



33rd Annual Symposium in Reproductive Science and Women's Health

**University of Kentucky ES Good Barn
and the Lexington Convention Center
March 26th and 27th, 2014**



University of Kentucky Forum for Reproductive Science and Women's

33rd Annual UK Symposium in Reproductive Science and Women's Health

Wednesday, March 26

3:00-6:00pm Trainee presentations- E. S. Goodbarn on the UK campus
7:00pm ES Good Barn Dinner: Billy's Bar-B-Que, Attendees
8:30pm Transport to the Hyatt- TBA

Thursday, March 27

Lexington Convention Center

8:30-9:00 AM Registration and breakfast

9:05 AM Welcome (Room TBA)

9:15 - 10:30 AM Session 1: Richard Schultz, PhD. Moderator: Linah Al-Alem, PhD.
Associate Dean for the Natural Sciences
and Charles and William L. Day Distinguished Professor of Biology
Department of Biology, University of Pennsylvania
"From egg to embryo: a peripatetic journey"

10:30-10:45 AM Break

10:45 AM-12:00 PM Session 2: Doug Antczak, PhD.
Moderator: Igor Frederico Canisso, DVM
Professor, James A. Baker Institute for Animal Health
College of Veterinary Medicine, Cornell University
"Epigenetic regulation of gene expression in the placenta"

12:00 – 1:30 PM Lunch, Mentor Recognition and Keynote Address
Bluegrass Ballroom

1:30-1:45 PM Break

1:45 - 3:00 PM Session 3: Humphrey Hung-Chang Yao, Ph.D.
Moderator: Katheryn Cerny
National Institute of Environmental Health Sciences (NIEHS/NIH)
"How to Make an Ovary: from Organogenesis to Cell Fate Determination "

3:00 - 5:30 PM Posters and Refreshments

Thursday, March 27, 2014

Session 1: 8:30 AM

Room TBA

Moderator: Linah Al-Alem, PhD.



Richard Schultz, PhD

Associate Dean for the Natural Sciences and Charles and William L. Day Distinguished Professor of Biology
Department of Biology, University of Pennsylvania

"From egg to embryo: a peripatetic journey"

<http://www.bio.upenn.edu/people/richard-schultz>

Research Interests:

Our laboratory has diverse interests in the journey of the egg to form an embryo. These include: Molecular mechanisms of egg activation, RNAi in mouse oocytes and preimplantation embryos, Maternal age-associated increase in incidence of aneuploidy, Regulation of degradation of maternal mRNA and Effect of culture on gene expression and behavior.

Molecular mechanisms of egg activation

Changes in egg calcium homeostasis following sperm-egg fusion initiate events that constitute egg activation, e.g., cortical granule exocytosis, cell cycle resumption. Fertilization induces an initial rise in Ca²⁺, followed by a series of Ca²⁺ oscillations of shorter duration. This oscillatory behavior is acquired following oocyte maturation, occurs only in the 1-cell embryo, and ceases following pronucleus formation. We are pursuing how Ca²⁺ oscillations are linked to recruitment/degradation of maternal mRNAs, and changes in gene expression occurring during pre- and post-implantation development.

RNAi in mouse oocytes and preimplantation embryos

RNA interference (RNAi) operates in mouse oocytes and preimplantation embryos where oocytes deficient in Dicer do not undergo proper maturation and maternal mRNA degradation does not occur correctly. miRNA-mediated degradation of maternal mRNAs is not a robust pathway in oocytes and the failure of Dicer-deficient oocytes to mature properly can be ascribed to failure to generate endo-siRNAs. Oocyte maturation triggers an abrupt transition in which most mRNAs are significantly degraded. We noted that CDK1-mediated phosphorylation of MSY2 triggers this transition. Current studies are focused on deciphering why this pathway does not function robustly in oocytes, what pathways are involved in maternal mRNAs degradation and their role in embryo transition and early development.

Effect of culture on gene expression and behavior

The use of assisted reproductive technologies (ART) to treat human infertility is gaining widespread use. Retrospective studies have unmasked an increased incidence of certain syndromes due to loss-of-imprinting, highlighting the concern about ART. Culture conditions can perturb global patterns of gene expression in mouse embryos such as biallelic expression of the imprinted H19 gene in the blastocyst, which persists in extra-embryonic tissue following implantation. We have developed a mouse model to study the effects of embryo culture. Cultured embryos exhibited specific behavioral alterations in anxiety and spatial memory. We are pursuing these studies by (1) examining the effect of culture conditions on the expression of global and imprinted genes (2) altering the culture conditions to minimize or eliminate the behavioral consequences of culture (3) mimicking clinical procedures known to produce "low quality eggs" and their effect on gene expression in embryos and offspring behavior.

Thursday, March 27, 2014

Session 1: 10:00 AM

Room TBA

Moderator: Igor Frederico Canisso, DVM



Doug Antczak, PhD

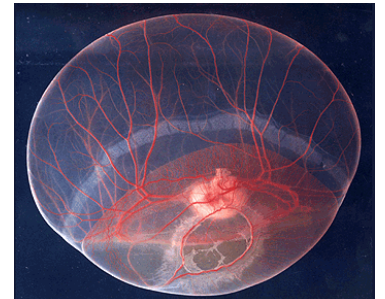
Professor, James A. Baker Institute for Animal Health
College of Veterinary Medicine, Cornell University

"Epigenetic regulation of gene expression in the placenta"

<http://bakerinstitute.vet.cornell.edu/faculty/view.php?id=176>

Equine Genetics Center

A day 33 horse conceptus, showing the principal components of the developing placenta. The invasive band of cells of the chorionic girdle are poised to migrate into the uterus at day 36-38 to establish the dramatic structures of the endometrial cups. The cup cells are the sole source of equine chorionic gonadotropin, and they also provide a strong immunological stimulus to the mare at this critical stage of equine pregnancy.



For 20 years our program has focused on the biological interactions that take place between a mother and fetus during pregnancy. In particular, we are concerned with how the placenta and fetus avoid recognition and destruction by the maternal immune system. This is an intriguing question that has broad applications to many areas of biology and medicine, including organ transplantation and cancer biology.

In the course of these studies our laboratory has acquired expertise in three important areas of equine medicine: immunology, genetics, and reproduction. The immunological assays we have developed for our research are also used to characterize immune system defects in horses admitted to the Large Animal Hospital at Cornell. Our reproductive studies have led to new ways to study the growth and function of the placenta. Finally, our genetic studies have been fundamental to the international collaboration of the Horse Genome Project.

Because of the laboratory resources that we have developed here at the Baker Institute, we are in a unique position to investigate the complex interactions between mother and fetus. Our studies are of relevance not only to horses, but to other animals and to human health.

Moderator: Katheryn Cerny



Humphrey Hung-Chang Yao, Ph.D.

National Institute of Environmental Health Sciences (NIEHS/NIH)

"How to Make an Ovary: from Organogenesis to Cell Fate Determination "

<http://irp.nih.gov/pi/humphrey-yao>

Research Topics

Compelling animal evidence and human epidemiological data have revealed that impairment of fetal organ development has profound consequences on adult health. This concept of "fetal origins of adult diseases" also applies to the reproductive systems where formation of most reproductive organs is completed before birth. Defects in reproductive organ formation manifest as birth defects in severe cases (i.e. pseudohermaphroditism). However, minor abnormalities are often left undetected and become a potential cause of fertility problems and neoplasia when the affected individual reaches adulthood. Our Group is using organogenesis of the gonads and reproductive tracts as the model to understand the basic process of organ formation as well as the potential implication on impacts of endocrine disruptor exposure on reproductive system development in fetuses and fertility in adulthood. Reproductive organs are one of the few organs that exhibit dramatic sex-specific pattern of dimorphic development. This unique pattern of development provides a model system to understand not only the mechanism of sexual differentiation, but also how progenitor cells make decision to differentiate into tissue-specific cell types, the fundamental concept of embryology. Synopses of two major projects are provided below:

1. Identify the sources of somatic cell lineages in the fetal gonads and investigate how they acquire their organ-specific identities

Organs are composed of common cell types and specialized cell types that define the unique functions of the organs. These specialized cells are thought to originate from organ-specific progenitor cells and acquire their identity during embryogenesis. Using mouse gonads as a model organ we study how progenitor cells make decision to differentiate into various tissue-specific cell types. Testis and ovary derive from a common primordium during embryogenesis. The primordium, through cell autonomous fate determination and intercellular signaling, gives rise to cell types unique to testis (Sertoli, Leydig, and peritubular myoid cells) and ovary (granulosa, theca, and unknown somatic stem cells). Using genetic lineage tracing mouse models, we characterize the progenitor cells in the primordium and study their sex specification process.

2. Define the cellular and molecular processes that lead to sexually dimorphic establishment of the reproductive tracts

Before sexual differentiation occurs, embryos are anatomically bisexual as they possess both male and female reproductive tracts. These two tracts derive from two separate progenitor systems in the fetal mesonephros: Wolffian duct for the male tract and Müllerian duct for the female tract. In male embryos, Wolffian ducts are maintained by testis-derived androgens while Müllerian ducts undergo regression induced by anti-Müllerian hormone, also a product of testes. Female embryos, which do not produce androgens or anti-Müllerian hormone (AMH), experience the opposite where Müllerian ducts are maintained and Wolffian ducts undergo regression. In search of novel regulators in this process, we discovered the presence of orphan nuclear receptor COUPTFII in the mesenchyme of the mesonephros. Inactivation of COUPTFII specifically in the mesonephric mesenchyme leads to maintenance of both Wolffian and Müllerian ducts in the male and female mouse embryos. COUPTFII in the mesenchyme of the mesonephros appears to be a molecular switch that controls the decision-making process of the identity of reproductive tract progenitors.