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# Characterization and Optimization of Ultrasound-induced Molecular Delivery In Vivo

Elisa Konofagou, James Choi, Shougang Wang, Barclay Morrison and Mark Borden
Dept. of Biomedical Engineering, Columbia Univ., 351 Engineering Terrace MC 8904, 1210 Amsterdam Ave., New York, NY 10027, USA

Current treatments of neurological and neurodegenerative diseases are limited due to the lack of a truly non-invasive, transient, and regionally selective brain drug delivery method. The brain is particularly difficult to deliver drugs to because of the blood-brain barrier (BBB). Over the past few years, we have been developing methods that combine Focused Ultrasound (FUS) and microbubbles in order to noninvasively, locally and transiently open the BBB so as to treat neurodegenerative diseases. In this paper, we will focus on the characterization of the type of molecular delivery that can be induced through the opened BBB. More specifically, we willl characterize important properties of the BBB opening such as its size and permeability using fluorescence and MR imaging techniques, respectively. The role of the microbubble type, size and concentration on the BBB diffusion properties, its reversibility and the pressure threshold for the opening will also be described in vivo. Finally, results will be shown in both non-transgenic (normal) and transgenic (Alzheimer's) mice in order to determine the variability of the properties of the opened BBB in the presence and absence of disease.