

International Exchange Course

# Developmental and Perinatal Biology 2022



## Program

A Joint Course between:



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# Welcome

Welcome to **Developmental & Perinatal Biology 2022!** This is the **24th Annual Exchange** in developmental and perinatal biology between The University of Toronto and The Karolinska Institute. The research course has been developed to provide a broad-based interdisciplinary training for graduate students, research fellows, clinical fellows and residents in the area of developmental biology from both basic science and clinical perspectives. The workshop combines a lecture/seminar program with an active research component.

This year we have experienced similar enthusiasm, with 4 Faculty and 12 Trainees attending from Sweden along with 22 Trainees from The University of Toronto. In addition, a large number of Faculty from across the University of Toronto will contribute to the course.

The organization of this type of course requires a considerable input of energy. Therefore, we would like to take this opportunity to thank those on the organizing committee for helping to put the exciting course program together, and to Fredrik Lanner for co-ordinating the Swedish side of the exchange. We would also like to thank Victoria De Luca, Bona Kim, and Christopher Casciaro who have provided invaluable organizational support. Finally, we would like to express our gratitude to the Department of Physiology (University of Toronto), our sponsors, many of whom have provided continuous support over the last 24 years, and who have made **Developmental & Perinatal Biology 2022** possible.

Please accept our warmest welcome to what we hope will be an exciting academic and social experience.



S. G. Matthews  
Professor  
Physiology, Ob/Gyn & Medicine  
University of Toronto



Brian Cox, PhD  
Associate Professor  
Department of Physiology  
University of Toronto

## **Local Organizing Committee:**

Stephen Matthews (Chair)  
Brian Cox  
Evelyn Lambe  
Stephen Lye  
Cristina Nostro  
Victoria De Luca  
Christopher Casciaro (trainee)  
Bona Kim (trainee)  
Aya Ragheai (trainee)

## **Co-Sponsors:**

Department of Physiology, University of Toronto  
Lunenfeld-Tanenbaum Research Institute, Sinai Health System  
Department of Obstetrics & Gynaecology, University of Toronto  
Hospital for Sick Children, Research Institute  
Faculty of Medicine, University of Toronto  
Heart and Stroke/Richard Lewar Centre of Excellence in Cardiovascular Research  
Create  
Mats Sundin Foundation

## **Location:**

**Registration:** August 18 – Room 2172, Medical Sciences Building, University of Toronto

**Lectures:** August 18-24 – Room 2172, Medical Sciences Building,  
University of Toronto

**Practical  
Workshops:** TBC

## **Social Activities:**

August 17 Art Gallery of Ontario/Pub Night  
August 18 Ripley's Aquarium/Axe Throwing  
August 19 Toronto Island Picnic  
August 20 Niagara Falls  
August 21 CN Tower and Royal Ontario Museum  
August 22 Course Welcome Reception - Faculty Club, University of Toronto  
August 23 Canadian National Exhibition

## **FACULTY—University of Toronto:**

	<b>Department</b>	<b>Location</b>
Brian Cox	Physiology	University of Toronto
Paul Delgado Olguin	Molecular Genetics	Hospital for Sick Children
Evelyn Lambe	Physiology	University of Toronto
Stephen Lye	Ob/Gyn and Physiology	Lunenfeld-Tanenbaum Research Institute
Stephen Matthews	Physiology and Ob/Gyn	University of Toronto and LTRI
Patrick McGowan	Biological Sciences	University of Toronto at Scarborough
Alison McGuigan	IBBME	University of Toronto
Lubna Nadeem	Ob/Gyn	Lunenfeld-Tanenbaum Research Institute
Cristina Nostro	Physiology	University of Toronto
Martin Post	Translation Medicine	Hospital for Sick Children
Stephanie Protze	Molecular Genetics	McEwen Stem Cell Institute
Amy Ramsey	Pharmacology & Toxicology	University of Toronto
Janet Rossant	Molecular Genetics & Ob/Gyn	Hospital for Sick Children
Greg Ryan	Medical Imaging	Lunenfeld-Tanenbaum Research Institute
Michael Seed	Paediatrics	Hospital for Sick Children
Sridevi Venkatesan	Physiology	University of Toronto
Amy Wong	Laboratory Medicine and Pathobiology	Hospital for Sick Children

## **Karolinska Hospital/Institute:**

Ola Hermanson	Neuroscience
Fredrik Lanner	Clinical Science, Intervention and Technology
Kristiina Tammimies	Neuropsychiatry
Pauliina Damdimopoulou	Clinical Science, Intervention and Technology

## Thursday, August 18

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8:30 Registration Room 2172, Medical Sciences Building, University of Toronto  
1 King's College Circle, Toronto

8:45 Welcome/Introduction **Stephen Matthews**  
International Exchange Program for Developmental and  
Perinatal Biology, University of Toronto

## Stem Cells, Early Embryonic Development and Disease

Co-ordinator: **Cristina Nostro**

9:00 **Stephanie Protze**: Pluripotent stem cells as tool to study human heart development

9:40 **Alison McGuigan**: Tissue engineering strategies to build multicellular structures for  
modelling disease and regeneration

Coffee

10:40 **Amy Wong**: iPSC-based models of human lung to understand development, disease and  
therapies

11:20 **Cristina Nostro**: Using hESC differentiation to model pancreatic development

### Trainee Presentations (Orals 1-3)

12:00 **Matthew Guo**<sup>1</sup>: A CRISPR screen of somatic cell reprogramming reveals novel biphasic  
regulation of fate by cell cycle genes

12:15 **Sheila Kwok**<sup>2</sup>: An Extended Culture System Mimicks Early Human Embryo Development in  
vitro

12:30 **Tim (Ka Ki) Tam**<sup>3</sup>: Elucidating trophoblast differentiation potential

13:00 **Lunch** - MSB Cafeteria

**Research Workshops**: TBC

18:00 **Social Activity: Ripley's Aquarium/Axe Throwing**

**Friday, August 19**

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## **Placenta and Organoids**

**Co-ordinator: Brian Cox**

9:00 **Janet Rossant:** Making the blastocyst- lineage formation and stem cell origins

9:40 **Fredrik Lanner:** Embryonic stem cells, pluripotency and totipotency

Coffee

10:40 **Brian Cox:** The placenta, a neglected organ

11:20 **Ola Hermanson:** Stem cellish cells as targets for treatment of brain tumor patients

### **Trainee Presentations (Orals 5-6)**

12:00 **Sarah Debebe<sup>5</sup>:** A novel surgical mouse model of maternal vascular malperfusion

12:15 **Aphrodite Demetriou<sup>6</sup>:** Estrogen receptor beta modulates microglia activation in Alzheimer's disease pathology (TBC)

12:30 **Lunch** - MSB Cafeteria

**Research Workshops:** TBC

18:00 **Social Activity: Toronto Island Picnic**

**Monday, August 22**

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## **Fetal Development**

**Co-ordinator: Stephen Lye**

9:00 **Lubna Nadeem:** Mechanism of Myometrial Progesterone Withdrawal and Labour Onset in Humans

9:40 **Greg Ryan:** Fetal Therapy

Coffee

10:40 **Michael Seed:** The Artificial Placenta

11:20 **Martin Post:** Cell therapy for lung disease

### **Trainee Presentations (Orals 7-9)**

12:00 **Henry Quach<sup>7</sup>:** Leveraging human pluripotent stem cells to understand fetal lung development and CF disease

12:15 **Baoshan Liao<sup>8</sup>:** AAV-CRISPR/Cas9-mediated Rhodopsin knock-in effectively rescues photoreceptor degeneration in the mouse models of autosomal dominant retinitis pigmentosa

12:30 **Akram Ahmed<sup>9</sup>:** A brain precursor atlas reveals the acquisition of developmental-like states in adult cerebral tumours

13:00 **GROUP PHOTO: please assemble outside on steps of MSB facing King's College Circle**

13:15 **Lunch** - MSB Cafeteria

14:00 **Poster Session** - Stone Lobby, MSB 2171

18:30 **Course Welcome Reception - Faculty Club, University of Toronto, 41 Willcocks St, Toronto**

**Tuesday, August 23**

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## **Developmental Origins of Health and Disease**

**Co-ordinator: Stephen Matthews**

9:00 **Pauliina Damdimopoulou:** How environmental pollutants impact the early germline/ovary

9:40 **Sophie Petropoulos:** Environmental influences on the early embryo

Coffee

10:40 **Paul Delgado-Olguin:** Fetal programming of heart disease

11:20 **Patrick McGowan:** Early programming of the brain

### **Trainee Presentations (Orals 10-12)**

12:00 **Christina Neofytou<sup>10</sup>:** Epigenetic Landscape and transcriptome in human neural progenitors after irradiation/lithium exposure: Implications for treatment of Cognitive Defects After Brain Radiotherapy

12:15 **Dominyka Batkovskyte<sup>11</sup>:** A hypomorphic variant in the translocase of the outer mitochondrial membrane complex subunit TOMM7 leads to syndromic short stature and developmental delay

12:30 **Bona Kim<sup>12</sup>:** Differential DNA Methylation Following Antenatal Corticosteroids in Newborn Brain

13:00 **Lunch** - MSB Cafeteria

**Research Workshops:** TBC

18:00 **Social Activity: Canadian National Exhibition**



**Wednesday, August 24**

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## **The Developing Brain**

**Co-ordinators: Evelyn Lambe**

9:00 **Amy Ramsey:** Convergent and divergent phenotypes of GRIN Disorder mouse models

9:40 **Sridevi Venkatesan:** Mechanisms of hyperexcitability in a mouse model of epileptic encephalopathy

Coffee

10:40 **Kristiina Tammimies:** iPSC and brain organoids for modeling autism and neurodegenerative disorders

11:20 **Karun Singh:** Investigating neurodevelopmental disorder disease mechanisms using stem cell models

12:30 **Lunch** - MSB Cafeteria

**End of Course**