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Titel des Beitrags:
Platelet Kinetics in the Pulmonary Microcirculation in vivo Assessed by Intravital Microscopy

Abstract:
Growing evidence supports the substantial pathophysiological impact of platelets on the development of acute lung injury. Methods for studying these cellular mechanisms in vivo are not present yet. The aim of this study was to develop a model enabling the quantitative analysis of platelet kinetics and platelet-endothelium interaction within consecutive segments of the pulmonary microcirculation in vivo. New Zealand White rabbits were anesthetized and ventilated. Autologous platelets were separated from blood and labeled ex vivo with rhodamine 6G. After implantation of a thoracic window, microhemodynamics and kinetics of platelets were investigated by intravital microscopy. Velocities of red blood cells (RBCs) and platelets were measured in arterioles, capillaries and venules, and the number of platelets adhering to the microvascular endothelium was counted. Kinetics of unstimulated platelets was compared with kinetics of thrombin-activated platelets. Velocity of unstimulated platelets was comparable to RBC velocity in all vessel segments. Unstimulated platelets passed the pulmonary microcirculation without substantial platelet-endothelial interaction. In contrast, velocity of activated platelets was decreased in all vascular segments indicating platelet margination and temporal platelet-endothelium interaction. Thrombin-activated platelets adhered to arteriolar endothelium; in capillaries and venules adherence of platelets was increased 8-fold and...
13-fold, respectively. In conclusion, using intravital microscopy platelet kinetics were directly analyzed in the pulmonary microcirculation in vivo for the first time. In contrast to leukocytes, no substantial platelet-endothelium interaction occurs in the pulmonary microcirculation without any further stimulus. In response to platelet activation, molecular mechanisms enable adhesion of platelets in arterioles and venules as well as retention of platelets within capillaries.

Stichworte: Intravital microscopy; Lung; Microcirculation; Model; Platelet-endothelium interaction; Platelets; Thrombocytes

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