Before transplant surgeries can be tested with humans, the proof of concept must be established in the animal model. However, connecting the small organs and tiny blood vessels in the body of a mouse takes extensive training and tremendous skill. This is exactly the type of work supported by Northwestern's Microsurgery Core.

“We work on tiny animals, so we can’t perform surgery with the naked eye,” says Jenny Zhang, transplant surgery and director of the core. “We have to perform the surgery under the microscope using very fine instruments. The suture we use is finer than a strand of hair. It’s technically demanding.”

Located on the 11th floor of the Tarry Building on the Chicago campus, the Microsurgery Core is a part of the Comprehensive Transplant Center (CTC) at the Feinberg School of Medicine. Staffed with five microsurgery experts, the core is a central resource for creating rodent models of organ transplantation and other microsurgical procedures that can be used to study human diseases.

The core is currently working on 10 major, ongoing projects. One of the projects uses a kidney transplant model to study the cytomegalovirus (CMV), a virus that typically goes unnoticed in healthy people but can be life-threatening for the immunocompromised. Because transplant patients take immunosuppressing drugs after surgery to avoid organ rejection, they are particularly vulnerable to the virus.

After initial exposure, the virus can remain latent in the body for a long period of time. However, after transplant surgery the virus can become activated and lead to an infection. “We want to know how this virus becomes activated,” Zhang says. “If we can understand that, then we can prevent it.”

Led by principal investigator Michael Abecassis, transplant surgery and director of the CTC, the project is funded by the National Institutes of Health.

Researchers at the Microsurgery Core also study organ rejection, which is one of the biggest hurdles for transplant recipients. One way to do this is to transplant a kidney or a heart from a black mouse into the body of a white mouse. These two mice have mismatched major histocompatibility complex (MHC), antigens on the cell surface of donated organs that give an immunological response in organ transplants. After the transplant surgery, researchers can study the immunological response and see if specific drugs have an effect on it.

Zhang is also working on her own research to study both acute and chronic rejection by examining molecular pathways and biomarkers in kidney transplants. “My goal is to find a biological signature for rejection,” she says. “We want to know what biological process is turned on when there’s a rejection.”

In addition to providing a service to principle investigators and creating new models for research, the Microsurgery Core is also a center for training residents, fellows, and students in microsurgery techniques. The core has three microsurgery workstations, each with dual binocular heads, so one person can observe while the other person performs the surgery. Two large-screen monitors are available in the lab space, so visitors can watch the surgeries from nearby. The monitors can also record the surgeries in order to be played back in the future for educational purposes.

Although the core started just three years ago, it already has experienced much success. Studies in the facility have helped investigators secure funding support from various funding agencies and have generated multiple publications in a variety of peer-reviewed journals.

For more information or to initiate a project with the core, click here.