

Newer technique to assess vascular function: a significance of endothelial microparticles and endothelial progenitor cells

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Vascular function evaluation contributes to our understanding of atherosclerotic vascular disease. Endothelial dysfunction is the early manifestation for the pathogenesis of vascular disease. It is essential to develop a novel method to assess endothelial function. Circulating endothelial microparticles (EMPs) and endothelial progenitor cells (EPCs) are the new markers for the clinical evaluation of endothelial function.

EMPs are defined as small vesicles released from endothelial cells in response to activation or apoptosis by various stimuli. Accumulating evidence shows that the circulating EMPs elevate in several pathological conditions related to endothelial dysfunction, such as hypertension, hyperlipidemia, acute coronary syndrome and so on. EMPs generation can be induced by certain agonist, for example, some inflammatory cytokine, interleukins, and C-reactive protein, which is related to BH₄-dependent NO formation.

EPCs derived from bone marrow have the capacity to migrate to peripheral circulation and to differentiate into mature endothelial cells. A body of evidence indicates that circulating EPCs are important endogenous repair approach for endothelial injury, which plays an important role in maintaining the integrity of vascular endothelium. The fall in number and function of circulating EPCs with subsequently endothelial dysfunction is involved in the pathogenesis of vascular injury. EPCs are not only a marker of endothelial function but also a powerful predictor of the outcome of cardiovascular disease. Upregulation of circulating EPCs may serve as a novel therapeutic target for improvement of vascular injury. Many drugs such as statins, ACEI, ARB and CCB can increase the numbers and functions of EPCs. Exercise and lowering fat diet served as the examples of non-drug therapy can also augment the EPCs.

In summary, measurement of both EMPs and EPCs as the evaluation parameters of endothelial function is useful complement to vascular risk factors and get more evaluable information about the risk of vascular events. The optimal therapy for patients with vascular disease should include not only controlling the risk factors but also improvement of vascular injury in parallel.