Mechanotransduction and autophagy in endothelial cells: links to vascular disease

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Abstract

Cardio and cerebrovascular disorders are among the main causes of morbidity and mortality in developed countries, also having a significant impact in health care costs. Hemodynamic factors have a pivotal role in the inception and evolution of such diseases, but the way these factors act upon the vascular wall is an unresolved question [1]. We are currently studying the role of blow flow on a subset of cellular autophagy, chaperone-assisted selective autophagy (CASA), to determine the influence of mechanical forces on this cell survival mechanism, by simulating blood flow on endothelial cells in parallel-plate flow chambers and also evaluating changes in animal models of disturbed arterial flow [2, 3]. In this presentation, we demonstrate the importance of mathematical modeling and computational simulation in this preclinical setting, but also address the potential for patient diagnosis and treatment, taking cerebral aneurysms as an example [4].

Keywords: Autophagy, Cerebrovascular disease, CFD, mechanotransduction

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