Developing Trustworthy Artificial Intelligence for Language-Based Assessment of Neurodegenerative Disorders: Enabling Early Detection of Cognitive Decline with Inexpensive, Scalable Technologies

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This project seeks to improve the diagnosis of dementia through the development of sensitive and usable AI-based tools that analyze speech to enable earlier detection and thus more timely interventions than is in current practice.

Drug Discovery Targeting the PARP1–HPF1 Complex for the Treatment of Cancer (Co-Sponsored by the University of Colorado Cancer Center)

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PARP inhibitors (e.g., Olaparib) have revolutionized the clinical treatment of cancer, particularly breast, ovarian, and pancreatic cancers. However, PARP inhibitors are plagued by significant drug resistance mechanisms. This proposal will execute a new drug discovery and therapeutic strategy to target a protein complex with PARP implicated in cancer.

Immune Reprogramming of Myeloid Cells in Pancreatic Islets Using Engineered Particles
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This project departs from traditional methods of treating type 1 diabetes by using an engineered particle technology to sustainably reprogram islet myeloid cells to resolve inflammation and disrupt the underlying mechanisms of autoimmunity.

Nucleotide Second Messengers at the Host-Pathogen Interface
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Aaron T. Whiteley, PhD, Department of Biochemistry, CU Boulder

Cyclic dinucleotides are crucial signaling molecules in the immune response to pathogens but are notoriously difficult to measure with current methodology. Using a newly developed cyclic dinucleotide biosensor platform, the Whiteley and Doran laboratories will investigate these signaling pathways during pathogenesis of Group B Streptococcus, a leading cause of invasive neonatal disease and meningitis in humans.
Sound Advice for Delivering Hearing Health Care: Evaluation of Current and Emerging Service Delivery Models for Hearing Aids
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Aging-related hearing loss, one of the most common chronic health conditions and a leading modifiable risk factor for dementia, is commonly treated with hearing aids. Our study will compare best practices for hearing aid service delivery models (i.e., professionally fit vs direct-to-consumer vs self-fit) using neurocognitive outcomes, to allow clinicians and patients to make informed hearing healthcare choices.

Novel Antimicrobials for Multi-Drug Resistant Osteomyelitis: Bacteriophage Stabilized for Extended Release by Atomic Layer Deposition Processes
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Theodore Randolph, PhD, Department of Chemical and Biological Engineering, CU Boulder

Osteomyelitis, or infection of the bone, is an area where multi-drug resistant nosocomial infections are particularly troublesome. This project will develop novel, controlled release formulations of bacteriophages, viruses that infect bacteria, for osteomyelitis treatment and prophylaxis.
The overarching goal of this project is to identify the biophysical properties associated with antigen-specific T cells that lead to successful adoptive cell therapies for cancer.