



Review

Microparticles are vectors of paradoxical information in vascular cells including the endothelium: role in health and diseases

Ferhat Meziani^{1,2}, Angela Tesse¹, Ramaroson Andriantsitohaina¹

¹CNRS UMR, 6214, Angers, France; INSERM, U771, Angers, France; Université d'Angers, Angers, France

²Département de réanimation médicale et de médecine hyperbare, CHU Angers, France

Correspondence: Ramaroson Andriantsitohaina, e-mail: ramaroson.andriantsitohaina@univ-angers.fr

Abstract:

Both inflammation and thrombosis can be orchestrated by the interactions between circulating cells, such as leukocytes and platelets, with vascular, endothelial and smooth muscle cells, which, during activation or apoptosis, can release circulating microparticles (MPs). Indeed, MPs are membrane vesicles with procoagulant and proinflammatory properties. MPs are present in blood from healthy individuals and in patients under several pathological states, for instance sepsis, preeclampsia, Crohn's disease and diabetes, strengthening the notion that MPs may play a role in these diseases. Circulating MPs or those generated *in vitro* from apoptotic T cells display deleterious effects on endothelial and/or vasomotor function. In contrast, MPs might be protective to endothelial cells. We have shown that MPs harboring the morphogen sonic hedgehog may represent a new therapeutic approach against endothelial dysfunction during acute severe endothelial injury. Indeed, these types of MPs induce NO release, decrease production of reactive oxygen species and induce angiogenesis from endothelial cells. This protective role for the endothelium was confirmed also by their *in vivo* injection in mice in which they were also able to reverse endothelial dysfunction in a model of heart ischemia/reperfusion. On the contrary, MPs from preeclamptic women compared to those from normal pregnant women showed pro-inflammatory properties in the vascular wall inducing vascular hyporeactivity in vessels from humans and mice. These effects were associated with complex interactions between NO and cyclooxygenase systems *via* endothelial cell activation. Altogether, these findings suggest that MPs can be considered as vectors of biological messages for vascular homeostasis, during immunity and inflammation.
