On October 12, 2009 the Center for Reproductive Science held its 30th Minisymposium on Reproductive Biology. Participants and attendees came from across the country to take part in this annual event. We were honored to have Dr. Linda Giudice, Professor and Chair, Department of Obstetrics, Gynecology and Reproductive Sciences at University of California, San Francisco, as our keynote speaker and the recipient of the Neena B. Schwartz Lectureship in Reproductive Science award. The keynote address was entitled, “Endometriosis: Interplay of Estrogen and Progesterone.”

Our alumni speakers this year were Dr. Bradley Cooke (Woolley Lab), Assistant Professor of Psychology at Georgia State University, Dr. Alan Diekman (Goldberg Lab), Associate Professor of Biochemistry and Molecular Biology at University of Arkansas for Medical Sciences and Dr. Janice Urban (Levine Lab), Associate Professor of Physiology and Biophysics at Chicago Medical School. They reflected on their experiences as trainees at Northwestern University and gave valuable advice about pursuing different types of careers in reproductive biology.

The 30th Annual Minisymposium was sponsored in part by the Offices of the President and Vice President for Research at Northwestern University and the Robert H. Lurie Comprehensive Cancer Center. These generous sponsorships help the Center for Reproductive Science continue its tradition of offering trainees from universities within Illinois and the surrounding states the opportunity to present their research and provide a forum for scientific exchange. This year set a record for attendance with 195 registrants, with students from six different universities presenting their work. Each year, the Minisymposium is organized by a selected group of trainees along with the CRS staff and remains free to all attendees.
FROM THE DIRECTOR....

I hope this issue of Reproduction Matters finds you all well, and I wish you all a joyous holiday season. In this issue, we highlight our 30th Minisymposium on Reproductive Biology, which was a huge success. I want to thank our keynote speaker, Dr. Linda Giudice, and our alumni speakers, Drs. Jan Urban, Alan Diekman, and Brad Cooke for their superb talks and interaction with our trainees. A special thanks to the student organizing committee, and congratulations to the student award winners featured in this issue.

I alerted you last year to anticipated changes to the Minisymposium, and those changes are now upon us. Over its history, the Minisymposium has drawn considerable participation from the greater Midwest, and especially from other universities in the state of Illinois. Led by CRS, interested faculty from throughout the state met to explore ways in which this relationship might evolve. This also afforded an opportunity to reflect on the outstanding history and promising future of reproductive biology research in the state of Illinois. Pioneers in reproductive biology including Neena Schwartz, Andy Nalbandov, and Jack Gorski did groundbreaking work here. More recent generations have taken up this mantle, and a very significant fraction of research funded by the NICHD Reproductive Sciences Branch is presently carried out in the state. An impressive number of recent leaders in key professional societies including the Society for the Study of Reproduction, the Endocrine Society, the American Society for Reproductive Medicine, the American Society of Andrology, and the Society for Gynecologic Investigation hail from Illinois. One tangible benchmark of this recognition of the state is that 3 of the 16 NICHD national Specialized Cooperative Centers in Reproduction and Infertility Research are presently located in Illinois, at Northwestern, UIUC and UIC.

To celebrate our strong research and educational heritage and to provide a forum for the career development of the next generation of Illinois reproductive biologists, the group elected to initiate a rotating annual statewide symposium. Its goals will be to foster the exchange of scientific information in the reproductive sciences, to facilitate the training and career development of future reproductive scientists, and to leverage our collective institutional strengths to maintain Illinois in a preeminent nationwide position in this critical research field. Thus, the 30th Minisymposium on Reproductive Biology was co-designated the 1st Illinois Symposium on Reproductive Biology. We were very pleased to have a record number of abstract submissions from throughout the state. The 2nd Illinois Symposium will be hosted by UIC in the fall of 2010, and the 3rd Illinois Symposium will be hosted by UIUC in the fall of 2011. We anticipate an eventual rotation among these, and likely additional institutions of higher learning, within the Prairie State.

Finally, remember - with growing concern about an increasing world population and a deteriorating environment - reproduction matters!

CRS FOUNDER, FACULTY AND MEMBERS GUESTS ON “MENTORING IN ACTION” PANEL

The Galter Health Sciences Library, the Institute for Women’s Health Research, and the Women Faculty Organization hosted a special event in honor of the exhibit Changing the Face of Medicine, Celebrating America’s Women Physicians, on Monday, December 7. Prior to a reception where attendees viewed the exhibit in the lobby of the Robert H. Lurie Medical Research Center, a “Mentoring in Action” informative panel discussion with current and future women leaders in science and medicine occurred. Following welcome remarks by James Shedlock AMLS, AHIP, FMLA, director of the Galter Health Science Library, and Linda Van Horn, Ph.D. RD, on behalf of the Women Faculty Organization, Teresa Woodruff, Ph.D. (pictured), discussed the history of women’s medical education in Chicago in the late nineteenth century. Her talk was followed by a question and answer session which she moderated between the audience and Sarah Rodriguez, Ph.D., a post-doctoral fellow in medical humanities with the Oncofertility Consortium and the Center for Bioethics, Science and Society on the history of women and medical education. After a question and answer session in which several of the 80 participants asked questions, three remarkable women at varying stages in their careers shared their career paths and the importance of mentorship in their lives. Neena Schwartz, Ph.D., Erica Marsh, M.D. MSCI, and Candace Tingen BS, BA (pictured) each spoke about the changing face of medicine at Northwestern. The session then adjourned to a reception near the National Library of Medicine exhibit.
The hypothalamus is a region of the brain that serves as a reproductive organ—one that is arguably as important as the ovaries or testes themselves in maintaining fertility and maximizing reproductive success. Pubertal maturation, ovulatory cyclicity, and sexual behavior are just three of the critically important reproductive processes that depend upon normal hypothalamic function. Dr. Jon E. Levine and his laboratory investigate the molecular, cellular, and physiological mechanisms that mediate the hypothalamic control of these vital neuroendocrine activities. Their work focuses on two major questions in reproductive neuroendocrinology: 1) How do physiological signals regulate hypothalamic gonadotropin-releasing hormone (GnRH) neurons, which govern pituitary secretions and gonadal function, and 2) How do gonadal hormones, in turn, exert their “feedback” actions in hypothalamic neurons?

A major effort in the Levine laboratory is directed towards understanding the molecular and cellular signaling mechanisms that mediate the actions of the estrogen, estradiol-17β (E₂), in the hypothalamus. Ovarian E₂ serves as a major feedback signal that regulates GnRH neurosecretion and hence, normal reproductive cyclicity. Disruption of these regulatory actions are thought to underlie features of a common form of infertility in women, called polycystic ovary syndrome (PCOS). The Levine laboratory has conducted several new studies that have revealed the molecular mechanisms that mediate these E₂ signals in the brain. Estrogen receptor alpha (ERα) appears to mediate most of these E₂ feedback actions, as disruption of ERα signaling leads to a loss of feedback regulation of GnRH neurosecretion and infertility. ERα signaling mechanisms may include “classical genotropic” effects mediated by direct binding of receptor dimers to DNA, “non-classical genotropic” effects involving tethering of ERs to other transcription factors, and “non-classical non-genotropic” actions mediated by cytoplasmic ERs coupled to membrane-initiated signal transduction pathways. In collaboration with the Jameson lab at the FSM, Levine’s studies are making use of novel ERα mutant mouse models to ascertain the cellular mechanisms by which ERα mediates E₂ effects on these physiological processes. Using mice that have been genetically engineered to allow only “non-classical” cellular pathways to mediate E₂ actions, these studies have revealed a previously unknown cellular action of E₂ that conveys its regulatory actions in the brain. This newly discovered signaling mechanism, involving an enzyme called “p21 activated kinase”, or PAK, may operate as an E₂-induced “switch” that increases or decreases the patency of synapses between nerve cells, and may therefore influence the level of activity in target brain circuitries. The Levine laboratory is pursuing the role that PAKs may play in pathophysiological alterations in brain sensitivity to estrogens, such as that which may occur in PCOS.

Ovarian E₂ is also an important regulator of energy homeostasis and body weight, and these actions are believed to be exerted in large part in hypothalamic neurons. Diminishment of E₂ levels, such as that occurring during menopause, is associated with a significant increase in risks for the development of obesity, diabetes, and cardiovascular disease. A major line of research in the Levine laboratory is focused on determining the molecular and cellular signaling mechanisms that mediate the effects of E₂ on body weight. Their work has recently revealed that non-classical ERα signaling is sufficient to normalize energy balance and body weight in obese ERα null mutant mice. Levine’s laboratory is now pursuing an understanding of the cell populations in which these signals are generated, and the downstream signaling mechanisms that mediate the effects on energy homeostasis.

Additional studies in the Levine laboratory are designed to identify the neuropeptidergic cell groups that are targets of estrogen actions. Cell-specific gene targeting is being used to conditionally ablate ERα from specific hypothalamic neuronal populations, such as those that express the neuropeptide kisspeptin; these studies have already revealed that kisspeptin neurons serve as important targets of E₂ feedback effects in the brain, as preliminary experiments demonstrate that kisspeptin-cell specific ERα deletion results in an abrogation of feedback control of GnRH release and acyclicity.

Dr. Levine is a Professor in the Department of Neurobiology and Physiology and Director of a NIH/NICHD-supported Training Program in Reproductive Biology. Levine also serves as co-director of a NIH/ORWH/NICHD Specialized Center for Research and is currently a P.I. on a project within the CRS administered NIH/NICHD Program Project Grant. He has been a member of CRS since its inception.


Biyasheva A, Legro RS, DunaiF A, Urbanek M. Evidence for association between polycystic ovary syndrome (PCOS) and TCF7L2 and glucose intolerance in women with PCOS and TCF7L2. (2009) *JCEM* 94(7):2617-25


Bak, B.; Carpio, L.; Kipp, J. L.; Lamba, P.; Wang, Y.; Ge, R. S.; Hardy, M. P.; Mayo, K. E.; Bernard, D. J. (2009). Activins Regulate 17beta-hydroxysteroid Dehydrogenase Type 1 Transcription in Murine Gonadotrope Cells. *Journal of Endocrinology* 1:201, 89-104


Constance Campbell Memorial Research Awards

**Oral Division:**

**1st Place**- Lavanya Anandan, University of Illinois: “Identification of a unique integrator of the mitogenic effects of steroid hormone growth factor pathways in the mammary gland and a potential oncogene of breast tumorigenesis”

**2nd Place**- Maricedes Acosta-Martinez, Northwestern University: “Kisspeptin-cell-specific deletion of estrogen receptor alpha (ERα) results in advanced pubertal onset and estrous acyclity in female mice”

**3rd Place**- Alison Kim, Northwestern University: “Transition metals are accumulated and functionally required during meiotic maturation and zygotic development of mouse oocytes”

**Poster Division:**

**1st Place** - Michael VanGompel, Northwestern University: “The conserved germ cell factor boule is necessary for mammalian spermiogenesis but not meiosis”

**2nd Place** - Daniel Trombly, Northwestern University: “Functionalized gold nanoparticles: A novel method for gene knockdown in reproductive tissues”

**3rd Place** - Antonina Frolova, Washington University: “GLUT1 is essential for endometrial stromal cell decidualization”

**3rd Place** - Cristina Thomas, Northwestern University: “Macrophage influence on pre-pubertal follicle development in mice”

For more information on the CRS Minisymposium please visit: www.northwestern.edu/research/crs

Photos by: Ingrid Cox
CRS ANNOUNCEMENTS

CRS Founder Publishes Book

CRS Founder and past director, Dr. Neena Schwartz, will have her autobiography “A Lab of My Own” published by Rodopi Publishers for their Lived Values, Valued Lives series in 2010. For more information and to place an order for the book, go to www.rodopi.nl/

2009-2010 Seminar Speakers

Alan Herbisson, Ph.D
University of Otago
New Zealand
10/22/09, 4-5 p.m.
Pancoe/Abbott Auditorium, EV

Diego Castrillon, M.D., Ph.D
University of Texas
Southwestern Med. Center
12/09/09, 4-5 p.m.
Pancoe/Abbott Auditorium, EV

Shahin Rafi, M.D.
Cornell University
2/18/10, 3-4 p.m.
Lurie Bldg., Baldwin Auditorium, CH

Patricia Hunt Ph.D.
Washington State University
3/24/10, 4-5 p.m.
Lurie Bldg., Rm. 4-133, CH

Nick Webster, Ph.D.
University of California, S.D.
3/10/10, 4-5 p.m.
Cook Hall- 3118 A/B, EV

Senyon Choe, Ph.D.
Salk Institute
4/21/10, 4-5 p.m.
Cook Hall- 3118 A/B, EV

Susan Fisher, Ph.D.
University of California
San Francisco
5/26/10, 3-4 p.m.
Pritzker Pavilion, Feinberg, CH