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Study of platelet activation in a system continuously releasing nitric oxide

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Motivation and Aim: Platelet activation is considered as a cornerstone in pathogenesis of cardiovascular disease. Laboratory assessment of platelet function is usually done using blood samples, for instance, in platelet-rich plasma [1]. However, the behavior of platelets in physiological conditions is different, mainly because activation is constantly inhibited. The main inhibitor is nitric oxide (NO), which is continuously released by endothelial cells.
Methods and Algorithms: NO is short-lived metabolite, therefore it should be continuously generated to maintain constant concentration and to mimic physiological conditions. We used specially synthesized molecules capable of light-controlled release of NO [2], or "NO photodonors". This approach allows us to tune the rate of NO generation by changing the light intensity. Specifically, we use N-Nitroso derivatives of BODIPY dyes [3].
Results: NO photodonor was added to the sample containing platelets loaded with Fluo-4 calcium indicator. The sample was studied using fluorescent microscope. 490 nm source was used for the excitation of Fluo-4 fluorescence and at the same time for activation of NO photorelease. We observed significantly reduced activation compared to the control sample and to the sample with BODIPY dye without N-Nitroso bond.
Conclusion: Our results suggest that the use of light-controlled nitric oxide donors allows one to mimic physiological conditions and reduces the spontaneous activation of platelets.
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