Apoptosis of endothelial cells. Contribution to the pathophysiology of atherosclerosis

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Abstract

Endothelial cell injury is a key event in the pathogenesis of atherosclerosis. Importantly, endothelial cells in lesion-prone regions, where atherosclerotic lesions preferentially develop, are characterised by increased endothelial cell turn-over rates suggesting a mechanistic link between endothelial cell turn-over with preceding cell death and the susceptibility to atherosclerotic plaque development. The activation of the cellular suicide pathway leading to apoptosis of the endothelial cell may be an initial step in the development of atherosclerotic lesions. This hypothesis is supported by the finding that proatherosclerotic factors such as angiotensin II, oxidized low density lipoprotein, reactive oxygen species, glucose and inflammatory cytokines have all been shown to induce apoptosis of endothelial cells. In contrast, the known atheroprotective factors, such as oestrogen, nitric oxide or anti-oxidants, prevented endothelial cell apoptosis. Furthermore, laminar flow, which seems to be one of the most potent endogenous anti-atherosclerotic factor as illustrated by the focal nature of atherosclerotic lesion development in areas with turbulent or low blood flow, protects endothelial cell from apoptotic cell death. The present article summarizes the effects of pro and anti-atherosclerotic factors on endothelial cell apoptosis and provides insights into the underlying signalling events.
The levels of endothelial cell apoptosis were determined via flow cytometry. The expressions of miR-210 and PDK1 in purified CD31+ endothelial cells from mouse aorta were measured via RT-qPCR and western blot. Binding between miR-210 and the 3′-untranslated region (UTR) of PDK1 mRNA was predicted using bioinformatics analyses and confirmed with a dual luciferase reporter assay. Authors' contributions. PY contributed to the design of the experiment. YL performed all experiments and wrote the manuscript. CY contributed to the creation of the atherosclerosis mouse model. LZ performed data analyses. Atherosclerosis-associated endothelial cell apoptosis by MiR-429-mediated down regulation of Bcl-2. Cell Physiol Biochem.