NAM Healthy Longevity Catalyst Award Competition

Webinar for Prospective Applicants

Project Abstracts

Carrie Nieman, MD, MPH, Assistant Professor // Core Faculty, Johns Hopkins School of Medicine Department of Otolaryngology-Head & Neck Surgery // Johns Hopkins Cochlear Center for Hearing & Public Health

Affordable, Accessible Hearing Care for Aging Well

Age-related hearing loss is nearly universal and is strongly and independently associated with negative outcomes in almost every domain of the aging process. The broader individual and public health implications of hearing loss in older adults are now being recognized at the national and international level. Strategies to ensure affordability and access to hearing care for adults are urgently needed. The 2017 U.S. legislation that created the designation of over-the-counter (OTC) hearing aids, which are expected to debut in the U.S. market by the end of 2020, creates a unique and timely opportunity to expand hearing care delivery models. The overarching objective of this proposal is to implement a community health worker (CHW) approach to providing a basic level of hearing care to vulnerable older adults. Within public health, CHW models of care have long been considered an efficacious and cost-effective approach to increasing access to care and addressing disparities but has traditionally not been incorporated into hearing care practice. This proposal will extend an unconventional approach to hearing care that advances a new model of hearing care while simultaneously building capacity and addressing the growing hearing care needs of aging societies, regardless of resource setting, in order to ensure all older adults have the tools needed to age well.

Vineet Raghu, PhD, Research Fellow, Massachusetts General Hospital and Harvard Medical School

Deep Learning to Predict Biological Age and Longevity from Chest Radiographs

Age-related chronic disease causes 60% of deaths in the US. Primary prevention (e.g. statin to prevent cardiovascular disease) and screening (e.g. screening for lung cancer with chest CT) interventions are based on chronological age, but we know that chronological age is an imperfect measure of the aging process. A more accurate measure of biological age would enable healthcare providers to better personalize care and help researchers address factors underlying the aging process. The goal of our

project is to develop a pragmatic measure of biological age using a convolutional neural network (CNN) and a chest x-ray image. We will evaluate whether this chest x-ray age predicts longevity and age-related disease better than chronological age. Chest x-rays are among the most common tests in medicine and leveraging these existing x-rays to more accurately assess biological age has the potential to transform care of the aging population. The CNN will be developed and tested using over 30,000 publicly available chest x-rays as well as up to 18-year follow-up for mortality in 60,000 individuals from two large multi-center clinical trials, the Prostate, Lung, Colorectal, and Ovarian (PLCO) cancer screening trial and the National Lung Screening Trial (NLST).

Nikhil Shah, DO, MPH, Chief Executive Officer and Co-Founder, Nephrodite, Inc., University of Texas, Austin

Development of an Implantable, Continuously Operating, Patient-Friendly Renal Replacement System for Transforming Home Dialysis

We are developing a fully implantable, fully mechanical, continuous hemodialysis device that is designed to be a bridge to transplant for eligible patients and/or a destination therapy for transplant ineligible patients. Our device, inspired by a patient named Ms. Holly, serves as a more effective renal replacement therapeutic as it minimizes the impact/burden of treatment, facilitate mobility, and reduce disease maintenance and complications. The key functionality is provided by the novel coupling of an arterial-based mechanical pump, long-lasting semi-permeable filtration membrane, and an implanted reservoir that allows for solutes < 30kDa to be removed from the blood via exchange with dialysate. The dialysate, including the waste product, is contained in the implanted reservoir, and exchanged daily during sleeping hours via an implanted catheter that is connected to an external fluid exchange device. Key proof-of-concept testing has been completed in construction of the mechanical pump termed the Filtration Unit (FU). These include: feasibility of implantation of the FU, pressure and flow testing of the device, and demonstration of sufficient urea removal over an extended period of time. We currently seek funding to validate prior experiments using blood and to build an operational benchtop prototype.