Flow Cytometric Blast Immunophenotypes in Acute Myeloid Leukemias Arising from Non-Acute Myeloid Disorders

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Abstract

Non-acute myeloid disorders can progress to acute myelogenous leukemia (AML). No data exists comparing blast immunophenotypes (pre- and post-transformation) of blasts from non-myeloid myeloid disorders have been demonstrated to be CD34+ by flow cytometry (FC) in most cases, we hypothesized that transformed cases would show similar results.

Design: 9 cases of non-myeloid disorders with transformation to AML were identified. Classification followed the 2008 WHO criteria. Pre and post-transformation blasts (IP) were determined by cluster analysis and 4-color FC in blood or bone marrow with the following antibodies: CD4, CD7, CD10, CD11b, CD13, CD14, CD16, CD21, CD22, CD34, CD38, CD45, CD56, CD79a, CD117, HLA-DR, MPO, and TdT. Blast aberrancies were defined as deviations from previously published IPs in normal myeloid blasts. Change in antigen expression was defined as a 1/4 log change in intensity.

Results: The study included 5 M and 4 F, ages 46-68 years (median 62). Pre-and post-transformation blast % by FC ranged from 1.7-17% (median 6); the number of IP aberrancies ranged from 1-8 (median 4) with the most common aberrancies present in CD33 (67%), CD13 (56%), CD11b (55%), CD15 (55%), CD117 (54%), HLA-DR (45%), and CD4 (44%) expression. The time from diagnosis to transformation ranged from 23-801 days (median 326). The blast % by FC in AML ranged from 0.59-27.8% (median 6); positive and negative antigen expression was defined based on a 20% threshold established with an isotonic control tube. Blast aberrancies were defined as deviations from previously published data on normal immunophenotypic (IP) profiles for myeloblasts; changes in antigen expression intensity were defined as 1/4 log change.

Conclusions:

1. Change in blast IP aberrancies occur in the majority of cases of MDS or MDS/MPN that transform to AML, however blast % retain a significant degree of homology in this transformation.

2. Most IP changes consist of changes in relative antigen expression in fewer instances of gain or loss of antigen expression.

3. CD34 status is relatively stable with transformation, with only one case showing increased expression at transformation.

4. Of 9 cases of transformed MDS and MDS/MPN showed decreased CD34 expression at initial diagnosis, which is higher than published data on non-acute myeloid disorder blast IPs. Decreased CD34 expression may therefore be a prognostic indicator in such cases—a phenomenon requiring additional study.