The Gears Keep Turning: Current Progress in Platelet Function Testing

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Since measure of the bleeding time was introduced by Duke [1] more than 100 years ago, platelet function testing is one of the major issues in hemostasis. Later more specific assays were developed and include platelet aggregometry first described by Born [2] or flow cytometry for detection of platelet-specific activation markers [3]. By now, the broad spectrum of published assays and protocols is completed by a number of commercial test systems. The present issue of TRANSFUSION MEDICINE AND HEMOTHERAPY encompasses a comprehensive overview of the start of the art in platelet function testing [4].

The fields of application of platelet function testing are: i) basic research; ii) clinical diagnosis; iii) transfusion medicine. The monitoring of parameters indicative for platelet functionality or the platelet activation state in platelet concentrates is one focus in transfusion medicine. Noninvasive technologies represent attractive options and are described for pH monitoring [5] and for relative platelet quantification by dynamic light scattering [6]. The ultrastructural evaluation of platelets by transmission electron microscopy (TEM) is an interesting approach to obtain detailed quality information of the platelet concentrate [7]. Platelet functionality is also reflected by their release of alpha and dense granules. Nucleotides (ADP and ATP) belong to the major substances in dense granules, and the quantitative determination by high-performance liquid chromatography (HPLC) could represent an important approach in basic platelet research or in clinical diagnosis of platelet function disorders [8]. However, implementation of such methods (TEM and HPLC) in a routine laboratory for clinical hemostaseology or blood banks could be challenging.

A novel platelet activation test in unprocessed blood (pac-t-UB) based on flow cytometry is described in the present issue [9]. Markers for platelet activation (P-selectin and fibrinogen binding) are measured in this standardized assay that could be implemented for monitoring platelet concentrates as well as platelet function in patients. Further interest of platelet monitoring lies in the establishment of novel functional markers in addition to the classical activation markers. The surface expression of tissue factor could represent such a novel marker that reflects the hemostatic potential of stored platelets [10].

Despite the availability of a variety of methods and devices, there is still no test system that could cover all aspects of platelet function which includes adhesion, aggregation, degranulation, and plug formation. Reliability, reproducibility, and robustness as well as feasibility in different laboratory and clinical environments are still the great challenges in platelet function testing. However, progress is made, and the gears keep turning in this direction.

References