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ORIGINAL ARTICLE

The clinical significance of PNH-phenotype cells accounting for < 0.01% of total granulocytes detected by the Clinical and Laboratory Standards Institute methods in patients with bone marrow failure

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Abstract

Small populations of glycosylphosphatidylinositol-anchored protein-deficient (GPI[-]) cells accounting for up to 0.01% of total granulocytes can be accurately detected by a high-sensitivity flow cytometry (FCM) assay established by the Clinical and Laboratory Standards Institute (CLSI method) and have a prognostic value in bone marrow failure (BMF); however, the significance of GPI(-) granulocytes accounting for 0.001–0.009% of granulocytes remains unclear. To clarify this issue, we examined the peripheral blood of 21 BMF patients in whom minor (around 0.01%) populations of GPI(-) granulocytes had been previously detected by a different high-resolution FCM method (OPTIMA method, which defines ≥ 0.003% GPI(-) granulocytes as an abnormal increase) using both the CLSI and OPTIMA methods simultaneously. These two methods detected an "abnormal increase" in GPI(-) granulocytes in 10 patients (48%) and 17 patients (81%), respectively. CLSI detected 0.002–0.005% (median, 0.004%) GPI(-) granulocytes in 7 patients who were deemed positive for PNH-type cells according to the OPTIMA method, which detected 0.003–0.012% (median 0.006%) GPI(-) granulocytes. The clone sizes of GPI(-) cells detected by each assay were positively correlated ($r = 0.994$, $p < 0.001$). Of the seven patients who were judged positive for PNH-type cells by OPTIMA alone, five received immunosuppressive therapy, and all of them achieved a partial or complete response. GPI(-) granulocytes detected in BMF patients by the CLSI method should thus be considered significant, even at percentages of < 0.01%.

Keywords Flow cytometry · Bone marrow failure · PNH-type cells

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