DePaul University – Rosalind Franklin University of Medicine & Science
AI in Biomedical Discovery and Healthcare
2026 Grant Recipients

Title: Development of a Non-Invasive Wearable Biosensor for Rodent Research

PI: Depaul: David Hanley (CDM)

RFUMS: Holly Hunsberger

Award: $66,728

Approximately 25 million mice & rats are used in the US annually to perform foundational scientific research and validate products across almost every disease state, drug, and medical intervention. While wearable technology flourishes in the consumer market, this technology has not transitioned to small animal research. There is a need for better research methods to reduce the number of animals used in biomedical research. We propose to develop a non-invasive biosensor, measuring multiple real-time biometrics continuously. This technology could eliminate the use of cross-sectional studies with multiple cohort testing for different disease variables. Technology gap: Currently, devices for mice and rats are implantable continuous sensors, which are expensive due to product cost, implant surgery, and recovery of the rodents prior to a study, or episodic sensors, which provide a single data point in time. To our knowledge, no existing system provides multi-model, continuous, non-invasive physiologic monitoring in mice for months at a time.

Title: Comprehensive Immunological Responses to Epstein–Barr Virus in Heart Transplant Recipients Who Do and Do Not Develop Post-Transplant Lymphoproliferative Disease

PI: DePaul: Leonard Jason (CSH)

Thiru Ramaraj (CDM)

RFUMS: David Everly

Award: $67,000

After a heart transplant, the 10-year cancer incidence is approximately 10%, and one of the common types of cancer seen is termed post-transplant lymphoproliferative disease (PTLD). Heart transplant recipients have one of the highest rates of PTLD development, and up to 90% of PTLD cases are associated with Epstein-Barr virus (EBV). Historically, EBV infection has been serologically tracked by monitoring the immune response to only one or a few selected “sentinel” antigens, such as viral capsid antigen (VCA), early antigen (EA), and Epstein-Barr nuclear antigen (EBNA); modern tools now enable the examination of the immune response to complete sets of viral antigens. We hypothesize that different antibodies to specific EBV antigens lead to different clinical courses following EBV infection. We will analyze the serum from control and patients with PTLD using an EBV-specific peptide microarray. We anticipate a distinct immunological profile for transplant patients that control EBV infection compared to those who develop PTLD. We will analyze the sera of 40 patients who go on to develop PTLD and 80 who do not

following heart transplantation. This pilot will allow us to identify EBV serologic predictors that lead to the development of PTLD following heart transplant.

Title: Integrating Quantum Computing and Medicinal Chemistry to Accelerate hCNT Inhibitor Discovery

PI: DePaul: Jindi Wu (CDM)

RFUMS: John K. Buolamwini

Award: $67,000

Human concentrative nucleoside transporters (hCNTs) mediate the cellular uptake of nucleoside-analog drugs essential to cancer chemotherapy and antiviral therapy. Despite their therapeutic importance, no potent or subtype-selective hCNT inhibitors exist-the standard reference compound, phloridzin, has an hCNTl ICso of only ~250 µM. Preliminary medicinal chemistry efforts have identified leads with ICso values as low as 1.25 µM (~200-fold improvement), demonstrating that optimization is feasible. However, with only ~45 characterized compounds available, conventional Al methods are ineffective due to extreme data scarcity, creating a critical bottleneck for efficient inhibitor optimization. To address this, we propose a closed-loop framework integrating quantum neural networks with medicinal chemistry to accelerate hCNTl inhibitor discovery beyond current leads. In Aim 1 (Lead: Wu, DePaul), we develop a Relative Activity Predictor (RAP) that learns pairwise activity differences to overcome small-data limitations, and a Compound Candidate Generator (CCG) based on quantum circuit Born machines that generates novel candidates through a fully quantum optimization pipeline. In Aim 2 (Lead: Buolamwini, RFUMS), top-ranked candidates are synthesized and evaluated via in vitro bioassays for hCNTl inhibitory activity and subtype selectivity. Experimental results augment the training dataset and provide biological insights to refine the quantum models, forming a fully integrated computational-experimental closed loop across 3-5 iterative cycles.