

# Platelets: are they only a “Hemostatic player”?

## Editorial

Platelets are small (5-9fl) blood cells, with discoid structure (1.5µx0.5-1µm), without nucleus. They are derived from megakaryocytes and enter in the circulation while being under the regulation of thrombopoietin, a hormone produced mainly in the liver. Platelets are found in mammals, probably as an evaluating process after severe bleeding. They are constituted of many glycoprotein receptors and proteins (such as GPIb/IX/V, GPIIb/IIIa, GPVI, PAR1, PAR2, P2Y12, P-selectin), all of which are related to platelets adhesion and aggregation and of many platelet organelles as dense and α-granules which include substances related to clot formation, induction signaling of endothelial cells and control of haemostasis in general.<sup>1-4</sup>

While the significant role of platelets in the haemostatic process is certain, information about their role in the inflammatory process is gaining attention recently. Specifically, platelets interact with Gram positive or Gram negative bacteria and defense against them through platelet microbicidal proteins (PMPs), which are small cationic proteins of the antimicrobial armamentarium and kinocidins, which are chemokines with direct and indirect microbicidal activities. Interaction has been described also with Neutrophils, monocytes and lymphocytes. Constituents of α-granules like PF4 (platelet factor 4) or SDF-1 (stromal cell-derived factor 1), are chemokines that help the activation of immune cells whereas constituents of dense granules like ADP, polyphosphates, or serotonin have immune modifying effects implicating monocyte differentiation and enhancement of T-cell activation.<sup>5-9</sup>

Additionally, acute phase response is modified by platelets, mainly via IL-1b (interleukin 1b) and binding to pathogens is induced by the expression of Toll-like receptors on platelets. Expression of TLR4 and TLR2 are the main receptors contributing to the interaction of platelets with neutrophil. Binding to neutrophils leads to the release of other chemokines and as a consequence the formation of neutrophil extracellular traps (NETS) which kill pathogens.<sup>8,10-13</sup> Platelets are also the major source of soluble CD40L, a “key” molecule of the adaptive immune response and B-cell immunoglobulin iso type switching. Modulation of dendritic cells (DC) through interactions between DC derived CD11b/CD18, T-cell enhancers and platelets have been documented.<sup>6,7,14,15</sup> Platelets also interact with the blood vessel endothelium, reinforce intercellular communication and spread the diverse repertoire of miRNAs that they carry, which are responsible for the vascular inflammation. Perhaps this could also interpret the interference of platelets in tumor growth and metastasis.<sup>16</sup>

In addition, quite recently it has been found that platelets possess mRNA, whose expression plays a crucial role in cytokines and lipid mediators. Signaling of platelet aggregation through calcium channels in patients with diabetes mellitus and metabolic syndrome has been described.<sup>17-19</sup> We understand that until 130years ago, platelets were thought to be just “dust” in the vessels, contributing only to haemostasis. Nowadays, special functions, especially that regarding inflammatory process modulation, are attributed to platelets. Expert research in this promising field, will probably give us more surprising results in the future.

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## Conflict of interest

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