



Translational neurovascular fMRI throughout the central nervous system

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Functional MRI offers unique promise for non-invasively mapping activity throughout the central nervous system, yet numerous challenges have kept it from clinical translation. Our lab seeks to address these challenges, using fMRI to characterize individual neuropathophysiology and to support the optimization and personalization of rehabilitative interventions. To achieve this, we have developed bespoke MRI-compatible devices to administer controlled, repeatable, and quantitative motor tasks during scanning. Acknowledging that such tasks will induce large head-motion artifacts, particularly in patient populations, we have pioneered innovative multi-echo fMRI approaches to mitigate these confounds and boost the sensitivity and specificity of our activation mapping. Because motor control involves neural pathways that span the central nervous system and connect the brain with the body, we are pushing fMRI methodology to map sensorimotor activity in the cortex, subcortex, cerebellum, brainstem, and spinal cord. We combine this work with our lab's long-standing expertise in fMRI of vascular function to better understand the role of vascular dysfunction in neurodegeneration and functional impairment. This effort has led to the first fMRI characterization of spinal cord hemodynamics in humans. Our ongoing work deploys all of these techniques to bring fMRI closer to clinical impact, relating new imaging metrics to existing gold-standard measurements and evaluating neurovascular responses to emerging therapeutic interventions.

ABOUT the SPEAKER

Following a S.B. in physics from MIT, Dr. Molly Bright received her D.Phil. from the University of Oxford as part of a collaboration with the US National Institutes of Health, working at the Oxford Centre for Functional MRI of the Brain (FMRIB) and the Advanced MRI group of NINDS. She completed post-doctoral training at the Cardiff University Brain Research Imaging Centre (CUBRIC), incorporating new physiological stimuli, additional imaging modalities, and advanced fMRI processing techniques to her research. She then moved to Nottingham as an independent Anne McLaren Fellow, to develop ultra-high-field MR imaging methods for studying cerebral physiology in neurological diseases at the world-leading Sir Peter Mansfield Imaging Centre, the birthplace of MRI. In 2018, she returned home to America to lead the Applied Neuro-Vascular Imaging Lab (ANVIL) at Northwestern University. Dr. Bright is an active member of the international neuroimaging community, with elected positions in the International Society for Magnetic Resonance in Medicine (ISMRM) and the Organization for Human Brain Mapping (OHBM), founding member of the OHBM Women Faculty special interest group, and co-founder of the Imaging Cerebral Physiology Network. She is on the editorial board for *Imaging Neuroscience* (previously *Neuroimage*), and is a handling editor for *Aperture Neuro* (the OHBM journal), emphasizing her commitment to community-driven academic publishing. Her lab focuses on advanced MRI techniques to assess the healthy function and interaction of neural activity and vascular physiology throughout the human central nervous system, with an emphasis on initial translation to patient populations. Her research connects the Departments of Physical Therapy and Human Movement Sciences, Biomedical Engineering, Neurology, Radiology, as well as the Shirley Ryan Ability Lab in downtown Chicago.

Monday, September 30 at Noon
1003 Engineering Centers (Tong Auditorium)

