WILLIAM G. LOWRIE DEPARTMENT OF CHEMICAL AND BIOMOLECULAR ENGINEERING Autumn 2024 seminar series

# Elizabeth Nance

Jagjeet and Janice Bindra Endowed Career Development Associate Professor, Department of Chemical Engineering, Associate Professor, Department of Bioengineering, University of Washington

# Translational Therapeutic Screening Methods for Newborn and Pediatric Brain Disease

## Thursday, November 21st, 11:30 AM130 Koffolt Lab, CBEC 151 W. Woodruff Ave.Reception at 11:00 AM – CBEC Lobby

### Abstract

Children comprise roughly 27% of the world’s population; yet pediatric trials make up 17% of the total number of clinical trials registered with the World Health Organization, and only 7% of clinical trials involve newborns. Therapies intended for use in children can take up to 7 years longer to go from the first clinical trial in adults to the first trial in children; often, many approved adult therapeutics are used off-label for children. These numbers highlight a significant gap in technological development for the neonatal and pediatric populations, particularly in technology that focuses on improving therapeutic outcomes for children and newborns with a range of conditions. Our research seeks to develop and evaluate therapeutic delivery systems for newborns and children, who have unique physiologies compared to adults. We focus specifically on engineering therapeutics that mitigate or attenuate ongoing injury in the brain, with the goal of improving neurological function and quality of life across the lifespan. As part of this work, we have developed living brain tissue models that are tunable to different stimuli and that capture the regional complexity and variability in response to injury and treatment. In this talk, I will discuss our use of whole hemisphere brain slices to evaluate cellular-extracellular changes in the brain microenvironment and screen therapeutics, including nanotherapeutics. I will show key design considerations that increase nanoparticle uptake and transport within the brain for improved neuroprotection in neonatal and pediatric brain diseases.

### bio

Dr. Elizabeth Nance joined the University of Washington in 2015 and is the Jagjeet & Janice Bindra Career Development Endowed Associate Professor & Associate Chair in Chemical Engineering, Associate Professor of Bioengineering, and adjunct professor in Radiology and the eScience Institute. Elizabeth received her B.S. in Chemical Engineering from NC State University, and her Ph.D. from Johns Hopkins University in Chemical & Biomolecular Engineering with Dr. Justin Hanes, with a focus on nanotherapies for brain cancer. She completed a postdoc with Dr. Sujatha Kannan in Anesthesiology & Critical Care Medicine at Johns Hopkins School of Medicine, with training in neuroscience, neonatal brain disease, and animal model development. Elizabeth’s research program supports the development of trainees in engineering clinically relevant models and technologies for neonatal and pediatric brain disease. She received the Presidential Early Career Achievement in Science & Engineering (PECASE) award, the UW Undergraduate Research Mentor Award (given to 4 faculty across the three UW campuses), an NIGMS R35 MIRA award, and the Burroughs Wellcome Career Award. She was recently named to the College of Fellows for the Controlled Release Society. Outside of her academic role, Elizabeth is founder of Women in Chemical Engineering ([www.wcheuw.edu](http://www.wcheuw.edu)), serves as the Editor in Chief for *Bioengineering & Translational Medicine*, is a UW OMBUD faculty conciliator, and is a member and mentor with Invent@Seattle Children’s, which supports commercialization of therapeutics for kids.

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