

The IMAGINE-SPOR chronic disease network **Translational Medicine in Gastroenterology (TMiGI) Program**

Goals; to provide students enrolled in basic science (as well as other pillars) graduate programs and clinical trainee’s exposure to a curriculum that will enhance their knowledge and skills in translational medicine in related to gastroenterology and specially in inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS) and the role of the microbiota in these disease states. This will be a one of a kind program in Canada and possibly internationally. We suspect this program will enhance the training of both basic science and clinical trainees and make Gastroenterology in Canada the leaders in Translational Medicine with researched efforts focused on GI patients and improving their quality of life.

Although both National Institute of Health and Canadian Institute of Health Research (CIHR) have increased their overall investment in research there over the last 20 years yet there has been a relative decrease in clinically relevant outputs such as new drugs. Many refer to this as the “Valley of Death” which represents the deep valley between basic researcher and clinical care. Nature 453, 840-842 (2008), (Acad Med. 2012 Mar; 87(3):266-70). It is hypothesized that this Valley of Death (increased investment and decreased patient related returns) is a result of “a major factor in this downward trend is the increasing isolation of the basic researchers who work in laboratories from the physicians who treat patients” (Acad Med. 2012 Mar; 87(3):266-70).

Needs As clinical training becomes more specialized often training in, and exposure to, basic science principles are marginalized. Clearly transactional medicine/research approaches are coming to the forefront. There is more and more focus on translating basic science findings into clinical care and more needs for clinical input to focus basic science projects. With the increased emphasis on personalized medicine, which requires close co-operation/interaction of clinicians and basic scientists we feel it is critical to enhance the interplay between clinical IBD and basic research in IBD. Recently, AIHS, CIHR and NIH have all made strides towards increasing programs that directly support translational medicine with this training program we feel it will not only enhance the interplay between clinical and basic science staff but will produce trainees that will be in the best position to excel in this new funding environment and area of medicine and science. CIHR announced in 2015 that it was cancelling the longstanding MD/PhD Program and this would be replaced by “other” programs, including SPOR grants.

Approach A one year **Translational Medicine in GI (TMiGI) Program** will be established through the Divisions of Gastroenterology, Department of Medicine and Graduate Studies Programs with the main emphasis on clinical trainees within the Internal Medicine/Gastroenterology Training Programs and graduate students in GI focused research programs. All such centers have research groups that are focused on basic science/population health related areas. In most centers a divide or “Valley” has gradually developed where clinicians and other that provide patient care do not actively engage/meet or interact with “non-clinical” basic researchers. An examples of this is 15 years ago main GI Training programs were 3 years, which involved; two main clinically intensive years of GI training which was followed by a third year which was primarily research focused. Due to budgetary issues (the third year was not funded by The Royal College of Physicians and Surgeons of Canada (RCPSC) and thus the GI Division had to find support for the student) this third year of research has completely disappeared across Canada yet is still common in many American and European Centers.

The TMiGI Program has been designed to build a bridge over this “Valley of Death” by exposing all clinical GI trainees to basic/population health research and exposing “non-clinical” graduate students to

clinical GI and patient related clinical problems. We realize this will not substitute for a full third year of research training as was done in the past but allow “non-clinical” graduate students and staff to develop cutting edge knowledge on patient related GI issues and clinical staff and students exposure to the world of basic research. We believe this will be a step towards fostering further collaborative projects translational projects and lead to enhanced patient care. This may increase further the number of students interested in pursuing a clinical investigator track career as well enhance the ability of those in more traditional science streams to better able to pursue more patient directed research and be part of a collaborative research team.

The TMiGI Program will produce trainees the are more “bilingual” that understand both clinical and basic science issues, problems and opportunities to enhancing patient care. Students from both clinical trainee programs (Internal Medicine, Gastroenterology and advanced GI/Hepatology training Programs as well as students in non-clinical Graduate Studies/Program that have a focus on gastroenterology will be eligible to participate. A set curriculum will be established that will have focus on areas of strength and emerging areas for each center including areas that directly address the role of the microbiome in IBD and IBS. Students that complete the program will receive a document/diploma which will be noted on their transcripts.

Summary of Areas of Study

- intestinal immunology, the immunology of IBD/IBS and hepatology related issues
- barrier function and host/microbial interactions
- current and future therapeutic approaches in IBD/IBS and hepatology
- ongoing clinical trials in IBD/IBS locally and internationally
- autoimmunity and its impact on the gastroenterology and hepatology
- exposure clinical cases in gastroenterology and hepatology
- pathology of the liver, pancreas and gastrointestinal tract; from basic normal anatomy/histology to assessment of clinical cases and animal models of disease.
- pharmacological primer for gastroenterology and hepatology
- diagnostic imaging
- exposure to clinical GI/Hepatology
- exposure to techniques/tools in basic science/population research
- knowledge translation tools and approaches
- exposure to patient advocate groups.

Specific rounds, research in progress, symposiums etc. already exist at all site in this SPOR yet the clinical trainees do not get to the basic science sessions and the non-clinical graduate students often do not attend the clinical sessions. Sessions will be grouped so that the students in the TMiGI Program are aware of core sessions that are required to attend.

At the University of Calgary many clinical problem cases and review sessions are currently available in POD cast format and the GI research Group and Inflammation Research Network (IRN) and the Snyder Institute of Chronic Disease all have review/introductory sessions for new students starting in non-clinical graduate programs and these will again be identified and made available to clinical trainees in live or recorded format. Specific core such sessions will be identified to the TMiGI students that can be seen live (in medical school of clinical rounds/sessions) or on iPOD-like format on their own time. A blog format will allow student from across Canada in the TMiGI Program to comment on sessions, interact ask questions and come up with new ideas and collaborations. A similar like structure has been used at

the University of Calgary Medical School (Cummings School of Medicine) during medical school and in the GIRG in Calgary for basic science based courses. Uof C and most GI Programs provide and introductory course for starting GI fellows such content would be ideal for many ‘non-clinical’ graduate students and staff in a revised format. SPOR staff and more senior students across the country will provide format and be available for blog based format interactions. Content from non-SPOR related staff and senior students will be encouraged to participate. For example most GI problem based sessions and lectures are available already in iPOD format. In short, the content of the TMiGI is being taught and presented already in most centers why “reteach it” to other groups.

-Clinical trainees will engage in workshops with hands on experience in cell culture, immunohistochemistry, PCR, histology, Western blotting, confocal microscopy, assessment of leukocyte recruitment and strategies designed to alter gene expression (knockdown (siRNA, CRISPR), over expression in cell lines and whole animals. They will be assigned to and taught predominately senior graduate students with expertise in specific areas on one on one basis. Again, introductory sessions on techniques and approaches for new non-clinical graduate students are in place at U of C and other centers and these will part of core sessions for TMiGI “clinical trainees”. They will be available in live and iPOD-like format.

-Basic Science Trainees will engage in some clinical activities including involvement in patient presentations, clinical/pathological conferences access to shadowing in GI/Hepatology clinics, observation of upper and lower endoscopy, exposure to pathology processing (taking a surgical resection/biopsy and examining and processing), pathology assessment via pathology rounds in the pathology department using the multiviewer microscope set up.

All students will be involved in a research project either clinical or basic science/population health with a GI focus and will present their project to the student body in the form of a 10 minute oral presentation.

Existing Resources/Expectations;

- The IBD group in Calgary was recognized as the 5th best in the world! Thus, we have extraordinary basic science and clinical staff as well as incredible support, resources, patient population and facilities to excel in training students in the Translational Medicine of IBD.
- The course will consist of two modules; **Module A** will run from Sept 1 to December 31st and **Module B** will run from January to end of April. Credit will be given for completing one module but both module A and B will must be successfully completed for the student to receive the **Translational Medicine in GI Program (TMiGI) diploma/certificate/credentials**.
- Core topics/sessions will be identified for both clinical and non-clinical trainees and will differ.

Clinical trainees will still be expected to attend all their required rounds and sessions for their clinical (Internal Medicine/GI) training program plus;

- Core sessions/events in basic research
- A set of “non-core” basic research sessions (or “options”) specific to the needs of the student’s project and/or career path.

Basic research trainees will also be required to attend their required rounds, sessions and events required by their graduate program plus;

Core sessions in clinical GI/Hepatology

- A set of “non-core” clinical sessions/events (or “options”) specific to the needs of the student’s project and/or career path.

- Each **TMiGI** trainee will present their research in a 10 minute oral format to other trainees once per semester/module.
- Joint GI translational rounds (pathology, interesting case rounds and State of the Art) occur at University of Calgary and most sites involved in the SPOR, a curriculum will be developed based on the U of C model and TMiGI students must attend a minimum of 70% of such sessions in both Module A and B. For those sites where existing such GI translational rounds are not available or in development, the U of C rounds would be made available to all TMiGI students by webcast or related formats.
- Specific SPOR session for all students and staff will occur on a regular basis as outlined in the SPOR proposal.
- Live endoscopy sessions are available at U of C and other sites for medical students and GI trainees and staff including introductory session for medical students and new GI clinical trainees. These are currently available in webcast format and specific sessions will make up Core sessions for basic research TMiGI trainees.
- TMiGI basic research trainees will also have access to onsite live endoscopy sessions.
- Pathology resources.
 - o All of the existing SPOR sites have an active pathology training program with multiview microscopes and video resources. (each trainee must attend 2 session (1h) per module).
 - o These sessions are often run by pathology staff or senior trainees and currently up and running at U of C and other sites.
- Core research facilities and individual labs are available for all of the above areas.
- Clinical encounters will be set up 2-3 times per semester, each basic science student must attend one clinic (2-3h) and one endoscopy session (2-3h) (in groups of two or three).
- One to two afternoons per semester will be set up for clinical trainees to have exposure to the above lab techniques (or this can be arranged on a private basis by ideally interacting with basic science trainees, i.e. next time you are doing a "Western blot let know I will come by and watch"). Each clinical trainee must complete 4 hours of exposure per module to basic science techniques.
- Each **TMiGI** student must complete a 5 page written overview in an area of basic science (for clinical trainees) or clinical GI/Hepatology (for basic science trainees). These projects will be approved and assessed by either clinical staff (for basic science trainees) or basic science staff (for clinical trainees). Students will present a 5 minute oral presentation of this written overview to the student body and staff.
- We expect that basic science trainees will engage in teaching, demonstrating basic science techniques above to the clinical trainees and that the clinical trainees will engage in teaching and demonstrating to basic science trainees (i.e. "get two or three student together and you can come to my next fellows endoscopy session or clinic"). A similar such approach has been used by Dr Paul Beck in developing the Leader in Medicine Program (LIM) (MD/PhD, MD/MSc) at U of C. This program currently has over 140 students at various stages of either graduate programs or medical school. This program is almost 100 percent run by students with close support and student from staff. See attached article on the LIM program at U of C and their recent annual report for further details
- Basic research trainees will have the opportunity to attend all GI/Hepatology rounds, visiting speaker series with some such sessions being identified as core requirements for TMiGI trainees.
- All **TMiGI** trainees will have the opportunity to attend rounds/seminars by visiting speakers in both basic science and clinical areas at all participating SPOR sites.

- All or most SPOR sites have both clinical and basic science programs have journal clubs that all **TMiGI** students can attend.
- The LIM Program at U of C has monthly research in progress and translational journal clubs attend by both basic science and clinical staff. When the topics are related to GI/Hepatology the **TMiGI** students will be notified and can attend/view via webcast if available.
- **TMiGI** students will have the opportunity to attend conferences offsite depending on funding and time availability. Numerous such sessions occur locally for all SPOR sites.
- **TMiGI** student will meet and attend patient advocacy sessions.
- Ideally, further joint projects involving both basic research trainees/staff science and clinical trainees/staff will emerge with the ultimate goal of “bridging the Valley of Death” and enhancing both patient specific basic research and clinical care.

Timelines and Development;

Most such resources are available at all sites, a curriculum will be established via interaction between both clinical and basic research SPOR stake holders and students. Where resources are not available at a specific site they will be made available via webcast or iPOD-like recorded formats. Ideally sessions from all SPOR sites will become part of the Canadian TMiGI Program where specific sites with expertise (for example) can present and be viewed live and recorded for Core and “options” sessions (see above) to maximally enhance their both their research and clinical education experiences, their progress in related research projects and career goals. A similar such program is in use in the LIM Program at U of C (see attached) and is planned in the next academic year for interested trainees at U of C independent on the success of the SPOR proposal.

Other Benefits to Students;

Above the educational experience this will also give the student specific academic credentials that will enhance their success in future career goals. Again, a similar such program of credentialing has been developed and accepted at U of C where student get credit on their academic transcripts for their involvement. The next step would involve full accreditation of the TMiGI Program by all participating Universities but such a process can take several years and most universities have specific guidelines on this yet approval as a “transcript notation/addition” is generally a simple process and was approved rapidly (3 months) at U of C for the LIM. Not only do we anticipate that this will markedly enrich the students educational experiences but they will act to link clinical and basic research staff and programs. We anticipate not only will this make some basic research students interested in a clinical investigator career but some clinical trainees will develop a passion for basic research and could pursue more such training (PhD, MSc other degrees) through the existing RCPSC Clinical Investigator Programs (CIP) available at many sites across Canada. The CIP program supports students pursue a graduate degree or post-doctoral training as part of their residency training. Dr Beck is a member of the CIP executive committee at U of C and part of the executive of the Canadian Society of Clinical Investigation (CSCI) which, with CIP and MD/PhD, MD/MSc Program directors from across Canada are dedicated to training of the clinical investigators of the future. CSCI interacts closely with CITAC (Clinician Investigator Training Association of Canada) which is student run organization to enhance and enable training of clinical investigators from across Canada at both medical/graduate school (MD/PhD, MD/MSc) level and the residency (PhD, MSc, PDF) level and through CIP. Annually CSCI/CITAC with organize a meeting where like-minded students and staff from across Canada interact, present their work and participate in career development session and workshops.

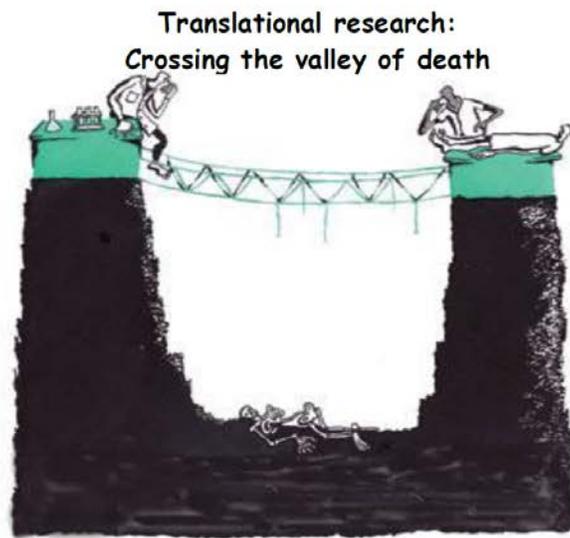
IMAGINE SPOR TMiGI Program

"To provide the best health care now and in the future"

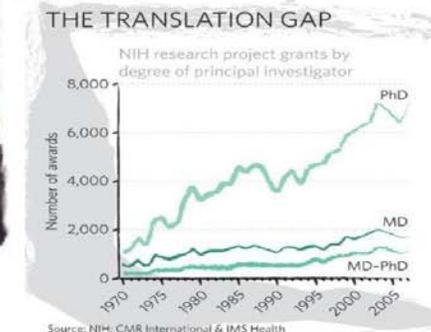
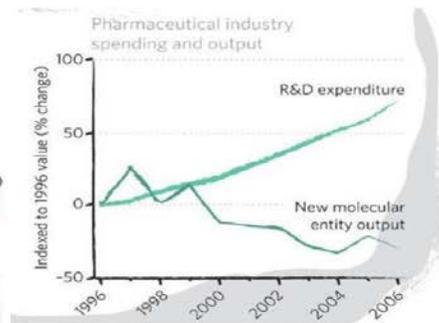
The Valley of Death; NIH invested \$31 billion in medical research in 2010, four times the amount spent 20 years prior. 74 new drugs were approved by the FDA between 2006-09 (vs 157 between 1996-9).

"A major factor in this downward trend is the increasing isolation of the basic researchers who work in laboratories from the physicians who treat patients".

Acad Med. 2012 Mar;87(3):266-70



Declan Butler, Nature 453, 840-842 (2008)



IMAGINE SPOR TMiGI Program will enhance education and interaction between basic researchers and clinicians in GI with the mission "To provide the best health care now and in the future".

