

Title of Program: Research in General Surgery

Dept/Center/Lab: General Surgery

Principal Mentor: Iain. H. Mckillop, Ph.D.

Other Faculty: Brent Matthews, MD (Minimally Invasive Surgery)
Richard White, MD (Surgical Oncology)
Susan Evans, MD (Trauma Surgery)
Keith Gersin, MD (Bariatric Surgery)
David Iannitti, MD (Hepato-Pancreato Biliary Surgery)
Dionisios Vrochides, MD, PhD (Hepato-Pancreato Biliary Surgery)
Eugene Sokolov, PhD
Valentina Zuckerman, PhD
Kyle Thompson, PhD
Michael Ekaney, PhD

Summary Description:

The department of General Surgery performs scientific, translational and clinical research to provide a better understanding of clinically relevant problems encountered within the fields of General Surgery. Studies are performed by researchers with backgrounds in biomedical research (undergraduate, post-graduate and post-doctoral) working in tandem with clinicians (surgical residents, fellows and attending physicians).

The major fields of research currently being pursued by the Department concern;

1. Hepatobiliary and pancreatic (HBP) disease – Drs. McKillop, Iannitti, Vrochides, Sokolov and Thompson. This group is interested in all aspects of hepatic and pancreatic disease with a particular emphasis on hepatocellular carcinoma (HCC). The group address the processes of liver cell transformation to a cancerous state, the way transformed hepatic cells progress to form tumors and why these cells do not respond to programmed cell death (apoptosis). These studies make extensive use of clinically relevant models of HCC with a strong emphasis on translation to the human disease state.

2. Cancer Immunology and Surgical Oncology – Dr. White. This group is interested in the body's immune response to the formation of tumors with a particular emphasis on advanced stage melanoma and renal cell carcinoma. This group investigates the clinical impact of new immunotherapeutic treatments for these diseases, the majority of which have gained FDA approval within the last five years. This group is particularly interested in potential ways to assess populations that may have greater benefit from these treatments. Students in this role assist in development of mostly retrospective data analysis projects to assess clinical outcomes of patients undergoing these treatments, learning basic research methods, scientific writing skills, and data analysis methods.

3. Systemic organ failure in the setting of trauma – Drs. Evans and Ekaney. A major clinical complication that arises in trauma patients is post-injury organ damage in organs not directly involved in the initial injury. In this setting patients are observed to improve following initial treatment in the ER yet, over the next several days, their condition progressively declines as a result of how specific organs respond to the initial injury even though they are not the site of this injury. In undergoing this response organs (e.g. kidney, lung, liver) alter their basic physiological functions to compensate. In doing so an additional stress can be placed on other organs that in turn elicits a “positive feedback” response to further “stress” organs. The research groups from the Trauma group are particularly interested in understanding the early responses to trauma and whether it is possible to blunt these effects prior to sequential organ failure becoming initiated.

4. Bariatric Surgery – Drs. Gersin and Stefanidis. Obesity significantly impacts the development and progression of numerous diseases. Current obesity levels in the United States are approaching 35% and the health and financial costs are dramatically impacting health care at multiple levels. Bariatric surgery may be an option for adults with severe obesity and involves surgical intervention to restrict food intake. The Bariatric Research Group are interested in identifying the most appropriate surgical technique(s) to optimize weight loss within different patient populations and identify clinical and pathological markers to help patients not only optimize initial weight loss but to maintain this weight loss toward a sustained healthy weight-BMI.

Expectations and Role of Student:

The successful student will be expected to bring enthusiasm, inquisitiveness, hard work, and passion. The student will be expected to learn well at least one aspect of an ongoing project in the laboratory, to frame and refine an important hypothesis; and to design and carry out experiments designed to confirm or refute the key hypothesis. The student will present oral and written summaries of research and will be required to prepare and present an abstract and paper summarizing findings.