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Development of a New Method for Platelet Function Test and Its Shearing Condition in Microfludic System HOYOON LEE, GYEHYU KIM, SEAWHAN CHOI, SEHYUN SHIN, Korea University, KOREA UNIVERSITY DEPARTMENT OF MECHANICAL ENGINEERING TEAM — Platelet is a crucial blood cell on hemostasis. As platelet exposed to high shear stress, it can be activated showing morphological and functional changes to stop bleeding. When platelet is abnormal, there is high risk of cardiovascular diseases. Thus, quick and precise assay for platelet function is important in clinical treatment. In this study, we design a microfluidic system, which can test platelet function exposed with the stimulation of shear and agonists. The microfluidic system consists of three parts: 1) a shear mechanism with rotating stirrer; 2) multiple microchannels to flow samples and to stop; 3) camera-interfaced migration distance(MD) analyzing system. When sheared blood is driven by pressure through the microchannel, shear-activated platelets adhere to a collagen-coated surface, causing blood flow to significantly slow and eventually stop. As the micro-stirrer speed increases, MD decreases exponentially at first, but it increases beyond a critical rpm after all. These results are coincident with data measured by FACS flowcytometry. These results imply that the present system could quantitatively measure the degree of activation, aggregation and adhesion of platelets and that blood MD is potent index for measuring the shear-dependence of platelet function.

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