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: Jason T Maynes, PhD/MD and John Coles, MD
Hospital/Research Institution: SickKids
Email: jason.maynes@sickkids.ca
Field of Research (2 keywords): cardiac function
Department: Anesthesia and Cardiac Surgery
School of Graduate Studies Appointment (IMS, LMP, IHPME etc)? Yes/No: Yes
If YES, please name: Biochemistry and IMS

Project Title: Inducing Cardiac Regeneration Using Neonatal Stem Cell Secreted Factors

Brief Project Description (<300 words):

The neonatal heart possesses a robust ability to repair and regenerate after injury, much greater than the capacity of hearts from older patients (even adolescents). We (and others) have illustrated how cardiac progenitor cells isolated from neonatal heart tissue can facilitate the repair of damaged myocardium when administered as an allogeneic injection. However, there is building evidence that the cells themselves are superfluous, and that administration of only the “repair” factors secreted by cardiac progenitor cells (secretome) induces the same (or better) therapeutic effect. We are collecting cardiac tissue and progenitor cells from neonatal and non-neonatal (adolescent) hearts during open procedures, to discern what factors are differentially secreted from neonatal samples and how these factors can more effectively induce cardiac repair. In this project, the student will specifically:

1. Determine the ability of collected secretomes to induce vasculogenesis. Using an established vascular endothelium assay, the student will perform and quantify the ability of secretomes to induce the formation of blood vessels in vitro, comparing neonatal and non-neonatal samples (n=6 thus far in each group).

2. Determine the ability of collected secretomes to induce stem cell growth and mobility. Using mesenchymal stem cells, the student will determine the ability of the secretomes to induce cell proliferation (Ki67 assay), cell motility (migration assay) and differentiation (flow cytometry), all metrics previously shown to correlate with in vivo therapeutic efficacy.

The student will be integrated into a collaborative team, presenting their progress as part of weekly joint meetings. These meetings are attended by physician scientists, RAs, and graduate/summer students. They will be exposed to other areas of the project including biophysical characterization of secretomes, and animal testing, providing them with a rounded educational experience. They will be enrolled in the HSC educational programme for summer students, providing knowledge into research methods, and facilitating networking.