

replacing DFD17-2017-001220

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Cerebral blood flow reduction in Alzheimers disease: impact of capillary occlusions on mice and humans¹ MAXIME BERG, ADLAN MERLO, MYRIAM PEYROUNETTE, VINCENT DOYEUX, AMY SMITH, Institut de Mecanique des Fluides de Toulouse, Universite de Toulouse, CNRS-INPT-UPS, JEAN CRUZ-HERNANDEZ, OLIVER BRACKO, MOHAMMAD HAFT-JAVAHERIAN, NOZOMI NISHIMURA, CHRIS B. SCHAFFER, Meinig School of Biomedical Engineering, Cornell University, YOHAN DAVIT, MICHEL QUINTARD, SYLVIE LORTHOIS, Institut de Mecanique des Fluides de Toulouse, Universite de Toulouse, CNRS-INPT-UPS — Alzheimers disease may be the most common form of dementia, yet a satisfactory diagnosis procedure has still to be found (Nelson JNEEN 2012). Recent studies (Iturria-Medina Nat Com 2016 Cruz-Hernandez SFN meeting 2016) suggest that a significant decrease of cerebral blood flow, probably caused by white blood cells stalling small vessels, may be among the earliest biological markers. To assess this hypothesis we derive a blood flow model, validate it against in vitro controlled experiments and in vivo measurements made on mice. We then investigate the influence of capillary occlusions on regional perfusion (sum of all arteriole flowrates feeding the network) of large mice and humans anatomical networks. Consistent with experiments, we observe no threshold effect, so that even a small percentage of occlusions (2-4%) leads to significant blood flow decrease (5-12%). We show that both species share the same linear dependance, suggesting possible translation from mice to human.

¹ERC BrainMicroFlow GA61510, CALMIP HPC (Grant 2017-1541)

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Date submitted: 25 Sep 2017

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