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Activated Monocytes Enhance Platelet-Driven Contraction of Blood Clots via Tissue Factor Expression

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Abstract

© 2017 The Author(s). Platelet-driven reduction in blood clot volume (clot contraction or retraction) has been implicated to play a role in hemostasis and thrombosis. Although these processes are often linked with inflammation, the role of inflammatory cells in contraction of blood clots and thrombi has not been investigated. The aim of this work was to study the influence of activated monocytes on clot contraction. The effects of monocytes were evaluated using a quantitative optical tracking methodology to follow volume changes in a blood clot formed in vitro. When a physiologically relevant number of isolated human monocytes pre-activated with phorbol-12-myristate-13-acetate (PMA) were added back into whole blood, the extent and rate of clot contraction were increased compared to addition of non-activated cells. Inhibition of tissue factor expression or its inactivation on the surface of PMA-treated monocytes reduced the extent and rate of clot contraction back to control levels with non-activated monocytes. On the contrary, addition of tissue factor enhanced clot contraction, mimicking the effects of tissue factor expressed on the activated monocytes. These data suggest that the inflammatory cells through their expression of tissue factor can directly affect hemostasis and thrombosis by modulating the size and density of intra- and extravascular clots and thrombi.

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