The mission of the biorepository at the Northwestern University Comprehensive Transplant Center (NUCTC) is to develop a state-of-the-art facility that collects, processes and stores well-characterized solid organ (e.g., kidney, liver, pancreas) and stem cell specimens for scientific studies, in particular, biomarker research and development. The field of transplantation is poised to benefit from significant advances in biomarker science. Biomarker development has enormous potential for both improved outcomes and less need for invasive diagnostics. Biological samples obtained serially during the process of transplantation are essential in validating the usefulness of biomarkers as either predictive or diagnostic of transplant outcomes. It is of vital interest to develop such a repository of biological samples in order to facilitate the study of novel diagnostics and therapeutics as we strive to improve the clinical outcomes of transplantation.

We propose to enroll every willing subject into the biorepository in a prospective manner. The study participants are recruited from organ transplant recipients, candidates for transplantation, and both potential and actual living donors under evaluation at the NUCTC and the Robert H. Lurie Comprehensive Cancer Center. Blood, urine and biopsy samples are collected at each standard of care visit, in addition to the usual standard of care collections. The samples are processed according to protocols that meet the requirements of the evolving molecular technologies such as DNA microarray, next generation sequencing, and protein mass spectrometry. We take full advantage of the facility of the Freezer Farm of Northwestern University Feinberg School of Medicine for housing the sample storage freezers. The accumulation of the biorepository is expected to increment by the volume of 25,000 samples per year. The biorepository will provide investigators with high quality biosamples for biomarker discovery and validation that remains contemporaneous with evolving molecular technologies in genomics, proteomics, metabolomics, etc. Some ongoing proteo-genomic assays at NUCTC serve as non-exclusive examples of the types of studies anticipated for the usage of the biorepository: proteomic signature analyses of the plasma and urine from kidney and liver transplant recipients using Rules-Based Medicine Multi-Analyte Profiles assays; gene expression profiling analyses of the whole blood of kidney and liver transplant recipients with DNA microarray. It is anticipated that the biorepository will also be useful for novel assay development, e.g., the urinary sediment biomarker analysis based on the novel cutting-edge technology, Simultaneous Ultrasensitive Subpopulation Staining/Hybridization In Situ.

The biorepository also has a powerful and secure web-based management database system with a visually appealing interface. The system has many popular features including intuitive GUI operations, user-friendly query, powerful reporting, and automatic alerts of low number of sample aliquots, sample expiration date, sample volume or freeze-thaw count. It is integrated with Northwestern University Enterprise Data Warehouse (EDW), and allows the biorepository data informatics to be linked with other databases on the medical campus. It is also linked to the web-based Aperio digital pathology platform at NUCTC that enable pathologists in an efficient integrated clinical workflow to read immunohistochemistry (IHC) slides on a computer monitor, perform quantitative image analysis and generate professional reports. This link will greatly facilitate investigators in locating the matching biopsy sample in the biorepository for an interesting IHC slide that may be identified through the Aperio pathology system.

The biorepository represents a multi-faceted, long-term commitment on the part of NUCTC to advance biomarker research and development through teamwork. The key personnel at NUCTC working on this project include Drs. Michael Abecassis, Chunfa Jie, John Fridewald, Josh Levitsky, Jayesh Mehta, Anna Zago, and Mr. Luke Preczewski. For additional information or to collaborate on the biorepository, please contact Dr. Chunfa Jie at c-jie@Northwestern.edu.