Abstract

Automated Detection of Fragmented Red Cells with XE-2100

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The extent of red blood cell fragmentation in peripheral blood is considered to be a useful indication for diagnosis and follow-up in many diseases, e.g., hemolytic uremic syndrome (HUS), transplantation-associated thrombotic microangiopathy (BMT-TMA). However, this quantification still relies on manual counting of smears. We developed a quantification system by gating a fixed area of fragmented red blood cells (Gate 1) on an automated hematology analyzer (XE-2100, Sysmex Corporation, Japan). The fragmented red cell percentage (FRC%) calculated with this system, from 90 samples, was compared with manual count FRC% and proved to be highly correlated (R^2=0.734, p<0.001). As iron deficiency anemia specimens usually take a lower position of the XE-2100 scattergram, with microsphere cells overlapping Gate 1 and causing a spuriously high FRC% calculation, a supplementary gate (Gate 2) was added. Using the particle number in this gate as well as in Gate 1, a revised method for such kind of samples was deduced and the validity was proved high (revised FRC% equally compared with manual count for 10 subjects (p<0.001). Since this gating system, could be simply programmed on any XE-2100, it is expected to be useful for accurate quantification of red blood cell fragmentation and monitoring the prospective development of BMT-TMA.

BMT-TMA is one of major issues of allogeneic stem cell transplantation (allo SCT). Increase of fragmented red cells (FRC) or schistocytosis is an important objective marker of TMA. We sequentially measured FRC% with XE-2100 during the clinical courses after allo SCT in 27 cases. Two patients already had schistocytosis previous to allo SCT, and their FRC% was gradually normalized after engraftment. In other 25 cases, FRC% was less than 1.3% before allo SCT. After allo SCT, FRC% exceeded 1.3 % in 11 cases during their clinical courses, and in three of them, FRC% was transiently elevated beyond 3 %. Two of the three cases had clinical TMA, which occurred overlapping with acute GVHD and/or hepatic VOD. Sharp increase of FRC% detected by sequential and frequent measurement was helpful to establish the diagnosis of TMA, which otherwise may have been mistaken as exacerbation of pre-existing complications.

Automatic detection of fragmented cells looks to be a useful and of clinical utility.