Supervisor/Project Information Form

Due February 14 2018 by email to crems.programs@utoronto.ca

PLEASE SUBMIT IN WORD FORMAT ONLY. PDF will not be accepted

Supervisor Name: Dr. Agostino Pierro

Hospital/Research Institution: The Hospital for Sick Children, Peter Gilgan Centre for Research and Learning

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Field of Research (2 keywords): Necrotizing Enterocolitis (NEC), Stem Cells

Department: Translational Medicine

School of Graduate Studies Appointment (IMS, LMP, IHPME etc)? Pending

If YES, please name: IMS, Physiology

Project Title: Amniotic Fluid Stem Cells and Necrotizing Enterocolitis

Brief Project Description (~300 words):

Background: Necrotizing enterocolitis (NEC) is the most common gastrointestinal emergency and one of the major causes of death in preterm infants. In neonatal rodents and humans, NEC is associated with impairment of intestinal epithelium stem cells (IESC). A decrease in this cell population, which is responsible for continuous renewal of the intestinal epithelium, can be responsible for NEC initiation and progression. Our group has demonstrated that amniotic fluid stem cells (AFSC) can prevent the development of experimental NEC through a paracrine effect. However, the administration of AFSC is difficult in human neonates. Preliminary experiments from our laboratory indicate that administration of supernatant from AFSC can have similar effects to administration of AFSC themselves. However, the effect of AFSC supernatant on the activity of endogenous IESC has not been explored.

Aim: To characterize the effects of AFSC supernatant on intestinal regeneration during experimental NEC.

Methods: The student will perform in vitro and in vivo experiments. In vitro, the student will form organoids units containing IESC using a technique developed in my laboratory. He/she will study in these organoids the regulation of IESC by AFSC supernatant. In vivo the student will study samples of injured intestine from our NEC experimental model. He/she will evaluate the effect of AFSC supernatant on intestinal inflammation, IESC proliferation and differentiation using staining and qPCR.

Significance: These experiments will expand our knowledge of intestinal homeostasis during the neonatal period and after an intestinal injury such as NEC. The student will contribute to provide the scientific basis for (i) the characterization of AFSC supernatant and its interaction with injured epithelium, and (ii) the design and evaluation of novel therapeutic approaches for NEC. Ultimately this program has the potential of influencing the outcome of infants with NEC.