Histocompatibility Core

Organ and Stem Cell transplantation have become the treatment of choice in end-stage organ failure or some hematologic malignancies. A critical component in achieving successful outcome after transplantation is assuring histocompatibility between the recipient and his/her organ or stem-cell donor. The mission of the Histocompatibility core is to develop and provide state of the art tools and services to improve donor selection as well as monitor donor-specific immune responses after transplantation in order to detect and treat potential rejection episodes.

Histocompatibility antigens are cell surface markers that are quite unique to each individual. They are determined genetically and therefore can be shared between family members, increasing the likelihood of better matching between the donor and the recipient. These molecules are identified (typed) in our laboratory by a variety of molecular biology methods including Sequence Specific Priming, a PCR based technique; Sequence Specific Oligonucleotide Probe hybridization, a solid phase luminex based technique; and Sequence Based Typing, a capillary array method. One of the major culprits in orchestrating rejection episodes in solid organ transplantation are antibodies that are directed specifically against histocompatibility antigens presented on donor cells. Such antibodies can be present in the patient’s circulation prior to transplantation due to historic sensitizing events, leading to diminished allograft survival, or develop a new following transplantation, still leading to decreased allograft survival. To monitor for the potential presence of donor-specific antibodies the laboratory uses solid-phase single-antigen micro-array platforms including a flow cytometer and luminex instruments. To monitor for engraftment in stem-cell and cord-blood transplantation, we utilize state of the art approaches including Real-Time PCR as well as Short Tandem Repeat analysis. Recently, a role for non-histocompatibility antigens in allograft rejection was proposed as well as increased role for complement binding antibodies. Methodologies to investigate the presence of such antibodies have been implemented.

The Comprehensive Transplant Center (CTC) at Northwestern is one of the largest transplant programs in the US performing kidney transplantation from living donors. Unfortunately, a significant portion of the patients awaiting kidney transplantation have high levels of antibodies to their intended living donors. The Histocompatibility core is instrumental in detecting those antibodies and monitoring their levels as guidance to the clinicians through desensitization protocols.

More recently, the Histocompatibility core have been supporting the CTC in facilitating transplantation of these highly sensitized patients by exchanging intended donors such that a better compatibility between the donor and the recipient is achieved. As part of this Kidney Paired Donation program more than 100 donor/recipient pairs have been transplanted over the past few years.

The Histocompatibility core is currently supporting all transplant programs at Northwestern Memorial Hospital including kidney, pancreas, liver and islet-cells as well as the heart transplant, the stem cell, and cord blood transplantation programs. In addition, the histocompatibility core supports the pediatric kidney and heart transplant programs at the Lurie Children’s Hospital.