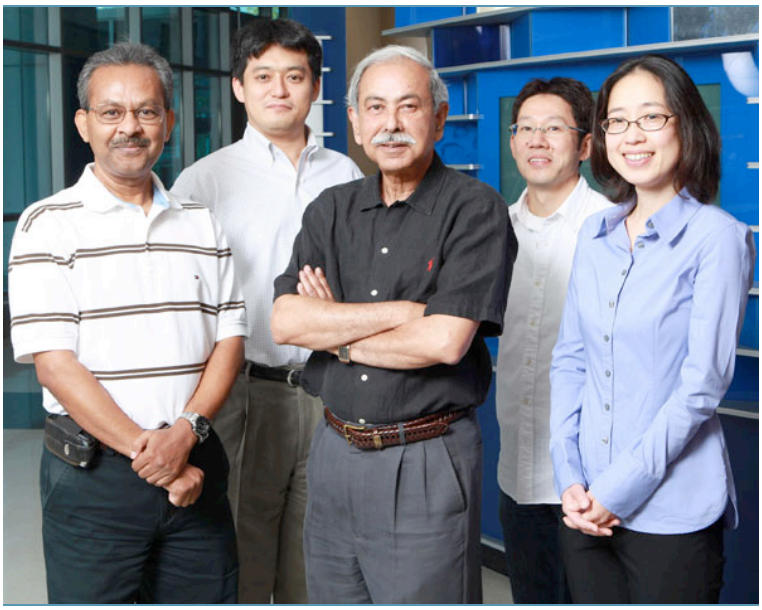
Reproductive Sciences

Division Photo



Left to Right: S. Das, S. Namekawa, S. Dey, Y. Ogawa, T. Daikoku

Division Data Summary

Research and Training Details

Number of Faculty	5
Number of Joint Appointment Faculty	1
Number of Research Fellows	9
Number of Research Students	3
Number of Support Personnel	8
Direct Annual Grant Support	$1,000,481
Peer Reviewed Publications	8

Significant Publications

Hirota Y, Daikoku T, Tranguch S, Xie H, Bradshaw HB, and Dey SK. Uterine-specific p53 deficiency confers premature uterine senescence and promotes preterm birth in mice. J Clin Investigation 120(3):803-815, 2010. PMCID in process.

This work demonstrated, for the first time, that premature uterine senescence provokes preterm delivery. This opens up avenues of treatment for the prevention of preterm birth. This article was highlighted in Nature Medicine (March 2010, 16[3]: 276-277) and rated exceptional by both the Faculty of 1,000 Biologists and Faculty of 1,000 Medicine. This article also received media attention.

Sun X, Jackson L, Dey SK, and Daikoku T. In pursuit of Lgr5 regulation and function in the uterus. Endocrinology 150:5065-5073, 2009. PMCID: PMC2775985.

This paper reported the first evidence for expression of Lgr5, an orphan receptor known for its presence in stem cells in the intestines and skin, in the uterus. The uniqueness of its expression suggests that this gene is required to maintain uterine responsiveness to steroid hormonal stimulation. This paper was highlighted on the journal cover.

Burnum KE, Cornett DS, Puolitaival SM, Milne SB, Myers DS, Tranguch S, Brown HA, Dey SK, and Caprioli RM. Spatial and temporal alterations of phospholipids determined by mass spectrometry during mouse embryo implantation. J Lipid Res 50(11):2290-2298, 2009, PMCID: PMC2759835.

This paper shows in vivo localization of lipid mediators in the uterus in the context of implantation, using in situ mass spectrometry analysis on uterine sections during implantation. This work shows, for the first time, the in situ molecular interactions of various lipid signaling molecules. This article was highlighted on the cover of the journal.

Division Highlights

Dr. S. K. Dey

Dr. S. K. Dey served as the Issue Editor for the Journal of Clinical Investigation's Reproductive Biology Review Series (120: 952-1023, 2010).

Dr. S. K. Dey

Dr. S. K. Dey, Dr. Yasushi Hirota (postdoctoral fellow) and Jeeyeon Cha (graduate student) were invited to contribute a "bed to benchside" column for Nature Medicine. Hirota Y, Cha J, Dey SK. Revisiting Reproduction. Prematurity and the puzzle of progesterone resistance. Nature Medicine 16: 529-531, 2010

Dr. S. K. Dey, Dr. Sanjoy Das

Faculty members serve on the editorial boards of Molecular Reproduction and Development, Biology of Reproduction, Reproduction, Prostaglandins and Other Lipid Mediators, the Journal of Clinical Investigation, Molecular Human Reproduction and PLoS One.

Dr. Sanjoy Das, Dr. S. K. Dey

Dr. Sanjoy Das served on four NIH ad hoc grant review committees in FY10; Dr. Dey served on one committee.

Dr. S. K. Dey

Dr. S. K. Dey served as a project evaluator for the Reproductive Biology Program of the Science Foundation of Ireland in June 2010.

Dr. S. K. Dey

Dr. S. K. Dey gave invited lectures at Northwestern University and Rutgers University, and was the keynote speaker at the Updates in Infertility Treatment meeting in Seville, Spain (sponsored by Ferring Pharmaceuticals).

Dr. Sanjoy Das

Dr. Sanjoy Das was an invited presenter at the Frontiers in Periimplantation Biology, SKLRB symposia at the Institute of Zoology, Chinese Academy of Sciences, Beijing, China, in May 2010.

Division Collaboration

Collaboration with Neonatology; Pulmonary Biology

Collaborating Faculty: Dr. Jeffrey Whitsett

Examining KLF5 and subsequent female reproductive phenotypes.

Collaboration with Developmental Biology

Collaborating Faculty: Dr. Steve Potter

Exploring Hoxa genes and associated female reproductive phenotypes.

Collaboration with Endocrinology

Collaborating Faculty: Dr. Stuart Handwerger

i). Epigenetic regulation of uterine receptivity for embryo implantation and ii) Uterine decidualization and developmental control of decidual cell polyploidy.

Collaboration with Molecular Immunology

Collaborating Faculty: Dr. Christopher Karp; Dr. Senad Divanovic

CB2 signaling and immunity

Faculty Members

Sudhansu K. Dey, PhD, Professor ; *Division Director; Lova Riekert Chair*
Research Interests: Pregnancy and implantation; reproductive cancers

Takiko Daikoku, PhD, Research Assistant Professor
Research Interests: Reproductive cancers; blastocyst implantation

Sanjoy Das, PhD, Associate Professor
Research Interests: Uterine decidualization; environmental estrogens

Satoshi Namekawa, PhD, Assistant Professor
Research Interests: Epigenetics of germ cells; X chromosome inactivation

Yuya Ogawa, PhD, Assistant Professor
Research Interests: Molecular mechanisms of X chromosome inactivation

Joint Appointment Faculty Members

Jade Lim, PhD, Adjunct Assistant Professor
Konkuk University, Korea
Embryo Implantation

Trainees

- **Nuray Acar, MS,** Akdeniz University, Antalya, Turkey
- **Jeeyeon Cha, BS,** University of Cincinnati, Medical School
- **Daesuk Chung, PhD,** University of Colorado
- **Hidetoshi Fujita, PhD,** University of Tsukuba, Tsukuba, Japan
- **Tomoko Fujita, PhD,** University of Tsukuba, Tsukuba, Japan
- **Fei Gao, PhD,** Vanderbilt University
- **Yasushi Hirota, MD, PhD,** University of Tokyo, Tokyo, Japan
- **Xiaofei Sun, BS,** Vanderbilt University
- **Huirong Xie, PhD,** Vanderbilt University
- **Yosuke Ichijima, PhD,** Harvard University
- **Xinghong Ma, PhD,** Mayo Clinic, Minneapolis, MN
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Significant Accomplishments

A growth story

The Division of Reproductive Sciences marked its second year at Cincinnati Children's, growing from 19 to 26 faculty members and significantly expanding its internal and external collaborations.

This year, we recruited two faculty members from Harvard University: Satoshi Namekawa, PhD, and Yuya Ogawa, PhD. Their research in epigenetic programming and the mechanisms of X chromosome inactivation in germ cells will provide insight into the causes of certain types of birth defects. Namekawa received a Cincinnati Children's Trustee Grant of $60,000 per year for two years for his project, "Regulation of sex chromosome inactivation by DNA repair pathways."

Key research projects

Reproductive Sciences faculty members collaborate with researchers in Developmental Biology, Endocrinology, Experimental Hematology, Visual Systems, Molecular Immunology and the Perinatal Institute on a range of topics.

Takiko Daikoku, PhD, is collaborating with Cornell University to examine Pten signaling in endometrial cancer. Daikoku received a $30,000 grant from Ohio Cancer Research Associates for her project, "Pten-Akt-Cox2 signaling axis in endometrial cancer."

Division director S.K. Dey, PhD, Namekawa and Daikoku are working with researchers at the University of Utsunomiya on a project exploring BRCA1's relationship to pre-implantation embryo development. Another project with Indiana University-Bloomington explores endocannabinoid signaling in pregnancy. Former research fellow Yasushi Hirota continues research on oxidative stress and premature birth, though he has relocated to the University of Tokyo.

Dey also received NIH ARRA funding for the study, "Aspects of Blastocyst Implantation," bringing total direct costs to $592,000.

Sanjoy Das, PhD, received NIH ARRA funding of $740,000 over two years for his work, "Molecular Signaling in Decidualization."

Sperm cryopreservation

Huirong Xie, a postdoctoral fellow, and Xiaofei Sun, a graduate student, trained staff of the Transgenic Core to perform sperm cryopreservation techniques. Sperm cryopreservation is an efficient, cost-effective alternative to embryo cryopreservation and is appropriate for most strains of transgenic mice.

In the first eight months of the service, 61 projects were completed for Cincinnati Children's and University of Cincinnati

affiliates. These projects provided revenue for the Transgenic Core and saved divisions costs in storing their transgenic lines.

Division Publications

1. Das SK, Dey SK. **"Embryo-uterine interactions during implantation: potential sites of interference by environmental toxins."** *Comprehensive Toxicology.* New York: Academic Press; 2010: 419-443.
2. Hirota Y, Daikoku T, Tranguch S, Xie H, Bradshaw HB, Dey SK. Uterine-specific p53 deficiency confers premature uterine senescence and promotes preterm birth in mice. *J Clin Invest.* 2010; 120: 803-15.
3. Das SK. Regional development of uterine decidualization: molecular signaling by Hoxa-10. *Mol Reprod Dev.* 2010; 77: 387-96.
4. Huang X, Ketova T, Fleming JT, Wang H, Dey SK, Litingtung Y, Chiang C. Sonic hedgehog signaling regulates a novel epithelial progenitor domain of the hindbrain choroid plexus. *Development.* 2009; 136: 2535-43.
5. Agis-Juarez RA, Galvan I, Medina F, Daikoku T, Padmanabhan R, Ludert JE, del Angel RM. Polypyrimidine tract-binding protein is relocated to the cytoplasm and is required during dengue virus infection in Vero cells. *J Gen Virol.* 2009; 90: 2893-901.
6. Burnum KE, Cornett DS, Puolitaival SM, Milne SB, Myers DS, Tranguch S, Brown HA, Dey SK, Caprioli RM. Spatial and temporal alterations of phospholipids determined by mass spectrometry during mouse embryo implantation. *J Lipid Res.* 2009; 50: 2290-8.
7. Sun X, Jackson L, Dey SK, Daikoku T. In pursuit of leucine-rich repeat-containing G protein-coupled receptor-5 regulation and function in the uterus. *Endocrinology.* 2009; 150: 5065-73.
8. Wada M, Saunders TL, Morrow J, Milne GL, Walker KP, Dey SK, Brock TG, Opp MR, Aronoff DM, Smith WL. Two pathways for cyclooxygenase-2 protein degradation in vivo. *J Biol Chem.* 2009; 284: 30742-53.

Grants, Contracts, and Industry Agreements

Grant and Contract Awards		Annual Direct / Project Period Direct
Daikoku, T		
A Novel Mouse Model of Endometrial-Specific Cancer Concern Foundation	07/01/08 - 06/30/10	$50,000 / $100,000
Pten-Akt-Cox2 Signaling Axis in Endometrial Cancer Ohio Cancer Research	01/01/10 - 06/30/11	$30,000 / $60,000
Das, S		
Environmental Toxins and Uterine Gene Expression National Institutes of Health R01 ES 007814	09/15/08 - 05/31/13	$222,750 / $1,122,750
Molecular Signaling in Decidualization National Institutes of Health R01 HD 056044	08/15/09 - 07/31/11	$393,113 / $739,555
Dey, S		
Endocannabinoid Signaling During Early Pregnancy National Institutes of Health R37 DA 006668	08/01/08 - 12/31/12	$304,618 / $1,627,815
	Current Year Direct	**$1,000,481**
	Total	**$1,000,481**

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Taxonomy
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