

## Alberta Inflammatory Bowel Disease Consortium

### Postdoctoral Fellowship: Molecular Biology

#### Overview

The Alberta Inflammatory Bowel Disease (IBD) Consortium is a multidisciplinary research team aimed at understanding how environmental, microbial, and genetic factors conspire to cause Crohn's disease and ulcerative colitis in humans. Our team consists of basic and clinical scientists in gastroenterology with expertise in immunology, microbiology, genetics, epidemiology, bioinformatics, and systems biology. This team was awarded a \$5 million grant from the Alberta Heritage Foundation for Medical Research in March 2009 and is presently recruiting trainees at both the University of Calgary and the University of Alberta (Edmonton).

Tier I of our project involves a unique province-wide registry of CD and UC patients that has been established to provide detailed clinical and environmental data on existing IBD patients, as well as a prospective registry of newly-diagnosed cases. Tissue banks have been established in both Calgary and Edmonton for collection of endoscopic intestinal biopsies, blood, and stool. In addition to clinical and environmental data, all patients will be characterized for known IBD-associated genes and intestinal microbiota. Tier II involves bench research presently examining (1) the impact of diet and environmental pollutants on intestinal mucosal immune/barrier function and compositional dynamics of the gut microbiota and, (2) the effects of various IBD-gene mutations on dendritic cell priming of lymphocytes.

#### Post-Doctoral Fellowship

Many patients with Crohn's disease (CD) require surgical resection of affected intestine due to complications of disease or failure to respond to medical treatment. Untreated, 70% of patients will have recurrent CD at the site where healthy bowel was surgically joined within one year of disease resection. For some patients recurrence of disease is marked by the development of aphthous ulcers, which represents the earliest macroscopic lesion of CD and is detectable endoscopically. Post-operative recurrence of CD is an important model of the earliest immunological and microbiological events that lead to CD in genetically susceptible individuals. The goal of this project is to characterize the microbiology and immunology of remission and recurrent CD after operative cure. The hypothesis is that studying early CD lesions will provide a novel understanding of inciting events in CD pathogenesis in humans.

This project will involve identifying and recruiting eligible CD patients retrospectively and prospectively from the Alberta IBD Registries, and coordinating collection of endoscopic biopsies to characterize microbiota and inflammatory signals in the vicinity of the anastomosis. Mucosa-associated microbial communities will be profiled and quantified using 16S rRNA TRFLP, qPCR, and pyrosequencing. The microbial colonization of aphthous ulcers will be assessed by electron microscopy and FISH. Cytokine, chemokine, and growth factor profiles will be determined by protein array and/or RT-PCR, and leukocyte subsets characterized by multi-template ribonuclease protection assay. Endoscopic recurrence or remission will be correlated with clinical, genetic, microbial, and immunological factors.

#### Other Goals and Responsibilities

The successful candidate will play an important role in establishing and optimizing techniques and processes for molecular characterization of the gut microbiota on all patients recruited to the Tier I patient registries. As a senior trainee in the team, you will serve as a technical resource to 2-4 other trainees (e.g. undergraduate, MSc and PhD candidates) involved in related Alberta IBD Consortium projects and an important technical and scientific liaison between Tier I and II projects.

## Skills and Other Requirements

- Strong skills in state-of-the-art molecular microbiology techniques, bioinformatics and statistical analyses of complex microbial communities
- Experience with conventional culture-based microbiology and genetic manipulation
- Ability to design, organize, execute and troubleshoot complex experiments
- Strong desire to drive creativity, innovation, and efficiency in projects
- Demonstrated ability to achieve critical time-dependent milestones
- Outstanding written and verbal communication skills
- Contributions to published work in leading journals
- Proven team player with genuine desire to help others
- Dedication to leadership and teaching

## Educational Requirement

PhD in molecular biology, microbiology, microbial ecology or related field

## Availability

January-April 2010

## Application

Please submit a letter of interest and *curriculum vitae* demonstrating experience and accomplishments with 3 references to:

Kate Hoang, Project Manager  
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*For additional information regarding the project and this postdoctoral training opportunity, please contact Dr. Kevin Rioux at [kprioux@ucalgary.ca](mailto:kprioux@ucalgary.ca).*

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