

Microperfusion Effects in Aortic Wall with Diffusion-driven Mechanisms

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Abstract: Aorta and major arteries of human body are not only passive conducting vessels but should be treated as autonomous organs. The diseases of great vessels, for example the aneurysms, appear due to media degeneration. Complex structure of vascular wall consists of three layers. The medium portion contains elastic fibers and collagen supported by smooth muscle cells. The role of the muscular cells has nothing to do with contractivity. They supply the media with newly produced protein fibers.

The aim of this preliminary study was to reveal the relation between diffusive nutrition of the media layer through the adventitia containing vasa vasorum. Augmentation of the stress and strain exerted on the elastic fibers due to increasing diameter of the vessel (Laplace law), may lead to the decreasing blood supply for the muscular cells and further asphyxia and stumming of the transcription mechanisms.

Thank to the computational model we would like to contribute to the knowledge of the pathological positive feedback between mechanical forces and the tissue degeneration.

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