

## Researchers Seek New Treatments for a Common Surgical Complication: Abdominal Adhesions

University of Rochester researchers [Alayna Loiselle, PhD](#), and [Nicole Wilson, PhD, MD](#), have earned a \$3 million grant to investigate a complication that befalls more than half of all abdominal surgery patients: post-operative adhesions that can cause serious and sometimes lifelong health problems.

Abdominal adhesions occur when scar tissue forms between the abdominal wall and internal organs in response to tissue trauma during abdominal or pelvic surgery. Adhesions frequently form between loops of the small intestine and the abdominal wall, and can cause small bowel obstructions, infertility, and chronic pain. They also can complicate patients' subsequent surgeries – including surgery to correct or remove the adhesions themselves.

The condition places a significant burden on both patients and the nation's health care system; health care costs associated with abdominal adhesion-related complications exceed \$5 billion annually in the U.S. Treatment options are limited to laparoscopic or open surgery to remove or break down scar tissue; these procedures may offer temporary relief but can cause new scar tissue to form.

The grant, from the National Institutes of Health and the National Institute of Diabetes and Digestive and Kidney Diseases, will enable Loiselle and Wilson to explore potential new ways to prevent adhesions from forming, and/or develop better treatments. Loiselle is an Associate Professor at UR's [Center for Musculoskeletal Research and the Departments of Orthopaedics & Physical Performance, Pathology & Laboratory Medicine, and Biomedical Engineering](#); Wilson is an Assistant Professor in the Departments of Surgery, Biomedical Engineering, and Pediatrics. They are co-Principal Investigators on the project.

“There is a substantial need to identify therapies to both prevent initial adhesion formation and to reduce adhesion persistence and recurrence,” said Loiselle. “However, the mechanisms that drive post-operative adhesion formation are only partially understood, so there are few current therapies that can improve patient outcomes, and none that can prevent or completely resolve the problem.”

How scar tissue forms, and how to prevent it, has been a central focus of Loiselle's lab at CMSR. Her research explores the causes and potential new treatments of scar tissue in tendon injuries to promote regenerative tendon healing, as well as develop strategies to preserve tendon function through the lifespan. Those findings on tendon injury can yield insights on scar tissue formation in abdominal surgery.

Wilson is a pediatric surgeon and biomedical engineer who directs the Wilson ECLIPSe lab (Engineering & Clinical Laboratory for Innovation in Pediatric Surgery), which aims to use and develop innovative tools to address the complex problems that arise for surgical patients.

“Almost all patients form adhesions after abdominal and pelvic surgery, which creates a lifelong burden for many and can result in multiple surgeries and complications – all related to the simple build-up of scar tissue in the abdomen,” Wilson said. “Improving our understanding of how adhesions form and investigating mechanisms that may prevent and potentially even reverse the formation of abdominal scar tissue represents an opportunity to dramatically improve the lives of millions of patients suffering from this debilitating condition.”

The NIH/NIDDKD grant will enable Loiselle and Wilson to build on the [Loiselle lab's discovery](#) that genetic knockdown of the small calcium binding protein, S100a4, results in significant reduction in scar formation in tendon. Researchers showed that using a drug to suppress S100a4 formation in the cellular environment around a surgically repaired tendon significantly reduced the amount of scar tissue and improved tendon healing.

The new research aims to provide critical insights into the basic causes of abdominal adhesion formation and reduction; define the mechanisms through which S100a4 drives adhesion formation; and establish the potential of S100a4 inhibition to prevent or resolve post-operative abdominal adhesions and adhesion-related small bowel obstructions.