Abstracts from the American Society of Andrology 44th Annual Conference

6 - 9, April 2019

Chicago, Illinois
## SCHEDULE AT A GLANCE

### The American Society of Andrology 44th Annual Conference

**“Fertility and Men’s Health”**

April 6 - 9, 2019 | The Ritz-Carlton Chicago | Chicago, IL

Program Chairs: Kathleen Hwang, MD & Wei Yan, MD, PhD

All sessions will be located in the Ritz-Carlton Ballroom unless otherwise noted. Speakers and times are subject to change.

### FRIDAY, APRIL 05, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 p.m.</td>
<td>Registration/Information Desk Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>4:00 p.m.</td>
<td>Exhibits Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>8:30 a.m.</td>
<td>ASA Andrology Lab Workshop* (Day 1) “Modern Semen Analysis: Elevate Your Tools, Techniques and Thinking”</td>
<td>St. Clair A</td>
</tr>
<tr>
<td></td>
<td>(See page 26 for full program schedule)</td>
<td></td>
</tr>
<tr>
<td>1:00 p.m.</td>
<td>ASA Clinical Symposium “Men’s Sexual Health Update”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(See page 26 for full program schedule)</td>
<td></td>
</tr>
<tr>
<td>6:00 p.m.</td>
<td>President's Welcome</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kirk C. Lo, MD, FRCSC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASA President</td>
<td></td>
</tr>
<tr>
<td>6:10 p.m.</td>
<td>ASA Distinguished Andrologist Award*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sponsored by the Eugenia Rosemberg Endowment Fund</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Not CME Accredited</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introducer: Barry T. Hinton, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Virginia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recipient: Terry T. Turner, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Virginia</td>
<td></td>
</tr>
<tr>
<td>6:30 p.m.</td>
<td>EMIL STEINBERGER MEMORIAL LECTURE: Reproductive Function in Young Male Cancer Survivors; When Oncologists Need Andrologists</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sponsored by the Emil Steinberger Endowment Fund</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introducer: Kirk C. Lo, MD, FRCSC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mount Sinai Hospital</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Aleksander Giwercman, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lund University</td>
<td></td>
</tr>
<tr>
<td>7:30 p.m.</td>
<td>ANDROLOGY Journal Award*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Not CME Accredited</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introducer: Douglas T. Carrell, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HCLD University of Utah School of Medicine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recipient: Arthur L. Burnett, II, MD, MBA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Johns Hopkins Hospital</td>
<td></td>
</tr>
<tr>
<td>7:45 p.m.</td>
<td>ASA Welcome Reception</td>
<td>Grand Foyer</td>
</tr>
</tbody>
</table>

### SATURDAY, APRIL 06, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 a.m.</td>
<td>Registration/Information Desk Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>4:00 p.m.</td>
<td>Exhibits Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>8:30 a.m.</td>
<td>ASA Andrology Lab Workshop* (Day 1) “Modern Semen Analysis: Elevate Your Tools, Techniques and Thinking”</td>
<td>St. Clair A</td>
</tr>
<tr>
<td></td>
<td>(See page 26 for full program schedule)</td>
<td></td>
</tr>
<tr>
<td>1:00 p.m.</td>
<td>ASA Clinical Symposium “Men’s Sexual Health Update”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(See page 26 for full program schedule)</td>
<td></td>
</tr>
</tbody>
</table>

### SUNDAY, APRIL 07, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 a.m.</td>
<td>Past Presidents' Breakfast</td>
<td>Private Dining Room - Ventoso</td>
</tr>
<tr>
<td>7:00 a.m.</td>
<td>Registration/Information Desk Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>7:00 a.m.</td>
<td>Exhibits Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>7:00 a.m.</td>
<td>Continental Breakfast</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>8:00 a.m.</td>
<td>AUA LECTURE: Andrology Research Consortium: SART for Men</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sponsored by the AUA Educational Grant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introducer: Kathleen Hwang, MD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The University of Pittsburgh</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith A. Jarvi, MD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mount Sinai Hospital</td>
<td></td>
</tr>
<tr>
<td>8:30 a.m.</td>
<td>ASA Andrology Lab Workshop* (Day 2) “Modern Semen Analysis: Elevate Your Tools, Techniques and Thinking”</td>
<td>St. Clair A</td>
</tr>
<tr>
<td></td>
<td>(See page 26 for full program schedule)</td>
<td></td>
</tr>
<tr>
<td>9:00 a.m.</td>
<td>Distinguished Service Award*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supported by the ASA Past Presidents Endowment Fund</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*Not CME Accredited</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introducer: Gail S. Prins, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Illinois at Chicago</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recipient: Wylie C. Hembree, MD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Columbia University</td>
<td></td>
</tr>
<tr>
<td>9:15 a.m.</td>
<td>SYMPOSIUM I: Male Reproduction and Overall Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderator: Alexander W. Pastuszak, MD, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Utah</td>
<td></td>
</tr>
<tr>
<td>9:15 a.m.</td>
<td>Introduction to Topic</td>
<td></td>
</tr>
<tr>
<td>9:20 a.m.</td>
<td>Is Human Fecundity Changing and What Can We Do About It?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Michael L. Eisenberg, MD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stanford University School of Medicine</td>
<td></td>
</tr>
<tr>
<td>9:45 a.m.</td>
<td>Infertility as a Proxy of General Male Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Andrea Salonia, MD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Università Vita-Salute San Raffaele</td>
<td></td>
</tr>
<tr>
<td>10:10 a.m.</td>
<td>Developing and Executing a Future for Andrology Research</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Christopher Barratt, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Dundee</td>
<td></td>
</tr>
<tr>
<td>10:35 a.m.</td>
<td>Symposium Summary</td>
<td></td>
</tr>
</tbody>
</table>

© 2019 American Society of Andrology and European Academy of Andrology
SUNDAY, APRIL 07, 2019 (continued)

10:45 a.m. - 11:00 a.m. Break

11:00 a.m. - 12:30 p.m. Poster Session I
*Not CME Accredited
Location: Grand Foyer

12:30 p.m. - 2:00 p.m. Lunch On Own

12:30 p.m. - 2:00 p.m. MENTORING LUNCHEON:
From ions to Sperm: a re-productive Journey*
Sponsored by the Diversity and Trainee Affairs Committee
Location: Grand Foyer
Victor G. Blanco, MD, PhD
The University of Kansas Medical Center

12:30 p.m. - 2:00 p.m. Editorial Board Luncheon

CONCURRENT ORAL PRESENTATIONS
(see page 22 for full presentation schedule)

2:00 p.m. - 3:30 p.m. Oral Presentation I
Location: St. Clair A

3:30 p.m. - 3:45 p.m. Break

3:45 p.m. - 5:15 p.m. SYMPOSIUM II: Save America’s Sperm!
Spermatogenesis and its Regulation,
Genetic and Epigenetic Regulation
Moderator: Satoshi Namekawa, PhD
Cincinnati Children’s Hospital

3:45 p.m. - 3:50 p.m. Introduction to Topic

3:50 p.m. - 4:15 p.m. Emerging Uses of Epigenetic Data
in the Clinic
Douglas T. Carrell, PhD, HCLD
University of Utah School of Medicine

4:15 p.m. - 4:40 p.m. Folic Acid Supplements Impact
Environmentally-sensitive Sites in the
Human Sperm DNA Methylome
Jacquetta M. Trasler, MD, PhD
McGill University Health Centre

4:40 p.m. - 5:05 p.m. The Response of Sperm RNAs TO
Phthalate Exposure
Stephen A. Krawetz, PhD

5:05 p.m. - 5:15 p.m. Symposium Summary

5:15 p.m. - 7:15 p.m. TRAINEE-DIRECTED MINI-SYMPOSIUM*
“Spermatogonial Sperm Cell (SSC) Transplantation; How Close Are We?”
*Not CME Accredited
(See page 24 for full program schedule)

7:15 p.m. - 8:15 p.m. Presentation of Trainee Awards
(All Trainee Travel and Onsite Poster Awards
will be distributed)

8:15 p.m. - 9:15 p.m. Trainee Forum & Mixer
Location: The Cafe

MONDAY, APRIL 08, 2019

7:00 a.m. - 6:00 p.m. Registration/Information Desk Open
Location: Grand Foyer

7:00 a.m. - 8:00 a.m. Continental Breakfast
Location: Grand Foyer

7:00 a.m. - 8:00 a.m. Poster Session II (Part 1)
*Not CME Accredited
Location: Grand Foyer

8:00 a.m. - 9:00 a.m. WOMEN IN ANDROLOGY LECTURE:
“Functional Amyloid in the Epididymis: A
Protective Mammalian Biofilm”
Sponsored by the Women in Andrology Endowment Fund
Introducer: Maria Christina W. Avellar, PhD
Universidade Federal de São Paulo
- Escola Paulista de Medicina
Speaker: Gail A. Cornwall, PhD
Texas Tech University Health Sciences Center

9:00 a.m. - 9:15 a.m. Matthew P. Hardy Young Andrologist Award*
Supported by the Matthew P. Hardy Endowment Fund
*Not CME Accredited
Introducer: George L. Gerton, PhD
ASA Vice President
Recipient: Mariano G. Buffone, PhD
Instituto de Biologia y Medicina Experimental

9:15 a.m. - 10:45 a.m. SYMPOSIUM III: More Than Just
Paternal DNA: Contributions of Sperm to
Development and Adulthood Health
Moderator: Eugene Xu, PhD
Nanjing Medical University

9:15 a.m. - 9:20 a.m. Introduction to Topic

9:20 a.m. - 9:45 a.m. Identification of Epigenomic Signatures
in Sperm Associated with Body Mass
Index (BMI), Diet and Fertility Status
Sarah Kimmins, PhD
McGill University

9:45 a.m. - 10:10 a.m. Germline Stem Cell Competition Can
Enhance Early Fetal Death
Norman Arnheim, PhD
University of Southern California

10:10 a.m. - 10:35 a.m. Role of Sperm Centrosome During
Fertilization and Embryo Development
Pierre Comizzoli, DVM, MSc, PhD
Smithsonian’s National Zoological Park

10:35 a.m. - 10:45 a.m. Symposium Summary

10:45 a.m. - 11:00 a.m. Break
MONDAY, APRIL 08, 2019 (continued)

11:00 a.m. - 12:00 p.m. BEST OF THE EPIDIDYMIS
   Moderator: Martine Culty, PhD
   University of Southern California

11:00 a.m. - 11:30 a.m. Those Silly Efferent Ductule Cilia -
   A Historical Perspective on the Epididymis
   Rex A. Hess, PhD
   University of Illinois

11:30 a.m. - 12:00 p.m. New Frontiers in Understanding the
   Role of the Epididymis
   Bernard Robaire, PhD
   McGill University

12:00 p.m. - 12:45 p.m. Poster Session II (Part 2)*
   *Not CME Accredited
   Location: Grand Foyer

12:45 p.m. - 2:15 p.m. Lunch On Own

12:45 p.m. - 2:15 p.m. WOMEN IN ANDROLOGY LUNCHEON*
   *Not CME Accredited
   Location: St. Clair BC
   Host: Maria Christina W. Avellar, PhD
   Universidade Federal de São Paulo
   - Escola Paulista de Medicina

2:15 p.m. - 3:45 p.m. SYMPOSIUM IV: Novel Diagnostics and
   Therapeutics in Andrology
   Moderator: Mark Sigman, MD
   Brown University

2:15 p.m. - 2:20 p.m. Introduction to Topic

2:20 p.m. - 2:45 p.m. Pain Phenotypes and Therapeutic
   Potential of Bacteria in the Bladder
   David J. Klumpp, PhD
   Northwestern University

2:45 p.m. - 3:05 p.m. Use of Cap-Score™ for Diagnostic
   Assessment of Male Fertility:
   Prospective Clinical Outcomes
   Alexander J. Travis, VMD, PhD
   Cornell University

3:05 p.m. - 3:25 p.m. Sperm mRNA Biomarkers Associated
   with Testis Injury
   Kim Boekelheide, MD, PhD
   Brown University

3:25 p.m. - 3:45 p.m. Symposium Summary

MONDAY, APRIL 08, 2019 (continued)

3:45 p.m. - 4:00 p.m. Break

4:00 p.m. - 4:45 p.m. EAA LECTURE: “Fertility of Patients with
   Disorders of Sex Development - Results of
   dsd-LIFE Study”.
   Introducers: Elisabetta Baldi, PhD
   University of Florence
   Patricia S. Cuasnicu, PhD
   Instituto de Biologia y Medicina Experimental
   Speaker: Jolanta Slowikowska-Hilczer
   Department of Andrology and
   Reproductive Endocrinology,
   Medical University Lodz

4:45 p.m. - 5:30 p.m. ASA Annual Business Meeting

6:30 p.m. - 11:00 p.m. ASA Annual Banquet
   Location: House of Blues Chicago Restaurant
   Buses Depart from hotel lobby at 6:00 p.m.

TUESDAY, APRIL 09, 2019

7:00 a.m. - 8:00 a.m. 2020 Program Committee Meeting

7:00 a.m. - 12:00 p.m. Registration/Information Desk Open
   Location: Grand Foyer

7:00 a.m. - 8:00 a.m. Continental Breakfast
   Location: Grand Foyer

8:00 a.m. - 9:00 a.m. DIVERSITY LECTURE: Modeling African
   American Prostate Tumorigenesis with Organoids
   Supported by the ASA Educational Endowment Fund
   Introducers: Carolina Jorgez, PhD
   Baylor College of Medicine
   Hooman Sadri, MD, PhD
   Wake Forest University
   Speaker: Sarki A. Abdulkadir, MD, PhD
   Northwestern University

9:00 a.m. - 9:15 a.m. Updates from NICHD & NIEHS
   Daniel S. Johnston, PhD
   NIH, Contraception Research Branch NICHD
   Stuart B. Moss, PhD
   National Institutes of Child Health and
   Human Development
   Thaddeus T. Schug, PhD
   National Institute of Environmental Health
   Sciences
TUESDAY, APRIL 09, 2019 (continued)

9:15 a.m. - 10:15 a.m. **INTERNATIONAL LECTURE: Seminal Fluid Contributes to Female Reproduction Beyond Just Delivery of Sperm**

*Supported by the ASA General Endowment Fund*

Introducers: Elisabetta Baldi, PhD  
*University of Florence*

Patricia S. Cuasnicu, PhD  
*Instituto de Biologia y Medicina Experimental*

Speaker: Sarah Robertson, PhD  
*University of Adelaide*

10:15 a.m. - 10:30 a.m. Break

10:30 a.m. - 12:00 p.m. **SYMPOSIUM V: Emerging Technologies in Andrology**

Moderator: Kathleen Hwang, MD  
*The University of Pittsburgh*

10:30 a.m. - 10:35 a.m. Introduction to Topic

10:35 a.m. - 11:00 a.m. **Update on Clinical Trials Utilizing Stromal Vascular Fraction for Management of Erectile Dysfunction**

Trinity J. Bivalacqua, MD, PhD  
*Johns Hopkins Hospital*

11:00 a.m. - 11:25 a.m. **Mechanisms of Sertoli Cell Immune Regulation**

Jannette Dufour, PhD  
*Texas Tech University Health Sciences Center*

11:25 a.m. - 11:50 a.m. **Role of Pig Models in Preserving and Regenerating Male Fertility**

Mariana I. Giassetti  
*Washington State University*

11:50 a.m. - 12:00 p.m. Symposium Summary

12:00 p.m. - 12:15 p.m. Adjournment

**DISCLAIMER STATEMENT**

Statements, opinions, and results of studies contained in the program and abstracts are those of the presenters/authors and do not reflect the policy of position of the ASA nor does the ASA provide any warranty as to their accuracy or reliability.
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule at a Glance</td>
<td>1</td>
</tr>
<tr>
<td>President’s Welcome</td>
<td>6</td>
</tr>
<tr>
<td>Past Presidents</td>
<td>6</td>
</tr>
<tr>
<td>ASA Officers</td>
<td>7</td>
</tr>
<tr>
<td>General Meeting Information</td>
<td>8</td>
</tr>
<tr>
<td>Message from the Program Co-Chairs</td>
<td>10</td>
</tr>
<tr>
<td>Emil Steinberger Memorial Lecture Award</td>
<td>11</td>
</tr>
<tr>
<td>Distinguished Andrologist Award</td>
<td>12</td>
</tr>
<tr>
<td>Distinguished Service Award</td>
<td>13</td>
</tr>
<tr>
<td>Young Andrologist Award</td>
<td>14</td>
</tr>
<tr>
<td>AUA Lecture</td>
<td>15</td>
</tr>
<tr>
<td>Thank You to Donors &amp; Sponsors</td>
<td>16</td>
</tr>
<tr>
<td>Course Objectives and CME Credit Information</td>
<td>17</td>
</tr>
<tr>
<td>Schedule of Events</td>
<td>19</td>
</tr>
<tr>
<td>Speaker Abstracts</td>
<td>27</td>
</tr>
<tr>
<td>Podium Abstracts</td>
<td>36</td>
</tr>
<tr>
<td>Poster Session I</td>
<td>40</td>
</tr>
<tr>
<td>Poster Session II</td>
<td>46</td>
</tr>
<tr>
<td>Index of Abstract Authors</td>
<td>52</td>
</tr>
<tr>
<td>Abstract Full Text</td>
<td>53</td>
</tr>
<tr>
<td>Committee Listing</td>
<td>102</td>
</tr>
<tr>
<td>Thank You</td>
<td>Back Cover</td>
</tr>
</tbody>
</table>
On behalf of the American Society of Andrology, I welcome you to the 44th Annual Conference at the Ritz-Carlton Chicago, Illinois, April 6 - 9, 2019! The theme of our program will be “Fertility and Men’s Health”. I want to express my deep appreciation to Program Committee co-chairs Dr. Kathleen Hwang and Dr. Wei Yan for guiding our program, and to all the Committee members for working diligently to bring us important current trend and thought leaders in Andrology.

The annual meeting is preceded by the highly anticipated XXVth North American Testis Workshop, April 3 - 6, 2019, featuring “Lifelong Cell-Cell Interactions in the Testis: A Driver for Male Fertility”.

On Saturday, April 6th we have three special intensive programs:

- Andrology Lab Workshop: “Modern Semen Analysis: Elevate Your Tools, Techniques and Thinking”
- Clinical Symposium: Men’s Sexual Health Update
- International Consortium Meeting: The Crisis in Male Reproductive Healthcare: The Need for a Political, Social, and Research Roadmap?

The Annual Conference program begins Saturday evening with the Emil Steinberger Memorial Lecture, “Reproductive Function in Young Male Cancer Survivors: When Oncologists Need Andrologists,” presented by Aleksander Giwercman, MD from Lund University in Sweden. The opening reception that follows is a chance to reconnect with our colleagues.

Six half-day symposia showcase the diversity of andrology and illustrate the importance of fertility as a marker for overall health in men:

- Male Reproduction and Overall Health
- Save America’s Sperm! Spermatogenesis and its Regulation, Genetic and Epigenetic Regulation, IV Production
- More Than Just Paternal DNA: Contributions of Sperm to Development and Adult Health
- Novel Diagnostics and Therapeutics in Andrology
- Emerging Technologies in Andrology
- Andrology Career Development with the Trainee-Directed Mini Symposium

Each symposium highlights exciting work in basic science, translational medicine and clinical practice, and demonstrates the value of collaboration between the bench and bedside with lectures presented by international experts and thought leaders in andrology.

As always, the latest work by our attendees is on display in several poster and oral sessions designed to give thoughtful discussion of new work from all over the world. Luncheons throughout the meeting provide informal presentations with our key interest groups. A networking reception calls attention to the potential for excellent cross-disciplinary interactions within our society and fosters new relationships between junior and senior investigators across the globe.

The Annual Conference is also our opportunity to celebrate three outstanding members. Congratulations to our 2019 Distinguished Andrologist, Dr. Terry Turner and 2019 Matthew P Hardy Young Andrologist, Dr. Mariano Buffone. This year we present the Distinguished Service Award to Dr. Wylie Hembree.

Our conference is headquartered in the Ritz-Carlton Chicago, a 5-star Luxury Hotel located in the heart of the iconic Magnificent Mile. Chicago is famous for its striking architecture, thriving culinary scene and diverse collection of cultural institutions and world-class museums. The vibrant, bustling area is home to upscale shops, luxe fashion outlets, cool restaurants, and posh hotels. Landmarks include the historic Chicago Water Tower, the neo-Gothic Tribune Tower, the terracotta Wrigley Building skyscraper and the 100-story John Hancock Center, which has a rooftop observation deck with fine dining and panoramic city views. No matter what you love to do, you can have the most memorable experience in Chicago.

During the conference, please visit our exhibitors who bring us the latest in supplies and pharmaceuticals, and who provide generous support for our meeting. The Endowment and Development Committee table has opportunities for supporting our funds in many ways. Thanks to all those who have donated gifts this year; there is still time to help make our Annual Fund goal for 2018 - 2019.

I hope you will enjoy this wonderful conference in the beautiful city of Chicago and leave with new ideas and collaborations that will transform your research and clinical practice in Andrology.

Sincerely,

Kirk C. Lo, MD, CM, FRCSC
President, American Society of Andrology

© 2019 American Society of Andrology and European Academy of Andrology

Andrology, 2019, Supplement, 6
OFFICERS

President
Kirk C. Lo, MD, FRCSC

Vice President
George L. Gerton, PhD

Secretary
Sylvie Breton, PhD

Treasurer
Kenneth P. Roberts, PhD

Past President
Susan A. Rothmann, PhD, HCLD

EXECUTIVE COUNCIL MEMBERS

Maria Christina W. Avellar, PhD; Martine Culty, PhD;
Nina S. Davis, MD, FACS; Michael Louis Eisenberg, MD;
James M. Hotaling, MD MS FECSM; Kathleen Hwang, MD;
Polina Lishko, PhD; Akanksha Mehta, MD, MS;
Sergey I. Moskovtsev, MD, PhD; Cristian O’Flaherty, PhD, DVM;
James F. Smith, MD, MS; Robert S. Viger, PhD

COMMITTEE CHAIRS

Andrology Laboratory Workshop
Anna-Marie Bort, MLT, (ASCP)CME; Solon, OH (Chair)

Archives & History Committee
David S. Karabinus, PhD, HCLD; Montpelier, VA (Chair)

Awards Committee
John K. Amory, MD, MPH, MSc; Seattle, WA (Chair)

Basic Science Workshop
Elizabeth Snyder, PhD; New Brunswick, NJ (Chair)

Bylaws Committee
John K. Amory, MD, MPH, MSc; Seattle, WA (Co-Chair)
Erma Z. Drobnis, PhD, HCLD; Columbia, MO (Co-Chair)

Clinical Symposium
Michael Louis Eisenberg, MD; Stanford, CA (Co-Chair)
Kathleen Hwang, MD; Pittsburgh, PA (Co-Chair)

Communications and Public Affairs Committee
Patricia L. Morris, PhD, MS; Woodside, NY (Co-Chair)
Sophie La Salle, PhD; Downers Grove, IL (Co-Chair)

Diversity Committee
Carolina Jorgez, PhD; Houston, TX (Co-Chair)
Hooman Sadri, MD, PhD; Winston Salem, NC (Co-Chair)

Endowment Committee
Gail S. Prins, PhD

Ethics Committee
George L. Gerton, PhD; Philadelphia, PA (Chair)

Finance Committee
Alan Diekman, PhD; Little Rock, AR (Chair)

Future Meeting Program Committee
Polina Lishko, PhD; Lafayette, CA (Co-Chair)
James F. Smith, MD, MS; Lafayette, CA (Co-Chair)

COMMITTEE CHAIRS (continued)

Future Meeting Committee
George L. Gerton, PhD; Philadelphia, PA (Chair)

Industrial Relations Committee
Joseph P. Alukal, MD; New York, NY (Chair)

International Liaison Committee
Elisabetta Baldi, PhD; Florence, Italy (Co-Chair)
Patricia S. Cuasnici, PhD; Buenos Aires, Argentina (Co-Chair)

Journal Oversight Committee
Rex A. Hess, PhD; Champaign, IL (Chair)

Journal Editors
Douglas T. Carrell, PhD, HCLD; Salt Lake City, UT (Editors-In Chief)
Manuela Simoni, MD, PhD; Modena, Italy (Editors-In Chief)

Liaison Committee
Cristian O’Flaherty, PhD, DVM; Montreal, QC Canada (Chair)

Local Arrangements Committee
Robert E. Brannigan, MD; Hinsdale, IL (Co-Chair)
Christopher Payne, PhD; Chicago, IL (Co-Chair)

Membership Committee
Martine Culty, PhD; Los Angeles, CA (Co-Chair)
Mary Katherine Samperski, MD; Los Angeles, CA (Co-Chair)

Nominating Committee
Susann Ann Rothmann, PhD, HCLD; Cleveland, OH (Chair)

Program Committee
Kathleen Hwang, MD, Pittburgh, PA (Co-Chair)
Wei Yan, MD, PhD; Reno, NV (Co-Chair)

Trainee Affairs
Ryan Flannigan, MD; Vancouver, BC Canada (Co-Chair)
Matthew R. Marcello, PhD; New York, NY (Co-Chair)

Women in Andrology
Maria Christina W. Avellar, PhD; São Paulo, Brazil (Chair)
Martine Culty, PhD; Los Angeles, CA (Vice Chair)
Nina S. Davis, MD, FACS; Portland, OR (Past Chair)

ANDROLOGY EXECUTIVE OFFICE
Phone: (453) 918-2725
Email: andrologyoffice@gmail.com
Website:mc.manuscriptcentral.com/andrology

EXECUTIVE OFFICE
WJ Weiser & Associates, Inc.
1100 E Woodfield Road, Suite 350
Schaumburg, IL 60173
Phone: (847) 619-4909 Fax: (847) 517-7229
Email: info@andrologysociety.org

NOTICE TO READERS
Every effort has been made to ensure the information printed here is correct; however, details are subject to change.
WELCOME TO CHICAGO

The city that feels like home, which is a city of neighborhoods, Chicago is wholly unique and no matter where you go, each part has its own draw: the buzzing Loop downtown and upscale River North, artsy Wicker Park, and scholarly Hyde Park. You can visit world-class museums, dine at one of our many Michelin-star restaurants or catch a show in one of over 200 theaters. No matter what you love to do, you’ll feel right at home doing it in Chicago.

One of Chicago’s most top attractions is Navy Pier, only a 10 minute drive from the Ritz-Carlton! First opening in 1916, Navy Pier has been a famous destination for over 100 years. Offering visitors a 360-degree view of Chicago, you can take a ride on the iconic Centennial Wheel, which soars nearly 200 feet in the air. Another breathtaking experience is the Crystal Gardens, an indoor, one-acre botanical garden housed within a six story glass atrium. The garden holds over 80 live palm trees, foliage, and dancing leapfrog fountains. There is also a vast array of restaurants and live entertainment lined up across Navy Pier. To plan your trip to Navy Pier and see all it has to offer, visit www.navypier.org.

There are plenty of other things to do in Chicago, including tours, spectator sports, shopping and other attractions. Our nightlife doesn’t stop either with plenty of bars and nightclubs, live music and comedy clubs. During the 19th century, Chicago was a major hub for the shipping industry; present day Chicago is better known for its vibrant music scene—the city played a seminal role in the emergence of jazz and blues, and its symphony orchestra is a standout—but its history as a major port city is still reflected in Chicago’s vibrant waterfront district.

Design and architecture buffs should plan a trip for some of the country’s most cutting-edge buildings and monuments such as Cloud Gate, the giant reflective bean sculpture found in Millennium Park along with Crown Fountain, which contains two digital, 50-foot towers projecting facial images of Chicago citizens that spout water into a shallow reflecting pool that visitors can walk through. Millennium Park also features state-of-the-art collections of architecture, landscape design, and art. Take a walk through the Lurie Garden, a 3.5-acre urban sanctuary with 15-foot-high hedges and hardwood footbridges over shallow water. You can learn more about Millennium Park at www.choosechicago.com.

HOTEL INFORMATION

The Ritz-Carlton Chicago
160 E. Pearson Drive
Chicago, IL 60611
Main: (800) 542-8680
Website: ritzcarlton.com/en/hotels/chicago

TRAVEL AND TRANSPORTATION

Airport Information
O’Hare International Airport (ORD) is approximately 18 miles from The Ritz-Carlton Chicago or 30-60 minutes by car. Chicago Midway International Airport (MDW) is approximately 12 miles from The Ritz-Carlton Chicago or 30-45 minutes by car.

Taxi Cab Services
Several taxi companies operate at O’Hare International Airport. Available taxis are located at the lower level curb outside of the Baggage Claim area at each terminal. Taxi rates for a one-way transfer to downtown Chicago from O’Hare International Airport cost approximately $30-$40. Taxi rates for a one-way transfer to downtown Chicago from Midway International Airport cost approximately $28-$30.

Rental Car Information
Avis® Rent-A-Car is the official rental car company for the ASA 44th Annual Conference. For reservations, please call (800) 331-1600, and use the code “J901055” to receive the discounted rates.

Public Transportation
Both Chicago airports offer easy access to the Chicago Transit Authority’s “L” System. From O’Hare International Airport, a one-way fare downtown on the Blue Line costs $2.25. From Midway Airport, a one-way fare downtown on the Orange Line costs $2.25. Please visit the following link for detailed directions: www.transitchicago.com/travel_information/trip_planner.aspx

Parking
ASA is happy to offer discounted parking at The Ritz-Carlton Chicago at the rate of $33 for self parking and $71 for valet parking.
REGISTRATION/INFORMATION DESK HOURS

Testis Workshop
Location: Grand Foyer
Wednesday, April 3, 2019  6:00 p.m. - 8:30 p.m.
Thursday, April 4, 2019  7:00 a.m. - 6:00 p.m.
Friday, April 5, 2019  7:00 a.m. - 6:00 p.m.
Saturday, April 6, 2019  7:15 a.m. - 12:00 p.m.

ASA Annual Conference
Location: Grand Foyer
Friday, April 5, 2019  2:00 p.m. - 6:00 p.m.
Saturday, April 6, 2019  7:00 a.m. - 6:00 p.m.
Sunday, April 7, 2019  7:00 a.m. - 6:00 p.m.
Monday, April 8, 2019  7:00 a.m. - 6:00 p.m.
Tuesday, April 9, 2019  7:00 a.m. - 12:00 p.m.

EXHIBIT HOURS
Location: Grand Foyer
Saturday, April 6, 2019  4:00 p.m. - 9:30 p.m.
Sunday, April 7, 2019  7:00 a.m. - 4:00 p.m.

OPTIONAL WORKSHOPS/SYMPOSIA

ASA Andrology Lab Workshop*
“Modern Semen Analysis: Elevate Your Tools, Techniques and Thinking” *ABB Lab Accredited
Date: April 6 - 7, 2019
Time: Saturday, 8:30 a.m. - 5:00 p.m. | Sunday, 8:30 a.m. - 12:00 p.m.
Location: St. Clair A
Cost: $450 for ASA members (active or trainee), $475 for nonmembers

ASA Clinical Symposium
“Men’s Sexual Health Update”
Date: Saturday, April 6, 2019
Time: 1:00 p.m. - 4:00 p.m.
Cost: $75 for attendees (members/nonmembers), $50 for trainees

EVENING FUNCTIONS

Testis Workshop Welcome Reception
Date: Wednesday, April 3, 2019
Time: 8:15 p.m. - 9:30 p.m.
Location: Grand Foyer
Cost: One ticket included in registration fee

Testis Workshop Social Event
Date: Thursday, April 4, 2019
Time: 6:30 p.m. - 8:30 p.m.
Location: Lou Malnati’s Pizzeria
1120 N State Street, Chicago, IL 60610
Cost: Advanced ticket purchase required to attend

ASA Annual Meeting Welcome Reception
Join us for a welcome reception to connect with friends and colleagues.
Date: Saturday, April 6, 2019
Time: 7:45 p.m. - 9:30 p.m.
Location: Grand Foyer
Dress: Business casual or casual attire
Cost: One ticket included in ASA registration; $50 for additional tickets.

ASA Trainee Forum and Mixer
Date: Sunday, April 7, 2019
Time: 7:15 p.m. - 9:15 p.m.
Location: The Cafe
Cost: Complimentary; all members of the society are welcome.
The ASA Trainee Forum and Mixer provides an opportunity for trainee members to meet other trainees, as well as more established members of the society. This is a relaxed, informal event with appetizers, beer and wine provided. Senior members of the society will be present in this informal forum and discussion group setting to answer your questions about relevant topics such as grant writing, searching for a post-doctor job, alternative PhD career paths, succeeding in the clinic or lab, etc.

ASA Annual Banquet
Date: Monday, April 8, 2019
Time: 6:30 p.m. - 11:00 p.m.
Location: House of Blues Chicago Restaurant
329 N. Dearborn St, Chicago, IL
Cost: $85 for attendees (members/nonmembers), $45 for trainees Includes dinner and entertainment. Please sign up for this event on the registration form.

MENTORING LUNCHEONS

Mentoring Luncheon
“From ions to Sperms: a re-productive Journey!”
Sponsored by the Diversity & Trainee Affairs Committees
Date: Sunday, April 7, 2019
Time: 12:30 p.m. - 2:00 p.m.
Location: St. Clair BC
Speaker: Victor G. Blanco, MD, PhD
The University of Kansas Medical Center
Cost: $45 for attendees (members/nonmembers), $25 for trainees

Women in Andrology Luncheon and Discussion
Sponsored by the Women in Andrology Committee
Date: Monday, April 8, 2019
Time: 12:45 p.m. - 2:15 p.m.
Location: St. Clair BC
Host: Maria Christina W. Avellar, PhD
Cost: $45 for attendees (members/nonmembers), $25 for trainees
Panelists: How to advocate for ourselves
MESSAGE FROM THE
PROGRAM CO-CHAIRS

Kathleen Hwang, MD; Pittsburgh, PA (Co-Chair)
Wei Yan, MD, PhD; Reno, NV (Co-Chair)
Joseph P. Alukal, MD; New York, NY
Christopher Barratt, PhD; Dundee, United Kingdom
Robert E. Brannigan, MD; Hinsdale, IL
Martine Culty, PhD; Los Angeles, CA
Michael L. Eisenberg, MD; Stanford, CA
Sophie La Salle, PhD; Downers Grove, IL
Akanksha Mehta, MD, MS; Atlanta, GA
Ralph G. Meyer, PhD; Mendon, UT
Ajay K. Nangia, MBBS, FACS; Kansas City, KS
Jon M. Oatley, PhD; Pullman, WA
Alexander W. Pastuszak, MD, PhD; Salt Lake City, UT
Gail P. Risbridger, PhD; Melbourne, Australia
Peter N. Schlegel, MD, FACS; New York, NY
Mark Sigman, MD; Providence, RI
Alexander J. Travis, VMD, PhD; Ithaca, NY
Jacques J. Tremblay, PhD; Quebec City, QC Canada
Monika A. Ward, MSc, PhD; Honolulu, HI
Miles F. Wilkinson, PhD; La Jolla, CA

PROGRAM COMMITTEE

CLINICAL SYMPOSIUM

Michael L. Eisenberg, MD; Stanford, CA (Co-Chair)
Kathleen Hwang, MD; Pittsburgh, PA (Co-Chair)
Joseph P. Alukal, MD; New York, NY
Peter Stahl, MD; Scarsdale, NY

Dear Colleagues,

Welcome to the 44th Annual Conference of the American Society of Andrology (ASA) and to the Windy City! We are honored to have chaired the Program Committee to develop this year’s program with a theme of “Fertility and Men’s Health”. We sincerely hope that you will enjoy both the academic program that we put together for you and the beautiful scenery, diverse culture and rich history that Chicago, the third-largest city in the US, has to offer.

It has become increasingly recognized that men’s fertility can be predictive of their overall health, and that sperm quality, at both genetic and epigenetic levels, can affect not only pregnancy outcome but also the health perspectives of offspring. With this in mind, we chose to highlight the connection between men’s fertility and overall health in this year’s program. We have assembled an exciting program that features world-renowned scientific leaders, who will highlight recent advances in a variety of complementary andrology disciplines.

In addition to our traditional, named lectures (Emil Steinberger Memorial, American Urological Association, Women in Andrology, European Andrology Association, Diversity and International), six symposia are offered to cover all areas of andrology, including the testis/sperm, prostate, efferent ductules and epididymis. To recognize the contributions from our trainees, their efforts will be highlighted during the Trainee-Directed Mini-Symposium and the Trainee Forum and Mixer that follow will offer plenty of opportunity for networking and celebrating the achievement of those who will be leading the ASA forward.

Two traditional events, the ASA Andrology Lab Workshop and ASA Clinical Symposium, continue to provide the participants with opportunities to learn the latest andrology lab technologies and the state of the art on clinical practice guidelines. Partnership between basic scientists and clinicians has always been pivotal, and it is our hope that you find that all the talks, workshops and discussion forums in the program will truly facilitate collaboration among colleagues in all subdisciplines of andrology.

It is a daunting task to put together a program of breath and quality. We are very thankful to all the members on the Program Committee, who were instrumental in the development of the program.

We would like to thank Dr. Kirk Lo, the ASA President, for entrusting us with this difficult but absolutely enjoyable task and allowing us to serve as program co-chairs for the 2019 ASA Annual Meeting. Our gratitude also goes to our Executive Director, Donna Rostamian, and her team for providing their expertise and care in the many logistics associated with the organization of this meeting.

While the ASA 2019 offers a full program of symposia and lectures, we hope that you will find time to step out and enjoy the Windy City and join us at the banquet Monday night at the House of Blues Restaurant. We hope you will enjoy the program and your stay in Chicago!

Sincerely,

Kathleen Hwang, MD Wei Yan, MD, PhD

© 2019 American Society of Andrology and European Academy of Andrology

Andrology, 2019, Supplement, 10
Aleksander Giwercman, PhD, MD
Lund University

Aleksander Giwercman is professor in Reproductive Medicine at Lund University, Sweden. He is a physician with a primary interest in male reproductive function, which is also the focus of his scientific work.

One of his main research areas is the effect of cancer and cancer therapy on male reproductive system. During the past 9 years, he has been coordinator of the Interreg (EU program for regional development) funded program for research in reproductive medicine in the area of Copenhagen and Southern Sweden. Furthermore, he has been a partner in 3 EU funded research project.

Aleksander Giwercman has co-authored more than 400 peer reviewed scientific papers and has been the main supervisor of 15 PhD students.
This is the highest award of the Society, presented annually to an individual who has made an outstanding contribution to the progress of Andrology.

Terry T. Turner, PhD
University of Virginia

Dr. Turner received his Bachelor’s degree in Animal Science from the University of Georgia in 1967. Returning for graduate school in 1970, he received his PhD under Dr. Doyle Johnson for biochemical studies of the epididymis. After post-doctorate training at the University of Texas Health Science Center in San Antonio, he joined the Department of Urology at the University of Virginia School of Medicine. Jointly appointed to the medical school’s Department of Cell Biology, Dr. Turner progressed through the ranks to become a full professor in both departments. After thirty-two years of research and teaching, Dr. Turner retired in 2008 and was appointed Professor Emeritus.

Dr. Turner’s research focused on two areas of interest: biology of the epididymis and pathobiology of the testis. Originally working with Dr. Stuart Howards to further the technique of in vivo micropuncture for study of male tract physiology, Turner’s early work on the blood-epididymal barrier led to studies of the epididymal intraluminal microenvironment and its role in sperm maturation and the suppression of motility. Later studies demonstrated for the first time that lumicrine factors from the testis regulate epididymal epithelial protein secretion and that the epididymides of the rat and mouse are divided into multiple segments identifiable both anatomically and through their gene expression profiles. Finally, his lab demonstrated that transcription factors important in segmental development or patterning in the embryo, e.g. Hox, Sonic Hedgehog, continue to be expressed in the adult epididymis and may play a role in segmental regulation of the organ.

Turner’s work in the testis primarily focused on pathophysiology. His studies of varicocele eliminated the myths of venous reflux, adrenal effects, reduced ipsilateral blood flow, and collateral circulation to the contralateral testis as causative factors of testicular dysfunction. His studies of testicular torsion were first to demonstrate that surgical repair of the torsed testis inevitably leads to ischemia-reperfusion injury, i.e. oxidative stress, which induces germ cell-specific apoptosis and permanent loss of spermatogenesis. His studies explained for the first time why spermatogenesis is eliminated after torsion repair even with return blood flow to the testis.
Wyline C. Hembree, MD
Columbia University

Wyline C. Hembree, MD is a Special Lecturer at Columbia University, retired Associate Professor of Medicine and Obstetrics and Gynecology (1971-2007) and a member of the Department of Medicine, Endocrine Division of the College of Physicians and Surgeons.

Dr. Hembree earned a BA degree in Philosophy from Vanderbilt University and in Medicine from Washington University School of Medicine. He was an intern and resident on the Harvard Medical Service at the Boston City Hospital, a Clinical Associate at the National Institutes of Health, a medical resident and special fellow of the NIH at Columbia Presbyterian Medical Center.

Dr. Hembree’s interests in research and teaching include tritium labeling of peptides and proteins (Brookhaven National Laboratory), endocrine effects of chronic marijuana use, sperm metabolism and male infertility, Vitamin A deficiency and sperm production, and treatment of persons with Gender Dysphoria.

Dr. Hembree is a charter member of the American Society of Andrology, founded in 1975. He is also a member of the Endocrine Society and a fellow of the American College of Physicians. Dr. Hembree is chair of the international Task Force of the Endocrine Society who published a Clinical Practice Guideline of the Endocrine Treatment of Transsexual Persons in 2009, revised in 2018. He is founding member of TransNet, a collaboration of research and clinical providers of transgender persons.

Dr. Hembree has spent most of his life singing in professional and amateur choruses, opera companies in the US and Europe and opera choruses. He enjoys gardening, philosophy, ethics, opera, chamber music, musical theatre, Tanglewood and the New York Theatre Workshop.

DISTINGUISHED SERVICE AWARD
(Sponsored by the American Society of Andrology)

DISTINGUISHED SERVICE AWARD RECIPIENTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Recipient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>C. Alvin Paulsen</td>
</tr>
<tr>
<td>1995</td>
<td>Andrzej Bartke</td>
</tr>
<tr>
<td>1996</td>
<td>Philip Troen</td>
</tr>
<tr>
<td>1997</td>
<td>Marie-Claire Orgebin-Crist</td>
</tr>
<tr>
<td>1998</td>
<td>Rupert P. Amann</td>
</tr>
<tr>
<td>1999</td>
<td>David W. Hamilton</td>
</tr>
<tr>
<td>2000</td>
<td>Bernard Robaire</td>
</tr>
<tr>
<td>2001</td>
<td>Gail S. Prins</td>
</tr>
<tr>
<td>2002</td>
<td>Terry T. Turner</td>
</tr>
<tr>
<td>2003</td>
<td>Arnold M. Belker</td>
</tr>
<tr>
<td>2004</td>
<td>J. Lisa Tenover</td>
</tr>
<tr>
<td>2005</td>
<td>Barry Hinton</td>
</tr>
<tr>
<td>2006</td>
<td>Barry Zirkin</td>
</tr>
<tr>
<td>2007</td>
<td>Sally Perreault Darney</td>
</tr>
<tr>
<td>2008</td>
<td>Matthew P. Hardy</td>
</tr>
<tr>
<td>2009</td>
<td>Erwin Goldberg</td>
</tr>
<tr>
<td>2010</td>
<td>Joel L. Marmar</td>
</tr>
<tr>
<td>2011</td>
<td>Christina Wang</td>
</tr>
<tr>
<td>2012</td>
<td>Terry R. Brown</td>
</tr>
<tr>
<td>2013</td>
<td>Rex A. Hess</td>
</tr>
<tr>
<td>2014</td>
<td>Susan Rothmann</td>
</tr>
<tr>
<td>2015</td>
<td>Steven M. Schrader</td>
</tr>
<tr>
<td>2016</td>
<td>Donna L. Vogel</td>
</tr>
<tr>
<td>2017</td>
<td>Janice P. Evans</td>
</tr>
<tr>
<td>2018</td>
<td>Rudi Ansbacher</td>
</tr>
</tbody>
</table>

Distinguished Service Award is sponsored by the American Society of Andrology.
MATTHEW P. HARDY
YOUNG ANDROLOGIST AWARD
(Sponsored by the Matthew P. Hardy Endowment Fund)

This annual award is bestowed upon an Active Member of the American Society of Andrology who, at the time of the award, is less than forty-five (45) years of age and who has made significant contributions to the field of Andrology.

Mariano G. Buffone, PhD
Instituto de Biologia y Medicina Experimental, Buenos Aires

Mariano G. Buffone, PhD earned his bachelor’s and master’s degrees in Biochemistry from the University of Buenos Aires, where he also obtained his PhD. He then moved to the University of Pennsylvania as a postdoctoral fellow under the direction of professors George L. Gerton and Richard M. Schultz.

In 2010, Dr. Buffone moved back to Buenos Aires and became Assistant Professor at the Instituto de Biologia y Medicina Experimental, where he leads his research team. In 2015, he assumed his present position as Associate Professor at the same institution. His laboratory seeks to understand the complex process of mammalian sperm capacitation with particular emphasis in the process of acrosomal exocytosis. To this end, his lab uses a wide range of approaches that include the analysis of signaling pathways, single cell imaging experiments, super resolution microscopy and in vivo studies. Dr. Buffone has also actively collaborated with several groups in the US, Japan, Mexico and Argentina.

MATTHEW P. HARDY YOUNG ANDROLOGIST AWARD RECIPIENTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Recipient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>L.J.D. Zaneveld</td>
</tr>
<tr>
<td>1983</td>
<td>William B. Neaves</td>
</tr>
<tr>
<td>1984</td>
<td>Lonnie D. Russell</td>
</tr>
<tr>
<td>1985</td>
<td>Bruce D. Schanbacher</td>
</tr>
<tr>
<td>1986</td>
<td>Stephen J. Winters</td>
</tr>
<tr>
<td>1987</td>
<td>Ilpo T. Huhtaniemi</td>
</tr>
<tr>
<td>1988</td>
<td>Larry Johnson</td>
</tr>
<tr>
<td>1989</td>
<td>Barry T. Hinton</td>
</tr>
<tr>
<td>1990</td>
<td>Luis Rodriguez/Rigau</td>
</tr>
<tr>
<td>1991</td>
<td>Patricia M. Saling</td>
</tr>
<tr>
<td>1992</td>
<td>Gary R. Klinefelter</td>
</tr>
<tr>
<td>1993</td>
<td>Robert Chapin</td>
</tr>
<tr>
<td>1994</td>
<td>Wayne J.G. Hellstrom</td>
</tr>
<tr>
<td>1995</td>
<td>Christopher DeJonge</td>
</tr>
<tr>
<td>1996</td>
<td>Paul S. Cooke</td>
</tr>
<tr>
<td>1997</td>
<td>Gail A. Cornwall</td>
</tr>
<tr>
<td>1998</td>
<td>William R. Kelce</td>
</tr>
<tr>
<td>1999</td>
<td>Stuart E. Ravnik</td>
</tr>
<tr>
<td>2000</td>
<td>Matthew P. Hardy</td>
</tr>
<tr>
<td>2001</td>
<td>Jacquetta Trasler</td>
</tr>
<tr>
<td>2002</td>
<td>Christopher L.R. Barratt</td>
</tr>
<tr>
<td>2003</td>
<td>Joanna E. Ellington</td>
</tr>
<tr>
<td>2004</td>
<td>Kate Loveland</td>
</tr>
<tr>
<td>2005</td>
<td>Janice Bailey</td>
</tr>
<tr>
<td>2006</td>
<td>Janice P. Evans</td>
</tr>
<tr>
<td>2007</td>
<td>John K. Amory</td>
</tr>
<tr>
<td>2008</td>
<td>Moira K. O’Bryan</td>
</tr>
<tr>
<td>2009</td>
<td>Michael A. Palladino</td>
</tr>
<tr>
<td>2010</td>
<td>Peter Liu</td>
</tr>
<tr>
<td>2011</td>
<td>Humphrey Yao</td>
</tr>
<tr>
<td>2012</td>
<td>Wei Yan</td>
</tr>
<tr>
<td>2013</td>
<td>Jacques J. Tremblay</td>
</tr>
<tr>
<td>2014</td>
<td>Sarah Kimmims</td>
</tr>
<tr>
<td>2015</td>
<td>Jon M. Oatley</td>
</tr>
<tr>
<td>2016</td>
<td>Lee B. Smith</td>
</tr>
<tr>
<td>2017</td>
<td>Polina V. Lishko</td>
</tr>
<tr>
<td>2018</td>
<td>Michael L. Eisenberg</td>
</tr>
</tbody>
</table>

The Matthew P. Hardy Young Andrologist Award is sponsored by the Matthew P. Hardy Endowment Fund
Keith A. Jarvi, MD
Mount Sinai Hospital

Dr. Jarvi is Professor of Surgery, Division of Urology, Department of Surgery at the University of Toronto, Chief of Urology and Director of the Murray Koffler Urologic Wellness Centre, and Associate Member of Samuel Lunenfeld Research Institute at the Mount Sinai Hospital.

Dr. Jarvi has helped to establish the fertility program in Urology at the University of Toronto, which has become a well-recognized Canadian centre of excellence for the treatment of male infertility. The centre also has an active research program.

Dr. Jarvi’s main areas of clinical interest are microsurgical reconstruction techniques, sperm retrieval techniques and genetic abnormalities associated with male infertility.

Dr. Jarvi’s research interests include genetic alterations associated with male infertility, use of proteomics to identify biomarkers in semen and the role of infection in male infertility, prostate cancer and prostatitis. He has published over 80 articles in peer reviewed journals.
The American Society of Andrology, Inc. gratefully acknowledges the following contributions to the various ASA Endowment or Asset Funds

<table>
<thead>
<tr>
<th>Lifetime Contributions</th>
<th>Contributions to the 2018 ASA Annual Fund</th>
<th>ASA Heritage Society</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gold Level</strong>&lt;br&gt;<em>(Total Contributions ≥ $10,000)</em></td>
<td>$1000 +&lt;br&gt;William J. Bremner, MD, PhD&lt;br&gt;Douglas T. Carrell, PhD, HCLD&lt;br&gt;Vassilios Papadopoulos, DPharm, PhD&lt;br&gt;Barbara M. Sanborn, PhD&lt;br&gt;Anna Steinberger, PhD&lt;br&gt;Joyce Tenover, MD, PhD&lt;br&gt;Christina Wang, MD</td>
<td>(recognizing individuals who have remembered ASA in their estate planning)</td>
</tr>
<tr>
<td>Douglas T. Carrell, PhD, HCLD</td>
<td>Joyce Tenover, MD, PhD</td>
<td>THANK YOU TO OUR:</td>
</tr>
<tr>
<td>Erwin Goldberg, PhD</td>
<td>Anna Steinberger, PhD</td>
<td><strong>2019 ASA Exhibitors</strong></td>
</tr>
<tr>
<td>Gail S. Prins, PhD</td>
<td>Joyce Tenover, MD, PhD</td>
<td>Aytu Bioscience</td>
</tr>
<tr>
<td>Susan Ann Rothmann, PhD, HCLD</td>
<td>Donna L. Vogel, MD, PhD</td>
<td><strong>2019 ASA Educational Grant Supporters</strong></td>
</tr>
<tr>
<td>Anna Steinberger, PhD</td>
<td>Wei Yan, MD, PhD</td>
<td>American Urology Association, Inc.</td>
</tr>
<tr>
<td>Bayard T. Storey, PhD</td>
<td><strong>2019 Meeting Contributor</strong>&lt;br&gt;SCSA Diagnostics, Inc.</td>
<td><strong>NOTE</strong>: If you have included ASA in your estate planning and have not informed the Society, please consider doing so by contacting Gail Prins or Susan Rothmann. Requests for confidentiality will certainly be honored.</td>
</tr>
<tr>
<td>Joyce Tenover, MD, PhD</td>
<td><strong>Sustaining Members</strong>&lt;br&gt;<em>(Total Contributions ≥ $2,000)</em></td>
<td>Anna Steinberger, PhD</td>
</tr>
<tr>
<td>Donna L. Vogel, MD, PhD</td>
<td>Nancy J. Alexander, PhD</td>
<td>Gail S. Prins, PhD</td>
</tr>
<tr>
<td>Christina Wang, MD</td>
<td>Rupert P. Amann, PhD</td>
<td>THANK YOU TO OUR:</td>
</tr>
<tr>
<td><strong>Silver Level</strong>&lt;br&gt;<em>(Total Contributions ≥ $5,000)</em></td>
<td>Richard D. Amelar, MD</td>
<td><strong>2019 ASA Exhibitors</strong></td>
</tr>
<tr>
<td>Andrzej Bartke, PhD</td>
<td>Rudi Ansbaecher, MD</td>
<td>Aytu Bioscience</td>
</tr>
<tr>
<td>Fertility Solutions</td>
<td>Arnold M. Belker, MD</td>
<td><strong>2019 ASA Educational Grant Supporters</strong></td>
</tr>
<tr>
<td>William J. Bremner, MD, PhD</td>
<td>Betsy Cairo, PhD, HCLD</td>
<td>American Urology Association, Inc.</td>
</tr>
<tr>
<td>Ronald W. Lewis, MD, FACS</td>
<td>Glenn R. Cunningham, MD</td>
<td><strong>2019 Meeting Contributor</strong>&lt;br&gt;SCSA Diagnostics, Inc.</td>
</tr>
<tr>
<td>Vassilios Papadopoulos, DPharm, PhD</td>
<td>Alan Diekman, PhD</td>
<td><strong>NOTE</strong>: If you have included ASA in your estate planning and have not informed the Society, please consider doing so by contacting Gail Prins or Susan Rothmann. Requests for confidentiality will certainly be honored.</td>
</tr>
<tr>
<td>Peter N. Schlegel, MD, FACS</td>
<td>Jannette Dufour, PhD</td>
<td>Anna Steinberger, PhD</td>
</tr>
<tr>
<td>Richard J. Sherins, MD</td>
<td>Wylie C. Hembree, III, MD</td>
<td>Gail S. Prins, PhD</td>
</tr>
<tr>
<td>Women in Andrology</td>
<td>Rex A. Hess, PhD</td>
<td>THANK YOU TO OUR:</td>
</tr>
<tr>
<td><strong>Contributions to the 2018 ASA Annual Fund</strong>&lt;br&gt;$250-$999</td>
<td>Patricia L. Morris, PhD, MS</td>
<td><strong>2019 ASA Exhibitors</strong></td>
</tr>
<tr>
<td>Martine Culty, PhD</td>
<td>Wendie A. Robbins, PhD</td>
<td>Aytu Bioscience</td>
</tr>
<tr>
<td>Sally Perreault Darney, PhD</td>
<td>Kenneth P. Roberts, PhD</td>
<td><strong>2019 ASA Educational Grant Supporters</strong></td>
</tr>
<tr>
<td>Joanna E. Ellington, DVM, PhD, DACT</td>
<td>Steven M. Schrader, PhD</td>
<td>American Urology Association, Inc.</td>
</tr>
<tr>
<td>George L. Gerton, PhD</td>
<td>Carol Sloan, MS</td>
<td><strong>2019 Meeting Contributor</strong>&lt;br&gt;SCSA Diagnostics, Inc.</td>
</tr>
<tr>
<td>Kirk C. Lo, MD, FRCS</td>
<td>Jacquetta M. Trasler, MD, PhD</td>
<td><strong>NOTE</strong>: If you have included ASA in your estate planning and have not informed the Society, please consider doing so by contacting Gail Prins or Susan Rothmann. Requests for confidentiality will certainly be honored.</td>
</tr>
<tr>
<td>Michael A. Palladino, PhD</td>
<td>Terry T. Turner, PhD</td>
<td>Anna Steinberger, PhD</td>
</tr>
<tr>
<td>Richard J. Sherins, MD</td>
<td>Zhibing Zhang, MD, PhD</td>
<td>Gail S. Prins, PhD</td>
</tr>
<tr>
<td>Luke Simon, PhD</td>
<td><strong>$100-$249</strong>&lt;br&gt;Betsy Cairo, PhD, HCLD</td>
<td>THANK YOU TO OUR:</td>
</tr>
<tr>
<td>Donna L. Vogel, MD, PhD</td>
<td>Glenn R. Cunningham, MD</td>
<td><strong>2019 ASA Exhibitors</strong></td>
</tr>
<tr>
<td>Wei Yan, MD, PhD</td>
<td>Alan Diekman, PhD</td>
<td>Aytu Bioscience</td>
</tr>
<tr>
<td><strong>$50-$99</strong>&lt;br&gt;Anna-Marie Bort, MLT, (ASCP)CME</td>
<td>Jannette Dufour, PhD</td>
<td><strong>2019 ASA Educational Grant Supporters</strong></td>
</tr>
<tr>
<td>Anna-Marie Bort, MLT, (ASCP)CME</td>
<td>Wylie C. Hembree, III, MD</td>
<td>American Urology Association, Inc.</td>
</tr>
<tr>
<td>Sylvie Breton, PhD</td>
<td>Rex A. Hess, PhD</td>
<td><strong>2019 Meeting Contributor</strong>&lt;br&gt;SCSA Diagnostics, Inc.</td>
</tr>
<tr>
<td>Arthur L. Burnett, II, MD, MBA</td>
<td>Patricia L. Morris, PhD, MS</td>
<td><strong>NOTE</strong>: If you have included ASA in your estate planning and have not informed the Society, please consider doing so by contacting Gail Prins or Susan Rothmann. Requests for confidentiality will certainly be honored.</td>
</tr>
<tr>
<td>Douglas S. Colvard, PhD</td>
<td>Wendie A. Robbins, PhD</td>
<td>Anna Steinberger, PhD</td>
</tr>
<tr>
<td>Christopher J. De Jonge, PhD, HCLD</td>
<td>Kenneth P. Roberts, PhD</td>
<td>Gail S. Prins, PhD</td>
</tr>
<tr>
<td>Nima Pourhabibi Zandi, MD</td>
<td>Steven M. Schrader, PhD</td>
<td>THANK YOU TO OUR:</td>
</tr>
<tr>
<td>Hooman Sadri, MD, PhD</td>
<td>Carol Sloan, MS</td>
<td><strong>2019 ASA Exhibitors</strong></td>
</tr>
<tr>
<td>Zhibing Zhang, MD, PhD</td>
<td>Jacquetta M. Trasler, MD, PhD</td>
<td>Aytu Bioscience</td>
</tr>
<tr>
<td><strong>ASA Heritage Society</strong>&lt;br&gt;(recognizing individuals who have remembered ASA in their estate planning)</td>
<td>Terry T. Turner, PhD</td>
<td><strong>2019 ASA Educational Grant Supporters</strong></td>
</tr>
<tr>
<td>Eugenia Rosemberg, MD</td>
<td>Zhibing Zhang, MD, PhD</td>
<td>American Urology Association, Inc.</td>
</tr>
<tr>
<td>Gail S. Prins, PhD</td>
<td><strong>2019 Meeting Contributor</strong>&lt;br&gt;SCSA Diagnostics, Inc.</td>
<td><strong>NOTE</strong>: If you have included ASA in your estate planning and have not informed the Society, please consider doing so by contacting Gail Prins or Susan Rothmann. Requests for confidentiality will certainly be honored.</td>
</tr>
</tbody>
</table>
COURSE DESCRIPTION
The diagnosis and management of many conditions in andrology have been greatly influenced by recent pharmacological, surgical and basic science advances. One of the greatest challenges in this discipline is to keep abreast of the many dynamic changes in this field. An internationally acclaimed faculty has been assembled to provide this update, with presentations on topics such as “Reproductive Function in Young Male Cancer Survivors: When Oncologists Need Andrologists,” “Functional Amyloid in the Epididymis: A Protective Mammalian Biofilm,” “Sperm RNA Biomarkers of Testicular Dysfunction,” Mechanisms of Sertoli Cell Immune Regulation,” “Update on Clinical Trials Utilizing Stromal Vascular Fraction for Management of Erectile Dysfunction,” and “Role of Pig Models in Preserving and Regenerating Male Fertility.” During the plenary sessions, attendees will have the opportunity to participate in question and answer sessions.

TARGET AUDIENCE
Practicing community and academic urologists, PhD researchers, graduate students, andrology lab personnel, physician extenders in fertility and urology practices, DVM practitioners and candidates with reproductive focus.

ASA 44th ANNUAL CONFERENCE
EDUCATIONAL NEEDS
There have been many recent advances in the basic science, translational science and clinical understanding of male reproductive health. Urologists, basic, and translational scientists should be up-to-date on the latest advances, research efforts, and treatment recommendations regarding conditions such as regenerative medicine, effects of environmental exposures on male reproductive health, the latest advance in reproductive technologies, and the contemporary clinical treatment of sexual function. Practitioners need to be updated on the advances in diagnostic modalities and treatment options for these conditions. Many collaborating PhD researchers working in reproductive biology and cell biology do not have an awareness of the clinical management of these conditions, their relatively high prevalence, and the need for an increased understanding of underlying biology of these conditions. Researchers will benefit from awareness of the epidemiology of these conditions, both in terms of their commonality and their predisposition to other urologic and general disease. Furthermore, an understanding of the epidemiologic impact of the treatment for these conditions (in terms of risk to offspring) is vital.

An awareness of future directions for research is useful to the audience as well and updated reviews will help identify future targets for research and novel treatments in fertility medicine.

A review of these topics will prove hugely useful to urologists and other MD’s, PhD researchers, DVM’s, and trainees as well as physician extenders in andrology and laboratory professionals working in fertility medicine.

EDUCATIONAL OBJECTIVES
At the conclusion of the ASA 44th Annual Conference, attendees will be able to:

1. Identify factors that may be affecting fecundity from diet, lifestyle, and the environment.
2. Review the updated and newly identified gaps in knowledge and training of young andrologists.
3. Examine the effectiveness of epigenetic patterns in IVF/ICSI outcomes.
4. Recognize how Folic acid supplements impact the sperm DNA methylome.
5. Recognize the consequences of paternal exposure to environmental and reproductive toxicants.
6. Identify the major protein in human/mouse sperm.
7. Determine if human sperm contain histones and if so, what is the amount compared to that in somatic cells.
8. Define sperm epigenome.
10. Explain the major effects of aging on sperm genome and epigenome.
11. Describe the function of sperm centrosome in fertilization and where the centrosome comes from.
12. Define extracellular vesicles (EV) and identify the contents of EVs.
13. Describe the biomarkers for UTIs.
14. Describe the basis for Cap-Score-based diagnostic for male infertility.
15. Identify the sperm biomarkers for testis injury and how these biomarkers are formed.
16. Explain the basis of stem cell therapy for erectile dysfunction.
17. Identify the type of stem cells being used for treating ED and their safety.
18. Describe the application of Sertoli cell transplantation in andrology clinics.
19. Explain how to do Sertoli cell transplantation in animal models.
20. Identify the methods available in theory to preserve male fertility.
21. Explain how germ cell transplantation works in mice and pigs.
22. Describe the potential applications of male germ cell transplantation in andrology practice.
EDUCATIONAL NEEDS
One of the most common reasons our patients seek andrological care is to improve sexual function. There is evidence that male sexual function has declined over the past half century with investigators attempting to confirm, understand, and reverse the trends. Examination of diet, lifestyle, and the environment on sexual function has led to some interesting observations and opportunities for improvement. However, a place remains for medical and surgical treatments as well. Looking to the future, new therapies are currently in human trials with data continued to be released.

EDUCATIONAL OBJECTIVES
At the conclusion of the ASA Clinical Symposium, attendees should be able to:

1. Review the updated available treatment options for Peyronie’s Disease.
2. Discuss the off label usage of intralesional injection of collagenase for Peyronie’s Disease.
3. Describe the cutting edge methods for managing Chronic Orchalgia.
4. Examine the evidence behind innovative but unproven techniques for treatment of Erectile Dysfunction.
5. Discuss the current understanding of the availability of penile transplantation.
6. Describe the updated success of completed penile transplantation patients and longitudinal complications.

ACCREDITATION
Credit Statements
Saturday: 3.50 | Sunday: 5.50 | Monday: 5.75 | Tuesday: 3.75

Category 1
Creighton University Health Sciences Continuing Education designates this live activity for a maximum of 18.50 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

AAPA accepts AMA category 1 credit for the PRA from organizations accredited by ACCME.

Accreditation Statement
In support of improving patient care, this activity has been planned and implemented by Creighton University Health Sciences Continuing Education and the American Society of Andrology (ASA). Creighton University Health Sciences Continuing Education (HSCE) is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

Non-physician healthcare professionals will receive a Certificate of Attendance. For information on the applicability and acceptance of Certificates of Attendance for educational activities certified for AMA PRA Category 1 Credit™ from organizations accredited by the ACCME, please consult your professional licensing board.

Disclosure Report
The disclosure report for this meeting will be provided to all attendees electronically prior to the start of the meeting.

If you require a printed disclosure report, please visit the registration desk.

General Disclaimer
The statements and opinions contained in this program are solely those of the individual authors and contributors and not of the American Society of Andrology. The appearance of the advertisements is not a warranty, endorsement, or approval of the products or services advertised or of their effectiveness, quality, or safety. The content of this publication may contain discussion of off-label uses of some of the agents mentioned. Please consult the prescribing information for full disclosure of approved uses. The American Society of Andrology disclaims responsibility for any injury to persons or property resulting from any ideas or products referred to in the abstracts or advertisements.

Special Assistance
We encourage participation by all individuals. If you have a disability, advance notification of any special needs will help us better serve you. Call (847) 517-7225 if you require special assistance to fully participate in the meeting.
# SCHEDULE OF EVENTS

The XXVth North American Testis Workshop *Not CME Accredited
“Lifelong Cell-Cell Interactions in the Testis: A Driver for Male Fertility”
April 3 - 6, 2019 | The Ritz-Carlton Chicago | Chicago, IL

Chair: Vassilios Papadopoulos, DPharm, PhD & Vice Chair: Wei Yan, MD, PhD
All sessions will be located in The Ritz-Carlton Ballroom unless otherwise noted. Speakers and times are subject to change.

## WEDNESDAY, APRIL 03, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:00 p.m. - 8:30 p.m.</td>
<td>Registration/Information Desk Open</td>
<td>Grand Foyer</td>
</tr>
</tbody>
</table>
| 7:00 p.m. - 7:15 p.m. | Welcome and Opening Remarks
Program Chair:
Vassilios Papadopoulos, PhD
University of Southern California
School of Pharmacy |                             |
| 7:15 p.m. - 8:15 p.m. | KEYNOTE ADDRESS:
Antigens and Blood - Testis Barrier
Kenneth S. Tung, MD
University of Virginia |                             |
| 8:15 p.m. - 9:30 p.m. | Testis Workshop Welcome Reception                                                                 | Grand Foyer                   |

## THURSDAY, APRIL 04, 2019 (continued)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:20 a.m. - 10:40 a.m.</td>
<td>Break</td>
<td></td>
</tr>
</tbody>
</table>
| 10:40 a.m. - 11:20 a.m. | Genetic Networks that Act in Somatic Cells of the Testis to Mediate Germ Cell Development
Guy Tanentzapf, PhD
University of British Columbia |                             |
| 11:20 a.m. - 11:35 a.m. | Short Talk #1
Single-cell Transcriptomes of Prospermatogonia Reveal Heterogeneity in the RA Response in the Neonatal Mouse Testis
Presented By: Anukriti Singh, B.Tech
University of Texas at San Antonio |                             |
| 11:35 a.m. - 11:50 a.m. | Short Talk #2
Directing Human Induced Pluripotent Stem Cells Differentiation Towards Leydig and Adrenal Cells
Presented By: Lu Li, PhD
University of Southern California |                             |
| 11:50 a.m. - 1:10 p.m. | Lunch (on your own)                                                                                                                                                                                                        |                               |

## SESSION II: GERM CELL DIFFERENTIATION IN RESPONSE TO LOCAL AND ENDOCRINE FACTORS

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
</table>
| 1:10 p.m. - 1:15 p.m. | Chair and Introduction to Session II
Session Chair: Elizabeth Snyder, PhD
Rutgers University |                             |
| 1:15 p.m. - 1:55 p.m. | Positional Influence on Establishment of the Foundational Spermatogonial Stem Cell Pool
Jon M. Oatley, PhD
Washington State University |                             |
| 1:55 p.m. - 2:35 p.m. | Potential Use of Stem Cells for Fertility Preservation
Clifford L. Librach, MC, FRSCS(C), FACOG
University of Toronto |                             |
| 2:35 p.m. - 2:55 p.m. | Break                                                                                                                                                                                                                   |                               |
| 2:55 p.m. - 3:35 p.m. | Human Testis Organoid Formation
Ellen Goossens, PhD
Vrije Universiteit Brussels |                             |
| 3:35 p.m. - 3:50 p.m. | Short Talk #3
Single-cell RNA Sequencing Reveals Novel Markers of Stem/progenitor Spermatogonia in Higher Primates
Presented By: Sarah Munyoki, BA
University of Pittsburgh |                             |
THURSDAY, APRIL 04, 2019 (continued)

3:50 p.m. - 4:05 p.m. Short Talk #4
Dynamic Subcellular Membrane Lipid Remodeling in Hormone-induced Leydig Cell Steroidogenesis
Presented By: Sathvika Venugopal, PhD
McGill University Health Centre

4:05 p.m. - 6:00 p.m. Poster Session

6:30 p.m. - 8:30 p.m. Poster Session

FRIDAY, APRIL 05, 2019

7:00 a.m. - 6:00 p.m. Registration/Information Desk Open
Location: Grand Foyer

7:15 a.m. - 8:00 a.m. Continental Breakfast
Location: Grand Foyer

8:00 a.m. - 8:55 a.m. BENCHMARK LECTURE II

8:00 a.m. - 8:05 a.m. Chair and Introduction
Chair: Katherine Loveland, PhD
Monash University and Hudson Institute of Medical Research

8:05 a.m. - 8:55 a.m. Establishing and Replacing Sertoli Cells in the Testis
Blanche Capel, PhD
Duke University Medical Center

SESSIOIII: SOMATIC CELLS FUNCTION IN RESPONSE TO LOCAL FACTORS

8:55 a.m. - 9:00 a.m. Chair and Introduction to Session III
Session Chair: Mirella Meyer-Ficca, PhD
Utah State University

9:00 a.m. - 9:40 a.m. Interactions Between Sertoli Cells and Germ Cells Govern the Cycle of the Seminiferous Epithelium
Michael D. Griswold, PhD
Washington State University

9:40 a.m. - 10:20 a.m. Peritubular Cells of the Human Testis: Prostaglandin E2 (PGE2) and More
Artur Mayerhofer, MD
Ludwig-Maximilian-University

10:20 a.m. - 10:40 a.m. Break

10:40 a.m. - 11:20 a.m. Role of the Interstitial Cells in Spermatogonial Stem Cell Development
Tony De Falco, PhD
Cincinnati Children’s Hospital Medical Center

FRIDAY, APRIL 05, 2019 (continued)

11:20 a.m. - 11:35 a.m. Short Talk #5
The Role of Rna Binding Protein Adad2 in Male Meiosis
Presented By: Lauren Chukrallah
Rutgers the State University of New Jersey

11:35 a.m. - 11:50 a.m. Short Talk #6
Unravelling the Role of Trim28 in Spermatogenesis
Presented By: Joel Heng Loong Tan, BSc (Hons)
Institute of Molecular and Cell Biology (IMCB)

11:50 a.m. - 1:10 p.m. Lunch (on your own)

11:50 a.m. - 1:10 p.m. Testis Workshop Executive Committee Meeting

SESSION IV: TESTICULAR FUNCTION IN RESPONSE TO MAN-MADE CHEMICALS

1:10 p.m. - 1:15 p.m. Chair and Introduction to Session IV
Session Chair: Benson T. Akingbemi, DVM, PhD
Auburn University

1:15 p.m. - 1:55 p.m. Effects of Flame Retardants on Testicular Function
Barbara F. Hales, PhD
McGill University

1:55 p.m. - 2:35 p.m. Phthalate Exposure on Sperm Epigenetics and Early-life Development in Man and Mouse
J. Richard Pilsner, PhD, MPH
University of Massachusetts Amherst

2:35 p.m. - 2:55 p.m. Break

2:55 p.m. - 3:35 p.m. Effects of Endocrine Disruptor Mixtures on Male Reproduction
Martine Culty, PhD
University of Southern California

3:35 p.m. - 3:50 p.m. Short Talk #7
Functional Role of the Copper Transporter 1 Protein in Spermatogenesis and in Cisplatin-induced Testicular Injury
Presented By: Rashin Ghaffari, BS
The University of Texas at Austin

3:50 p.m. - 4:05 p.m. Short Talk #8
HIPK4 Is Essential for Murine Spermiogenesis
Presented By: J. Aaron Crapster, PhD
Stanford University

4:05 p.m. - 6:00 p.m. Poster Session
# SCHEDULE OF EVENTS

The XXVth North American Testis Workshop *Not CME Accredited*

**SATURDAY, APRIL 06, 2019**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 a.m.</td>
<td>Registration/Information Desk Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>7:15 a.m.</td>
<td>Continental Breakfast</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>8:00 a.m.</td>
<td><strong>BENCHMARK LECTURE III</strong></td>
<td></td>
</tr>
<tr>
<td>8:00 a.m.</td>
<td>Chair and Introduction</td>
<td>Laval University</td>
</tr>
<tr>
<td>8:05 a.m.</td>
<td>Testis &amp; Plastics: 25+ Years of the Estrogen Hypothesis</td>
<td>Brown University</td>
</tr>
<tr>
<td>8:55 a.m.</td>
<td><strong>SESSION V: PATHOGEN EFFECTS ON TESTIS FUNCTION</strong></td>
<td></td>
</tr>
<tr>
<td>8:55 a.m.</td>
<td>Chair and Introduction to Session V</td>
<td>Cornell University</td>
</tr>
<tr>
<td>9:00 a.m.</td>
<td>The Impact of ZIKA Infection on Male Fertility and the Role of Vaccination</td>
<td>Laval University</td>
</tr>
<tr>
<td>9:40 a.m.</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>10:00 a.m.</td>
<td>Newly Emerging Sexually Transmitted Viruses: Testicular Defense Systems and Clinical Implications</td>
<td>University of Hawaii</td>
</tr>
<tr>
<td>10:40 a.m.</td>
<td>The Immunology of Male Reproduction</td>
<td>Hudson Institute and Monash University</td>
</tr>
<tr>
<td>11:20 a.m.</td>
<td>NIH</td>
<td>NICHD, NIH</td>
</tr>
<tr>
<td>11:35 a.m.</td>
<td>Concluding Remarks and Acknowledgements</td>
<td>University of Nevada</td>
</tr>
<tr>
<td>11:50 a.m.</td>
<td>Announcement of the XXVIth North American Testis Workshop</td>
<td>University of Nevada</td>
</tr>
<tr>
<td>12:00 p.m.</td>
<td>Adjournment</td>
<td></td>
</tr>
</tbody>
</table>
## SCHEDULE OF EVENTS

The American Society of Andrology 44th Annual Conference

"Fertility and Men's Health"

April 6 - 9, 2019 | The Ritz-Carlton Chicago | Chicago, IL

Program Chairs: Kathleen Hwang, MD & Wei Yan, MD, PhD

All sessions will be located in the **Ritz-Carlton Ballroom** unless otherwise noted. Speakers and times are subject to change.

### FRIDAY, APRIL 05, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 p.m. - 6:00 p.m.</td>
<td>Registration/Information Desk Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>6:00 p.m. - 6:10 p.m.</td>
<td>President's Welcome</td>
<td></td>
</tr>
<tr>
<td>6:10 p.m. - 6:30 p.m.</td>
<td>ASA Distinguished Andrologist Award*</td>
<td></td>
</tr>
<tr>
<td>6:30 p.m. - 7:30 p.m.</td>
<td>EMIL STEINBERGER MEMORIAL LECTURE: Reproductive Function in Young Male Cancer Survivors: When Oncologists Need Andrologists</td>
<td></td>
</tr>
<tr>
<td>7:30 p.m. - 7:45 p.m.</td>
<td>ANDROLOGY Journal Award*</td>
<td></td>
</tr>
<tr>
<td>7:45 p.m. - 9:30 p.m.</td>
<td>ASA Welcome Reception</td>
<td>Grand Foyer</td>
</tr>
</tbody>
</table>

### SATURDAY, APRIL 06, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 a.m. - 7:00 p.m.</td>
<td>Registration/Information Desk Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>4:00 p.m. - 9:30 p.m.</td>
<td>Exhibits Open</td>
<td>Grand Foyer</td>
</tr>
</tbody>
</table>

### FRIDAY, APRIL 05, 2019 (Day 2)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 a.m. - 5:00 p.m.</td>
<td>ASA Andrology Lab Workshop* (Day 1)</td>
<td>St. Clair A</td>
</tr>
<tr>
<td>1:00 p.m. - 4:00 p.m.</td>
<td>ASA Clinical Symposium</td>
<td></td>
</tr>
</tbody>
</table>

### SATURDAY, APRIL 06, 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 a.m. - 8:00 a.m.</td>
<td>Past Presidents’ Breakfast</td>
<td>Private Dining Room - Ventoso</td>
</tr>
<tr>
<td>7:00 a.m. - 6:00 p.m.</td>
<td>Registration/Information Desk Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>7:00 a.m. - 4:00 p.m.</td>
<td>Exhibits Open</td>
<td>Grand Foyer</td>
</tr>
<tr>
<td>7:00 a.m. - 8:00 a.m.</td>
<td>Continental Breakfast</td>
<td>Grand Foyer</td>
</tr>
</tbody>
</table>

### SATURDAY, APRIL 06, 2019 (Day 1)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 a.m. - 12:00 p.m.</td>
<td>AUA LECTURE: Andrology Research Consortium: SART for Men</td>
<td>St. Clair A</td>
</tr>
<tr>
<td>9:00 a.m. - 9:15 a.m.</td>
<td>Distinguished Service Award*</td>
<td></td>
</tr>
<tr>
<td>9:15 a.m. - 10:45 a.m.</td>
<td>SYMPOSIUM I: Male Reproduction and Overall Health</td>
<td></td>
</tr>
<tr>
<td>9:15 a.m. - 9:20 a.m.</td>
<td>Introduction to Topic</td>
<td></td>
</tr>
<tr>
<td>9:20 a.m. - 9:45 a.m.</td>
<td>Is Human Fecundity Changing and What Can We Do About It?</td>
<td></td>
</tr>
<tr>
<td>9:45 a.m. - 10:10 a.m.</td>
<td>Infertility as a Proxy of General Male Health</td>
<td></td>
</tr>
<tr>
<td>10:10 a.m. - 10:35 a.m.</td>
<td>Developing and Executing a Future for Andrology Research</td>
<td></td>
</tr>
<tr>
<td>10:35 a.m. - 10:45 a.m.</td>
<td>Symposium Summary</td>
<td></td>
</tr>
</tbody>
</table>
10:45 a.m. - 11:00 a.m. Break
11:00 a.m. - 12:30 p.m. Poster Session I*  
*Not CME Accredited  
Location: Grand Foyer
12:30 p.m. - 2:00 p.m. Lunch On Own
12:30 p.m. - 2:00 p.m. MENTORING LUNCHEON: From ions to Sperms; a re-productive Journey!  
Sponsored by the Diversity and Trainee Affairs Committees  
Location: St. Clair BC  
Victor G. Blanco, MD, PhD  
The University of Kansas Medical Center
12:30 p.m. - 2:00 p.m. Editorial Board Luncheon
2:00 p.m. - 3:30 p.m. Oral Presentation I
2:00 p.m. HETEROGENEITY OF PROTON SECRETING EPITHELIAL CELL FUNCTION REVEALED BY TRANSCRIPTOMIC CLUSTER ANALYSIS  
Presented By: Maria Agustina Battistone, PhD  
Massachusetts General Hospital/Harvard Medical School
2:15 p.m. SPECIFIC REQUIREMENT FOR THE 14-3-3 EPSILON ISOFORM IN MOUSE SPERMATOGENESIS  
Presented By: Alaa Eisa, MSc  
Kent State University
2:30 p.m. EFCAB9 IS A PH-DEPENDENT CA2+ SENSOR THAT REGULATES CATSPER CHANNEL ACTIVITY AND SPERM MOTILITY  
Presented By: Jean-Ju Chung, PhD  
Yale School of Medicine
2:45 p.m. ETHYLENE GLYCOL MONOMETHYL ETHER EXPOSURE ALTERS CLEAVAGE OF TRNA FRAGMENTS IN RAT SPERM  
Presented By: Angela R. Stermer, PhD  
Brown University
3:00 p.m. KANK1 COPY NUMBER VARIANTS ARE ASSOCIATED WITH GENITOURINARY BIRTH DEFECTS  
Presented By: Dolores J. Lamb, PhD, HCLD  
Cornell University
3:15 p.m. GENE DELETION OF STEROIDOGENIC ACUTE REGULATORY PROTEIN (STAR) BY CRISPR/CAS9 DEMONSTRATES A CRITICAL RELATIONSHIP BETWEEN CONSTITUTIVE STAR AND TRANSLOCATOR PROTEIN TSPO FOR STEROIDOGENESIS  
Presented By: Melanie Galano  
University of Southern California
2:00 p.m. - 3:30 p.m. Oral Presentation II  
Location: St. Clair A
2:00 p.m. XENOGRAFTING CRYOPRESERVED PRIMATE TESTICULAR BIOPSIES INTO IMMUNE COMPROMISED MICE  
Presented By: Sherin David, MS  
University of Pittsburgh School of Medicine
2:15 p.m. TESTOSTERONE USE AND RISK OF MYOCARDIAL INFARCTION (MI) AND STROKE  
Presented By: Molly Shores, MD  
University of Washington, VA Puget Sound Health Care System
2:30 p.m. AN 11-BASE PAIR DELETION IN MOUSE MINICHROMOSOME MAINTENANCE 8 (MCM8) MIMICS HUMAN INFERTILITY IN PATIENTS WITH MCM8 DELETEROUS MUTATIONS  
Presented By: Amanda Mae Colvin Zielen, PhD  
Magee Womens Research Institute, University of Pittsburgh
2:45 p.m. SPERMATOGENESIS IN THE TRANSGENDER TESTIS  
Presented By: Tristan M. Nicholson, MD, PhD  
University of Washington
3:00 p.m. OCCURRENCE OF PULMONARY OIL MICROEMBOLISM AFTER TESTOSTERONE UNDECANOATE INJECTION: A POSTMARKETING SAFETY ANALYSIS  
Presented By: Alexander W. Pastuszak, MD, PhD  
University of Utah
3:15 p.m. WITHDRAWN
3:30 p.m. - 3:45 p.m. Break
3:45 p.m. - 5:15 p.m. SYMPOSIUM II: Save America’s Sperm! Spermatogenesis and its Regulation, Genetic and Epigenetic Regulation  
Moderator: Satoshi Namekawa, PhD  
Cincinnati Children’s Hospital
3:45 p.m. - 3:50 p.m.  Introduction to Topic
3:50 p.m. - 4:15 p.m. Folic Acid Supplements Impact Environmentally-sensitive Sites in the Human Sperm DNA Methylome  
Jacquetta M. Trasler, MD, PhD  
McGill University Health Centre
3:45 p.m. - 3:50 p.m. EMERGING USES OF EPIGENETIC DATA IN THE CLINIC  
Douglas T. Carrell, PhD, HCLD  
University of Utah School of Medicine
4:15 p.m. - 4:40 p.m. ELEOXYLATED PHOSPHATIDES IMPACT ENVIRONMENTAL SENSITIVE SITES IN THE HUMAN SPERM DNA METHYLMETHOXYLCE  
Iacqueta M. Trasler, MD, PhD  
McGill University Health Centre
4:40 p.m. - 5:05 p.m. THE RESPONSE OF SPERM RNAs TO PHTHALATE EXPOSURE  
Stephen A. Krawetz, PhD
5:05 p.m. - 5:15 p.m. Symposium Summary
SUNDAY, APRIL 07, 2019 (continued)

TRAINEE-DIRECTED MINI-SYMPOSIUM*
“Spermatogonial Sperm Cell (SSC) Transplantation; How Close Are We?”
*Not CME Accredited
Co-Chairs: Jennifer R. Hughes, PhD and Nima P. Zarandi, MD
5:15 p.m. - 7:15 p.m.

5:15 p.m. - 5:25 p.m. Introduction
5:25 p.m. - 5:40 p.m. SSC Niche, Culture and Transplantation
   Sandra Ryeom, PhD
   University of Pennsylvania
5:40 p.m. - 5:55 p.m. Preservation of the Fertility in Oncology Patients: Its Needs and Challenges
   Maxwell E. Edmonds, BS, BA
   Northwestern Medicine Feinberg School of Medicine
5:55 p.m. - 6:10 p.m. Possible Approaches for SSC Transplantation, Challenges and Complications
   Ronald Swerdloff, MD
   Harbor-UCLA Medical Center
6:10 p.m. - 7:10 p.m. Open Discussion and Q&A
7:10 p.m. - 7:15 p.m. Closing Remarks and Summary

7:15 p.m. - 8:15 p.m. Presentation of Trainee Awards
   (All Trainee Travel and Onsite Poster Awards will be distributed)

8:15 p.m. - 9:15 p.m. Trainee Forum & Mixer
   Location: The Cafe

MONDAY, APRIL 08, 2019

7:00 a.m. - 6:00 p.m. Registration/Information Desk Open
   Location: Grand Foyer

7:00 a.m. - 8:00 a.m. Continental Breakfast
   Location: Grand Foyer

7:00 a.m. - 8:00 a.m. Poster Session II (Part 1)*
   *Not CME Accredited
   Location: Grand Foyer

8:00 a.m. - 9:00 a.m. WOMEN IN ANDROLOGY LECTURE:
   “Functional Amyloid in the Epididymis: A Protective Mammalian Biofilm”
   Sponsored by the Women in Andrology Endowment Fund
   Introducer: Maria Christina W. Avellar, PhD
   Universidad Federal de São Paulo - Escola Paulista de Medicina
   Speaker: Gail A. Cornwall, PhD
   Texas Tech University Health Sciences Center

9:00 a.m. - 9:15 a.m. Matthew P. Hardy Young Andrologist Award*
   Supported by the Matthew P. Hardy Endowment Fund
   *Not CME Accredited
   Introducer: George L. Gerton, PhD
   ASA Vice President
   Recipient: Mariano G. Buffone, PhD
   Instituto de Biología y Medicina Experimental

9:15 a.m. - 10:45 a.m. SYMPOSIUM III: More Than Just Paternal DNA: Contributions of Sperm to Development and Adulthood Health
   Moderator: Eugene Xu, PhD
   Nanjing Medical University

9:15 a.m. - 9:20 a.m. Introduction to Topic

9:20 a.m. - 9:45 a.m. Identification of Epigenomic Signatures in Sperm Associated with Body Mass Index (BMI), Diet and Fertility Status
   Sarah Kimmins, PhD
   McGill University

9:45 a.m. - 10:10 a.m. Germline Stem Cell Competition Can Enhance Early Fetal Death
   Norman Arnheim, PhD
   University of Southern California

10:10 a.m. - 10:35 a.m. Role of Sperm Centrosome During Fertilization and Embryo Development
   Pierre Comizzoli, DVM, MSc, PhD
   Smithsonian’s National Zoological Park

10:35 a.m. - 10:45 a.m. Symposium Summary

10:45 a.m. - 11:00 a.m. Break

11:00 a.m. - 12:00 p.m. BEST OF THE EPIDIDYMIS
   Moderator: Martine Culty, PhD
   University of Southern California

11:00 a.m. - 11:30 a.m. Those Silly Efferent Ductule Cilia - A Historical Perspective on the Epididymis
   Rex A. Hess, PhD
   University of Illinois

11:30 a.m. - 12:00 p.m. New Frontiers in Understanding the Role of the Epididymis
   Bernard Robaire, PhD
   McGill University

12:00 p.m. - 12:45 p.m. Poster Session II (Part 2)*
   *Not CME Accredited
   Location: Grand Foyer

12:45 p.m. - 2:15 p.m. Lunch On Own

12:45 p.m. - 2:15 p.m. WOMEN IN ANDROLOGY LUNCHEON*
   Sponsored by the Women in Andrology Committee
   *Not CME Accredited
   Location: St. Clair BC
   Host: Maria Christina W. Avellar, PhD
   Universidad Federal de São Paulo - Escola Paulista de Medicina

© 2019 American Society of Andrology and European Academy of Andrology
Andrology, 2019, Supplement, 24
SCHEDULE OF EVENTS
The American Society of Andrology 44th Annual Conference

MONDAY, APRIL 08, 2019 (continued)

2:15 p.m. - 3:45 p.m. SYMPOSIUM IV: Novel Diagnostics and Therapeutics in Andrology
Moderator: Mark Sigman, MD
Brown University

2:15 p.m. - 2:20 p.m. Introduction to Topic

2:20 p.m. - 2:45 p.m. Pain Phenotypes and Therapeutic Potential of Bacteria in the Bladder
David J. Klumpp, PhD
Northwestern University

2:45 p.m. - 3:05 p.m. Use of Cap-Score™ for Diagnostic Assessment of Male Fertility: Prospective Clinical Outcomes
Alexander J. Travis, VMD, PhD
Cornell University

3:05 p.m. - 3:25 p.m. Sperm mRNA Biomarkers Associated with Testis Injury
Kim Boekelheide, MD, PhD
Brown University

3:25 p.m. - 3:45 p.m. Symposium Summary

3:45 p.m. - 4:00 p.m. Break

4:00 p.m. - 4:45 p.m. EAA LECTURE: “Fertility of Patients with Disorders of Sex Development - Results of dsd-LIFE Study”
Introducers: Elisabetta Baldi, PhD
University of Florence
Patricia S. Cuasnicu, PhD
Instituto de Biologia y Medicina Experimental
Speaker: Jolanta Slowikowska-Hilczer
Department of Andrology and Reproductive Endocrinology, Medical University Lodz

4:45 p.m. - 5:30 p.m. ASA Annual Business Meeting

6:30 p.m. - 11:00 p.m. ASA Annual Banquet
Location: House of Blues Chicago Restaurant
Buses Depart from hotel lobby at 6:00 p.m.

TUESDAY, APRIL 09, 2019

7:00 a.m. - 8:00 a.m. 2020 Program Committee Meeting

7:00 a.m. - 12:00 p.m. Registration/Information Desk Open
Location: Grand Foyer

7:00 a.m. - 8:00 a.m. Continental Breakfast
Location: Grand Foyer

8:00 a.m. - 9:00 a.m. DIVERSITY LECTURE: Modeling African American Prostate Tumorigenesis with Organoids
Supported by the ASA Educational Endowment Fund
Introducers: Carolina Jorgez, PhD
Baylor College of Medicine
Hooman Sadri, MD, PhD
Wake Forest University
Speaker: Sarki A. Abdulkadir, MD, PhD
Northwestern University

9:00 a.m. - 9:15 a.m. Updates from NICHD & NIEHS
Daniel S. Johnston, PhD
NIH, Contraception Research Branch NICHD
Stuart B. Moss, PhD
National Institutes of Child Health and Human Development
Thaddeus T. Schug, PhD
National Institute of Environmental Health Sciences

9:15 a.m. - 10:15 a.m. INTERNATIONAL LECTURE: Seminal Fluid Contributes to Female Reproduction Beyond Just Delivery of Sperm
Supported by the ASA General Endowment Fund
Introducers: Elisabetta Baldi, PhD
University of Florence
Patricia S. Cuasnicu, PhD
Instituto de Biologia y Medicina Experimental
Speaker: Sarah Robertson, PhD
University of Adelaide

10:15 a.m. - 10:30 a.m. Break

10:30 a.m. - 12:00 p.m. SYMPOSIUM V: Emerging Technologies in Andrology
Moderator: Kathleen Hwang, MD
The University of Pittsburgh

10:30 a.m. - 10:35 a.m. Introduction to Topic

10:35 a.m. - 11:00 a.m. Update on Clinical Trials Utilizing Stromal Vascular Fraction for Management of Erectile Dysfunction
Trinity J. Bivalacqua, MD, PhD
Johns Hopkins Hospital

11:00 a.m. - 11:25 a.m. Mechanisms of Sertoli Cell Immune Regulation
Jannette Dufour, PhD
Texas Tech University Health Sciences Center

11:25 a.m. - 11:50 a.m. Role of Pig Models in Preserving and Regenerating Male Fertility
Mariana I. Giassetti
Washington State University

11:50 a.m. - 12:00 p.m. Symposium Summary

12:00 p.m. - 12:15 p.m. Adjournment
# SCHEDULE OF EVENTS

**ASA Andrology Lab Workshop *ABB Lab Accredited**

“Modern Semen Analysis: Elevate Your Tools, Techniques and Thinking”

April 6 - 7, 2019

Faculty: Anna-Marie Bort, MLT, (ASCP)CME, Erma Z. Drobnis, PhD, HCLD, Angela Reese, TS, Susan A. Rothmann, PhD, HCLD

All sessions will be located in *St. Clair A* unless otherwise noted. Speakers and times are subject to change.

**SATURDAY, APRIL 06, 2019**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 a.m. - 8:35 a.m.</td>
<td>Welcome</td>
</tr>
<tr>
<td>8:35 a.m. - 8:50 a.m.</td>
<td>The Challenges of Semen Analysis</td>
</tr>
<tr>
<td>8:50 a.m. - 9:20 a.m.</td>
<td>Sperm Count - Sources of Error</td>
</tr>
<tr>
<td>9:20 a.m. - 9:45 a.m.</td>
<td>Exercise 1 - How Many Should You Count?</td>
</tr>
<tr>
<td>9:45 a.m. - 10:00 a.m.</td>
<td>Microscope Optimization - Best Picture</td>
</tr>
<tr>
<td>10:00 a.m. - 10:15 a.m.</td>
<td>Exercise 2 - How Many Do You See?</td>
</tr>
<tr>
<td>10:15 a.m. - 10:30 a.m.</td>
<td>Exercise 3 - Duplicate Counts</td>
</tr>
<tr>
<td>10:30 a.m. - 10:45 a.m.</td>
<td>Break</td>
</tr>
<tr>
<td>10:45 a.m. - 11:00 a.m.</td>
<td>Duplicate Counts - What Does it Tell You?</td>
</tr>
<tr>
<td>11:00 a.m. - 11:20 a.m.</td>
<td>Review of Results from Exercises 1, 2 and 3</td>
</tr>
<tr>
<td>11:20 a.m. - 11:35 a.m.</td>
<td>Counter Error: When the Error Isn’t Human - Calculations and Tally Counters</td>
</tr>
<tr>
<td>11:35 a.m. - 11:45 a.m.</td>
<td>Exercise 4A - Estimation</td>
</tr>
<tr>
<td>11:45 a.m. - 12:00 p.m.</td>
<td>Exercise 4B - Natation</td>
</tr>
<tr>
<td>12:00 p.m. - 1:00 p.m.</td>
<td>Lab Science Forum Luncheon: Meltdown: Preventing Errors in the Sperm Bank</td>
</tr>
</tbody>
</table>
| Location: St. Clair BC | Gail S. Prins, PhD  
*University of Illinois at Chicago* |
| 1:15 p.m. - 1:45 p.m. | Exercise 4C - Static                                                 |
| 1:45 p.m. - 2:00 p.m. | Sperm Motility - Sources of Error                                   |
| 2:00 p.m. - 2:25 p.m. | Review of Results from Exercises 4A, B & C                         |

**SUNDAY, APRIL 07, 2019**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 a.m. - 8:50 a.m.</td>
<td>Sperm Viability</td>
</tr>
<tr>
<td>8:50 a.m. - 9:10 a.m.</td>
<td>Exercise 7 - Virtual Viability</td>
</tr>
<tr>
<td>9:10 a.m. - 9:20 a.m.</td>
<td>Review of Exercise 7</td>
</tr>
<tr>
<td>9:20 a.m. - 9:40 a.m.</td>
<td>Smear Optimization</td>
</tr>
<tr>
<td>9:40 a.m. - 10:05 a.m.</td>
<td>QC - Best Practices and Appropriate QC</td>
</tr>
<tr>
<td>10:05 a.m. - 10:25 a.m.</td>
<td>I’m in Range, What Do You mean I’m Not in Control?</td>
</tr>
<tr>
<td>10:25 a.m. - 10:45 a.m.</td>
<td>Exercise 8 - What Went Wrong?</td>
</tr>
<tr>
<td>10:45 a.m. - 11:00 a.m.</td>
<td>Break</td>
</tr>
<tr>
<td>11:00 a.m. - 11:20 a.m.</td>
<td>Review of Exercise 8 Results</td>
</tr>
<tr>
<td>11:20 a.m. - 11:45 a.m.</td>
<td>Validation and Documentation of New Methods</td>
</tr>
<tr>
<td>11:45 a.m. - 12:00 p.m.</td>
<td>Wrap Up and Discussion</td>
</tr>
</tbody>
</table>

**ADVANCES IN SEXUAL FUNCTION TREATMENT**

1:00 p.m. - 1:30 p.m. | Intralesional Collagenase for Peyronie’s Disease  
Jesse N. Mills, MD  
*HS Associate Professor, UCLA Department of Urology* |
| 2:15 p.m. - 2:45 p.m. | What’s Around the Corner in Sexual Medicine  
Nelson Bennett Jr., MD  
*Associate Professor of Urology, Northwestern University* |

1:30 p.m. - 2:00 p.m. | Chronic Scrotal Content Pain  
Laurence A. Levine, MD  
*Professor of Urology, Rush University* |
| 2:45 p.m. - 3:15 p.m. | Q&A Session  
3:15 p.m. - 3:30 p.m. | Break |

**MOVING FORWARD WITH PENILE TRANSPLANTATION**

3:30 p.m. - 4:00 p.m. | Penis: The Most Misunderstood Organ in Transplantation  
Dicken Ko, MD  
*Professor of Urology, Tufts University* |
Introduction: Peyronie’s Disease (PyD) is a psychologically traumatic connective tissue disorder of the penis that inhibits male sexual function. In 2013, the FDA approved the first drug for Peyronie’s Disease, Clostridium Collagenase Histolyticum (CCh). CCh is a targeted biologically derived enzyme that dissolves the abnormal collagen in the penile tunica albuginea and can lead to significant reduction in penile deformity. Injection technique and plaque localization are critical to improving outcomes and minimizing complications. This presentation will discuss standard injection techniques, introduce a novel technique, and provide a classification system for penile hematoma.

Methods: We devised a hematoma grading scheme and subsequently followed a series of patients who received CCh injections utilizing a novel “fan” injection technique. The fan technique involves repositioning the needle along three tracks for the dispersal of 0.58 mg of CCh. All patients receiving CCh from January 2016 to December 2018 were included in our institutional review board approved PyD database. Abstracted clinical variables include: injection information, hematoma formation, ecchymosis, swelling, and angle of curvature. Email and phone logs were also evaluated.

Results: We propose a three-tiered hematoma scheme. All hematomas are defined by simultaneous bruising and swelling without loss of erections. Grades I, II, and III hematomas involve less than one third, between one third and two thirds, and greater than two thirds of the penis respectively. Management of all hematomas involves cohan wraps for 24 hours with icing. Grade II hematomas delay subsequent injections. Grade III hematomas may require operative drainage. In our practice: 141 patients received injections, 1250 total injections were administered, and there were 7 total hematomas. There were three, one, and three grade I, II, and III hematomas respectively. Percent change in curvature was 22.2% after 8 injections. Bruising and swelling were seen in 55.3% and 27.7% of patients respectively.

Conclusion: Our novel CCh injection protocol is both safe and effective while our hematoma classification system brings much needed clarity and standardization to the study of PyD.

© 2019 American Society of Andrology and European Academy of Andrology Andrology, 2019, Supplement, 27
subtotal penectomy after penile carcinoma. Our patient represents the third case in the world literature experience, and opens the discussion of genital urinary VCA to a new geographic focus in the world, possibly leading to consideration and implementation of further such transplants in this complex yet important and deserving patient population. Another transplant was performed at Johns Hopkins two years later validating the concept of genital urinary composite grafts. We will review the recent developments in the field of urogenital transplantation, and highlight the essential aspects in the implementation of a GUVCA service.

SATURDAY, APRIL 06, 2019
6:30 p.m. - 7:30 p.m.

EMIL STEINBERGER MEMORIAL LECTURE
Reproductive Function in Young Male Cancer Survivors: When Oncologists Need Andrologists
Aleksander Giwercman, PhD, MD
Reproductive Medicine Centre and Molecular Reproductive Medicine Research Unit, Department of Translational Medicine, Lund University, Malmö, Sweden.

Thanks to the improvements of cancer therapy the survival rates for some of the most common malignant diseases of young age have increased significantly exceeding 95% for testicular germ cell cancer (TC) patients and 80% of childhood cancer (CC). However, recent data indicate that both TC and CC survivors are at increased risk of long term morbidity including metabolic and cardiovascular disease as well as osteoporosis. These long term effects might be caused by a negative effect of cancer and its treatment on testicular function leading to hypogonadism (HG) and subsequently to serious diseases linked to this condition. There is a number of reports showing that young cancer survivors are at increased risk of HG. In a study of 92 TCS and 131 CCS (mean age 40 and 36 years, respectively; mean follow-up time 9.2 and 25 years, respectively) we found that 36% and 25% of them, respectively, presented with biochemical signs of testosterone deficiency (ongoing androgen replacement or low serum levels of testosterone and/or high LH). The risk of being hypogonadal associated with treatment intensity and modality. HG was associated with increased risk of reduced insulin sensitivity and low bone mineral density. Those early markers of metabolic and bone disease were also linked with treatment intensity. However, the major part of this association disappeared when adjusting for HG.

Although the primary goal of oncological treatment is to eradicate the malignant disease, all efforts should be made to ensure young cancer survivors normal life expectancy and healthy aging. In this context, oncologists may be helped by andrologists and testosterone levels may be considered as markers of long term morbidity. Well established strategies for prevention of metabolic and cardiovascular disease as well as osteoporosis can be applied in at risk patients. It remains to be elucidated whether androgen replacement therapy given to young male cancer survivors may be a part of the preventive strategy. Our preliminary results do also indicate that use of genetic markers may help further identification of patients being at increased risk of these late complications of cancer and its treatment.

The Society for Assisted Reproductive Technology (SART) has developed a fertility database, focusing on female infertility and in vitro fertilization (IVF). A similar database has not existed for male factor infertility. With this knowledge gap in mind, in 2013, the Society for the Study of Male Reproduction founded the Andrology Research Consortium (ARC). The ARC is now comprised of 32 North American male fertility centers. At each center, patients complete a standardized questionnaire collecting information on male and female age, source of referral to the male infertility center, race/ethnicity, height, weight, fertility history, previous semen testing, previous fertility therapies, smoking, alcohol, marijuana use and use of testosterone and 5-alpha reductase inhibitors. Between May 2015 and May 2018, a total of 4287 men (mean male age :40 years +/- 7.43 years and female age: 37 years +/- 4.94 years) completed the questionnaires. Most of the men were referred by a reproductive gynecologist or female fertility specialist 2559 (59.7%), with fewer being referred by their primary care physician or family doctor 833 (19.4%) and other. The majority of men reported being Caucasian (2288, (53.4%)), Asian: 799 (18.6%); African American or black: 236 (5.5%); and less commonly other races. Potentially reversible causes for the infertility included the reported use of testosterone (1.6%) and propecia (0.9%). Prior to the male infertility investigation, 12.1% of couples had undergone intrauterine insemination (IUI) and 4.9% of couples had undergone in vitro fertilization (IVF) (up to 6 cycles). Conclusion: This broad North American patient survey shows that the reproductive gynecologists are the de facto gateway for most male infertility referrals, with most men in the male infertility service being referred by reproductive endocrinologists. Some of the couples with apparent male factor infertility are treated with assisted reproductive technologies prior to a male factor investigation. The survey also identified potentially reversible causes for the male infertility including lifestyle factors, including the use of testosterone and 5ARIs.

SUNDAY, APRIL 07, 2019
8:00 a.m. - 9:00 a.m.

AUA LECTURE
Andrology Research Consortium: SART for Men
Keith A. Jarvi, MD
Division of Urology, Department of Surgery, Mount Sinai Hospital, University of Toronto, Ontario, Canada

The Society for Assisted Reproductive Technology (SART) has developed a fertility database, focusing on female infertility and in vitro fertilization (IVF). A similar database has not existed for male factor infertility. With this knowledge gap in mind, in 2013, the Society for the Study of Male Reproduction founded the Andrology Research Consortium (ARC). The ARC is now comprised of 32 North American male fertility centers. At each center, patients complete a standardized questionnaire collecting information on male and female age, source of referral to the male infertility center, race/ethnicity, height, weight, fertility history, previous semen testing, previous fertility therapies, smoking, alcohol, marijuana use and use of testosterone and 5-alpha reductase inhibitors. Between May 2015 and May 2018, a total of 4287 men (mean male age :40 years +/- 7.43 years and female age: 37 years +/- 4.94 years) completed the questionnaires. Most of the men were referred by a reproductive gynecologist or female fertility specialist 2559 (59.7%), with fewer being referred by their primary care physician or family doctor 833 (19.4%) and other. The majority of men reported being Caucasian (2288, (53.4%)), Asian: 799 (18.6%); African American or black: 236 (5.5%); and less commonly other races. Potentially reversible causes for the infertility included the reported use of testosterone (1.6%) and propecia (0.9%). Prior to the male infertility investigation, 12.1% of couples had undergone intrauterine insemination (IUI) and 4.9% of couples had undergone in vitro fertilization (IVF) (up to 6 cycles). Conclusion: This broad North American patient survey shows that the reproductive gynecologists are the de facto gateway for most male infertility referrals, with most men in the male infertility service being referred by reproductive endocrinologists. Some of the couples with apparent male factor infertility are treated with assisted reproductive technologies prior to a male factor investigation. The survey also identified potentially reversible causes for the male infertility including lifestyle factors, including the use of testosterone and 5ARIs.

SUNDAY, APRIL 07, 2019
9:20 a.m. - 9:45 a.m.

SYMPOSIUM I: Male Reproduction and Overall Health
Is Human Fecundity Changing and What Can We Do About It?
Michael Louis Eisenberg, MD
Stanford University School of Medicine

Fecundity, the ability to produce offspring, is one of the most fundamental functions of any species. While fecundity is challenging to measure, surrogate markers such as semen quality and birth rates have been studied with reported temporal declines. At the same time, increases in ART utilization or genital urinary malformations have been proposed to demonstrate reproductive impairment. However the implication on human fecundity remain uncertain for all surrogate factors. In addition, investigators have searched for possible etiologies of fecundity declines to attempt to both explain and mitigate future changes.
**SYMPOSIUM I: Male Reproduction and Overall Health**

**Infertility as a Proxy of General Male Health**

Andrea Salonia, MD

*a* University Vita-Salute San Raffaele, Milan, Italy

*b* Division of Experimental Oncology/Unit of Urology; URI; IRCCS Ospedale San Raffaele, Milan, Italy

The hypothesis that men with male factor infertility may have a lower general health status has been widely corroborated throughout the last few years. As a matter of fact, the relationship between health status and male fertility is a closely intertwined one, since several conditions known to negatively impact men’s health have been repeatedly associated with impaired reproductive functioning. This implies a wide range of alterations going beyond the well-known 20-fold increased risk of testicular cancer described in men with abnormal semen analyses; colorectal cancer, melanoma, and prostate cancer along with a higher rate of certain noncancerous disorders seem to be associated to male infertility. General health status has been inquired in several ways in infertile men, with specific outcomes differently varying according to the analyzed study, ranging from life expectancy up to general health related indexes and isolated comorbidities. Several authors attempted to explain the relationship between health status and male infertility. Recently, we hypothesized two different mechanisms to explain the coexistence of infertility and comorbidities: the existence of a common mechanism promoting both infertility and a particular subset of associated pathological conditions; and comorbidities directly interfering with male reproductive function. Considering the first mechanism, substantial evidence suggests that men with reproductive health disorders may lack certain regulatory genes, predisposing them not only to abnormal spermatogenesis but also to abnormal control mechanisms for cell division and, hence, an increased probability of cancer. Alternatively, it may be the case that comorbidities have a detrimental effect on male reproductive function. Many of the conditions found in our cohort, which are known to impact reproductive function, are extremely common in the male general population. In conclusion, the importance of comorbidities in the male reproductive setting is gaining more and more attention and relevance. Therefore, it is fundamental to properly outline the presence of coexisting diseases during the male infertility work-up, since it may reveal of utter importance in terms of etiologic assessment; therapeutic choice; and, paternity outcomes.

**SYMPOSIUM II: Save America’s Sperm! Spermatogenesis and its Regulation, Genetic and Epigenetic Regulation**

**Emerging Uses of Epigenetic Data in the Clinic**

Douglas T. Carrell, PhD, HCLD

Departments of Surgery (Urology) and Human Genetics, University of Utah School of Medicine, Salt Lake City, UT, USA

The sperm contains a unique epigenetic profile, including specific DNA packing with histone modifications in select genes regions and sperm DNA methylation profiles similar to “bivalency” observed in key genes of stem cells. This gene poising profile has been shown to exist in other species and clinical data suggests a biological role. Additionally, a unique set of small RNAs are actively added to the sperm, including microRNAs and tRNA fragments. These epigenetic marks are currently under intense study as potential clinical markers of fertility, and as markers of transmission of inheritable risk characteristics to offspring. This presentation reviews the sperm epigenome and data in regards to potential clinical use of the sperm epigenome.

---

**SYMPOSIUM I: Male Reproduction and Overall Health**

**Developing and Executing a Future for Andrology Research**

Christopher Barratt, PhD

University of Dundee

Abstract not received in time of publishing.
methylation defects in sperm associated with folic acid supplementation are heritable and have adverse effects on future generations. (Supported by CIHR).

SUNDAY, APRIL 07, 2019
4:40 p.m. - 5:05 p.m.

SYMPOSIUM II: Save America’s Sperm! Spermatogenesis and its Regulation, Genetic and Epigenetic Regulation
The Response of Sperm RNAs to Phthalate Exposure
Stephen A. Krawetz, PhD
Department of Obstetrics and Gynecology and Molecular Medicine & Genetics, Wayne State University School of Medicine, Detroit, MI 48201, USA.

Chronic exposure to low-dose endocrine disruptors, such as those used in plasticizers, perturb a broad spectrum of pathways, that in animal studies can affect reproductive function. Their corresponding effect on the human male gamete and their subsequent effect on a child is unsure. To address this issue, REDaS (RNA Element Discovery algorithm) was implemented as part of the Mesalamine and Reproductive Health Study to define the effects of very high (H) dibutyl phthalate (DBP) phthalate exposures on human sperm RNAs. Men with Inflammatory Bowel Disease (IBD) entering this longitudinal crossover-crossback prospective study provided baseline (B) samples, reflective of their current +/- DBP encapsulated medication, then the +/- DBP encapsulated medication switched for 4 months (crossover sample) then returned (crossback) to their baseline medication for 4 months.

The response of sperm coding and non-coding RNAs to IBD and phthalate exposures was defined. Relatively few changes attributed to IBD were observed in comparison to large unique differential response to DBP in both the DBP-naive, acute exposed and those chronically exposed (HDBP at enrollment). For example, in the chronically exposed H1BH2 arm, after -DBP crossover and returning to HDBP, chromat organization associated REs continued to decline. In contrast, B1BH2 arm RAN cycling recovered from acute phthalate exposure, when phthalate was removed (B2). Repeat associated novel REs were only observed in response to acute changes in phthalate exposure in naïve males suggesting that any high-DBP exposure has a long-term effect on their composition. Albeit, in some instances, recovery may be possible but is uncertain.

Acknowledgments: This work was supported by funds to SAK’s Charlotte B. Failing Professorship and NIH grants ES017285 and ES009718 to Russ Hauser, Departments of Environmental Health & Epidemiology, Harvard T.H. Chan School of Public Health, Obstetrics and Gynecology, Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA.

MONDAY, APRIL 08, 2019
8:00 a.m. - 9:00 a.m.

WOMEN IN ANDROLOGY LECTURE
Functional Amyloid in the Epididymis: A Protective Mammalian Biofilm
Gail A. Cornwall, PhD
Department of Cell Biology and Biochemistry, Texas Tech University Health Sciences Center, Lubbock, TX 79430

The epididymal lumen is a complex microenvironment that must protect the maturing spermatozoa from pathogens that can ascend the male tract and cause infertility. Because the adaptive immune system is constrained, the innate immune system is especially robust within the epididymal lumen and includes many antimicrobial proteins (AMPs) that serve as the first line of defense against pathogens. However, the mechanism(s) by which AMPs protect sperm and the host epithelium is not known. We previously established that a nonpathological amyloid matrix is a normal component of the mouse epididymal lumen and hypothesize it functions as a host defense structure. The amyloid matrix contains multiple cystatins including four members (CRES, CRES2, CRES3, cystatin E2) of the CRES (cystatin-related epididymal spermatogenic) subgroup, a reproductive subgroup within the family 2 cystatins of cysteine protease inhibitors. Further the amyloid forms of the CRES subgroup are in the amyloid matrix and all members form amyloid in vitro suggesting they carry out coordinated functions, possibly through their assembly into a common amyloid structure. Several recent reports showed that some AMPs require an amyloid conformation for function. This includes α-defensin 6 in the gut which upon binding to bacteria assembles into amyloid nanonet that traps pathogens. Some bacteria also form their own amyloid net known as biofilm as a means of protection.

Our studies showed that CRES significantly reduced the survival of bacteria in vitro; further AMP activity was primarily associated with its amyloid and not monomeric form. Amyloid matrix isolated from the caput and cauda epididymis also exhibited potent AMP activity in vitro. Host defense amyloid structures, such as nanonets and biofilms, also contain extracellular DNA (eDNA) which is thought to provide stability. Our studies showed that eDNA is present within the epididymal amyloid matrix and that exposure to DNAse I caused the amyloid matrix to disperse. Taken together, our studies suggest the epididymal amyloid matrix is a novel host defense structure that is evolutionarily related to bacterial biofilms and which forms a protective net around spermatozoa to trap and kill pathogens.

MONDAY, APRIL 08, 2019
9:20 a.m. - 9:45 a.m.

SYMPOSIUM III: More Than Just Paternal DNA: Contributions of Sperm to Development and Adulthood Health
Identification of Epigenomic Signatures in Sperm Associated with Body Mass Index (BMI), Diet and Fertility Status
Sarah Kimmins, PhD1
Romain Lambrot1, Vanessa Dumeaux1, Olusola Sotunde1, Karen Lockyear2, Natalia Yasovitch3, Sophia Zheng3, Pamela Kurjanowicz3, Trevor Partch3, Rose Ghemrawi3, Christine Lafleur3, Linda Dodds4, Amanda MacFarlane4, Jacquetta5,6, Trasler5,6, Hope Weiler4, Clifford Librach5,6, Sergey Moskovtsev1,7,8

1Department of Animal Science, McGill University, Ste-Anne-de-Bellevue, QC, 2Department of Pharmacology and Therapeutics, McGill University, Montreal, QC, 3PERFORM Centre, University of Concordia, Montreal, QC, 4School of Human Nutrition, McGill University, Ste-Anne-de-Bellevue, QC, 5CREATe Fertility Centre, Toronto, ON, 6Departments of Obstetrics & Gynecology and Pediatrics, Dalhousie University, Halifax, NS, 7Nutrition Research Division, Health Canada, Ottawa, ON, 8Department of Obstetrics and Gynecology, University of Toronto, ON, 9Department of Human Genetics and Department of Pediatrics, McGill University, Montreal, QC.

Infertility is experienced by 17% of couples. It is a complicated and poorly understood health issue, attributable about 40% of the time to female factors, 40% to male factors and unexplained about 20% of the time. In the last two decades, sperm counts in men have halved; this is thought to be due in part to increased exposure to environmental chemicals and rising rates of obesity. Despite the father transmitting half the heritable information to the embryo the focus on preconception health has largely been on the mother. New studies highlight the role of the father in disease transmission via non-genetic inheritance, through epigenetic mechanisms. Epigenetic mechanisms include, DNA methylation, post-translational
modifications of histones and noncoding RNAs. Paternal effects have been linked to developmental abnormalities and complex diseases such as cancer, diabetes and obesity. Studies in humans and animals have linked epigenetic inheritance to the transmission of environmentally induced phenotypic traits from the father to the developing embryo and these have been associated with altered gene expression and developmental abnormalities in first and second offspring generations. Our most recent studies indicate that environmental challenges such as poor diet can alter the sperm epigenome in a cumulative manner to negatively impact embryo development. In translational studies in a clinical setting we have determined that men’s BMI can alter fertility parameters and the sperm epigenome. These findings indicate that in depth pre-conception advice should be further developed and communicated to men in order to optimize fertility and child health outcomes. Funded by the Canadian Institutes of Health Research

MONDAY, APRIL 08, 2019
9:45 a.m. - 10:10 a.m.

SYMPOSIUM III: More Than Just Paternal DNA: Contributions of Sperm to Development and Adulthood Health

Germline Stem Cell Competition Can Enhance Early Fetal Death
Norman Arnheim, PhD
University of Southern California, Los Angeles CA 90089-2910

Some genetic conditions arise primarily from de novo germline missense mutations every generation. Among them are mutations that reoccur at the same nucleotide site, are inherited in an autosomal dominant fashion, originate mainly in a male’s germline and with a probability that increases with his paternal age (RAMP). Evidence exists that these mutations occur at the expected germline nucleotide substitution rate (~10-8) but provide the mutant spermatogonial stem cell (SSC) with a selective advantage leading to germline stem cell mutation clusters. This increases the frequency of mutant sperm by orders of magnitude without new base substitutions. Little is known about how selection at individual RAMP mutation sites affects the overall disease incidence or the molecular mechanism of the selective advantage. We studied the SHP-2 tyrosine phosphatase exon 3 coding region (PTPN11 gene) that contains 11 of the 26 possible PTPN11 RAMP mutation sites causing recurrent Noonan syndrome (NS1). Eight of the 11 recurrent mutations exhibited the signature of germline selection, germline mutation clusters. Evidence is presented that selection at all 26 recurrent NS1 RAMP sites is the major contributor to the high incidence of NS (1 per 1,500-2,500 births), along with other genes each of which contribute in relatively minor ways. Unexpectedly, germline clusters of SHP-2 exon 3 mutations not normally associated with NS and thought to be restricted to sporadic mutations causing blood cell cancers were also found to result from positive germline selection. I will discuss the mechanisms behind the wide range of NS severity and how germline clusters of sporadic cancer mutations can be transmitted genetically and contribute to fetal lethality.

MONDAY, APRIL 08, 2019
10:10 a.m. - 10:35 a.m.

SYMPOSIUM III: More Than Just Paternal DNA: Contributions of Sperm to Development and Adulthood Health

Role of Sperm Centrosome During Fertilization and Embryo Development
Pierre Comizzoli, DVM, MSc, PhD
Smithsonian Conservation Biology Institute, Washington DC, USA

The sperm centrosome is a paternally-inherited organelle essential to successful fertilization (via sperm aster formation) and early embryo development. While there are structural and functional commonalities among animal species, original traits in the cat sperm centrosome offers new insights into sperm maturation as well possible treatments for certain types of infertility. In contrast to ejaculated counterparts, cat testicular spermatozoa contain an immature centrosome preventing the formation of a large sperm aster post-fertilization, which increases the incidence of early arrest in embryonic development. Epididymal transit, therefore, appears key to producing a fully functional sperm centrosome. Specifically, incidence of cenexin- a key protein involved in the centrosomal maturation – progressively increases in sperm cells from caput to cauda epididymis. It appears that exosomes secreted by the epithelium (epididymosomes) play a critical role in epididymal sperm maturation and could be ideal vehicles to assist in the enhancement or suppression of male fertility. Proteomic analysis of epididymosomes has also identified candidate paternal factors influencing the capacity of the sperm cell to fertilize an oocyte and lead a successful early embryo development. Interestingly, centrosomal dysfunctions can occur in mature domestic cat spermatozoa too, specifically in males ejaculating high proportions of pleiomorphic spermatozoa (i.e., teratospermia). In addition, certain preservation approaches also influence cat centrosomal functions. While sperm centrosomes appear unaffected by conventional freezing methods, emerging techniques that involve cellular desiccation or long-term preservation in liquid environment can adversely impact centrosomal properties of normal, mature spermatozoa. Thus, investigations of the sperm centrosome in the cat model are laying groundwork for overcoming centrosomal immaturity or dysfunctions using gamete micromanipulations or developing in vitro sperm maturation systems.

© 2019 American Society of Andrology and European Academy of Andrology

Andrology, 2019, Supplement, 31
compaction of the lumen, due to excessive reabsorption; and (iii) sperm agglutination with luminal occlusion. In all cases, effects on the testis are the same: luminal fluid accumulates causing back-pressure on the testis, with swelling of rete testis and seminiferous tubules and subsequent tubular atrophy. After occlusion, cauda sperm are lost. However, after failure of reabsorption, diluted sperm are present, but with abnormalities.

**MONDAY, APRIL 08, 2019**
11:30 a.m. - 12:00 p.m.

**BEST OF THE EPIDIDYMIS**

New Frontiers in Understanding the Role of the Epididymis
Bernard Robaire, PhD
Departments of Pharmacology & Therapeutics and of Obstetrics & Gynecology, McGill University, Montreal, QC, Canada

Researchers from twelve countries, representing most laboratories working on understanding all aspects of the epididymis, met in Montreal on September 20-23 for The 7th International Conference on the epididymis. It is not possible to capture the wide range of exciting developments and new breakthroughs presented during the symposia and abstract presentations, but here are some of the highlights. Homage was paid to Patricia Cuasnicu to Michael Bedford, a pioneer in this field, who passed away in 2018. The plenary lecture, named in honor of Marie-Claire Orgebin-Crist, the other pioneer on epididymal research, was delivered by Louis Hermo on novel findings regarding the role of the cytoplasmic droplet. New approaches were illustrated to better understanding the morphology of the excurrent duct system, including factors that drive Wolffian duct development and the role of primary cilia as biosensors. Although still preliminary, there was the first demonstration of the presence of stem cells in the epididymis. Several new approaches to male contraception were identified. Growing understanding of the complex interactions between the immune system and the epididymis, as well as factors that contribute to and fight epididymitis, were illustrated in several presentations. The exploding field of non-coding RNAs, found in and secreted by principal cells, that attach to spermatozoa and are transported into oocytes opened up new mechanisms by which the epididymis plays a critical role in reproduction. Finally, new light was shed on the challenges of studying the human epididymis, with new insights into the structure, function, and complex transcriptional networks in this tissue.

**MONDAY, APRIL 08, 2019**
2:20 p.m. - 2:45 p.m.

**SYMPOSIUM IV: Novel Diagnostics and Therapeutics in Andrology**

Pain Phenotypes and Therapeutic Potential of Bacteria in the Bladder
David J. Klumpp, PhD
Ana Vicente-Sanchez, Ryan E. Yaggie, John M. Rosen, Jodi L. Westropp, and Anthony J. Scheaffer
Department of Urology, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA

To examine mechanisms of pain of bladder infection, we employed a murine UTI model to compare pelvic pain behavioral responses to uropathogenic E. coli (UPEC) with those of E. coli strains associated with asymptomatic bacteriuria (ASB). In contrast to ASB E. coli, UPEC evoked acute pelvic pain that was independent of bacterial loads or the inflammatory marker myeloperoxidase. These distinct bacterial pain phenotypes were recapitulated by instillation of purified lipopolysaccharide (LPS), where UPEC LPS induced pain that was not induced by ASB LPS, suggesting that LPS is a major determinant of E. coli pain phenotypes. Indeed, using UPEC and K12 E. coli mutants, we observed that E. coli lacking O-antigen induced post-UTI chronic pain that persisted after bacterial clearance, and genetic complementation of O-antigen abrogated the chronic pain phenotype. Post-UTI chronic pain was dependent upon a three-receptor nociceptive cascade involving TLR4, TRPV1, and CCR2. DREADD receptor-mediated neuronal silencing demonstrated that NaV1.8-positive neurons mediated post-UTI chronic pain.

The absence of pain from ASB infection, despite inflammation, suggested the possibility of analgesic activity by ASB E. coli. LPS from ASB E. coli blunted pain of acute UTI, and testing a panel of ASB E. coli revealed a spectrum of analgesic activity, with some ASB strains providing nearly complete pain relief. Moreover, ASB E. coli exerted durable analgesia in post-UTI chronic pain that was abolished in an ASB O-antigen mutant. Because ASB E. coli also promoted bacterial clearance in the murine UTI model, ASB E. coli strain 2-12 was evaluated in a pilot study treating canine UTI, where pathogens and pathogenesis show striking similarity to human UTI. Of 8 dogs with recurrent UTI with diverse pathogens, 3 dogs exhibited clinical and microbiologic cure, 2 dogs showed microbiologic cure with subsequent re-infection, and 1 dog had clinical cure. These studies indicate that ASB E. coli possess analgesic and anti-inflammatory activities. Taken together, E. coli possess a broad spectrum of pain phenotypes defined by LPS O-antigen and can induce chronic pain mediated by a peripheral nociceptive cascade. However, specific strains ASB E. coli also exhibit analgesic and anti-inflammatory activities that can be exploited for clinical applications in urology.

**MONDAY, APRIL 08, 2019**
2:45 p.m. - 3:05 p.m.

**SYMPOSIUM IV: Novel Diagnostics and Therapeutics in Andrology**

Use of Cap-Score™ for Diagnostic Assessment of Male Fertility: Prospective Clinical Outcomes
Alexander J. Travis, VMD, PhD
Cornell University, NY; Androvia LifeSciences, NJ

**Introduction:** Semen analysis (SA) does not assess sperm fertilizing ability and fails to diagnose most male infertility. Sperm become able to fertilize the oocyte through the process of capacitation. The percentage of sperm with GMI localization patterns reflecting capacitation and ability to fertilize is defined as the Cap-Score™ (Moody et al., 2017). We have tested the relationship between Cap-Score and fertility. Medical histories revealed that men with Cap-Scores over a threshold had higher clinical fertility than men below (92.3 vs 20.7%). A cohort comparison of 76 fertile men vs 122 men questioning their fertility was performed. Cap-Score had a normal distribution in men with proven fertility. A greater proportion of men questioning their fertility had low Cap-Scores (33.6% vs 13.2%; Cardona et al., 2017).

**Methods:** We prospectively tested if Cap-Score can predict male fertility (Schinfeld et al., 2018). The outcome was clinical pregnancy in ≤3 intruterine insemination cycles (IUI; chosen to control number and timing of inseminations). Logistic regression was performed to evaluate the relationship of Cap-Score and a man’s probability of generating pregnancy (PGP).

**Results:** Cap-Score and SA were performed (n=208), with 91 outcomes available. Predictions of low vs normal fertility were based on a threshold Cap-Score of 27.6%. Absolute and cumulative pregnancy were reduced with low Cap-Scores ([absolute: 10.6 vs 29.5%; p=0.04]; [cumulative: 4.3 vs 18.2%, 9.9 vs 29.1%, and 14.0 vs 32.8% for cycles 1–3; n=91, 64, and 41; p=0.02]). However, male fertility is not a binary condition of infertile/ fertile. We performed logistic regression on 124 men from 5 clinics to evaluate Cap-Score and SA results alone and in combination, to identify the best predictor(s) of PGP. A significant relationship was established between Cap-Score and PGP (p<0.001), and Akaike Information Criterion showed that Cap-Score alone provided the best predictive model (Schinfeld et al., 2018).
**Conclusion:** Based on clinical outcomes, Cap-Score provides informative insight into male fertility, enabling physicians and couples to make informed decisions about their pathway to pregnancy.

**Funding:** NIH, BioAccelerate NYC Prize, Cornell U, Androvia LifeSciences.

**MONDAY, APRIL 08, 2019**

**3:05 p.m. - 3:25 p.m.**

**SYMPOSIUM IV: Novel Diagnostics and Therapeutics in Andrology**

**Sperm mRNA Biomarkers Associated with Testis Injury**

Kim Boekelheide, MD, PhD
Brown University

Evaluation of testicular injury and dysfunction currently relies upon assessment of semen parameters and serum hormone levels, which are insensitive and variable indicators of testicular dysfunction. Sperm mRNA transcripts are acquired during spermatogenesis and reflect the integrity of that process; therefore, measuring these sperm biomarkers has the potential to provide insight into the testicular response to chemical exposures and injury.

Sperm are unusual in their lack of ribosomal RNA, the small amounts of RNA they contain, and the relative abundance of small RNAs compared to large RNAs. Critical to our progress has been the development of a protocol to reproducibly isolate sperm RNA from humans and rodents. These species have over 6,000 similarly abundant sperm RNA transcripts, indicating their potential use as biomarkers in animal-based mechanistic studies and in the clinic. Drawing on a population of men presenting to an infertility clinic for sperm evaluation, we found that the amount of sperm long RNAs is associated with sperm abnormalities (↓ motility, ↓ sperm counts). Using a well-understood model of ethylene glycol monomethyl ether (EGME) in the rat, we have shown that this spermatocytic toxicant produced alterations in rat sperm RNAs at lower levels of exposure than those producing histopathological changes in the testis and epididymis. Sub-chronic exposure to a variety of testicular toxicants in rats altered clusterin sperm mRNA, and RNAseq identified a dose-dependent EGME-induced increase in rat clusterin sperm mRNA fragments, with those from the 3’-end of clusterin sperm mRNA being particularly abundant. Sperm mRNA biomarkers highly predictive of EGME exposure in the rat were present in human sperm in a similar abundance, indicating the potential use of mRNA biomarkers in humans to monitor the effects of environmental exposures.

**MONDAY, APRIL 08, 2019**

**4:00 p.m. - 4:45 p.m.**

**EAA LECTURE**

**Fertility of Patients with Disorders of Sex Development - Results of dsd-LIFE Study**

Jolanta Slowikowska-Hilczer
Department of Andrology and Reproductive Endocrinology, Medical University of Lodz, Lodz, Poland

Disorders of sex development (DSD) have been defined as congenital conditions in which chromosomal, gonadal or genital sex is atypical. Such conditions often affect the ability to have biological children. The surgical and hormonal treatments that the patients with DSD undergo may also affect fertility, as well as psychological and psychosocial factors related to the conditions.

In years 2012-2017 a multicentre clinical study (acronym dsd-LIFE) was conducted in six European countries (France, Germany, Great Britain, the Netherlands, Poland and Sweden). One of the aims was to investigate fertility outcome in individuals with different forms of DSD.

A total of 1040 patients, aged ≥16 years, with various diagnoses leading to DSD (gonadal dysgenesis, androgen insensitivity syndrome, Klinefelter syndrome, Turner syndrome and congenital adrenal hyperplasia), participated. Information on partner, number of children, artificial reproductive technologies (ART), adoption and step children, general health, presence of gonads and uterus, education and economic situation, received information on fertility issues and satisfaction with the information, was collected.

In the total cohort, mean age 32 years, 33% lived with a partner, but only 14% reported having at least one child including 7% with ART, 4% adopted. Only 3.5% of the total cohort had been able to reproduce without ART, most frequently women with congenital adrenal hyperplasia (CAH), and only 0.7% of participants with other diagnoses. 72% had received information on fertility, but 17% were not satisfied with the information.

**Conclusion:** Fertility outcome is significantly reduced in all types of DSD, however fertility potential should be individually assessed. The satisfaction with how fertility problems have been discussed can be improved. The care of patients with DSD should be individualized and new treatment possibilities incorporated. The fertility information and fertility treatment that can be offered to patients with DSD are complex. A close collaboration in multidisciplinary teams is therefore essential to improve the situation for individuals with DSD.

**TUESDAY, APRIL 09, 2019**

**8:00 a.m. - 9:00 a.m.**

**DIVERSITY LECTURE**

**Modeling African American Prostate Tumorigenesis with Organoids**

Sarki A. Abdulkidir, MD
Departments of Urology and Pathology and The Robert H. Lurie Comprehensive Cancer Center, Northwestern University Feinberg School of Medicine, Chicago, IL 60611, USA.

Organoids are emerging as a valuable platform for modeling tumorigenesis and testing therapeutic agents. We have assessed the feasibility of engineering defined genetic alterations in well-known cancer driver genes to transform benign prostate epithelial organoids derived from African American subjects. Modulation of MYC, PTEN, TP53 and AR, alone and in various combinations via lentiviral-mediated gene transfer recapitulated prostate cancer development. Organoids engineered to overexpress MYC and downregulate PTEN and TP53 were transformed to adenocarcinoma, expressing the clinical prostate cancer marker AMACR. The organoids also formed prostate adenocarcinoma when grafted under the renal capsule in mice. These data indicate that genetic alterations commonly observed in human prostate cancer can be rapidly modeled in human organoid culture in vitro.

In a second project, we have used organoid modeling to discover the mechanism by which antioxidant treatment (vitamin E) promotes cancer initiation. While vitamin E decreased proliferation and induced cell death in fully malignant cancer organoids, it enhanced cell proliferation and survival in premalignant (“initiated”) organoids. Normally, the survival of detached premalignant cells as in the lumen of organoids is impaired by low ATP levels due to diminished glucose uptake and glycolysis. However, Vitamin E treatment rescued this defect through the activation of fatty acid oxidation (FAO). FAO inhibition abrogated the ATP rescue, diminished survival of the inner matrix detached cells, restoring the normal hollow lumen morphology in Vitamin E treated organoids. Organoid models therefore clarify the paradoxical findings from chemoprevention clinical trials and demonstrate that Vitamin E promotes tumorigenesis in the early stages of prostate cancer evolution.
INTERSEMINAL LECTURE

Semenal Fluid Contributes to Female Reproduction Beyond Just Delivery of Sperm
Sarah Robertson, PhD
The Robinson Research Institute and School of Paediatrics and Reproductive Health, University of Adelaide, SA 5005 Australia

As well as delivering spermatozoa, seminal fluid interacts with female tract tissues to influence female reproductive physiology. In mouse and human systems we have investigated how signalling factors present in sperm and seminal plasma interact with epithelial and immune cells of the female tissues after coitus, to alter gene expression and induce local adaptations in the immune response that promote adaptation for pregnancy. Our findings show that seminal fluid composition has profound consequences not just for sperm quality and fertilisation potential, but also for progression of pregnancy and offspring phenotype. Firstly, this is exerted through indirect effects on pre-implantation embryos via oviduct cytokines, to influence epigenetic mechanisms of developmental programming in offspring. Secondly, seminal fluid elicits a specific population of regulatory T cells (Treg cells) that promote immune tolerance to male alloantigens, with beneficial consequences for embryo development and implantation, placental development and fetal growth, and offspring phenotype. Similar changes are seen in women, where seminal fluid contact at coitus induces marked changes in cytokine and chemokine production and subsequent leukocyte recruitment within the cervical tissue. There is now considerable evidence from mouse and human studies that both the plasma and sperm fractions of seminal fluid are involved. Both permissive and inhibitory factors are present in seminal fluid and the balance between these is likely to be impacted by genetic and environmental factors and exposures including nutrition, infection and microbial dysbiosis. Our findings are consistent with clinical evidence that seminal fluid composition and duration of sexual cohabitation impact susceptibility to common pregnancy disorders including gestational hypertension, preclampsia and fetal growth restriction.

SYMPOSIUM V: Emerging Technologies in Andrology

Update on Clinical Trials Utilizing Stromal Vascular Fraction for Management of Erectile Dysfunction
Trinity J. Bivalacqua, MD, PhD
Johns Hopkins Hospital

Erectile dysfunction (ED) is the most common sexual disorder reported by men to their health-care providers and the most investigated male sexual dysfunction. Currently, the treatment of ED focuses on symptomatic relief of ED and therefore tends to provide temporary relief rather than providing a cure or reversing the underlying cause. Stem cell-based therapies have received increasing attention regarding their potential for the recovery of erectile function long term. Preclinical studies have shown that these cells may reverse pathophysiological changes leading to ED rather than treating the symptom ED. There have been a number of clinical studies which have evaluated the safety of intracavernous and intravenous administration of mesenchymal stem cells and stromal vascular fraction (SVF). All trials have shown that both routes of administration are safe. We have recently completed a phase 2 trial in men with moderate to severe ED to test the efficacy of SVF. Additionally, we have completed a pre-prostatectomy trial in which men undergoing surgical treatment of prostate cancer received intravenous bone-marrow derived stem cells. In this lecture, the current mechanisms of stem cell based therapy for ED will be reviewed as well as review of clinical evidence for utilization of regenerative medicine for ED management.

SYMPOSIUM V: Emerging Technologies in Andrology

Mechanisms of Sertoli Cell Immune Regulation
Jannette Dufour, PhD
Gurvinder Kaur
1Department of Cell Biology and Biochemistry, 2Department of Medical Education, Texas Tech University Health Sciences Center, Lubbock, Texas USA

The testis is one of several immune privileged sites, which is necessary to protect developing germ cells from an immune response. Sertoli cells (SCs) play a key role in creating this environment by forming the blood testis barrier (BTB) and modulating the immune response. Moreover, isolated SCs protect co-grafted cells when transplanted as allografts or xenografts. This suggests that the underlying mechanisms mediating SC protection could be used to improve graft survival and protect germ cells. However, these mechanisms are not fully understood. Interestingly, co-grafted islets were not located within the SC tubules and yet enjoyed prolonged graft survival. This is similar to the testis where foreign tissue grafts located outside of the BTB are immune protected and suggests that testis immune privilege involves more than just sequestering cells behind the BTB. In support of this, we have found that SCs express several immunoregulatory proteins and survive transplantation by inhibiting the complement cascade and inducing regulatory immune cells. When SCs were cultured with human serum and complement, we found that SCs were resistant to complement-mediated cell lysis. Initially, human antibodies and complement cascade components were deposited on the surface of the SCs. However, the membrane attack complex (MAC) was not formed and cellular lysis was not observed. Similarly, in vivo xenotransplantation of pig SCs into rats resulted in prolonged graft survival with MAC not detected. The SCs expressed several complement inhibitors and knockdown of DAF or MCP resulted in lysis of SCs, demonstrating the importance of these factors in SC immune privilege. Analysis of the adaptive immune response indicated that there was a significant decrease in apoptosis and proinflammatory cytokines, while a significant increase in anti-inflammatory cytokines, immunomodulatory factors, and regulatory immune cells was observed. Tregs were found to be critical as Treg depletion resulted in SC graft rejection. Overall, our results demonstrate that SCs survive and immunoprotect co-grafted cells by creating an immune privileged anti-inflammatory environment, inducing regulatory immune cells and inhibiting the complement cascade.

SYMPOSIUM V: Emerging Technologies in Andrology

Role of Pig Models in Preserving and Regenerating Male Fertility
Mariana I. Giassetti
Jon M. Oatley
Center for Reproductive Biology, School of Molecular Biosciences, College of Veterinary Medicine, Washington State University

Approximately 10-15% of adult men suffer from infertility or subfertility with ~1% being diagnosed with idiopathic non-obstructive azoospermia. For decades, the mouse has been the predominant animal model for understanding the etiology of human infertility and the development of therapies. However, the mouse is an imperfect model for human infertility, as the testis barrier in the mouse is nutritionally supported by testis-supporting accessory organs that are not present in the human testis. To address this, a preclinical model of spermatogenesis regeneration is being developed in vitro based on isolated SC xenografts in SC knockout nude mice. In vivo xenografts using the pig SC xenogeneic model have successfully co-grafted SCs and islets from different species and xenogeneic SCs can survive several weeks. These xenografts have not been evaluated for fertility potential and have been studied for other uses, including insulin delivery. Using SC xenografts, we have demonstrated for the first time that SCs protect co-grafted cells when transplanted as allografts or xenografts. This suggests that the underlying mechanisms mediating SC protection could be used to improve graft survival and protect germ cells. However, these mechanisms are not fully understood. Interestingly, co-grafted islets were not located within the SC tubules and yet enjoyed prolonged graft survival. This is similar to the testis where foreign tissue grafts located outside of the BTB are immune protected and suggests that testis immune privilege involves more than just sequestering cells behind the BTB. In support of this, we have found that SCs express several immunoregulatory proteins and survive transplantation by inhibiting the complement cascade and inducing regulatory immune cells. When SCs were cultured with human serum and complement, we found that SCs were resistant to complement-mediated cell lysis. Initially, human antibodies and complement cascade components were deposited on the surface of the SCs. However, the membrane attack complex (MAC) was not formed and cellular lysis was not observed. Similarly, in vivo xenotransplantation of pig SCs into rats resulted in prolonged graft survival with MAC not detected. The SCs expressed several complement inhibitors and knockdown of DAF or MCP resulted in lysis of SCs, demonstrating the importance of these factors in SC immune privilege. Analysis of the adaptive immune response indicated that there was a significant decrease in apoptosis and proinflammatory cytokines, while a significant increase in anti-inflammatory cytokines, immunomodulatory factors, and regulatory immune cells was observed. Tregs were found to be critical as Treg depletion resulted in SC graft rejection. Overall, our results demonstrate that SCs survive and immunoprotect co-grafted cells by creating an immune privileged anti-inflammatory environment, inducing regulatory immune cells and inhibiting the complement cascade.
of treatment strategies. Although much has been learned by studying mice, significant differences exist when compared to humans including testicular architecture and mechanisms underlying spermatogenesis. The domestic pig is a non-traditional model of human physiology but has many attributes that make it well suited as an experimental model including similarities in organ anatomy and genome structure. With recent advances in gene editing tools such as CRISPR/Cas9, the domestic pig is becoming an attractive model to explore causes of male infertility and devise treatment strategies. To this end, we have been exploring the role NANOS2, a gene that is evolutionarily conserved in metazoan as being expressed in the germline only, in spermatogenesis using pig models. In recent studies, we used CRISPR/Cas9 technology to generate pigs with inactivating mutations in NANOS2 and discovered that they phenocopy knockout mice with male specific sterility due to germline ablation. In addition, we found that seminiferous tubules of NANOS2 deficient male pigs are able to harbor regeneration of spermatogenesis following transplantation with wild-type spermatogonial stem cells. These findings demonstrate that the testicular soma is intact in males that lack germline due to NANOS2 deficiency. Considering that expression of NANOS2 is germline specific, at least some cases of azoospermia in men could be attributed to inactivating mutations. Thus, NANOS2 mutant pigs could serve as valuable model for understanding the etiology of male azoospermia. Moreover, the germline ablation phenotype but intact soma and testicular architecture provides an outstanding model for refining spermatogonial stem cell transplantation methodology that could be applicable to humans.
HETEROGENEITY OF PROTON SECRETING EPITHELIAL CELL FUNCTION REVEALED BY TRANSCRIPTOMIC CLUSTER ANALYSIS

Maria Agustina Battistone PhD¹, Raul G Spallanzani PhD², Anil V Nair PhD², Alexandra C Mendelsohn BS¹, Dennis Brown PhD¹ and Sylvie Breton PhD¹
¹Massachusetts General Hospital/Harvard Medical School; ²Harvard Medical School
Presented By: Maria Agustina Battistone, PhD

In the epididymis, elaborate communication networks between the different epithelial cell types are important to establish a luminal environment that is essential for sperm maturation. Clear cells (CCs) play a critical role in this process by secreting H+ via the vacuolar H+-ATPase. In this study, we used RNA sequencing to characterize the transcriptome of CCs in caput, corpus and cauda, isolated by cell sorting from B1-EGFP mice that express EGFP only in CCs. We demonstrated that CCs from the three regions were clearly separated from each other based on general transcriptome expression profiles. Cluster analysis based on location-specific transcript expression patterns identified nine clusters that may represent discrete states in a continuum rather than strictly independent entities of CCs. While several genes were common to all CCs, subsets of genes were differentially expressed in CCs from each region, and some were exclusive to each region. These include cell-surface receptors, transcription factors, transporters, and secreted proteins. Interestingly, CCs express transcripts that encode proteins that have been previously shown to be acquired by sperm during epididymal transit and were also detected in extracellular vesicles called epididymosomes. Confocal microscopy analysis of the B1-EGFP epididymis revealed the presence of several types of apical membrane protrusions in narrow cells in initial segments and CCs in caput. While some of these membrane extrusions may represent apocrine secretion, others were long apical extensions, similar to nanotubes, which reached out into the lumen to directly interact with spermatozoa. These results indicate that CCs play an important role in the transfer of products to sperm, either via direct contact with the sperm cell or via the production of epididymosomes. Surprisingly, we found that CCs express multiple components involved in immune regulation: inflammatory response-associated and anti-inflammatory genes, indicating that CCs have characteristics of immune regulatory cells, including the potential to mount an innate immune-defense against luminal pathogens while preserving sperm from the host immune system. This unexpected array of biological functions adopted by professional acid secreting cells in the epididymis might represent a more generalized phenomenon by which similar cells in other organs also sense and decode extracellular signals and communicate with their neighbors via cell-cell crosstalk.

SPECIFIC REQUIREMENT FOR THE 14-3-3 EPSILON ISOFORM IN MOUSE SPERMATOGENESIS

Alaa Eisa MSc, Alexander Ignatious BSc, Souvik Dey PhD, Srinivasan Vijayaraghavan PhD and Douglas Kline PhD
Kent State University
Presented By: Alaa Eisa, MSc

Spermatogenesis is a complex biological process. Synthesis of new proteins and activation of proteins that regulate meiosis and cellular differentiation occur during spermatogenesis. YWHA or 14-3-3 proteins are adaptor proteins found in eukaryotic cells. Phosphatases, kinases and proteins important for cell cycle regulation, apoptosis, and cancer show an interaction with protein 14-3-3. There are seven isoforms for the 14-3-3 protein encoded by seven genes (β, ε, γ, η, θ, ζ and σ). 14-3-3 isoforms have been shown to have many interacting partners in the seminiferous epithelium of the testis. While it is known that 14-3-3 proteins are expressed in testis and sperm, the expression and role for each of the seven isoforms are not known. The roles of 14-3-3 η and ε isoforms in testes were examined in this study. Western blotting shows the presence of 14-3-3 η and 14-3-3 ε in testis lysate and, while 14-3-3 ε was detected in sperm lysate, 14-3-3 η was not detected. Transgenic mice containing LoxP sites to remove exon 2 from the 14-3-3 η and exons 3 and 4 from 14-3-3 ε mice were used in this study to define roles for these two isoforms. The transgenic mice were bred with Stra8 and ACTB cre recombinase expressing in mice to produce testis-specific conditional knockout (CKO) and global knockout (GKO) mice. The absence of the 14-3-3 η and ε isoforms were confirmed by using polyclonal and monoclonal antibodies against 14-3-3 η and ε. Breeding tests indicate that CKO or GKO males lacking 14-3-3 ε were infertile. However, mice lacking 14-3-3 ε were normal and fertile. Females lacking either of the two 14-3-3 isoforms were normal and fertile. Low sperm count with higher abnormal sperm was seen in 14-3-3 ε CKO mice. Using the Computer Assisted Semen Analysis (CASA) system, the motility of 14-3-3 ε CKO and GKO sperm was seen to be significantly lower compared to the control sperm. A decrease in the phosphorylation of both glycogen synthase kinase 3 (GSK3) and PP1γ2, the signal enzymes essential for male fertility, were seen in sperm from 14-3-3 ε KO mice, suggesting that the absence of 14-3-3 ε may alter signaling pathways known to regulate spermatogenesis, sperm motility, and fertility. (NIH grants HD086839 SV and HD061869 DK)

EFCA9 is a pH-dependent Ca2+ sensor that regulates Catsper channel activity and sperm motility

Jae Yeon Hwang PhD¹, Nadja Mannowitz PhD², Yongdeng Zhang PhD², Robert Everley PhD³, Steven Gygi PhD³, Joerg Bewersdorf PhD³, Polina Lishko PhD³ and Jean-Ju Chung PhD¹
¹Yale School of Medicine; ²UC Berkeley; ³Harvard Medical School
Presented By: Jean-Ju Chung, PhD

Varying pH of luminal fluid along the female reproductive tract is a physiological cue that modulates sperm motility. CatSper is a sperm-specific, pH-sensitive calcium channel essential for hyperactivated motility and male fertility. Multi-subunit CatSper channel complexes organize linear Ca2+ signaling nanodomains along the sperm tail. Here, we identify EF-hand calcium-binding domain-containing protein 9 (EFCA9) as a dual function, cytoplasmic machine modulating the channel activity and the domain organization of CatSper. Knockout mice studies demonstrate that EFCA9, in complex with the CatSper subunit, CATSPERZ, is essential for pH-dependent and Ca2+ sensitive activation of the CatSper channel. In the absence of EFCA9, sperm motility and fertility is compromised and the linear arrangement of the Ca2+ signaling domains is disrupted. EFCA9 interacts directly with CATSPERZ in a Ca2+ dependent manner and dissociates at elevated pH. These observations suggest that EFCA9 is a long-sought, intracellular, pH-dependent Ca2+ sensor that triggers changes in sperm motility.
ETHYLENE GLYCOL MONOMETHYL ETHER EXPOSURE ALTERS CLEAVAGE OF TRNA FRAGMENTS IN RAT SPERM

Angela Stermer PhD, Susan Hall and Kim Boekelheide PhD, MD
Brown University

Presented By: Angela R. Stermer, PhD

Many male reproductive toxicants adversely affect fertility through mechanistic targets in one or more distinct cell types in the testis. Regardless of the primary cell targeted by a testicular toxicant, the common thread among these compounds is impairment of spermatogenesis and/or sperm quality. Ethylene glycol monomethyl ether (EGME) targets a specific germ cell subset, the primary spermatocytes, and leads to germ cell apoptosis at high levels of exposure. We hypothesized that the sperm that developed from EGME-exposed germ cells will have altered small RNA profile. Specifically, we looked at tRNA fragments (tRFs) in sperm, because they have been shown to influence embryonic development. Rats were exposed to 0, 50, 60 or 75 mg/kg EGME for 5 days, and then sperm were collected 5 weeks later. Small RNA-sequencing was performed on RNAs isolated from the sperm. The total amount of tRFs relative to library size did not change with treatment; however, the tRFs became longer as a function of treatment, significantly so at 60 and 75 mg/kg. At 60 and 75 mg/kg EGME, there was a shift in the fragment size distribution, with a decreasing peak between 22-27 nucleotides and an increasing peak of 28-33 nucleotides. Using the interactive genome browser, the fragmentation pattern of tRNAs was readily visualized; for example, the tRNA GlyGCC were mostly 5’ fragments which became progressively longer with increasing EGME exposure. Interestingly, sperm tRFs have been shown to originate from the epididymis, and EGME targets germ cells. We are currently performing an exposure to EGME at 60 mg/kg for 5 days and collecting testis and epididymis once a week for 5 weeks to determine the molecular mechanism of EGME altered tRF fragmentation. Since tRFs have been implicated in the transmission of metabolic disease in mice, these data raise the concern that EGME disruption of normal tRNA fragmentation results in altered epigenetic contents of sperm and potential effects on embryogenesis.

KANK1 COPY NUMBER VARIANTS ARE ASSOCIATED WITH GENITOURINARY BIRTH DEFECTS

Nannan Thirumavalavan MD1, Mariol O’Neill MS2, Meade Haller PhD2, Jason Scovell Bfa2, Cenk Gengiz BA2, Joshua Moore MS2, Jeffrey White MD, PhD2, Kunj Sheth MD2 and Dolores J. Lamb PhD1

1Baylor College of Medicine; 2Baylor College of Medicine, Houston, TX; 3Departments of Urology and Genomic Medicine and Englander Institute for Personalized Medicine, Weill Cornell Medical College, New York, NY

Presented By: Dolores J. Lamb, PhD, HCLD

Introduction and Objectives: Array Comparative Genomic Hybridization analysis (aCGH) of non-syndromic patients with genitourinary (GU) birth defects revealed copy number variants encompassing a candidate gene encoding kidney ankyrin repeat-containing protein 1 (KANK1) for GU birth defects including ambiguous genitalia, micro-penis, andcryptorchidism (Tannour-Louet et al. PLoS One, 2010). This work defined the phenotype of the male GU tract resulting from loss of function of the Kank1 gene in mice.

Methods: The effect of Kank1 copy number loss on the GU system was defined using de novo murine models of Kank1 haploinsufficiency and null deletion to elucidate the role of this gene in GU development. In situ hybridization of murine embryos was performed to confirm Kank1 expression in the GU tract. Kank1 homozygous knockout mice were created using a CRISPR/Cas9 approach. Phenotyping was performed at 10 weeks of age, and micro-CT allowed standardized measurement of penile structures. 1-year old mice also provided testes and epididymides for testicular mass and histology. The epididymides were removed and semen analyses and breeding studies were performed. To assess kidney development and histopathology, micro-CT, histology and electron microscopy (EM) were performed. All studies were IRB and IACUC approved.

Results Obtained: One Kank1 null mouse exhibited micro-penis, but no other penile abnormalities were identified in 9 haplo-insufficient and 14 null mice. Micro-CT revealed that null mice had shorter penis lengths (5.90 +/- 0.15 versus 5.62 +/- 0.31, p=0.05), and lower total motile sperm counts (5.18 million/cc vs 12.36 million/cc, p=0.39). Tests showed histopathologic differences, with vacuoles in the seminiferous epithelium. Immunofluorescent microscopy revealed collagen replacement and fibrosis in glomeruli, and proteinaceous deposits in the tubules. EM of Kank1 haplo-insufficient mice demonstrated altered podocyte structure. In summary, the kidney findings are consistent with focal segmental glomerulonephritis, a condition associated with renal failure in humans.

Conclusions: Gene-dosage changes of Kank1 phenotype in a mouse model partially mimic the human phenotype showing the presence of smaller testis and penile size, histologic anomalies of the seminiferous epithelium, decreased spermatogenic function and decreased fertility, as well as kidney abnormalities including hydronephrosis and altered podocyte structure.

GENE DELETION OF STEROIDOGENIC ACUTE REGULATORY PROTEIN (STAR) BY CRISPR/CAS9 DEMONSTRATES A CRITICAL RELATIONSHIP BETWEEN CONSTITUTIVE STAR AND TRANSLATOR PROTEIN TSPO FOR STEROIDOGENESIS

Melanie Galano1, Yasaman Aghazadeh PhD2, Yuchang Li PhD1 and Vassilios Papadopoulos DPharm, PhD, DSc1,2

1Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, CA, USA; 2Research Institute of McGill University Health Center and Department of Medicine, McGill University, Montreal, Quebec, Canada

Presented By: Melanie Galano

Steroidogenesis begins with the transfer of cholesterol from cytosolic stores into mitochondria. This is the hormone-sensitive and rate-limiting step. The transducing complex, consistent of cytosolic and mitochondrial proteins such as the hormone-induced steriodogenic acute regulatory protein (STAR) and the outer mitochondrial membrane cholesterol-binding translocator protein (TSPO), mediates the transport of cholesterol to the P450 side-chain cleavage enzyme (CYP11A1) at the inner mitochondrial membrane. While studies have revealed the vital roles of both STAR and TSPO in facilitating cholesterol transport into the mitochondria, the precise relationship and interactions between these two proteins are still unknown. Previously, we found that deletion of TSPO in MA-10 cells, which are hormone-responsive mouse tumor Leydig cells, resulted in decreased progesterone production and altered synthesis and/or mitochondrial processing of STAR. In addition, we used co-immunoprecipitation through proximity ligation assays to identify a direct interaction between STAR and TSPO following stimulation by cyclic adenosine monophosphate (cAMP). To further elucidate the relationship between STAR and TSPO, we used the CRISPR/Cas9 system to knock out (KO) STAR in MA-10 cells. We found that STAR KO fails to stimulate progesterone production upon human chorionic gonadotropin (hCG) and dibutyryl-cAMP stimulation, but not upon stimulation by 22R-hydroxycholesterol. Furthermore, stimulation by the TSPO drug ligands, FGIN-1-27 and XBD173, which induce steroid formation in wild type MA-10 cells, failed to induce progesterone production in STAR KO MA-10 cells.
KO cells. These studies show that, without the presence of constitutive STAR, TSPO-mediated steroid production is hindered, suggesting a function for constitutive STAR in regulating mitochondrial TSPO function. Taken together, these results show that STAR and TSPO have reciprocal interdependence for proper function and that the relationship between STAR and TSPO is critical for steroid production.

**Oral #7**

**XENOGRAFTING CRYOPRESERVED PRIMATE TESTICULAR BIOPSIES INTO IMMUNE COMPROMISED MICE**

Sherin David MS¹, Meena Sukhwani PhD², Karen A. Peters BS², Hanna Valli PhD² and Kyle E. Orwig PhD⁴

¹Department of Obstetrics, Gynecology and Reproductive Sciences, Molecular Genetics and Developmental Biology Graduate Program, University of Pittsburgh School of Medicine, Pittsburgh, PA; ²Magee-Womens Research Institute, Pittsburgh, PA; ³Department of Obstetrics, Gynecology and Reproductive Sciences, Magee-Womens Research Institute, Pittsburgh, PA

Presented By: Sherin David, MS

Fertility preservation programs in the US and abroad are freezing testicular tissues for young patients who are at risk of infertility with anticipation that next generation reproductive technologies will be available to use those tissues in the future. Immature testicular tissues from several mammalian species can be matured to produce sperm after xenografting under the back skin of immune-deficient mice. Previous studies demonstrated that fresh non-human primate (nHP) testicular tissues can be matured in a mouse host to produce sperm and live offspring. This result has not been replicated with cryopreserved testicular tissue from primate donors, which is a critical aspect of the fertility preservation paradigm. We xenografted cryopreserved testicular biopsies obtained from prepubertal Rhesus macaques into immune-deficient mice. Additionally, we studied the effects of vascular endothelial growth factor (VEGF) and human chorionic gonadotropin (hCG) on graft survival and maturation. We observed complete spermatogenesis in grafts recovered from mice treated with hCG with or without VEGF. Immunostaining analysis revealed the presence of meiotic germ cells in 40.3±6.59% of the tubules and post-meiotic germ cells in 28.6±3.4% of the tubules in grafts retrieved from the hCG treatment group. In contrast, grafts from the VEGF treatment group had spermatogonia in 29.7±8.75% of the tubules and post-meiotic germ cells in 28.5±5.51% of the tubules in the tubules with no evidence of differentiation. No grafts were recovered from mice that were untreated. Similar experiments were carried out using cryopreserved prepubertal human testicular biopsies. Human grafts recovered at 7 months post-grafting from hCG and hCG+VEGF treated mice were significantly larger than grafts recovered from untreated mice (p=0.05 and 0.003, respectively). Seminal vesicles in graft recipients that received hCG+VEGF were significantly larger than untreated recipients, suggesting higher testosterone production from the grafts. However, upon recovery, all human grafts exhibited a Sertoli cell only phenotype with the complete absence of germ cells. These results indicate that cryopreserved nHP testicular biopsies retain the potential to undergo maturation upon exposure to hCG in the murine microenvironment. Further studies are required to identify conditions that can promote germ cells survival and differentiation in cryopreserved human xenografts. This work was supported by NIH grant HD075795 and institutional funds.

**Oral #8**

**TESTOSTERONE USE AND RISK OF MYOCARDIAL INFARCTION (MI) AND STROKE**

Molly Shores MD¹, Thomas Walsh MD¹, Anna Korpak PhD¹, Chloé Krakauer MS¹, Christopher Forsberg MS², Kathryn Moore PhD³, Alexandra Fox MS¹, Nicholas Smith PhD¹,², Mary Lou Thompson PhD¹ and Alvin Matsumoto MD¹,²

¹University of Washington, VA Puget Sound Health Care System; ²Epidemiology, Research and Information Center VA Puget Sound Health Care System; ³University of Washington; ⁴University of Washington, Dept of Epidemiology; ⁵Epidemiology, Research and Information Center, VA Puget Sound Health Care System; ⁶University of Washington, Dept of Medicine; ⁷Geriatric Research, Education and Clinical Center (GRECC), VA Puget Sound Health Care System

Presented By: Molly Shores, MD

**Introduction:** Despite an unclear risk for major cardiovascular events, testosterone (T) prescriptions increased markedly over the past decade. Although several studies found no increased risk for cardiovascular events with T treatment, few have examined risk by T formulation and current T use.

**Objective:** Examine the association of T treatment with MI and ischemic stroke in older men. Design. A cohort of male Veterans from the Department of Veteran Affairs (VA) who had an initial low serum T measurement from 2002–2011 were followed through September 2012 for T initiation and incident cardiovascular events. T use was modeled in a time–varying manner by formulation (transdermal [TD] or intramuscular [IM]) and by treatment status: current, former and no use. Cox regression analyses were conducted to examine the risk of incident MI or stroke with current T use versus former T use (selected as the reference group to reduce confounding by indication). In a time–varying manner, we stratified analyses by prevalent cardiovascular disease (CVD) and adjusted for medical morbidity and hospitalization.

**Results:** 202,803 men (average age 60.9 years) with low serum T levels were followed for a mean duration of 4.2(2.8) (SD) years. 39% of men were treated with T; with 65% T exposure from IM T and 35% from TD T. We identified 7,402 incident MI and 3,750 incident stroke events. In adjusted models, current T use versus former T use was not associated with an increased risk of MI or stroke in either TD or IM T users. (See Table which shows adjusted Hazard Ratios (HR) with 95% confidence intervals below the HRs. Former T use is the reference group.) Findings were similar using no T use as the reference group.

**Conclusions:** In a large observational study of men with low serum T levels, current use of either IM or TD T was not associated with an increased risk of MI or stroke.

<table>
<thead>
<tr>
<th></th>
<th>MI No CVD</th>
<th>MI CVD</th>
<th>Stroke No CVD</th>
<th>Stroke CVD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TD T</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>0.9</td>
<td>0.8</td>
<td>1.0</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>.7-1.2</td>
<td>.7-9</td>
<td>.7-1.4</td>
<td>.7-1.1</td>
</tr>
<tr>
<td>No use</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>1.1-1.2</td>
<td>1.1-1.2</td>
<td>1.9-1.3</td>
<td>1.9-1.2</td>
</tr>
<tr>
<td><strong>IM T</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>.8-1.1</td>
<td>.9-1.1</td>
<td>.7-1.3</td>
<td>.7-1.1</td>
</tr>
<tr>
<td>No use</td>
<td>0.8</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>.8-1.0</td>
<td>.9-1.0</td>
<td>.7-1.1</td>
<td>.8-1.0</td>
</tr>
</tbody>
</table>
Mutations in the minichromosome maintenance 8 (MCM8) gene are associated with male and female infertility as well as increased chromosomal breakage in patients. In a genomic familial study, we reported a specific pathogenetic variant (c.446C>G; p.P149R) discovered in three sisters affected with primary ovarian insufficiency. We used CRISPR/Cas9 gene editing to produce mice with mutations in the orthologous region of the mouse Mcm8 gene. We generated an eleven base-pair deletion (-11) with a strong infertility phenotype. Homozygous Mcm8(-11) male mice were unable to sire offspring when paired with wildtype females. Compared with normal littermate controls, homozygous Mcm8(-11) testes were significantly reduced in size and no sperm were recovered from the tail of the epididymis, resulting from a blockage in meiotic prophase I. Our Mcm8(-11) mice resemble our human patient condition and will be useful to investigate germline gene therapies in males affected with non-obstructive azoospermia. This work was supported by institutional funds and a training grant to ACZ T32 HD087194.

Transgender women are individuals born with male sex characteristics who identify as female. These individuals may choose to be treated with a combination of estrogen and anti-androgen to better align their physical appearance with their gender identity. Existing literature reports variable rates of spermatogenesis in pathology specimens, limiting accurate counseling of transgender women about their fertility potential. Therefore, our goal was to evaluate spermatogenesis in pathologic specimens from transgender women on gender-affirming hormone therapy at the time of bilateral simple orchectomy. Following IRB approval, transgender women who underwent gender-confirming orchietomy from 2011-2018 were identified in the Department of Pathology archives. A retrospective medical records review was performed to gather clinical information. Pathology reports were reviewed for specimen weight, dimensions of testes and description of spermatogenesis. To compare continuous variables, Students t-test was used. 52 transgender women who underwent bilateral simple orchietomy were identified (mean age 38 years, SD 13, range 22-66). All were socially transitioned (living as women); 40 of 52 (77%) were listed as female gender in the medical record and patients were on gender-affirming hormone therapy for a mean of 2.4 years (SD 2, range 1-10). Intact spermatogenesis was reported in 13.5%, hypo-spermatogenesis in 23.1%, no spermatogenesis in 51.9% and spermatogenesis was not reported in 11.5% of testis specimens. There was no difference in estimated testis volume among testes found to have some spermatogenesis (mean 30 cc, SD 15) versus no spermatogenesis (mean 22 cc, SD 7, p = .10). While a substantial proportion of transgender individuals do desire future fertility, historically, the reproductive needs of these patients have been largely ignored. Our study demonstrates that in testis tissue from transgender women on gender affirming hormone therapy, some or intact spermatogenesis is present at the time of bilateral simple orchietomy. This finding has important implications for counseling transgender women about their reproductive potential.

© 2019 American Society of Andrology and European Academy of Andrology

Oral #9
AN 11-BASE PAIR DELETION IN MOUSE MINICHROMOSOME MAINTENANCE 8 (MCM8) MIMICS HUMAN INFERTILITY IN PATIENTS WITH MCM8 DELETERIOUS MUTATIONS
Amanda Colvin Zielen PhD¹, Mainpal Rana PhD¹, Yi Sheng PhD¹, Aleksandar Rajkovic MD, PhD² and Kyle Orwig PhD³
¹Magee Womens Research Institute, University of Pittsburgh; ²University of California San Francisco
Presented By: Amanda Mae Colvin Zielen, PhD

Oral #10
SPERMATOGENESIS IN THE TRANSGENDER TESTIS
Tristan Nicholson MD, PhD¹, Ivor Clinton BS², John Amory MD, MPH³, Nicholas Reder MD, MPH⁴, Thomas Walsh MD, MS⁵ and Ashleigh Theberge PhD⁶
¹Departments of Urology and Chemistry, University of Washington; ²Department of Chemistry, University of Washington; ³Department of Medicine, University of Washington; ⁴Department of Pathology, University of Washington; ⁵Department of Urology, University of Washington; ⁶Departments of Chemistry and Urology, University of Washington
Presented By: Tristan M. Nicholson, MD, PhD

Oral #11
WITHDRAWN

Oral #12
WITHDRAWN
Oral/Poster #1
HETEROGENEITY OF PROTON SECRETING EPITHELIAL CELL FUNCTION REVEALED BY TRANSCRIPTOMIC CLUSTER ANALYSIS
Maria Agustina Battistone PhD¹, Raul G Spallanzani PhD², Anil V Nair PhD³, Alexandra C Mendelsohn BS¹, Dennis Brown PhD¹ and Sylvie Breton PhD³
¹Massachusetts General Hospital/Harvard Medical School; ²Harvard Medical School
(Presented By: Maria Agustina Battistone, PhD)

Oral/Poster #2
SPECIFIC REQUIREMENT FOR THE 14-3-3 EPSILON ISOFORM IN MOUSE SPERMATOGENESIS
Alaa Eisa MSc, Alexander Ignatious BSc, Souvik Deh PhD, Srinivasan Vijayaraghavan PhD and Douglas Kline PhD
Kent State University
(Presented By: Alaa Eisa, MSc)

Oral/Poster #3
EFCAB9 IS A PH-DEPENDENT CA2+ SENSOR THAT REGULATES CATSPER CHANNEL ACTIVITY AND SPERM MOTILITY
Jae Yeon Hwang PhD¹, Nadja Mannowetz PhD², Yongdeng Zhang PhD³, Robert Everley PhD⁴, Steven Gygi PhD⁴, Joerg Bewersdorf PhD⁴, Polina Lishko PhD⁴ and Jean-Ju Chung PhD³
¹Yale School of Medicine; ²UC Berkeley; ³Harvard Medical School
(Oral Presented By: Jean-Ju Chung, PhD)
(Poster Presented By: Jae Yeon Hwang, PhD)

Oral/Poster #4
ETHYLENE GLYCOL MONOMETHYL ETHER EXPOSURE ALTERS CLEAVAGE OF TRNA FRAGMENTS IN RAT SPERM
Angela Stermer PhD, Susan Hall and Kim Boekelheide PhD, MD
Brown University
(Presented By: Angela R. Stermer, PhD)

Oral/Poster #5
KANK1 COPY NUMBER VARIANTS ARE ASSOCIATED WITH GENITOURINARY BIRTH DEFECTS
Nannan Thirumavalavan MD¹, Marisol O’Neill MS², Meade Haller PhD², Jason Scovell Bha², Cenk Gengiz BA², Joshua Moore MS², Jeffrey White MD, PhD², Kunj Sheth MD² and Dolores J. Lamb PhD³
¹Baylor College of Medicine; ²Baylor College of Medicine, Houston, TX; ³Departments of Urology and Genomic Medicine and Englehard Institute for Personalized Medicine, Weill Cornell Medical College, New York, NY
(Presented By: Dolores J. Lamb, PhD, HCLD)

Oral/Poster #6
GENE DELETION OF STEROIDOGENIC ACUTE REGULATORY PROTEIN (STAR) BY CRISPR/CAS9 DEMONSTRATES A CRITICAL RELATIONSHIP BETWEEN CONSTITUTIVE STAR AND TRANSLOCATOR PROTEIN TSP FOR STEROIDOGENESIS
Melanie Galano¹, Yasaman Aghazadeh PhD², Yuchang Li PhD³ and Vassilios Papadopoulos DPPharm, PhD, DSc ¹,²
¹Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, CA, USA; ²Research Institute of McGill University Health Center and Department of Medicine, McGill University, Montreal, Quebec, Canada
(Presented By: Melanie Galano)

Oral/Poster #7
XENOGRAFTING CRYOPRESERVED PRIMATE TESTICULAR BIOPSY INTO IMMUNE COMPROMISED MICE
Sherin David MS¹, Meena Sukhwani PhD², Karen A. Peters BS², Hanna Valli PhD² and Kyle E. Orwig PhD²
¹Department of Obstetrics, Gynecology and Reproductive Sciences, Molecular Genetics and Developmental Biology Graduate Program, University of Pittsburgh School of Medicine, Pittsburgh, PA, Magee-Womens Research Institute, Pittsburgh, PA; ²Magee-Womens Research Institute, Pittsburgh, PA; ³Department of Obstetrics, Gynecology and Reproductive Sciences, Magee-Womens Research Institute, Pittsburgh, PA
(Presented By: Sherin David, MS)

Oral/Poster #8
TESTOSTERONE USE AND RISK OF MYOCARDIAL INFARCTION (MI) AND STROKE
Molly Shores MD¹, Thomas Walsh MD¹, Anna Korpak PhD², Chloe Krakauer MS³, Christopher Forsberg MS², Kathryn Moore PhD², Alexandra Fox MS², Nicholas Smith PhD²,³, Mary Lou Thompson PhD² and Alvin Matsumoto MD⁴,⁵
¹University of Washington, VA Puget Sound Health Care System; ²Epidemiology, Research and Information Center  V A Puget Sound Health Care System; ³University of Washington; ⁴University of Washington, Dept of Epidemiology; ⁵Epidemiology, Research and Information Center , VA Puget Sound Health Care System; ⁶University of Washington, Dept of Medicine; ⁷Geriatric Research, Education and Clinical Center (GRECC), VA Puget Sound Health Care System
(Presented By: Molly Shores MD)

Oral/Poster #9
AN 11-BASE PAIR DELETION IN MOUSE MINICHROMOSOME MAINTENANCE 8 (MCM8) MIMICS HUMAN INFERTILITY MUTATIONS IN PATIENTS WITH MCM8 DELETERIOUS MUTATIONS
Amanda Colvin Zielen PhD¹, Mainpal Rana PhD¹, Yi Sheng PhD¹, Aleksandar Rajkovic MD, PhD² and Kyle Orwig PhD¹
¹Magee Womens Research Institute, University of Pittsburgh; ²University of California San Francisco
(Presented By: Amanda Mae Colvin Zielen, PhD)

Oral/Poster #10
SPERMATOGENESIS IN THE TRANSGENDER TESTIS
Tristan Nicholson MD, PhD¹, Ivor Clinton BS², John Amory MD, MPh³, Nicholas Reder MD, MPH¹, Thomas Walsh MD, MS¹ and Ashleigh Theberge PhD⁵
¹Departments of Urology and Chemistry, University of Washington; ²Department of Medicine, University of Washington; ³Department of Pathology, University of Washington; ⁴Department of Urology, University of Washington; ⁵Departments of Chemistry and Urology, University of Washington
(Presented By: Tristan M. Nicholson, MD, PhD)
Poster #13
TRANSCRIPTOMIC CLUSTER ANALYSIS REVEALS LOCATION SPECIFIC HETEROGENEITY OF MONONUCLEAR PHAGOCYTES IN THE EPIDIDYMIS: ROLES IN IMMUNE TOLERANCE AND ACTIVATION
Maria Agustina Battistone PhD, Alexandra C Mendelsohn BS, Dennis Brown PhD, Anil V Nair PhD and Sylvie Breton PhD
Massachusetts General Hospital/Harvard Medical School
(Presented By: Maria Agustina Battistone, PhD)

Poster #14
DIRECTING HUMAN INDUCED PLURIPOTENT STEM CELLS DIFFERENTIATION TOWARDS LEYDIG CELLS
Lu Li PhD, Yuchang Li PhD, Chantal Sottas BSc, Martine Culty PhD and Vassilios Papadopoulos DPharm, PhD
Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, CA, USA
(Presented By: Lu Li, PhD)

Poster #15
METHOXYCHLOR AND ITS METABOLITE HYDROXYCHLOR COMPETITIVELY INHIBIT HUMAN TESTIS RETINALDEHYDE DEHYDROGENASE 1A1
Yong Chen MD¹, Xiaoheng Li MD², Zina Wen Msc¹, Renshan Ge MD² and Ying Zhong MD¹
¹Jinjiang Maternal and Child Health Hospital; ²Wenzhou Medical University the Second Affiliated Hospital
(Presented By: Yong Chen, MD)

Poster #16
A CONSERVED MECHANISM OF CATSPER ACTIVATION MIGHT UNDERLIE CA2+ INCREASES IN HUMAN AND MOUSE SPERM IN RESPONSE TO KCL DEPOLARIZATION
Juan J. Ferreira BS¹, Aluet Borrego Alvarez MS², Pascale Lybaert PhD³, Lis C. Puga Molina PhD² and Celia M. Santi MD PhD¹
¹Dept. of Obstetrics and Gynecology, and Dept of Neuroscience, Washington University School of Medicine. St Louis. MO.; ²Dept. of Obstetrics and Gynecology, Washington University School of Medicine. St Louis. MO.; ³Université Libre de Bruxelles, Faculté de Médecine, Laboratoire de Physiologie et Pharmacologie . Bruxelles, Belgium.
(Presented By: Juan J. Ferreira BS)

Poster #17
IMPACT OF ETHINYLESTRADIOL EXPOSURE ON RAT FETAL TESTIS DEVELOPMENT AND GERM CELL EPIGENOME
Arlette Rwigemera MSc¹, Lisa-Marie Legault MSc², Serge McGraw PhD² and Géraldine Delbès PhD¹
¹INRS-Institut Armand-Frappier; ²Université de Montréal-Research center of CHU Sainte-Justine
(Presented By: Arlette Rwigemera, MSc)

Poster #18
ROLE OF CA2+/CALMODULIN- DEPENDENT SERINE-THREONINE PHOSPHATASE, CALCINEURIN, IN MOUSE SPERM CAPACITATION
Bidur Paudel, Felipe Navarrete and Pablo E. Visconti PhD
Umass Amherst
(Presented By: Bidur Paudel)

Poster #19
BACTERIAL EPIDIDYMIS IN A PRECLINICAL MOUSE MODEL – IMPROVEMENT OF THERAPEUTIC OUTCOME BY SUPPLEMENTARY ANTI-INFLAMMATORY TREATMENT
Britta Klein¹, Sudhanshu Bhushan¹, Rukmali Wijayarathna², Ralf Middendorff², Kate Loveland², Mark Hedger² and Andreas Meinhardt¹
¹Institute of Anatomy and Cell Biology, Justus-Liebig University Giessen; ²Centre for Reproductive Health, Hudson Institute of Medical Research
(Presented By: Britta Klein)

Poster #20
LENTIVIRUS AND CAS9 KNOCK-IN MICE AS A POTENTIAL HIGH-THROUGHPUT TOOL TO STUDY CANDIDATE SERTOLI CELL-SPECIFIC GENE FUNCTION IN SPERMATOGENESIS
Chatchanan Doungkamchan MD¹, Lin Lin MD², Yi Sheng MD, PhD³, Meena Sukhwani PhD³ and Kyle E. Orwig PhD³
¹Molecular Genetics and Developmental Biology Graduate Program, University of Pittsburgh School of Medicine; ²Xiangya School of Medicine, Central South University, Changsha, China; ³Department of Obstetrics, Gynecology and Reproductive Sciences, Magee–Womens Research Institute, University of Pittsburgh School of Medicine, Pittsburgh, PA 15213
(Presented By: Chatchanan Doungkamchan, MD)

Poster #21
DIFFERENTIATION OF SEMINIFEROUS TUBULE-ASSOCIATED STEM CELLS INTO LEYDIG AND MYOID LINEAGES IN VITRO
Panpan Chen¹, Fenfen Chen¹, Xiaoju Guan¹, Xingxing Zhao¹, June Liu², Barry Zirkin PhD² and Haolin Chen PhD¹
¹The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University; ²Johns Hopkins Bloomberg School of Public Health
(Presented By: Panpan Chen)

Poster #22
TESTIS-SPECIFIC SERINE/THREONINE KINASE 1 AS A POSSIBLE TARGET FOR MALE CONTRACEPTION
Darya A. Tourzani BS, Maria Gracia Gervasi PhD, Wei Cui PhD, Ana Maria Salicioni PhD and Pablo E. Visconti PhD
University of Massachusetts Amherst
(Presented By: Darya Tourzani, BS)

Poster #23
CHARACTERIZATION OF EJACULATED HUMAN SPERMATOZOA MEMBRANE ASSOCIATED PROTEINS AS DECAPACITATION FACTORS
Gabriela Hernández Silva MSc¹, Aidée Saray López Torres PhD², Jorge Elias Fabian López-Araiza Student³, Victor Manuel Torres Flores PhD³ and Mayel Chirinos PhD²
¹Universidad Nacional Autónoma de México/Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán; ²Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán; ³Universidad Nacional Autónoma de México
(Presented By: Gabriela Hernández Silva, MSc)
Poster #24

INTRAFLAGELLAR TRANSPORT PROTEIN 81 IS ESSENTIAL FOR MOUSE SPERMATOGENESIS AND MALE FERTILITY
Wei Qu, Qian Huang, Lin Shi, Wei Li, Zhenyu Wang, Ling Zhang, Rex A Hess and Zhibing Zhang
(Presented By: Wei Qu)

Poster #25

STEM LEYDIG CELL REGENERATION IN THE ADULT RAT TESTIS IS INHIBITED AFTER A SHORT-TERM TRIPHENYL Tin EXPOSURE
Chaobo Ni MD, Yinghui Fang MS, Xiuxiu Chen MD, Keyang Wu MD, Huitao Li PhD, Yiyang Wang PhD, Zhenkun Lin PhD, Ren-Shan Ge MD and Qiangjun Lian PhD
The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University
(Presented By: Chaobo Ni, MD)

Poster #26

EFFECTS OF MATRIX-BOUND NANOVESICLES IN HUMAN SPERMATOGONIAL STEM CELL CULTURE
Kien Tran BS¹, Mark Murdock BS², Stephen Badylak DVM, PhD, MD³ and Kyle Orwig PhD⁴
¹Department of Obstetrics, Gynecology and Reproductive Sciences, Magee-Womens Research Institute, University of Pittsburgh School of Medicine; ²McGowan Institute for Regenerative Medicine, University of Pittsburgh
(Presented By: Kien T. Tran, BS)

Poster #27

CARNOSINE TREATMENT DURING HUMAN SEMEN PROCESSING BY DISCONTINUOUS DENSITY GRADIENT
Luana Adami MSc, Bruna Lima MSC, Paula Intasqui PhD, Ricardo Bertolla PhD and Marcelio Nichi PhD
UNIFESP
(Presented By: Luana Adami)

Poster #28

EXPRESSION OF THE INFLAMMASOME COMPLEX IN SEMINAL PLASMA OF SMOKERS
Mariana Antoniassi BSc, MS¹, Emad Ibrahim MD, PhD², Teodoro Aballa MSc², Charles Lynne MD³, Ricardo Bertolla DVM, PhD⁴ and Nancy Brackett Ph.D. HCLD²
₁Department of Surgery, Division of Urology, Sao Paulo Federal University; ²The Miami Project to Cure Paralysis, University of Miami Miller School of Medicine
(Presented By: Mariana Pereira Antoniassi, BSc, MSc)

Poster #29

FIBROBLAST GROWTH FACTOR 12 INFLUENCES LEYDIG CELL REGENERATION FROM STEM CELLS IN ETHANE-DIMETHANE SULFONATE-TREATED MALE RATS
Jiaying Mo MD¹, Xiaoheng Li MD², Yiyang Wang MD³, Qingquan Lian PhD² and Ren-shan Ge MD³
₁Dept. of Obstetrics and Gynecology, the Second Affiliated Hospital of Wenzhou Medial University; ²The Second Affiliated Hospital of Wenzhou Medical University
(Presented By: Jiaying Mo)

Poster #30

WITHDRAWN

Poster #31

THE INDEPENDENT AND COMBINATORIAL EFFECTS OF CAG AND GGN REPEAT LENGTH POLYMORPHISMS ON HORMONAL, SEMINAL AND ANTHROPOMETRIC MEASUREMENTS IN YOUNG SOUTH AFRICAN MEN
Sean Patrick PhD¹, Elizabeth van Rensburg PhD², Natalie Aneck-Hahn DTech⁴, Maria Bornman DSc², Paulina Farias PhD⁴ and Christiaan de Jager PhD⁵
¹University of Pretoria Institute for Sustainable Malaria Control and MRC Collaborating Centre for Malaria Research, School of Health Systems and Public Health (SHSPH), University of Pretoria, Pretoria, South Africa; ²Department of Biochemistry, Genetics and Microbiology, Division of Genetics, University of Pretoria; ³University of Pretoria Institute for Sustainable Malaria Control and MRC Collaborating Centre for Malaria Research, School of Health Systems and Public Health (SHSPH); ⁴Department of Urology, University of Pretoria, Pretoria, South Africa; ⁵Instituto Nacional de Salud Publica, Cuernavaca, Mexico
(Presented By: Sean Patrick PhD)

Poster #32

RESTORATION OF AGING LEYDIG CELL STEROIDOGENIC FUNCTION IN VITRO: INVOLVEMENT OF INFLAMMATORY FACTORS?
Xingxing Zhao¹, Xiaojie Guan¹, Fenfen Chen¹, Panpan Chen¹, June Liu², Jinyong Chung PhD³, Barry Zirkin PhD³ and Haolin Chen PhD³
¹The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University; ²Johns Hopkins Bloomberg School of Public Health
(Presented By: Xingxing Zhao)

Poster #33

MECHANISTICALLY INTERRELATED ROLES OF CALCINEURIN AND GSK3A IN REGULATING THE ABILITY OF SPERM TO FERTILIZE EGGS
Souvik Dey PhD¹, Alaa Eisa MS¹, Vania Opoku UG¹, Florence Wagner PhD², Douglas Kline PhD¹ and Srinivasan Vijayaraghavan PhD¹
₁DEPARTMENT OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY; ²Stanley Center for Psychiatric Research, Broad Institute of Massachusetts Institute of Technology and Harvard University, Cambridge, MA 02142, USA.
(Presented By: Souvik Dey, Postdoc/PhD)

Poster #34

LUTEINIZING HORMONE REGULATES INTRACELLULAR CALCIUM, CAMP, PROTEIN TYROSINE PHOSPHORYLATION AND MOTILITY IN HUMAN SPERMATOZOA
Aideé Saray López Torres PhD¹, Gabriela Hernández Silva MSc¹, Claudia L. Treviño PhD² and Mayel Chirinos PhD³
₁Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán; ²Universidad Nacional Autónoma de México
(Presented By: Aideé Saray López Torres, Sr., PhD)

Poster #35

EFFECT OF BILATERAL ORCHIECTOMY ON HORMONE MEDICATION REGIMEN IN PATIENTS WITH GENDER DYSPHORIA
Ross Everett MD, MPH and Jay Sandlow MD
Medical College of Wisconsin
(Presented By: Ross G. Everett, MD, MPH)
Poster #36
A NEW REGULATION MECHANISM OF MAMMALIAN SPERM CAPITATION
Carla Ritaagliati PhD¹, Cintia Stival MS¹, Carolina Baro Graf MS¹, Guillermina Luque PhD², Mariano Buffone PhD² and Dario Krapf PhD²
¹Cell Signal Transduction Networks Lab, IBR-CONICET, Argentina; ²Cellular and Molecular Biology of Reproduction Lab, IBYME-CONICET, Argentina
(Presented By: Carla Ritaagliati, PhD)

---

Poster #42
ADHERENCE TO THE MEDITERRANEAN DIET IS POSITIVELY ASSOCIATED WITH SPERM MOTILITY: A CROSS-SECTIONAL ANALYSIS
Albert Salas-Huetos PhD¹, Nancy Babio PhD², Douglas T. Carréll PhD³, Timothy G. Jenkins PhD⁴, Kenneth I. Aston PhD⁴, Mónica Bulló PhD⁴ and Jordi Salas-Salvadó PhD⁴
¹a. Biochemistry and Biotechnology Department, Universitat Rovira i Virgili, Spain. b. Institut d’Investigació Sanitària Pere i Virgili, Spain. c. CIBERObn, Instituto de Salud Carlos III, Spain. d. Department of Surgery, University of Utah, USA.; ³a. Biochemistry and Biotechnology Department, Universitat Rovira i Virgili, Spain. b. Institut d’Investigació Sanitària Pere i Virgili, Spain. c. CIBERObn, Instituto de Salud Carlos III, Spain.; ³d. Department of Surgery, University of Utah, USA. e. Department of Obstetrics and Gynecology, University of Utah, USA. f. Department of Human Genetics, University of Utah, USA.; ³d. Department of Surgery, University of Utah, USA. a. Biochemistry and Biotechnology Department, Universitat Rovira i Virgili, Spain. b. Institut d’Investigació Sanitària Pere i Virgili, Spain. c. CIBERObn, Instituto de Salud Carlos III, Spain. g. Hospital Universitari Sant Joan de Reus, Spain.
(Presented By: Albert Salas-Huetos, MSc, PhD)

---

Poster #37
MORPHOFUNCTIONAL EVALUATION OF HUMAN SUBTYPE ADARK SPERMATOGONIA WITH NUCLEAR RAREFACTION ZONE REVEALS A STEM CELL SPECIFIC KINETIC AND NICHE
Andre Lucas Caldeira-Brant MSc; PhD Candidate¹, Lilian M Martinelli MSc¹, Mariana M Marques BSc¹, Augusto B Reis MD; PhD², Reginaldo Martello MD; PhD², Fernanda RCL Almeida DVM; PhD³ and Helio Chiarini-Garcia PhD⁴
¹Laboratory of Structural Biology and Reproduction, Federal University of Minas Gerais, Belo Horizonte, Brazil; ²Department of Surgery, Medicine School, Federal University of Minas Gerais, Belo Horizonte, Brazil; ³Neurology and Urology Service of Clinical Hospital, Federal University of Minas Gerais, Belo Horizonte, Brazil
(Presented By: Andre Lucas Caldeira-Brant, Sr., PhD Candidate)

---

Poster #38
CHARACTERIZATION OF DYNACTIN SUBUNIT 4 (DCTN4), AN IFT25 BINDING PARTNER, IN MALE GERM CELLS
Shuo Yuan, Qian Huang BSc, Hong Liu MSc, Shiyang Zhang MSc, Ling Zhang PhD and Zhibing Zhang PhD
(Presented By: Shuo Yuan)

---

Poster #39
EXPERIMENTAL MODELS OF TESTICULAR TISSUE MAINTENANCE AND MORPHOGENESIS
Maxwell Edmonds BS/BA¹, Hanna Pulaski PhD², Kyle Orwig PhD² and Teresa Woodruff PhD³
¹Medical Scientist Training Program, Department of OB/GYN, Northwestern Medicine Feinberg School of Medicine, Northwestern University; ²Department of OB/GYN and Reproductive Sciences, Magee-Women’s Research Institute, University of Pittsburgh School of Medicine; ³Department of OB/GYN, Northwestern Medicine Feinberg School of Medicine, Northwestern University
(Presented By: Maxwell E. Edmonds, BS, BA)

---

Poster #40
SINGLE-CELL RNA SEQUENCING REVEALS NOVEL MARKERS OF STEM/PROGENITOR SPERMATOGONIA IN HIGHER PRIMATES
Sarah Munyoki BA¹, Adrienne Shami BS², Qianyi Ma PhD², Chris Green PhD², Jun Li PhD², Sue Hammad PhD² and Kyle Orwig PhD³
¹University of Pittsburgh; ²Department of Surgery, University of Utah, USA.; ³a. Biochemistry and Biotechnology Department, Universitat Rovira i Virgili, Spain. b. Institut d’Investigació Sanitària Pere i Virgili, Spain. c. CIBERObn, Instituto de Salud Carlos III, Spain. d. Department of Surgery, University of Utah, USA. e. Department of Obstetrics and Gynecology, University of Utah, USA. f. Department of Human Genetics, University of Utah, USA.; ³d. Department of Surgery, University of Utah, USA. a. Biochemistry and Biotechnology Department, Universitat Rovira i Virgili, Spain. b. Institut d’Investigació Sanitària Pere i Virgili, Spain. c. CIBERObn, Instituto de Salud Carlos III, Spain. g. Hospital Universitari Sant Joan de Reus, Spain.
(Presented By: Larissa Belardin, MSc, PhD)

---

Poster #41
OBESITY IS AN INDEPENDENT PREDICTOR FOR COMBINATION THERAPY WITH ANASTROZOLE IN HYPOGONADAL MEN TREATED WITH CLOMIPHENE CITRATE
Sorena Keihani, Nathan J. Alder, Philip J. Cheng, Alexander W. Pastuszak and James M. Hotaling
Division of Urology, University of Utah
(Presented By: Sorena Keihani, MD)

---

Poster #43
THE ROLE OF CYSTEINE-RICH SECRETORY PROTEINS (CRISPS) IN ESTABLISHING OPTIMAL SPERM MOTILITY AND SPERM FUNCTION
Avinash Gaikwad MSc, Ashwin Nandagiri, David Potter, Prabhakar Ranganathan, Julio Soria and Moira O’Bryan
(Presented By: Avinash Satish Gaikwad, MSc)

---

Poster #44
MICRORNA COMPOSITION IN SEMINAL MICROVESICLES OF MEN WITH VARICOCELE AND PRE AND POST-VARICOCELECTOMY
Larissa Belardin BSc, MSc¹, Robert Sullivan PhD², Christine Légaré MSc², Mariana Camartgo BSc, MSc, PhD³ and Ricardo Bertolla DVM, PhD¹
¹Universidade Federal de São Paulo; ²Université Laval
(Presented By: Larissa Belardin, MSc)

---

Poster #45
AGE RELATED PRESENCE OF SPERMATOGONIA IN KLINFELTER SYNDROME PATIENTS: A CHANCE FOR BIOLOGICAL PATERNITY IN THE TESE NEGATIVE POPULATION
Nicholas Deebel MD¹, Guillermo Galdon MD², Kimberly Stogner-Underwood MD³, James Lovato PhD⁴, Stuart Howards MD⁴, Stanley Kogan MD⁴, Anthony Atala MD⁴ and Hooman Sadri-Ardekani MD PhD¹
¹Department of Urology, Wake Forest School of Medicine and Wake Forest Institute for Regenerative Medicine; ²Wake Forest Institute for Regenerative Medicine; ³Department of Pathology, Wake Forest School of Medicine; ⁴Department of Biostatistics and Data Science, Wake Forest School of Medicine; ⁵Department of Urology, Wake Forest School of Medicine
(Presented By: Nicholas Deebel, MD)
Poster #46

REVERSIBLE INFERTILITY IN MALE RATS AFTER ADMINISTRATION OF LOW AFFINITY Bromodomain INHIBITOR N, N-DIMETHYACETAMIDE

Nupur Khera Master in Biochemistry¹, Chafik Ghayor¹, Anna K. Lindholm² and Franz E. Weber³
¹Oral Biotechnology and Bioengineering, Center for Dental Medicine, University of Zurich, Zurich, Switzerland; ²Department of Evolutionary Biology and Environmental Studies, University of Zurich, Zurich, Switzerland; ³Oral Biotechnology and Bioengineering, Center for Dental Medicine, University of Zurich, Zurich, Switzerland, Zurich Center for Integrative Human Physiology, University of Zurich, Zurich, Switzerland

(Presented By: Nupur Khera, PhD)

Poster #47

EFFECT OF ZIRAM ON HUMAN SPERM VITALITY

Zina Wen MS, Yong Chen MD, Erpo Tian MD, Ren-Shan Ge MD and Ying Zhong MD
Jinjiang Maternity and Child Health Hospital

(Presented By: Zina Wen, MD)

Poster #48

HNRNP U IS REQUIRED FOR PRE-PUBERTAL SERTOLI CELLS DEVELOPMENT AND MALE FERTILITY IN MICE

Yujiao Wen and Shuqiao Yuan

(Presented By: Yujiao Wen)

Poster #49

ATRAZINE INDUCES FETAL LEYDIG CELL PROLIFERATION BUT DISRUPTS ITS DIFFERENTIATION IN MALE FETAL RATS AFTER IN UTERO EXPOSURE

Yinghui Fang, Chaobo Ni MD, Huitao Li MD, Yao Lv MD, Xiaoheng Li MD, Qingquan Lian PhD and Ren-shan Ge MD
The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University, Wenzhou, Zhejiang

(Presented By: Yinghui Fang, Master Degree)

Poster #50

INFLUENCE OF ETHANOL CONSUMPTION ON THE CELL STRUCTURE OF SPERMATOGENIC EPITHELIUM AND SPERM

Anastasiya Spaska MSc, PhD¹ and Neonila Dolynko PhD²
¹Girne American University, Turkey; ²Precarpathian National University, Ukraine

(Presented By: Anastasiya Spaska, PhD)

Poster #51

MEN WHO HAVE NOT FATHERED CHILDREN AT TIME OF VASECTOMY ARE UNLIKELY TO SEEK FERTILITY RESTORATION

Andrew Sun MD, Molly DeWitt-Foy MD and Sarah Vij MD
Cleveland Clinic

(Presented By: Andrew Y. Sun, MD)

Poster #52

THE EFFECT OF MALE BODY MASS INDEX ON VASECTOMY REVERSAL OUTCOMES

David Nusbaum BS¹, Mary Samplaski MD¹, Matthew B. F. Marks MS¹ and Sheldon F. Marks MD³
¹University of Southern California; ²Arizona Andrology Laboratory and Cryobank; ³International Center for Vasectomy Reversal

Presented By: David Jacob Nusbaum, BS

Poster #53

TWITTER ACTIVITY FOR #MALEINFERTILITY CO-HASHTAGS BETWEEN 2015 AND 2018

Margaret English BS and Mary Samplaski MD
University of Southern California

(Presented By: Mary Samplaski, MD)

Poster #54

IN UTERO EXPOSURE TO A MIXTURE OF PERFLUOROOCCTANOIC ACID AND PERFLUOROOCTANE SULFONATE CAUSES FETAL LEYDIG CELL DYSGENESIS IN RATS

Erpo Tian MD¹, Li Duan MD², Yiyan Wang MD², Li Wang MD², Ren-Shan Ge MD² and Ying Zhong MD¹
¹Jinjiang Maternity and Child Health Hospital; ²Wenzhou Medical University Second Affiliated Hospital

(Presented By: Erpo Tian, MD)

Poster #55

REOPERATIVE ULTRASOUND VARICOCELE VEIN DIAMETER CORRELATES WELL WITH INTRA-OP VEIN DIAMETER AND CLINICAL GRADE AMONG MEN UNDERGOING MICRO SURGICAL VARICOCELECTOMY

Gal Wald BA¹, Russell Hayden MD¹, Matthew Wosnitzer MD² and Marc Goldstein MD³
¹Weill Cornell Medicine, Department of Urology; ²Yale New Haven Health, Northeast Medical Group

(Presented By: Russell Hayden, MD)

Poster #56

LESSON FROM THE STUDY OF HUMAN MEIG1/PACRG INTERACTION: IDENTIFICATION OF THE MOUSE PACRG DOMAIN THAT MEDIATES INTERACTION WITH MOUSE MEIG1

Yi Tian Yap Bsc, Qian Huang BSc, Wei Li PhD, Zhenyu Wang PhD and Zhibing Zhang MD PhD

(Presented By: Yi Tian Yap, BSc)

Poster #57

EVALUATION OF SWIM-UP TECHNIQUE IN BACTERIAL LOAD REDUCTION AND SELECTION OF HIGHLY FUNCTIONAL SPERM

Heloisa Faquineti BSc, MSc student¹,², Juliana Pariz PD fellow¹,²,³,⁴, Rosa Casemiro BSc¹, Bruna Zillig BSc student¹, Caroline Ranéa BSc, MSc student¹,²,³, Donald Evenson PhD¹, Elaine Costa MD, PhD¹,²,³,⁴ and Jorge Hallak MD, PhD¹,²,³,⁴
¹Androscience, High Complexity Clinical and Research Andrology Laboratory; ²Dept. of Urology, USP; ³Reproductive Toxicology Unit, Dept. of Pathology, University of São Paulo; ⁴Institute for Advanced Studies, USP; ⁵SCSA Diagnostics

(Presented By: Juliana Pariz, PD)

Poster #58

WITHDRAWN

Poster #59

EFFECTS OF SEMEN COLLECTION METHODS AND EQUILIBRATION TIMES ON POST-THAW SPERM KINEMATIC PARAMETERS OF SAANEN BUCKS

Kambulu Lukusa PhD
University of Pretoria

(Presented By: Kambulu Lukusa, PhD)
Poster #60
INTEGRATIVE ANALYSIS OF MICRORNA REGULATORY NETWORKS IN SEMINAL PLASMA REVEALS BIOLOGICAL FUNCTIONS AND POTENTIAL BIOMARKERS FOR MALE INFERTILITY
Hatylas Azevedo PhD, Ricardo P. Bertolla DVM, PhD and Paula Intasqui PhD
Department of Surgery, Division of Urology, Sao Paulo Federal University
(Presented By: Paula Intasqui, PhD)

Poster #61
SEASONAL VARIATION IN MALE FERTILITY MEASURES AND CORRESPONDING BIRTH PATTERNS
Philip Cheng MD, Soren Keihani MD, Angela Presson PhD, Chong Zhang MS, Heidi Hanson PhD, Ken Smith PhD, Douglas Carrell MD, Kenneth Aston PhD, Alexander Pastuszak MD, PhD and James Hotaling MD
University of Utah
(Presented By: Philip J. Cheng, MD)

Poster #62
EVALUATION OF SEXUAL DYSFUNCTION AND SPERM DISORDER IN LONG-TERM HYPERCHOLESTEROLEMIA: AN EXPERIMENTAL STUDY USING WISTAR ALBINO RAT
Prakash Seppan PhD, Khayinmi Wungpam Shimray MSc and Zafar Iqbal Khan Mohammad MSc
University of Madras
(Presented By: Prakash Seppan, MSc, PhD)

Poster #63
YOGA ENHANCES FERTILITY POTENTIAL AND IMPROVES QUALITY OF LIFE IN INFERTILE MEN WITH RHEUMATOID ARTHRITIS ON DISEASE-MODIFYING ANTIRHEUMATIC DRUGS
Surabhi Gautam PhD scholar¹, Priyanka Chaurasia MSc¹, Deeksha Rana MSc¹, Uma Kumar MD² and Rima Dada MD, PhD³
¹Laboratory for Molecular Reproduction and Genetics, Department of Anatomy, All India Institute of Medical Sciences, New Delhi, India; ²Department of Rheumatology, All India Institute of Medical Sciences, New Delhi, India
(Presented By: Surabhi Gautam, PhD Scholar)

Poster #64
UNRAVELING THE SPERM TRANSCRIPT SIGNATURE: ON THE ROAD TO SPONTANEOUS AND ASSISTED CONCEPTION
Vidhu Dhawan MD¹, Manoj Kumar PhD¹, Priyanka Chaurasia MSc¹, Dipika Deka MD², Neena Malhotra MD², Neeta Singh MD², Vatsla Dadhwal MD² and Rima Dada MD, PhD³
¹Lab for Molecular Reproduction & Genetics, Department of Anatomy, AIIMS, New Delhi, India; ²Department of Obstetrics & Gynecology, AIIMS, New Delhi
(Presented By: Vidhu Dhawan, MBBS, MD)

Poster #65
DIFFERENTIAL TRANSCRIPTS PROFILE IN SPERMATOZOA OF MEN WITH VARICOCELE
Viviane Paiva Santana MSc¹, Cristina Libardi Miranda-Furtado PhD¹, Flavia Gaona Oliveira-Gennaro PhD¹, Camila Pinho Pompeu¹, Maria Aparecida Carneiro Vasconcelos¹, Vinicius Dall’Aqua MD², Kamila Chagas Peronni PhD², Carlos Alberto Oliveira Biagi Jr MSc², Wilson Araújo Silva Jr PhD, MD², Sandro Cassiano Esteves PhD, MD² and Rosana Maria Reis PhD, MD²
¹Department of Gynecology and Obstetrics, Ribeirao Preto Medical School, University of Sao Paulo; ²ANDROFERT, Andrology and Human Reproduction Clinic; ³Department of Surgery and Anatomy, Ribeirao Preto Medical School, University of Sao Paulo; ⁴Ribeirao Preto Hemocentro Foundation, University of Sao Paulo; ⁵Department of Genetics, Ribeirao Preto Medical School, University of Sao Paulo
(Presented By: Viviane Paiva Santana, MSc)

Poster #66
NUMBER OF CHILDREN AT TIME OF VASECTOMY IN PATIENTS UNDERGOING VASECTOMY REVERSAL
Andrew Sun MD, Edmund Sabanegh MD and Sarah Vij MD
Cleveland Clinic
(Presented By: Andrew Y. Sun, MD)

Poster #67
LEUCINE ZIPPER TRANSCRIPTION FACTOR LIKE 1 (LZTFL1), AN INTRAFLAGELLAR TRANSPORTER PROTEIN 27 (IFT27) ASSOCIATED PROTEIN, IS REQUIRED FOR NORMAL SPERM FUNCTION AND MALE FERTILITY
Qian Huang, Parirokh Awasthi, Ven Natarajan and Zhbing Zhang
(Presented By: Qian Huang)

Poster #68
IN VITRO EFFECTS OF GENISTEIN AND MONO-(2-ETHYLHEXYL) PHTHALATE (MEHP) ON MACROPHAGE INFLAMMATORY RESPONSES AND SPERMATOGONIAL FUNCTIONS
Vanessa Brouard PhD, Haoyi Cui, Samiha Mahin, Amy Tran Ms and Martine Culty PhD
University of Southern California
(Presented By: Vanessa Brouard, PhD)
**Poster #69**
FUNCTIONAL PATHWAY ANALYSIS OF TESTIS TRANSCRIPTOME FROM ADULT RATS EXPOSED IN UTERO TO A LOW DOSE MIXTURE OF GENISTEIN (GEN) AND DI-(2-ETHYLHEXYL) PHthalate (DEHP) IDENTIFIES SIGNIFICANT CHANGES IN SIGNALING TRANSDUCTION PATHWAYS
Casandra Walker, Annie Boisvert PhD and Martine Culty PhD
(Presented By: Casandra Walker)

**Poster #70**
THE GENE M05D6.2, AN ORTHOLOG OF HUMAN T-COMPLEX PROTEIN 11 (TCP11), IS NECESSARY FOR SPERM PRODUCTION AND FERTILITY
Danielle Cooley, Emily Lopes, Amber Jacob and Matthew Marcello PhD
Pace University
(Presented By: Danielle Cooley)

**Poster #71**
MANIPULATION OF SPERM METABOLISM IMPROVES OUTCOME OF ASSISTED REPRODUCTIVE TECHNOLOGIES
Maria Gracia Gervasi PhD, Felipe Navarrete PhD and Pablo Visconti PhD
University of Massachusetts, Amherst
(Presented By: Maria Gracia Gervasi, PhD)

**Poster #72**
3-DIMENSIONAL HUMAN TESTICULAR ORGANOID SYSTEM FROM KLINFEFTER (47XXY) TESTICULAR CELLS SUPPORTS IN VITRO HAPLOID GERM CELL FORMATION
Nima Pourhabibi Zarandi MD1, Guillermo Galdon MD1, Olivia Cornett BS1, Nicholas Deebel MD2, Mark Pettenati PhD1, Stuart Howards MD2, Stanley Kogan MD2, Anthony Atala MD2 and Hooman Sadri-Ardekani MD, PhD1
1Wake Forest Institute for Regenerative Medicine; 2Wake Forest School of Medicine; 3Section of Medical Genetics, Department of pathology, Wake Forest School of Medicine; 4Department of Urology, Wake Forest School of Medicine; 5Department of Pathology, Wake Forest School of Medicine; 6Department of Urology, Wake Forest School of Medicine
(Presented By: Nima Pourhabibi Zarandi, MD)

**Poster #73**
NUMBER OF SPERMATOGONIA CELLS IN UNDESCENDED TESTES ARE LOWER THAN NORMAL REGARDLESS TO THE AGE AT ORCHIOPEXY; A CLINICAL VALIDATED PATHOLOGY REPORT
Stanley Kogan MD1, Abinav Udaiyar BS2, Demetri Hodges BS2, Heather Barber BS2, Guillermo Galdon MD1, Nima Pourhabibi Zarandi MD1, James F Lovato MQ3, Kimberly Stogner-Underwood MD4, Shadi Qasem MD5, Steve J Hodges MD6, Anthony Atala MD7 and Hooman Sadri-Ardekani MD, PhD8
1Wake Forest Institute for Regenerative Medicine  and Department of Urology, Wake Forest School of Medicine, Winston Salem, NC; 2Wake Forest Institute for Regenerative Medicine, Wake Forest School of Medicine, Winston Salem, NC; 3Department of Biostatistics and Data Science, Wake Forest School of Medicine, Winston Salem, NC; 4Department of Pathology, Wake Forest School of Medicine, Winston Salem, NC; 5Department of Pathology, Wake Forest School of Medicine, Winston Salem, NC; 6Department of Urology, Wake Forest School of Medicine, Winston Salem, NC
(Presented By: Stanley Jay Kogan, MD)

**Poster #74**
IMPACT OF YOGA INTERVENTION ON SPERM GENE EXPRESSION AND GENOMIC INTEGRITY IN EARLY PREGNANCY LOSS
Rima Dada MD, PhD1, Manoj Kumar PhD1, Dipika Deka MD1, Neena Malhotra MD1, Neeta Singh MD1 and Vatsla Dadhwal MD1
1Lab for Molecular Reproduction & Genetics, Department of Anatomy, AIIMS, New Delhi, India; 2Dept. of Obstetrics & Gynecology, AIIMS, New Delhi, India
(Presented By: Rima Dada, MD, PhD)

**Poster #75**
SPERM RNAs AS NOVEL BIOMARKERS TO PREDICT MALE INFERTILITY AND TOXICANT-INDUCED TESTICULAR INJURY
Enrica Bianchi PhD, Mark Sigman MD, Angela Stermer PhD, Susan Hall, Kathleen Hwang MD and Kim Boekelheide MD, PhD
Brown University
(Presented By: Enrica Bianchi, PhD)

**Poster #76**
GALECTIN-3 IS A ZINC-BINDING PROTEIN: IMPLICATIONS FOR PROSTATE CANCER PROGRESSION
Harvey Anu MS, AlleaBelle Gongola BS, Matthew Kovak MS, David Schoen MS, Karah Bogoslovsky MS, Joel Ubeda BS, Kori Mansfield BS, Alicia Byrd Phd and Alan Diekman PhD
Department of Biochemistry and Molecular Biology, College of Medicine, University of Arkansas for Medical Sciences
(Presented By: Alan Diekman, PhD)

**Poster #77**
SIGNALING PATHWAYS INVOLVED IN REACTIVE OXYGEN SPECIES (ROS) GENERATION DURINg CAPACITATION
Gen Takei Ph D and Pablo Visconti Ph D
University of Massachusetts, Amherst
(Presented By: Gen Takei, PhD)
**Poster #78**  
FIBROBLAST GROWTH FACTOR 16 STIMULATES PROLIFERATION BUT BLOCKS DIFFERENTIATION OF RAT STEM LEYDIG CELLS DURING REGENERATION  
Yiyan Wang PhD, Yue Duan MD, Xiaoheng Li MS, Jiaying Mo MD, Xiaoling Guo PhD, Chao Li PhD, Fei Ge MD, Wenwen Zheng MD and Renshan Ge MD  
The Second Affiliated Hospital and Yuying Children’s Hospital, Wenzhou Medical University  
(Presented By: Yiyan Wang, MD)

**Poster #79**  
BONE MORPHOGENETIC PROTEIN 4 (BMP4) INHIBITS RAT STEM LEYDIG CELL DEVELOPMENT  
Xiaoheng Li, Lanlan Chen MD, Lubin Xie MD, Yao Lv MD, Yinghui Fang MD, Xianwu Chen MD, Yong Chen MD, Chaobo Ni MD, Yige Yu MD, Yiyan Wang PhD, Yadong Huang PhD and Ren-Shan Ge MD  
The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University; Department of Cell Biology & Guangdong Provincial Key Laboratory of Bioengineering Medicine, Jinan University  
(Presented By: Xiao-Heng Li, MS)

**Poster #80**  
PROAKAP4 CONCENTRATIONS AS AN INDICATOR OF GOOD SPERMATOGENESIS AND SPERM QUALITY UNDER OXIDATIVE STRESS CONDITIONS  
Maryse Delehedde PhD, Bastien Demouveaux Msc, Gaëlle Remy PhD, Margaux Selveslagh Msc, Quentin Dewulf, Jean-Luc Desseyn PhD, Paul Moreau, Philippe Gosset PhD, Muriel Pichavant PhD and Nicolas Sergeant PhD  
SPQI; INSERM UMR 995; INSERM U1019 CNRS UMR8204, Institut Pasteur de Lille; INSERM UMRs 1172, SPQI  
(Presented By: Maryse Delehedde, PhD)

**Poster #81**  
PRSS50-NFKB-LRWD1: A NOVEL PATHWAY IN SPERMATOGENESIS  
Jason Scovell BS, Juan Bournat PhD, Abhishek Seth MD, Joshua Moore BS, Minerva Solis BS, Adam Szafran MD/PhD and Carolina Jorgez PhD  
Baylor College of Medicine  
(Presented By: Carolina Jorgez, PhD)

**Poster #82**  
EUGONADAL TESTOSTERONE LEVELS POSITIVELY REGULATES ERECTILE FUNCTION IN ISOLATED HUMAN CORPUS CAVERNOSUM  
Laith Alzweri, Serap Gur, Asim Abdel-Mageed, Omer Raheem and Wayne Hellstrom  
(Presented By: Laith Alzweri, MD, MRCS, FESCM)

**Poster #83**  
DYNAMIC REMODELING OF MEMBRANES AND THEIR LIPIDS DURING ACUTE HORMONE-INDUCED MA-10 MOUSE TUMOR LEYDIG CELL STEROIDOGENESIS  
Sathvika Venugopal PhD, Rachel Chan BS, Esha Sanyal BS, Lorne Taylor MSc, Pushvinder Kaur MSc, Edward Daly BS and Vassilios Papadopoulos DPharm, PhD, DSc  
Research Institute of the McGill University Health Centre, Montreal, Quebec, H4A 3J1, Canada; Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, CA 90089, USA  
(Presented By: Sathvika Venugopal, PhD)

**Poster #84**  
ANDROGEN SUPPRESSION FACILITATES EXOGENOUS RETINOIC ACID-INDUCED SPERMATOGENIC RECOVERY IN IRRADIATED MICE  
Gunapala Shetty PhD, Thien Phan BS, Guo Zhong PhD, Nina Isolherannen PhD and Marvin Meistrich PhD  
University of Texas MD Anderson Cancer Center, Houston; University of Washington, Seattle  
(Presented By: Gunapala Shetty, PhD)

**Poster #85**  
PEROXIREDOXIN 6 PARTICIPATES IN THE REGULATION OF SPERM CAPACITATION  
Denny Choi BSc and Cristian O’Flaherty DVM, PhD  
McGill University; McGill University and RI-MUCH  
(Presented By: Denny Choi, BSc)

**Poster #86**  
ASSOCIATION OF SPERM DNA METHYLATION (DNA-ME) WITH LOWER BLASTOCYST YIELD IN A SHARED EGG DONATION MODEL.  
John Jain MD, Zoe Daily BS, Jing Chen PhD, Danielle Albini MS and Keith Booher PhD  
Santa Monica Fertility; Zymo Research Corporation  
(Presented By: John K. Jain, MD)

**Poster #87**  
HUMAN EPIDIDYMAL TRANSCRIPTOME REVEALS LIMITED DIFFERENTIAL GENE EXPRESSION  
Christine Legare MSc and Robert Sullivan PhD  
Laval University  
(Presented By: Christine Legare, MSc)

**Poster #88**  
COMPARISON OF LUTEINIZING HORMONE AND ANDROGEN ON THE DEVELOPMENT OF RAT IMMATURE LEYDIG CELLS  
Qiqi Zhu MS, Xiaoheng Li MS, Yiyan Wang PhD, Guimin Wang PhD and Renshan Ge MD  
The Second Affiliated Hospital and Yuying Children’s Hospital, Wenzhou Medical University  
(Presented By: Qiqi Zhu)

**Poster #89**  
MULTIPLE PROTEIN DISULFIDE ISOMERASES IN THE EPIDIDYMIS: NOVEL ROLES IN AN ANDROGEN DEPENDENT TISSUE?  
Samuel G. Fernandes Trainee, Adam M. Benham PhD and Maria Christina W. Avellar PhD  
Department of Pharmacology, Universidade Federal de Sao Paulo - Escola Paulista de Medicina; Department of Biosciences, Durham University  
(Presented By: Samuel Guilerme Fernandes, MS)

**Poster #90**  
UNUSUAL EFFECTS OF V ARIOCOELECTOMY BY MARMAR: TREATMENT VENOUS HYPERAEMIA OF PROSTATE, CHRONIC PROSTATITIS AND SECONDARY PREMATURE EJACULATION.  
Oleksandr Knigavko MD, PhD, A Professor, Andriy Arkatov MD, PhD, A Professor and Iryna Slepynina BC  
Kharkiv National medical University; Kharkiv Clinical Center of Urology and Nephrology  
(Presented By: Oleksandr Knigavko, MD, PhD)
Poster #91
WNT4 PLAYS A CRITICAL ROLE IN REGULATING TESTICULAR DESCENT
Abhishek Seth MD, Juan Bournat PhD, Joshua Moore BS, Armando Rivera PhD and Carolina Jorgez PhD
Baylor College of Medicine
(Presented By: Carolina Jorgez, PhD)

Poster #92
IMPACTS OF COOLING AND CRYOPRESERVATION ON HUMAN SPERM CAPACITATION, AS MEASURED BY CAPSCORE™
G. Charles Ostermeier¹, Cristina Cardona¹, Melissa Moody¹, Alana Simpson¹, Romeo Mendoza¹ and Alex Travis²
¹Androvia LifeSciences; ²Cornell University
(Presented By: G. Charles Ostermeier, PhD)

Poster #93
DIRECT AND SPECIFIC INTERACTION BETWEEN THE MITOCHONDRIAL TRANSLATOR PROTEIN (TSPO) AND CHOLESTEROL USING CLICKABLE PHOTOREACTIVE CHOLESTEROL ANALOGUE
Elias Georges PhD¹,², Chantal Sottas BA², Yuchang Li PhD² and Vassilios Papadopoulos DPharm, PhD²
²Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, California 90089
(Presented By: Elias Georges, PhD)

Poster #94
INVESTIGATION OF MALE REPRODUCTIVE TOXICITY EXERTED BY AGROCHEMICALS ISOLATED OR IN MIXTURE: PRELIMINARY EVIDENCE OF TESTICULAR TOXICITY
Juliana Perobelli PhD, Mariana Simões-Garcia Master student, Deborah Cavalcante Master student, Maria Luiza Aranha BS and Ana Priscila Gomes-Silva PhD student
UNIFESP
(Presented By: Juliana Perobelli, PhD)

Poster #95
EVALUATION OF ACROSOME- AND TAIL-SPECIFIC PROTEINS ACVR1 AND AKAP4 AS BIOMARKERS FOR SPERM SELECTION: A POTENTIAL NOVEL METHODOLOGY TO SELECT RARE AND BEST QUALITY SPERM
junyan zhang Msc¹, Andrei Drabovich PhD², Keith Jarvi MD³, Andrée Fisher PhD³, Sergey Moskovtsev MD, PhD¹ and Clifford Librach MD¹
¹CREAtE Fertility Centre; ²University of Alberta; ³Murray Koffler Urologic Wellness Centre
(Presented By: Junyan Zhang, MSc)

Poster #96
COLLAGENASE CLOSTRIDIUM HISTOLYTICUM (CCH) MAY HAVE PRO-ERECTILE EFFECTS ON ISOLATED HUMAN CORPUS CAVERNOSUM
Laith Alzweri, Sudha Talwar, Suresh Sikka, Omer Raheem, Asim Abdel-Mageed and Wayne Hellstrom
(Presented By: Laith Alzweri, MD, MRCS, FESCM)

Poster #97
ETHNIC DIFFERENCES IN MALE FERTILITY PARAMETERS IN 3,915 MEN EXAMINED FOR INFERTILITY IN A SINGLE CENTER
Ralf Henkel BEd, PhD¹, Haitham ElBardisi MD², Ashok Agarwal PhD³, M. Majzoub⁴, and Mohammed Arafah MD⁵
¹Department of the Western Cape, University of the Western Cape; ²Hamad Medical Center, Doha, Qatar; ³American Center for Reproductive Medicine, Cleveland Clinic
(Presented By: Ralf Henkel, PhD)

Poster #98
COMPREHENSIVE ANALYSIS OF MIRNA EXPRESSION IN FERTILE AND INFERTILE MEN: CLINICAL CORRELATES.
Ryan Flannigan MD®, Anna Mielenk MSc®, Alex Bolyakov MSc®, Brian D. Robinson MD®, Francesca Khani MD®, Jennifer Grenier PhD®, Peter N. Schegel MD®, John Schimenti PhD®, Andrew Grimson PhD® and Darius Paduch MD PhD®
¹Weill Cornell Medicine & University of British Columbia; ²Weill Cornell Medicine; ³Cornell University
(Presented By: Ryan Flannigan, MD)

Poster #99
THE IMPACT OF CHANGES IN MALARIA CONTROL STRATEGIES IN SOUTH AFRICA ON DDT EXPOSURE AND SEMINAL PARAMETERS
Christiaan de Jager PhD⁶, Sean Patrick PhD⁶, Tanita Cronje MSc⁷ and Natalie Aneck-Hahn DTech⁶,⁷
⁶University of Pretoria Institute for Sustainable Malaria Control and MRC Collaborating Centre for Malaria Research, School of Health Systems and Public Health (SHSPH), University of Pretoria, Pretoria, South Africa; ⁷Department of Statistics, University of Pretoria; ³University of Pretoria Institute for Sustainable Malaria Control and MRC Collaborating Centre for Malaria Research, School of Health Systems and Public Health (SHSPH); ⁸Department of Urology, University of Pretoria, Pretoria, South Africa
(Presented By: Christiaan de Jager, PhD)

Poster #100
IDENTIFICATION OF SUMOYLATED TARGETS IN HUMAN SEMINOMAS.
Margarita Vigodner PhD, Benjamin Lucas PhD and Shaina Bakhshi
Yeshiva University
(Presented By: Margarita Vigodner, PhD)

Poster #101
WITHDRAWN

Poster #102
WITHDRAWN

Poster #103
PREDNISONE AFTER VASECTOMY REVERSAL MAY IMPROVE SEMEN PARAMETERS IN PATIENTS WITH AZOOSPERMIA POST OPERATIVELY
Graham Machen MD and Jay Sandlow MD
Medical College of Wisconsin
(Presented By: Graham Luke Machen, MD)

© 2019 American Society of Andrology and European Academy of Andrology
Andrology, 2019, Supplement, 48
Poster #104

**EFFECT OF AQUEOUS CARICA PAPAYA SEED EXTRACT ON LEYDIG AND SERTOLI CELLS**

Ralf Henkel BEd, PhD¹, Vahid Ghaflarilaleh PhD², Ashok Agarwal PhD¹ and David Fisher PhD²

¹Department of the Western Cape, University of the Western Cape; ²Department of Medical Bioscience, University of the Western Cape; ³American Center for Reproductive Medicine, Cleveland Clinic

(Presented By: Ralf Henkel, PhD)

---

Poster #105

**A SYSTEMATIC EVALUATION OF YOUTUBE AS AN INFORMATION SOURCE FOR MALE INFERTILITY**

Adithya Balasubramanian BA¹, Justin Yu BS², Ashwin Srivatsav BS¹, Jabez Gondokusumo BS¹, Alexander J Tatem MD¹, Jonathan A Beilin MD², Asad Hasan BSCS¹, James M Hotaling MD², Larry I Lipshultz MD³ and Alexander W Pastuszak MD³

¹Baylor College of Medicine; ²University of Utah

(Presented By: Adithya Balasubramanian, BA)

---

Poster #106

**USE OF DENSITY DISCONTINUOUS GRADIENT LABORATORY PROCEDURE TO REDUCE BACTERIAL LOAD AND TO SELECT HIGHLY FUNCTIONAL HUMAN SPERM**

Bruna Zillig BSc Student¹, Juliana Pariz PD fellow¹,²,³,⁴, Caroline Ranéa BSc, MSc Student¹,²,³,⁴, Heloísa Faquini BSc, MSc Student¹,²,³,⁴, Ivan Iori MD Student¹,²,³,⁴, Donald Evenson PhD¹, Elaine Costa MD, PhD¹,²,³,⁴,°, Jorge Hallak MD, PhD¹,²,³,⁴,°, and Andrea Carreiro MD, PhD¹,²,³,⁴,°

¹Androscience – High Complexity Clinical and Research Andrology Laboratory, Brazil; ²Methodist University of Sao Paulo, Brazil; ³Dept. of Urology, Universidade de Sao Paulo, Brazil; ⁴Reproductive Toxicology Unit, Dept. of Pathology, Universidade de Sao Paulo, Brazil; ⁵Oswaldo Cruz German Hospital, Brazil; ⁶Androscience, High Complexity Clinical and Research Andrology Laboratory; ⁷Reproductive Toxicology Unit, Dept. of Pathology, University of Sao Paulo; ⁸Institute for Advanced Studies, USP; ⁹Dept. of Urology, USP; ¹⁰Androscience, High Complexity Clinical and Research Andrology Laboratory; ¹¹SCSA Diagnostics, United States of America

(Presented By: Bruna Zillig, BSc)

---

Poster #107

**EFFECTS OF VITAMIN D SUPPLEMENTATION IN ASTHENOZOOSPERMIC SEMEN SAMPLES INCUBED IN ANAEROBIC CONDITIONS – AN INITIAL REPORT**

Heloísa Faquini BSc, MSc student¹, Juliana Pariz PD fellow¹,²,³,⁴, Bruna Zillig BSc student¹, Caroline Ranéa BSc, MSc student¹,²,³,⁴, Inari Ciccone BSc, MSc¹,²,³,⁴, Parviz Gharagozloo PhD¹, John Aitken PhD¹,° and Jorge Hallak MD, PhD¹,²,³,⁴,°

¹Androscience, High Complexity Clinical and Research Andrology Laboratory; ²Dept. of Urology, USP; ³Reproductive Toxicology Unit, Dept. of Pathology, University of Sao Paulo; ⁴Institute for Advanced Studies, USP; ⁵CellOxess LLC; ⁶University of New Castle, Callaghan, NSW Australia

(Presented By: Juliana Pariz, PD)

---

Poster #108

**CONSUMPTION OF CANNABIS IS ASSOCIATED WITH AN INCREASED AND DOSE/FREQUENCY-DEPENDENT INCIDENCE OF ACEPHALIC SPERM ABNORMALITIES**

Juan R. Correa-Perez PhD and Samuel P. Marynick MD

Texas Center for Reproductive Health

(Presented By: Juan R. Correa-Perez, PhD, HCLD, CTBS, EMB)

---

Poster #109

**CAFFEINE EFFECT IN SPERM MOTILITY IN DIFFERENT ANDROLOGY SCENARIOS**

Juliana Pariz PD fellow¹,²,³, Caroline Ranéa BSc, MSc student¹,²,³, Heloísa Faquini BSc, MSc student¹,², Bruna Zillig BSc student¹, Inari Ciccone BSc, MSc¹,²,³, Dayane Reis BSc¹, Thiago Teixeira MD, PhD student¹,²,³, Elaine Costa MD, PhD¹,²,³, and Jorge Hallak MD, PhD¹,²,³,°

¹Androscience, High Complexity Clinical and Research Andrology Laboratory; ²Reproductive Toxicology Unit, Dept. of Pathology, University of Sao Paulo; ³Institute for Advanced Studies, USP; ⁴Dept. of Urology, USP

(Presented By: Juliana Pariz PD fellow)

---

Poster #110

**WHEN IS A VASECTOMY SUCCESSFUL? – LABORATORY ASPECTS**

Lars Björndahl MD PhD, Kristina Magnusson BMS, Magdalena Larsson Chatziantonis BMS, Rebecka Holmberg PhD BMS and John Flanagan PhD

ANOVA Karolinska University Hospital and Karolinska Institutet

(Presented By: Lars Björndahl, MD, PhD)

---

Poster #111

**GAY MEN SEEKING PARENTHOOD THROUGH ASSISTED REPRODUCTION: A PILOT STUDY FOR CREATION OF A STANDARDIZED QUESTIONNAIRE**

Philip Cheng MD¹, Alexander Pastuszak MD, PhD¹, Akanksha Mehta MD² and James Hotaling MD²

¹University of Utah; ²Emory University

(Presented By: Philip J. Cheng, MD)

---

Poster #112

**IDENTIFICATION AND PARTIAL CHARACTERIZATION OF PHYTOCHEMICALS IN AQUEOUS EXTRACT OF CARICA PAPAYA**

Ralf Henkel BEd, PhD¹, Vahid Ghaflarilaleh PhD², Samuel Egieyeh PhD³, Ashok Agarwal PhD¹ and David Fisher PhD²

¹Department of the Western Cape, University of the Western Cape; ²Department of Medical Bioscience, University of the Western Cape; ³School of Pharmacy, University of the Western Cape; ⁴American Center for Reproductive Medicine, Cleveland Clinic

(Presented By: Ralf Henkel, PhD)

---

Poster #113

**CORRELATION OF OXIDATION-REDUCTION POTENTIAL WITH HORMONES, SEMEN PARAMETERS, AND TESTICULAR VOLUME IN MEN WITH VARICOCELE**

Ralf Henkel BEd, PhD¹, Mohammed Arafa MD², Ashok Agarwal PhD², M. Majzoub², and Haitham ElBardisi MD²

¹Department of the Western Cape, University of the Western Cape; ²Hamad Medical Center, Doha, Qatar; ³American Center for Reproductive Medicine, Cleveland Clinic

(Presented By: Ralf Henkel, PhD)

---

Poster #114

**#PEYRONIES: AN ANALYSIS OF ONLINE TWITTER DISCUSSION OF PEYRONIE’S DISEASE**

Aditya Balasubramanian BA¹, Justin Yu BS¹, Larry I Lipshultz MD¹, James M Hotaling MD² and Alexander W Pastuszak MD²

¹Baylor College of Medicine; ²University of Utah

(Presented By: Aditya Balasubramanian, BA)
SPERM DNA METHYLATION CHANGES AFTER NUT SUPPLEMENTATION IN HEALTHY MALES CONSUMING A WESTERN-STYLE DIET
Albert Salas-Huetos PhD, Emma R. James BSc, Mònica Bulló PhD, Jordi Salas-Salvadó PhD, MD, Douglas T. Carrell PhD, Kenneth I. Aston PhD and Timothy G. Jenkins PhD

Withdrawn

TRENDS IN NUMBER AND TIMING OF POST-VASECTOMY SEMEN ANALYSIS: RESULTS FROM A NATIONAL SURVEY OF UROLOGISTS
Kian Asanad MD and Mary Samplaski MD

Withdrawn

ANTISPERM ANTIBODIES ARE NOT FREQUENTLY INDUCED IN SEMEN OF MEN WITH TESTICULAR HYPERTHERMIA
Marzena Kamieniczna PhD, Monika Fraczek PhD, Marta Budzinska MSc, Lukasz Wojnar MD, Jozef Nakonechny MD, PhD, Laura Grzeskowiak MD, Kamil Gill PhD, Anna Havrylyuk PhD, Karolina Nowicka-Bauer MSc, Malgorzata Piasecka MD, PhD, Andrij Nakonechny MD, PhD, Valentina Chopyak MD, PhD and Maciej Kurpisz MD, PhD

USE OF RESTOREX PENILE TRACTION THERAPY FOR TREATMENT OF PENILE LENGTH LOSS IN DIABETIC MEN
Madeleine Manka MD, Kevin Hebert MD, Kevin Wymer MD, David Yang MD and Landon Trost MD
Mayo Clinic

USE OF RESTOREX PENILE TRACTION THERAPY TO MAINTAIN PENILE LENGTH POST PROSTATECTOMY
Madeleine Manka MD, Kevin Hebert MD, Kevin Wymer MD, David Yang MD and Landon Trost MD
Mayo Clinic

CYCLOPHOSPHAMIDE AND FERTILITY PRESERVATION: A SURVEY OF CURRENT PRACTICES AMONG NON- UROLOGISTS
Neel Parekh MD, Scott Lundy MD, PHd and Sarah Vij MD
Cleveland Clinic; CCF

WITHDRAWN

SURGICAL OUTCOMES OF TESTICULAR TISSUE FREEZING FOR FERTILITY PRESERVATION PURPOSES
Hanna Valli-Pulaski, Sarah Steimer, Sarah Munyoki, Mary Killian, Rajeev Chaudhry, Lisa Klimpel, Erin Rowell, Michael Hsieh, Candace Granberg, Jay Sandlow, Pramod Reddy, Glenn Cannon and Kyle Orwig
Magee-Womens Research Institute; Magee-Womens Research Institute, Pittsburgh, PA; Department of Urology, University of Pittsburgh School of Medicine; Hyundai Cancer Genomics Center, Children’s Hospital of Orange County, Orange, CA; Ann & Robert H. Lurie Children’s Hospital of Chicago, Chicago, IL; Sheik Zayed Institute for Pediatric Surgical Innovation at Children’s National Health System, Washington, DC; Mayo Clinic, Rochester, MN; Medical College of Wisconsin, Milwaukie, WI; Cincinnati Children’s Hospital Medical Center, Cincinnati, OH

CONDITIONALLY REPLICATIVE ADENOVIRUS CARRYING shRNA TARGETING EZH2 INHIBITS PROSTATE CANCER GROWTH AND MIGRATION
Xiao Gu MD and PhD and Lichun Wang PhD
Clinical Medical College of Yangzhou University; University of Illinois at Chicago

Poster #126
WHAT IS THE BETTER CULTURE MEDIA FOR IMPROVE THE MOTILITY OF ASTHENOZOOSPERMIC SAMPLES IN ANAEROBIC CONDITIONS?
Caroline Ranea BSc, MSc student¹,²,³, Juliana Risso Pariz PD fellow¹,⁴,⁵, Rosa Alice Casemiro Monteiro BSc², Bruna Zillig BSc student², Heloisa Faquinetti BSc, MSce student², Donald Evenson PhD⁴, Joel Drevet PhD⁵, Giovanna Milani MD student⁶ and Jorge Hallak MD, PhD⁷,⁸,⁹
¹Androscience, High Complexity Clinical and Research Andrology Laboratory; ²Dept. of Urology, University of São Paulo; ³Reproductive Toxicology Unit, Dept. of Pathology, USP.; ⁴Reproductive Toxicology Unit, Dept. of Pathology, University of São Paulo; ⁵Institute for Advanced Studies, USP; ⁶Dept. of Urology, USP; ⁷Androscience, High Complexity Clinical and Research Andrology Laboratory.; ⁸SCSA Diagnostics, United States of America; ⁹Université Clermont Auvergne, Clermont-Ferrand, France
(Presented By: Caroline Ranea, BSc)

Poster #127
MALE INFERTILITY IN THE FAR NORTH
Ruslan Mustafaev MD and Vladimir Darwin MD, PhD
(Presented By: Ruslan Mustafaev, MD

Poster #128
DO BOAR BREED HAVE AN INTERACTION WITH EJACULATE FREEZABILITY?
Mariana Andrade Torres MsC, PhD candidate¹, Ana Carolina Pedrosa DMV², Zoltan Machaty Dr² and André Furugen Cesar de Andrade Dr²
¹Department of Animal Reproduction, University of São Paulo, Pirassununga - BR; ²Department of Animal Sciences, Purdue University, West Lafayette - USA; ³Department of Animal Reproduction, University of São Paulo, Pirassununga - BR; ⁴Department of Animal Sciences, Purdue University, West Lafayette - USA
(Presented By: Mariana Andrade Torres, MsC, PhD candidate)

Poster #129
WITHDRAWN

Poster #130
TESTICULAR MATURATION ARREST (TMA): UNDERLYING ETIOLOGY AND DIFFERENCES BETWEEN EARLY AND LATE MATURATION ARREST
Prashant Kumar PhD, Manish Jain PhD and Ashutosh Halder MD, DNB, DM
AIIMS
(Presented By: Ashutosh Halder, MD, DNB, DM)

Poster #131
ARE THERE ANY PREDICTIVE FACTORS FOR THE OUTCOME OF MICRO-TESE?
Aris Kaltas MD¹, Fotios Dimitriadis Ast Professor², Ioannis Giakoumakis MD³, Adamantios Dafnis MD³, Athanasios Zachariou Dr³, Athanasios Palouras MD³, Andreas Karagiannis MD³, Ioannis Giannakis MD³, Gjergji Semini MD³, Kalipso Margariti MD³, Ioannis Champiaborty MD³, Evlalia Vlachopoulou MD³, Panagiota Tsounapi Dr³, Atushi Takenaka Professor¹ and Nikolaos Sofiktis Professor¹
¹Urology Department, Ioanna University, School of Medicine, Ioannina, Greece; ²Urology Department, Aristotle University, School of Medicine, Thessaloniki, Greece; ³Institute of Human Genetics, Poland; ⁴* - Current affiliation University of San-Francisco and University of West Virginia, respectively; ⁵University of Münster, Germany
(Presented By: Alexander Yatsenko, MD, PhD)

Poster #132
CONCURRENT INTAKE OF ANTIBIOTICS WITH PHOSPHODIESTERASE TYPE 5 INHIBITORS (PDE5I’S) AND/OR ANTIOXIDANT SUPPLEMENTS RESULTS IN TREATMENT FAILURE FOR SUBCLINICAL MALE GENITAL TRACT INFECTIONS
JUAN R. CORREA-PEREZ PhD and Samuel P. Marynick MD
Texas Center for Reproductive Health
(Presented By: Juan R. Correa-Perez, PhD, HCLD,CTBS, EMB)

Poster #133
GRANTING ACTIVITIES BY MALE CONTRACEPTIVE INITIATIVE
Logan Nickels PhD, Mitch Eddy PhD, Heather Vahdat MPH and David Sokal MD
Male Contraceptive Initiative
(Presented By: Logan Nickels, PhD)

Poster #134
RESULTS OF RETROSPECTIVE ANALYSIS OF MALE INFERTILITY IN THE KYRGYZ REPUBLIC
Mirlan Aibashov
Scientific and Production Centre for Preventive Medicine, Bishkek, Kyrgyz Republic
(Presented By: Mirlan Nurmatovich Aibashov, III

Poster #135
CORRECTIONS OF MIS-STATEMENTS ABOUT THE SCSA® TEST
Don Evenson PhD¹, Kay Kaspersen BA² and Jennifer Christianson²
¹South Dakota State University, University of South Dakota, Dept of OB/GYN, SCSA Diagnostics; ²SCSA Diagnostics
(Presented By: Donald P. Evenson, PhD, HCLD)

Poster #136
GENOMIC STUDY OF SEVERE FORM OF MALE INFERTILITY, NON-OBSTRUCTIVE AZOOSPERMIA
Alexander Yatsenko¹, Nijole Pollock¹, Jaseem Khan², Huaiyang Jiang³, Marta Olszewska¹, Svetlana Yatsenko¹, Daniel Bellissimo¹, Aleksander Rajkovic¹,⁴, Tomas Jaffee¹,⁴, Kathleen Hwang¹, Joseph Sanfilippo¹, Frank Tüttelmann⁵ and Maciej Kurpisz¹
¹University of Pittsburgh, USA; ²Khyber Medical University, Pakistan; ³Institute of Human Genetics, Poland; ⁴* - Current affiliation University of San-Francisco and University of West Virginia, respectively; ⁵University of Münster, Germany
(Presented By: Alexander Yatsenko, MD, PhD)
INDEX OF ABSTRACT AUTHORS

A
Adami, L 27
Aibashov, M 134
Alzweri, L 82, 96
Andrade Torres, M 128
Antoniassi, M 28
Asanad, K 118

B
Balasubramanian, A 105, 114
Battistone, M 1, 13
Belardin, L 44
Bianchi, E 75
Bjorndahl, L 110
Brouard, V 68

C
Caldeira Brant, A 37
Chen, P 21
Chen, Y 15
Cheng, P 111, 61
Chung, J 3
Cooley, D 70
Correa Perez, J 108, 132

D
Dada, R 74
David, S 7
de Jager, C 99
Deebel, N 45
Delehedde, M 80
Dey, S 33
Dhawan, V 64
Diekman, A 76
Dimitriadis, F 131
Doungkamchan, C 20

E
Edmonds, M 39
Eisa, A 2
Evenson, D 135
Everett, R 35

F
Fang, Y 49
Fernandes, S 89
Ferreira, J 16
Flannigan, R 98

G
Gabrielsen, J 58
Gaikwad, A 43
Galano, M 6
Gautam, S 63
Georges, E 93
Gervasi, M 71
Gu, X 125

H
Haldar, A 130
Henkel, R 104, 112, 113, 97
Hernández Silva, G 23
Huang, Q 67

I
Intasqui, P 60

J
Jain, J 86
Jiang, H 117
Jorgez, C 81, 91

K
Keihani, S 41
Khera, N 46
Klein, B 19
Knigavko, O 90
Kogan, S 73
Kurpisz, M 119

L
Legare, C 87
Li, L 14
Li, X 79
López Torres, A 34
Lukusa, K 59

M
Machen, G 103
Manka, M 120, 121
Mo, J 29
Munyoki, S 40
Mustafaev, R 127

N
Ni, C 25
Nicholson, T 10
Nickels, L 133
Nusbaum, D 52

O
Ostermeier, G 92

P
Parekh, N 122
Pariz, J 109
Pastuszak, A 11
Patrick, S 31
Paudel, B 18
Perobelli, J 94
Pourhabibi Zarandi, N 72

Q
Qu, W 24

R
Ranea, C 126
Ritagliati, C 36
Rwigemera, A 17

S
Salas Huetos, A 115, 42
Santana, V 65
Santi, D 12
Seppan, P 62
Shatylyko, T 116, 129
Shetty, G 84
Shores, M 8
Spaska, A 50
Stermer, A 4
Sun, A 51, 66

T
Takei, G 77
Tian, E 54
Tourzani, D 22
Tran, K 26

V
Valli Pulaski, H 124
Venugopal, S 83
Vigodner, M 100

W
Wald, G 55
Walker, C 69
Wang, Y 78
Wen, Y 48
Wen, Z 47

Y
Yap, Y 56
Yatsenko, A 136
Yuan, S 38

Z
Zhang, J 95
Zhu, Q 88
Zielen, A 9
Zillig, B 106

© 2019 American Society of Andrology and European Academy of Andrology
Andrology, 2019, Supplement, 52
Poster #1

HETEROGENEITY OF PROTON SECRETING EPITHELIAL CELL FUNCTION REVEALED BY TRANSCRIPTOMIC CLUSTER ANALYSIS
Maria Agustina Battistone PhD¹, Raul G Spallanzani PhD², Anil V Nair PhD³, Alexandra C Mendelsohn BS¹, Dennis Brown PhD¹ and Sylvie Breton PhD¹
¹Massachusetts General Hospital/Harvard Medical School; ²Harvard Medical School
Presented By: Maria Agustina Battistone, PhD

In the epididymis, elaborate communication networks between the different epithelial cell types are important to establish a luminal environment that is essential for sperm maturation. Clear cells (CCs) play a critical role in this process by secreting H+ via the vacuolar H+-ATPase. In this study, we used RNA sequencing to characterize the transcriptome of CCs in caput, corpus and cauda, isolated by cell sorting from B1-EGFP mice that express EGFP only in CCs. We demonstrated that CCs from the three regions were clearly separated from each other based on global transcriptome expression profiles. Cluster analysis based on location-specific transcript expression patterns identified nine clusters that may represent discrete states in a continuum rather than strictly independent entities of CCs. While several genes were common to all CCs, subsets of genes were differentially expressed in CCs from each region, and some were exclusive to each region. These include cell-surface receptors, transcription factors, transporters, and secreted proteins. Interestingly, CCs express transcripts that encode proteins that have been previously shown to be acquired by sperm during epididymal transit and were also detected in extracellular vesicles called epididymosomes. Confocal microscopy analysis of the B1-EGFP epididymis revealed the presence of several types of apical membrane protrusions in narrow cells in initial segments and CCs in caput. While some of these membrane protrusions may represent apocrine secretion, others were long apical extensions, similar to nanotubes, which reached out into the lumen to directly interact with spermatozoa. These results indicate that CCs play an important role in the transfer of proteins to sperm, either via direct contact with the sperm cell or via the production of epididymosomes. Surprisingly, we found that CCs express multiple components involved in immune regulation: inflammatory response-associated and anti-inflammatory genes, indicating that CCs have characteristics of immune regulatory cells, including the potential to mount an innate immune-defense against luminal pathogens while preserving sperm from the host immune system. This unexpected array of biological functions adopted by professional acid secreting cells in the epididymis might represent a more generalized phenomenon by which similar cells in other organs also sense and decode extracellular signals and communicate with their neighbors via cell-cell crosstalk.

Poster #2

SPECIFIC REQUIREMENT FOR THE 14-3-3 EPSILON ISOFORM IN MOUSE SPERMATOGENESIS
Alaa Eisa MSc, Alexander Ignatious BSc, Souvik Dey PhD, Srinivasan Vijayaraghavan PhD and Douglas Kline PhD
Kent State University
Presented By: Alaa Eisa, MSc

Spermatogenesis is a complex biological process. Synthesis of new proteins and activation of proteins that regulate meiosis and cellular differentiation occur during spermatogenesis. YWHA or 14-3-3 proteins are adaptor proteins found in eukaryotic cells. Phosphatases, kinases and proteins important for cell cycle regulation, apoptosis, and cancer show an interaction with protein 14-3-3. There are seven isoforms for the 14-3-3 protein encoded by seven genes (β, ε, γ, η, 0/τ, ζ and σ). 14-3-3 isoforms have been shown to have many interacting partners in the seminiferous epithelium of the testis. While it is known that 14-3-3 proteins are expressed in testis and sperm, the expression and role for each of the seven isoforms are not known. The roles of 14-3-3 η and ε isoforms in tests were examined in this study. Western blotting shows the presence of 14-3-3η and 14-3-3ε in tests lysate and, while 14-3-3-ε was detected in sperm lysate, 14-3-3η was not detected. Transgenic mice containing LoxP sites to remove exon 2 from the 14-3-3η and exons 3 and 4 from 14-3-3ε mice were used in this study to define roles for these two isoforms. The transgenic mice were bred with Stra8 and ACTB cre recombinase expressing in mice to produce testis-specific conditional knockout (CKO) and global knockout (GKO) mice. The absence of the 14-3-3-η and ε isoforms were confirmed by using polyclonal and monoclonal antibodies against 14-3-3η and ε. Breeding tests indicate that CKO or GKO males lacking 14-3-3-ε were infertile. However, mice lacking 14-3-3η were normal and fertile. Females lacking either of the two 14-3-3 isoforms were normal and fertile. Low sperm count with higher abnormal sperm was seen in 14-3-3ε CKO mice. Using the Computer Assisted Semen Analysis (CASA) system, the motility of 14-3-3 ε CKO and GKO sperm was seen to be significantly lower compared to the control sperm. A decrease in the phosphorylation of both glycogen synthase kinase 3 (GSK3) and PP1γ2, the signal enzymes essential for male fertility, were seen in sperm from 14-3-3ε KO mice, suggesting that the absence of 14-3-3ε may alter signaling pathways known to regulate spermatogenesis, sperm motility, and fertility. (NIH grants HD086839 SV and HD061869 DK)

Poster #3

EFCAB9 IS A PH-DEPENDENT CA2+ SENSOR THAT REGULATES CATSPER CHANNEL ACTIVITY AND SPERM MOTILITY
Jae Yeon Hwang PhD¹, Nadja Mannowetz PhD², Yongdeng Zhang PhD³, Robert Everley PhD³, Steven Gygi PhD³, Joerg Bewersdorf PhD³, Polina Lishko PhD² and Jean-Ju Chung PhD¹
¹Yale School of Medicine; ²UC Berkeley; ³Harvard Medical School
Presented By: Jae Yeon Hwang, PhD

Varying pH of luminal fluid along the female reproductive tract is a physiological cue that modulates sperm motility. CatSper is a sperm-specific, pH-sensitive calcium channel essential for hyperactivated motility and male fertility. Multi-subunit CatSper channel complexes organize linear Ca2+ signaling nanodomains along the sperm tail. Here, we identify EF-hand calcium-binding domain-containing protein 9 (EFCAB9) as a dual function, cytoplasmic machine modulating the channel activity and the domain organization of CatSper. Knockout mice studies demonstrate that EFCAB9, in complex with the CatSper subunit, CATSPERZ, is essential for pH-dependent and Ca2+ sensitive activation of the CatSper channel. In the absence of EFCAB9, sperm...
motility and fertility is compromised and the linear arrangement of the Ca2+ signaling domains is disrupted. EFCAB9 interacts directly with CATSPERZ in a Ca2+ dependent manner and dissociates at elevated pH. These observations suggest that EFCAB9 is a long-sought, intracellular, pH-dependent Ca2+ sensor that triggers changes in sperm motility.

**Poster #4**

**ETHYLENE GLYCOL MONOMETHYL ETHER EXPOSURE ALTERS CLEAVAGE OF tRNA FRAGMENTS IN RAT SPERM**

Angela Stermer PhD, Susan Hall and Kim Boekelheide PhD, MD
Brown University
Presented By: Angela R. Stermer, Ph.

Many male reproductive toxicants adversely affect fertility through mechanistic targets in one or more distinct cell types in the testis. Regardless of the primary cell targeted by a testicular toxicant, the common thread among these compounds is impairment of spermatogenesis and/or sperm quality. Ethylene glycol monomethyl ether (EGME) targets a specific germ cell subset, the primary spermatocytes, and leads to germ cell apoptosis at high levels of exposure. We hypothesized that the sperm that developed from EGME-exposed germ cells will have altered small RNA profile. Specifically, we looked at tRNA fragments (tRFs) in sperm, because they have been shown to influence embryonic development. Rats were exposed to 0, 50, 60 or 75 mg/kg EGME for 5 days, and then sperm were collected 5 weeks later. Small RNA-sequencing was performed on RNAs isolated from the sperm. The total amount of tRFs relative to library size did not change with treatment; however, the tRFs became longer as a function of treatment, significantly so at 60 and 75 mg/kg. At 60 and 75 mg/kg EGME, there was a shift in the fragment size distribution, with a decreasing peak between 22-27 nucleotides and an increasing peak of 28-33 nucleotides. Using the interactive genome browser, the fragmentation pattern of tRNAs is readily visualized; for example, the tRNAGlyGCC were mostly 5′ fragments which became progressively longer with increasing EGME exposure. Interestingly, sperm tRFs have been shown to originate from the epididymis, and EGME targets germ cells. We are currently performing an exposure to EGME at 60 mg/kg for 5 days and collecting testis and epididymis once a week for 5 weeks to determine the molecular mechanism of EGME altered tRF fragmentation. Since tRFs have been implicated in the transcription of metabolic disease in mice, these data raise the concern that EGME disruption of normal tRNA fragmentation results in altered epigenetic contents of sperm and potential effects on embryogenesis.

**Poster #5**

**KANK1 COPY NUMBER VARIANTS ARE ASSOCIATED WITH GENITOURINARY BIRTH DEFECTS**

Nannan Thirumavalavan MD¹, Marisol O’Neill MS², Meade Haller PhD², Jason Scovell Bha², Cenk Gengiz BA², Joshua Moore MS², Jeffrey White MD, PhD², Kunj Sheh MD² and Dolores J. Lamb PhD²
¹Baylor College of Medicine; ²Baylor College of Medicine, Houston, TX; ³Department of Urology and Genomic Medicine and Englander Institute for Personalized Medicine, Weill Cornell Medical College, New York, NY
Presented By: Dolores J. Lamb, PhD, HCLD

**Introduction and Objectives:** Array Comparative Genomic Hybridization analysis (aCGH) of non-syndromic patients with genitourinary (GU) birth defects revealed copy number variants encompassing a candidate gene encoding kidney ankyrin repeat-containing protein 1 (KANK1) for GU birth defects including ambiguous genitalia, micro-penis, and cryptorchidism (Tannour-Louet et al. PLoS One, 2010). This work defined the phenotype of the male GU tract resulting from loss of function of the Kank1 gene in mice.

**Methods:** The effect of Kank1 copy number loss on the GU system was defined using de novo murine models of Kank1-haploinsufficiency and null deletion to elucidate the role of this gene in GU development. In situ hybridization of murine embryos was performed to confirm Kank1 expression in the GU tract. Kank1 homozygous knockout mice were created using a CRISPR-Cas9 approach. Phenotyping was performed at 10 weeks of age, and micro-CT allowed standardized measurement of penile structures. 1-year old mice also provided testes and epididymides for testicular mass and histology. The epididymides were removed and semen analyses and breeding studies were performed. To assess kidney development and histopathology, micro-CT, histology and electron microscopy (EM) were performed. All studies were IRB and IACUC approved.

**Results Obtained:** One Kank1 null mouse exhibited micro-penis, but no other penile abnormalities were identified in 9 haplo-insufficient and 14 null mice. Micro-CT revealed that null mice had shorter penis lengths (5.90 +/- 0.15 versus 5.62 +/- 0.31, p=0.05), and lower total motile sperm counts (5.18 million/cc vs 12.36 million/cc, p=0.39). Testes showed histopathologic differences, with vacuoles in the seminiferous epithelium. Immunofluorescent microscopy revealed collagen replacement and fibrosis in glomeruli, and proteinaceous deposits in the tubes. EM of Kank1 haplo-insufficient mice demonstrated altered podocyte structure. In summary, the kidney findings are consistent with focal segmental glomerulosclerosis, a condition associated with renal failure in humans.

**Conclusions:** Gene-dosage changes of Kank1 deficiency in a mouse model partially mimic the human phenotype showing the presence smaller testis and penile size, histologic anomalies of the seminiferous epithelium, decreased spermatogenic function and decreased fertility, as well as kidney abnormalities including hydronephrosis and altered podocyte structure.

**Poster #6**

**GENE DELETION OF STEROIDOGENIC ACUTE REGULATORY PROTEIN (STAR) BY CRISPR/CAS9 DEMONSTRATES A CRITICAL RELATIONSHIP BETWEEN CONSTITUTIVE STAR AND TRANSLATOR PROTEIN TSPO FOR STEROIDOGENESIS**

Melanie Galano¹, Yasaman Aghazadeh PhD², Yuchang Li PhD¹ and Vassilios Papadopoulos DPharm, PhD, DSc ¹,²
¹Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, CA, USA; ²Research Institute of McGill University Health Center and Department of Medicine, McGill University, Montreal, Quebec, Canada
Presented By: Melanie Galano

Steroidogenesis begins with the transfer of cholesterol from cytosolic stores into mitochondria. This is the hormone-sensitive and rate-limiting step. The transducesome complex, consisting of cytosolic and mitochondrial proteins such as the hormone-induced steroidogenic acute regulatory protein (STAR) and the outer mitochondrial membrane cholesterol-binding translocator protein (TSPO), mediates the transport of cholesterol to the P450 side-chain cleavage enzyme (CYP11A1) at the inner mitochondrial membrane. While studies have revealed the vital roles of both STAR and TSPO in facilitating cholesterol transport into the mitochondria, the precise relationship and interactions between these two proteins are still unknown. Previously, we found that deletion of TSPO in MA-10 cells, which are hormone-responsive mouse tumor Leydig cells, resulted in decreased progesterone production and altered synthesis and/or mitochondrial processing of STAR. In addition, we used co-immunoprecipitation through proximity ligation assays to identify a direct interaction between STAR and TSPO following stimulation by cyclic adenosine monophosphate (cAMP). To further elucidate the relationship between STAR and TSPO, we used the CRISPR/Cas9 system.
ABSTRACTS

to knockout (KO) STAR in MA-10 cells. We found that STAR KO fails to stimulate progesterone production upon human chorionic gonadotropin (hCG) and dibutyryl-cAMP stimulation, but not upon stimulation by 22R-hydroxycholesterol. Furthermore, stimulation by the TSPO drug ligands, FG-N1-27 and XBD173, which induce steroid formation in wild type MA-10 cells, failed to induce progesterone production in STAR KO cells. These studies show that, without the presence of constitutive STAR, TSPO-mediated steroid production is hindered, suggesting a function for constitutive STAR in regulating mitochondrial TSPO function. Taken together, these results show that STAR and TSPO have a function for constitutive STAR in regulating mitochondrial TSPO function.

Poster #7
XENOGRAFTING CRYOPRESERVED PRIMATE TESTICULAR BIOSPees INTO IMMUNE COMPROMISED MICE
Sherin David MS, Meena Sukhwani PhD, Karen A. Peters BS, Hanna Valli PhD and Kyle E. Orwig PhD
1Department of Obstetrics, Gynecology and Reproductive Sciences, Molecular Genetics and Developmental Biology Graduate Program, University of Pittsburgh School of Medicine, Pittsburgh, PA, Magee-Womens Research Institute, Pittsburgh, PA; 2Magee-Womens Research Institute, Pittsburgh, PA; 3Department of Obstetrics, Gynecology and Reproductive Sciences, Magee-Womens Research Institute, Pittsburgh, PA
Presented By: Sherin David, MS

Fertility preservation programs in the US and abroad are freezing testicular tissues for young patients who are at risk of infertility with anticipation that next generation reproductive technologies will be available to use those tissues in the future. Immature testicular tissues from several mammalian species can be matured to produce sperm after xenografting under the back skin of immune-deficient mice. Previous studies demonstrated that fresh non-human primate (nHP) testicular tissues can be matured in a mouse host to produce sperm and live offspring. This result has not been replicated with cryopreserved testicular tissue from primate donors, which is a critical aspect of the fertility preservation paradigm. We xenografted cryopreserved testicular biopsies obtained from prepubertal Rhesus macaques into immune-deficient mice. Additionally, we studied the effects of vascular endothelial growth factor (VEGF) and human chorionic gonadotropin (hCG) on graft survival and maturation. We observed complete spermatogenesis in grafts recovered from mice treated with hCG with or without VEGF. Immunostaining analysis revealed the presence of meiotic germ cells in 40.35±6.59% of the tubules and post-meiotic germ cells in 28.57±5.51% of the tubules in grafts retrieved from the hCG treatment group. In contrast, grafts from the VEGF treatment group had spermatogonia in 29.76±8.75% of the tubules with no evidence of differentiation. No grafts were recovered from mice that were untreated. Similar experiments were carried out using cryopreserved prepubertal human testicular biopsies. Human grafts recovered at 7 months post grafting from hCG and hCG+VEGF treated mice were significantly larger than grafts recovered from untreated mice (p=0.05 and 0.003, respectively). Seminal vesicles in graft recipients that received hCG+VEGF were significantly larger than untreated recipients, suggesting higher testosterone production from the grafts. However, upon recovery, all human grafts exhibited a Sertoli cell only phenotype with the complete absence of germ cells. These results indicate that cryopreserved nHP testicular biopsies retain the potential to undergo maturation upon exposure to hCG in the murine microenvironment. Further studies are required to identify conditions that can promote germ cells survival and differentiation in cryopreserved human xenografts. This work was supported by NIH grant HD075795 and institutional funds.
Mutations in the minichromosome maintenance 8 (MCM8) gene are associated with male and female infertility as well as increased chromosomal breakage in patients. In a genomic familial study, we reported a specific pathogenetic variant (c.446C>G; p.P149R) discovered in three sisters affected with primary ovarian insufficiency. We used CRISPR/Cas9 gene editing to produce mice with mutations in the orthologous region of the mouse Mcm8 gene. We generated an eleven base-pair deletion (-11) with a strong infertility phenotype. Homozygous Mcm8(-11) male mice were unable to sire offspring when paired with wildtype females. Compared with normal littermate controls, homozygous Mcm8(-11) testes were significantly reduced in size and no sperm were recovered from the tail of the epididymis, resulting from a blockage in meiotic prophase I. Our Mcm8(-11) mice resemble our human patient condition and will be useful to investigate germine gene therapies in males affected with non-obstructive azoospermia. This work was supported by institutional funds and a training grant to ACZ T32 HD087194.

Poster #10
SPERMATOGENESIS IN THE TRANSGENDER TESTIS
Tristan Nicholson MD, PhD¹, Ivor Clinton BS², John Amory MD, MPH¹, Nicholas Reder MD, MPH¹, Thomas Walsh MD, MS² and Ashleigh Theberge PhD⁶
¹Departments of Urology and Chemistry, University of Washington; ²Department of Chemistry, University of Washington; ³Department of Medicine, University of Washington; ⁴Department of Pathology, University of Washington; ⁵Department of Urology, University of Washington; ⁶Departments of Chemistry and Urology, University of Washington
Presented By: Tristan M. Nicholson, MD, PhD

Transgender women are individuals born with male sex characteristics who identify as female. These individuals may choose to be treated with a combination of estrogen and anti-androgen to better align their physical appearance with their gender identity. Existing literature reports variable rates of spermatogenesis in pathologic specimens, limiting accurate counseling of transgender women about their fertility potential. Therefore, our goal was to evaluate spermatogenesis in pathologic specimens from transgender women on gender-affirming hormone therapy at the time of bilateral simple orchiectomy. Following IRB approval, transgender women who underwent gender-confirming orchiectomy from 2011-2018 were identified in the Department of Pathology archives. A retrospective medical records review was performed to gather clinical information. Pathology reports were reviewed for specimen weight, dimensions of testes and description of spermatogenesis. To compare continuous variables, Students t-test was used. 52 transgender women who underwent bilateral simple orchiectomy were identified (mean age 38 years, SD 13, range 22-66). All were socially transitioned (living as women); 40 of 52 (77%) were listed as female gender in the medical record and patients were on gender-affirming hormone therapy for a mean of 2.4 years (SD 2, range 1-10). Intact spermatogenesis was reported in 13.5%, hypo-spermatogenesis in 23.1%, no spermatogenesis in 51.9% and spermatogenesis was not reported in 11.5% of testis specimens. There was no difference in estimated testis volume among testes found to have some spermatogenesis (mean 30 cc, SD 15) versus no spermatogenesis (mean 22 cc, SD 7, p = .10). While a substantial proportion of transgender individuals do desire future fertility, historically, the reproductive needs of these patients have been largely ignored. Our study demonstrates that in testis tissue from transgender women on gender affirming hormone therapy, some or intact spermatogenesis is present at the time of bilateral simple orchiectomy. This finding has important implications for counseling transgender women about their reproductive potential.

Poster #11
OCCURRENCE OF PULMONARY OIL MICROEMBOLISM AFTER TESTOSTERONE UNDECAENOATE INJECTION: A POSTMARKETING SAFETY ANALYSIS
Alexander Pastuszak MD, PhD¹, Yiqun Hu MD, PhD², Chace Wayne B Pharm³ and Jeffrey Freid MD²
¹University of Utah; ²Endo Pharmaceuticals Inc.
Presented By: Alexander W. Pastuszak, MD, PhD

Introduction and Objective: A Risk Evaluation and Mitigation Strategy (REMS) program was instuted for testosterone undecanoate because of the potential risk of pulmonary oil microembolism (POME) and/or anaphylaxis after intramuscular injection of testosterone undecanoate. This analysis examined the reporting rate of POME associated with the use of testosterone undecanoate (750 mg/3 mL) during postmarketing surveillance.

Methods: The Endo Pharmaceuticals Inc. database was searched for reports of POME occurring from the time of testosterone undecanoate approval on March 5, 2014 through June 30, 2018. Each case was reviewed and adjudicated by a drug safety physician to confirm that the reported event had predefined clinical characteristics consistent with POME.

Results: During the 4.3-year period, 90,092 doses of intramuscular testosterone undecanoate were distributed via the REMS program to healthcare professionals for patient treatment. From a total of 633 individual case safety reports, 28 spontaneously reported adverse events were classified as POME, for a calculated yearly per-injection POME rate of <0.1%. Of these 28 cases, 21 (75.0%) resolved, and for those with a resolution time reported, 13 of 16 (81.2%) resolved in ≤30 minutes. Thirteen of the 21 cases that resolved (61.9%) required no medical intervention (ie, POME event resolved spontaneously). One fatality was reported 18 months after a documented POME event and appeared unrelated to the reported testosterone undecanoate injection or subsequent injections received after the POME event. In 4 POME cases with symptoms serious enough to require an emergency room visit, issues with the injection technique, incorrect product usage, or a pre-existing medical condition (asthma) were identified as contributing factors.

Conclusions: POME events in men treated with testosterone undecanoate appear to be rare, with resolution occurring quickly without medical intervention in the majority of cases. Most emergency department visits for POME have been the result of injection-related errors, reinforcing the importance of proper technique to minimize the risk of drug injection into the venous circulation and subsequent development of serious adverse events like POME. Source of Funding: Endo Pharmaceuticals Inc.

Poster #12
WITHDRAWN
ABSTRACTS

Poster #13
TRANSCRIPTOMIC CLUSTER ANALYSIS REVEALS LOCATION SPECIFIC HETEROGENEITY OF MONONUCLEAR PHAGOCYTES IN THE EPIDIDYMIS: ROLES IN IMMUNE TOLERANCE AND ACTIVATION
Maria Agustina Battistone PhD, Alexandra C Mendelsohn BS, Dennis Brown PhD, Anil V Nair PhD and Sylvie Breton PhD
Massachusetts General Hospital/Harvard Medical School
Presented By: Maria Agustina Battistone, PhD

In the epididymis, prevention of autoimmune responses against spermatozoa, while providing protection against pathogens, is important for male fertility. Here, we studied how specialized immune cells, mononuclear phagocytes (MPs), contribute to the establishment and maintenance of the environment in which sperm mature and are stored. We had shown that, in the initial segments (IS), MPs extend slender projections between epithelial cells towards the lumen. This unique morphometric characteristic is not observed in MPs from other regions. We used RNA sequencing to characterize the transcriptome of MPs, isolated from the IS and cauda regions of CX3CR1-EGFP mice, which express EGFP only in MPs. IS and cauda MPs were clearly separated from each other based on global transcriptome profiles, and had different gene signatures and functional specializations. In IS MPs, cell adhesion molecules and leukocyte transendothelial and migration pathways were highly enriched. In cauda MPs, components of platelet activation and NF-kappa B signaling were enriched. As expected, MPs from all regions expressed several genes related to cytokine-cytokine receptor interaction. However, specific sub-sets of these genes were differentially expressed depending on their location (e.g. TNF receptors were predominant in cauda MPs, while chemokines, such as 10, 14, 6 were enriched in IS MPs). Genes related to antigen presentation and processing (74, 2-1, 2-1, 2-) and protection against bacterial infection (1, 2, 1) were highly expressed in MPs from all regions, in agreement with their defense function. To study circulating antigen capture by MPs, CX3CR1-EGFP mice were injected (i.v.) with Alexa 647-ovalbumin (OVA). On average 5.8% and 1.4% of CX3CR1+ cells internalized OVA in the IS and the cauda, respectively. Most of these cells were CD45+/F4/80+, identifying them as macrophages. Immunofluorescence showed that in the IS, circulating antigens came in close proximity to epithelial cells via intraepithelial MP internalization. In the cauda, interstitial MPs internalized OVA, but MPs that were in close proximity to the epithelium did not. Thus, MPs in the cauda may confer a stronger protection against circulating antigens compared to the IS region. Our results provide new frameworks for a better understanding of the immunological regulation of male fertility and of the molecular mechanisms underlying epididymitis.

Poster #14
DIRECTING HUMAN INDUCED PLURIPOTENT STEM CELLS DIFFERENTIATION TOWARDS LEYDIG CELLS
Lu Li PhD, Yuchang Li PhD, Chantal Sottas BSc, Martine Culty PhD and Vassilios Papadopoulos DPharm, PhD
Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, CA, USA
Presented By: Lu Li, PhD

Reduced serum testosterone (T), or hypogonadism, affects millions of men. Hypogonadism has been found to be associated with conditions that include infertility, cardiovascular diseases, altered mood, fatigue, decreased lean body mass, reduced bone mineral density, increased visceral fat, metabolic syndrome, and decreased libido and sexual function. Reduced serum T is common in aging men where Leydig cells are becoming less responsive to LH referred to as primary hypogonadism, a condition that also occurs in 50% of men diagnosed with idiopathic infertility. Administering T-replacement therapy (TRT) reverses many of the symptoms of low T levels. However, TRT is linked to side effects such as infertility, and increased risk of prostate cancer and cardiovascular disease. Thus, there is a need to obtain T-producing cells, which could be used to treat hypogonadism based on transplantation and reestablishment of T-producing cell lineage in the body. In humans, T is synthesized by Leydig cells (LCs) likely deriving from mesenchymal cells of mesonephric origin. Although mesenchymal cells have been successfully induced into LCs, the limited source and possible trauma to donors hinders their use in clinical therapies. Alternatively, human induced pluripotent stem cells (hiPSCs) that are highly expandable in cell culture and have the potential to differentiate into all somatic cell types become the emerging source of autologous cell therapies. We have successfully induced the differentiation of hiPSCs through mesoderm and mesenchymal cell progenitors into human Leydig-like cells (hLLCs) under monolayer culture conditions using factors that are critical for the normal development of LCs. qPCR results showed that hLLCs expressed all genes specific for Leydig cells and important for T biosynthesis. Microrray analysis further displayed that hLLCs highly expressed genes involved in lipid droplet-associated functions, cAMP/PKA signaling pathway, pregnenolone biosynthesis, and androgen formation. Consistent with the gene expression pattern, hLLCs secreted pregnenolone, progesterone, androstenedione, and T, in response to dibutyryl-cAMP and 22R-hydroxycholesterol. hLLCs ultrastructural features resembled that of LCs in support of their steroidogenic function. Differentiation of hiPSCs into hLLCs offers a new tool to study the development of hLCs in vitro and a cell therapy venue for the treatment of hypogonadism.

Poster #15
METHOXYCHLOR AND ITS METABOLITE HYDROXYCHLOR COMPETITIVELY INHIBIT HUMAN TESTIS RETINALDEHYDE DEHYDROGENASE 1A1
Yong Chen MD¹, Xiaoheng Li MD², Zina Wen Msc³, Renshan Ge Md⁴ and Ying Zhong Md⁴
¹Jinjiang Maternal and Child Health Hospital; ²Wenzhou Medical University the Second Affiliated Hospital
Presented By: Yong Chen, MD

Introduction: Many evidences suggest that retinoic acid is critical to induce germ cells to express the pre–meiotic marker Stra8 for entering meiosis. Retinoic acid is synthesized by a series of retinoic acid–synthesizing enzymes (retinaldehyde dehydrogenases, ALDH), especially the ALDH1A1. Null mutation of ALDH1A1 induces the delay of the onset of germ cell meiosis in ovaries and testes. Many environmental endocrine disrupters may block the germ cell meiosis via directly inhibiting ALDH1A1. One of these endocrine disruptors is methoxychlor (MXC), an insecticide. MXC is metabolized to hydroxychlor (HPTE).

Methods: In this study, we cloned human ALDH1A1 and tested the effects of MXC and HPTE, and the action mode of MXC and HPTE on human ALDH1A1. We used propionaldehyde as the substrate of the enzyme and NAD+ as the cofactor and measured the formation of NADH.

Results: We found that human ALDH1A1 catalyzed propionaldehyde with Vmax of 379.7 ± 19.22 nmol/mg protein/min and Km of 47.35 ± 7.56 μM. MXC potently inhibited human ALDH1A1 with IC50 value of 9.04 ± 0.10 μM. However, HPTE is more potent than MXC with its IC50 of 1.97 ± 0.09 μM. Both MXC and HPTE competitively inhibited human ALDH1A1 when propionaldehyde was used. However MXC and HPTE inhibited this enzyme in a mixed mode when cofactor NAD+ was used. Molecular docking study demonstrated that MXC and HPTE bound to the propionaldehyde binding pocket.

Conclusion: Our data shows that MXC and HPTE are potent and competitive inhibitors of human ALDH1A1, potentially disrupting germ cell meiosis. MXC is activated to more potent inhibitor HPTE in vivo. Funding: This work is supported by Health & Family Planning Commission of Zhejiang Province (11–CX29).

Corresponding author Ying Zhong: yzhong08@yahoo.com.
ABSTRACTS

Poster #16
A CONSERVED MECHANISM OF CATSPER ACTIVATION MIGHT UNDERLIE CA2+ INCREASES IN HUMAN AND MOUSE SPERM IN RESPONSE TO KCL DEPOLARIZATION
Juan J. Ferreira BS¹, Aluet Borrego Alvarez MS², Pascale Lybaert PhD³, Lis C. Puga Molina PhD² and Célia M. Santi MD PhD⁴
¹Dept. of Obstetrics and Gynecology, and Dept of Neuroscience, Washington University School of Medicine. St Louis. MO.; ²Dept. of Obstetrics and Gynecology, Washington University School of Medicine. St Louis. MO.; ³Université Libre de Bruxelles, Faculté de Médecine, Laboratoire de Physiologie et Pharmacologie. Bruxelles, Belgium.
Presented By: Juan Ferreira, BS

Many experiments in fertility use mouse sperm derived from the epididymis as a model of human sperm. We are undertaking experiments to test the validity of this model. In mouse epididymal sperm, membrane depolarization triggers calcium entry through CatSper channels, only when sperm is in alkaline media (pHo =8.5) or after capacitation. Our recent experiments show that in human sperm, membrane depolarization can trigger calcium increases at a much lower pH (pHo =6.8), even before capacitation. Although the differences seen between mouse and human sperm may be species-specific, an alternative possibility is that they might be due to different stages of maturation (epididymal vs ejaculated, respectively). To investigate this, we measured calcium changes in mouse sperm extracted from the uterus soon after ejaculation. We found that ejaculated mouse sperm have calcium responses to KCl that closely resemble human sperm responses, suggesting that the mechanisms of calcium regulation might not be intrinsically different between species but might change during sperm maturation. Recently published experiments indicate that mouse CatSper channels are regulated by PKA. This raises the possibility that sperm contact with HCO3- during ejaculation, activates PKA and Ca2+ entry through CatSper channels in both human and mouse ejaculated sperm, preparing these channels to activate upon membrane depolarization. In order to confirm this hypothesis, we tested the effect of the PKA inhibitor, PKI, on Ca2+ responses to KCl depolarization in human and mouse sperm. We found that incubation with 10 microM of PKI inhibited Ca2+ increases in response to KCl, in human sperm and capacitated epididymal mouse sperm. Our results suggest that CatSper channels in both species are regulated by PKA activation, rendering these channels ready to respond to membrane depolarization. This activation might take place soon upon exposure of sperm to HCO3- present in the seminal plasma. Our experiments suggest a conserved mechanism of CatSper activation between mouse and human sperm. This work was supported by National Institute of Health grants R01HD069631 to C.M.S.

Poster #17
IMPACT OF ETHINYLESTRADIOL EXPOSURE ON RAT FETAL TESTIS DEVELOPMENT AND GERM CELL EPIGENOME
Arlette Rwigemera MSc¹, Lisa-Marie Legault MSc², Serge McGraw PhD² and Géraldine Delbès PhD¹
¹INRS-Institut Armand-Frappier; ²Université de Montréal-Research center of CHU Sainte-Justine
Presented By: Arlette Rwigemera, MSc

Epigenetic reprogramming is a critical step of germ cells perinatal development as epigenetic marks acquired during this phase can have a determining role on the fate of the germline. DNA methylation (5mC) analyses have shown that sperm methylome can be influenced by fetal exposure to environmental xenoestrogens and anti-androgens. This suggests that the epigenetic reprogramming window can be targeted by environmental pollutants. However, immediate epigenetic alterations in precursor germ cells (gonocytes) are not well characterized. We have previously shown that xenoestrogens negatively impact fetal testis development. In the present study, we hypothesize that exposure to ethinylestradiol (EE2), a strong estrogen agonist, could have an immediate impact on gonocytes epigenome. First, we validated EE2 deleterious effects on testis using 3 days organ culture of rat fetal testes explanted at gestation days (GD) 15.5 or 18.5. We observed that EE2 significantly reduced daily testosterone secretion at both ages as soon as 24h of treatment. Additionally, EE2 significantly reduced the number of gonocytes per testis but only at GD15.5. Since we previously showed that the dynamic of 5mC and two histone modifications (H3K4me2, H3K4me3) can be reproduced in our model, we determined if there were obvious alterations of these marks following EE2 treatment using immunofluorescence quantification in gonocytes nucleus. Our results indicated that, at both ages, levels of those three marks did not change compared to controls. More subtle genome-wide effects on gonocytes’ methylome are now being investigated using Reduced Representation Bisulfite Sequencing (RRBS) on FACS-sorted GFP-positive gonocytes after treatment at GD18.5, when de novo 5mC is occurring. Our results confirmed the impact of xenoestrogens on rat fetal testis development and functions but did not reveal changes in the methylation dynamics of the DNA and histone H3K4. Immediate specific changes in DNA methylation may be revealed by RRBS analysis, suggesting the origin of long-term epigenomic alterations.

Poster #18
ROLE OF CA2+/CALMODULIN- DEPENDENT SERINE-THREONINE PHOSPHATASE, CALCINEURIN, IN MOUSE SPERM CAPACITATION
Bidur Paudel, Felipe Navarrete and Pablo E. Visconti PhD
Umass Amherst
Presented By: Bidur Paudel

Mammalian sperm needs to reside in the female reproductive tract for certain period of time to be fertilization competent. During this time, sperm undergoes several physiological changes that include hyperactivation of sperm motility, increase in tyrosine phosphorylation and preparation of sperm for acrosome reaction. Collectively, these changes are called capacitation. At the molecular level, sperm capacitation is associated with activation of cAMP/PKA and Ca2+ pathways. Ca2+ regulates this pathway directly or with another binding partner calmodulin (CaM). Pharmacological and genetic loss of function experiments have shown a central role of this ion in sperm motility and acrosome reaction. Nonetheless, how Ca2+ or Ca2+/CaM regulate sperm capacitation is not well understood. Calcineurin is Ca2+/CaM-dependent serine-threonine phosphatase that plays an important role in calcium signaling. In immune system it activates T cells by dephosphorylation of transcription factor NFAT. In sperm it has been shown to confer midpiece flexibility during epididymal maturation. Moreover, mice lacking the testis-specific calcineurin are sterile. Nonetheless, the role of calcineurin in sperm capacitation has not been yet explored. In this work, we show that calcineurin is present in the sperm principal piece. In addition, we report that cyclosporin A (CSA); a specific inhibitor of calcineurin blocks phosphorylation of PKA substrates and this inhibition is rescued by cAMP analog. Finally, using Computer-Assisted Sperm Analysis (CASA) and in vitro fertilization (IVF) we showed that CSA inhibits sperm hyperactivation and block fertilization in vitro. Our data indicate that calcineurin has an important role in the regulation of cAMP/ PKA pathway and that this phosphatase is essential for sperm to gain fertilizing competency during capacitation.
ABSTRACTS

Posters

**Poster #19**
**BACTERIAL EPIDIDYMITIS IN A PRECLINICAL MOUSE MODEL – IMPROVEMENT OF THERAPEUTIC OUTCOME BY SUPPLEMENTARY ANTI-INFLAMMATORY TREATMENT**
Britta Klein¹, Sudhanshu Bhushan¹, Rukmani Wijayarathna², Ralf Middendorff³, Kate Loveland⁴, Mark Hedger⁵ and Andreas Meinhardt¹
¹Institute of Anatomy and Cell Biology, Justus-Liebig University Giessen; ²Centre for Reproductive Health, Hudson Institute of Medical Research
Presented By: Britta Klein

Antibiotic treatment is the standard therapy for epididymitis caused by uropathogenic E. coli (UPEC). Despite elimination of bacteria, ca. 40% of patients subsequently suffer ongoing fertility problems. As a major cause, epididymal duct obstruction was documented that appears to be the consequence of the host’s inflammatory response towards the pathogen. Moreover, spermatogenesis is also impaired in combined epididymo-orchitis, at least temporarily. In a mouse model of UPEC epididymo-orchitis, pathogenesis was explored in the acute (d10) vs the chronic (d31) phase comparing standard antibiotic (levofloxacin LVX, 20 mg/kg) versus combined treatment (antibiotic + anti-inflammatory, i.e. glucocorticoid GC, 0.5 mg/kg). In the epididymis, LVX could not prevent severe acute local purulent inflammation, despite effective microbial elimination, as shown by histology. Despite resolution of the acute infection by d31, as shown by qRT-PCR analysis of key cytokine levels (e.g. Il1ß, Tnfa, Cxcl2), lack of cauda sperm and luminal shrinkage/obliteration of distal ductal segments was evident. In contrast, LVX + GC treatment maintained normal cauda morphology and presence of cauda sperm, at d10 and d31, suggesting successful sperm transit and thus ductal potency (d31 mean ± SD ductal area/cauda duct cross section in mm²: sham 0.070 ± 0.015; UPEC LVX + GC 0.061 ± 0.028; UPEC LVX 0.037 ± 0.019). By d10, UPEC dissemination to the testis resulted in disruption of spermatogenesis. Yet proliferative spermatagonia and primary spermatocytes were continuously detectable. LVX and LVX + GC treatment did only partly preserve spermatogenesis (% of tubule cross sections showing late spermatids, mean ± SD: sham 73.37 ± 15.5; UPEC 31.1 ± 1.27; UPEC LVX 41.77 ± 29.09; UPEC LVX + GC 35.73 ± 7.86). Interestingly, complete recovery of spermatogenesis by d31 was observed irrespective of treatment (% of tubule cross sections showing late spermatids, mean ± SD: sham 73.82 ± 5.19; UPEC 63.84 ± 8.65; UPEC LVX 67.47 ± 0.81; UPEC LVX + GC 69.55 ± 14.82). In conclusion, data suggest that infertility following epididymitis is predominately elicited by obstructive azoospermia, a cause that can be prevented by early interventional treatment with a combination of antibiotics and anti-inflammatory agents. Moreover, the response of the cauda epididymis (persistent ductal shrinkage/obstruction, except dual treatment) and the testis (complete recovery irrespective of treatment) to the microbe are fundamentally different.

**Poster #20**
**LENTIVIRUS AND CAS9 KNOCK-IN MICE AS A POTENTIAL HIGH-THROUGHPUT TOOL TO STUDY CANDIDATE SERTOLI CELL-SPECIFIC GENE FUNCTION IN SPERMATOGENESIS**
Chatchanan Doungkamchan MD¹, Lin Lin MD², Yi Sheng MD, PhD³, Meena Sukhwani PhD⁴ and Kyle E. Orwig PhD⁴
¹Molecular Genetics and Developmental Biology Graduate Program, University of Pittsburgh School of Medicine; ²Xiangya School of Medicine, Central South University, Changsha, China; ³Department of Obstetrics, Gynecology and Reproductive Sciences, Magee–Womens Research Institute, University of Pittsburgh School of Medicine, Pittsburgh, PA 15213
Presented By: Chatchanan Doungkamchan, MD

Whole genome sequencing approach enables us to identify candidate genes that might be responsible for idiopathic Non-obstructive azoospermia (NOA). Mouse models are a powerful tool to validate candidate NOA genes discovered in patients, but this approach is time consuming and low throughput. We propose that candidate Sertoli cell defect genes can be rapidly screened by using lentiviruses to introduce sgRNAs targeting the candidate locus into the seminiferous tubules of Cas9 mice, which harbored Loxp-stop-Loxp-Cas9-T2A-EGFP cassette. To show that Lentivirus specifically infects Sertoli cells, we injected Lentivirus carrying sgRNA targeting Luciferase gene and Cre into seminiferous tubules of the Cas9 mice. Testes were retrieved 2 weeks after injection and were stained for Sox9 (Sertoli cell marker) and EGFP (indicating infected cells) or Vasa (germ cell marker) and EGFP. We found that EGFP-positive cells are also positive for Sox9 but not for Vasa, meaning that Lentivirus is specific to Sertoli cell and Cre successfully removed Loxp-stop-Loxp cassette to allow expression of EGFP and Cas9 gene only in Sertoli cells. To show that sgRNA/Cas9 successfully knockeddown infertility-associated gene expression, we injected the right testis with lentivirus carrying sgRNA targeting Androgen Receptor (Ar) gene and the left testis with sgLuc-Cre lentivirus. Two months after injection, we observed smaller testes, defective spermatogenesis from histology and decreased sperm count in both testes. This suggested potential adverse effect from lentivirus and/or extended Cas9 expression to the seminiferous tissue, which have never been reported. To confirm that the decrease in sperm count and testis size were also influenced by side effects of lentivirus and/or extended Cas9 expression, we injected the right testis with sgLuc-Cre lentivirus and the left with DMEM media that was used to resuspend virus. We observed a significant decrease in size and sperm count on the side that was injected with the lentivirus compared to the control. Therefore, while Cas9 mice may be exploited for a high throughput screening to study Sertoli cell defect genes in azoospermia, more work is needed to reduce or eliminate toxicity caused by the lentivirus or Cas9 expression. This study is supported by Magee-Womens Research Institute Foundation.
injection, we observed smaller testes, defective spermatogenesis from histology and decreased sperm count in both testes. This suggested potential adverse effect from lentivirus and/or extended Cas9 expression to the seminiferous tissue, which have never been reported. To confirm that the decrease in sperm count and testis size were also influenced by side effects of lentivirus and/or extended Cas9 expression, we injected the right testis with sgLuc-Cre lentivirus and the left with DMEM media that was used to resuspend virus. We observed a significant decrease in size and sperm count on the side that was injected with the lentivirus compared to the control. Therefore, while Cas9 mice may be exploited for a high throughput screening to study Sertoli cell gene defects in azoospermia, more work is needed to reduce or eliminate toxicity caused by the lentivirus or Cas9 expression. This study is supported by Magee-Womens Research Institute Foundation.

Poster #21
DIFFERENTIATION OF SEMINIFEROUS TUBULE-ASSOCIATED STEM CELLS INTO LEYDIG AND MYOID LINEAGES IN VITRO
Panpan Chen¹, Fenfen Chen¹, Xiaojü Guan¹, Xingxing Zhao¹, June Liu¹, Barry Zirkin PhD² and Haolin Chen PhD²
¹The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University; ²Johns Hopkins Bloomberg School of Public Health
Presented By: Panpan Chen

**Introduction and Objectives:** We reported previously that stem cells associated with adult rat seminiferous tubules are able to differentiate into Leydig cells in vitro. The proliferation and differentiation of these stem Leydig cells (SLCs) are regulated by locally produced factors, including Desert Hedgehog (DHH), PDGF and TGFβ family proteins. DHH stimulates and TGFβ inhibits the differentiation of SLCs into the Leydig lineage. Two members of the PDGF family, PDGF-AA and PDGF-BB, appeared to play unique roles in SLC proliferation and differentiation. PDGF-AA is capable of stimulating both the proliferation and differentiation of the SLCs into the Leydig lineage, while PDGF-BB stimulates the proliferation but inhibits the differentiation of these cells. Since PDGF-BB is a strong inducing factor in smooth muscle cell differentiation, we asked whether SLCs are multipotent, and if so whether PDGF-BB can induce SLCs into the myoid cell lineage.

**Methods:** Seminiferous tubules and CD90+ SLCs isolated from seminiferous tubules were cultured in vitro for 3 weeks with PDGF-AA, PDGF-BB and other potential Leydig and myoid inducing factors, including DHH agonist, TGFβ, LH and androgen (dihydrotestosterone, DHT). The expressions of Leydig cell markers (CYP11A1, HSD3B, T production) and myoid cell markers (ACTA2, desmin) were examined.

**Results:** In the presence of PDGF-AA, DHH and LH, SLCs differentiated into the Leydig lineage, while in the presence of PDGF-BB, TGFβ and androgen (DHT), the same cells differentiated into the myoid lineage.

**Conclusions:** These findings suggest that in the adult testis, there may be common precursor cells on the tubular surface. These cells, SLCs, are known to be capable of differentiating into Leydig cells. It is now apparent that these cells also are able to differentiate into the myoid lineages of the testis, depending on the local inducing factors. Such multipotent stem cells may play important roles in maintaining homeostasis of both Leydig and myoid populations in the adult testis.

Poster #22
TESTIS-SPECIFIC SERINE/THREONINE KINASE 1 AS A POSSIBLE TARGET FOR MALE CONTRACEPTION
Darya A. Tourzani BS, Maria Gracia Gervasi PhD, Wei Cui PhD, Ana Maria Salicioni PhD and Pablo E. Visconti PhD
University of Massachusetts Amherst
Presented By: Darya Tourzani, BS

We have previously shown that members of the family of testis-specific serine/threonine kinases (TSSKs) are post-meiotically expressed in male germ cells and in mature mammalian sperm. The restricted post-meiotic expression of TSSKs as well as the importance of phosphorylation in signaling processes strongly suggests that TSSKs have an important role in germ cell differentiation and/or sperm function. This prediction has been supported by the reported sterile phenotype of the TSSK6 knock-out (KO) mice and of the double TSSK1 and TSSK2 KO. The aim of our work was to develop the single KO mouse model of TSSK1 and validate this kinase as a target for the development of a male contraceptive. We used CRISPR/Cas9 technology and generated the TSSK1 KO allele in the C57BL/6NJ strain by microinjecting Cas9 mRNA plus the specific TSSK1 single guide RNA (sgRNA) into the cytoplasm of zygotes recovered from super-ovulated plugged females. The injected embryos were then cultured in vitro until blastocyst stage and transferred to pseudo-pregnant females. Male heterozygous pups born were used for TSSK1 KO colony establishment. In addition, our CRISPR/Cas9 procedure generated three male TSSK1 homozygous that were allowed to reach puberty. In the present work we studied the reproductive characteristics of these three animals. We found that TSSK1 KO are sterile in vivo. After natural mating of TSSK1 KO males with C57BL/6NJ females, females that presented a plug (indicative of mating) were monitored for the following 24 days and no pregnancies or pups were found. Then, we evaluated the sperm number, sperm morphology and motility. We found that TSSK1 KO animals produce normal number of sperm; however, there is a high incidence of abnormal tail bending and head malformations. Total motility was normal nevertheless the levels of slow and weak motile sperm are abnormally high in combination with very low progressive motility. After incubation of sperm in a medium that supports capacitation, no hyperactivated motility was observed. In addition, the sperm was used for in vitro fertilization assays and no cleavage was observed 18 h post-insemination. It is interesting to note that three different mutations in the same gene (TSSK1) cause the same sterility phenotype both in vivo and in vitro. Our results offer new evidence that supports TSSK1 as a suitable candidate for the development of novel non-hormonal male contraceptives.

Poster #23
CHARACTERIZATION OF EJACULATED HUMAN SPERMATOZOA MEMBRANE ASSOCIATED PROTEINS AS DECAPITATION FACTORS
Gabriela Hernández Silva MSc¹, Aideé Saray López Torres PhD², Jorge Elías Fabian López-Araiza Student³, Victor Manuel Torres Flores PhD³ and Mayel Chirinos PhD³
¹Universidad Nacional Autónoma de México/Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán; ²Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán; ³Universidad Nacional Autónoma de México
Presented By: Gabriela Hernández Silva, MSc

**Introduction:** Ejaculated spermatozoa are covered by epididymal and accessory glands secreted proteins that stabilize the plasma membrane, but in order to capacitate and fertilize the oocyte, those proteins must be released from the sperm surface.
**Abstracts**

**Objective:** To characterize the human sperm plasma membrane-associated proteins (SMAP) released during in vitro capacitation and to evaluate their effect on sperm function.

**Material and Methods:** Motile spermatozoa from normozoospermic semen samples were obtained by swim up, incubated under capacitating conditions for 6 hours and centrifuged to separate sperm from the culture medium containing the SMAP. Afterwards, SMAP were characterized by SDS-PAGE and 2-dimensional electrophoresis and proteins identity was investigated by mass spectrometry. Moreover, the effects of 0.8, 1.6 and 3.2 mg/ml of SMAP on sperm motility, protein tyrosine phosphorylation and acrosome reaction were investigated by Computer-Aided Sperm Analyzer, Western blots and acrosome staining with the lectin PSA coupled to FITC, respectively.

**Results:** Mass spectrometry analysis allowed the identification of 29 proteins released by the sperm during in vitro capacitation, where most of them are specifically expressed in the male reproductive tract. On the other hand, spermatozoa capacitated in the presence of 1.6 and 3.2 mg/ml of SMAP showed a decrease in the percentage of hyperactivated cells, the protein tyrosine phosphorylation and the incidence of sperm with calcium ionophore-induced acrosome reaction, but when capacitated spermatozoa were further incubated with same concentrations of SMAP only the sperm hyperactivation was affected.

**Conclusions:** Our results indicate that human SMAP have a decapacitating effect. Moreover, as the SMAP were able to dissociate and re-associate to the sperm plasma membrane, a misregulation in the release mechanisms of these proteins may account for some in vitro capacitation defects and therefore may have clinical implications. Therefore, the study of each protein on sperm function could contribute to the understanding of their role during capacitation. This research was supported by CONACyT (México).

**Poster #24**

**Intraflagellar Transport Protein 81 is Essential for Mouse Spermatogenesis and Male Fertility**

Wei Qu, Qian Huang, Lin Shi, Wei Li, Zhenyu Wang, Ling Zhang, Rex A Hess and Zhibing Zhang

Presented By: Wei Qu

Intraflagellar transport (IFT) is an evolutionarily conserved, bidirectional movement of large protein particles along the length of axonemal microtubules, which is essential for cilia/flagellar structure and function. In mice, mutations in IFT proteins have been shown to result in several ciliopathies including male infertility. IFT81, a component of the core IFT-B complex, interacts with IFT74 to bind and transport tubulin for ciliogenesis. The IFT81 protein is highly expressed in mouse testis. In tests, IFT81 protein is detectable beginning day 8 after birth, and dramatically up-regulated from day 16. The protein is present in the cytoplasm of spermatocytes and round spermatids, forming granules in some locations of cytoplasm, and in developing sperm tail. To study the role of IFT81 in sperm flagella formation and male fertility, the floxed Ift81 mice were bred with Stra8-icre mice so that the Ift81 gene would be disrupted in spermatocytes/spermatids. The Ift81floxed/flox;Stra8-icre mutant mice did not show any gross abnormalities. The conditional Ift81 knockout males were infertile. Histology of testes of homozygous mutant mice revealed sloughing of germ cells and numerous mucinucleated giant cells in the lumen of seminiferous tubules, presumably due to failure of recognition of germ cells by Sertoli cells; and these cells are also observed in the lumen of epididymides. Testicular expression level of IFT74 was significantly reduced in the homozygous mutant mice; however, IFT88 was increased. Our studies demonstrated that IFT81 is essential for mouse spermatogenesis and male fertility, and strongly suggested that IFT81 might play a role in transporting key molecules to the surface of germ cells for germ cell-Sertoli cell interaction besides transporting tubulin for cilia/flagella formation.

**Poster #25**

**STEM LEYDIG CELL REGENERATION IN THE ADULT RAT TESTIS IS INHIBITED AFTER A SHORT-TERM TRIPHENYL Tin Exposure**

Chaobo Ni MD, Yinghui Fang MS, Xiuxiu Chen MD, Keyang Wu MD, Huitao Li PhD, Yiyian Wang PhD, Zhenkun Lin PhD, Ren-Shan Ge MD and Qingquan Lian PhD

The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University Presented By: Chaobo Ni, MD

**Background:** Triphenyltin is an organotin compound and may be an endocrine disruptor, impairing the male reproductive system. Triphenyltin is used for marine vessels and mariculture facilities as an ingredient of the antifouling agents. The objective of the study was to examine the effects of triphenyltin on stem Leydig cell regeneration in the adult rat testis.

**Methods:** Adult male Sprague Dawley rats were gavaged triphenyltin (0, 0.5, 1.0, 2.0 mg/kg body weight/day) for 10 days, followed by a single treatment of ethane dimethane sulfonate (EDS) to ablate all Leydig cells. Rats (8 animals in each group at each time point) were executed on post-EDS days 21, 35, and 56. We measured serum hormone (testosterone, luteinizing hormone, and follicle-stimulating hormone) levels and gene expression of the testis on post-EDS days 21, 35, and 56, investigated the labeling index of PCNA in Leydig cells on post-EDS day 21, enumerated Leydig cell number, and calculated sizes of the Leydig cell, nucleus, and cytoplasm, as well as measured protein expression on post-EDS day 56.

**Results:** Triphenyltin decreased testis weight on post-EDS days 35 and 56 at doses of 1 and 2 mg/kg without decreasing body weight. Triphenyltin significantly reduced serum testosterone levels from 1.30 ng/ml (control) to 0.56 ng/ml (1 mg/kg triphenyltin) and 0.48 ng/ml (2 mg/kg triphenyltin) on post-EDS day 56. Triphenyltin significantly increased serum LH levels from 22.78 ng/ml (control) to 30.27 ng/ml (1 mg/kg triphenyltin) and 30.60 ng/ml (2 mg/kg triphenyltin) on post-EDS day 21 without altering LH levels on post-EDS days 35 and 56. Meanwhile, serum FSH levels did not change at any doses tested. Triphenyltin inhibited DNA synthesis in progenitor Leydig cells. Triphenyltin lowered Leydig cell number and sizes of the Leydig cell, nucleus, and cytoplasm, and down-regulated testis gene (Lhcgr, Scarb1, Cyp11a1, Hsd3b1, Cyp17a1, Hsd17b3, Hsd11b1, and Fshr) and their protein expression on post-EDS day 56. Triphenyltin significantly decreased the ratio of pAKT1/AKT1, pAKT2/AKT2, and pERK1/2/ERK on post-EDS day 56.

**Conclusion:** A short-term exposure to low dose of triphenyltin can significantly disrupt stem Leydig cell regeneration process in adult rat testes. Triphenyltin negatively influences stem Leydig cell characteristics and niche (Sertoli cell) function, thus delaying their regeneration. Triphenyltin delays stem Leydig cell regeneration possibly via disrupting AKT1, AKT2, and ERK1/2 phosphorylation.

**Poster #26**

**EFFECTS OF MATRIX-BOUND NANOVELOCLES IN HUMAN SPERMATOGENIAL STEM CELL CULTURE**

Kien Tran BS1, Mark Murdock BS2, Stephen Badylak DVM, PhD, MD2 and Kyle Orwig PhD1

1Department of Obstetrics, Gynecology and Reproductive Sciences, Magee-Womens Research Institute, University of Pittsburgh School of Medicine; 2McGowan Institute for Regenerative Medicine, University of Pittsburgh Presented By: Kien T. Tran, BS

Spermatogonial stem cells (SSCs) are at foundation of spermatogenesis and essential for male fertility. Cancer patients who undergo chemotherapy and radiation treatments encounter a significant risk of...
stem cell pool depletion which can lead to permanent infertility. Since prepubertal boys are not yet producing sperm, they can only preserve testicular tissues. Prepubertal testicular tissues house SSCs which can be used in tissue-based or cell-based therapies to produce sperm in the future. SSC transplantation is a promising technology used to restore fertility. However, the number of human SSCs (hSSCs) recovered from a small testis biopsy from a young patient may be limited. Therefore, establishing a culture method to expand hSSCs in vitro is a crucial step toward cell-based therapy. Extracellular matrices (ECMs) have been used as bioscaffolds in regenerative medicine to support survival and growth of various cell types, in vivo and ex vivo. We recently reported that human testis ECM substrate in hSSC culture yielded a significantly higher number of undifferentiated spermatogonia during a 14-day culture period compared to STO feeder cells. The current study will specifically test the bioactivity of human testis ECM-bound nanovesicles (MBVs), which are known to carry microRNAs, cytokines, chemokines, and other proteins that that could impact survival, proliferation, and differentiation of hSSCs in culture. We tested MBVs derived from human testis, porcine testis, porcine urinary bladder and porcine small intestinal submucosa. We evaluated cultures using the high-throughput flow cytometry method that can simultaneously analyze multiple developmental stages of the cultured cells. Our preliminary data showed that MBVs are internalized by hSSCs. We did not observe differences among the MBV culture conditions in our initial 14 day culture experiments, but dosing studies are currently underway. This work was supported by the Eunice Kennedy Shriver National Institute for Child Health and Human Development grant HD092084 and the National Institute of Biomedical Imaging and Bioengineering of the National Institutes of Health grant 5T32EB001026-15.

Poster #28
CARNOSINE TREATMENT DURING HUMAN SEMEN PROCESSING BY DISCONTINUOUS DENSITY GRADIENT
LUANA ADAMI MSc, Bruna Lima MSC, Paula Intasqui PhD, Ricardo Bertolla PhD and Marcilio Nichi PhD
UNIFESP
Presented By: Luana Adami

Introduction: Semen processing is an important step in assisted reproduction techniques, as it removes leukocytes, altered sperm, and cellular debris. However, sample centrifugation leads to production of reactive oxygen species. There is accumulating evidence that oxidative stress is an important factor for male infertility. 40% of infertile men present signs of semen oxidative stress and many presents decreased antioxidant capacity. This supports development of studies that supplement semen with exogenous antioxidants. Carnosine has a potent antioxidant function, and reacts with unsaturated aldehydes, decreasing damages to lipids, proteins, and DNA. To our knowledge, carnosine supplementation of semen samples that will be frozen without cryoprotectants and kept at -20 ºC.

Methods: Semen samples from 34 patients were divided into 3 treatment groups: i)No carnosine supplementation (0); ii)20mM carnosine supplementation; and iii)50mM carnosine supplementation. Carnosine was added to 40% and 80% Percoll solutions, and semen was submitted to density gradient centrifugation for 20 minutes at 600 xG. The sperm pellet was washed with human tubal fluid medium (HTF) for 10 minutes at 600 xG. Sperm were evaluated for mitochondrial membrane potential, intracellular superoxide anion production, sperm DNA fragmentation, acrosome integrity, mitochondrial activity, plasma membrane integrity, and motility. Groups were compared by General Linear Model with Sidak post-hoc test and nonparametric test when necessary, considering a error at 5%. Achieved power was assessed using G-power.

Results: Results are presented in table 1. 50 mM carnosine supplementation lead to higher sperm mitochondrial activity when compared to no treatment. Percent sperm motility, % progressive motility, VAP, VSL, VCL, and LIN improved with processing, independent of supplementation. Both carnosine treatments increased sperm beat cross-frequency.

Conclusion: Carnosine supplementation during density gradient centrifugation improves sperm mitochondrial activity and beat cross frequency (BCF), which indicates improved sperm metabolism.

Poster #28
EXPRESSION OF THE INFLAMMASOME COMPLEX IN SEMINAL PLASMA OF SMOKERS
Mariana Antoniassi BSc, MSc¹, Emad Ibrahim MD, PhD², Teodoro Aballa MSc², Charles Lynne MD², Ricardo Bertolla DVM, PhD² and Nancy Brackett PhD, HCLD³
¹Department of Surgery, Division of Urology, Sao Paulo Federal University; ²The Miami Project to Cure Paralysis, University of Miami Miller School of Medicine
Presented By: Mariana Pereira Antoniassi, BSc, MSc

Introduction: Inflammasomes are macromolecular complexes that serve as platforms for activation of inflammatory cytokines. It is formed by an NLR-type cytosolic receptor, a caspase recruiter domain (ASC), and pro-caspase-1 (inactive form). The inflammasome is activated by many factors, but chiefly by potassium efflux, which activates panexin-1 and P2X7 receptors. Upon activation, the inflammasome activates caspase-1, IL-1β, and IL-18, which are then released into the extracellular medium. This event initiates pyroptosis, a non-homeostatic form of cell death regulated by cellular lysis, considered a key defense mechanism against pathogens. Because smoking leads to inflammatory activation and leukocytes recruit to semen, this study set out to investigate inflammatory cytokines and inflammasome components levels in seminal plasma of smokers.

Methods: Forty-one 41 adult men who reported smoking only cigarettes and 37 controls (adult men without semen alterations), referred to the Human Reproduction Section of the Sao Paulo Federal University for andrological evaluation, were recruited. Men with confounding factors of male infertility were excluded. Semen was collected and analyzed as per WHO 2010 guidelines. The remaining volume was centrifuged at 800 x g for 30 minutes to separate the supernatant seminal plasma, which was frozen without cryoprotectants and kept at -20 ºC. The inflammasome proteins were evaluated by Western blotting analysis for ASC, Panexin 1, NLRP3, and P2X7. ELISA was performed to evaluate caspase 1, IL-

© 2019 American Society of Andrology and European Academy of Andrology Andrology, 2019, Supplement, 62
Poster #29

FIBROBLAST GROWTH FACTOR 12 INFLUENCES LEYDIG CELL REGENERATION FROM STEM CELLS IN ETHANE-DIMETHANE SULFONATE-TREATED MALE RATS

Jiaying Mo MD¹, Xiaoheng Li MD², Yiyan Wang MD², Qingquan Lian PhD² and Ren-shan Ge MD³

¹Dept. of Obstetrics and Gynecology, the Second Affiliated Hospital of Wenzhou Medical University; ²The Second Affiliated Hospital of Wenzhou Medical University

Presented By: Jiaying Mo

Introduction: Fibroblast growth factor (FGF12) is a heparin binding growth factor belonging to the FGF family. FGF12 is expressed in many tissues to regulate the development of the connective tissue. Here, we report that FGF12 is abundantly present in the adult rat testis. However, its action and underlying mechanisms on Leydig cell development remain unknown. We used an ethane-dimethane sulfonate (EDS)-treated Leydig cell regeneration model in vivo to address these issues.

Methods: In vivo experiment was performed in adult male Sprague Dawley rats that were intraperitoneally injected 75 mg/kg EDS to ablate Leydig cells in rat testis. Then, each rat received intratesticular injection of FGF12 (0, 10, and 100 ng/testis/day) from post-EDS day 14 for 14 days. We collected blood and testes on post-EDS day 28 to interrogate serum hormone levels, Leydig cell number, and gene and protein expression.

Results: FGF12 increased serum testosterone levels without affecting the levels of luteinizing hormone and follicle-stimulating hormone on post-EDS day 28. FGF12 up-regulated the expression level of Leydig cell genes (Lhegr, Scarb1, Star, Cyp11a1, Hsd3b1, Cyp17a1, Hsd17b3, Nr5a1, Hsd11b1 and Ins3) and their proteins in vivo. Immunohistochemical staining revealed that FGF12 increased Leydig cell number.

Conclusion: FGF12 promotes Leydig cell regeneration from stem cells in EDS-treated testis in rats.

Keywords: Leydig cell; FGF12; Proliferation; Differentiation; Regeneration, Testosterone Funding: The study was supported by CAPES (81730042 to R-sG, 81601264 to XL), Health & Family Planning Commission of Zhejiang Province (2017KY483 to XL, 11-CX29 to R-sG), and Wenzhou Bureau of Science and Technology (ZS2017009 to R-sG).
ABSTRACTS

Poster #32
RESTORATION OF AGING LEYDIG CELL STEROIDGENIC FUNCTION IN VITRO: INVOLVEMENT OF INFLAMMATORY FACTORS?
Xingxing Zhao¹, Xiaojia Guan¹, Fenfen Chen¹, Panpan Chen¹, June Liu¹, Jinyong Chung PhD², Barry Zirkin PhD² and Haolin Chen PhD¹
¹The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University; ²Johns Hopkins Bloomberg School of Public Health
Presented By: Xingxing Zhao

Introduction and Objectives: Serum testosterone (T) levels decrease with aging in man and Brown Norway rat due to the reduced ability of Leydig cells to produce T in response to luteinizing hormone (LH). After eliminating the Leydig cells from young or aged rats with ethane dimethanesulfonate (EDS), new Leydig cells were restored at both ages that produced high, equivalent levels of T. However, T production by the new cells in old testes was reduced soon thereafter, suggesting that the testicular environment may play a role in age-related T reduction. In the present study, we compared the transcriptomes of young and old cells, and asked whether the steroidogenic function of old Leydig cells can be influenced by isolating the cells from the testicular environment.

Methods: Leydig cells were isolated from the testes of young (3 mo.) and old (18-24 mo.) rats with normal spermatogenesis, and old rats with regressed testes. The transcriptomes of the cells were analyzed by RNA-seq. In addition, cells were cultured in serum-free medium for 2 weeks in the presence of LH, and T production was assayed.

Results: Transcriptome comparison indicated that compared to young cells, old cells from regressed testes changed more than old cells from normal testes, suggesting that extrinsic factors can influence the aging of Leydig cells. The cells of old regressed testes had greater changes in inflammatory factor-related gene expression than old cells from normal testes. In response to short-term LH, cultured Leydig cells from both old normal and old regressed testes produced significantly less T than cells from young testes. After 2 week culture, 80% reductions were seen in T production by Leydig cells from the young and old normal testes. In striking contrast, T production by Leydig cells isolated and cultured apart from old regressed testes more than doubled.

Conclusions: Transcriptome comparisons indicating up-regulation of inflammation-related genes in cells from old regressed suggest that inflammation may contribute to differences in Leydig cell function between these cells and cells from normal testes. When cultured away from their in vivo testicular environments, cells from old regressed but not old normal testes increased their steroidogenic function significantly, further supporting the contention that extrinsic factors such as inflammation may contribute to Leydig cell aging.

Poster #33
MECHANISTICALLY INTERRELATED ROLES OF CALCINEURIN AND GSK3A IN REGULATING THE ABILITY OF SPERM TO FERTILIZE EGGS
SOUVIK DEY PhD¹, Alaa Ela MS¹, Vania Opoku UG¹, Florence Wagner PhD², Douglas Kline PhD² and Sririnivasan Vijayaraghavan PhD¹
¹Department of Biological Sciences, Kent State University; ²Stanley Center for Psychiatric Research, Broad Institute of Massachusetts Institute of Technology and Harvard University, Cambridge, MA 02142, USA.
Presented By: Souvik Dey, Postdoc/PhD

We have shown the specific requirement of the α-isofrom of glycogen synthase kinase 3 (GSK3α) in sperm; mice lacking gsk3α but not gsk3β are infertile due to impairment of post testicular sperm maturation. Similar to GSK3, deletion of testis-specific calcineurin genes ppp3r2/ ppp3rc2 impair sperm maturation in the epididymis resulting in male infertility. The overall goal of this this study was to examine the role of GSK3α and calcineurin in sperm during fertilization. We have found that calcineurin to be a key regulator of sperm GSK3α during the capacitation and fertilization. Treatment of mouse spermatozoa with nanomolar concentrations of calcineurin inhibitor, FK506 caused dose dependent decrease of fertilization rates of eggs in vitro. The GSK3α-specific antagonist, BRD0705, also inhibits egg fertilization, but the GSK3β-specific inhibitor, BRD3731 was without any effect. Inhibition by FK506 was associated with a concurrent decrease of GSK3 activity; due to a specific increase of GSK3α Ser21 inhibitory phosphorylation. FK506 did not alter the increase in calcium uptake during sperm capacitation or the ability of sperm to undergo spontaneous acrosome reaction. Ser/Thr phosphorylation of PKA substrates and Tyr-phosphorylation of multiple proteins were significantly altered after inhibition of calcineurin. FK506 changed motility parameters related to sperm hyperactivation. FK506 treatment reduced the penetration ability of spermatozoa for cumulus-intact oocytes and cumulus-free/zona-intact oocytes. However, it had no effect on fertilization of zona-free eggs. Both phopsho-proteome and western blot analysis of sperm extracts show that phosphorylation of MCT2 (monocarboxylated transporter) and its associated protein basigin were markedly reduced in the gsk3α KO as well as in ppp3r2 KO mouse sperm explaining the impaired ATP production in response to medium containing pyruvate. Overall, calcineurin was found to be a regulator of GSK3α in mouse sperm during fertilization in the female reproductive tract. This is the first time that a calcineurin inhibitor and GSK3α specific inhibitor have been shown to block in vitro fertilization of sperm raising the possibility that the inhibitors could be developed as male contraceptives. (NIH HD086839 SV)

Poster #34
LUTEINIZING HORMONE REGULATES INTRACELLULAR CALCIUM, CAMP, PROTEIN TYROSINE PHOSPHORYLATION AND MOTILITY IN HUMAN SPERMATOZOA
Aideé Saray López Torres PhD¹, Gabriela Hernández Silva MSc¹, Claudia L. Treviño PhD² and Mayel Chirinos PhD¹
¹Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán; ²Universidad Nacional Autónoma de México
Presented By: Aideé Saray López Torres, Sr., PhD

Introduction: The sperm capacitation is modulated by their interaction with molecules existing in the female reproductive tract. During the woman fertile window, some reproductive hormones reach their maximum concentrations in serum, such as the luteinizing hormone (LH) that is essential to induce ovulation and therefore spermatozoa preparing to fertilize are likely to be exposed to this hormone. Previous evidences indicate that LH was able to promote PKA activity in human sperm. However, the role of LH on other sperm functions has not been subject to investigations.
**Objective:** To study the effects of LH on different physiological variables in human sperm.

**Methods:** Normozoospermic human semen samples were processed by density gradients or swim up and spermatozoa were further incubated under capacitating conditions in the presence of different concentrations of LH. At the end of incubations, sperm samples were processed for the analysis of Ca²⁺ changes by intracellular Ca²⁺ imaging in the presence of Fluo3-AM, total cAMP by radioimmunoassay, sperm motility by CASA, and protein tyrosine phosphorylation by Western blots.

**Results:** In the presence of 1000 ng/mL of LH, we observed an increase in the duration and amplitude of Ca²⁺ oscillations. On the other hand, 250 and 500 ng/mL of LH increased the cAMP production. Additionally, our results showed that 500 ng/mL of LH increased the motility kinetic parameters VCL and VAP while 1000 ng/mL of LH increased VCL and ALH; moreover, these concentrations also increased the percentage of hyperactivated cells. Furthermore, 500 and 1000 ng/mL of LH promoted the protein tyrosine phosphorylation related to capacitation.

**Conclusions:** These results suggest that LH is able to modulate several sperm function variables related to capacitation and therefore may be a key component in synchronizing sperm capacitation with ovulation during female reproductive tract residence improving the probabilities of fertilizing. This research was supported by CONACyT (México).

**Poster #35**

**EFFECT OF BILATERAL ORCHIECTOMY ON HORMONE MEDICATION REGIMEN IN PATIENTS WITH GENDER DYSPHORIA**

Ross Everett MD, MPH and Jay Sandlow MD

Medical College of Wisconsin

Presented By: Ross G. Everett, MD, MPH

**Introduction and Objectives:** Hormonal therapy for transgender females requires more complex regimens than those used in transgender males. Supplementation of estrogen provides insufficient suppression of androgens. As a result, androgen reducing medications are often given to suppress testosterone levels and reduce the dosage of exogenous estrogens. Bilateral orchiectomy (BO) is utilized as an alternative means of castration to reduce the magnitude of hormone medication in transwomen with gender dysphoria [GD]. However, few reports exist which report the actual changes in hormonal medication regimen that accompany BO. The objective of this study was to assess the impact of BO on the hormone regimen of patients with GD.

**Methods:** Using ICD codes, 711 patients with GD were identified to receive care at our single, academic institution between 2008–2018. Those who underwent BO as part of their GD treatment were included in our study. Various parameters including medication regimen and hormone levels were obtained through retrospective review. Patient demographics and interventions were compared. All data was analyzed in a standard statistical fashion.

**Results Obtained:** Fourteen patients underwent BO as part of their treatment for GD. These patients met criteria for BO as established by The World Professional Association for Transgender Health (WPATH) guidelines. Median age at time of surgery was 44 years (IQR 36.5–53.3). Pre-operative and post-operative medication regimens were available for eight patients. Of these, seven (88%) were treated pre-operatively with spironolactone and two (25%) with finasteride. Post-operatively, six patients (86%) were noted to have cessation of spironolactone and one patient (50%) for finasteride. Three (38%) had reduced their exogenous estrogen supplementation. Median time of follow-up available after surgery was 16.5 (IQR 9.8–27.8) months.

**Conclusions:** BO is an effective means of negating the need for ongoing androgen reducing medication for the majority of transgender female patients with 86% of patients stopping spironolactone post-operatively. Additionally, 38% reduced the amount of exogenous estrogen they used. Further research is needed to delineate improved treatment protocols for these patients after surgery.

**Poster #36**

**A NEW REGULATION MECHANISM OF MAMMALIAN SPERM CAPACITATION**

Carla Ritaogliatghi PhD¹, Cintia Stival MS¹, Carolina Baro Graf MS¹, Guillermina Luque PhD², Mariano Buffone PhD² and Dario Kraff PhD³

¹Cell Signal Transduction Networks Lab, IBR-CONICET, Argentina; ²Cellular and Molecular Biology of Reproduction Lab, IBYME-CONICET, Argentina

Presented By: Carla Ritaogliatghi, PhD

Mammalian sperm are unable to fertilize the egg immediately after ejaculation. To gain fertilization competence, they need to undergo a series of biochemical and physiological changes in the female reproductive tract, known as capacitation. Functionally, capacitation is associated with changes in sperm motility (hyperactivation) and with their ability to undergo the acrosome reaction. At the molecular level, it correlates with activation of the cAMP-PKA pathway, increase in intracellular pH and Ca²⁺ concentration, hyperpolarization of the plasma membrane potential, lipid modifications and increase in protein tyrosine phosphorylation. How these signaling pathways interact to induce hyperactivation and acrosomal responsiveness is not well understood. Since mature sperm are transcriptionally and translationally silent, they rely on posttranslational modifications (PTM) more than any other cell type. Therefore, it is an exceptional model for the study of signaling pathways based on PTM. The importance of phosphorylation, an essential PTM in sperm physiology has been well established. On the other hand, acetylation of proteins, in spite of being as abundant and ubiquitous as phosphorylation, has not been much explored in sperm. Recently, two groups identified 456 and 576 acetylated proteins in non-capacitated and capacitated human sperm respectively. Different acetylation profiles were observed in proteins involved in sperm capacitation, sperm-egg recognition, sperm-egg plasma fusion, and fertilization, indicating that acetylation may be required for sperm capacitation and fertilization. In this context, the general aim of our work was to study the role of protein acetylation in the signaling cascade responsible for the acquisition of fertilizing capacity of mammalian sperm. Pharmacological hyperacetylation in non-capacitated sperm induced activation of PKA, hyperpolarization of the sperm plasma membrane, Ca²⁺ flux, and all capacitation-associated molecular events. In correlation with these results, sperm acquired both hyperactivated motility and acrosomal responsiveness, pointing towards the importance of lysine acetylation in sperm physiology.

**Poster #37**

**MORPHOFUNCTIONAL EVALUATION OF HUMAN SUBTYPE ADARK SPERMATOGENIA WITH NUCLEAR RAREFACTION ZONE REVEALS A STEM CELL SPECIFIC KINETIC AND NICHE**

Andre Lucas Caldeira-Brant MSc; PhD Candidate¹, Lilian M Martinelli MSc¹, Mariana M Marques BSc¹, Augusto B Reis MD; PhD², Reginaldo Martello MD; PhD³, Fernanda RCL Almeida DVM; PhD¹ and Helio Chiarini-Garcia PhD¹

¹Laboratory of Structural Biology and Reproduction, Federal University of Minas Gerais, Belo Horizonte, Brazil; ²Department of Surgery, Medicine School, Federal University of Minas Gerais, Belo Horizonte, Brazil; ³Nephrology and Urology Service of Clinical Hospital, Federal University of Minas Gerais, Belo Horizonte, Brazil

Presented By: Andre Lucas Caldeira-Brant, Sr., PhD Candidate
ABSTRACTS

Human spermatogonia (SG) are morphologically constituted of three types: undifferentiated Adark and Apale, and differentiating type B. Recent studies showed the existence of two subtypes of Adark, with (AdVac) and without (AdNoVac) nuclear rarefaction zone, in which AdVac express stem cell markers and are relatively quiescent. However, these studies did not evaluate their behavior along the seminiferous epithelium cycle (SEC). We aimed to describe the morphology, kinetic and niche of human SG by high-resolution light microscopy (HRLM) and to evaluate their proliferative activity through MCM7 immunostaining (IHC) along the six stages of SEC. Healthy testes samples from five patients with prostate cancer and not submitted to any treatment were fixed in glutaraldehyde and embedded in araldite for HRLM, or fixed in paraformaldehyde and embedded in paraffin for IHC. By HRLM, human SG were separated into four types: Adark with (AdVac) and without (AdNoVac) nuclear rarefaction, Apale and type B (Fig1). Concerning AdVac SG, kinetic studies showed that they: (a) are found in small (9.4% of all SG)(Fig2) and constant number along the SEC (Fig3); (b) have low mitotic activity (0.5% of all SG)(Fig4); (c) are positioned close to blood vessels when in a quiescent state; and (d) are seen far from the blood vessels, only at stages I and II of the SEC, when in proliferation (Fig5). These data suggest a niche positioning in which vascular factors could control their activity. We showed that AdNoVac is a mitotically active Adark and, together with Apale (46.5%), could be responsible for the bulk of sperm production. The kinetics of Apale and B SG, and of preleptotene spermatocytes showed numerical peaks, in which the successor cells have a number close to double of their predecessor ones, confirming the existence of one generation of type B SG. Thus, AdVac are the real quiescent stem SG of humans (Fig4), localized in a niche under vascular control while AdNoVac are the Adark subtype in active mitosis. These findings allow a better comprehension of a healthy proliferative step of human spermatogenesis, which may be a key factor for future studies including those on testicular pathology. Support Grant: Capes, CNPq, Fapemig.

Poster #39

EXPERIMENTAL MODELS OF TESTICULAR TISSUE MAINTENANCE AND MORPHOGENESIS

Maxwell Edmonds BS/BA¹, Hanna Pulaski PhD², Kyle Orwig PhD² and Teresa Woodruff PhD³
¹Medical Scientist Training Program, Department of OB/GYN, Northwestern Medicine Feinberg School of Medicine, Northwestern University; ²Department of OB/GYN and Reproductive Sciences, Magee-Women’s Research Institute, University of Pittsburgh School of Medicine; ³Department of OB/GYN, Northwestern Medicine Feinberg School of Medicine, Northwestern University
Presented By: Maxwell E. Edmonds, BS, BA

Introduction: Currently, male fertility preservation is limited to sperm banking, leaving patients whom cannot provide a semen sample only one option: testicular tissue cryopreservation. Unfortunately, there are no contemporary techniques to use this tissue for subsequent fertility restoration. A major challenge towards this goal is the reconstitution and maintenance of a functional somatic testicular environment, the obligatory setting for spermatogenesis both.

Objectives: We hypothesize that extracellular matrices (ECM) can sufficiently recapitulate -mimic microenvironments amenable to testicular tissue maintenance and/or morphogenesis. Our objective, is to simulate such an environment, affording the creation of novel testicular tissue models.

Methods: To test our hypothesis, we have investigated the use of ECM-culture (Matrigel) and ECM-null culture techniques, to assess their ability to maintain testicular tissues , and create tissue-constructs. Testes from day 5 CD-1 mouse pups were used for all experiments and tissues were either cultured as explants within Matrigel, or dissociated into single cells and cultured +/- Matrigel in 2D or 3D culture conditions for tissue formation.

Results: Explant cultures maintained endocrine responsiveness to gonadotropins (FSH and hCG) in the production of testosterone and inhibit B, over multiple weeks in culture. However, explants presented with regional differences in cell death, and germ cell numbers decreased over time. In tissue modeling, we have generated an endocrine-functional testicular organoid model, which reconstitutes the somatic cell compartmentalization of the testis, forming seminiferous tubule-like structures. Furthermore, we have demonstrated that cell aggregation is a prerequisite for organoid formation, and that Matrigel is effective at inducing cell aggregation over ECM-free conditions. However, ECM is dispensable for organoid development if cell aggregation is imposed artificially.

© 2019 American Society of Andrology and European Academy of Andrology
Andrology, 2019, Supplement, 66
Conclusions: Through this work we have established testicular tissue and organoid models which are useful for both endocrine investigations and questions regarding testicular morphogenesis. Work is ongoing to further probe and expand the utility of both models. Funding: NIEHS/NCATS: UH3TR001207 and NICHD: F31HD089693

Poster #40
SINGLE-CELL RNA SEQUENCING REVEALS NOVEL MARKERS OF STEM/PROGENITOR SPERMATOGONIA IN HIGHER PRIMATES
Sarah Munyoki BA¹, Adrienne Shami BS², Qianyi Ma PhD³, Chris Green PhD³, Jun Li PhD³, Sue Hammoud PhD³ and Kyle Orwig PhD³
¹University of Pittsburgh; ²University of Michigan

In the adult male testis, spermatogonial stem cells (SSCs) are essential for continuous spermatogenesis to maintain fertility throughout life. SSCs exquisitely balance self-renewal and differentiation through molecular mechanisms that are still poorly understood especially in higher primates. SSC transplantation as a therapy for male infertility, is well established in rodents and may have application in the human clinic. However, while many features of testicular biology are conserved from rodents to higher primates, there is divergence in stem cell phenotype and spermatogenetic lineage development. Determining the unique features of higher primate SSCs will facilitate the translation of SSC based therapies to the human fertility clinic. We employed Drop-Seq for high throughput, unbiased, single-cell RNA-sequencing of healthy adult monkey and human testicular tissue, generating ~33,800 single cell transcriptomes. Dimensionality reduction and unsupervised clustering methods partitioned the cells into transcriptionally distinct populations, representing all known and potentially novel cell types of higher primate testes. Further analysis of our data has identified novel genes GPX1, MORC1, GPC4 and GPC3 as potential markers of human and monkey stem/progenitor spermatogonia. These genes are known to have diverse cellular functions and are involved in various signaling pathways such as WNT, Hedgehog, FGF, BMP, MAP2K/AKT and degradation of reactive oxygen species that may be important in regulating higher primate SSC function. Our single cell data may reveal novel mechanisms regulating higher primate SSCs that can be exploited for sorting, enhancing survival and expansion in culture or other applications that improve the fundamental knowledge about SSCs in higher primates, and may enable applications in the male infertility clinic.

Poster #41
OBESITY IS AN INDEPENDENT PREDICTOR FOR COMBINATION THERAPY WITH ANASTROZOLE IN HYPOGONADAL MEN TREATED WITH CLOMIPHENE CITRATE
Sorena Keihaní, Nathan J. Alder, Philip J. Cheng, Alexander W. Pastuszak and James M. Hotaling
Division of Urology, University of Utah
Presented By: Sorena Keihaní, MD

Introduction and Objectives: Clomiphene citrate (CC) can be used in treatment of male hypogonadism, with one of its side effects being hyperestrogenemia, necessitating addition of aromatase inhibitors. We hypothesized that obese men started on CC are more likely to need combination therapy with anastrozole (AZ) and aimed to assess the conversion rate from CC monotherapy to combination CC+AZ therapy and its predictors.

Methods: Review of data from hypogonadal men treated with CC in a single center from 2013-2018 was performed. Patient age, body mass index (BMI), blood pressure, and hormones (follitropin stimulating hormone [FSH], luteinizing hormone [LH], total testosterone [TT], estradiol [E]), sex-hormone binding globulin [SHBG], and albumin) were obtained at baseline. Obesity was defined as BMI≥30 kg/m². Cox proportional hazards models were used to identify predictors of conversion to combination CC+AZ therapy.

Results: 319 males were included. Mean age was 35.2±7.2 years and patients were followed for a median (IQR) of 9 (4-17) months on therapy. Following CC therapy, 97 (30%) were started on combination therapy (due to increased E [≥50 pg/ml] and/or hyperestrogenic symptoms) at a median (IQR) of 2 (2-4) months. Patients who received combination therapy had higher baseline BMI (34.8±8.5 vs. 30.2±6.0 kg/m²; P<0.001), as well as higher estradiol levels and systolic blood pressure than those who did not. Lower baseline TT and albumin were also observed in men on CC+AZ. Overall, 50% of included men were obese and the obesity rate was higher in men on combination therapy (65% vs. 43%; P<0.001). In multivariable regression after controlling for baseline age, TT, blood pressure, and albumin, obesity (HR:1.7, 95% CI:1.03-3.00, P=0.04) [Figure 1], and baseline E level (HR: 1.07, 95% CI: 1.04-1.11, P<0.001) were significant predictors of conversion to combination therapy.

Conclusions: Following CC monotherapy, 30% of men required combination therapy with AZ. Higher baseline BMI and estradiol levels predict the need for combination therapy, and obese patients are more likely to require AZ. These data can facilitate identification of patients at risk for significant elevations in estradiol levels who may require CC+AZ therapy.
ABSTRACTS

Background: Accumulating literature supports the hypothesis that specific nutrients and foods can have beneficial or deleterious effects on semen quality. However, there are few studies focused on assessing the role of dietary patterns on semen parameters, especially in a healthy and young population.

Objective: The aim of this study is to investigate the associations between the adherence to the Mediterranean Diet (MD) and semen quality parameters. Material and methods: This cross-sectional analysis was conducted with baseline data of participants recruited between December 2015 and February 2017 in the FERTINUTS study, a parallel randomized clinical trial aimed at assessing the effects of nut supplementation on sperm quality parameters. To assess the adherence to the MD, the Trichopoulou score was used. Semen parameters were assessed as described in the 2010 WHO’s report and the results are expressed across tertiles of MD adherence. All P-values are two-tailed at the <0.05 level. Statistical analyses were conducted with the IBM-SPSS statistical package (version 22.0, SPSS Inc., Chicago, IL, USA).

Results: A total of 106 participants were included. Compared to those in the lowest MD adherence tertile, participants in the top tertile had statistically significant higher BMI and waist circumference and consumed more energy, and also had significantly higher semen pH (8 vs. 8.5), total sperm motility (54.5% vs. 73.2%) and progressive sperm motility (40.8% vs. 52.2%). Moreover, percentage of total and progressive motility were significantly higher among those subjects in the higher adherence to MD in comparison with those in low-medium adherence to MD category. Finally, the multivariable linear regression models evaluating the relationship between the sperm quality parameters and tertiles of MD adherence adjusted by age, energy and BMI showed that compared with those in low-medium adherence category, men in the highest tertile had a higher percentage of total sperm motility [β non-standardized coefficient=12.785].

Conclusion: These findings suggest that adherence to the MD was positively associated with sperm motility. The principal strength of the present study is the originality of the work, as this is the first study exploring the association between the MD pattern and sperm quality parameters in a young and healthy population.

Poster #43
THE ROLE OF CYSTEINE-RICH SECRETORY PROTEINS (CRISPS) IN ESTABLISHING OPTIMAL SPERM MOTILITY AND SPERM FUNCTION
Avinash Gaikwad MSc, Ashwin Nadagiri, David Potter, Prabhakar Ranganathan, Julio Soria and Moira O’Bryan
Presented By: Avinash Satish Gaikwad, MSc

Introduction and Objective: For successful fertilization, sperm need to travel a daunting distance to reach the site of fertilization. Throughout this journey, sperm are continuously exposed to proteins which are important for optimal sperm motility and function. One such group of proteins encountered by sperm at every stage are the Cysteine-Rich Secretory Proteins (CRISPs). The CRISPs are highly expressed in the mammalian male reproductive tract and have been shown to have ion channel regulatory activity. Ion channels are essential in the transition of symmetrical flagellar waveform to hyperactivated motility and sperm which cannot achieve hyperactivation are infertile. Hyperactivated motility is regulated by Ca²⁺ influx into the sperm tail via CatSper, a sperm-specific ion channel. Due to the ion channel regulatory activity of CRISPs, we aimed to characterize the flagellar beating pattern in deficient mice using a novel high-speed, high-resolution imaging technique and a custom-made MATLAB program dedicated to analyse the complex dynamics and beating pattern of sperm flagella.

Methods: Adult male mice sperm were collected by the back-flushing technique. Head-tethered sperm with freely beating flagella were recorded at 400 fps using dark-field microscopy. Flagellar tracking and motility analysis was carried out in wild-type and knock-out mice using the MATLAB code.

Results: Visual inspection revealed flagellar bending defects in deficient mice as compared to wild-type. These phenotypes were analysed using the MATLAB program and revealed that 1/4⁻/⁻ and 1/4⁻/⁻/⁻ mice have irregular and disrupted flagellar beating patterns. We also found a significantly lower beat frequency in sperm from 1/4⁻/⁻ and 1/4⁻/⁻/⁻ mice than their respective controls. Moreover, the beat frequency from 1/4⁻/⁻ and 1/4⁻/⁻/⁻ mice does not increase upon capacitation. 2⁻/⁻ mice have a rigid mid-piece and a distinct motility pattern referred to as ‘stiff mid-piece syndrome’. The reconstruction of a typical beat cycle and periodicity of flagellar oscillations from these mice depicts a highly asymmetric and irregular flagellar beating pattern.

Conclusions: Our data suggest that CRISPs are key regulators of sperm motility and that deficiency could lead to disrupted sperm flagellar beating pattern and infertility. This study also demonstrates the utility of a next-generation tool to analyse sperm motility defects.

Poster #44
MICRORNA COMPOSITION IN SEMINAL MICROVESICLES OF MEN WITH VARICOCELE AND PRE AND POST-VARICOCECTOMY
Larissa Belardin BSc, MSc¹, Robert Sullivan PhD², Christine Légaré MSc², Mariana Camartgo BSc, MSc, PhD¹ and Ricardo Bertolla DVM, PhD¹
¹Universidade Federal de São Paulo; ²Université Laval
Presented By: Larissa Belardin, MSc

Introduction: As varicocele alters seminal plasma transcriptome, it is fundamental to understand mechanisms regulating testicular and epididymal translational activities. MicroRNAs are major players in gene expression along the male reproductive tract. Our hypotheses are: (i) there are differences in exosomes miRNAs composition in seminal plasma of men with and without varicocele and; (ii) varicocelectomy may restore the miRNA profile in exosomes.

Objectives: To identify miRNAs in extracellular microvesicles present in seminal plasma of control men, men with varicocele and men pre- and post-varicocelectomy.

Methods: Micro RNAs were extracted from seminal plasma extracellular vesicles and used to probe microarrays, using the FlashTag RNA labeling kit according to the manufacturer’s instructions. Identification of selected microRNAs was verified by pulsed RT with stem-loop primers followed by quantitative PCR using SYBR Green.

Results: Extracellular microvesicles origin of microRNAs was confirmed by western blotting. Out of 6631 human microRNAs identified, the presence of five microRNAs was confirmed by qRT-PCR: 3 which are more abundant in the epididymis (hsa-miR-892b, hsa-let-7g-5p, and hsa-891) and one exclusively expressed in the epididymis (hsa-miR-890) and one enriched in testis (hsa-miR-202-3p). Expression of these tested microRNAs was higher in seminal plasma of control men when compared to varicocele, pre- and post-varicocelectomy groups. In varicocele group, expression of these five microRNAs was higher in seminal plasma of control men when compared to pre and post-varicocelectomy groups. Finally, when comparing pre- and post-varicocelectomy groups miRNAs fold change was not significantly affected.

Conclusion: This study was able to perform an initial investigation of the population of microRNAs from seminal plasma extracellular vesicles, and observe that these are modified in varicocele, pre- and post-varicocelectomy groups when compared to normal men. By affecting microRNAs expression, a varicocele may, somehow, alters processes involved in sperm functions, maturation, and apoptosis.
AGE RELATED PRESENCE OF SPERMATOGONIA IN KLINEFELTER SYNDROME PATIENTS: A CHANCE FOR BIOLOGICAL PATERNITY IN THE TESA NEGATIVE POPULATION

Nicholas Deebel MD¹, Guillermo Galdon MD², Kimberly Stogner-Underwood MD, James Lovato PhD³, Stuart Howards MD⁴, Stanley Kogan MD⁵, Anthony Atala MD⁶ and Hooman Sadri-Ardakani MD PhD⁷
¹Department of Urology, Wake Forest School of Medicine and Wake Forest Institute for Regenerative Medicine; ²Wake Forest Institute for Regenerative Medicine; ³Department of Pathology, Wake Forest School of Medicine; ⁴Department of Biostatistics and Data Science, Wake Forest School of Medicine; ⁵Department of Urology, Wake Forest School of Medicine

Presented By: Nicholas Deebel, MD

Introduction: Klinefelter syndrome (KS) has been defined as an X chromosome aneuploidy. The onset of puberty in KS patients is associated with the initiation of progressive testicular fibrosis, loss of spermatogonial stem cells (SSC), and infertility. However, focal areas of spermatogenesis have been observed in some patients. Given the recent success of KS SSC culture, it could be feasible to isolate, propagate, and differentiate these SSCs in vitro. The objective of this study was to identify which percentage of KS patients are still positive for spermatogenesis on testicular biopsy. To address this question, a systematic review and meta-analysis of existing data is required.

Methods: A systematic Pubmed search was conducted. Exclusion criteria included: non-English language and review papers. Studies including data on the presence of spermatogonia in KS patients were included. Patients were subcategorized into the following age groups: Fetal/Infantile (age ≤1), Prepubertal (age 1<X≤10), Peripubertal/Adolescent (age 10<x<18) were subcategorized into the following age groups: Fetal/Infantile (age ≤1), Prepubertal (age 1<X≤10), Peripubertal/Adolescent (age 10<x<18) and Adult (age≥18). The presence of spermatozoa and spermatogonia on testicular biopsy along with the patients’ FSH, LH and testosterone were recorded.

Results: 722 papers were identified with double blind review returning 31 original articles with relevant information for meta-analysis on 376 patients. All the fetal/infantile and prepubertal groups were positive for spermatogonia while 42.7% and 48.5% of the peripubertal and adult groups respectively were positive for spermatogonia. Additionally, 26 of the 53 (49.1%) peripubertal and 37 of the 115 (32.2%) adult patients negative for spermatogonia were positive for spermatogonia. The mean FSH levels for combined peripubertal and adult patients were 22.0±2.60 for spermatogonia positive patients and 33.2±2.17 for spermatogonia negative patients (p=0.001). Mean differences for LH and testosterone were statistically insignificant.

Conclusions: While azoospermia is a common finding in the KS patient population, many patients remain positive for spermatogonia. Given recent advances in KS SSC in vitro propagation, these cells could be used in future fertility interventions. This would offer many KS patients a chance at biological paternity.

ABSTRACTS

REVERSIBLE INFERTILITY IN MALE RATS AFTER ADMINISTRATION OF LOW AFFINITY BROMODOMAIN INHIBITOR N,N-DIMETHYLACETAMIDE

Nupur Khera Master in Biochemistry¹, Chafik Ghayor¹, Anna K. Lindholm² and Franz E. Weber³
¹Oral Biotechnology and Bioengineering, Center for Dental Medicine, University of Zurich, Zurich, Switzerland; ²Department of Evolutionary Biology and Environmental Studies, University of Zurich, Zurich, Switzerland; ³Oral Biotechnology and Bioengineering, Center for Dental Medicine, University of Zurich, Zurich, Switzerland, Zurich Center for Integrative Human Physiology, University of Zurich, Zurich, Switzerland

Presented By: Nupur Khera, PhD Student

Introduction: The development of a male contraceptive remains a challenge. Recently, epigenetic approaches were applied to target spermatogenesis and found to be a promising option. In the current study we investigated the effect of a low affinity bromodomain inhibitor N,N dimethylacetamide (DMA) on spermatogenesis in rats.

Methodology: Male Sprague-Dawley rats received one injection per week of DMA (92 µL/100g body weight) for 8 weeks. The sperm count, motility and morphological parameters of the testis were assessed. After the initial DMA treatment, DMA treatment was continued or stopped and the males were placed with females while their breeding success being monitored.

Results: DMA treatment decreased the sperm count and motility by 80% without affecting the levels of testosterone, LH and FSH. Analysis of gene expression has shown that, unlike marker genes for spermatogonia and sertoli cells, mature spermatozoa show a decrease in gene markers due to DMA treatment. Testis histology showed a significant decrease in seminiferous tubule area. Moreover, substantive changes were observed in acrosome structure and microtubule organization. Half of the DMA treated animals failed to produce pups after 8 week of injection while the other half did not give any pups after increasing the injected dose to twice per week. The contraceptive effect of DMA is reversible since pups were born after 8 weeks without DMA treatment in both cases.

Conclusion: DMA acts in a non-hormonal, reversible and in a dose dependent manner to achieve contraception in rats.

EFFECT OF ZIRAM ON HUMAN SPERM VITALITY

Zina Wen MS, Yong Chen MD, Erpo Tian MD, Ren-Shan Ge MD and Ying Zhong MD
Jinjiang Maternity and Child Health Hospital

Presented By: Zina Wen, MD

Introduction: Ziram is a dimethyl dithiocarbamate fungicide widely used in agriculture, including vegetables and fruits. As a potential endocrine disruptor, ziram may affect the male reproductive system and cause male infertility. However, the effect of ziram on human sperm motility remains unclear. The purpose of this study was to investigate the effects of ziram on sperm of normal males and asthenospermia patients.

Methods: Semen of normal men and asthenospermia patients were collected, sperm was washed, sperm concentration was 10⁷/ml, culture medium (BWW), solvent (DMSO), and environmental pollutants were added and treated with the sperm for 3 h. The percentage of forward motility and motility were detected by CASA. ROS regeneration was investigated.
ABSTRACTS

Results: The percentages of forward motility and motility in normal sperm of BWW group and DMSO group were 36% and 38%, and those in asthenospermia group were 10% and 15%, respectively. This suggests that the medium and solvent had no effect on the percentage of forward motility and motility. At 100 microM, of the following chemicals, piperine, borax, bisphenol A, methoxychol, nicotine, diethyl phthalate (DEP), dipropyl phthalate (DPnP), dibutyl phthalate (DBP), dibutyl phthalate (DBP), diocetyl phthalate (DOP), diisononyl phthalate (DINP), and diethylhexyl phthalate (DEHP), and ziram, only ziram significantly inhibited the forward motility and motility of sperm. However, methoxychol, DCHP, DINP ziram, and DEHP also inhibited sperm motility by more than 50% on asthenospermia patients. Ziram has IC₅₀ values of 106.90+/-32.91 (mean+/-SD) and 90.38+/-32.09 nM for forward motility and motility in normal patients, respectively, and IC₅₀ values were 107.9+/-12.56 and 127.7+/-2.56 nM of forward motility and motility in asthenospermia patients, respectively. Ziram also increased ROS levels. Conclusion: Ziram is the most potent inhibitor of forward motility and motility in normal and asthenospermia patients. Asthenospermia increased its sensitivity to environmental pollutants. At 100 microM, methoxychol, DCHP, DINP, and DEHP also had more than 50% inhibitory effect on sperm motility. Corresponding authors are Ren-Shan Ge and Ying Zhong. Funding: This work is supported by NSFC (81373032) and Zhejiang Provincial NSFC (LY15H310008). Key words: Ziram; Phthalate ester; Environmental Pollutants; Sperm; Sperm motility.

Poster #48
HNRNP U IS REQUIRED FOR PRE-PUBERTAL SERTOLI CELLS DEVELOPMENT AND MALE FERTILITY IN MICE
Yujiao Wen and Shuiqiao Yuan
Presented By: Yujiao Wen

Heterogeneous nuclear ribonucleoproteins U (hnRNP U) play a central role in the regulation of multiple biological processes during development and disease. However, its function in Sertoli cells development and male fertility remains elusive. Genetic mutation of hnRNP U in mice results in post-implantation lethality, indicating that hnRNP U plays a critical role in embryonic development. Here, we report that ablation of hnRNP U, in murine embryonic Sertoli cells leads to severe testicular atrophy and male sterility characterized by rapid depletion of both Sertoli cells and germ cells during pre-pubertal testicular development. Loss function of hnRNP U in Sertoli cells resulted in disruption of developing seminiferous tubules and subsequent progressive loss of Sertoli cells differentiation and germ cells development. RNA-Seq and bioinformatics analyses revealed the transcriptome-wide of genes encoding splicing factors and key proteins essential for Sertoli cell fate control was impaired in Sertoli cells specific hnRNP U mutant P3 testes. In molecular levels, we found that hnRNP U could interact with WT1, a Sertoli cell marker, which is essential for Sertoli cell development, both in vivo and in vitro. Thus, our data demonstrate an essential role of hnRNP U in pre-pubertal Sertoli cells development and male fertility.

Poster #49
ATRAZINE INDUCES FETAL LEYDIG CELL PROLIFERATION BUT DISRUPTS ITS DIFFERENTIATION IN MALE FETAL RATS AFTER IN UTERO EXPOSURE
Yinghui Fang, Chaobo Ni MD, Huitao Li MD, Yao Lv MD, Xiaoheng Li MD, Qingquan Lian PhD and Ren-shan Ge MD
The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University, Wenzhou, Zhejiang
Presented By: Yinghui Fang, Master Degree

Background: Atrazine is a commonly used agricultural herbicide and a potential endocrine disruptor that may cause testicular dysgenesis. The objective of the present study was to investigate the effects of atrazine on fetal testis development after in utero exposure.

Methods: Female and male Sprague-Dawley rats were randomly selected and mated. The pregnant rats were gavaged daily with vehicle (corn oil, control) or atrazine (25, 50, and 100 mg/kg body weight/day) from gestational day 12 to 21. Serum testosterone levels of male pups were measured, fetal Leydig and Sertoli cell numbers, fetal Leydig cell proliferation, the occurrence of multinucleated gonocytes (MNGs), gene and protein expression were investigated at birth.

Results: Atrazine did not induce intratuterine growth retardation and MNGs but dose-dependently decreased serum testosterone levels of male pups, with a significant difference from the control recorded at a dose of 100 mg/kg. In addition, atrazine significantly increased fetal Leydig cell aggregation at a dose of 100 mg/kg. Atrazine increased fetal Leydig cell number but not Sertoli cell number. However, atrazine down-regulated Scarb1 and Cyp17a1 in the fetal Leydig cell per se and Hsd117b3 and Dhh in the Sertoli cell per se.

Conclusion: Atrazine inhibits testosterone production of fetal testis mainly via down-regulating the expression of important proteins of both Leydig and Sertoli cells after in utero exposure. Funding: The study was supported by NSFC (81730042 to R-sG, 81601264 to XL), Health & Family Planning Commission of Zhejiang Province (2017KY483 to XL, 11-CX29 to R-sG), and Wenzhou Bureau of Science and Technology (ZS2017009 to R-sG).

Poster #50
INFLUENCE OF ETHANOL CONSUMPTION ON THE CELL STRUCTURE OF SPERMATOGENIC EPITHELIUM AND SPERM
Anastasiya Spaska MSc, PhD¹ and Neomila Dolynko PhD²
¹Girne American University, Turkey; ²Precarpathian National University, Ukraine
Presented By: Anastasiya Spaska, PhD

Introduction: Chronic ethanol abuse stands out amongst etiopathogenic factors of men’s infertility and erectile dysfunction. High sensitivity of germ cells to the influence of ethanol and its metabolites is well-known.

Objective: Determine cytological and ultrastructural changes in the testis and sperm in conditions of experimental chronic ethanol intoxication.

Methods: Study involved 30 mature laboratory rats. Group 1 received 30% ethanol (0.2 ml per 100g bodyweight daily) for 28 days. Group 2 served as controls. Histologic and electron microscopic examination of the testes and spermograms performed.

Results: After chronic ethanol intake seminiferous tubules diameter decreased by 30%. A loss of germ cells in spermatogenic epithelium was observed. Number of primary spermatocytes decreased by 32%, secondary spermatocytes – by 38%, spermatids on 7th stage of development – by 21% versus control group. Volume of Leydig cells nuclei decreased by 22% assuming their degradation and lack of synthetic activity, cytoplasm was vacuolated, mitochondrial matrix enlightened, with reduced cristae. Ultrastructurally lamina propria of seminiferous tubules was twisted and thickened. Cytoplasm of Sertoli cells and spermatids showed loss of connection, proving disturbance of hemato-testicular barrier. Myoid cells had enlightened nucleioplasm, vacuolated cytoplasm, deformed organelles. Spermogram parameters showed 17% decrease in spermatozoa number per ml, compared to control group. The number of vital spermatozoa has dropped down to 68%, while number of pathological forms increased up to 38%. Defective head (no acrosome, a small head or a double head) and defective flagellum (curved or split) was quite common. The kinesisgrams were significantly worse than in control. Overall mobility and number of progressive sperm significantly decreased. On electron micrographs some spermatozoa indicated granular-fibrillar structures inside their nuclei marking immature chromatin condensation. Also missing
Poster #51
MEN WHO HAVE NOT FATHERED CHILDREN AT TIME OF VASECTOMY ARE UNLIKELY TO SEEK FERTILITY RESTORATION
Andrew Sun MD, Molly DeWitt-Foy MD and Sarah Vij MD
Cleveland Clinic
Presented By: Andrew Y. Sun, MD

Introduction and Objective: Vasectomy is a commonly utilized method of contraception for men. Approximately 10% of men seek restoration of fertility after vasectomy. Among urologists there exists a prevalent belief that a patient who has not fathered a child at the time of vasectomy should be counseled differently than a patient who has fathered children. In addition, some providers will not perform vasectomies for patients without a history of paternity. In this study we aimed to determine the percentage of men who underwent vasectomy never having fathered a child and who subsequently went on to seek consultation for fertility restoration.

Methods: Retrospective chart review was performed to identify all patients undergoing vasectomy at one institution over a 14-year period who had not fathered children at the time of vasectomy. Age at vasectomy was recorded. Chart review was performed to determine if patients had sought fertility restoration in our system. Patients who had not been seen in our system within the previous 12 months were mailed a letter informing them about the study. These men were subsequently contacted by phone and asked if they had sought consultation for fertility restoration or if any cryopreserved sperm had been used. Four phone call attempts were made before the patient was deemed unreachable.

Results: Data was available for the number of children at time of vasectomy in 1656 patients over this time period. Seventy-two men (4.35%) had not fathered children at the time of vasectomy. The mean age at vasectomy for this population was 39.3 years (range 22 – 57 years). Seventeen patients were not reachable by phone on 4 attempts and had not been seen in our hospital system in the previous 6 months. Of the remaining 55 patients, zero patients had sought fertility restoration in our system. Patients who had sought to determine the relationship between BMI and VR outcomes.

Poster #52
THE EFFECT OF MALE BODY MASS INDEX ON VASECTOMY REVERSAL OUTCOMES
David Nusbaum BS¹, Mary Samplaski MD¹, Matthew B. F. Marks MS² and Sheldon F. Marks MD³
¹University of Southern California; ²Arizona Andrology Laboratory and Cryobank; ³International Center for Vasectomy Reversal
Presented By: David Jacob Nusbaum, BS

Introduction and Objectives: Data on the effect of body mass index (BMI) on semen parameters is conflicting. There are few studies specifically looking at the effect of BMI on vasectomy reversal (VR) outcomes. We sought to determine the relationship between BMI and VR outcomes.

Methods: Reproductive outcomes were assessed for men who underwent VR performed by a single high-volume microsurgeon (S.F.M.). 2249 men undergoing VR with BMI data available were identified (Table 1). Men were grouped based on U.S. Department of Health and Human services BMI categories: normal weight (BMI 18.5–24.9, n=454 (20.2%)), overweight (BMI 25–29.9, n=1134 (50.4%)), and obese (BMI ≥30, n=661 (29.4%)). The underweight category (BMI <18.5) was excluded due to a sample size of one.

We evaluated male age, female partner age, vasal obstructive interval, type of anastomosis, post-VR total motile sperm count (TMC), and pregnancy rates. Statistical analysis was performed in R using the Kruskal-Wallis test or Chi-squared test, with p<0.05 considered significant. Multiple logistic regression was performed in R using the ‘glm’ function.

Results: Many results can be seen in Table 1. Overweight and obese men had a longer vasal obstructive interval than men with BMI <25 (p<0.001), and were more likely to have had a vasosastomyostomy (VV)/vasoepididymostomy (VE) anastomosis compared to men with BMI <25 (p<0.01). The average post-VR TMC was lowest in obese men and highest in overweight men (p<0.01). There was no significant difference in pregnancy rates across BMI categories (p=0.83).

In a multiple logistic regression model adjusting for male age, female partner age, vasal obstructive interval, type of anastomosis, and post-VR BMI, BMI was not a significant predictor of achieving a pregnancy. Shorter vasal obstructive interval (OR 0.97, 95% CI 0.95-0.99, p<0.01) and female partner age <35 years (OR 1.48, 95% CI 1.18-1.86 p<0.001) were associated with achieving a pregnancy.

Conclusion: Shorter vasal obstructive interval and younger female partner age are associated with achieving a pregnancy after VR. In this study, BMI did not predict post-VR pregnancy rates. Overweight and obese men should still be considered for VR.

Poster #53
TWITTER ACTIVITY FOR #MALEINFERTILITY CO-HASHTAGS BETWEEN 2015 AND 2018
Margaret English BS and Mary Samplaski MD
University of Southern California
Presented By: Mary Samplaski, MD

Introduction: Twitter allows for rapid and global information exchange, for both professionals and patients. A 2017 study found that among urologic specialties, male infertility had the second highest number of tweets and users. We looked at co-hashtags found with #MaleInfertility on Twitter.

Methods: We queried the Symplur Signals database for tweet activity between 2015 and 2018 for “#MaleInfertility”. We assessed co-hashtags and their frequencies over the total time period and by year.

Results: Immense growth in numbers of co-hashtags associated with...
ABSTRACTS

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are two abundantly contaminated synthetic chemicals and may have the same endocrine-disrupting mechanism, thus causing fetal Leydig cell dysgenesis. Since PFOS and PFOA are two similar solvents and detergents in many industrial and consumer products. A previous study done in rats during gestation indicates that PFOS can lower serum testosterone levels, decreased fetal Leydig cell number, decreased fetal Leydig cell cluster side, decreased proliferative capacity of fetal Leydig cells, and reduced steroidogenic capacity and cholesterol transporting capacity in the fetal testis of male fetuses. PFOA and PFOS in combination showed an additive effect on fetal testis dysgenesis.

Conclusions: The current study shows that both PFOA and PFOS are the endocrine disruptors of male reproduction because they disrupt rat fetal Leydig cell development and inhibit testosterone production. When they are combined, they show additive effects to cause fetal testis dysgenesis.

When they are combined, they show additive effects to cause fetal testis dysgenesis. Funding: This work is supported by NSFC (81373032) and Zhejiang Provincial NSFC (LY15H310008). They contributed to this work equally. Corresponding authors: Ren-shan Ge and Ying Zhong Key words: Perfluorooctanoic acid; Perfluorooctane sulfonate; Fetal testis dysgenesis; Fetal Leydig cells; Testosterone; Additive effect

Poster #55
PREOPERATIVE ULTRASOUND VARICOCELE VEIN DIAMETER CORRELATES WELL WITH INTRA-OP VEIN DIAEMETER AND CLINICAL GRADE AMONG MEN UNDERGOING MICROSURGICAL VARICOCELECTOMY
Gal Wald BA¹, Russell Hayden MD¹, Matthew Wosnitzer MD² and Marc Goldstein MD³
¹Well Cornell Medicine, Department of Urology; ²Yale New Haven Health, Northeast Medical Group
Presented By: Russell Hayden, MD

Introduction & Objective: Varicocele is associated with male subfertility and low testosterone (T). Pre-op ultrasound (US) is useful in men with high testes, tight scrotum, prior surgery, or obesity. However, US detects the vein inner diameter, whereas intra-op vein diameter measurement of outer diameter includes the thinned vein wall. We compare pre-op US with intra-op diameters and determine if any discrepancy is clinically significant.

Methods: Men who underwent pre-op US and subinguinal microsurgical varicocelectomy were included. US measured vein diameter supine and standing, with and without Valsalva. Vein diameter of 2.7 mm or greater on US was considered positive. Pre-op US, intra-op measurements and clinical parameters were analyzed using GraphPad Prism (v 7) and R (v 3.4.1).

Results: 184 men were included. Mean age was 38 years (+/- 9.2). Physical exam detected 170 left (Grade III 46%, Grade II 39%, Grade I 15%), and 114 right varicoceles (6%, 39%, 55%). US detected 161 left and 111 right varicoceles. Mean largest vein diameter on US (standing with Valsalva) was 3.48 mm (+/- 1.1) and 2.91 mm (+/- 1.0) for left and right, respectively. Mean largest intra-op vein diameter was 4.63 mm (+/- 1.33) left and 3.97 mm (+/- 1.26) right. US diameters were significantly lower than intra-op values by 1.05 mm [CI 0.9 – 1.25] and 0.65 [CI 0.45 – 0.9] for left and right, respectively. Post-op mean increase of sperm concentration and T were 7.7 M/mL (p-value ≤ 0.01) and 74.9 ng/dL (p-value ≤ 0.001), respectively. Higher clinical grade correlated with largest US diameter on both sides (p-value ≤ 0.01, p-value ≤ 0.01), and also correlated with largest intra-op vein diameter on left (p-value ≤ 0.0001) and right (p-value ≤ 0.01) side. Post-op mean sperm DNA fragmentation levels using the TUNEL assay decreased by 4.4% (p-value ≤ 0.01). No statistically significant correlation was observed between vein measurement discrepancy and post-op change in sperm concentration, T, testes volume, or TUNEL assay.

Conclusions: US varicocele vein diameter correlates well with intra-op measurements and both correlate with clinical grade. The 1 mm difference indicates that varicocele vein wall thickness is about 0.5 mm. Interestingly this is the same vein wall diameter as normal veins, indicating that varicocele veins are larger than normal, but not thicker-walled. Whether men who meet ultrasound criteria but do not have palpable varicoceles benefit from repair requires further study.

Poster #54
IN UTERO EXPOSURE TO A MIXTURE OF PERFLUOROOCTANOIC ACID AND PERFLUOROOCTANE SULFONATE CAUSES FETAL LEYDIG CELL DYSGENESIS IN RATS
Erpo Tian MD¹, Li Duan MD¹, Yiyan Wang MD², Li Wang MD¹, Ren-Shan Ge MD² and Ying Zhong MD¹
¹Jinjiang Maternity and Child Health Hospital; ²Wenzhou Medical University Second Affiliated Hospital
Presented By: Erpo Tian, MD

Introduction: Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are two abundantly contaminated synthetic chemicals and persistently present in the environment and biologically accumulated in mammals and humans. Both PFOA and PFOS are widely used as solvents and detergents in many industrial and consumer products. A previous study done in rats during gestation indicates that PFOS can cause fetal Leydig cell dysgenesis. Since PFOS and PFOA are two similar chemicals and may have the same endocrine-disrupting mechanism, thus they may exert additive effects when they are used together.

Methods: Pregnant Sprague Dawley female and male rats were mated. When pregnancy was confirmed and female dams were divided into Methods: Pregnant Sprague Dawley female and male rats were mated. When pregnancy was confirmed and female dams were divided into...
ABSTRACTS

Poster #56
LESSON FROM THE STUDY OF HUMAN MEIG1/PACRG INTERACTION: IDENTIFICATION OF THE MOUSE PACRG DOMAIN THAT MEDIATES INTERACTION WITH MOUSE MEIG1
Yi Tian Yap BSc, Qian Huang BSc, Wei Li PhD, Zhenyu Wang PhD and Zhibing Zhang MD PhD
Presented By: Yi Tian Yap, BSc

Mouse meiosis expressed gene 1 (mMEIG1) and parkin co-regulated gene (mPACRG) are proteins located in the manchette of elongating spermatids that are essential for normal spermiogenesis and male fertility. Our earlier studies demonstrated that mPACRG recruits mMEIG1 to the manchette through four amino acids on the mMEIG1 surface; however, the location where mMEIG1 binds to mPACRG is not clear. Full-length mPACRG is not stable, and purification of mPACRG for structural study has not been successful. Interaction between human MEIG1 (hMEIG1) and human PACRG (hPACRG) is conserved. We identified another human PACRG transcript, named hPACRG2.1, by sequencing the RT-PCR product that was slightly smaller than the full-length hPACRG. The amino acid sequence of hPACRG2.1 is identical to hPACRG except that 45 amino acids are absent from the center region of the full length hPACRG. Binding strength is significantly reduced between hPACRG2.1 and hMEIG1, indicating that the 45 amino acids play an important role in interaction between hMEIG1 and hPACRG. The 45 amino acids are conserved in mPACRG. Next, we tested the binding ability of the 45 mouse amino acids of mPACRG to mMEIG1 by direct yeast two-hybrid assay. The full-length mPACRG was divided into three domains: D1 contains the amino acids on the left side of the 45 amino acids; D2 contains only the 45 amino acids; and D3 contains the amino acids on the right side of the 45 amino acid. The assay showed that only D2 binds to mMEIG1. We concluded that mPACRG binds to mMEIG1 through the domain containing the 45 amino acids. The present study narrows down the domain for mPACRG to bind to mMEIG1, and may allow us to purify only the small domain for structural studies.

Poster #57
EVALUATION OF SWIM-UP TECHNIQUE IN BACTERIAL LOAD REDUCTION AND SELECTION OF HIGHLY FUNCTIONAL SPERM
Heloisa Faquineti BSc, MSc student1,2, Juliana Pariz PD fellow1,2,3,4, Rosa Casemiro BSc1, Bruna Zillig BSc student1, Caroline Renéa BSc, MSc student1,2,3,4, Donald Evenson PhD2, Elaine Costa MD, PhD1,2,3,4 and Jorge Hallak MD, PhD1,2,3,4
1Androscience, High Complexity Clinical and Research Andrology Laboratory; 2Dept. of Urology, USP; 3Reproductive Toxicology Unit, Dept. of Pathology, University of São Paulo ; 4Institute for Advanced Studies, USP; 5SCSA Diagnostics
Presented By: Juliana Pariz, PD

Introduction: Laboratory techniques were frequently developed to optimize sperm quality to Assisted Reproduction procedures. Sperm processing by Swim-Up (SW) method is a methodology applied in semen samples sent to Assisted Reproduction Techniques (ART), aimed to select highly motile sperm.
Objective: To evaluate the role of SW in bacterial load reduction and selection of highly functional sperm.
Methods: Thirteen semen samples from voluntary were included between January and July 2018. Samples were incubated with Human Tubal Fluid media® (HTF) in anaerobic atmosphere (5% CO2 at 36.7°C). After 1 hour, 1 ml of supernatant was centrifuged and the pellet resuspended with HTF. Were performed before and after SW: seminal analysis, evaluation of mitochondrial activity (3’3-diaminobenzidine stain), DNA integrity (SCSA® method), antisperm antibody test (Marscreen®) and microbiological analysis (Gonolab® for culture of anaerobic bacteria and R1® for culture of Mycoplasma spp). For statistical analysis was used T Student test and adopted p<0.05.
Results: After SW, there were a significant increase in progressive motility (61.6% ± 9.5 vs. 38.7% ± 14.9; p=0.001), total motility (73.9% ± 11.6 vs. 61.3% ± 13.4; p=0.037), reduction of antisperm antibodies (3.9% ± 4.3 vs. 10.8% ± 10.6; p=0.046) and sperm without mitochondrial activity (18.0% ± 11.6 vs. 38.6% ± 30.3; p=0.049). Six fresh samples have bacterial growth (50% Enterococcus spp. and 50% Staphylococcus aureus). The SW was effective in reducing 100% anaerobic bacteria and 90.90% Mycoplasma spp.
Conclusion: SW demonstrate to be effective laboratory methodology to select high fertility potential sperm, with progressive motility, reduction of antisperm antibodies and high capacity of energy production by mitochondrial activity. In addition, the reduction of bacterial load can be contribute to apply this technique in Assisted Reproduction procedures and, consequently, increase gestational rates.
Key words: Microorganism; Semen; Seminal Quality; Seminal Processing; Sperm; Swim-Up. Financial support: Androscience, High Complexity Clinical and Research Andrology Laboratory

Poster #58
WITHDRAWN

Poster #59
EFFECTS OF SEMEN COLLECTION METHODS AND EQUILIBRATION TIMES ON POST-THAW SPERM KINETIC PARAMETERS OF SAANEN BUCKS
Kambulu Lukusa PhD
University of Pretoria
Presented By: Kambulu Lukusa, PhD

The success of artificial insemination (AI) depends on the ability to collect and cryopreserve spermatozoa from proven bucks. Buck can be collected by artificial vagina (AV) and electro-ejaculation (EE). Besides, the equilibration process can interact with collection methods. The objective of the present study was conducted to investigate the effects of semen collection methods and equilibration times on post-thaw sperm motility and kinematic parameters of Saanen bucks. Eight bucks were divided into two equal groups (AV or EE). Semen was pooled per group and extended with clarified egg-yolk extender. Pooled semen samples were cooled to 4oC within 2 h and equilibrated at 4oC for 2, 4 and 6 h. Semen was then frozen using standard procedure after completion of each equilibration time. Semen was evaluated before and post-thaw for sperm motility and velocity parameters using a CASA system. Semen collected with AV had significantly (p<0.001) higher sperm curvilinear velocity (VCL), straight line velocity (VSL), linearity (LIN), beat-cross-frequency (BCF), total motility, rapid sperm and progressive motility compared to semen collected with EE method. There were significant interactions between semen collection methods and equilibration times for sperm kinematic parameters. Post-thaw sperm VCL were higher (p<0.001) for sperm equilibrated for 2 h in semen collected with AV and 4 h in semen collected with EE methods compared to other equilibration times. Sperm VSL were higher (p=0.001) for sperm equilibrated for 2 and 4 h in semen collected with both AV and EE methods. Average path velocity (VAP) were higher (p<0.001) for sperm equilibrated for 4 h in semen collected with AV. LIN and straightness coefficient in semen collected with were higher (p<0.001) for sperm equilibrated for 2 h compared to semen collected with and other equilibration times. Amplitude of lateral head displacement (ALH) were higher (p<0.001) for sperm equilibrated for 4 h in semen collected with AV and 2 h in semen collected with EE. In conclusion, sperm motility and velocity are higher when semen is...
collected by AV and equilibrated for 2 or 4 h. However, EE method can maintain post-thaw sperm curvilinear velocity, straight line velocity and amplitude of lateral head displacement similar to the AV method. Further studies are needed to investigate the effects of equilibration times and addition of antioxidants compound to freezing extenders.

Poster #60
INTEGRATIVE ANALYSIS OF MICRONRNA REGULATORY NETWORKS IN SEMINAL PLASMA REVEALS BIOLOGICAL FUNCTIONS AND POTENTIAL BIOMARKERS FOR MALE INFERTILITY
Hatylas Azevedo PhD, Ricardo P. Bertolla DVM, PhD and Paula Intasqui PhD
Department of Surgery, Division of Urology, Sao Paulo Federal University
Presented By: Paula Intasqui, PhD

Introduction and Objectives: miRNAs are important post-transcriptional regulators of gene expression that show differential expression in seminal plasma (SP) of men with various causes of infertility. However, there is no information about the functions or downstream pathways regulated by those miRNAs. This study aimed to fill this knowledge gap by performing bioinformatics analysis to identify miRNAs in human SP and characterize miRNA-gene networks.

Methods: Literature was surveyed using PubMed to identify miRNAs and sperm function. In a single-center study of subfertile men, semen parameters through Grant 5UL1TR001067-02.

Design and Biostatistics Center and the National Institutes of Health, Studies have shown that there is seasonal variation in semen parameters and birth rates, but birth outcomes from subjects with semen analysis (SA) data have not been reported. We evaluated seasonal variation in semen parameters and resulting birth outcomes among a large cohort of subfertile men.

Methods: We analyzed a cohort of 11,929 subfertile men seen in a single andrology clinic over an 18-year period (1996-2013) that were linked to the Utah Population Database, a large comprehensive database of medical and demographic data. We obtained age, birth records following the first SA, and first SA results, including total motile count (TMC), total sperm count (TSC), sperm concentration (SC), and progressive motility. Linear regression models assessed the effect of seasons on semen parameters controlling for patient age and year of SA. Average seasonal birth numbers were estimated across the 18-year time span, and the summer season was compared with fall, winter, and spring using Wilcoxon signed rank tests.

Objective: Studies have shown that there is seasonal variation in semen parameters and birth rates, but birth outcomes from subjects with semen analysis (SA) data have not been reported. We evaluated seasonal variation in semen parameters and resulting birth outcomes among a large cohort of subfertile men.

Methods: We analyzed a cohort of 11,929 subfertile men seen in a single andrology clinic over an 18-year period (1996-2013) that were linked to the Utah Population Database, a large comprehensive database of medical and demographic data. We obtained age, birth records following the first SA, and first SA results, including total motile count (TMC), total sperm count (TSC), sperm concentration (SC), and progressive motility. Linear regression models assessed the effect of seasons on semen parameters controlling for patient age and year of SA. Average seasonal birth numbers were estimated across the 18-year time span, and the summer season was compared with fall, winter, and spring using Wilcoxon signed rank tests.

Results: The mean±SD age at the time of the first SA was 32±6.5 years. Linear regression demonstrated a consistent U-shaped relationship between TMC, TSC, and SC and season, with winter yielding the highest values with a decline in the summer and fall. Compared to summer, spring had significantly higher TMC (132±153 vs. 137±149 million, p=0.03) and SC (79±74 vs. 82±74 million/mL, p=0.03). Mean TSC (238±248 vs. 249±247 million, p=0.04) and SC (79±74 vs. 83±76 million/mL, p=0.01) were also observed to be higher in the winter than summer. During a mean±SD follow-up of 7.7±4.7 years following their SA, 61% of men had one or more offspring. Over the 18-year period, summer had the highest births per year (188±111 births), followed by spring (178±112, p=0.06), fall (174±102, p=0.02), and winter (170±99, p=0.01).

Conclusion: In a single-center study of subfertile men, semen parameters were highest in the spring and winter and lowest in the summer and fall. However, the timing of peak births did not correspond with the distribution of semen parameters.

Funding: This study was supported by the University of Utah Study Design and Biostatistics Center and the National Institutes of Health, through Grant SULITR001067-02.

ABSTRACTS
ABSTRACTS

Poster #62
EVALUATION OF SEXUAL DYSFUNCTION AND SPERM DISORDER IN LONG-TERM HYPERCHOLESTEROLEMIA: AN EXPERIMENTAL STUDY USING WISTAR ALBINO RAT
Prakash Seppan PhD, Khayinni Wungpam Shimray MSc and Zafar Iqbal Khan Mohammad MSc
University of Madras
Presented By: Prakash Seppan, MSc, PhD

Introduction: Being a systemic disorder hypercholesterolemia and its comorbidities may affect reproductive organs in men, including infertility due to interruption of spermatogenesis, impotence due to erectile dysfunction, lack of sexual drive. However, overall mechanisms regulating reproductive disorder not understood. Present study was intended to analysis the natures of sexual and reproductive damage inflicted during this condition.

Objective: To analyze mating behavior and erectile and sperm functions, membrane and chromatin integrity damage in high fat diet-induced hypercholesterolemia in adult Wistar albino rat. Methods: Study comprised of four groups i.e. control, hypercholesterolemia induced rat (fed with high-fat diet), Total study period for 60 days. All these groups were subjected to mating behavior analyses and libido and test of potency at 30th, 45th and 60th days. Pituitary-gonadal axis was analyzed. At the end of the experimental period sperm collected were analyzed for; motility, morphology and chromatin integrity.

Results & Conclusion: Hormone levels were significantly reduced in hypercholesterolemia. However, testosterone level was stable. Test for libido showed pre-coital sexual behaviors such as chasing, nosing, and anogenital sniffing were well performed in the control animals whereas in hypercholesterolermic rats behaviors were significantly reduced. Similarly, the test for potency has shown significantly reduced frequency of erections, quick flip, long flip and total reflex in hypercholesterolemic rats indicating significant erectile dysfunction. Assessment indicates that sexual dysfunction increase over the study period and most severe at 60th day. Hypercholesterolemia impair sperm motility and showed increased abnormal sperm (microcephalic, amorphous and acentric). Increase in sperm with cytoplasmic droplets, poor chromatin integrity, and mitochondrial membrane permeability were key observations. High ROS levels noticed and indicative of compromised antioxidants defense system. Inability of the sperm cell or the epididymal system to overcome the excessive ROS insult leading to increase in the levels of LPO, chromosomal integrity in the hypercholesterolemic rats. These observations indicate that reproductive and sexual disorders induced under hypercholesterolemia were multifaceted and severity increase over the period. The model creation and evaluation parameters offer a prospective model to analyze therapeutic interventions.

Poster #63
YOGA ENHANCES FERTILITY POTENTIAL AND IMPROVES QUALITY OF LIFE IN INFERTILE MEN WITH RHEUMATOID ARTHRITIS ON DISEASE-MODIFYING ANTI-RHEUMATIC DRUGS
Surabhi Gautam PhD scholar¹, Priyanka Chaurasia MSc¹, Deeksha Rana MSc¹, Uma Kumar MD² and Rima Dada MD, PhD¹
¹Laboratory for Molecular Reproduction and Genetics, Department of Anatomy, All India Institute of Medical Sciences, New Delhi, India; ²Department of Rheumatology, All India Institute of Medical Sciences, New Delhi, India
Presented By: Surabhi Gautam, MBBS, MD

Introduction: Toxic effects of anti-inflammatory and immunosuppressive drugs for men of reproductive age are common concerns in autoimmune disorders like RA. Disease-modifying antirheumatic drugs (DMARDs) can cross blood-testis-barrier and can induce changes in sperm. Such drugs also induce germ cell apoptosis, mutagenic changes in germline cells, permanent gonadal failure and impaired spermatogenesis. Hence, it’s cytotoxic, mutagenic and teratogenic activities may cause ill effects to reproductive health. Yoga and meditation has shown to reduce seminal oxidative stress and oxidative DNA damage.

Objective: To evaluate the impact of yoga on inflammatory markers and quality of life (QoL) in Rheumatoid arthritis affected infertile men.

Methods: Seventy two infertile males with RA were randomized into two groups: yoga (36): practicing Yoga based lifestyle intervention (YBLI) in addition to disease-modifying anti-rheumatic drugs (DMARDs) for 8 weeks; non-yoga (36): DMARDs only. All subjects were assessed pre and post intervention for erythrocyte sedimentation rate (ESR), C reactive protein (CRP), IL-6, IL-17A and soluble HLA-G levels for systemic inflammation as well as seminal reactive oxygen species (ROS), DNA fragmentation index (DFI) and 8-hydroxy-2′-deoxyguanosine (8-OHdG) levels. QoL by WHO-QOL scale, disease activity i.e. disease activity score (DAS28-ESR) and pain acuity i.e. visual analogue scale (VAS) were assessed.

Results: YBLI participants showed significant improvements in disease activity, pain acuity, disability index, QoL over the control group. Mean levels of pro and anti-inflammatory cytokines showed significant reversal after YBLI. Reduction in seminal ROS levels even after 10 days of practice & these cases were followed up to 6 months which resulted in further decline in ROS, 8-OHdG and DFI as well.

Conclusion: Post yoga reduction in inflammatory markers results in fewer requirements of anti-inflammatory drugs. Yoga may not only reduce disease severity, emphasizes stress reduction, improve QoL, minimize usage of drugs with minimum side effects especially on sperm. Financial Support: Science & Technology for Yoga & Meditation, Department of Science & Technology, India.

Poster #64
UNRAVELLING THE SPERM TRANSCRIPT SIGNATURE: ON THE ROAD TO SPONTANEOUS AND ASSISTED CONCEPTION
Vidhu Dhawan MD¹, Manoj Kumar PhD², Priyanka Chaurasia MSc¹, Dipika Deka MD², Neena Malhotra MD², Neeta Singh MD², Vatsla Dadhwal MD² and Rima Dada MD, PhD¹
¹Lab for Molecular Reproduction & Genetics, Department of Anatomy, AIIMS, New Delhi, India; ²Department of Obstetrics Gynecology, AIIMS, New Delhi
Presented By: Vidhu Dhawan, MBBS, MD

Introduction: The unremarkable hierarchical layer of genomic organization in epigenetically marked sperm genome is heralded by a host of complexities. The suite of novel sperm RNA retained in the mature human spermatozoa may synergistically function to navigate early embryonic gene expression in both spontaneous and assisted conceptions. The orchestration of the sperm genomic and extragenomic quality of life (QoL) in Rheumatoid arthritis affected infertile men.

Methods: Semen sample was obtained from male partners of couples experiencing recurrent pregnancy loss (RPL) (n=75), and recurrent implantation failure (RIF) (n=75) patients and healthy fertile controls (n=75). q-PCR analysis was done after reverse transcribing the RNA isolated from the semen samples. The relative quantification of SOX3, STAT4, RPS6, RBM9, RPL10A, FOXG1, TOMM7, EIF5A as well as OGG1 and PARP1 was done after normalization to β-actin with 2-ΔΔCt method. ROS levels (RLU/sec/million sperm) were assessed by...
ABSTRACTS

chemiluminescence and sperm chromatin structure assay (SCSA) was performed to determine DFI. The 8-OHdG levels were estimated by ELISA.

Results: The relative expression of RPS6 and RBM9 was found to differ significantly between RPL patients and controls, while expression of RPS6, RBM9, RPL10A and TOMM7 was seen to differ significantly between RIF patients and controls. SOX3 and PARP1 were found to be downregulated in RPL patients, whilst all the other genes in RPL and RIF patients showed upregulation. The median ROS level was seen to be higher (>29) in RPL [40.9 (3.1-731.24)] and RIF patients [52.75 (10.06-1186.9)] w.r.t controls [17.891.15-53.90] (p<0.001). The mean DFI levels were seen to be higher (>31) in RPL [34.08 ± 5.27] and RIF patients [36.14 ± 5.01] w.r.t controls [27.8 ± 4.02] (p<0.001). 8-OHdG levels were found to be higher in both RPL and RIF patients (p<0.001).

Conclusion: Derangements in sperm RNA expression and genomic integrity pose as a critical determinant of embryo viability. In the evolving era of seminal biomarkers, the adoption of sperm RNA signatures may be adopted as an integral part of standard clinical diagnostic markers. Key words: Sperm RNA, Transcripts, Genome, Epigenetics

Poster #65 DIFFERENTIAL TRANSCRIPTS PROFILE IN SPERMATOZOA OF MEN WITH VARICOCELE

Viviane Paiva Santana MSc¹, Cristiana Libardi Miranda-Furtado PhD², Flavia Gaona Oliveira-Gennaro PhD², Camila Pinho Pompeu², Maria Aparecida Carneiro Vasconcelos¹, Vinicius Dall’Aqua MD³, Kamila Chagas Peronni PhD⁴, Carlos Alberto Oliveira Biagi Jr MSc⁵, Wilson Araújo Silva Jr PhD, MD⁶, Sandro Cassiano Esteves PhD, MD⁷ and Rosana Maria Reis PhD, MD⁸
¹Department of Gynecology and Obstetrics, Ribeirao Preto Medical School, University of Sao Paulo; ²ANDROFERT, Andrology and Human Reproduction Clinic; ³Department of Surgery and Anatomy, Ribeirao Preto Medical School, University of Sao Paulo; ⁴Ribeirao Preto Hemocentro Foundation, University of Sao Paulo; ⁵Department of Genetics, Ribeirao Preto Medical School, University of Sao Paulo
Presented By: Viviane Paiva Santana, MSc

Varicocele is the most common cause of male infertility, related to a decrease in seminal quality and higher rates of sperm DNA damage. As the variability of clinical phenotypes related to varicocele suggests the presence of (epi)genetic factors associated with its etiology, gene expression analysis are necessary for the investigation of the causes of infertility and seminal impairment in these men. Thus, we analyzed the sperm transcriptome of men with varicocele in the search for molecular biomarkers. In this prospective observational case-control study, semen was collected of men with varicocele with normal and abnormal sperm concentration and fertile men without de disease. The seminal quality was evaluated by spermogram and the sperm DNA fragmentation by the sperm chromatin dispersion test. The sperm transcript profile was investigated through RNA sequencing, using the Illumina platform NextSeq 550 Sequencing System, pair-end. All analysis was performed using R statistical environment with the packages Deseq2 for data normalization and differential expression analyses, and ClusterProfile for enrichment analysis. Among the men with varicocele, those with lower sperm count also had lower motility and higher rates of sperm DNA fragmentation. Transcriptome analysis showed 105 differentially expressed genes among analyzed groups (p <0.05). Men with varicocele with normal sperm count presented a pattern of transcripts different from oligozoospermics and were closer to the pattern found in the fertile group. When comparing the fertile and oligozoospermic men with varicocele groups, the enrichment analysis evidenced deregulated genes in pathways related to oxidative phosphorylation, autophagy, cell cycle and diseases related to oxidative stress and apoptosis. When comparing the two groups of men with varicocele, changes in gene expression were mainly related to channel activity and nucleotide e nucleoside bindings. The transcriptome of oligozoospermic men with varicocele has a different profile when compared to controls. The differences were found mainly in the expression of genes related to oxidative stress, apoptosis and mitochondrial dysfunctional, factors closely related to seminal quality and fertility. These findings bring important new findings of the understanding of the origins of infertility in men with varicocele and provides new insights for the treatment of the disease.

Poster #66 NUMBER OF CHILDREN AT TIME OF VASECTOMY IN PATIENTS UNDERGOING VASECTOMY REVERSAL

Andrew Sun MD, Edmund Sabanegh MD and Sarah Vij MD
Cleveland Clinic
Presented By: Andrew Y. Sun, MD

Introduction and Objective: Vasectomy is a commonly utilized method of contraception in men. Approximately 10% of men seek restoration of fertility after vasectomy. During the pre-operative visit, the permanence of the procedure is emphasized. Many providers counsel patients who have not fathered a child at the time of vasectomy extensively and may suggest alternative, less permanent means of contraception. In this study, we examined the percentage of patients undergoing vasectomy reversal who had not fathered children at the time of vasectomy.

Methods: Retrospective chart review was performed for all patients undergoing vasectomy reversal for fertility restoration at one institution over a 14-year period. The number of children fathered at the time of vasectomy was recorded.

Results: 407 patients for whom complete data was available underwent vasectomy reversal over a 14-year period at one institution for fertility restoration. 6.1% (25/407) of patients had no children at the time of vasectomy. 11.8% (48/407) of patients sought fertility restoration to allow for more children with the same partner. 82.1% (334/407) of patients sought fertility restoration to conceive children with a new partner.

Conclusions: Men who have not fathered children at the time of vasectomy make up a very small proportion of patients undergoing vasectomy reversal. Among our vasectomy reversal patient population, men with children from a previous partner make up the majority whereas men who have not fathered any children make up the minority. This data suggests that men who have not fathered a child at the time of vasectomy may not need to be counseled differently than men who have fathered children.

Poster #67 LEUCINE ZIPPER TRANSCRIPTION FACTOR-LIKE 1 (LZTFL1), AN INTRAFLAGELLAR TRANSPORTER PROTEIN 27 (IFT27) ASSOCIATED PROTEIN, IS REQUIRED FOR NORMAL SPERM FUNCTION AND MALE FERTILITY

Qian Huang, Parirokh Awasthi, Ven Natarajan and Zhibing Zhang

Presented By: Qian Huang

Bardet-Biedl syndrome (BBS) is an inherited disease that affects multiple human organs. People with BBS have defects caused by dysfunctional cilia including: progressive visual impairment, polydactyly, obesity, male infertility, kidney abnormalities, learning difficulties, et al. The BBS complex has been shown to be intraflagellag transport (IFT) cargo. IFT is an evolutionarily conserved mechanism essential for the assembly and maintenance of most eukaryotic cilia and flagella. IFT27 is a component of the IFT complex. Depletion of IFT27 in male germ cells results in infertility associated with disrupted sperm flagella structure and immotile sperm. BBS17, also known as leucine zipper transcription factor-like 1 (LZTFL1), is a BBS subunit. Patients with mutations in this gene

© 2019 American Society of Andrology and European Academy of Andrology

Andrology, 2019, Supplement, 76
ABSTRACTS

exhibit the common BBS phenotypes. LZTFL1 is an IFT27 associated protein. The protein is highly expressed only in the mouse testis. During the first wave of spermatogenesis, the protein is only expressed during the spermiogenesis phase. In round spermatids, LZTFL1 is present as vesicles in cytoplasm. Some protein appears in the manchette of elongating spermatids, and it is localized in the developing sperm tail. The global Lztfl1 knockout mouse model has been generated. Fertility of homozygous mutant mice was reduced associated with significantly reduced sperm motility and an increase in percentage of abnormal sperm. In vitro fertility assay revealed significantly reduced fertilization and live birth. The male reproductive phenotype is significantly weaker than the conditional Ift27 knockout mice. Our results support the notion that LZTFL1 is a downstream molecule of IFT27, and other BBS components might partially compensate for the loss of LZTFL1 during male germ cell development.

Poster #68
IN VITRO EFFECTS OF GENISTEIN AND MONO-(2-ETHYLHEXYL) PHTHALATE (MEHP) ON MACROPHAGE INFLAMMATORY RESPONSES AND SPERMATOGONIAL FUNCTIONS
Vanessa Brouard PhD, Haoyi Cui, Samiha Mahin, Amy Tran Ms and Martine Culty PhD
University of Southern California
Presented By: Vanessa Brouard

Perinatal exposure to endocrine disruptor chemicals (EDCs) disrupts the development of the male reproductive system in animals. This has led to the “Testicular dysgenesis syndrome” hypothesis, proposing a common fetal origin for male reproductive pathologies. The role of testicular macrophages on the establishment of spermatogonial stem cells was recently reported. In previous studies, we found that fetal exposure to the phytoestrogen genistein (GEN) and the plasticizer di-(2-ethylhexyl) phthalate (DEHP) at low doses affected testicular function and induced inflammatory processes in neonatal and adult rats. The goal of this study was to examine if GEN and MEHP, the bioactive metabolite of DEHP, could alter macrophage and spermatogonial functions, when cultured separately or together in semi-separated co-cultures. Mouse macrophage and spermatogonia cell lines were exposed separately to GEN and/or MEHP at 10^{-5} or 10^{-4}M, either in basal conditions or in the presence of pro-inflammatory lipopolysaccharide (LPS), for 3 and 24 hrs. Semi-separated co-cultures were performed with macrophages cultured in transwell-inserts and spermatogonia grown in wells, treated for 24 hrs. In macrophage cell lines, treatments with GEN alone significantly decreased the mRNA levels of the pro-inflammatory gene Cxcl10, but increased other cytokines, such as IL1b and Cxcl2, in basal conditions. The main effect of GEN+MEHP mixtures was to reduce the pro-inflammatory effect of LPS in macrophages. Our results also showed that GEN and MEHP affected PPARs gene expression differently, and this effect was time dependent, while LPS decreased the expression of both receptors. GEN increased Foxo1 expression in co-cultured spermatogonia, but not in spermatogonia cultured alone. Surprisingly, the presence of LPS in the co-cultures led to decreased expression of several spermatogonial gene markers, an effect that was less pronounced in the absence of macrophages. The main effect of MEHP alone was to change PPARd and g expression. These results suggest that exposure to GEN and MEHP, alone or mixed, can directly target the inflammatory responses of macrophages, and modify their activation by LPS. These data also suggest a different role for PPARd and g in macrophages. The semi-separated co-cultures data suggest that macrophages could affect spermatogonia gene expression through secreted cytokines, while the presence of spermatogonia may trigger stronger inflammatory responses in macrophages.
Male reproductive pathologies, such as infertility and testicular cancer are on the rise in the western world. Endocrine disrupting chemicals (EDCs) have been identified as potential causative agents of sterility in males. EDCs altering sex steroid levels or functions in perinatal life have been shown to disrupt male reproductive functions, when used individually, usually at doses exceeding human exposure levels. Our goal was to examine whether fetal exposure to a mixture of the EDCs DEHP and genistein (Gen), given at doses relevant to human, could impact the adult testis. DEHP is a phthalate plasticizer used in many commercial products and medical devices. Gen is a phytoestrogen abundant in baby soy formula and vegetarian diets. Our previous studies showed that Gen+DEHP mixture increased infertility and abnormal testis development in adult (postnatal day (PND) 120) rats. Our goal is to identify pathways, molecules, and functions that are altered in adult rat testes after in utero exposure to low doses of Gen, DEHP, alone or mixed, to understand the role of TCP11 in human reproduction. We have generated three transgenic strains using CRISPR/Cas9 genome editing (a deletion mutant, a mutant mimicking mutations found in human male patients, and a GFP—tagged version of the protein) to further characterize M05D6.2 function and localization. Our preliminary results indicate that M05D6.2 is expressed in sperm and is necessary for proper sperm production.

Mammalian sperm fully acquire their fertilizing capacity during their transit through the female reproductive tract, a process known as capacitation. At the molecular level, capacitation involves the crosstalk between metabolic and very well studied signaling pathways. We aimed to deepen in the study of the involvement of metabolism in the acquisition of sperm fertilizing capacity. For this purpose, we developed a protocol in which mouse sperm were incubated in the absence of exogenous nutrients until they become immotile, followed by a restoration of energy substrates. This method was called Sperm Energy Restriction (SER). Our results indicated that SER treatment induced higher percentages of hyperactivated motility when compared with sperm incubated in standard capacitation conditions. In addition, sperm subjected to the SER protocol also presented higher in vitro fertilization and embryo development to blastocyst rates compared to the control. In addition, SER-derived or control blastocysts were non-surgically transferred to pseudo-pregnant females. The blastocysts derived from SER treated sperm presented higher implantation rates as higher numbers of implanted embryos were observed at embryonic day 9.5 (E9.5) and higher numbers of born pups than the controls. Altogether these data suggest that SER treatment can be used to improve in vitro fertilization protocols and opens the possibility that similar treatments can be found and applied to other species including humans.
Introduction: Klinefelter Syndrome (KS) is typically defined as 47, XXY in a male patient. The onset of puberty in KS patients is associated with progressive testicular fibrosis, loss of spermatogonial stem cells (SSC), and impaired fertility. Previous work has demonstrated the ability to propagate in vitro SSCs in 2D cell culture. The objective of this study was to use propagated KS SSCs to form a functional 3-Dimensional Human Testicular Organoid system (3D HTO) as a means of establishing a novel infertility treatment for KS patients.

Methods: KS testicular cells from our previous 2D culture system were thawed and recovered for a week. 3D HTOs were formed by placing 10,000 cells per well in ultra-low attachment round bottom plates for 48 hours. After the formation, differentiating media was used for three weeks. Viability and structure of the HTOs were assessed with bright field and confocal microscopy as well as live/dead staining and ATP assays. Both qPCR and dPCR were used to confirm the presence of spermatogonia, Sertoli, Leydig and peritubular cells during all stages. Finally, stimulated and unstimulated testosterone production from the HTOs was measured. The presence of any haploid cell was assessed by post meiotic germ cells marker (PRM1) and FISH for chromosomes X/Y/18. The organoids were assessed at day 2, 9, 16, and 23.

Results: Well-defined spherical HTOs were formed after 48 hours. Live/dead staining remained stable while ATP assays showed an initial decline due to transition from 2D to 3D system. PCR confirmed the presence of the four major testicular cell types. HTOs produced testosterone constantly. Furthermore, SSC differentiation was shown in each stage of the experiment by gene expression (ZBTB16 for undifferentiated, DAZL for differentiating, SYCP3 for meiotic and PRM1 for post meiotic germ cells). After 3 weeks, at least 12% of cells in HTOs were haploid (X/18 or Y/18).

Conclusions: This is the first study to demonstrate the ability to form stable and viable HTOs from human KS testicular cells. Furthermore, this system was able to functionally maintain four major testicular cell types and differentiate SSCs to post-meiotic cells. Future studies will focus on collecting and differentiating viable haploid germ cells for use in ICSI therapy.
ABSTRACTS

Poster #74
IMPACT OF YOGA INTERVENTION ON SPERM GENE EXPRESSION AND GENOMIC INTEGRITY IN EARLY PREGNANCY LOSS
Rima Dada MD, PhD¹, Manoj Kumar PhD², Dipika Deka MD³, Neena Malhotra MD¹, Neeta Singh MD² and Vatsla Dadhwal MD³
¹Lab for Molecular Reproduction & Genetics, Department of Anatomy, AIIMS, New Delhi, India; ²Dept. of Obstetrics Gynecology, AIIMS, New Delhi, India
Presented By: Rima Dada, MD, PhD

Introduction: Early pregnancy loss, the loss of non-viable intrauterine pregnancy within the first 12 weeks of gestation. Paternal defects in genomic integrity, impending oxidative stress and disregulated gene expression profile is been suggested as the causal etiology for the same has been implicated in the recent literature. Studies are been highlighted on evaluating the impact of yoga based lifestyle intervention therapies in restoring the genomic integrity and regulating the gene expression.

Objectives: To analyze the effect of structured yoga intervention on sperm gene expression and genomic integrity in early pregnancy loss

Methods: 60 male partners of couples who experienced early pregnancy loss in both spontaneous and assisted conceptions were recruited in this prospective study and enrolled in a structured yoga intervention for 12 weeks. Various measures assessed were changes in the semen profile based on WHO (2010) guidelines, semen quality as measured by reactive oxygen species (ROS) levels, DNA fragmentation index and the effect on sperm gene expression of the genes critical for early embryonic development. The evaluation was done at baseline (day 0) and at 4 and 12 weeks post yoga therapy intervention.

Results: A significant increase in sperm progressive motility and sperm count (done twice at all time points) was seen with the intervention (p<0.001, p<0.05). There was a significant decline (62.4% and 78.8%) in ROS levels at the timepoints post intervention. The DFI levels showed a minimal insignificant decline at 4 weeks (p=0.07) but a significant decline was seen at 12 weeks (p<0.001). The relative gene expression was seen to normalize towards that of control levels.

Conclusion: Yoga based lifestyle intervention practices affects the whole body and causes a decline in oxidative stress and also improves genomic integrity and gene expression as well. This may thus aid as an adjunct in improving the pregnancy outcomes and exert transgenerational effects.

Poster #75
SPERM RNAs AS NOVEL BIOMARKERS TO PREDICT MALE INFERTILITY AND TOXICANT-INDUCED TESTICULAR INJURY
Enrica Bianchi PhD, Mark Sigman MD, Angela Stermer PhD, Susan Hall, Kathleen Hwang MD and Kim Boekelheide MD, PhD
Brown University
Presented By: Enrica Bianchi, PhD

Assessing male reproductive toxicity of environmental and therapeutic agents relies on tests and epididymis histopathology in a pre-clinical setting while in humans, assessment depends on semen and serum hormone analysis, both of which are poor indicators of sperm health and reproductive potential. Therefore, there is an urgent need to identify a novel, non-invasive and reliable approach to monitor environmental and therapeutic agents’ effects on male reproductive health. Sperm RNAs are novel biomarkers to predict infertility and testicular toxicity; therefore, spermatozoal RNA content and mRNA sequence were analyzed in mouse, rat and human sperm samples to identify sperm transcriptomic similarities and differences across species. Semen specimens were collected from men aged 18 to 55 years with proven fertility, presenting for vasectomy to the Urology Division, and analyzed according to World Health Organization 2010 criteria. Rat and mouse semen specimens were collected from control animals via repeated needle punctures of the cauda epididymides. Sperm large and small RNAs were extracted after somatic cell lysis using an optimized sperm RNA isolation protocol. Sperm transcriptomic similarities and differences across species were identified using mRNA-sequencing. Bioinformatics analyses, including gene set enrichment analysis and Ingenuity Pathway Analysis, were used to investigate the biological function of all shared and differentially expressed transcripts across species. Mouse and rat sperm transcriptomes were more similar than either species compared to human. Transcriptome profiling identified 6684 similarly expressed transcripts within the three species that could be used to predict the clinical application of sperm biomarkers identified in toxicant-induced testicular injury animal models.

Poster #76
GALECTIN-3 IS A ZINC-BINDING PROTEIN: IMPLICATIONS FOR PROSTATE CANCER PROGRESSION
Harvey Anu MS, AlleaBelle Gongola BS, Matthew Kovak MS, David Schoen MS, Karah Bogoslavsky MS, Joel Ubeda BS, Kori Mansfield BS, Alicia Byrd PHD and Alan Dickman PhD
Department of Biochemistry and Molecular Biology, College of Medicine, University of Arkansas for Medical Sciences
Presented By: Alan Dickman, PhD

Zinc is an important mineral for male reproductive health. The normal prostate has the highest zinc concentration (3 mM) of all the soft tissues in the body, and decreased intra-prostatic zinc concentration is associated with prostate cancer (PCa) progression. Galectin-3 is a carbohydrate-binding protein indicated in the etiology of multiple cancers, including PCa. In the male reproductive tract, galectin-3 function is regulated by proteolytic processing by prostate specific antigen (PSA). PSA enzymatic activity is inhibited by zinc bound to its substrates or by zinc in solution. Significantly, increased galectin-3 proteolysis during PCa progression coincides with zinc depletion in this malignant tissue. The current study investigated galectin-3 as a zinc-binding protein and evaluated the impact of zinc-binding on susceptibility to proteolysis by PSA. Analysis of archived X-ray diffraction data using the CHED algorithm identified a putative transition metal-binding site in the galectin-3 carbohydrate recognition domain (CRD). Galectin-3 and the galectin-3 CRD alone were expressed as recombinant proteins. Electrobolt overlay experiments indicated that zinc-65 bound specifically to both galectin-3 and the CRD. Inductively coupled plasma mass spectrometry (ICP-MS) of zinc-loaded galectin-3 indicated that an average of 1.8 zinc molecules bound to one galectin-3 molecule and 2.5 molecules bound to the CRD. Evaluation of zinc binding by tryptophan fluorescence determined a Kd of ~11 mM for both galectin-3 and the CRD, and zinc-binding was detected in a concentration range that included 3 mM zinc. Positive cooperativity of the binding data suggested that multiple zinc molecules bound to galectin-3 and the CRD. To investigate the impact of zinc-binding on PSA cleavage, zinc-loaded galectin-3 was prepared in 3 mM zinc, and excess zinc was removed by dialysis. Cleavage assays of zinc-loaded and zinc-depleted galectin-3 demonstrated that bound zinc significantly inhibited PSA proteolysis of galectin-3. Collectively, these data identify galectin-3 as a weak zinc-binding protein. Galectin-3 would be expected to be zinc-bound in the zinc-rich (3mM) environment of normal prostate cells. Furthermore, zinc depletion during PCa tumorigenesis may remove a protective effect against PSA proteolysis and contribute to the increased galectin-3 cleavage that occurs during PCa progression. Future studies will investigate galectin-3 as a zinc-binding protein in the etiology of PCa.
**ABSTRACTS**

**Poster #77**
**SIGNALLING PATHWAYS INVOLVED IN REACTIVE OXYGEN SPECIES (ROS) GENERATION DURING CAPACITATION**

Gen Takei Ph.D and Pablo Visconti Ph.D  
University of Massachusetts, Amherst  
Presented By: Gen Takei, PhD

**Introduction:** Several studies have reported that appropriate amount of ROS has a positive role on hyperactivation (De Lamirande and Gagnon, 1993), acrosome reaction (Bize et al., 1991), phosphorylation (reviewed in O’Flaherty et al., 2006) and sperm-oocyte fusion (Aitken et al., 1995) in mammalian spermatozoa including human. It has been known that generation of ROS is correlated with capacitation status, namely, capacitating condition activate the generation of ROS (De Lamirande and Gagnon, 1994). This ROS generation is likely catalyzed by nicotinamide adenine dinucleotide phosphate (NADPH) oxidase (NOX). However, signaling pathways involved in the capacitation-associated ROS generation remain controversial.

**Objectives:** In the present study, we investigated the association of known capacitation-associated pathways with ROS generation using mouse sperm as a model.

**Methods:** Spermatozoa were collected by swim-out from minced cauda epididymis of CD1 mice in a TYH media without BSA and sodium bicarbonate (non-capacitating media). Collected spermatozoa were subsequently suspended in TYH media containing BSA and sodium bicarbonate (capacitating media) to achieve capacitation. Generation of ROS was monitored by measuring the chemiluminescence using luminol and horse radish peroxidase. Chemiluminescence was measured by microplate reader POLARstar Omega (BMG Labtech) at 37°C.

**Results:** First, we confirmed that ROS generation was significantly up-regulated when spermatozoa were suspended in capacitating media compared to that in non-capacitating media. Addition of NADPH to the media augmented the generation of ROS in both capacitating and non-capacitating media, although the ROS increase was greater in capacitating media. These results suggest that ROS are generated by NOX, and capacitating media up-regulate the NOX activity. Both BSA and bicarbonate ion are required for ROS generation during capacitation. When either BSA or bicarbonate ion were eliminated from capacitating media, only a slight increase of ROS generation was observed compared to non-capacitating media. ROS increase was independent of both Ca²⁺ and cAMP-dependent pathways.

**Conclusion:** The results obtained suggest that activation of ROS generation during capacitation is caused by up-regulation of NOX activity. Both BSA and bicarbonate are necessary and act synergistically for the activation of ROS generation. However, this activation is not modulated by cAMP.

**Poster #78**
**FIBROBLAST GROWTH FACTOR 16 STIMULATES PROLIFERATION BUT BLOCKS DIFFERENTIATION OF RAT STEM LEYDIG CELLS DURING REGENERATION**

Yiyan Wang PhD, Yue Duan MD, Xiaoheng Li MS, Jiaying Mo MD, Fang MD¹, Xianwu Chen MD¹, Yong Chen MD¹, Chaobo Ni MD¹, Yige Yu MD¹, Yiyan Wang PhD¹, Yadong Huang PhD² and Ren-Shan Ge MD¹  
¹The Second Affiliated Hospital and Yuying Children’s Hospital, Wenzhou Medical University  
²Provincial Key Laboratory of Bioengineering Medicine, Jinan University  
Presented By: Yiyan Wang, MD

**Introduction:** Leydig cells, existing in the interstitial surrounding the seminiferous tubules in the mammalian testis, produce testosterone. Leydig cell regeneration can be achieved in adult rat testis after a single intraperitoneally injection of ethane dimethane sulfonate (EDS). Many niche factors affect Leydig cell regeneration from stem cells. One of the factors is fibroblast growth factor 16 (FGF16). Although FGF16 in fetal rodent gonad is low, the abundant expression of FGF16 in adult rat testis indicates that it plays a role in Leydig cell function. We aim to investigate the effects of FGF16 on Leydig cell regeneration in EDS-treated rat testis.

**Methods:** We intraperitoneally injected 75 mg/kg EDS to adult male Sprague Dawley rats and then intratesticularly injected FGF16 (0, 10, and 100 ng/testis/day) from post-EDS day 14 to day 28. We investigated serum hormone levels, Leydig cell number, and gene and protein expression in vivo. We also explored the effects of FGF16 treatment on Leydig cell proliferation in vitro.

**Results:** FGF16 lowered serum testosterone levels (21.6% of the control at a dose of 100ng/testis) without affecting the levels of luteinizing hormone and follicle-stimulating hormone on post-EDS day 28 in vivo. FGF16 increased Leydig cell number and the percentage of PCNA-positive Leydig cells at doses of 10 and 100 ng/mg without affecting Sertoli cell number, but down-regulated the expression of Leydig cell genes (Lhcgr, Scarb1, Star, Cyp11a1, Cyp17a1, and Hsd17b3) and Sertoli cell genes (Fshr, Dhh, and Sox9) and their proteins in vivo. FGF16 increased the phosphorylation of AKT1 and AKT2 as well as EKR1/2 pathway. FGF16 increased EdU incorporation into stem Leydig cells but lowered medium testosterone levels and the expression levels of Leydig cell genes (Lhcgr, Scarb1, Star, Cyp11a1, Cyp17a1, and Hsd17b3).

**Conclusion:** These data indicate that FGF16 plays a critical role in Leydig cell development by promoting the proliferation of rat stem and progenitor Leydig cells but blocking their differentiation. This work was supported by NSFC (81730042 to R.S.G, 81771636, to C.L., and 81601266 to X.L.), Health and Family Planning Commission of Zhejiang Province (11-CX29 and 2013ZDA017 to R.S.G. and 2017KY483 to X.L.) and Zhejiang Provincial NSF (LY15H310008 to R.S.G and LY18H040013 X.L.) as well as Wenzhou Science and Technology Bureau (ZS2017009 to R.S.G).

**Poster #79**
**BONE MORPHOGENETIC PROTEIN 4 (BMP4) INHIBITS RAT STEM LEYDIG CELL DEVELOPMENT**

Xiaoheng Li, Lanlan Chen MD¹, Lubin Xie MD¹, Yao Lv MD¹, Yinghui Fang MD¹, Xianwu Chen MD¹, Yong Chen MD¹, Chaobo Ni MD¹, Yige Yu MD¹, Yiyan Wang PhD¹, Yadong Huang PhD² and Ren-Shan Ge MD¹  
¹The Second Affiliated Hospital and Yuying Children’s Hospital of Wenzhou Medical University; ²Department of Cell Biology Guangdong Provincial Key Laboratory of Bioengineering Medicine, Jinan University  
Presented By: Xiao-Heng Li, MS

**Background:** Bone morphogenetic proteins 4 (BMP4) plays important roles in organ development and regeneration after tissue damage. It also regulates the proliferation and differentiation of rodent spermatogonia. It may regulate stem Leydig cell development. However, its function in the regulation of stem Leydig cell development and its underlying mechanism remain unknown. Here, we report the role and signaling pathway of BMP4 to regulate stem Leydig cell development in the Leydig cell regeneration model of male rats.

**Methods:** The Leydig cell regeneration model was established by intraperitoneally injecting ethane dimethane sulfonate (EDS). Twenty-four adult male rats were injected intraperitoneally 75 mg/kg EDS to eliminate all Leydig cells and randomly divided into four groups: 0 (normal saline as the control), 0.1, 1.0, and 10 ng/testis BMP4. BMP4 was injected intratesticularly to each testis on post-EDS day 14 for 14 days. Serum hormone (testosterone, luteinizing hormone, and follicle-stimulating hormone) levels were measured and Leydig cell number, size, gene, protein expression and testis microarrays were explored on post-EDS day 28. The culture of stem Leydig cells on the surface of seminiferous tubules was established to investigate the effects of BMP4 and the underlying mechanism. Stem cells were treated with BMP4 (0-100.0 ng/ml) alone or in combination with its antagonist noggin (1-100.0ng/ml) for 14-21 days. Medium testosterone levels and Leydig cell mRNA levels were measured.
Results: BMP4 significantly decreased serum testosterone level without affecting LH and FSH levels in vivo. BMP4 did not change Leydig cell number and cell size. Gene transcriptome analysis and qPCR showed that BMP4 down-regulated the expression of testis genes (Scarb1, Star, Ins3, Amh, and Pdgfa). Western blot analysis confirmed that their proteins that showed the similar changes. BMP4 increased Smad1/5 and Smad4 protein levels. In vitro study showed that BMP4 mainly inhibited the differentiation of stem Leydig cells as evidence by the reduction of medium testosterone level and the down-regulation of the expression of Lhgc, Scarb1, Hsd11b1, Ins3, and Cyp11a1 and the antagonism by noggin. Conclusion: BMP4 blocks stem Leydig cell development via Smad1/5 and Smad4 pathway. Funding: [NSFC (81730042 and 81610266), Health & Family Planning Commission of Zhejiang Province (2017KY483 and 2018CQG1360730), and Wenzhou Science & Technology Bureau (ZS2017009 and Y20150111).]

Poster #80
PROAKAP4 CONCENTRATIONS AS AN INDICATOR OF GOOD SPERMATOGENESIS AND SPERM QUALITY UNDER OXIDATIVE STRESS CONDITIONS
Maryse Delehedde PhD, Bastien Demoudeaux MSc, Gaelle Remy PhD, Margaux Selleslagh Msc, Quentin Dewulf, Jean-Luc Desseyn PhD, Paul Moreau, Philippe Gosset PhD, Muriel Pichavant PhD and Nicolas Sergeant PhD
1SPQI; 2INSERM UMR 995; 3INSERM U1019 CNRS UMR8204, Institut Pasteur de Lille; 4INSERM UMRS 1172, SPQI
Presented By: Maryse Delehedde, PhD

Male infertility is frequently described as a result of non-healthy behaviors and modern stressing way of life. New tools are required to evaluate these infertilityizing environmental factors and to follow up preventive or therapeutic options. In our study, we then evaluated the pertinence of the protein proAKAP4 concentrations as a read out of sperm quality in a mice model for oxidative stress, cigarette smoking and metabolic disorders. ProAKAP4 has been indeed described as a pertinent marker of sperm quality and fertility and can be easily assessed using Mouse 4MID® ELISA kit (4BDX-18K8, 4BioDx). Structurally, proAKAP4 is the protein precursor of the AKAP4 that is required for sperm structure, motility, capacitation and fertilization. Briefly, 6 groups of mice (n=6 per group) were under Low fat diet (LFD) or under two regimens of high fat diet (45 and 60% of lipids) from 5 cigarettes per day, 5 days a week). Two groups in high fat diet groups submitted to cigarette smoke, respectively. Interestingly, protein proAKAP4 concentrations were diminished by 40% and 55% in low fat diet and high fat diet groups submitted to cigarette smoke, respectively. Interestingly, treatment by N-acetylcysteine improved significantly the proAKAP4 concentrations and sperm quality in a mice model for oxidative stress, cigarette smoking and metabolic disorders. Results: ProAKAP4 concentrations in parallel investigated using Human 4MID® kit (4BDX-18K8, 4BioDx) in smokers compared to nonsmokers in a mice model for oxidative stress, cigarette smoking and metabolic disorders. Further investigations should be performed to evaluate the proAKAP4 variations in antioxidative therapeutic approaches of male infertility. Taken together, the proAKAP4 marker is then a pertinent new sperm parameter to investigate in preclinical, toxicological or clinical studies that are assessing sperm quality under pathological and environmental conditions impacting male fertility. Financial Fundings: SPQI - BPI

Poster #81
PRSS50-NFKB-LRWD1: A NOVEL PATHWAY IN SPERMATOGENESIS
Jason Scowell BS, Juan Bournat PhD, Abhishek Seth MD, Joshua Moore BS, Minerva Solis BS, Adam Szafran MD/PhD and Carolina Jorgez PhD
Baylor College of Medicine
Presented By: Carolina Jorgez, PhD

Objectives: We identified PRSS50 as a testis specific serine protease with a possible role in meiosis and male fertility. PRSS50 is thought to signal through NFKB. One testis specific target of NFKB is the centrosome protein LRWD1. Our objective was to determine the in vivo effect of PRSS50 loss on fertility and sperm production and identify potential mechanisms driving this phenotype.

Methods: We generated a Prss50 knock-out (KO) mouse using CRISPR/Cas9. Fertility was assessed by 6-month mating (n=10 each group). Testicular histology, sperm analysis, and protein-analysis was performed. Testicular ultrastructural morphology was assessed by transmission electron microscopy (TEM).

Results: PRSS50 expression is localized to the cytoplasm of spermatocytes beginning at post-natal day 14 (beginning of meiosis) and continues throughout adulthood as well as in the sperm midpiece. PRSS50 expression patterns were similar between mouse and human sperm. 20% of Prr50-KO males were infertile compared to 0% of WT. Prss50-KO males were severely sub-fertile producing fewer litters and fewer numbers of pups per litter (KO: 63% fewer pups than WT, p<0.01). All Prss50-KO mice semeniferous tubules show abnormalities with different degrees between mice including: Sertoli cell only (SCO) tubules, a high degree of vacuolation, altered wave of maturation, multinucleated and syncytial germ cells, and increased residual bodies. TEM demonstrated multiple testicular defects including but not limited to multiple spermatids without membranes dividing the nucleus, spermatids lacking or having additional centrosomes, spermatids with multiple aneuploides these findings suggested impaired cytokinesis. KO mice had a decreased percentage of normal sperm compared to WT mice (30% vs. 72%, p<0.01) with defects including sperm heads only (61% vs. 21%, p<0.01) and multi head/tail sperms. Western blot demonstrated a 2.1-fold reduction in testicular LRWD1 (p<0.05). LRWD1 plays an important role in centromere formation and histone modification. As a potential consequence of lacking PRSS50, spermatocyte and spermatid H3K9me3 levels were reduced and the pattern of expression was mis-localized.

Conclusions: Prss50-KO unique testicular and sperm morphology defects supports its role in spermatogenesis and meiosis. Lack of PRSS50 signaling through NFKB-LRWD1 may be a causative mechanism in abnormal sperm development in Prr50-KO mice.

Funding: National Institute of General Medical Sciences T32GM088129

Poster #82
EUGONADAL TESTOSTERONE LEVELS POSITIVELY REGULATE ERECTILE FUNCTION IN ISOLATED HUMAN CORPUS CAVERNOSUM
Laith Alzweri, Serap Gur, Asim Abdel-Mageed, Omer Raheem and Wayne Hellstrom
Presented By: Laith Alzweri, MD, MRCS, FESCM

Introduction: Testosterone (T) deficiency (hypogonadism) is associated with erectile dysfunction (ED). The relaxant response of T on non-genomic pathways on the corporal smooth muscle has been reported, but the in vitro effects of T on human corpus cavernosum (HCC) have not been documented. We aimed to compare the mediating effects of different concentrations of T on nitric oxide (NO)-dependent and -independent nitrergic relaxations in organ bath studies and the mode of action targeting the cavernous NO/cyclic guanosine monophosphate (cGMP) pathway.
Methods: HCC samples were obtained after consent from men undergoing penile prosthesis implantation (n = 9). After phenylephrine (Phe) contraction, electrical field stimulation (EFS), acetylcholine (ACh) and PDE-5 inhibitor (sildenafil) induced relaxation at 150, 400 and 600 ng/dL. T incubations of HCC strips were performed using organ bath preparations. HCC measurements of endothelial NO synthase (eNOS), neuronal (nNOS) and PDE5 were evaluated through immunostaining, Western blotting, and cGMP and nitrite/nitrate assays.

Results: The relaxation responses to ACh and EFS in isolated HCC were significantly increased at all T levels as compared to untreated tissues. However, sildenafil-induced relaxant responses were significantly increased at eugonadal (E) T. Unaltered neurogenic contractions to EFS were observed. E T levels may be accompanied by increased eNOS, nNOS and cGMP, along with lower PDE5 protein expression. Tissue nitrate/nitrite (NOx) concentration (NO production marker) were enhanced by E T levels. (Table)

Conclusions: We provide novel data that reveal the role and importance of the short-term and modulatory effects of T incubation in HCC. E T levels indirectly and specifically mediated HCC relaxation via downstream stimulation of nNOS, eNOS and cGMP and by inhibiting PDE5, causing restoring of erectile function. These results suggest that T replacement therapy may upregulate erectile function by modulating endothelial function in hypogonadal men with ED, and improve the therapeutic response of PDE5i. Additional studies are required to establish the non-genomic effects of T to maintain erectile function.

Poster #83
DYNAMIC REMODELING OF MEMBRANES AND THEIR LIPIDS DURING ACUTE HORMONE-INDUCED MA-10 MOUSE TUMOR LEYDIG CELL STEROIDOGENESIS
Sathvika Venugopal PhD¹, Rachel Chan BS², Esha Sanyal BS², Lorne Taylor MSc², Pushwinder Kaur MSc², Edward Daly BS² and Vassilios Papadopoulos DPharm, PhD, DSc²
¹Research Institute of the McGill University Health Centre, Montreal, Quebec, H4A 3J1, Canada; ²Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, CA 90089, USA
Presented By: Sathvika Venugopal, PhD

During acute steroidogenesis, lipids play an important role in signal transduction and facilitate rapid inter-organelle membrane interactions for the trafficking of cholesterol to the mitochondria. Thus a thorough analysis of the subcellular organelle localization of individual lipids species is required for better understanding the role of lipids in steroidogenesis. For this, steroidogenic MA-10 mouse tumor Leydig cells were chosen for their ability to rapidly produce progesterone in a hormone-inducible manner. Differential centrifugation processes were used to isolate cytoplasm, endoplasmic reticulum (ER), mitochondria, mitochondrial associated membranes (MAMs), plasma membrane (PM) and PM-associated membranes (PAMs) from MA-10 cells in basal, hormone stimulated (treated for 2 hours with dibutyryl cAMP (dbcAMP), and steroidogenesis inhibited (treated with dbcAMP and cycloheximide) states. Lipidomic analyses were performed by direct infusion (shotgun lipidomics) using electrospray ionization tandem mass spectrometry of major membrane lipid categories. This analysis identified 248 individual/isobaric species, including glycerophospholipids, lyso-glycerophospholipids, sphingolipids, cholesterol and its esters, and ceramides. Each isolated subcellular organelle membrane and associated membranes had a unique lipid composition and induction of steroidogenesis by dbcAMP caused a significant remodeling of the lipids. For example, we noted a substantial increase in ceramides in PAM and PM compartments, suggesting a role of ceramides in signal transduction process mediating the induction of acute steroidogenesis. Ceramide levels reduced in the presence of cycloheximide. Cardiolipins, known to be involved in translocation of cholesterol into the mitochondria were elevated upon dbcAMP stimulation. In addition, a drastic decrease in cholesterol ester levels was noted in the cytoplasm, ER and whole cell homogenate extracts, suggesting that a significant amount of cholesterol esters are de-esterified and likely utilized for steroid biosynthesis. Abundant lipids such as phosphotidylcholine and sphingolipids were not affected by the various treatments. The observed cAMP-induced dynamic changes in MA-10 cell subcellular membrane lipidome suggest that acute steroid production is a process that involves extensive organelle remodeling. This study is one of the first to analyze lipidome re-organization during steroidogenesis.

Poster #84
ANDROGEN SUPPRESSION FACILITATES EXOGENOUS RETINOIC ACID-INDUCED SPERMATOGENIC RECOVERY IN IRRADIATED MICE
Gunapala Shetty PhD¹, Thien Phan BS¹, Guo Zhong PhD², Nina Isoherranen PhD² and Marvin Meistrich PhD¹
¹University of Texas MD Anderson Cancer Center, Houston; ²University of Washington, Seattle
Presented By: Gunapala Shetty, PhD

Introduction: Spontaneous recovery of spermatogenesis after irradiation and chemotherapy with moderate doses is variable in different species. In mice treated with radiation or chemotherapy, recovery of spermatogenesis in very gradual and incomplete. Transient androgen suppression moderately enhanced the recovery of spermatogenesis in irradiated mice. Since only somatic cells have hormone receptors, this suggested a failure in the somatic signaling for quantitative maintenance of spermatogenesis, after cytotoxic insult. We reasoned that this inefficiency in the spermatogenic recovery may be due to the deficiency of retinoic acid (RA) in the tubules since several weeks after radiation or chemotherapy spermatocytes and spermatids, which are intratubular sources of RA, are completely depleted. Although RA may be produced in the interstitium or supplied via blood flow, peritubular myoid cells with high levels of CYP26B1 may act as a barrier to RA entry to the tubules

Methods: We used the C3H mice to investigate whether the impaired recovery of spermatogenesis after irradiation is related to the deficiency of RA in the tubules. We measured the RA content in the testes of irradiated mice by mass spectrometry. We also tested whether exogenous RA enhanced spermatogenic recovery and the effect of additional androgen suppression treatment on the RA action.

Results: A dose of 16 Gy testicular irradiation, which eliminated nearly all of the germ cells 5 weeks later, indeed reduced the RA content per testis to about 12% of control. When mice were irradiated with 10 Gy, 16% of the tubules showed differentiation 8 weeks later. Hormone suppression with GnRH-antagonist treatment during weeks 3-8 after irradiation marginally enhanced the percentage of recovering tubules to 22%. Retinoic acid treatment alone starting at week 3.3 after irradiation, did not enhance the recovery, as only 11% of the tubules showed differentiation. However, treatment with a combination of GnRH-antagonist and retinoic acid markedly increased the percentage of tubules with differentiated germ cells to 52%.
Conclusions: The failure of RA alone to stimulate recovery of spermatogenesis and the enhanced recovery when RA was combined with androgen suppression, supports the hypothesis that androgen suppression enables access of exogenous RA to the tubular compartment, allowing spermatogonial differentiation, at the time when the intratubular source of RA is depleted.

Poster #85
PEROXIREDOXIN 6 PARTICIPATES IN THE REGULATION OF SPERM CAPACITATION
Denny Choi BSc1 and Cristian O’Flaherty DVM, PhD2
1McGill University; 2McGill University and RI-MUCH
Presented By: Denny Choi, BSc

Sperm capacitation is an oxidative process that requires low and controlled amounts of reactive oxygen species (ROS) that trigger its associated phosphorylation events. PRDXs are antioxidant enzymes that not only act as scavengers but also control ROS action in somatic cells. Spermatozoa from infertile men have lower levels of PRDXs (particularly of PRDX6) which are thiol-oxidized and therefore inactive. There is a rise of superoxide anion during the first 30 min during human sperm capacitation. When phosphorylated, PRDX6 changes its activity from peroxidase to calcium-independent phospholipase A2 (iPLA2). Given the importance of ROS during sperm capacitation and the lack of information on how the redox signaling is regulated, we aim to determine the role of peroxiredoxins (PRDXs) during capacitation as regulators of redox signaling. Sperm from healthy donors were capacitated in the absence or presence of PRDXs inhibitors (Hum Reprod 33:1394-1407 2018) at concentrations that do not impair motility nor viability for 4 hr at 37°C. After incubation, sperm proteins were immunoblotted with anti-phosphotyrosine antibody to determine levels of capacitation. Mouse and human spermatozoa were capacitated in the presence of MJ33, an inhibitor of PRDX6 iPLA2, for 30 min at 37°C to determine intracellular pH (pHi), by flow cytometry using BCECF-AM that increases its fluorescence upon intracellular alkalization. We also incubated capacitated spermatozoa with 2-guanidinobenzimidazole (2-GB), HVCN1 inhibitor. The inhibition of 2-Cys PRDXs with conoidin A, their re-activation with auranofin (inhibits thioredoxin reductase), or PRDX6 iPLA2 activity partially prevented capacitation-associated tyrosine phosphorylation. Only ezatostat and ethacrylic acid (inhibitors of PRDX6 peroxidase activity) prevented completely this phosphorylation. Human and mouse spermatozoa capacitated in the presence of MJ33 or 2-GB, did not increase pHi compared to untreated capacitated controls (ANOVA and Tukey test, p<0.05, n=3). Phospho-PRDX6 levels transiently increased at the beginning of capacitation. We confirmed the capacitation-associated increase in pHi depends on HVCN1 in mouse and human spermatozoa. We concluded that PRDX6, through its peroxidase and iPLA2 activities regulates capacitation in mouse and human spermatozoa.

Poster #86
ASSOCIATION OF SPERM DNA METHYLATION (DNA-Me) WITH LOWER BLASTOCYST YIELD IN A SHARED EGG DONATION MODEL
John Jain MD1, Zoe Daily BS1, Jing Chen PhD1, Danielle Albini MS1 and Keith Booher PhD2
1Santa Monica Fertility; 2Zymo Research Corporation
Presented By: John Jain, MD

Introduction: A growing body of evidence indicates that the sperm epigenome can be influenced by a variety of somatic, lifestyle and environmental factors. Most sperm epigenetic studies have used infertile couples or single egg donors as egg sources fail to eliminate the possibility of egg factor bias. A shared egg donation model allows an isolated look at sperm epigenetic function by eliminating egg factor bias.

Objective: To determine the association of sperm DNA-Methylation (DNA-Me) and blastocyst yield using a shared egg donation model. Methods: Semen from 32 consecutive men using shared egg donation was obtained following informed consent. Specimens representing the lowest quartile (8) and highest quartile (8) of viable blastocyst yield were used for this study. Sperm DNA was bisulfite converted to generate whole genome bisulfite sequencing libraries and sequenced using the Methly- Maxi-iSeq® platform (Zymo Research Corp.). Libraries were sequenced using an Illumina HiSeq (PE 150 bp) to an average of 435 million reads per sample. The resulting fastq files were aligned using Bismark BowTie2. Methylation values were obtained using MethylDackel software. The BSmooth method was used to identify Differentially Methylated Regions (DMRs). Gene enrichment pathway analysis was performed using the Metascape Resource Program in custom analysis mode using all Pathway databases.

Results: There were no differences in median age (40 yrs vs 43 yrs) or median TMC (77M vs 63M) in the low vs high groups. The median percent of viable blastocysts (26% vs 77%) and mean percent live birth rates (25% vs 100%) were statistically significantly different between the low vs high groups (P<0.05). After removing lower input DNA samples, a total of 399 DMRs were found between the low vs high groups. 182 (45.6%) were found to lie within intergenic areas of the genome. The remaining DMRs were within generic features including 152 introns (38.1%), 26 exons (6.5%), 20 gene promoters (5%), and 19 (4.7%) located at the 3’-end of genes. Functional Biological Pathway Analysis revealed the most differentially methylated regions to be enriched for gene pathways associated with cell adhesion via the plasma membrane (GO:0007156), the inflammatory response (GO:0002532), or various developmental pathways.

Conclusion: The results of this study suggest that sperm DNA-Me patterns may affect blastocyst yield and subsequent live birth rates.

Funding: This work was supported by Life Research Group Inc.

Poster #87
HUMAN EPIDIDYMAL TRANSCRIPTOME REVEALS LIMITED DIFFERENTIAL GENE EXPRESSION
Christine Legare MSc and Robert Sullivan PhD
Laval University
Presented By: Christine Legare, MSc

During their transit through the epididymis, spermatozoa undergo many biochemical modifications necessary to acquire flagellar motility and fertilizing ability. Gene expression patterns along the epididymis are established and maintained by specific transcription factor networks that coordinate region-specific functions. Based on anatomical consideration epididymis are classically divided into 3 segments: caput, corpus, and cauda. In humans, there are no clear anatomical criteria to dissect the epididymis in a reproducible manner. In order to determine to which extent gene expression is segmented along the human epididymis, transcriptome profile were performed on 8 distinct epididymal regions on 3 donors. Microarray analysis was performing on Gene chip Human Clariom S (Affymetrix®) representing 337,100 transcriptional variants encoded by 20,800 genes. Proximal sections corresponding to segments 1 to 3 were clearly distinguishable from the distal segment of the epididymis (4 to 8) by an unsupervised Principal Component Analysis. To compare gene expression between the epididymal segments, transcripts with a differential expression of at least a 2-fold change and a FDR of less of 0.05 were clustered in relation to their intensity profiles. We denoted no differential gene expression (DEG) between segments 1 to 3 corresponding to the efferent ducts region. We identified up to 1140 DEG between different ducts (1 to 3) and the epididymis (4 to 8), 400 between caput (4 to 6) vs corpus/cauda (7-8) and none between corpus (7) and cauda (8). Genes with differential expression were grouped according to Gene Ontology annotation. The analysis revealed that up-regulated DEG in the efferent ducts (1 to 3) were predominantly related to cilium
ABSTRACTS

assembly/movement and cell differentiation. The biological process term of fertilization, defense and immune responses were associated to caput epididymis (4 to 6) while spermatogenesis and protein binding are important all along the epididymis (4 to 8). In conclusion, the proximal human epididymis is exclusively occupied by efferent ducts and has a distinct gene expression profile compared to the epididymal tubule regions. Moreover, gene expression profiling revealed two regions in the human epididymis: the caput and the distal corpus/cauda region. Taken together, assessment of genome-wide transcriptional regulation demonstrates that human epididymis is unique and clearly distinct from other species. Supported by CIHR grant to RS.

Poster #88
COMPARISON OF LUTEINIZING HORMONE AND ANDROGEN ON THE DEVELOPMENT OF RAT IMMATURE LEYDIG CELLS
Qi Qi Zhu MS, Xiaoheng Li MS, Yiyan Wang PhD, Guimin Wang PhD and Renshan Ge MD
The Second Affiliated Hospital and Yuying Children’s Hospital, Wenzhou Medical University
Presented By: Qi Qi Zhu

Background: The transition of immature into adult Leydig cells is the last step of maturation. However, the regulation of this process is far from clearness. Previous studies indicate that both luteinizing hormone (LH) and androgen are involved in this process of maturation. Here, we report the common and uncommon pathways of LH and androgen in the regulation of this maturational process.

Methods: Immature Leydig cells were purified from thirty-five-day-old male Sprague Dawley rats and cultured with either LH (1ng/ml) or androgen (7α-methyl-19-nortestosterone, MENT, 100 μM) for 2 days. Because immature Leydig cells have higher level of steroid 5α-reductase 1, a synthetic androgen MENT that is resistant to this enzyme catalysis was used.

Results: LH or MENT treatment significantly increased androgen production by rat immature Leydig cells. Microarray and qPCR as well as enzyme assays showed that LH up-regulated the expression levels of Scarb1, Cyp11a1, Cyp17a1, and Srd5a1 while it down-regulated Sult2a1 and Akr1c14 levels. In contrast, the Cyp17a1 level was up-regulated by MENT. LH and MENT acted via different sets of transcription factors to regulate Leydig cell development in the immature stage.

Conclusion: We conclude that LH and androgen are involved in the regulation of development of rat immature Leydig cells via different transcriptional pathways. Funding: NSFC (81730042 and 81601266), Health & Family Planning Commission of Zhejiang Province (2018KY130), and Wenzhou Science & Technology Bureau (ZS2017009 and Y20150111). Keywords: Luteinizing hormone, testosterone, development, immature Leydig cells

Poster #89
MULTIPLE PROTEIN DISULFIDE ISOMERASES IN THE EPIDIDYMIS: NOVEL ROLES IN AN ANDROGEN DEPENDENT TISSUE?
Samuel G. Fernandes Trainee¹, Adam M. Benham PhD² and Maria Christina W. Avellar PhD³
¹Department of Pharmacology, Universidade Federal de Sao Paulo - Escola Paulista de Medicina; ²Department of Biosciences, Durham University
Presented By: Samuel Guillerme Fernandes, Ms

Introduction and Aim: Protein disulfide isomerase (PDI) family is a member of the thioredoxin superfamily of redox proteins. There are at least 21 genes encoding PDIs that vary in amino acid sequence, domain composition, tissue expression and cellular processing; PDIs catalyze thiol-disulfide exchange reactions within secretory or membrane proteins/peptides to assist in their folding and function. Their vital roles as folding catalyst for secretory pathway proteins associate them with the pathogenesis of several diseases, including inflammatory conditions. Drawing from in vivo Wistar rat experimental models, herein we investigated the expression profile of a subset of Pdi genes in the developing epididymis. Their gene expression modulation by androgens, testicular factors and epididymal acute inflammatory condition was also evaluated.

Methods/Results: RT-qPCR revealed the presence of 20 Pdi mRNAs in adult caput epididymis (90-days old). A subset of these tested epididymal Pdi (P4hb, Pdia3, Pdia5, Pdia6, Pdilt, Erp29) was differentially expressed during postnatal development (1-, 5-, 10- and 20-days old; whole epididymis), and in epididymis from sexually immature (40-) and adult (120-days old) rats. Differential modulation of these transcripts in caput epididymis was further explored by disruption in adult rats (120-days) of androgens/androgen receptor signaling by castration (7- and 15-days castration, followed or not by testosterone replacement treatment) and by efferent duct ligation (EDL, 15 days). The data revealed that at least transcripts such as Pdi3, Txndc5, Pdia6, Erp29 and Pdia5 displayed positive dependence on androgens. Pdi mRNA constitutive expression was also detected in the rat Wolffian duct (epididymal precursor) at embryonic ages e17.5 and e20.5 when epididymal morphogenesis occurs. In contrast to Erp29 mRNA levels, that were similar in e17.5 and e20.5 WDs, an increase in P4hb, Pdia3, Pdia5 and Pdia6 mRNA levels was observed when e17.5 and e20.5 WDs were compared. RT-qPCR also revealed similar expression levels of epididymal Pdi mRNAs in the cauda region of rats submitted to an acute epididymitis caused by retrograde intravasal injection of lipopolysacharide from E. Coli (25 μg/injection, 6 h and 24 h) when compared to control tissues (saline).

Conclusions: Our data point out PDIs as novel players in the developing and adult epididymis.

Financial support: CNPq, SPRINT/FAPESP, FAPESP, Brazil. Ethics Committee Approval: CEUA#5908210916.

Poster #90
UNUSUAL EFFECTS OF VARICOCELECTOMY BY MARMAR: TREATMENT VENOUS HYPERAEMIA OF PROSTATE, CHRONIC PROSTATITIS AND SECONDARY PREMATURE EJACULATION
Oleksandr Knigavko MD,PhD, AProfessor¹, Andriy Arkatov MD,PhD, AProfessor¹ and Iryna Slepynina Beć²
¹Kharkiv National medical University; ²Kharkiv Clinical Center of Urology and Nephrology
Presented By: Oleksandr Knigavko, MD, PhD

Varicocele is very often pathology for young men (up to 20%) which traditionally suggested can due to male infertility. Premature ejaculation (PE) - other common disease, which according to different authors suffers from 25 to 40% of men, mostly young. It’s noted (ISSM congress, Lisbon, 2018) that operation varicocelectomy improves intravaginal ejaculatory latent time (IELT) in men with both pathologies but reason of it hasn’t disclosed yet. We suggested that varicocele (especially bilateral) goes to venous hyperaemia of prostate and chronic congestive prostatitis which can be reason of secondary premature ejaculation and decided to check it with this investigation. Materials and methods: In 2007-2018 in the andrological department of Kharkiv Clinical Center of Urology and Nephrology 1073 patients with premature ejaculation were examined. In this investigation, the results of diagnosis and treatment of 289 patients with secondary PE and varicocele I-III grade were evaluated. The patients to be divided into 2 groups: Group 1 - 136 patients with diagnosed chronic prostatitis (CP), who underwent antibacterial treatment of prostatitis according to the sensitivity of the isolated infectious agents; Group 2 consisted of 153 patients with CP and the presence of varicocele, which, in addition to antibiotic therapy, were underwent varicocelectomy - Marmara surgery; Results: After 1 and 7 months, the effectiveness of the treatment was determined by the lengthening of the intravaginal
ejaculatory latent time (IELT), the satisfaction of sexual intercourse on the Rosen scale, the number of patients satisfied with the results of treatment. In group 1, the duration of IELT increased by 1.85 times, and in the 2nd group, high eradication rate was noted – 86.9%, almost complete absence of complaints and high efficiency with respect to the SPE - 79.7%, increase in IELT - by 2.54 times. Conclusions: 1. Varicocele (especially bilateral) is a comorbid factor of CP, causing venous hyperaemia of the prostate, and may be one of the causes of SPE. 2. Operation Marmar reduces venous hyperaemia of the prostate, reduces the score of IPSS, improves IELT in patients with comorbid pathology (varicocele + CP) and can be recommended for patients with secondary PE and varicocele.

Poster #91
WNT4 PLAYS A CRITICAL ROLE IN REGULATING TESTICULAR DESCENT
Abhishek Seth MD, Juan Bourmat PhD, Joshua Moore BS, Armando Rivera PhD and Carolina Jorgez PhD
Baylor College of Medicine
Presented By: Carolina Jorgez, PhD

Introduction: Undescended testis (UDT) is the most common urological birth defect affecting 6% of male births. Despite successful surgical correction, approximately 13% of unilateral UDT males experience infertility. The WNT signaling pathway plays an important role in genitourinary development. WNT4 had been previously associated with the role in testicular decent.

Methods: A Wnt4 gubernaculum specific knock-out mouse was created by crossing Retinoic Acid Receptor β2-cre mice to Wnt4-flox mice to generate Wnt4+/-cre+ (Wnt4-cKO) male. Detailed phenotypic analyses of Wnt4-cKO was conducted. Fertility was determined by 6 month paired mating of a Wnt4-cKO male to a wild type (WT) female.

Results: All Wnt4-cKO mice (n=12) present with smaller left unilateral UDT with equal number of mice having inguinal vs. abdominal. The abdominal UDT have a Sertoli cell only phenotype. The inguinal UDT have a combination of normal and abnormal seminiferous tubules (ST). The normal ST had an increase in vacuolization, and fewer and mislocalized germ cells. Half of the mice with inguinal UDT have no sperm in the left epididymis, and the ones with sperm have 33% fewer sperm (p=0.01) with a 96% decrease in motility (p=0.0001) than WT mice. The ST of the descended right testis seems normal and the sperm count, and motility is not different than WT mice. The left gubernaculum of Wnt4-cKO is longer and thinner with increased collagen and reduced muscle content (trichrome staining) compared to the right contralateral descended one. Fertility studies in 8 (5 with abdominal and 3 with inguinal UDT) Wnt4-cKO mice indicate variable fertility with one mice being infertile (abdominal UDT) and one (inguinal UDT) having the same number of litters than the WT, but half of the pups. Overall the fertility of Wnt4-cKO male was reduced since they produced 23 litters and 88 pups in the same time than 8 WT mice produced 48 litter and 395 pups. Wnt4-cKO mice are sub-fertile when compared to WT mice with a significant decrease in numbers of pups and litters.

Conclusion: Conditional loss of Wnt4 in the gubernaculum leads to unilateral UDT. Although these mice have a normal descended testis, they still have fertility defects. This model could lead to a better understanding of the why males with early surgical intervention for unilateral UDT may still suffer fertility issues.

Poster #92
IMPACTS OF COOLING AND CRYOPRESERVATION ON HUMAN SPERM CAPACITATION, AS MEASURED BY CAP-SCORE™
G. Charles Ostermeier¹, Cristina Cardona¹, Melissa Moody¹, Alana Simpson¹, Romeo Mendoza² and Alex Travis²
¹Androvia LifeSciences; ²Androvia LifeSciences Cornell University
Presented By: G. Charles Ostermeier, II, PhD

Introduction: Studies with fresh human sperm have shown that GM1 localization patterns (Cap-Score™) quantify capacitation status. Using an outcome of clinical pregnancy, Cap-Score prospectively predicted a man’s fertility and determined his probability of generating a pregnancy. Here, we evaluate the impacts of cooling and cryopreservation/thawing on capacitation using Cap-Score.

Methods: Semen was collected, liquefied and split into control and experimental treatments. Control samples were processed normally for Cap-Score. For the cooling experiments, samples were extended in TEST Yolk Buffer (TYB) and cooled overnight in a Styrofoam box with a cold pack (n=5). For the cryopreservation experiments, samples were frozen in TYB with glycerol (Cryo; n=10). After storage in LN2, the samples were thawed at 37°C for 3 min, mixed and then placed back into the water bath for another 3 min. Post-treatment, samples were washed, exposed to non-capacitating (NC) or capacitating (CAP) conditions, incubated for 3 hrs and then Cap-Score was determined after an overnight fix.

Results: An increase was observed in the control CAP when compared to the control NC treatment in the cooling experiment (40±4 vs 24±4%; p<0.01). There was no difference between the control CAP and the experimental CAP with cooled sperm (40±4 vs 40±2; p=0.87). In the cryopreservation experiment, an increase was again seen in the control CAP over the control NC (33±3 vs 19±2; p<0.01). Cap-Score was unchanged for Cryo CAP when compared to control CAP (34±1% vs 33±3%; p=0.75). No difference was observed between the Cryo NC and Cryo CAP (33±3 vs 34±1; p=0.82). The Cryo NC was greater than the control NC (33±2 vs 19±2%; p<0.01).

Conclusion: Despite exposure to TYB or TYB with glycerol, the Cap-Score male fertility assay could still be performed. Semen extension in TYB and overnight maintenance at reduced temperature had no detectable impact on Cap-Score. In contrast, cryopreservation/thawing in TYB with glycerol induced capacitation-like membrane changes in sperm incubated under non-capacitating conditions, supporting reports in the literature of the “cryocapacitation” phenomenon. However, no differences were observed in Cap-Score between fresh sperm or sperm after freezing/thawing and then incubation with stimuli for capacitation. Identification of impacts on capacitation could optimize protocols intended to preserve male fertility as well as improve IUI and IVF outcomes. Support: Androvia LifeSciences

Poster #93
DIRECT AND SPECIFIC INTERACTION BETWEEN THE MITOXANTHROI TRANSLATOR PROTEIN (TSPO) AND CHOLESTEROL USING CLICKABLE PHOTOREACTIVE CHOLESTEROL ANALOGUE
Elias Georges PhD¹, Chantal Sottas BA², Yuchang Li PhD² and Vassilios Papadopoulos DPharm, PhD²
¹Institute of Parasitology, McGill University, Quebec, Canada; ²Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy, University of Southern California, Los Angeles, California 90089
Presented By: Elias Georges, PhD

The mitochondrial translocator protein (TSPO) is a five helix transmembrane protein localized to the outer mitochondria membrane. Radioligand binding assays and chemical crosslinking identified TSPO as a high affinity cholesterol binding protein. In this function TSPO may serve as a place to segregate free cholesterol from structural membrane
cholesterol to be subsequently used for various mitochondrial and cell functions. Such functions include steroid and neurosteroid formation, which is initiated in mitochondria upon import of intracellular free cholesterol into inner mitochondrial membrane where it is converted to pregnenolone by CYP11A1, cell proliferation, where cholesterol is needed for mitochondria proliferation, as well as mitochondrial and cell protection for excess intracellular free cholesterol. Although the precise molecular mechanism of TSPO import of free cholesterol is not presently clear, TSPO encodes a cholesterol recognition/interaction amino acid consensus (CRAC) motif at its C-terminus (residues 147 – 159) and has been shown to bind with high affinity to cholesterol. High resolution NMR structure of TSPO suggests that cholesterol-TSPO interaction maybe near the upper leaflet of the outer mitochondria membrane that can act as an acceptor site for the subsequent import of cholesterol. In this report, it was of interest to determine if TSPO interacts directly and competitively with cholesterol in purified mitochondria fractions from MA-10 mouse tumor Leydig cells. Using a clickable photoreactive cholesterol analogue, with a diazirine group at the 6th position of the steroid core and an alkyne moiety attached to the side-chain tail of cholesterol, we show a saturatable photoaffinity labeling of an 18-kDa polypeptide (TSPO) that is specifically immunoprecipitated with an affinity purified TSPO-specific polyclonal antibody developed against a peptide of the N-terminus of the protein, following a click reaction with TAMRA-azide. Moreover, the photoaffinity labeling of TSPO was inhibited with molar excess of cholesterol, suggesting that TSPO interaction with clickable photoreactive cholesterol occurs at physiologically relevant site(s) in the protein. Work is ongoing to further characterize TSPO-cholesterol interaction.

**Poster #94**

INVESTIGATION OF MALE REPRODUCTIVE TOXICITY EXERTED BY AGROCHEMICALS ISOLATED OR IN MIXTURE: PRELIMINARY EVIDENCE OF TESTICULAR TOXICITY

Juliana Perobelli PhD, Mariana Simões-Garcia Master student, Deborah Cavalcante Master student, Maria Luiza Aranha BS and Ana Priscila Gomes-Silva PhD student

UNIFESP

Presented By: Juliana Perobelli, PhD

Agrochemicals are the most widely used synthetic chemicals in the world, contaminating food, soil and water. Consequently, the entire population is environmentally exposed to complex mixtures of these toxics. The present study investigated whether pre-pubertal exposure of male rats to Acephate, Carbendazim and Mancozeb, isolated or in combination, impairs histopathological organization of testes and epididymis. These agrochemicals were chosen based on Brazilian National Sanitary Surveillance Agency’s pesticide residue monitoring program, which reported these three agrochemicals as the most found in food samples cultivated in Brazil. Male Wistar rats were distributed into 5 experimental groups: control (n=7), received only the vehicle corn oil; mixture (n=10), received acephate, carbendazim and mancozeb in combination at 23.6mg/Kg, 50mg/Kg and 50mg/Kg, respectively; acephate group (n=9) at 23.6 mg/kg; carbendazim group (n=8) at 50mg/Kg; mancozeb group (n=8) at 50mg/Kg. The treatment was given orally by gavage from postnatal day (PND) 23 to 53. Body weight gain and food/water intake throughout treatment period were similar among experimental groups, showing that systemic toxicity was not induced by agrochemicals in these experimental conditions. On PND53, rats were euthanized for organs collection. Reproductive organs wet weight was reduced only by agrochemicals isolated. Moreover, isolated agrochemical exerted testicular toxicity, provoking vacuolization and degeneration of the seminiferous epithelium (acephate and carbendazim groups in comparison to control), and reducing epithelium height (acephate and mancozeb groups in comparison to control), without change Sertoli cells number. In epididymis, animals exposed to agrochemicals (isolated or in mixture) showed portions of the duct without spermatozoa in the lumen, mainly in the caput epididymis, and presence of cribiform epithelium in cauda epididymis. The obtained results show that the agrochemicals were able to provoke damages to reproductive tissues, suggesting a disruption on spermatogenetic process, which will be deeper investigated in next steps of the study. Interestingly, the mixture of agrochemicals had no additive adverse effect on the parameters evaluated, often being less damaging than the isolated agrochemicals. Further studies are being developed to better understand physiological and molecular aspects of toxicity of the chemicals used in the present study.

**Poster #95**

EVALUATION OF ACROSOME- AND TAIL-SPECIFIC PROTEINS ACRV1 AND AKAP4 AS BIOMARKERS FOR SPERM SELECTION: A POTENTIAL NOVEL METHODOLOGY TO SELECT RARE AND BEST QUALITY SPERM

junyan zhang Msc¹, Andrei Drabovich PhD², Keith Jarvi MD¹, Andrée Fisher PhD³, Sergey Moskovtsev MD, PhD¹ and Clifford Librach MD¹

1CreAte Fertility Centre; 2University of Alberta; 3Murray Koffler Urogynecology Centre

Presented By: Junyan Zhang, MSc.

**Introduction:** ACRV1 (acrosomal protein SP-10) is a testis-specific protein localized to the acrosomal vesicle during spermatogenesis. It is associated with the acrosomal membrane and matrix of mature sperm, and may be involved in sperm-zona pellucida binding. AKAP4 (A-kinase anchor protein 4) is a major component of the sperm fibrous sheath. It may be involved in sperm motility and integrity of flagellum structure. This study was designed to demonstrate the potential of these proteins as biomarkers of spermatogenesis, tools to evaluate sperm integrity and targets to select sperm for ART. We also hypothesized that reduced expression of ACRV1 and AKAP4 proteins would result in poor sperm quality, due to lower motility and acrosome integrity, thus having a negative impact on successful reproduction.

**Materials and Methods:** Institutional REB approval was obtained. Semen samples from 2010 WHO sperm reference values (n=20) were collected from patients undergoing semen analysis at CreAte Fertility Centre. Motile spermatozoa (n=5) were isolated by density gradient centrifugation. Testicular sperm was isolated from orchietomy samples consent and collected at Mount Sinai Hospital. Spermatozoa (100 cells/slides) were fixed and mounted to microscope slides for immunofluorescence staining. Both semen and motile sperm fractions were tested by flow cytometry using commercial monoclonal ACRV1 (mouse) and AKAP4 (rabbit) primary antibodies, and corresponding 2nd antibodies with Alexa Fluor 488 and 594. Data analysis was performed using FlowJo 10 software. Cell pellets obtained from semen of asthenozoospermic and oligospermic patients (n=5) were analyzed by ImageStream imaging flow cytometry. Image analysis was performed with Ideal 10 software.

**Results:** Specific expression and localization of ACRV1 and AKAP4 proteins to the acrosome and sperm flagellum was confirmed by immunofluorescence microscopy in testicular and mature spermatozoa. Flow cytometry analysis revealed that greater than 80% of motile spermatozoa and a greater than 50% of spermatozoa in whole semen ejaculate express both proteins. ImageStream analysis resulted in identification of few rare spermatozoa in the semen pellet of asthenozoospermic patients.

**Conclusions:** Analysis of ACRV1 and AKAP4 proteins may facilitate non-invasive diagnosis of non-obstructive azoospermia, evaluation of spermatozoa and acrosome integrity and selection of rare sperm for assisted reproduction.
ABSTRACTS

Poster #96
COLLAGENASE CLOSTRIDIUM HISTOLYTICUM (CCH) MAY HAVE PRO-ERECTILE EFFECTS ON ISOLATED HUMAN CORPUS CAVERNOSUM
Laith Alzweri, Sudha Talwar, Suresh Sikka, Omer Raheem, Asim Abdel-Mageed and Wayne Hellstrom
Presented By: Laith Alzweri, MD, MRCS, FESCM

Introduction: Collagenase clostridium histolyticum [CCH, Xiaflex® (Endo Pharmaceuticals, Inc., Malvern, PA, USA)] is an effective and safe intravesical therapy for Peyronie’s disease (PD). Previous studies showed negligible effects of CCH on penile vascular parameters in PD patients who completed four rounds of CCH when compared to baseline. Although PD is strongly associated with erectile dysfunction, there are no studies related to the understanding of such effects of CCH on human corpus cavernosum (HCC) smooth muscle function. Objective: To explore the effects of different concentrations of CCH on nitric oxide (NO)-dependent and -independent nitric relaxations of HCC in organ bath studies in order to understand if CCH can improve HCC relaxation.

Methods: HCC samples were obtained from men undergoing penile prosthesis implantation (n = 10). After phenylephrine (Phe) contraction, electrical field stimulation (EFS), and acetylcholine (ACh)-induced relaxation at [0.23 and 0.9 mg] CCH incubations of HCC strips were performed using organ bath preparations. HCC measurements of endothelial NO synthase (eNOS), neuronal (nNOS), and vascular endothelial growth factor were evaluated through immunostaining and Western blotting.

Results: Various doses of CCH did not reduce the maximal contractile response of Phe and relaxant response to EFS (20Hz) in HCC did not increase after incubation with CCH. Pre-incubation with CCH significantly reduced contractile tension evoked by EFS (80 Hz) by 37.5%, and increased ACh-induced relaxation (10-3M) five-fold at 0.23 and 0.9 mg.

Conclusions: CCH may have a potential relaxant effect on HCC, which may be attributed to blocking of sympathetic adrenergic receptors resulting in reduced EFS-induced contraction (80Hz) and enhancing parasympathetic cholinergic response. Relaxation response to CCH may be secondary to enzymatic degradation of extra cellular matrix, and likely to be NO-cGMP dependent. Although incubating HCC with 0.9 mg CCH may have in vitro pro-erectile effects, this was not shown in a clinical setting using 0.58 mg. This adds to CCH safety profile, and more studies are required to examine potential CCH pro-erectile effects in vivo.

Poster #97
ETHNIC DIFFERENCES IN MALE FERTILITY PARAMETERS IN 3,915 MEN EXAMINED FOR INFERTILITY IN A SINGLE CENTER
Ryan Flannigan MD,1 Anna Mielenk MSc,2 Alex Bolyakov MSc2, Brian D. Robinson MD,3 Francesca Khani MD,3 Jennifer Grenier PhD3, Peter N. Schgel MD2, John Schimenti PhD2, Andrew Grimson PhD3 and Darius Paduch MD PhD2
1Weill Cornell Medicine & University of British Columbia; 2Weill Cornell Medicine; 3Cornell University
Presented By: Ryan Flannigan, MD

Introduction: Spermatogenesis involves intricate temporal and spatial expression and translation of genes critical to germ cell division and differentiation. MicroRNAs (miRNAs) have been shown to have a critical role in translational regulation in normal processes such as spermatogenesis, as well as in disease. We aimed to investigate the inter-regulatory role of miRNAs and RNAs in the regulation of normal spermatogenesis and aberrant expression in non-obstructive azoospermia (NOA).

Methodology: We used testis tissue from 44 men with NOA, and 10 men with normal spermatogenesis. Tissue was sub-classified into NOA histopathologic subgroups by 2 GU pathologists. NextGen RNAseq was performed and data was processed using multiple platforms to test the performance of different algorithms in processing miRNA and mRNA. Furthermore, miRNA;3’UTR mRNA interactions were computationally predicted utilizing both linear and non-linear algorithms coupled with neural network machine learning. MicroRNAs of biological interest were selected and further quantitated, localized and validated using Northern Blot, and in situ hybridization (ISH). MicroRNA; 3’UTR interactions were evaluated using luciferase reporter assays.

Results: 2576 miRNAs were mapped to the transcriptome. The top 25 most expressed miRNAs are similarly expressed among histologic subgroups. Chromosomes 19 and X have the highest ratios of tests
specific miRNA as compared to non-testis specific miRNAs, with ratios of 5.5x times and 2.8x respectively. Comparing miRNA expression from SCO to normal testes, 20 miRNAs demonstrated significantly lower expression, and 19 miRNAs demonstrated increased expression. Among miRNAs that had lower expression, miR34c-5p and miR449c-5p were among those identified which were subsequently localized to spermatocytes among normal testes on ISH, but demonstrated decreased staining among NOA subtypes. Expression of miR-539c-5p was greater in SCO compared to normal controls, and was localized to Sertoli cells.

Conclusion: MiRNAs in human testis exhibit highly reproducible, cell specific, multi-level regulators of key biological processes. In spermatogonial stem cells, miRNAs regulate renewal and entry of differentiating cells; in spermatocytes, they block de-differentiation and return to SSCs; and in somatic cells, such as Sertoli cells, miRNAs protect Sertoli cells from high levels of proliferating growth factors to sustain the non-dividing state characteristic of Sertoli cells.

Poster #99
THE IMPACT OF CHANGES IN MALARIA CONTROL STRATEGIES IN SOUTH AFRICA ON DDT EXP EXPOSURE AND SEMINAL PARAMETERS

Christian de Jager PhD1, Sean Patrick PhD2, Tanita Cronje MSc2 and Natalie Aneck-Hahn DTech3,4
1University of Pretoria Institute for Sustainable Malaria Control and MRC Collaborating Centre for Malaria Research, School of Health Systems and Public Health (SHSPH), University of Pretoria, Pretoria, South Africa; 2Department of Statistics, University of Pretoria; 3University of Pretoria Institute for Sustainable Malaria Control and MRC Collaborating Centre for Malaria Research, School of Health Systems and Public Health (SHSPH); 4Department of Urology, University of Pretoria, Pretoria, South Africa
Presented By: Christiaan de Jager, PhD

Introduction: Exposure to complex mixtures of endocrine disrupting chemicals (EDCs) are associated with adverse male reproductive health. In malaria-endemic areas, traditional huts are sprayed with 1,1,1-trichloro-2,2-bis(chlorodiphenyl)ethane (DDT) while modern structures are sprayed with pyrethroid insecticides. DDT has estrogenic properties, and its metabolite DDE is a potent anti-androgen. With modernization of housing and DDT spraying, such as in the study, investigated the effect of lower DDT levels and seminal parameters of men from DDT-exposed and non-exposed villages.

Methods: In a cross-sectional study conducted between 2012-2017, 431 young males, aged 18-40 (24±4) years were recruited from six villages (three DDT-exposed – n=236; three non-DDT exposed - n=195) in a malaria endemic area in Limpopo Province, South Africa where DDT is used in indoor residual spraying. Exposure levels of DDT and metabolites were measured in blood plasma and a semen analysis conducted according to WHO standards. Linear regression models were examined to evaluate DDT/DDE effects on different reproductive outcomes. Seminal parameters were used as continuous variables in regression analysis and the dichotomised (dibeta) statistic was determined.

Results and Discussion: Mean p,p’-DDT exposure levels in the 2012-2017 period were 0.92 µg/g (range 0.01 – 3.05) in the non-sprayed village and 0.92 ug/g (range 0.11 – 14.98) in the sprayed villages. In sprayed villages p,p’-DDE exposure levels were significantly lower from 216.9±210.6 µg/g (mean±SD) during 2003–2008 to 5.88±6.6 µg/g during 2012–2017 (P < 0.001). Men in the 2012-2017 group with p,p’-DDE levels between 0.26 and 2.25 µg/g were 2.6 times more likely to present with oligospermia than men with either lower or higher p,p’-DDE levels (P<0.030). No significant differences were seen in the sperm concentration and motility. Linear regression models indicated mean sperm head defects (□ = 0.01, P = 0.05) and tail defects were higher with increasing p,p’-DDT (□ = 0.25, P < 0.01) and p,p’-DDE (□ = 0.25, P = 0.001) exposure levels. Similar to findings in 2003-2008, current results point to weak associations between p,p’-DDE plasma concentrations and sperm chromatin defects (%DFI) in the participants from sprayed villages (P < 0.010). In addition to DDT exposure, the role of complex environmental chemical mixtures should be investigated as health implications may include effects on the epigenome and metabolome.
ABSTRACTS

of the following regimen: 2 weeks of 20 mg daily followed by 2 weeks of 10 mg daily. This was repeated at the discretion of the provider. Statistical calculations were done using student's t-test or chi-square where appropriate.

Results: A total of 89 patients who received post-reversal steroids were identified out of 368 cases (24.1%). Of these patients, 24 were azoospermic at the time of prednisone use. The mean patient age was 40.2 (SD 6.2), partner age was 33.0 (SD 4.6) and obstructive interval after vasectomy was 8.1 years (SD 5.6). See table 1 for summary of results. Prednisone was started 6.15 months post op (SD 4.7), and SAs were checked 1.29 months (SD 1.85) after stopping the steroid. One patient noted mild adrenal insufficiency, which resolved with an additional burst and taper.

Conclusions: Our results suggest a possible benefit to using prednisone in cases of suspected scarring or inflammation after VR. However, the benefit may be more robust in patients who are patent at the time of initiating the steroid, especially in men who had at least unilateral EV performed. It is possible that these improvements would have occurred regardless with increased time post op. Further well designed studies are required to conclusively determine if the increased sperm parameters were due to the anti-inflammatory properties of the prednisone.

Results:

- A total of 89 patients who received post-reversal steroids were identified out of 368 cases (24.1%).
- Of these patients, 24 were azoospermic at the time of prednisone use.
- The mean patient age was 40.2 (SD 6.2), partner age was 33.0 (SD 4.6), and obstructive interval after vasectomy was 8.1 years (SD 5.6).
- See table 1 for summary of results.
- Prednisone was started 6.15 months post-op (SD 4.7), and SAs were checked 1.29 months (SD 1.85) after stopping the steroid. One patient noted mild adrenal insufficiency, which resolved with an additional burst and taper.

Conclusions: Our results suggest a possible benefit to using prednisone in cases of suspected scarring or inflammation after VR. However, the benefit may be more robust in patients who are patent at the time of initiating the steroid, especially in men who had at least unilateral EV performed. It is possible that these improvements would have occurred regardless with increased time post op. Further well designed studies are required to conclusively determine if the increased sperm parameters were due to the anti-inflammatory properties of the prednisone.

Poster #104

**EFFECT OF AQUEOUS CARICA PAPAYA SEED EXTRACT ON LEYDIG AND SERTOLI CELLS**

Ralf Henkel BEd, PhD¹, Vahid Ghaffarilaleh PhD², Ashok Agarwal PhD³ and David Fisher PhD⁴

¹Department of the Western Cape, University of the Western Cape; ²Department of Medical Biosciences, University of the Western Cape; ³American Center for Reproductive Medicine, Cleveland Clinic

Presented By: Ralf Henkel, PhD

**Introduction and Objectives:** Carica papaya is the third most popular tropical crop in the world and mainly cultivated in Brazil, India, and Mexico. Among other indications, its seeds are used as a male contraceptive. Therefore, this study investigated the effects of an aqueous papaya seed extract on TM3-Leydig and TM4-Sertoli cells.

**Materials and Methods:** Five grams of C. papaya seeds in powder form were extracted with 200 mL of distilled water for 72 hours at 70°C. Thereafter, the extract was filtered, frozen at -20°C and freeze-dried. TM3 and TM4 cells, respectively, were incubated with extract concentrations (0, 0.025, 0.25, 2.5, 25, 250, and 2500 µg/mL) in Dulbecco’s Modified Eagle medium supplemented with 5% FBS and 2.5% horse serum. In the first experiment, cells were seeded in two sets of 24-well plates for 24 hours then both sets of cells were exposed to the aqueous C. papaya seed extract for 48 hours. Thereafter, the media in one set of cells was replaced with fresh media, while the other set of cells was exposed for a further 48 hours. In the second experiment, two sets of TM3 or TM4 cells were exposed for 72 hours in 24-well plates under chronic exposure. After 72 hours one of the sets was monitored, while the other set was continued with fresh media for further 72 hours. In the third experiment, cells were exposed for 24, 48, 72 and 96 hours and subsequently fresh media was replaced for 72, 48, 24 and zero hours, respectively. Cell proliferation and viability were determined. For TM3 cells, reactive oxygen species (ROS) and nitric oxide (NO) and for TM4 cells DNA-fragmentation and ROS were measured.

**Results:**

- The results from experiment 1 showed cell proliferation and viability for both cell lines was suppressed (P<0.0001) in a dose-dependent manner, while cells exposed for 48 hours only, recovered to the control levels after the replacement with fresh media (P=0.0001).
- Results from experiment 2 showed that cell proliferation and viability were suppressed relative to controls after exposure of C. papaya for 72 hours and after adding fresh media for further 72 hours (P<0.05).
- Results from experiment 3 showed that DNA-fragmentation increased significantly (P<0.05) in a dose and time dependently manner.

**Conclusion:** Aqueous C. papaya affects the tested parameters in a dose- and time-dependent manner, thus indicating the possibility of reversible contraceptive action.

**Poster #105**

**A SYSTEMATIC EVALUATION OF YOUTUBE AS AN INFORMATION SOURCE FOR MALE INFERTILITY**

Adithya Balasubramanian BA¹, Justin Yu BS², Ashwin Srivatsav BS¹, Jabez Gondokusumo BS³, Alexander J Tatem MD¹, Jonathan A Beilan MD¹, Asad Hasan BSCS¹, James M Hotaling MD², Larry I Lipshultz MD³ and Alexander W Pastuszak MD⁴

¹Baylor College of Medicine; ²University of Utah

Presented By: Adithya Balasubramanian, BA

**Objective:** YouTube (YT) is the most popular internet video platform. Patients and other stakeholders use YT to share information and discuss medical conditions. We evaluated YouTube videos (YTVs) focused on male infertility to assess information quality on YT and spotlight themes presented in YTVs to identify high quality content that reliably facilitates care.

**Method:** The top 50 YTVs based on relevance were identified using the keyword “male infertility.” A standardized checklist addressing pathophysiology, evaluation, and management of male infertility was developed to assess YTV content. 2 investigators extracted YTV features, including duration, likes, views, days on YT, classified creators and assessed YTVs via the checklist. YTVs were graded and ranked based on checklist scores and stratified by content and creator.

**Results:** A total of 42 YTVs were included; 8 non-English YTVs were excluded. Higher grades were associated with shorter duration (p=0.0305) (Table 1). Most YTVs (23/42, 55%) were created by healthcare-related organizations. 31% (13/42) of YTVs explicitly defined infertility as an inability to conceive after 12 months of unprotected intercourse. 48% of YTVs (20/42) indicated that infertility is exclusively a male issue, while 45% (19/42) indicated that both partners contribute. 90% (38/42) of YTVs discussed male infertility evaluation, including history (25/38), physical (18/38), and diagnostic tests (38/38), including semen analysis in all YTVs. 71% (30/42) of YTVs discussed infertility management including nonsurgical interventions (21/30), surgical treatments (14/30), and assisted reproductive technologies (ART) (13/30). 14% (6/42) of YTVs produced by healthcare providers addressed ART, compared to 42% (18/42) of YTVs created by patients.

**Conclusion:** Various creators have adopted YT to discuss male infertility. Providers should be vigilant of the influence YT may have on patient awareness and understanding of the condition. Knowledge gaps identified in YTVs such as limited discussion about the timeline for receiving a male infertility diagnosis can help improve patient counseling and enable providers to direct patients to accurate and reliable sources of information for the condition on YT. (See next page for chart)
ABSTRACTS

Poster #106
USE OF DENSITY DISCONTINUOUS GRADIENT LABORATORY PROCEDURE TO REDUCE BACTERIAL LOAD AND TO SELECT HIGHLY FUNCTIONAL HUMAN SPERM
Bruna Zillig BSc Student¹, Juliana Pariz MD fellow¹,²,³,4,5,6,7,8,9, Caroline Ranêa Bsc, Msc Student²,³,⁴,⁵,⁶,⁷,⁸,9, Carolina Faquinetti Bsc, Msc Student³,⁴,⁵,⁶,⁷,⁸,9, Ivan Iori MD Student³,⁴,⁵,⁶,⁷,⁸,9, Donald Eveson PhD⁹, and Jorge Hallak MD, PhD⁹,¹⁰,¹¹

Introduction: Bacteriospermia is present in 15% male subfertility cases. For this, a laboratory procedure is required to remove bacteria present in semen sample. Laboratory semen processing, such as density discontinuous gradient, is a methodology applied in semen samples sent to assisted reproduction techniques (ART), with the objective of selecting mobile sperm, removing debris, round cells and unfeasible sperm. However, sperm physiology characteristics and bacteria load reduction is no totally elucidated after these processes.

Objective: To evaluate the role of seminal processing by the Isolate® method in bacterial load reduction and selection of highly functional sperm in semen samples.

Methods: The present study has used 19 semen samples from volunteer patients. Samples were prepared using the Isolate® method. Fifty hundred milliliters of Lower layer, 0.5ml Upper layer and 1ml sample were added in a tube and centrifuged by 15 minutes at 1600 rcf. The pellet was resuspended in 0.5 ml culture medium. It was executed seminal analysis (sperm concentration, motility and morphology), functional tests [DNA Fragmentation Index (%DFI), High DNA Stainability (%HDS), mitochondrial activity, antigen antibodies and reactive oxygen species dosage (ROS)] and microbiological analysis using Gonolab®, for anaerobic bacteria culture, and R1®, for Mycoplasma spp. culture. The Independent T test was used for the comparison of means and statistical analysis.

Results: Initial progressive motility was 25.31% and post-Isolate 8.45% (p=0.076). After seminal processing, a significant decrease in HDS (9.30% ± 5.07 vs. 3.30% ± 1.70, p = 0.005) and increase in ROS (4.17% ± 4.27 vs. 20.16% ± 18.57, p = 0.046) were observed. In 13 samples has growth bacteria, being 53.3% Staphylococcus aureus and 42% Enterococcus spp. Isolate was effective in bacterial load reduction, showing 88.88% efficiency by Gonolab and 0% in R1.

Conclusion: Seminal process was effective in reducing immature sperm and this could be applied in Assisted Reproduction techniques. In addition, the procedure was efficient in samples bacterial load reduction, except Mycoplasma spp., being a good laboratory tool to be used in the seminal samples of men with genitourinary tract infection, guaranteeing success in fertilization, since the reduction of bacterial load is fundamental to minimize effects such as embryonic malformation, congenital malformations or implantation failures.

Financial support: Androscience

Poster #107
EFFECTS OF VITAMIN D SUPPLEMENTATION IN ASTHENOZOOSPERMIC SEMEN SAMPLES INCUBED IN ANAEROBIC CONDITIONS – AN INITIAL REPORT
Heloisa Faquini BSc, MSc student¹,²,³,⁴, Juliana Pariz MD fellow¹,²,³,⁴, Bruna Zillig BSc student¹, Caroline Ranêa BSc, MSc student²,³,⁴, Donald Eveson PhD⁹, and Jorge Hallak MD, PhD⁹,¹⁰,¹¹

Introduction: Vitamin D is a versatile signaling molecule with classic effects on bone, calcium and phosphate homeostasis that targets also male reproductive organs. In male reproductive tract, vitamin D is involved in reproduction functions and can be associated with increase of sperm motility.

Objective: To report vitamin D effects on low-motility sperm submitted to incubation in anaerobic conditions.

Methods: Six asthenozoospermic semen samples from volunteer subjects were included between September and November 2018. After semen routine initial analyses, samples were processed by simple centrifugation. Four samples were incubated with Continuous Single Culture Media® (CSCM) and calcitriol 10-6 U (1,25-dihidroxicholecalciferol; 1,25VD) and two samples were incubated with CSCM and cholecalciferol 10-12 M (activated 7-dehidrocolesterol; 7-DHC), at 37°C in a CO2 atmosphere (5%) by two hours, and sperm motility was analyzed.

Results: Two samples (samples 2 and 3) incubated with 1,25VD demonstrated progressive (16.5% vs. 43.0%) and total (24.5% vs. 54.0%) motility increase when compared to pre-incubation samples. In addition, progressive motility mean of samples incubated with 7-DHC was greater than pre-incubation progressive motility (30% vs. 33%) (Table 1).

Conclusion: In this pilot study, was reported role of vitamin D showing to be effective in sperm progressive and total motility increase, reinforcing previous studies that suggested its positive effects in spermatogenesis and semen quality of male subjects. This results will direct new studies by our group to unravel Vitamin D mechanisms in sperm physiology.

Keywords: Incubation; Motility; Semen; Vitamin D.

Financial support: Androscience, High Complexity Clinical and Research Andrology Laboratory

<table>
<thead>
<tr>
<th>Table 1 – Means and percentage of semen samples progressive and total motility pre and post-incubation with 1,25VD and 7-DHC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Sample 1 + 1,25VD</td>
</tr>
<tr>
<td>Sample 2 + 1,25VD</td>
</tr>
<tr>
<td>Sample 3 + 1,25VD</td>
</tr>
<tr>
<td>Sample 4 + 1,25VD</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Sample 5 + 7-DHC</td>
</tr>
<tr>
<td>Sample 6 + 7-DHC</td>
</tr>
<tr>
<td>Mean</td>
</tr>
</tbody>
</table>

© 2019 American Society of Andrology and European Academy of Andrology

Andrology, 2019, Supplement, 91
ABSTRACTS

Poster #108
CONSUMPTION OF CANNABIS IS ASSOCIATED WITH AN INCREASED AND DOSE/FREQUENCY-DEPENDENT INCIDENCE OF AÇEPHALIC SPERM ABNORMALITIES
JUAN R. CORREA-PEREZ PhD and Samuel P. Marynick MD
Texas Center for Reproductive Health
Presented By: Juan R. Correa-Perez, PhD, HCLD. CTBS, EMB

Introduction and Objectives: Aside from alcohol, nicotine and caffeine, cannabis is considered as one of the most commonly used recreational drugs worldwide. In regards to reproductive function in males, negative effects have been reported to involve endocrine, testicular and spermatogenic disturbances. In the case of sperm morphology, the majority of reports indicate changes in the percentage of abnormal sperm. However, there is a lack of information regarding the effect of cannabis use on specific sperm morphology patterns. In this study, we report an increased incidence of accephalic sperm in semen specimens from recreational/chronic users of cannabis.

Methods: The results of semen analyses were compared to the patients’ lifestyle factors. Sperm morphology was assessed according to Kruger’s strict criteria. Morphology patterns were allocated into 5 main groups according to head, neck-piece, tail, accephalic and acrosome abnormalities. Patients were allocated to non-users and users of cannabis after excluding for use of medications, alcohol, nicotine, excessive caffeine and other recreational drugs.

Results: Users of cannabis had a high incidence of accephalic sperm ranging from 9-94% of the total abnormalities. The incidence of accephalic sperm appears to be related to the dose, frequency and number of years consuming cannabis. Chronic users had the highest percentages (>30-94%) of accephalic sperm in their ejaculates as compared to sporadic users. The presence of accephalic spermatozoa was confirmed in some cases via repeating the semen analysis at various intervals. Non-users of cannabis appear to have minimal numbers (<3%) of accephalic sperm in their ejaculates.

Conclusion: Use of cannabis induces specific morphological changes characterized by a high incidence of accephalic sperm. The incidence of accephalic sperm in users of cannabis appears to be related to the dose and frequency of cannabis consumption. Development of accephalic forms appears to be irreversible.

Poster #109
CAFFEINE EFFECT IN SPERM MOTILITY IN DIFFERENT ANDROLOGY SCENARIOS
Juliana Pariz PD fellow1, 2, 3, 4, Caroline Ranéa BSc, MSc student1, 2, Heloisa Faquineti BSc, MSc student1, 2, Bruna Zillig BSc student1, 2, Inari Ciccone BSc, MSc1, 2, 3, Dayane Reis BSc1, Thiago Teixeira MD, PhD student1, 2, 3, Elaine Costa MD, PhD1, 2, 4 and Jorge Hallak MD, PhD1, 2, 4
1Androscience, High Complexity Clinical and Research Andrology Laboratory; 2Reproductive Toxicology Unit, Dept. of Pathology, University of São Paulo; 3Institute for Advanced Studies, USP; 4Dept. of Urology, USP
Presented By: Juliana Risso Pariz, BSc, MSc, PhD

Introduction: Caffeine has a powerful stimulant effect in cell metabolism. This substance acts as inhibitor of phosphodiesterase enzyme, which is responsible for the breakdown of cyclic adenosine monophosphate (cAMP), thus triggering an increase in the concentration of intracellular cAMP and allowing the energy metabolism of cells to rise.

Objective: To investigate the caffeine effect in sperm motility in different Andrology scenarios.

Methods: This study was divided in three steps: (I) retrospective study that included 659 male subjects who came for an andrological evaluation, seminal analysis, and who self-reported coffee consumption; (II) prospective study that included 8 asthenozoospermic semen samples. Was performed simple wash, added medium Human Tubal Fluid® (HTF) supplemented with 15% Serum Substitute Suplement® and 2mM caffeine, and incubated at 37°C in a CO2 atmosphere (5%) by 2 hours; (III) experimental study that evaluated 30 normozoospermic semen samples submitted to cryopreservation by slow-freeze method with Test Yolk Buffer. Post-thaw, 2mM caffeine was added into modified HTF®, incubated by 15 minutes at 37°C in aerobic conditions. In II and III assays were performed seminal parameters evaluation before and after caffeine supplementation. Were used paired T-test to compare two groups and Person’s correlation test. Was adopted p<0.05 as significant.

Results: Mean of coffee consumption in study I subjects was 3.1 cup of coffee/day. Were observed positive correlation between coffee consumption and total motile sperm count (r=0.157, p=0.002), total progressive sperm count (r=0.160, p=0.007) and total motility (r=0.131; p=0.012). In study II, no significant caffeine effect in sperm motility was observed (p<0.05). Caffeine supplementation in post-thawed samples (study III) increased progressive motility (13.27±2.62% vs. post-thaw control samples=7.50±2.71%; p=0.005).

Conclusion: This study demonstrate strong evidence of caffeine acts in sperm motility stimulation probably by increase of mitochondria energy production, both intake and post-thawed supplementation. Caffeine proved to be positive and a useful and simple tool in the andrology routine, in special in patients with low-quality sperm profile and in asthenozoospermic semen samples used in Assisted Reproduction procedures.

Poster #110
WHEN IS A VASECTOMY SUCCESSFUL? – LABORATORY ASPECTS
Lars Björndahl MD PhD, Kristina Magnusson BMS, Magdalena Larsson Chatziantonis BMS, Rebecka Holmberg PhD BMS and John Flanagan PhD
ANOVA Karolinska University Hospital and Karolinska Institutet
Presented By: Lars Björndahl, MD, PhD

Introduction and Objectives: Post-vasectomy follow-up (PVFU) is based on microscopy analysis to identify the presence or absence of motile spermatozoa three months after surgery. The standard andrology laboratory routine is to systematic scan a minute volume of the liquefied ejaculate. This is associated with uncertainty, due to the % of the ejaculate volume possible to scan. In this study, we analyzed the biochemical marker for epididymal secretion, Neutral alpha-glucosidase (Na,G), to evaluate if biochemical assessments in parallel with microscopy analysis could be more useful in post vasectomy follow-up.

Methods: Ejaculates examined according to WHO: liquefaction at 37°C, start of microscopic examination (200-400x phase optics) 30 minutes after sample collection, scanning 10 µL aliquot under a 22x22 mm cover slip; centrifugation 15' by 3,000 g, pellet resuspended in a minute volume and 10 µL scanned as above. Biochemical markers assessed in seminal plasma free of spermatozoa for the prostate (Zinc) and epididymis (Na,G) functions. Prostatic Zinc concentration was determined using a kit (Wako Chemicals GmbH). The NaG activity was measured by incubating seminal plasma with the substrate, paranitrophenyl-a-d-glucopyranoside (PNPG) at 37°C for 2 hours, where NaG converts PNPG to the product, p-Nitrophenol. The quantity of this product was measured spectrophotometrically at 400 nm. The results expressed as enzyme activity (mIU) per ml and per ejaculate. Semen analysis data were retrospectively obtained from the lab database for the period of January 2017 to October 2018 of ejaculates collected after 2-5 abstinence days: a total of 1,262 PVFU samples free of motile sperm and 1,106 sperm containing (> 40 million spermatozoa per ejaculate) semen samples obtained from men undergoing infertility investigation.

Results Obtained: 1. A cut-off for NaG between spermatozoa free ejaculates and ejaculates with normal passage of spermatozoa was 23.6 mIU ejaculate with a specificity of 95% (95% C.I. 93.6-96.2) and a sensitivity of 91% (89.4-92.6). 2. Zinc concentrations indicated that...
prostate maybe a possible extra epididymal source of NOG. 3. High NOG activity was more common in samples with high zinc concentration obtained after longer abstinence time.

Conclusions: NOG is a useful adjuvant analysis to microscopic examination of post vasectomy samples. False positives can occur in samples with long abstinence time and high prostatic contribution. Conflicts of Interest None

Poster #111
GAY MEN SEEKING PARENTHOOD THROUGH ASSISTED REPRODUCTION: A PILOT STUDY FOR CREATION OF A STANDARDIZED QUESTIONNAIRE
Philip Cheng MD¹, Alexander Pastuszak MD, PhD¹, Akanksha Mehta MD² and James Hotaling MD³
¹University of Utah; ²Emory University
Presented By: Philip J. Cheng, MD

Objectives: Although an increasing number of gay men are seeking parenthood using an egg donor and a gestational carrier (GC), no studies have evaluated the reproductive concerns of gay men. The aim of this study is to explore the main areas of concern for gay men who have children through third party reproduction, and to use that information to create a quantitative, evidence-based survey tool to assess the needs of gay men interested in paternity.

Methods: Six gay males in the Salt Lake City area who had previously had children using a GC completed semi-structured interviews and provided written answers (multiple choice and open-ended questions) to different areas of concern specific to this population: sperm usage/male factor infertility, egg donation, surrogacy, legal issues, and financial burden. Interview and written answers were aggregated and analyzed.

Results: The mean age of the participants was 44±6.6 years. All men had been in committed relationships for at least 2 years (mean 9±6) prior to deciding to have children. The majority of the men had a college (5, 83%) or post-graduate degree (4, 67%). 50% found it difficult to understand the procedures involved in third party reproduction. None of the men had issues with male factor infertility. 50% used sperm from one partner while 50% used sperm from both partners and had more than one child. For 83%, third party reproduction was illegal in their state of residence, so they traveled to an out-of-state fertility center. 33% encountered legal issues (i.e. inability to get both names on a birth certificate) or had difficulties with a reproductive attorney. For 83%, financial considerations were significant, and 50% saved money for 2-5 years before seeking fertility services. When asked what part of the process was the most anxiety-provoking, a variety of answers were provided: 33% noted the cost of the process, 50% the health of the baby, and 33% the unknowns with regards to the GC, such as fear that she would not give up her rights to the child. 50% of the men expressed being overwhelmed by the long and complex process.

Conclusion: Gay men seeking biological children face unique reproductive challenges, such as the process of surrogacy and the inevitable legal and financial issues involved. A large-scale analysis is needed to build an evidence-based survey tool to assess the needs of gay men that can highlight the specific needs of the couple and facilitate an individualized approach to treatment.

Poster #112
IDENTIFICATION AND PARTIAL CHARACTERIZATION OF PHYTOCHEMICALS IN AQUEOUS EXTRACT OF CARICA PAPAYA
Ralf Henkel BEd, PhD¹, Vahid Ghaefifaralaleh PhD², Samuel Egieyeh PhD³, Ashok Agarwal PhD³, and David Fisher PhD³
¹Department of the Western Cape, University of the Western Cape; ²Department of Medical Bioscience, University of the Western Cape; ³School of Pharmacy, University of the Western Cape; ⁴American Center for Reproductive Medicine, Cleveland Clinic
Presented By: Ralf Henkel, PhD

Introduction and Objectives: Carica papaya (pawpaw/papaya) belongs to the family of Caricaceae and is regarded as a medicinal plant. Ethnobotanical reviews revealed that the extract of C. papaya seeds is used as a contraceptive. Animal studies showed that this extract immobilizes sperm and induces a reversible azoospermia. Therefore, the aim of this study was to partially isolate and identify the bioactive compounds of an aqueous seed extract.

Methods: Washed seeds were dried and ground to a powder, of which 5 g were mixed with 200 mL distilled water and extracted at 70°C for 72 hours. The supernatant was filtered and frozen in -80°C, freeze-dried and stored at -20°C until use. Thereafter, organoleptic and physicochemical characterization tests were conducted. Infrared spectroscopy was used to analyse the chemical functional groups predominant in the extract. An integrated High Pressure Liquid Chromatography (HPLC) fingerprint was developed for the extract and column chromatography was used to separate components of the extract.

Results: The extract is a soft brownish powder. Phytochemical screening revealed the presence of flavonoids, alkaloids and terpenes. Infrared spectroscopy showed the presence of hydroxyl groups (OH), bonded carbonyl groups (-CO) and C-H single bonds. An HPLC fingerprint showed reproducible distinct peaks that can be used to identify the extract. Column separation with 95% methanol on silica gel gave fractions that showed single spots on thin layer chromatography.

Conclusions: The freeze-dried aqueous extract of Carica papaya was characterized using organoleptic properties, physicochemical screening and HPLC fingerprint. Future studies will focus on characterization of the phytochemical profile of papaya seeds, identification of intracellular signaling pathways targets, identification of the bioactive compounds by means of NMR spectrometry as well as their biopharmacokinetics and toxicological safety in an in vivo animal model.

Poster #113
CORRELATION OF OXIDATION-REDUCTION POTENTIAL WITH HORMONES, SEMEN PARAMETERS, AND TESTICULAR VOLUME IN MEN WITH VARICOCELE
Ralf Henkel BEd, PhD¹, Mohammed Arafa MD², Ashok Agarwal PhD³, M. Majzoabi, and Haitham ElBardissi MD³
¹Department of the Western Cape, University of the Western Cape; ²Hamad Medical Center, Doha, Qatar; ³American Center for Reproductive Medicine, Cleveland Clinic
Presented By: Ralf Henkel, PhD

Introduction and Objectives: Oxidative stress (OS) is a major cause of male factor infertility and can be measured as oxidation-reduction potential (ORP). Studies showed significant negative relationships of ORP with sperm count, motility or DNA integrity. Since these parameters are also associated with FSH, LH, testosterone, testicular volume and the occurrence of varicocele, it is important to understand the relationship between ORP and hormonal and/or testicular parameters. Therefore, we studied the relationship between ORP, hormone profiles and testicular volume in infertile men with and without varicocele.

Materials and Methods: In a retrospective study of 660 patients, sperm DNA fragmentation (SDF), ORP, LH, FSH, testosterone, prolactin, estradiol and testicular volume were determined. In addition, the presence of uni- or bilateral varicocele was recorded. The exclusion criteria involved patients with documented genetic abnormalities, testicular cancers, genitourinary tract infections or those receiving hormone replacement or antioxidant therapy.

Results: Negative correlations were detected between ORP and sperm count (r=-0.793; P<0.001), motile sperm count (r=-0.579; P<0.001), progressive motility (r=-0.431; P<0.001) and normal morphology (r=-0.458; P<0.001). ORP levels were correlated with SDF (r=0.264; P<0.0001), testicular volume (r=-0.386; P=0.0001), FSH (r=0.273; P<0.0001) and LH (r=0.182; P=0.0002). When taking the varicoceles status as covariate into account, the relationships between ORP and FSH
ABSTRACTS

OBJECTIVES: The relationship between varicocele status and semen parameters was previously evaluated in a meta-analysis of 10 studies with non-significant overall results. The aim of this study was to evaluate the relationship between varicocele status and semen parameters in a larger dataset, including more recent studies.

MATERIALS AND METHODS: A systematic review of the literature was conducted using PubMed, Scopus, and Web of Science databases. Studies were included if they investigated the relationship between varicocele status and semen parameters.

RESULTS: A total of 32 studies were included, comprising 26,751 men. The results showed a significant negative correlation between varicocele and semen volume (r = -0.0737; P = 0.0308). No relationship was found between varicocele status and sperm count (r = 0.360; P < 0.0001) and normal morphology (r = 0.163; P = 0.0217). No relationship was found between testicular volume and motility (r = 0.0737; P = 0.3008).

CONCLUSION: Since OS causes degeneration of Sertoli cell with testicular shrinkage, we propose that this results in a negative feedback on the hypothalamus with less inhibin secretion. In turn, this may lead to increased LH and FSH secretion. Thus, systemic and/or local OS may be responsible for smaller testis volumes.

POSTER #114

#PEYRONIES: AN ANALYSIS OF ONLINE TWITTER DISCUSSION OF PEYRONIE’S DISEASE
Adithya Balasubramanian BA¹, Justin Yu BS¹, Larry I Lipshtulz MD¹, James M Hotaling MD² and Alexander W Pastuszak MD²

1Baylor College of Medicine; 2University of Utah

Objectives: Social media offers avenues for awareness and information on Peyronie’s Disease (PD). The microblogging service Twitter has been adopted by physicians as a medium for disseminating information. Urologists have established the hashtag #Peyronies as the official hashtag for PD on Twitter via an international standardization effort. Although #Peyronies has been formalized as the official hashtag for online Twitter discussions about PD, the hashtag’s performance and utilization has not been previously investigated. We examined Twitter activity, users and content for #Peyronies to better understand Twitter discussions related to PD.

Methods: Symplur, a Twitter analytics service, was used to aggregate and analyze Twitter activity, users, and content for #Peyronies between April 2013 and September 2018. Activity was measured by tweets per month and cumulative users per year. Users were classified based on geography, occupation and organizational affiliation. Content analysis was performed by retrieving information about retweets, links, media, replies, frequently used words and hashtags.

Results: A total of 3,278 tweets and 767 users utilizing #Peyronies were identified between 4/1/2013 and 9/3/2018. Most tweets (75%) were sent with links and contained media images (49%). The average ± SD number of tweets using #Peyronies per month increased from 17.7 ± 8.5 in 2013 to 121.4 ± 52.2 in 2018 (p < 0.001). The number of users increased from 78 to 767 during the study period. Users tweeted from 61 countries, with the majority located in the United States. Physicians comprised 46% and patients 1% of the Top 100 influencers. Common words in tweets with #Peyronies included “disease,” “men,” “andropeyronie,” “curvature,” and “traction.” Other popular hashtags associated with #Peyronies included #menshealth, #peyronie, #men, #peyroniesdisease, #mypeyronies and #urology. Hyperlinks in #Peyronies tweets led to advocacy, academic, commercial and other social media websites. Codification of tweet content revealed that a majority were focused on discussions about clinical care followed by tweets centered around providing online patient support.

Conclusions: Twitter discussions regarding PD are growing. Although overall discussion volume is smaller relative to other benign urologic conditions, this study demonstrates that online discussions about PD are attracting a growing number of users, and that Twitter can influence awareness and perceptions of PD.

Poster #115

SPERM DNA METHYLATION CHANGES AFTER NUT SUPPLEMENTATION IN HEALTHY MALES CONSUMING A WESTERN-STYLE DIET
Albert Salas-Huetos PhD¹, Emma R. James BSc², Mónica Bulló PhD³, Jordi Salas-Salvadó PhD², MD⁴, Douglas T. Carrell PhD³, Kenneth I. Aston PhD⁵ and Timothy G. Jenkins PhD⁶

¹a. Biochemistry and Biotechnology Department, Universitat Rovira i Virgili, Spain. b. Institut d’Investigació Sanitària Pere i Virgili, Spain. c. CIBERObn, Instituto de Salud Carlos III, Spain. d. Department of Surgery, University of Utah, USA. e. Department of Surgery, University of Utah, USA. f. Department of Human Genetics, University of Utah, USA. g. Department of Obstetrics and Gynecology, University of Utah, USA. h. Department of Urology, University of Utah, USA.

Objective: To evaluate the effect of frequent consumption of nuts on changes in sperm DNA methylation patterns.

Material and Methods: The present study was conducted in a sub-cohort of participants that were submitted to a dietary intervention with 60 g/d of a mixture of nuts (walnuts, almonds and hazelnuts) for 14 weeks within the FERTINUTS trial: a parallel randomized clinical trial aimed at assessing the effects of nut supplementation on sperm parameters. All of the individuals were healthy and young men (aged 18-35 years). Semen samples and detailed dietary information were collected at baseline and at the end of the intervention. Sperm DNA was extracted using QIAamp DNA Mini kit and subjected to bisulfite conversion (EZ DNA Methylation-Gold). The converted DNA was then hybridized to Infinium MethylationEPIC microarrays. Sperm DNA fraction methylation values were analyzed using minfi Bioconductor, a package for the R statistical software, and Useq bioinformatics software. All two-tailed P-values<0.05 following Benjamini-Hochberg correction were considered significant.

Results: A total of 24 participants randomly selected from the 49 participants that completed the entire nuts dietary intervention were included. No individual differentially methylated CpGs were associated with the intervention. However, we identified 302 genomic regions that were significantly differentially methylated between the baseline and the end of the trial. All differentially methylated regions displayed increased methylation at the end of the trial. The differentially methylated regions included 3,061 individual CpGs. CpG islands and enhancers were significantly under-represented compared to the background of the entire array. The genes encompassed in the differentially methylated regions were subjected to gene ontology analysis, but no one GO term or Pathway was significantly enriched.

Conclusion: Our findings provide evidence that a short-term nutritional intervention with nuts has an effect on the sperm DNA methylobe. Future studies are needed to evaluate the functional impact of these changes.

Poster #116

WITHDRAWN
ABSTRACTS

Poster #117
WITHDRAWN

Poster #118
TRENDS IN NUMBER AND TIMING OF POST-VASECTOMY SEMEN ANALYSIS: RESULTS FROM A NATIONAL SURVEY OF UROLOGISTS
Kian Asanad MD and Mary Samplaski MD
University of Southern California
Presented By: Kian Asanad, MD

Introduction and Objectives: Post-vasectomy semen analysis (PVSA) is used to detect occlusive effectiveness of vasectomy after surgery. The 2015 AUA Guidelines on Vasectomy state that: “8-16 weeks is the appropriate time range for the first PVSA”, but that the timing “should be left to the judgment of the surgeon”; And that a single PVSA is adequate for demonstration of contraceptive efficacy. We sought to determine trends in PVSA practices (timing and quantity), using national survey of urologists.

Methods: We designed a brief 5-question questionnaire that assessed physician vasectomy experience and PVSA trends. Using the American Medical Association Physician Masterfile database, the survey was sent to 3000 urologists by electronic mail in November 2018. All responses were anonymous.

Results: 136 responses were received (4.5% response rate). 30.9% of urologists performed 0-5 vasectomies per month, 43.4% performed 6-10 per month, and 17.6% performed 11-15 per month. Regarding the number of PVSAs, 59.7%, 18.7%, and 21.7% of urologists reported that >76%, 51-75%, and <50% of their patients have one PVSA checked, respectively. Furthermore, 58.2% of urologists reported that <25% and 25.4% reported that >76% of their patients have two PVSAs checked. 69.6% of urologists checked PVSA at 2-4 months, 26.7% at 1-2 months, 3% at 4-6 months, and 0.7% at 6-8 months after vasectomy.

Conclusions: Most urologists perform 6-10 vasectomies per month. Consistent with the AUA Guidelines, most urologists check their PVSA after 2-4 months, with most patients obtaining a single PVSA. From a health care utilization of resources perspective, these results are reassuring.

Poster #119
ANTISPERM ANTIBODIES ARE NOT FREQUENTLY INDUCED IN SEMEN OF MEN WITH TESTICULAR HYPERTHERMIA
Marzena Kamienicznia PhD1, Monika Fraczek PhD1, Marta Budzinska MSc, Lukasz Wojnar MD2, Jozef Nakonechnyy MD, PhD2, Laura Grzeskowiak MD2, Kamil Grill PhD2, Anna Havrylyuk PhD2, Karolina Nowicka-Bauer MSc2, Malgorzata Piascika MD, PhD2, Andrij Nakonechnyy MD, PhD2, Valentina Chopak MD, PhD2 and Maciej Kurpisz MD, PhD10
1Institute of Human Genetics, Pol. Acad. Sci; 2Institute of Human Genetics, Pol. Acad.Sc.; 3Clini Urology and Oncological Urology, Poznan University; 4Departament of Urology, Lviv National medical University; 5Certus Private Hospital in Poznan; 6Department of Histology and Developmental Biology, Pomeranian University; 7Department of Clinical Immunology and Allergology, Lviv National Medical University; 8Department of Histology and Developmental Biology, Pomeranian University; 9Department of Pediatric Surgery, Lviv National Medical University; 10Institute of Human Genetics, Pol. Acad. Sci.
Presented By: Maciej Kurpisz, MD, PhD

Introduction: Clinical abnormalities such as varicocele and cryptorchidism are associated with the exposure of the testis to increased temperature. Prolonged testicular/scrotal hyperthermia may induce oxidative stress response and may initiate the immune-based reactions. The assessment of antisperm antibodies (AsA) is an essential tool for the diagnosis of male immunological infertility, however AsA formation is the end point of complex immunological process. Therefore, immune-based male factor infertility should be considered in a broad context of inflammatory process.

Objectives: The aim of this study was to find a correlation between AsA and oxidative stress response in men exposed to elevated testicular/scrotal temperature.

Method: The studied male cohort was classified into the following groups: infertile patients with varicocele (n=50), infertile patients with cryptorchidism (n=30), professional drivers (n=30), infertile patients not exposed to hyperthermia (n=30), and fertile individuals as control (n=30). The MAR test and flow cytometry were used for the detection of AsA on the surface of sperm and in seminal plasma. Total antioxidant capacity (TAC) was measured by ELISA.

Results: The low AsA incidence in MAR test as well as in flow cytometry have been found. All the samples were under 20% range in MAR test. The TAC values were lower in men with cryptorchidism compared to men with varicocele, professional drivers and fertile control males.

Conclusions: Based on the results obtained, it can be concluded that hyperthermia does not increase the frequency of AsA incidence, and is rather related to oxidative stress in semen. The study was financed by National Science Centre, Poland, grant No 2015/19/B/NSZ/02241.

Poster #120
USE OF RESTOREX PENILE TRACTION THERAPY FOR TREATMENT OF PENILE LENGTH LOSS IN DIABETIC MEN
Madeleine Manka MD, Kevin Hebert MD, Kevin Wymer MD, David Yang MD and Landon Trost MD
Mayo Clinic
Presented By: Madeleine G. Manka, MD

Introduction and Objectives: Penile length loss is a common complaint among men with diabetes mellitus (DM). Although robust epidemiological studies are lacking, limited data suggest reductions in all penile dimensions among diabetic men, including a mean 1 cm loss compared to men without DM. Penile traction therapy (PTT) is one treatment often recommended to help restore lost penile length. Recently, a novel PTT device, RestoreX, was developed and demonstrated significant length improvements with 30 minutes daily use. Given these findings, we sought to determine the efficacy of RestoreX in improving penile length in men with DM.

Methods: A randomized, controlled trial (NCT18006696) is ongoing to evaluate the impact of PTT with RestoreX in 100 men with DM. Men are randomized to one of four groupings for 6 months: Group 1 - no therapy (control); Group 2 - Restorex for 30 minutes 2x/day x 3 months, followed by no use x 3 months; Group 3 – Restorex for 30 minutes 2x/day x 3 months, followed by once weekly x 30 minutes x 3 months; Group 4 - Restorex for 30 minutes 2x/day x 6 months. Assessments of stretched penile length and standardized and non-standardized questionnaires are administered at each visit to evaluate sexual function.

Results Obtained: A total of 14 men (mean age 56.6; SD 5.9) have been enrolled to date, with 3-month data available on 7 (control=2, traction=5). Mean duration of DM is 15.2 years, with 29% currently taking insulin. Fifty-seven percent of men described erectile dysfunction (mean duration 5.3 years), while 86% noted penile shortening (mean 4.3 cm). Baseline IIEF erectile function domain scores were a mean 21.6, and baseline penile length to corona and tip were 13.7 cm and 17.1 cm, respectively. Following 3-months of treatment, PTT men demonstrated significant improvements in penile length compared to controls: +1.8 cm vs +0.25 cm, p=0.02. No statistically significant differences were noted with any subgroup of the IIEF, although 60% of men using PTT felt that it improved their erectile function compared to 0% of controls. Adverse events were limited, with forty percent of men noting mild erythema and decreased sensation which resolved within minutes of discontinuing use.

Conclusions: Based on preliminary data, PTT with RestoreX results in statistically significant improvements in penile length in men with DM. Additional follow-up is required to confirm findings.
ABSTRACTS

Poster #121
USE OF RESTOREX PENILE TRACTION THERAPY TO MAINTAIN PENILE LENGTH POST PROSTATECTOMY
Madeleine Manka MD, Kevin Hebert MD, Kevin Wymer MD, David Yang MD and Landon Trost MD
Mayo Clinic
Presented By: Madeleine G. Manka, MD

Introduction and Objectives: Penile length loss is a common occurrence post-prostatectomy, ranging from 15-68% of cases and with reductions of >1 cm in many cases. Limited data are available on the impact of penile traction therapy (PTT) post prostatectomy on maintaining penile length and preventing length loss. The objective of the current series is to evaluate the efficacy of RestoreX PTT in men post-prostatectomy.

Methods: A randomized, controlled trial (NCT03500419) is ongoing to evaluate the impact of PTT with RestoreX in 60 men post prostatectomy. Men are randomized to one of three groupings for 5 months: Group 1 - no therapy (control); Group 2 - treatment with RestoreX for 30 minutes 5x/week; Group 3 – treatment with RestoreX for 60 minutes 7x/week. All men then enter an open label phase for 6 months. Assessments of stretched penile length and standardized and non-standardized questionnaires are administered at each visit to evaluate sexual function.

Results Obtained: A total of 31 men (mean age 58.1; SD 7.1) have been enrolled to date, with 6-month data available on 8 (control=3, traction=5). Forty-five percent of men self-reported baseline erectile dysfunction (mean duration 78.1 months), with an overall mean IIEF erectile function domain score of 22.2 (SD 10.4). Baseline penile length assessed post-prostatectomy was 12.0 cm (SD 1.8; corona) and 14.7 cm (SD 3.2; tip). At the 6-month time point, men receiving traction demonstrated a mean 2.3 cm length increase compared to 0.5 cm in the control group (p=0.03). Using a 10-point Likert scale, men in the traction arms reported overall satisfaction with traction of 8.4 (10 highest). One-hundred percent indicated that they would recommend it to a friend and would have chosen to do traction post-prostatectomy again if they were making the decision today. No men reported de-novo penile curvature, and all adverse events associated with traction were mild and well tolerated (40% with transient erythema / tenderness). Conclusions: Based on preliminary data, PTT with RestoreX results in statistically significant improvements in penile length post-prostatectomy, with high overall satisfaction and minimal adverse events. Additional data are needed to confirm findings.

Poster #122
CYCLOPHOSPHAMIDE AND FERTILITY PRESERVATION: A SURVEY OF CURRENT PRACTICES AMONG NON-UROLOGISTS
Neel Parekh MD¹, Scott Lundy MD, PhD² and Sarah Vij MD³
¹Cleveland Clinic; ²CCF
Presented By: Neel Parekh, MD

Introduction and Objective: Cyclophosphamide is the mainstay of treatment for a number of oncologic, renal and rheumatic diseases but is associated with gonadotoxicity and potentially irreversible infertility in men and women. There has been a push to promote fertility preservation (FP) in the field of oncology, but little is known about the use of FP and barriers to the service among providers in other disciplines. We surveyed nephrologists and rheumatologists regarding their current practice of prescribing cyclophosphamide in patients of child-bearing age and whether FP is offered to these patients.

Methods: A 5-question digital anonymous survey was distributed using publicly available e-mail addresses to 96 nephrologists and rheumatologists in academic and community practices. The survey captured information regarding frequency of cyclophosphamide use, FP discussion rates, and barriers to FP. Results: 96 nephrologists and rheumatologists were contacted by e-mail and 34% responded (25 nephrologists and 8 rheumatologists) to the survey. 31 of 33 (94%) specialists reported regularly using cyclophosphamide in their practice with an average of 5 patients per year. Fertility counseling was performed prior to administering cyclophosphamide for 76% of patient encounters. Some providers reported 100% counseling rate while others reported 0% counseling rate. 27% (9) were unaware of FP options. Additional barriers to FP included: time constraints (5), cost to patients (2) and lack of standardized protocol (1). 94% of the respondents believe that clinical practice guidelines would increase awareness and improve fertility counseling rates.

Conclusions: Clinical practices for fertility preservation in patients undergoing treatment with cyclophosphamide vary greatly amongst nephrologists and rheumatologists, and nearly 1 in 4 patients are not counseled appropriately prior to initiation of therapy. There have been significant advances in assisted reproductive technology, but there continues to be barriers to timely referral and access to cryopreservation and fertility specialists. These findings may help guide future research and support the establishment of clinical practice guidelines in this area for practitioners who may not be exposed to FP options.

Poster #123
WITHDRAWN

© 2019 American Society of Andrology and European Academy of Andrology Andrology, 2019, Supplement, 96
ABSTRACTS

Poster #125
CONDITIONALLY REPLICATIVE ADENOVIRUS CARRYING SHRNA TARGETING EZH2 INHIBITS PROSTATE CANCER GROWTH AND MIGRATION
Xiao Gu MD and PhD¹ and Lichun Wang PhD²
¹Clinical Medical College of Yangzhou University; ²University of Illinois at Chicago
Presented By: Xiao Gu, MD, PhD
Objective: Androgen deprivation therapy (ADT) is the standard treatment for patients with advanced/metastatic prostate cancer (PCa). It is one of the major factors of poor prognosis as most patients would develop castration-resistant prostate cancer (CRPC) inevitably. Therefore, identifying new molecular mechanisms in cancer progression and precise therapies are necessary to improve clinical outcomes of PCa patients. The present study aimed to construct conditionally replicative adenovirus (CRAds) carrying shRNA targeting enhancer of zeste homolog 2 (EZH2), and to study the effect on inhibiting the growth and migration of PCa.
Methods: Immunohistochemistry analyses of EZH2 was performed in tumor tissue from PCa and benign prostate hyperplasia (BPH). Human telomerase reverse transcriptase (hTERT) promoter was chosen to transcriptionally control EZH2 gene expression to obtain adenoviral replication (Ad-hTERT-EZH2shRNA) in human PCa cell lines. The inhibitory effect of Ad-hTERT-EZH2shRNA on EZH2 expression was tested by reverse transcription polymerase chain reaction (RT-PCR) and western blot analysis. CCK-8 assay was used to evaluate the effect of the Ad-hTERT-EZH2shRNA on cell proliferation. Matrigel invasion assay was used to detect cell invasion.
Results: EZH2 immunohistochemical staining was stronger in CRPC samples than in androgen-dependent prostate cancer (ADPC), but was absent in BPH. Furthermore, knockdown of EZH2 expression suppressed PCa cell proliferation and migration. Moreover, we found that Ad-hTERT-EZH2shRNA selectively replicated and significantly reduced the expression of EZH2 in cell lines. The growth ability and migration of DU145 and PC3 cells in vitro was effectively inhibited by Ad-hTERT-EZH2shRNA. Silencing EZH2 led to decreased expression of CCND1 and Ki67 and increased expression of E-cadherin in western blot test.
Conclusions: CRAds armed with EZH2 shRNA exhibits effective antitumor effect in human prostate cancer. Knockdown of EZH2 suppressed PCa cell proliferation and migration. CRAds-mediated regulating of EZH2 inhibition of PCa cells growth may have potential clinical significance in developing therapeutic strategies for treating CRPC.

Poster #126
WHAT IS THE BETTER CULTURE MEDIA FOR IMPROVE THE MOTILITY OF ASTHENOZOOSPERMIC SAMPLES IN ANAEROBIC CONDITIONS?
Caroline Ranea BSc, MSc student¹,², Juliana Risso Pariz PD fellow¹,³,⁴,⁵,⁶, Rosa Alice Casemiro Monteiro BSc², Bruna Zillig BSc student², Heloisa Faquineti BSc, MSc student², Donald Evenson PhD³, Joel Drevet PhD³, Giovanna Milani MD student³ and Jorge Hallak MD, PhD³,⁴,⁵,⁶
¹Androscience, High Complexity Clinical and Research Andrology Laboratory; ²Dept. of Urology, University of São Paulo; ³Reproductive Toxicology Unit, Dept. of Pathology, USP; ⁴Reproductive Toxicology Unit, Dept. of Pathology, University of São Paulo; ⁵Institute for Advanced Studies, USP; ⁶Dept. of Urology, USP; ⁷Androscience, High Complexity Clinical and Research Andrology Laboratory; ⁸SCSA Diagnostics, United States of America; ⁹Université Clermont Auvergne, Clermont-Ferrand, France
Presented By: Caroline Ranea, BSc, MSc student
Introduction: Limited protocols established in Assisted Reproductive Techniques employ different culture media to promote in vitro conditions of spermatozoa totally removed to seminal plasma. Currently, there is no time of incubation and culture medium formulated specifically with required nutrients to sperm maintenance, development and maturation, including motility capacity.
Objective: To compare two commercial culture media added in asthenozoospermic samples during different periods of in vitro incubation.
Methods: We used 46 asthenozoospermic (PR<32%) seminal samples from voluntaries men (21-45 years-old). Seminal parameters were evaluated and divided in assays: Protocol I (n=28)- fresh samples classified as T0 (control group), T1 (1 hour incubation), T2 (2 hours incubation), T3 (3 hours incubation) and T4 (4 hours incubation). Protocol II included 18 seminal samples, processed by discontinuous density gradient or simple wash, added two different medium culture: “Continuous Single Culture Media” (CSCM) + 15% “Human Serum Albumin” (HSA) and “Human Tubal Fluid” (HTF) + 10% “Serum Substitute Supplement” (SSS). Samples were incubated at 37ºC/CO2 atmosphere (5%), seminal parameters, DNA integrity (SCSA®) and reactive oxygen species (ROS) were evaluated before and after incubation with medium culture. Were used ANOVA, Pearson’s correlation and independent T-Student tests.
Results: In Protocol I, there were significant reduction in total motile number (p<0.001), total progressive sperm number (p<0.001), progressive motility (p<0.003), total motility (p<0.05) in T4 when compared with T0. There were negative correlation between incubation time, total motility sperm number (r=-0.444;p<0.001), total progressive sperm number (r=-0.328;p<0.001) and non-progressive sperm (r=-0.181;p=0.36). In Protocol II, was adopted 2 hours incubation (Table 1).
Conclusion: Incubation with CSCM+HSA culture medium demonstrated positive effects on sperm motility in asthenozoospermic seminal samples after 2 hours incubation. This culture medium can be applied in the Andrology routine, replacing HTF medium, and reducing procedures cost by up to 70%.

<table>
<thead>
<tr>
<th></th>
<th>Fresh sample (T0)</th>
<th>2 hours (T2)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFT+SSS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immotility sperm(10⁶permil)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>71.55, 16.45</td>
<td>58.83, 21.22</td>
<td>0.052</td>
<td></td>
</tr>
<tr>
<td>Progressive motility(PR;%)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>12.05, 11.44</td>
<td>10.85, 15.04</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Total motility(PR+NP;%)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>28.39, 16.38</td>
<td>27.11, 20.67</td>
<td>0.172</td>
<td></td>
</tr>
<tr>
<td>DNA Fragmentation(CF;%)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>47.21, 28.03</td>
<td>49.47, 23.30</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td>ROS (10⁶ cpm/20p)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>22.00, 35.00</td>
<td>10.35, 13.64</td>
<td>0.426</td>
<td></td>
</tr>
<tr>
<td>CSCM+HSA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immotility sperm(10⁶permil)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>69.94, 18.08</td>
<td>58.83, 19.06</td>
<td>0.089</td>
<td></td>
</tr>
<tr>
<td>Progressive motility(PR,%)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>8.33, 6.92</td>
<td>26.55, 13.97</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Total motility(PR+NP,%)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>26.61, 16.10</td>
<td>41.17, 19.06</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>DNA Fragmentation(CF,%)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>5.47, 2.77</td>
<td>5.20, 2.43</td>
<td>0.781</td>
<td></td>
</tr>
<tr>
<td>ROS (10⁶ cpm/20p)</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
</tr>
<tr>
<td>23.75, 11.50</td>
<td>13.66, 11.39</td>
<td>0.176</td>
<td></td>
</tr>
</tbody>
</table>

ABSTRACTS

Poster #127
MALE INFERTILITY IN THE FAR NORTH
Ruslan Mustafaev MD and Vladimir Darwin MD, PhD
Presented By: Ruslan Mustafaev, MD

Introduction: About 15 – 20% of couples suffer from infertility. It is known that in 48 - 51% of cases of infertility, according to different authors, the cause is the pathology of the male reproductive sphere. Among the etiological factors causing male infertility, almost all researchers note the impact of environmental factors. A number of studies have noted the role of hypoxia in the violation of spermatogenesis. According to Mizun, hypoxia in the Far North due to oxygen deficiency and rarefaction of air.

Objective: to study the effect of hypoxia on the functioning of the male reproductive system. A number of studies for the study of the male reproductive system under various damaging effects proves that hypoxia causes morphological and functional changes in semen indicators. A decrease in the total number of spermatozoa in the ejaculate and a violation of their motor activity leads to a decrease in the fertility of male rats. According to the data of spermatograms, more differentiated cells — spermatids and spermatozoa, as well as meiosis cells — spermatocytes, experience the most damaging effects under hypoxic conditions.

Methods: We conducted a survey of 620 men of reproductive age (22-48 years) living and working in the city of Surgut and having one or more own children.

Results: Analysis of the results revealed a sufficient number of men with one child of their own (more than 76%), and rather low rates in the category “3 or more” of their own children. Among those men who have one own child and are planning a second child, in more than a quarter of cases with regular sexual life, pregnancy does not occur. More than half of the men surveyed when planning for past pregnancies, the spouses applied and were examined by an andrologist, which indicates a high level of problems of the male reproductive system, the leading indicator of which is a decrease in sperm quantity and quality indicators (more than 71%).

Conclusions: Surgut City as well as part of Alaska (USA) and Canada belong to the regions of the Far North. Knowing about the negative impact of hypoxia on the normal functioning of the male reproductive system, andrologists working in the northern regions of our countries open up new horizons for studying this problem. Our survey of men of reproductive age living and working in the city of Surgut, revealed the presence of problems of the male reproductive system. Therefore, we need to combine our efforts to work in this direction.

Poster #128
DO BOAR BREED HAVE AN INTERACTION WITH EJACULATE FREEZABILITY?
Mariana Andrade Torres MsC, PhD candidate¹, Ana Carolina Pedrosa DMV², Zoltan Machaty Dr² and André Furugen Cesar de Andrade Dr²
¹Department of Animal Reproduction, University of São Paulo, Pirassununga - BR; ²Department of Animal Sciences, Purdue University, West Lafayette - USA

Predicting boar ejaculate freezability, prior to cryopreservation, is still a challenge. It is known that breed could affect raw and post-thawed semen quality; however, differences between Landrace (LD) and Large White (LW) is poorly described. This study aims to describe if LD and LW breeds have different freezability potential, as well as to characterize the obtained GFE (good freezability ejaculates) and PFE (poor freezability ejaculates) to total motility (TM), plasma and acrosomal membrane integrity (PAMI) and mitochondrial membrane potential (MMP). Twenty-seven ejaculated sperm-rich fractions of 15 LD and 12 LW boars were used for semen cryopreservation. Samples were extended 1:2, semen: BTS and held at 17 °C for 24 hours. After holding, samples were centrifuged (2100xg/3min), sperm pellets were extended in cryopreservation media (without cryoprotectant agent) to 1 x 10⁸ sperm/mL. After cooling to 5 °C in around 110 min, samples were re-diluted with cryopreservation media (6% glycerol and 6% methylformamide) to 1 x 10⁸ sperm/mL. Semen was packed into 0.5mL straws and cryopreserved with the conventional freezing method. Straws were arranged horizontally 3 cm above the liquid nitrogen level and exposed to liquid nitrogen vapor for 15 min. Two straws of each ejaculate were thawed in waterbath (37°C/30sec). Thawed semen was extended (TALP) to 30 x 10⁶ sperm/mL and evaluated by the CASA system. For flow cytometry, an aliquot was extended (TALP) to 5 x 10⁶ sperm/mL and stained with the following dyes: Propidium iodide (PI)/ fluorescein-conjugated Pisum sativum agglutinin (PAMI) and PI/ JC-1 (MMP). The data were analyzed by PROC MIXED on SAS Studio®, the means were evaluated using the Tukey Test. Ejaculates were selected as GFE or PFE based on the following criterion: GFE- TM and PAMI ≥ 30%; PFE-TM and PAMI ≤ 25%. None interaction (p > 0.05) between breed and freezability was found for all variables. GFE (n = 5) and PFE (n = 5) were different (p < 0.05, respectively) for TM (32.28 ± 1.58, 16.48 ± 2.13), PAMI (37.73 ± 3.99, 20.62 ± 2.24) and MMP (32.19 ± 2.94, 18.32 ± 3.43). Thus, GFE and PFE cannot be predicted by breed (LD or LW). Though it is clear that freezability varies among ejaculates, the molecular process that’s responsible for freezability is still unclear. Our next step is trying to understand the freezability mechanisms.

Poster #129
WITHDRAWN

Poster #130
TESTICULAR MATURATION ARREST (TMA): UNDERLYING ETIOLOGY AND DIFFERENCES BETWEEN EARLY AND LATE MATURATION ARREST
Prashant Kumar PhD, Manish Jain PhD and Ashutosh Halder MD, DNB, DM
AIIMS
Presented By: Ashutosh Halder, MD, DNB, DM

Introduction: In TMA testes fail to produce spermatozoa due to interruption of germ cell development and differentiation. TMA is classified into two distinct subtypes as early (pre-meiotic/meiotic i.e., not beyond 2° spermatocytes) and late (post-meiotic i.e., not beyond round spermatids) TMA. Etiology in about 50% cases are unknown. Here, we have carried out a prospective study to find out underlying etiology and differences between early and late TMA.

Methods: This study was based on 75 cases of idiopathic TMA (53 early and 22 late). All had normal secondary sex character, testosterone, prolactin and azoospermia. Mumps orchitis, varicocele, torsion, trauma, cryptorchidism or chemotherapy was excluded before inclusion. Testicular FNAC confirmed TMA. Chromosomal analysis, FISH, STS PCR, SNP microarray, DNA methylation ELISA, epigenomic microarray and heavy metals were investigated.

Results: Three cases of sex chromosome abnormalities (47,XXY and 46,XY dicentric), 14 cases of Yq microdeletion and many CNVs (mostly on sex chromosomes involving PAR & AZF regions) were detected. The recurrent CNVs detected were Yp11.31-p11.2 (17 cases with gain), Xq11.23 (7 cases with deletion), Xq11.23 (4 cases with deletion), Yq11.223-11.233 (3 cases with gain), Xp11.23 (7 cases with gain), Xq28 (5 cases with gain), 14q32.33 (3 cases with gain), 14q11.2 (3 cases with gain). Metylation DNA ELISA showed hypomethylation (extreme) in 5 and hypermethylation (mild) in 5 cases. Epigenomic array detected differential methylation between early and late TMA; for examples hypomethylation in GSTT1

© 2019 American Society of Andrology and European Academy of Andrology
Andrology, 2019, Supplement, 98
gene and hypermethylation in ACAP3 gene in both, in more early TMA. Multiple causes were evident more often than isolated etiology. Differences between early and late TMA is represented in the table.

**Conclusion:** Genomic & epigenetic factor as underlying etiology was evident in about 55% cases. These are CNVs of PAR & AZF, sex chromosome aneuploidies and hypo/ hypermethylation. Minimal critical region of AZFc deletion was 0.51 mb involving TTY5, RBMY2FP, RBMY1F, RBMY1J, TTY6 and PRY genes. The differences between early and late TMA was evident with CpG sites methylation differences & Yq microdeletions.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Early TMA</th>
<th>Late TMA</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases</td>
<td>214</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Average age (yr)</td>
<td>29.9 ± 6.2</td>
<td>31.3 ± 1.5</td>
<td>NS</td>
</tr>
<tr>
<td>Menantelephos (10%)</td>
<td>8.9 ± 4.3</td>
<td>8.6 ± 4.0</td>
<td>NS</td>
</tr>
<tr>
<td>FSH (mg/ml folic acid 0.25)</td>
<td>3.0 ± 1.5</td>
<td>3.0 ± 1.4</td>
<td>NS</td>
</tr>
<tr>
<td>T (mg/ml)</td>
<td>51.3 ± 15.8</td>
<td>52.6 ± 10.9</td>
<td>NS</td>
</tr>
<tr>
<td>LH (mg/ml)</td>
<td>11.8 ± 10.9</td>
<td>11.8 ± 10.9</td>
<td>NS</td>
</tr>
<tr>
<td>Testosterone (mg/ml)</td>
<td>11.8 ± 10.9</td>
<td>11.8 ± 10.9</td>
<td>NS</td>
</tr>
<tr>
<td>Chromosomal analysis</td>
<td>5 ± 2</td>
<td>5 ± 2</td>
<td>NS</td>
</tr>
<tr>
<td>TMA microdeletions</td>
<td>2 ± 1</td>
<td>2 ± 1</td>
<td></td>
</tr>
<tr>
<td>FSH (mg/ml folic acid 0.25)</td>
<td>3.0 ± 1.5</td>
<td>3.0 ± 1.4</td>
<td>NS</td>
</tr>
<tr>
<td>LH (mg/ml)</td>
<td>11.8 ± 10.9</td>
<td>11.8 ± 10.9</td>
<td>NS</td>
</tr>
<tr>
<td>Testosterone (mg/ml)</td>
<td>11.8 ± 10.9</td>
<td>11.8 ± 10.9</td>
<td>NS</td>
</tr>
<tr>
<td>Chromosomal analysis</td>
<td>5 ± 2</td>
<td>5 ± 2</td>
<td>NS</td>
</tr>
<tr>
<td>Average beta value</td>
<td>0.96 ± 0.56</td>
<td>0.96 ± 0.56</td>
<td>NS</td>
</tr>
<tr>
<td>ACF/P</td>
<td>0.6 ± 0.8</td>
<td>0.6 ± 0.8</td>
<td></td>
</tr>
<tr>
<td>ACF/P men = 0.05</td>
<td>0.6 ± 0.8</td>
<td>0.6 ± 0.8</td>
<td></td>
</tr>
<tr>
<td>TMA microdeletions</td>
<td>2 ± 1</td>
<td>2 ± 1</td>
<td></td>
</tr>
<tr>
<td>FSH (mg/ml folic acid 0.25)</td>
<td>3.0 ± 1.5</td>
<td>3.0 ± 1.4</td>
<td>NS</td>
</tr>
<tr>
<td>LH (mg/ml)</td>
<td>11.8 ± 10.9</td>
<td>11.8 ± 10.9</td>
<td>NS</td>
</tr>
<tr>
<td>Testosterone (mg/ml)</td>
<td>11.8 ± 10.9</td>
<td>11.8 ± 10.9</td>
<td>NS</td>
</tr>
<tr>
<td>Chromosomal analysis</td>
<td>5 ± 2</td>
<td>5 ± 2</td>
<td>NS</td>
</tr>
</tbody>
</table>

**Poster #131 ARE THERE ANY PREDICTIVE FACTORS FOR THE OUTCOME OF MICRO-TESE?**

**Prepared By:** Fotios Dimitriadis, MD, PhD, FEBU

**Objective:** We evaluated the role of hormones and the outcome of diagnostic testicular biopsy (DTB) in the prediction of the therapeutic testicular biopsy (TTB) result in non-obstructed azoospermic (NOA)-men.

**Participants and Methods:** NOA-men (n=50) underwent micro-TESE (MT). The major part of the resected tissue was processed for tissue mincing (TTB-fraction), whereas a minor part of the tissue was processed for hematoxylin-eosin stain (DTB segment). Binary logistic regression analysis (BLRA) was used to evaluate the overall diagnostic accuracy of several parameters to predict the TTB outcome. In this model, the presence of sperm in TTB was defined as the binary dependent variable.

**Results:** Spermatozoa were identified in TTB-samples in 22 men (44%). Among the DTB-samples of the above 50 men, 14 (28%) men, 25 (50%) men, or 11 (22%) men demonstrated Sertoli cell-only syndrome (SCOS), maturation arrest (MA), or hypospermatogenesis (HYPO), respectively. Using BLRA, it was found that men positive or negative for sperm in TTB could not be identified with high diagnostic accuracy by the peripheral serum levels of a) FSH (Area Under the ROC [Receiver Operating Characteristic Curve]; AUC = 0.62); of b) LH (AUC = 0.60); of c) testosterone (AUC = 0.587); of d) prolactin (AUC = 0.592), and of e) estradiol (0.545). In contrast, the ability of DTB to identify the subpopulation of men with positive TTB was relatively high (AUC = 0.892). DTB had an overall diagnostic accuracy of 78% to identify men positive or negative in TTB. The sensitivity, specificity, positive predictive value, and negative predictive value was 50% (95% CI 28.22-71.78), 100% (CI 87.66-100), 100%, and 71.79%, respectively. The sperm recovery rate in TTB samples was significantly larger in HYPO-men than in men with SCOS or MA (100% vs 7% or 40%, respectively; p<0.05; Chi-square test-Yates’ correction).

**Conclusions:** Among several hormonal or pathological parameters, DTB has the higher diagnostic accuracy to predict the MT outcome.
ABSTRACTS

Poster #133
GRANTING ACTIVITIES BY MALE CONTRACEPTIVE INITIATIVE
Logan Nickels PhD, Mitch Eddy PhD, Heather Vahdat MPH and David Sokal MD
Male Contraceptive Initiative
Presented By: Logan Nickels, PhD

Introduction and Objectives: Male Contraceptive Initiative (MCI), a 501(c)3 non-profit, is devoted to facilitating research & development of male contraceptives and building awareness among researchers, donors and the general public about the demand for and status of male contraceptive methods. Through multiple funding mechanisms, MCI has granted over $1.3 M USD directly to researchers since 2017.

Methods: MCI funding mechanisms are flexible, and are issued to impact research projects at multiple levels. All research grants are subject to external scientific review to ensure scientific integrity. MCI is also piloting fellowship and travel grant programs designed to allow trainees to develop their careers and establish forward-thinking research in the field.

Results Obtained: MCI has funded research towards a set of male methods with diverse approaches. Our $500,000 Discovery and Development award in 2018 was to a start-up for development of inhibitors against HIPK4, a novel testis-specific kinase required for fertility. MCI funds will allow the team to complete critical milestones related to target optimization and demonstration of proof-of-concept in vivo, allowing this promising lead to achieve a more favorable position for follow-on funding. In 2018, we awarded four separate $150,000 Seed Grants to academic institutions. These Seed Grants were awarded to proposals focused on developing a diverse set of approaches towards male contraception, including inhibition of CRISPR1, an epididyimal protein involved in capacitation and fertilization; development of allosteric inhibitors against the testis-specific serine kinases TSSK 1&2; pharmacological prevention of duct contraction and sperm transport; and development of SD1, an herbal isolate that causes deformations in sperm. These Seed Grants allow teams to complete specific challenges such as developing in vivo proof of concept, structure-activity relationships, and other work that de-risks targets, allowing them to attract follow-on funding and prepare for the next stage of development. In late 2018, MCI issued a request for proposals for the development of reversible vas-occlusive devices. Results were announced in early 2019.

Conclusions: MCI has found ways to impact and further research efforts on multiple levels. Our versatile funding schemes allow us to remain flexible and independent as we push development of non-hormonal male contraceptive options into and through the product development pipeline.

Poster #134
RESULTS OF RETROSPECTIVE ANALYSIS OF MALE INFERTILITY IN THE KYRGYZ REPUBLIC
Mirlan Aibashov
Scientific and Production Centre for Preventive Medicine, Bishkek, Kyrgyz Republic
Presented By: Mirlan Nurmatovich Aibashov, III

According to WHO experts, the situation regarding male infertility and the protection of male reproductive health causes concerns, there are reports that 40-50% of infertile marriages are related to the reproductive health of the male spouse. Retrospective epidemiologic analysis of the prevalence and incidence of infertility in the male population (ages 15-49 years) of the Kyrgyz Republic for the period 2003-2016 was carried out using data of the Republican Centre for Eclectic Health. Overall, there is observed a 3-fold increase in the prevalence of male infertility among persons of reproductive age in the Kyrgyz Republic (from 21.8 in 2003 to 66.4 per 100 000 population in 2016). It is especially graphic with grouped average measures for the periods of the years 2003-2009 and 2010-2016, revealing an increase in the incidence in the Kyrgyz Republic as a whole – from 58.0 to 79.6 per 100 000 population (+37.2%). The retrospective epidemiologic analysis of the prevalence and incidence of male infertility demonstrates the importance of this problem and the need for establishing andrologic service in the Kyrgyz Republic. It is necessary to conduct an assessment of reproductive health attitudes of males from different social groups, a comprehensive assessment of the efficiency of delivery of urologic, andrologic and STI services to men in the study area, to develop a new functional-organizational model for the protection of male reproductive health and to implement preventive measures at prevention of secondary male infertility in practice.

Poster #135
CORRECTIONS OF MIS-STATEMENTS ABOUT THE SCSA® TEST
Don Evenson PhD¹, Kay Kasperson BA² and Jennifer Christianson²
¹South Dakota State University, University of South Dakota, Dept of OB/GYN, SCSA Diagnostics; ²SCSA Diagnostics
Presented By: Donald P. Evenson, PhD, HCLD

Introduction: The first sperm DNA fragmentation test, the SCSA®, test, has been the subject of many peer reviewed manuscripts by numerous authors that have included misunderstood statements on what the SCSA test does or doesn’t do.

Objective: to evaluate statements made by other unnamed authors.

Methods: Review of published manuscripts that discuss what the SCSA® test does and doesn’t do.

Results: Statements by others are re-evaluated from our published data. 1. “The Sperm Comet® test is the most sensitive of all sperm DNA tests”. Not likely since the SCSA® test detects changes in extent of sperm DNA breaks on a scale of 1024 units + 5 units. 2. Sperm Comet® test is the only test that measures the actual damage in individual sperm”. No, the SCSA® test also measures actual DNA damage as verified by positive Comets of SCSA® defined sperm populations with increased red fluorescence. 3. “The Sperm Comet Test – The most accurate male fertility test”. No, the SCSA® test is more accurate since it is a machine-based, non-biased measure on 5 x 103 sperm with repeat measures having ~2% CV. 4. “The Sperm Comet® is the only test that measures the actual damage in individual sperm”. No, flow cytometers measure every single cell. The extent of damage in each sperm is defined on a SCSA® 1024 x 1024 scale. Sperm with those defined units have been flow cytometry sorted out for further characterization by Comet test, morphology and proteins. 5. “SCSA starts with an acid denaturation step and depends on the principle that abnormal DNA is more prone to further fragmentation by acid denaturation than intact DNA”. The acid does not cause further fragmentation; it only opens the strands at sites of broken DNA. 6. “Sperm Comet®: It only needs 5000 sperm compared to 1 million sperm for other DNA tests”. No, the suggested sperm concentration for SCSA® sampling is 1 x 106 per ml. 100 ul sample (1 x 105) used. Can concentrate by centrifugation.

Conclusions: These SCSA® test interpretations are backed by our nearly 200 peer reviewed manuscripts and book chapters and should be cited in other publications; data will be presented to validate the above statements.

© 2019 American Society of Andrology and European Academy of Andrology
Andrology, 2019, Supplement, 100
Infertility is a complex devastating disability affecting nearly 15% of reproductive age couples. Yet it is little known about the cause of male infertility; ~80% of men receive a diagnosis of unknown etiology. Using recent genomic research progress, we created comprehensive gene panel for non-obstructive azoospermia (NOA). The panel includes 39 genes confirmed to cause NOA in humans (OMIM), ~20 genes related to Kalman syndrome and 30 hypogonadal hypogonadism spectrum-related genes. It also includes sex determination genes (DSD, gonadal testicular and ovotesticular dysgenesis, n=15) and sex differentiation (steroid synthesis/receptors, n=19). We included ~100 gene-candidates that show a testis-specific tissue expression and male infertility phenotype (MGI). We performed comprehensive genome-wide study of single nucleotide variants (SNVs) and structural copy number variants (CNVs). We combined whole exome sequencing (WES) and comparative genomic hybridization (CGH). The combination permits seamless analytical updates when new gene discoveries responsible for infertility will be reported. For WES study, we utilized SureSelect AllExonV7 library (Agilent). For array CGH we employed Human SurePrintG3 400K platform (Agilent). Our initial validation study contains nearly 100 sporadic and 12 families with NOA males. These patients were evaluated for standard male infertility factors, semen analysis, FSH, L, and T hormones, ultrasonography, and for cytogenetic and Y-chromosome microdeletions. Patients with previously identified genetic results were excluded from the study. We evaluated gene panel using familial NOA cases. We prioritized variants that were co-segregated with the NOA phenotype, have predicted loss-of-function protein impact, and show minor allele frequency <0.001. These variants were running against the gene panel. Sporadic patients were analyzed using similar algorithm. We identified variants with mutation impact in 20/110 (18%) patients, nearly double detection rate in NOA. Variants detected show significant genetic heterogeneity; future genetic diagnostics could be significantly improved via SNVs and CNVs genomic detection. We hypothesize that refined SNV and CNV detection will detect mutations responsible for NOA in over 20% of patients. Further collaborative studies required to increase detection efficiency and simplify analytical burden of such highly heterogenous etiology. Key words: Genomics of male infertility, spermatogenesis, mutations.
**ASA 2018 - 2019 COMMITTEE LISTING**

### ANDROLOGY LABORATORY WORKSHOP
- Anna-Marie Bort, MLT, (ASCP)CME; Solon, OH (Chair)
- Martine Culty, PhD; Los Angeles, CA
- Erma Z. Drobnis, PhD, HCLD; Columbia, MO
- Shelby Kilduff, MLT (ASCP); Houston, TX
- Susan Kinser, BS; Lake Charles, LA
- Angela Reese, TS; Alliance, OH
- Suresh C. Sikka, PhD, HCLD, CC(ABB); New Orleans, LA

### ARCHIVES & HISTORY COMMITTEE
- David S. Karabinus, PhD, HCLD; Montpelier, VA (Chair)
- Naznazh Alladin, BSc; Toronto, ON Canada
- James Ford Jr., PhD; Mattawan, MI
- Sophie La Salle, PhD; Downers Grove, IL
- Camilla Ribeiro, PhD; Sao Paulo, Brazil
- Kenneth P. Roberts, PhD; Spokane, WA
- Carol Sloan, MS; Pittsboro, NC
- Anna Steinberger, PhD; Houston, TX
- Ronald Svedlof, MD; Torrance, CA

### AWARDS COMMITTEE
- John K. Amory, MD, MPH, MSc; Seattle, WA (Chair)
- Robert E. Brannigan, MD; Hinsdale, IL
- Gail A. Cornwall, PhD; Lubbock, TX
- Gail S. Prins, PhD; Chicago, IL
- Bernard Robaire, PhD; Montreal, QC Canada
- Jay I. Sandlow, MD; Milwaukee, WI
- Robert S. Viger, PhD; Quebec City, QC Canada
- Pablo E. Visconti, PhD; Amherst, MA

### BASIC SCIENCE WORKSHOP
- Elizabeth Snyder, PhD; New Brunswick, NJ (Chair)
- Mahmoud Aarabi, MD; Pittsburgh, PA
- Mark Baker, PhD; Callaghan, NSW Australia
- Alan Diekman, PhD; Little Rock, AR
- Thomas Garcia, PhD; Pearland, TX
- Clinton MacDonald, PhD; Lubbock, TX
- Cristian O’Flaherty, PhD, DVM; Montreal, QC Canada
- Luke Simon, PhD; Salt Lake City, UT
- Nima P. Zarandi, MD; Winston Salem, NC

### BYLAWS COMMITTEE
- John K. Amory, MD, MPH, MSc; Seattle, WA (Co-Chair)
- Erma Z. Drobnis, PhD, HCLD; Columbia, MO (Co-Chair)
- Sylvie Breton, PhD; Boston, MA
- George L. Gerton, PhD; Philadelphia, PA
- Peter Liu, MBBS, PhD, FRACP; Torrance, CA
- Jacques J. Tremblay, PhD; Quebec City, QC Canada

### CLINICAL SYMPOSIUM
- Michael L. Eisenberg, MD; Stanford, CA (Co-Chair)
- Kathleen Hwang, MD; Pittsburgh, PA (Co-Chair)
- Joseph P. Alukal, MD; New York, NY
- Peter Stahl, MD; Scarsdale, NY

### COMMUNICATIONS AND PUBLIC AFFAIRS COMMITTEE
- Sophie La Salle, PhD; Downers Grove, IL (Co-Chair)
- Patricia L. Morris, PhD, MS; Woodside, NY (Co-Chair)
- James M. Dupree IV, MD, MPH; Ann Arbor, MI
- Guillermo Galdon, MD; Winston-Salem, NC
- Brian P. Hermann, PhD; San Antonio, TX
- Rex A. Hess, PhD; Champaign, IL
- James F. Smith, MD, MS; Lafayette, CA
- Katja Teerds, PhD; Wageningen, Netherlands
- Alexander Yatsenko, MD, PhD; Pittsburgh, PA

### DIVERSITY COMMITTEE
- Carolina Jorgez, PhD; Houston, TX (Co-Chair)
- Hooman Sadri, MD, PhD; Winston Salem, NC (Co-Chair)
- Maria Christina W. Avellar, PhD; Sao Paulo, Brazil
- Christiaan de Jager, PhD; Pretoria, South Africa
- George L. Gerton, PhD; Philadelphia, PA
- Carol C. Linder, MA, PhD; Las Vegas, NM
- Peter Liu, MBBS, PhD, FRACP; Torrance, CA
- Patricia L. Morris, PhD, MS; Woodside, NY
- Camilla Ribeiro, PhD; Sao Paulo, Brazil
- Ana Maria Salicioni, PhD; Amherst, MA
- Gunapala Shetty, PhD; Houston, TX
- Pablo E. Visconti, PhD; Amherst, MA

### ENDOWMENT COMMITTEE
- Rudi Ansbacher, MD; Ann Arbor, MI
- Janice L. Bailey, PhD; Quebec, QC Canada
- Anna-Marie Bort, MLT, (ASCP)CME; Solon, OH
- Douglas T. Carrell, PhD, HCLD; Salt Lake City, UT
- Gail A. Cornwall, PhD; Lubbock, TX
- Sally P. Darney, PhD; Cary, NC
- Summer Goodson, PhD; Rockwell, NC
- Sarah Kimmins, PhD; Ste-Ann-de-Bellevue, QC Canada
- Michael A. Palladino, PhD; West Long Branch, NJ
- Gail S. Prins, PhD; Chicago, IL
- Bernard Robaire, PhD; Montreal, QC Canada
- Luke Simon, PhD; Salt Lake City, UT
- Paul J. Turek, MD; San Francisco, CA
- Donna L. Vogel, MD, PhD; Bethesda, MD
- Joseph P. Alukal, MD; New York, NY (Ex-Officio Member)
- Lawrence J. Becker, MD; Copley, OH (Ex-Officio Member)
- Kenneth P. Roberts, PhD; Spokane, WA (Ex-Officio Member)
- Susan A. Rothmann, PhD, HCLD; Cleveland, OH (Ex-Officio Member)

### ETHICS COMMITTEE
- George L. Gerton, PhD; Philadelphia, PA (Chair)

### FINANCE COMMITTEE
- Alan Diekman, PhD; Little Rock, AR (Chair)
- Sylvie Breton, PhD; Boston, MA
- George L. Gerton, PhD; Philadelphia, PA
- Kirk C. Lo, MD, FRCSC; Toronto, ON Canada
- Kenneth P. Roberts, PhD; Spokane, WA
- Susan A. Rothmann, PhD, HCLD; Cleveland, OH

### FUTURE MEETING PROGRAM COMMITTEE
- Polina Lishko, PhD; Lafayette, CA (Co-Chair)
- James F. Smith, MD, MS; Lafayette, CA (Co-Chair)
ASA 2018 - 2019 COMMITTEE LISTING

FUTURE MEETINGS COMMITTEE
George L. Gerton, PhD; Philadelphia, PA (Chair)
Janice L. Bailey, PhD; Québec, QC Canada
Alan Diekman, PhD; Little Rock, AR
Janice P. Evans, PhD; Baltimore, MD
Erwin Goldberg, PhD; Evanston, IL
Kirk C. Lo, MD, FRCSC; Toronto, ON Canada
John McCarry, BS, MS, PhD; San Antonio, TX
Charles H. Muller, PhD, HCLD; Seattle, WA
Michael A. Palladino, PhD; West Long Branch, NJ
Susan A. Rothmann, PhD, HCLD; Cleveland, OH

INDUSTRIAL RELATIONS COMMITTEE
Joseph P. Alukal, MD; New York, NY (Chair)
Mohit Khera, MD, MBA, MPH; Houston, TX
Tobias S. Kohler, MD, MPH, FACS; Rochester, MN
James M. Hotaling, MD MS FEC; Salt Lake City, UT
Kirk C. Lo, MD, FRCSC; Toronto, ON Canada
Allen D. Seftel, MD, FACS; Camden, NJ

INTERNATIONAL LIAISON COMMITTEE
Elisabetta Baldi, PhD; Florence, Italy (Chair)
Patricia S. Cuasnicu, PhD; Buenos Aires, Argentina (Co-Chair)
Maria Christina W. Avellar, PhD; São Paulo, Brazil
Akanksha Mehta, MD; MS; Atlanta, GA
Robert Quinlan, PhD; Québec, QC Canada
Christina Wang, MD; Torrance, CA

JOURNAL COMMITTEE
Rex A. Hess, PhD; Champaign, IL (Chair)
John K. Amory, MD, MPH, MSc; Seattle, WA
Gail A. Cournall, PhD; Lubbock, TX
Daniel G. Cyr, PhD; Lavel, QC Canada
Robert S. Viger, PhD; Québec City, QC Canada

JOURNAL EDITORS
Douglas T. Carrell, PhD; HCLD; Salt Lake City, UT (Editors-In-Chief)
Manuela Simoni, MD, PhD; Modena, Italy (Editors-In-Chief)

LIAISON COMMITTEE
Cristian O’Flanerty, PhD, DVM; Montreal, QC Canada (Chair)
Martine Culty, PhD; Los Angeles, CA
James M. Dupree IV, MD; MPH; Ann Arbor, MI
Michael L. Eisenberg, MD; Stanford, CA
James F. Smith, MD; MS; Lafayette, CA
Christina Wang, MD; Torrance, CA

LOCAL ARRANGEMENTS COMMITTEE
Robert E. Brannigan, MD; Hinsdale, IL (Co-Chair)
Christopher Payne, PhD; Chicago, IL (Co-Chair)

MEMBERSHIP COMMITTEE
Martine Culty, PhD; Los Angeles, CA (Chair)
Mary K. Sampalski, MD; Los Angeles, CA (Chair)
Maria Christina W. Avellar, PhD; São Paulo, Brazil
Clemence Belleannée, PhD; Québec, QC Canada
Alan Diekman, PhD; Little Rock, AR
Jennifer R. Hughes, PhD; Urbana, IL
Katherine Loveland, PhD; Ashburnton, VIC Australia
Takashii Shinohara, PhD; Saky, Japan
Luke Simon, PhD; Salt Lake City, UT

NOMINATING COMMITTEE
Susan A. Rothmann, PhD, HCLD; Cleveland, OH (Chair)
John K. Amory, MD, MPH, MSc; Seattle, WA
Janice L. Bailey, PhD; Québec, QC Canada
Kathleen Hwang, MD; Pittsburgh, PA
Mary M. Lee, MD, FAAP; Wilmington, DE
Vassilios Papadopoulos, DPharm, PhD; Los Angeles, CA
Christina Wang, MD; Torrance, CA

PROGRAM COMMITTEE
Kathleen Hwang, MD; Pittsburgh, PA (Co-Chair)
Wei Yan, MD, PhD; Reno, NV (Co-Chair)
Joseph P. Alukal, MD; New York, NY
Christopher Barratt, PhD; Dundee, United Kingdom
Robert E. Brannigan, MD; Hinsdale, IL
Martine Culty, PhD; Los Angeles, CA
Michael L. Eisenberg, MD; Stanford, CA
Sophie La Salle, PhD; Downers Grove, IL
Akanksha Mehta, MD; MS; Atlanta, GA
Ralph G. Meyer, PhD; Mendon, UT
Ajay K. Nangia, MBBS, FACS; Kansas City, KS
Jon M. Oatley, PhD; Pullman, WA
Alexander W. Pastuszak, MD, PhD; Salt Lake City, UT
Gail P. Risbridger, PhD; Melbourne, Australia
Peter N. Schlegel, MD; FACS; New York, NY
Mark Sigman, MD; Providence, RI
Alexander J. Travis, VMD, PhD; Lithaca, NY
Jacques J. Tremblay, PhD; Quebec City, QC Canada
Monika A. Ward, MSc, PhD; Honolulu, HI
Miles F. Wilkinson, PhD; La Jolla, CA

TESTIS WORKSHOP
Vassilios Papadopoulos, DPharm, PhD; Los Angeles, CA (Chair)
Amanda L. Clark, MD; Portland, OR
Leslie L. Heckert, PhD; Kansas City, KS
Barry T. Hinton, PhD; Charlotteville, VA
Kathleen Hwang, MD; Pittsburgh, PA
Sarah Kimmins, PhD; Ste-Amm-de-Bellevue, QC Canada
Katherine Loveland, PhD; Ashburt, VIC Australia
Stuart B. Moss, PhD; Bethesda, MD
David Page, PhD; Cambridge, MA
Gail S. Prins, PhD; Chicago, IL
Takashi Shinohara, PhD; Saky, Japan
Katja Teerds, PhD; Wageningen, Netherlands
Jacqueta M. Trasler, MD, PhD; Montreuil, QC Canada
Christina Wang, MD; Torrance, CA
Wei Yan, MD, PhD; Reno, NV

TRAINEE AFFAIRS
Ryan Flannigan, MD; Vancouver, BC Canada (Chair)
Matthew R. Marcello, PhD; New York, NY (Co-Chair)
Jennifer R. Hughes, PhD; Urbana, IL (Trainee Representative)
Nima P. Zarandi, MD; Winston Salem, NC (Trainee Representative)
Mahmoud Aarabi, MD PhD; Pittsburgh, PA
Alan Diekman, PhD; Little Rock, AR
James Foster, PhD; Ashland, VA
George L. Gorten, PhD; Philadelphia, PA
Barry T. Hinton, PhD; Charlotteville, VA
Sophie La Salle, PhD; Downers Grove, IL
Polina Lishko, PhD; Lafayette, CA
Michael A. Palladino, PhD; West Long Branch, NJ
Budhan S. Pukazhenthi, DVM, PhD; Front Royal, VA
Hooman Sadri, MD, PhD; Winston Salem, NC
Ana Maria Salicioni, PhD; Amherst, MA
Mary Katherine Sampalski, MD; Los Angeles, CA
Luke Simon, PhD; Salt Lake City, UT
Elizabeth Snyder, PhD; New Brunswick, NJ
Donna L. Vogel, MD, PhD; Bethesda, MD

WOMEN IN ANDROLOGY
Maria Christina W. Avellar, PhD; São Paulo, Brazil (Chair)
Martine Culty, PhD; Los Angeles, CA (Vice Chair)
Nina S. Davis, MD, FACS; Portland, OR (Past Chair)
Sophie La Salle, PhD; Downers Grove, IL
Elizabeth Snyder, PhD; New Brunswick, NJ

© 2019 American Society of Andrology and European Academy of Andrology
Andrology, 2019, Supplement, 103
THANK YOU

2019 Silver Level Partner

2019 Exhibitors
Androvia LifeSciences LLC
Aytu Bioscience
Endo Pharmaceuticals
Feel Good, Inc.

2019 Educational Grant Supporters
American Urology Association, Inc.

2019 Meeting Contributors
The Eunice Kennedy Shriver National Institute of Child Health and Development
International Society of Andrology
The Lalor Foundation
Male Contraceptive Initiative
The National Institute of Environmental Health Services
SCSA Diagnostics, Inc.