

Correlation Mapping for Measuring Platelet Adhesion

Authors : Eunseop Yeom

Abstract : Platelets can be activated by the surrounding blood flows where a blood vessel is narrowed as a result of atherosclerosis. Numerous studies have been conducted to identify the relation between platelets activation and thrombus formation. To measure platelet adhesion, this study proposes an image analysis technique. Blood samples are delivered in the microfluidic channel, and then platelets are activated by a stenotic micro-channel with 90% severity. By applying proposed correlation mapping, which visualizes decorrelation of the streaming blood flow, the area of adhered platelets (APlatelet) was estimated without labeling platelets. In order to evaluate the performance of correlation mapping on the detection of platelet adhesion, the effect of tile size was investigated by calculating 2D correlation coefficients with binary images obtained by manual labeling and the correlation mapping method with different sizes of the square tile ranging from 3 to 50 pixels. The maximum 2D correlation coefficient is observed with the optimum tile size of 5×5 pixels. As the area of the platelet adhesion increases, the platelets plug the channel and there is only a small amount of blood flows. This image analysis could provide new insights for better understanding of the interactions between platelet aggregation and blood flows in various physiological conditions.

Keywords : platelet activation, correlation coefficient, image analysis, shear rate

Conference Title : ICBSIA 2018 : International Conference on Biomedical Signal and Image Analysis

Conference Location : Bangkok, Thailand

Conference Dates : February 08-09, 2018