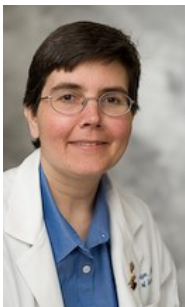


Department of Surgery Research

The Department of Surgery is home to the exciting and groundbreaking work of more than 65 research faculty in both clinical and laboratory fields of investigation. Each issue of *Surgery Synopsis* will include profiles of researchers in the department, celebrating some of their current successes.

This issue features the work of some of our faculty, in particular, Drs. Eileen Bulger, Joseph Cuschieri and Alec Clowes. Future issues will feature the amazing work of our other faculty.

Eileen Bulger, MD, Professor of Surgery



A leader in pre-hospital research and injury prevention, Dr. Bulger is currently focusing on six important research projects, three of which are highlighted here.

Dr. Bulger is a co-Principal Investigator (PI) for Trauma Seattle/King County Resuscitation Outcomes Consortium (ROC) which is funded by the National Institutes of Health and the Department of Defense. The goal of the ROC is to provide infrastructure and project support for clinical trials in the areas of cardiopulmonary arrest and severe traumatic injury in order to improve outcomes. At this site, two randomized controlled trials of hypertonic resuscitation have taken place: one for patients with traumatic hemorrhagic shock and one for patients with traumatic brain injury. Patients are currently being enrolled in a prospective observational study to evaluate point-of-care lactate levels in the pre-hospital environment as a predictor of occult shock. This year, enrollment will begin for a randomized controlled trial comparing two different massive transfusion protocols for patients with major bleeding after injury. This work could prove instrumental in finding the most effective ways of treating patients in the pre-hospital environment, leading to standardized practices and better outcomes.

Dr. Bulger is the PI for the Seattle center of the Crash Injury Research and Engineering Network (CIREN) which seeks to improve the prevention, treatment, and rehabilitation of motor vehicle crash injuries to reduce deaths, disabilities, and human and economic costs. The Seattle site was recently awarded five years of renewal funding from the National Highway Traffic Safety Administration. The research has recently focused on: evaluating injury patterns associated with roof crush after rollover collisions; looking



Trauma & Burn Surgery Division
at Harborview Medical Center

at side airbags and rates of renal injury in side impact collisions; and studying injuries resulting from size-mismatched motor vehicle collisions. During the next year, the study will focus on the components of the Field Triage Guidelines for Emergency Medical Services (EMS) following motor vehicle crashes as well as evaluating the utility of automatic crash notification variables for EMS triage and response.

Airway and ventilation management in the pre-hospital setting has been a major focus for Dr. Bulger. She recently completed several projects evaluating the utility of pre-hospital airway management and optimal ventilation strategies following traumatic brain injury (TBI). Because hypoxia and hypotension contribute to the development of secondary brain injury and worsen outcomes after TBI, it is vital to develop best-practice ventilation strategies in the early phase after injury in order to increase the likelihood of positive outcomes. Dr. Bulger also critically evaluated the role of end-tidal CO₂ for pre-hospital monitoring of ventilation and its use to predict occult shock.

These and other key projects, including collaborative laboratory work with other Trauma faculty, are demonstrative of the breadth of Dr. Bulger's groundbreaking work.

Joseph Cuschieri, MD, Professor of Surgery



An important researcher in severe injury, Dr. Cuschieri is involved in several essential projects, including working to understand what happens to the body after the injury and what may be the source of devastating infections and sepsis—discoveries that are vital to developing the most effective interventions for injured patients.

Dr. Cuschieri is funded by the NIH to investigate the effects of ischemia and reperfusion on the lipid and protein structures on monocytes and macrophages. Ischemia/reperfusion is a common event following severe injury and is associated with the development of organ dysfunction in patients initially surviving severe trauma. An improved understanding of such alterations to the cell membrane would lead to potential prognostic and therapeutic interventions to limit the dysregulated immune function that contributes to organ failure.

In addition, Dr. Cuschieri worked on a large multi-center study along with Dr. Ronald Maier and Dr. Grant O’Keefe evaluating the genomic and proteomic responses to injury. Findings of this work have challenged the concept of a two-hit hypothesis of organ failure following trauma and has led to the initial development of a genomic signature that may be used for early prediction of patients at greatest risk for the development of complications.

Dr. Cuschieri remains actively involved in clinical research evaluating factors associated with the development of hypercoagulable states leading to venous thromboembolism, factors associated with nosocomial infection, organ failure, and death. Among the factors discovered included early withdrawal of commonly used medications, including statins.

The discoveries that are taking place in these studies are examples of what will continue to lead to better outcomes for patients that have undergone serious traumatic injury. Dr. Cuschieri is making significant contributions to this important field of research.

Genetic Factor Linked to Long-Term Success of Leg Bypass Surgery

Outcomes of bypass surgery to repair blocked arteries in the legs tend to be better in the roughly one-in-five people who have inherited a specific genetic variation from both parents, according to a study presented at the Vascular Annual Meeting in Chicago in 2011.

The new findings may prove useful in weighing treatment options for the estimated eight million people in the U.S. with peripheral artery disease (PAD), a condition that can produce severe disability and lead to amputation. Treatment options include surgery and/or medication.

More than 100,000 bypass and stent procedures and angioplasties are performed each year to relieve artery disease symptoms such as pain and numbness.

Alexander Clowes, MD, UW professor of surgery, and Michael Conte, MD, professor, University of California- San Francisco, Division of Vascular & Endovascular Surgery, led the study.



Alexander Clowes, MD

“These studies represent a major breakthrough in our understanding of arteries closing after angioplasty and bypass grafting,” said Clowes. “More importantly, they may help us identify patients at increased risk of treatment failures. These results may also accelerate drug development to prevent re-narrowing of vascular reconstructions.”

Conte and Clowes performed a gene association study in 204 patients who had undergone a leg vein bypass graft. They tested the patients for a common variation of the gene p27, which is known to control how cells grow.

The physicians are members of the Vascular Cures Research Network, a national research consortium. Members of this team share information and results in order to substantially accelerate the development of new drugs, technologies and predictive tools for vascular disease.

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