Solid organ transplantation is the treatment of choice for many patients with end stage organ failure, and short-term success rates with transplantation have continued to improve over the last several decades. However, long term success rates have been more difficult to impact. There are a host of factors that can affect the outcome of a solid organ transplant. One major limitation of managing recipients of organ transplants is our lack of sensitive tests to detect graft damage. These tests, commonly called biomarkers, can ideally detect or even predict damage to the allograft and allow early correction of problems to avoid irreversible damage that will impact graft and ultimately patient longevity.

Researchers in the Comprehensive Transplant Center, along with partners both within and outside the University, have focused on developing novel biomarkers of organ dysfunction with the goal of individualizing care and improving outcomes. The field of proteogenomics describes a group of assays that examine levels of proteins, messenger RNA (mRNA), microRNA (miRNA), and types of DNA and correlates those with various clinical outcomes. Some of the early work in this field has been directed at finding a gene expression “signature” in the blood or urine of patients undergoing acute rejection of their transplanted organ. Currently, an invasive tissue biopsy must be performed to make an accurate diagnosis of organ rejection. The promise of less invasive and more accurate blood and urine biomarkers would improve both patient outcomes and experience.

The investigators in the CTC are currently leading an NIH funded, multi-center clinical trial aimed at finding a variety of proteogenomic biomarkers for the prediction and diagnosis of various outcomes in recipients of liver and kidney transplants. To do this, they are leveraging the expertise of the clinical research group and partnering with experts in the field of proteogenomics and bioinformatics. Two of these experts, Dr. Daniel Salomon (Scripps Clinic, La Jolla, CA) and Dr. Neil Kelleher (at Northwestern University’s main campus, Evanston, IL), are leading investigators having substantial funding in genomic and proteomic research and are collaborating with CTC investigators in solid organ transplant studies. The Clinical Trials in Organ Transplantation (CTOT), a consortium under the National Institute of Allergy and Infectious Diseases is funding two multicentered studies led by Dr. Abecassis, one in kidney and the other in liver transplant recipients, to obtain serial blood, urine, and tissue samples to correlate proteins and gene expression signatures to important clinical outcomes. The main focus of the kidney transplant study is acute and chronic organ graft rejection, while the liver study concentrates on markers of liver graft (rejection, hepatitis C recurrence) and native kidney dysfunction. The patterns of proteins and gene expression will give us better clues as to the underlying pathophysiology of these diseases as well as one day provide less invasive, less expensive clinical tools to diagnose and treat early signs of complications before they progress. This would be akin to preventative strategies being developed in many other fields of medicine.