CORRESPONDENCE

B-acute Lymphoblastic Leukemia with Bright CD45 and Moderate Side Scatter Simulating Monocytoid Population: An Unusual Phenotype

Tanvi Gupta¹ · Ruchi Gupta¹ · Navkirti Mittal¹ · Khaliqur Rahman¹ · Soniya Nityanand¹

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Dear Editor,

Primary gating of cells in CD45 versus side scatter (SSc) plot for reliable isolation of blasts from other hematopoietic cell types and lineage discrimination is well established [1]. This gating strategy gives the first clue to the biology of cells, mature versus immature cell type and guides us to the use of a minimal panel of monoclonal antibodies required for accurate phenotypic determination of the atypical cells. In the CD45 versus SSc dot plot, lymphoblasts classically lie in the so-called “*bermude area*” that is in the middle of the other described cell types and exhibit low side scatter and variable CD45 expression ranging from dim to moderate [2]. We, hereby report an unusual case of B lineage acute lymphoblastic leukemia (B-ALL) which showed an unusually bright CD45 and moderate SSc simulating monocytes, a combination rarely found in literature particularly for blast population.

A 48 year old female presented to hematology OPD with complaints of fever and lethargy for 1-month duration. Complete blood counts revealed bicytopenia, while bone

marrow examination showed proliferation of large sized blasts with moderately condensed chromatin, irregular nuclear contours and scant to moderate amount of agranular cytoplasm (Fig. 1a). Cytochemically, these were negative for myeloperoxidase and periodic acid schiff stains. Flow cytometry analysis displayed a distinct blast population with moderate SSc and bright CD45 expression (Fig. 1b–f); an area known to be the ‘monocytoid region’. However all lineage specific monocytoid markers CD14/CD11b/CD64 were negative. Instead, these cells expressed CD10, CD19, CD34, CD38, HLA-DR, cCD79a while being negative for other myeloid and T lineage markers. A final diagnosis of B-lymphoblastic leukemia was made considering both immunophenotype and morphology of cells. Conventional karyotyping revealed hyperdiploidy. Molecular work up for recurrent mutations, namely t(9;22), t(12;21), t(1;19) and MLL rearrangement was found to be negative. The patient was started on MRC UK ALL protocol. She responded well to chemotherapy and attained morphological remission. Minimal residual disease assessed by flow cytometry at post induction and post consolidation phase was negative.

In flow cytometry, SSc signals correlate with internal cytoplasmic complexities, hence it can be inferred that lymphoblasts with scanty agranular cytoplasm have low SSc. Also, CD45 expression on lymphoblasts is usually about one deca log or more weaker than in normal lymphocytes [3, 4]. However, in this present case of B-ALL, blasts lie in high CD45 and moderate SSC region, which can be attributed to relatively large size of blasts, and irregular nuclear contours as compared to those noted in ALL. The presence of lymphoblasts in the bright CD45 region has been associated with poor prognosis, attributable to its frequent association with presence of MLL/AF4 and BCR/ABL1 translocations [4, 5].

✉ Ruchi Gupta
ruchipgi@yahoo.co.in
Tanvi Gupta
tanvi.g21@gmail.com
Navkirti Mittal
dr.navkirti@gmail.com
Khaliqur Rahman
drkhaliq81@gmail.com
Soniya Nityanand
soniya_nityanand@sngpi.ac.in

¹ Department of Hematology, I-Block, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Raebareilly Road, Lucknow, U.P. 226014, India

Fig. 1 May Grunwal Giemsa stain (100 $\times$)—large sized blasts with scanty agranular cytoplasm, irregular nuclear contours and moderately condensed chromatin (a), SSC versus CD45 dot plot showing blasts gated in bright CD45 and moderate SSC region (b), the blasts expressed CD19/CD10/CD34/CD38/cyto CD79a and were negative for CD14/CD64/cyto MPO (c–f)

Conversely, a dim CD45 expression is associated with favorable prognostic markers i.e. hyperdiploidy and t(12;21) [4, 5]. These observations are contrary to the

features in the present case, which showed bright CD45 expression with hyperdiploidy.

To conclude, CD45 expression on lymphoblasts is variable and a bright CD45 expression does not negate the possibility of an immature neoplasm. Also, its correlation with underlying cytogenetics and prognosis is deplorable.

Compliance with ethical standards

Conflict of interest The authors declare that they have no competing interests.

Ethical standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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