
Gordon Research Conferences
frontiers of science
Germinal Stem Cell Biology
Programming and Reprogramming the Vertebrate Germline
June 18-23, 2017
The Chinese University of Hong Kong
Chair: Peter Koopman
The University of Queensland, Australia
Vice Chair: Monika A. Ward
The University of Hawaii, USA
www.grc.org/programs.aspx?id=15863

Third Gordon Research Conference on Germinal Stem Cell Biology

Germ cells play a unique and crucial role as the carriers of genetic information from one generation to the next. Intense interest has centered on their origins, how their properties and behavior are regulated genetically and epigenetically, and the molecular signals that drive meiosis and gamete formation.

Insights into these processes are crucial for understanding and managing a range of human reproductive disorders including infertility, environmental endocrine disruption, and gonadal cancers. They hold tremendous untapped potential for application in biotechnology and agriculture.

Especially topical is the issue of how germ cells relate to other types of stem cell: how their pluripotency is controlled, and how germline stem cells can be experimentally deprogrammed and reprogrammed. Moreover, recent research has raised the prospect of generating functional gametes from induced pluripotent stem cells, and differentiated somatic cells from germline stem cells.

Recent advances in germline genome editing have raised new possibilities for human disease treatment and agricultural biotechnology.

This conference will assemble leading scientists at the forefront of international research in a range of vertebrate systems. It is designed to have broad appeal for developmental, reproductive and stem cell scientists working in basic biology, biotechnology, agriculture and clinical settings. As a venue for presenting unpublished findings and for robust discussion, the conference will highlight emerging trends and define new research directions.

Invited talks featuring thought leaders and emerging stars in the field, selected by a scientific advisory board of renowned experts, form the backbone of the conference.

Several speaking opportunities have been reserved for **talks selected from abstracts**, and late-breaking advances, to further enrich the program.

Three **poster sessions** will be a forum for students, postdocs and lab leaders alike to present and discuss their work among the top experts in the field, providing unparalleled collaborative and networking opportunities.

Finally, **panel discussion sessions** will address some of the major current challenges in the field, and set the course for future research.

The location on the green and fragrant campus of the Chinese University of Hong Kong, welcoming participants to explore one of the world's most vibrant cities and a gateway to the academic centres of East Asia.

A number of **travel subsidies** will be available for eligible students and postdocs, on application.

Scientific program

Molecular Specification of Germline Cells

Discussion leader: Azim Surani

Confirmed speakers:

- **Naoko Irie**, University of Cambridge, UK
  Uncovering the Molecular Network that Establishes the Human Germline
- **Jenny Nichols**, Cambridge Stem Cell Institute, UK
  Acquisition and Maintenance of Pluripotency in the Mammalian Embryo
- **Kathy Niakan**, Francis Crick Institute, UK
  Mechanisms of Lineage Specification in Human Embryos and Stem Cells

Programming Fetal Germ Cells

Discussion leader: Peter Koopman

Confirmed speakers:

- **Josephine Bowles**, The University of Queensland, Australia
  Regulation of Fetal Germ Cell Development
- **Yumiko Saga**, National Institute of Genetics, Japan
  Role of Nanos Proteins in Male Germ Cell Development
- **Blanche Capel**, Duke University, USA
  Navigating the Germline Stem Cell to Pro-Spermatogonia Transition

Spermatogonial Stem Cells and their Niche

Discussion leader: Jon Oatley

Confirmed speakers:

- **Brian Hermann**, University of Texas at San Antonio, USA
  Conservation of a Spermatogonial Stem Cell Barcode in Mice and Humans
- **Erika Matunis**, Johns Hopkins University, USA
  Regulation of Cell Identity in the Drosophila Spermatogonial Stem Cell Niche

- **Shosei Yoshida**, National Institute for Basic Biology, Japan
  Dynamics of Spermatogenic Stem Cells in the Open Niche Environment
- **Chris Geyer**, East Carolina University, USA
  Germ Cell Isthmuses in the Developing Testis

Ex-vivo Orchestration of Germline Development

Discussion leader: Mitinori Saitou

Confirmed speakers:

- **Yayoi Obata**, Tokyo University of Agriculture, Japan
  Maturing Embryonic Ovarian PGCs into Functional Oocytes in Culture
- **Takehiko Ogawa**, Yokohama City University, Japan
  Production of Gametes in Testis Organ Culture
- **Kazuhiro Kawamura**, St Marianna University, Japan
  Infertility Treatment Through In Vitro Activation of Follicles

Epigenetic Reprogramming of the Germline

Discussion leader: Amander Clark

Confirmed speakers:

- **Azim Surani**, The University of Cambridge, UK
  Epigenetic Regulation of Potency and Competency for Cell Fate Decisions
- **Weizhi Ji,** Yunnan Key Laboratory of Primate Biomedical Research, China
  Methylation Analysis of Germline Cells in Rhesus Monkey
- **Déborah Bourc'his**, Instutut Curie, France
  Learning ABC in the Male Germline
- **Wolf Reik**, The Babraham Institute, UK
  Single Cell Epigenomics

Making Gametes from Stem Cells in Vitro

Discussion leader: Wai-Yee Chan

Confirmed speakers:

- **Mitinori Saitou,** Kyoto University, Japan
  In Vitro Reconstitution of Germ Cell Development
- **Xiaoyang Zhao,** Southern Medical University, China
  Mammalian Germ Cell Generation In Vitro
- **Katsuhiko Hayashi**, Kyushu University, Japan
  Verification of Artificial Oocytes from Stem Cells
- **Amander Clark**, University of California LA, USA
  Enhancing Germline Differentiation from Human Pluripotent Stem Cells

Environmental Effects and Transgenerational Inheritance

Discussion leader: John McCarrey

Confirmed speakers:

- **John Aitken**, University of Newcastle, Australia
  Transgenerational Inheritance: Paternal Impacts on the Mutational Load
- **Anne Ferguson-Smith**, University of Cambridge, UK
  Non-genetic Inheritance in a Mouse Model
- **Sarah Kimmins**, McGill University, Canada
  Environmental Programming of the Heritable Sperm Epigenome
- **Qi Chen**, University of Nevada, Reno, USA
  Sperm RNAs in epigenetic inheritance

Genetic Influences on the Developing Germline

Discussion leader: Monika Ward

Confirmed speakers:

- **Matt Lorincz**, University of British Columbia, Canada
  Methylome, transcriptome and imprintome in mouse oocytes and early embryo
- **John McCarrey,** University of Texas at San Antonio, USA
  Genetic integrity of male germline stem cells
- **John Schimenti,** Cornell University, USA
  Genome maintenance mechanisms in germ cells

Medical and Biotechnological Applications of Germ Cell Research

Discussion leader: Chris Lau

Confirmed speakers:

- **James Turner**, Francis Crick Institute, UK
  Reprogramming-Mediated Chromosome Correction: Application to Human Sex Chromosome Trisomies
- **Jon Oatley**, Washington State University, USA
  Germline Ablation and Transplantation in Livestock
- **Scott Fahrenkrug**, Recombinetics, USA
  Editing Germ Cell Lineages for Targeted Trait Addition and Horizontal Amplification

Additional discussion sessions

- *Origin and Functional Dynamics of Spermatogonial Stem Cells: Reconciling the Models.*
  Discussion leader: Jon Oatley
- *Transgenerational Epigenetic Inheritance – Fact or Folly? Only the Germ Line Knows for Sure!*
  Discussion leader: John McCarrey

Speaker bios

John Aitken, PhD, DSc, FAHMS, FRSE, FAA
https://www.newcastle.edu.au/profile/john-aitken

Prof. John Aitken is Director of the Priority Research Centre for Reproductive Science at the University of Newcastle, Australia. His research focus has been the cell biology of mammalian germ cells, particularly in the male. This interest extends from the fundamental molecular mechanisms that regulate the differentiation of male germ cells in the testes to the development of clinical improvements in capacity to diagnose and treat male infertility. Special areas of expertise include proteomic analyses of spermatozoa and oocytes, techniques for the identification of spermatogonial stem cells and defining key elements of their niche, maturation and capacitation of spermatozoa, control of sperm function through partitioning of key proteins into lipid rafts on the plasma membrane, and the role of oxidative stress in the aetiology of DNA damage in the germ line.

Déborah Bourc'his, PhD
http://ugbdd.curie.fr/en/team-bourchis

Dr Déborah Bourc'his is Head of the the Epigenetic Decisions and Reproduction group in the Department of Genetics and Developmental Biology at the Institut Curie in Paris, France. Her research focuses on the role of DNA methylation in mammalian gametogenesis and embryogenesis. Her group uses the mouse as a mammalian model, and extends knowledge to human through collaborations with fertility centers; their work involves use of precise genetic tools (CRISPR) and genome-wide sequencing approaches. Her most recent work highlights the remarkable evolution of the DNA methyltransferase machinery in mammals and its tight link with the selective pressure to maintain reproductive fitness.

Josephine Bowles, PhD
http://researchers.uq.edu.au/researchers/383

Dr Jo Bowles is a Senior Research Fellow in the School of Biomedical Science at the University of Queensland, Brisbane, Australia. Her research team aims to understand the signalling that instructs naïve germ cells to embark on either oogenesis or spermatogenesis. The group also studies the etiology of testicular germ cell cancer and how abnormal regulation during fetal life predisposes germ cells to tumorigenesis during adult life. Key discoveries include: 1) that retinoic acid in the fetal ovarian environment triggers germ cells to begin meiosis; 2) that testicular germ cell fate is regulated by FGF signalling; and 3) that the Nodal/Cripto signalling pathway regulates male germ cell pluripotency and is abnormally active in certain forms of testis cancer.

Blanche Capel, PhD
http://www.cellbio.duke.edu/blanche-capel/

Dr Blanche Capel is a James B. Duke Professor of Cell Biology at Duke University Medical Center, USA. Blanche's group studies the cell and molecular pathways that regulate organogenesis of the testis and ovary and the biology of germ cells in the testis and ovary. Much of her work centres on understanding how the intracellular program in germ cells, in combination with regulation from the niche within the gonad, lead to the transition of germ cells from a pluripotent state into pro-spermatogonia. Experimental approaches in the Capel lab revolve around organ culture, transgenic mice, confocal microscopy and live imaging, biochemical and molecular techniques, comparative embryology, classic mouse genetics, transcriptomics and systems biology.

Qi Chen, MD, PhD
http://qichen-lab.info

Qi Chen is Assistant Professor in the Department of Physiology and Cell Biology at University of Nevada, Reno School of Medicine, USA. His lab recently discovered that tsRNAs (tRNA-derived small RNAs) are highly enriched in the mature sperm and serum with evolutionary conservation. His group also showed that sperm tsRNAs could act as epigenetic factors in mediating intergenerational inheritance of acquired traits. The current mission of the Chen lab is to address the open questions that how paternally acquired traits can be "memorized" in the sperm, encoded in the form of sperm RNAs and RNA modifications; and how these epigenetic information carried by sperm can transmit paternally acquired phenotypes via shaping early embryo development.

Amander Clark, PhD
https://clark.mcdb.ucla.edu/accordnew/

Dr Amander Clark is Professor and Vice Chair of the Department of Molecular Cell and Developmental Biology at the University of California Los Angeles. Her research seeks to understand the cell and molecular mechanisms that affect the germline and impact on human fertility. Using stem cells, her goal is to develop strategies to regenerate cells that are lost or damaged following cancer therapy so as to improve the quality of life for cancer survivors. Her laboratory also studies the origins of the human germline with an emphasis on understanding epigenetic reprogramming and inheritance, using mouse and pluripotent stem cell models. The long-term objective is to understand the fundamental principles of human germline formation towards the genesis of high quality gametes and the birth of healthy children.

Scott Fahrenkrug, PhD
http://www.recombinetics.com/about-us/

Dr. Scott Fahrenkrug is Founder, Chairman of the Board and Chief Scientific Officer of Recombinetics, Inc. He is an academic, inventor, entrepreneur and a recognized leader in livestock genetics and genomics. Prior to founding Recombinetics, Scott was tenured faculty in the Department of Animal Science at the University of Minnesota, where he earned a PhD in Molecular, Cellular, Development Biology and Genetics. He was a member of the Center for Genome Engineering, the Stem Cell Institute and the Masonic Cancer Center. He co-founded Spring Point Project, a non-profit organization focused on developing cures for diabetes using swine cells and tissues, and he served as a molecular geneticist at the USDA Meat Animal Research Center. With Recombinetics, Scott aims to apply the gene-editing revolution to improve and lengthen human lives, and to sustainably and clinically improve and grow agriculture to help feed the world's growing population.

Anne Ferguson-Smith, PhD, FMedSci
http://www.gen.cam.ac.uk/research-groups/ferguson-smith

Prof. Anne Ferguson-Smith is Wellcome Trust Senior Investigator, Professor and Head of Department of Genetics at the University of Cambridge, UK. Her lab focuses on the molecular events governing pre- and postnatal mammalian development, in particular investigating the epigenetic mechanism(s) controlling gene expression and the epigenetic control of genome function in embryos and stem cells. The lab integrates both 'wet' and 'dry' research with bioinformatics and in silico genomics activities taking place alongside molecular genetics laboratory research, high-throughput genomics, stem cell and tissue culture approaches and the use of mouse and zebrafish genetic and developmental models.

Chris Geyer, PhD
http://www.ecu.edu/cs-dhs/anatomy/faculty/geyer.cfm

Christopher Geyer is Assistant Professor in the Department of Anatomy and Cell Biology in the Brody School of Medicine at East Carolina University, USA. His laboratory uses mouse spermatogenesis as a model system to investigate mechanisms involved in regulating cellular differentiation. Current interests include investigating how the foundational spermatogonial stem cell population is formed and defining the signals that control the balance between proliferation and differentiation in the developing male germline.

Katsuhiko Hayashi, PhD
http://hyoka.ofc.kyushu-u.ac.jp/search/details/K005449/english.html

Katsuhiko Hayashi is Professor in the Department of Stem Cell Biology and Medicine in the Faculty of Medical Sciences, Kyushu University, Japan. His research interests include studying the molecular mechanisms underlying primordial germ cell specification, understanding the functional interaction between germ cells and gonadal somatic cells, and reconstitution of germ cell development in vitro. In recent work published and featured in Nature, his group transformed mouse skin cells into eggs in a dish, and used those eggs to make fertile pups - the first creation of eggs entirely outside a mouse. This work paves the way for producing artificial human eggs without needing to implant immature cells into ovaries to complete their development.

Brian Hermann, PhD
http://hermannlab.utsa.edu

Brian Hermann is an Assistant Professor in the Department of Biology at the University of Texas at San Antonio. He is part of a growing group of stem cell biologists at UTSA who study the stem cell system underlying spermatogenesis, essential for male fertility. A primary interest of his lab is understanding the fundamental biology of these spermatogonial stem cells, their origin during male germline development, and use of stem cells to regenerate spermatogenesis. They are also actively pursuing approaches to preserve fertility in prepubertal male cancer patients.

Naoko Irie, PhD
http://www.gurdon.cam.ac.uk/research/surani

Dr Irie is a Research Associate in the laboratory of Azim Surani, The Wellcome Trust/Cancer Research UK Gurdon Institute, University of Cambridge, UK. She established a cell culture system for human germ cell development, which led to the identification of factors crucial for human primordial germ cell (hPGC) specification. This work provides a robust model for understanding germ cell disorders, germ cell biology as well as the potential impact of environmentally induced epigenetic modifications, their inheritance, and consequences for subsequent generations.

Weizhi Ji, PhD
http://www.swchina.wisc.edu/cvs/cvji.pdf

Dr Wezhji Ji, formerly Director of the Kunming Institute of Zoology, Chinese Academy of Sciences, leads a program at Yunnan Key Laboratory of Primate Biomedical Research, China. His research centres on the reproductive biology of primates, in vitro culture of primate gametes, and use of reproductive technologies for the conservation of endangered primates. More recently his work has focused on targeted gene manipulation in monkeys. His group has recently achieved success with CRISPR/Cas9, heralding a new era of biomedicine in which complex human diseases can be modeled in monkeys. While the work is still in the phase of technology development and basic comparative molecular and cell biology, his group hopes to create monkeys with Parkinson's disease and other brain disorders, with a view to identifying early markers of the disease and studying the mechanisms that allow it to progress.

Kazuhiro Kawamura, MD, PhD
http://www.grantforfertilityinnovation.com/en/gfi_2014/winners/Kazuhiro_Kawamura.html

Dr Kazuhiro Kawamura is Professor and Director of the Reproduction and Infertility Center at St Marianna University, Japan. As a practicing clinician, his research work centres on infertility treatment of patients with diminished ovarian reserve using in vitro activation of follicles. His group found that activation of dormant primordial follicles though PI3K signaling pathway and fragmentation of ovaries promoted actin polymerization and disrupted ovarian Hippo signaling, leading to increased expression of downstream growth factors, promotion of follicle growth, and the generation of mature oocytes. In this way they successfully retrieved mature oocytes in POI patients resulting in successful pregnancy and birth.

Sarah Kimmins, PhD
http://kimminslab.com

Dr Sarah Kimmins is an Associate Professor in the Departments of Animal Science and Pharmacology and Therapeutics, and Associate Director of the Centre for Research in Reproduction and Development at McGill University, Canada. She holds a Canada Research Chair in Epigenetics, Reproduction and Development. Her group studies how paternal health, in particular diet and exposure to toxicants, affects the development and health of offspring using a combination animal models and transgenic approaches. Her research group is working with indigenous and vulnerable populations and Canadian men in Ontario, with a particular focus on understanding how environmental exposure information is transmitted via the heritable information in the sperm epigenome. Their finding that disruption of histone methylation in developing sperm impairs offspring health transgenerationally was published in Science in 2015.

Matthew Lorincz, PhD
http://lorinczlab.ca/index.html

Dr Matt Lorincz is a Professor in the Department of Medical Genetics at the University of British Columbia, Canada and Head of the Molecular Epigenetics Group at the Life Science Institute. Focussing on the germline, early mouse embryos and embryonic stem cells, his lab is using conditional knock-outs to dissect the roles of histone H3K9 methyltransferases and "readers" of H3K9 methylation in transcriptional regulation of genes and LTR retrotransposons. His group is also currently characterizing the role of active LTRs in shaping the transcriptome and methylome in female germ cells, using CRISPR/Cas9 to study the consequences of deletion of candidate "domesticated" elements in vivo.

Erika Matunis, PhD
http://cellbio.jhmi.edu/people/faculty/erika-matunis-phd

Dr Erika Matunis is a Professor and Principal Investigator at the Johns Hopkins School of Medicine, USA. Her research focuses on how stem cells renew and differentiate. She uses the fruit fly testis as a model system, studying the molecular signals that control whether germ line stem cells form more stem cells or become sperm. Her team recently discovered that cells transitioning into sperm can be redirected back in to stem cells, allowing her to focus on the molecular mechanisms that underpin germ cell programming and reprogramming.

John McCarrey, PhD
http://gsbs.uthscsa.edu/faculty/john-mccarrey-ph.d

Dr John McCarrey is a Professor in the Department of Biology, and the Robert and Helen Kleberg Distinguished Chair in Cellular & Molecular Biology at the University of Texas at San Antonio. Research in his laboratory is centered on mammalian germ cells and stem cells, using mouse, baboon, and opossum models. Specific interests include the epigenetic regulation of cell functions: determination of cell fates, maintenance of genetic integrity, regulation of gene expression, genomic imprinting, X-chromosome inactivation and meiotic sex chromosome inactivation. Additional interests in the lab include epigenetic defects ("epimutations") induced by methods of assisted reproduction, transgenerational epigenetic inheritance, the evolution of tissue-specific gene expression in mammalian species, and developing the baboon as a model system for testing stem cell-based therapeutic applications.

Kathy Niakan, PhD
https://www.crick.ac.uk/research/a-z-researchers/researchers-k-o/kathy-niakan/projects/

Dr Kathy Niakan is a group leader at the Francis Crick Institute, UK, investigating the mechanisms of lineage specification in human embryos and stem cells. Her research focuses on the molecular mechanisms that regulate embryonic stem cell pluripotency and how these are disengaged during cellular differentiation. Her group seeks to define the genetic hierarchy acting during differentiation, the influence of extracellular signalling and the extent to which these mechanisms are conserved between humans and mice. In 2016, Kathy became the first scientist in the world to gain regulatory approval to edit the genomes of human embryos for research.

Jennifer Nichols, PhD
http://www.stemcells.cam.ac.uk/researchers/principal-investigators/dr-jennifer-nichols

Dr Jenny Nichols is a group leader at the Cambridge Stem Cell Institute, and reader of embryonic pluripotency in the Department of Physiology, Development and Neuroscience, University of Cambridge, UK. Her research seeks to illuminate how pluripotency is specified, maintained and relinquished during development in mouse and human embryos – knowledge that is crucial for establishing protocols for efficient capture and controlled differentiation of stem cells for research and therapy. They use a combination of genetic modification, ex vivo culture and molecular profiling to investigate the roles of relevant pluripotency factors and signalling pathways. Currently, they are using chimaeras to investigate early lineage segregation in the host embryo in response to administration of normal or mutant ES cells.

Jon Oatley, PhD
http://www.smb.wsu.edu/faculty-trainees-and-staff/faculty/jon-oatley

Dr Jon Oatley is an Associate Professor in the School of Molecular Biosciences, and the Director of the Center for Reproductive Biology, at Washington State University, USA. His laboratory studies the mechanisms guiding development and maintenance of the germline stem cell pool in the mammalian testis. The lab is also interested in the development of strategies to enhance reproductive capacity in male livestock including genetic engineering to produce recipients for germline stem cell transplantation.

Yayoi Obata, PhD
http://www.ics-com.biz/nodai/undergraduate/faculty/biosciences/bioscience.html

Dr Yayoi Obata is a Professor in the Laboratory of Animal Developmental Biology, Department of Bioscience at the Tokyo University of Agriculture, Japan. Her research focus is the in vitro growth of immature oocytes as a means of understanding the mechanisms underlying oocyte development and of potentially providing new treatments for infertility. Her group recently reported the first reconstitution of the entire process of mammalian oogenesis in vitro from primordial germ cells.

Takehiko Ogawa, MD, PhD
http://www.tsurumi.yokohama-cu.ac.jp/proteome/ogawa/en/index.html

Dr Takehiko Ogawa is a Professor in the Laboratory of Biopharmaceutical and Regenerative Sciences, Institute of Molecular Medicine and Life Science, Yokohama City University, Japan. He has worked as as a clinical urologist for more than 20 years, while simultaneously indulging a life-long passion for germ cell research instilled during post-doctoral work with the respected pioneer, Dr Ralph Brinster. His research efforts centre on recapitulating spermatogenesis in culture to allow mechanisms of spermatogenesis to be studied in detail, and impacting on human fertility treatment. His group succeeded in producing functional sperm from SSCs with the testis of mouse using an organ culture method, the first demonstration of complete mammalian spermatogenesis achieved outside the body.

Wolf Reik, PhD, FRS, FMedSci
http://www.babraham.ac.uk/our-research/epigenetics/wolf-reik

Professor Wolf Reik is Head of the Epigenetics Programme and Associate Director at the Babraham Institute, Professor of Epigenetics at the University of Cambridge, and Associate Faculty at the Sanger Institute, UK. Wolf's early work led to the discovery that genomic imprinting is based on DNA methylation. His lab discovered epigenetic reprogramming in mammalian development and is interested in its roles in stem cell biology, inheritance, and ageing. Their current work addresses the mechanisms of genome-wide demethylation in the mammalian germ line, links between reprogramming and pluripotency, the potential for transgenerational epigenetic inheritance, and the role of epigenetic mechanisms in experimental reprogramming. His lab also develops new epigenomics technologies especially in single cells.

Yumiko Saga, PhD, DSc
https://www.nig.ac.jp/nig/research/organization-top/organization/saga

Professor Yumiko Saga is Head of the Mammalian Development Laboratory at the National Institute of Genetics, Mishima, Japan. Her research team is interested in the mechanisms of germ cell development—sex differentiation of the germline, establishment of spermatogonial stem cells, and RNA-mediated germ cell regulation—in mice, especially studying the function of RNA binding proteins, Nanos2 and Nanos3. They aim to elucidate the target RNAs of these key germ cell factors to understand the events associated with Nanos-mediated RNA regulation. Recently her group has introduced CAS9-mediated genome editing method to facilitate mutant mouse production.

Mitinori Saitou, MD, PhD
https://www.med.kyoto-u.ac.jp/E/grad_school/introduction/1103/

Professor Mitinori Saitou is in the Department of Anatomy and Cell Biology at Kyoto University, Japan. His research focuses on the mechanism of germ cell development, in particular the dynamic regulation of the genome and epigenome involved in acquisition of totipotency. Through understanding the regulatory basis for germline stem cell characteristics, his group aims to control them appropriately in vitro. Using pluripotent stem cells (ESCs and iPSCs), they have succeeded in reconstituting the mouse germ-cell specification pathway in culture, leading to sperm and oocytes with full developmental potential. Recently they have analysed early germ cell development in primates, and are studying the induction of human germ cells from human iPSCs, both with a view to application of germ cell research to human reproduction.

John Schimenti, PhD
http://schimentilab.vertebrategenomics.cornell.edu

John Schimenti is Professor of Genetics and Director, Center for Vertebrate Genomics, Cornell University, USA. His laboratory uses the mouse as a model system to investigate the genetics of mammalian development, gametogenesis, and cancer. He has used forward and reverse genetic technologies to mutagenize the mouse genome and identify novel genes involved in these processes. With respect to gametogenesis, he is using mutant mouse models to identify and understand genes required for recombination and chromosome behaviour during meiosis. Of particular interest are "quality control" mechanisms which normally protect against chromosome aberrations that can lead to birth defects in offspring.

Azim Surani, PhD, CBE, FRS, FMedSci
http://www.gurdon.cam.ac.uk/research/surani

Professor Azim Surani is Director of Germline and Epigenomics Research at the Gurdon Institute, and a Member of the Physiology, Development and Neuroscience Department at the University of Cambridge, UK. His group has established principles for the mechanisms of cell fate determination and epigenetic programming that are widely applicable to human development and disease. Further, by developing an in vitro model, and with authentic hPGCs from human embryos, they have also established how pluripotent cells gain competence for germ cell fate in human, compared with mouse. Ultimately, they aim to exploit the knowledge gained from studies on germ cells by creating in vitro models for induced epigenetic reprogramming, and using these models towards attempts at rejuvenation of somatic cells.

James Turner, MD, PhD
https://www.crick.ac.uk/research/a-z-researchers/researchers-t-u/james-turner/

Dr James Turner leads the Sex Chromosome Biology Laboratory at The Francis Crick Institute, London, UK. His research focuses on the evolution and epigenetics of X chromosome inactivation, and the role of the X chromosome in germ cell development, in order to understand how these chromosomes influence human health and disease. Previous work from his lab showed that the mammalian X is dominated by genes involved in spermatogenesis, with around 18 per cent of all X-genes expressed in developing sperm. They have also identified a surveillance mechanism, meiotic silencing, that inactivates genes on unpaired meiotic chromosomes, and is mediated by the DNA damage proteins BRCA1, ATR and histone H2AFX. This mechanism is likely to play a major role in the infertility phenotypes seen in patients with chromosome abnormalities.

Shosei Yoshida, MD, PhD
http://www.nibb.ac.jp/en/sections/developmental_biology/yoshida/

Professor Shosei Yoshida heads the Division of Germ Cell Biology, National Institute of Basic Biology, Okazaki, Japan. His laboratory aims to understand the mammalian spermatogenic stem cell system essential for long-lasting spermatogenesis and producing the next generation. Using techniques such as intravital live imaging and pulse labelling, his group has been analysing spermatogenic stem cell behaviour over-time, in vivo, at single-cell resolution. He also investigates the anatomical and molecular aspects of stem cell regulation in the niche microenvironment. Based on these observations, his group explores the mechanism underlying the stem cell homeostasis at the level of population dynamics.

Xiao-Yang Zhao, PhD
http://sourcedb.cas.cn/sourcedb_ioz_cas/yw/scs/pi/201110/t20111012_3361711.html
http://app.smu.edu.cn:81/supervisor/view.aspx?id=2701

Dr Xiao-Yang Zhao received a PhD in Developmental Biology from the Institute of Zoology, Chinese Academy of Sciences, and is currently at Southern Medical University, Guangzhou, Guangdong province, China. His group recently reported a method to make mouse sperm in a dish, which were then used to produce offspring. His team is currently trying to make Mouse and human PGCs mature in vitro, using human testicular tissue from patients.