Computational and Mathematical Methods in Medicine

Hindawi

Special Issue on

Modeling Vascular Structure and Function in Disease States

CALL FOR PAPERS

The primary function of the circulatory system is to supply oxygen and nutrients to every tissue in the body. This transport is achieved via convection through the blood and diffusion between blood and surrounding tissue. A highly branched and complex network of blood vessels makes transport of oxygen from the heart to the most distal systemic tissues possible. A combination of processes including blood flow, blood vessel mechanics, diffusion, blood flow regulation, and molecular and cellular responses to physical and biochemical signals occurs across large and small scales of the circulatory system. Impairments of any of these processes at any level can greatly affect tissue and/or organ behavior.

This special issue aims to demonstrate the contributions of mathematical and computational approaches to quantify relationships between vascular processes and phenomena that occur at different scales. Such theoretical studies play a critical role in cardiovascular physiology and are used to provide insight and improved therapeutic strategies for cardiovascular and systemic disease such as peripheral arterial disease, atherosclerosis, stroke, hypovolemic shock, hypertension, cerebral or aortic aneurysms, diabetes, neurodegenerative diseases, and cancer.

Potential topics include but are not limited to the following:

- Blood flow regulation
- Diffusive mass transport
- Short-term blood flow regulation of vascular smooth muscle behavior
- Long-term structural adaption of blood vessels, including vessel growth, remodeling, and maturation
- Angiogenesis
- Vessel wall mechanics
- Cell signaling
- Cardiomyocytes and fibroblasts
- Tumor circulation
- Vascular pathology and inflammation

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