Immunophenotyping of Acute Leukemia in Northwestern Iran

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Abstract

The significance of immunophenotyping is growing day by day. It provides basic information in regard to classification and prognosis of acute leukemia which helps the management of patients. This study was conducted to identify CD markers in leukemic patients admitted to Tabriz, in northwestern Iran. Immunophenotyping of 60 patients with acute leukemia was determined. Patients with acute myelogenous leukemia (AML) were 42% of M2 type, 23.6% M3, 15.7% M4, 13% M1 and 5.7% M5. CD13 and CD33 were the most prevalent myeloid markers. T-lymphoid markers consisted mainly of CD7 and its occurrence was mostly in M2 and M4, and least in M1 subtypes. The most common lymphoid markers in patients with T-cell acute lymphoblastic leukemia (ALL) were CD2, CD3, CD7, and in those with B-cell ALL were CD10, CD19, and HLA-DR. The most prevalent myeloid markers in T-ALL were CD14, CD33 and CD13.

Keywords • Immunophenotyping • acute leukemia • CD markers

Introduction

Acute leukemia is a heterogenous group of neoplastic diseases and is categorized into two main subgroups; myeloid and lymphoid. Immunophenotyping is of great importance, not only in more accurate classification and diagnosis of leukemias, but also in determining prognosis and natural history of these disorders.

This study was conducted on 60 patients with acute leukemia who were admitted to the Hematology and Oncology Center of Tabriz University of Medical Sciences, Tabriz, northwestern part of Iran, between September 1990 and March 2000. The blood sample taken from each patient was examined for immune markers by FACS caliber system (Becton Dickinson, USA). The studied markers were myeloid and monocytic markers (i.e., CD33, CD13, CD14, CD45), lymphoid markers (i.e., CD2, CD5, CD7, CD19, CD20, CD22), independent markers (i.e., CD10, CD14, HLA-DR) and cytoplasmic enzyme TdT.

Of 60 patients studied, 68% had acute myelogenous leukemia (AML), 30% had acute lymphocytic leukemia (ALL), and 2% were interpreted as mixed lineage. The average age of AML and ALL patients were 36 and 19 years, respectively. The most common markers in AML (M0) subgroup were CD13 (71%) and CD33 (71%), while the most common markers in AML (M1) subgroup were CD13 (71%) and CD33 (71%), respectively. Evaluation of B-lymphoid lineage markers (i.e., CD19, CD20, CD22) and T-lineage markers (i.e., CD2, CD5, CD2) and the lineage-independent marker (CD10) demonstrated that...
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The expression of B-lineage markers were much less than T-lineage markers.

The most common markers of T-cell lineage in AML patients were CD7 (17%) and CD2 (10%). The most common AML subgroups that express lymphoid markers were M1 and M2. Frequency distribution of immune markers in T-cell ALL and B-cell are illustrated in Figures 1 and 2. It is notable that the frequency of CD2 in AML M4 subgroup is about 19%. No case was positive for M0, M6 and M7.

In AML M1 cases, CD33, CD34 and HLA-DR markers are usually positive; TdT marker is either positive or negative while CD7 marker may be expressed.3,4

The frequency of CD14 was observed to be more than CD15, especially in AML M4 subgroup. If AML is considered as a whole, different studies have shown that the most common marker on myeloblasts is CD33 that is present in 80-90% of cases. CD13 is fairly less frequent and is expressed on 70-90% of AML blasts. Disregarding CD45, which is the most frequent marker (72%) on

Figure 1: Frequency distribution of immune markers in T-cell ALL.

Figure 2: Frequency distribution of immune markers in B-lineage ALL.
leukocyte and called “common leukocyte antigen”, the two other most common marker on myeloid blasts are CD13 (71%) and CD33 (71%). In our study, frequency of these two markers is about 10% less than that of reference data. The most common lymphoid markers are TdT (5-45%), CD2 (11-28%), CD2 (5.21%) and CD19 (3-14%). Other less frequent markers include CD10 (1-5%) and CD20 (9%). The frequency of CD13 and CD33 markers in our study group is much less than the previously reported data. TdT is an enzyme marker and is present with high concentration on cortical thymocytes and a small proportion of bone marrow cells. About 20% of AML blasts are positive for TdT. We indicated that the average frequency of TdT marker in AML patients was 20% with the highest percentage in AML M1 subgroup (35%). Because the number of patients with pre-B ALL (2 cases) and B-ALL (1 case) was low in our study, the immune markers were not evaluated separately and we considered them altogether as B-cell lineage markers. The relative frequency of all the markers, but CD20, in our study is lower than the previously reported frequencies.

Myeloid antigens are also expressed in ALL patients. The most common antigens are CD13 (6-16%) and CD33 (3-10%). Expression of myeloid antigens worsens overall prognosis in adult patients. However, a study performed on Malaysian children indicates that this condition has little impact on the prognosis of the affected children. Frequency of CD10 in the patients with AML in our study group is 4.4% that is consistent with reference data. CD34 is a primary marker that is expressed on progenitor myeloid, lymphoid or stem cells. This marker is present in about 40-60% of AML cases, especially in the cases with less differentiated phenotypes. Frequency of this marker in B-lineage ALL is about 64% and associated with good prognosis. Frequency of this marker in the patients with AML in our study group, was 20% in average, while it was most common in M1 subgroup (44%) and least common in M5 (8%) and M3 (4%) subgroups. One possible explanation for this finding is lower frequency of M1 subgroup and higher frequency of M3 subgroup in our study group, compared to the reference data. Frequency of CD34 marker in the patients with B cell ALL in our center is 48% that is less than reference value (64%).

HLA-DR is present in most acute leukemias, except T-ALL and AML M5. Other studies indicate that the presence of HLA-DR marker is usually negative in the patients with T-ALL, but it can be positive in occasional cases. Frequency of HLA-DR in the patients with AML is 65% in our center and AML M3 is the least common subtype. In our study group, frequency of HLA-DR in T-ALL patients is 42% and it is obvious that converse to the reference data, our patients with T-ALL are not negative for HLA-DR so far.

References