DALHOUSIE UNIVERSITY

Fuel for Survival (FFS)

Sepsis takes the lives of nearly 1 million newborns every year; most of these babies die from sepsis on the first days of their lives. We think that the outcome of newborn infection can be determined within the first hours of life. Low-cost interventions like colostrum feeding and immune boosting can help protect newborns but via largely unknown mechanisms – meaning that we can't use these interventions to their fullest potential. So far, we identified that boosting the neonate's immune system with the Bacille Calmette Guerin (BCG) vaccine offers protection from neonatal sepsis by stimulating the neonatal host to rapidly produce mature neutrophils through a process called "emergency granulopoesis". Coupled with this, we have shown that L-arginine and arachidonic acid together can reduce the risk to die from sepsis in animal models; both are found at much higher concentrations in colostrum than in mature breastmilk. However, not all neonates benefit from BCG vaccination. We hypothesize that this is because immune boosters like BCG need "fuel" to work. Given the strong relationship between nutrition and immune responses, we are now investigating how there critical first feeds (i.e. colostrum) impact on neonatal immunity and the response to BCG.

Project details: You will be joining our team within the Canadian Centre for Vaccinology, and the I3V research cluster at Dalhousie University in Halifax, Canada, including international collaborations (with exchange visits) with our partners in Denmark, Ghana, Kenya and Guinea Bissau (see our Collaborators). The FFS project investigates the relationship between colostrum feeding and BCG vaccination to determine whether BCG is rendered ineffective in metabolically ill-equipped (e.g. colostrum deprived) neonates, and if so, what supplementation strategies are most effective at restoring the protective capacity of BCG vaccination. This project will apply tools of systems and molecular biology and cutting-edge methods such as non-invasive metabolic phenotyping using indirect calorimetry. You will collaborate with our partners in large clinical studies (> 3,000 participants) as well as preclinical animal models to analyze biological samples (colostrum, blood, tissue biopsies) relating intervention to clinical outcome using sophisticated bioinformatic tools.

Candidate characteristics: Given the collaborative nature of our work, the individual must be adaptable and motivated to work in diverse team settings. This includes responding well to feedback and being willing to follow or to lead, as the situation demands. This team approach also will require flexible hours, including occasional weekends or nights. Our team has a strong commitment to EDIA and expects all lab members to undertake EDIA training to create an inclusive and welcoming environment where students and staff from low- and high- resource settings can learn together and thrive. Candidates should be self-motivated and take initiative to drive their work forward, while adhering to lab processes for data collection, data analysis, and record-keeping. Prior experience is highly desirable in either wet bench/preclinical work, bioinformatics, or both, but individuals who lack this experience yet have a strong motivation to learn would also be considered.

Interested? Get in touch. We have funding secured for PhD student as well as post-doctoral candidates.
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