



# Capillary Fluid Exchange: Regulation, Functions, and Pathology (Colloquium Series on Integrated Systems Physiology: From Mol)

*Joshua Scallan, Virginia H. Huxley, Ronald J. Korthuis*

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The partition of fluid between the vascular and interstitial compartments is regulated by forces (hydrostatic and oncotic) operating across the microvascular walls and the surface areas of permeable structures comprising the endothelial barrier to fluid and solute exchange, as well as within the extracellular matrix and lymphatics. In addition to its role in the regulation of vascular volume, transcapillary fluid filtration also allows for continuous turnover of water bathing tissue cells, providing the medium for diffusional flux of oxygen and nutrients required for cellular metabolism and removal of metabolic byproducts.

Transendothelial volume flow has also been shown to influence vascular smooth muscle tone in arterioles, hydraulic conductivity in capillaries, and neutrophil transmigration across postcapillary venules, while the flow of this filtrate through the interstitial spaces functions to modify the activities of parenchymal, resident tissue, and metastasizing tumor cells. Likewise, the flow of lymph, which is driven by capillary filtration, is important for the transport of immune and tumor cells, antigen delivery to lymph nodes, and for return of filtered fluid and extravasated proteins to the blood. Given this background, the aims of this treatise are to summarize our current understanding of the factors involved in the regulation of transcapillary fluid movement, how fluid movements across the endothelial barrier and through the interstitium and lymphatic vessels influence cell function and behavior, and the pathophysiology of edema formation. Table of Contents: Fluid Movement Across the Endothelial Barrier / The Interstitium / The Lymphatic Vasculature / Pathophysiology of Edema Formation

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