

## THE INFLUENCE OF OXYGEN SUPPLY, HEMORHEOLOGY AND MICROCIRCULATION IN THE HEART AND VASCULAR SYSTEMS

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### Abstract

The microcirculation is an important system, containing resistance arterioles, capillaries and venules, whose main function is to transport oxygen and nutrients to the tissues. Endothelial cells are the main cell types of the microcirculation; their homeostasis is modulated by constant shear stress. Altered hemorheology induces a change in the production of vasodilator and vasoconstrictor agents. The most important pattern inducing endothelium dysfunction is an increase in oxidative stress, which decreases the amount of nitric oxide and favors microvascular phlogosis. In this review we will consider the main scientific reports about the cardiovascular risk factors such as smoking, hypercholesterolemia, hyperviscosity, hypertension, diabetes, stress and increased homocysteine levels, all having as common etiopathogenetic

factor alterations in microcirculation and in tissue oxygenation. We also focus on their influence on endothelial cells, inducing endothelial changes and dysfunction related to altered oxygen supply and linked to increased oxidative stress. Also important are endothelial stem cells, that are able to repair vascular endothelial damage, especially in cardiovascular patients, with or without endothelial dysfunction. Under these circumstances the numbers of these stem cells are altered, which means there is a decrease in regeneration capability (post ischaemia modified albumin, etc.). This could be an important negative prognostic factor. Microcirculation and tissue oxygenation are very important factors strongly linked to hemorheology, especially in cardiovascular patients, and their alterations could cause impairment, or initiate cardiovascular pathologies. [**Adv Exp Med Biol.** 2010;662:33-9]PMID: 20204768

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