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Letter to Editor

Human Microvessel Wall Shear Stress

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Wall Shear Stress (WSS) is a very important biomechanical stimulus in the function of the circulatory system, the Blood-Brain Barrier (BBB) [1] and the endothelial autophagy [2]. In order to study the effect of WSS scientists make in vitro models and microfluidic organs on chip [1, 3]. A key aspect of these in vitro models is simulating WSS with values of physiological level [3].

Therefore, I would like to call attention to the papers of Koutsiaris et al [4, 5] where WSS was quantified i*n vivo* from noninvasive measurements of blood flow velocity in the human eye precapillary arterioles, capillaries and postcapillary venules. Even though WSS levels between 3 and 20 dynes/cm^2 used to be considered as "physiological", it is now known that WSS can easily reach greater values. More specifically, 3 points are now clear: 1) a significant arteriolar velocity pulsation, attenuates slowly (logarithmically) as blood proceeds down to smaller arteriolar diameters in the human eye [6], 2) the velocity pulse corresponds to a WSS pulse which can reach values of 200 dynes/cm^2 at the precapillary arteriolar side and 3) average arteriolar WSS values are more than double than those in the venular side for the same diameters [1].

Finally, taking into account the sophisticated role of endothelial cells in the cardiovascular system, acting as cardiovascular processing sensors (CPSs) [1], and the principle of segmental heterogeneity [7], the microfluidic model designers should consider simulating five different microvascular segments, as recently proposed [1]: arteriolar, precapillary arteriolar, capillary, postcapillary venular and venular. Hopefully, the above information will be helpful to the authors and readers of your journal.

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