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Brief Report

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 M_2 type, 23.6% M_3, 15.7% M_4, 13% M_1 and 5.7% M_5. CD_{13} and CD_{33} were the most prevalent myeloid markers. T-lymphoid markers consisted mainly of CD_7 and its occurrence was mostly in M_2 and M_4, and least in M_3 subtypes. The most common lymphoid markers in patients with T-cell acute lymphoblastic leukemia (ALL) were CD_2, CD_3, CD_7 and in those with B-cell ALL were CD_{10}, CD_{19} and HLA-DR. The most prevalent myeloid markers in T-ALL were CD_{14}, CD_{33} and CD_{13}.
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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.[1] 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.[2]

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 calibur system (Becton Dikinson, USA). The studied markers were myeloid and monocytic markers (*i.e.,* CD_{33}, CD_{13}, CD_{14}, CD_{45}), lymphoid markers (*i.e.,* CD_2, CD_3, CD_7, CD_{19}, CD_{20}, CD_{22}), independent markers (*i.e.,* CD_{10}, CD_{34}, 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 (M_1) subgroup were CD_{13} (71%) and CD_{33} (71%), while the most common markers in AML (M_3) and AML (M_2) subgroups were CD_{13} and $CD_{33,}$ respectively. Evaluation of B-lymphoid lineage markers (*i.e.,* D_{19}, CD_{20}, CD_{22}) and T-lineage markers (*i.e.,* CD_7, CD_5, CD_2) and the lineage-independent marker (CD_{10}) demonstrated that

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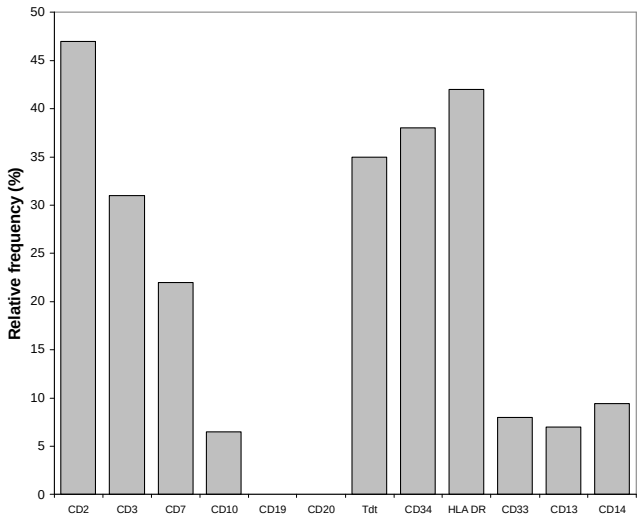

Figure 1: Frequency distribution of immune markers in T cell ALL.

the expression of B-lineage markers were much less than T-lineaeg markers.

The most common markers of T-cell lineage in AML patients were CD_7 (17%) and CD_2 (10%). The most common AML subgroups that express lymphoid markers were M_1 and M_2. 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 CD_2 in AML M_4 subgroup is about 19%. No case was positive for M_0, M_6 and M_7.

In AML M_1 cases, CD_{33}, CD_{34} and HLA-DR markers are usually positive; TdT marker is either positive or negative while CD_7 marker may be expressed.[3,4]

The frequency of CD_{14} was observed to be more than $CD_{15,}$ especially in AML M_4 subgroup.
If AML is considered as a whole, different studies have shown that the most common marker on myeloblasts is CD_{33} that is presents in 80-90% of cases. CD_{13} is fairly less frequent and is expressed on 70-90% of AML blasts. Disregarding CD_{45}, which is the most frequent marker (72%) on

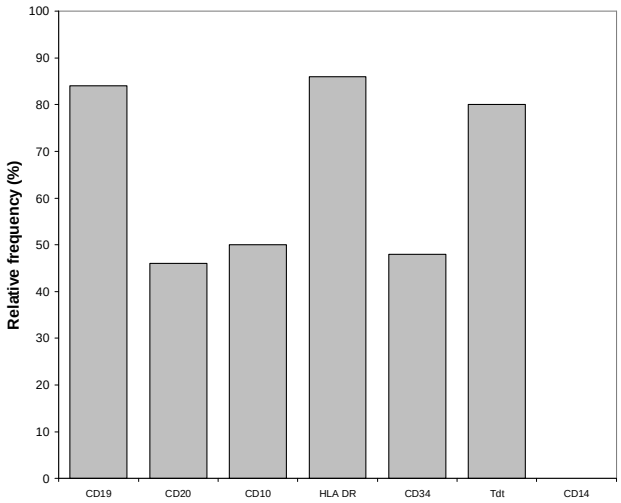

Figure 2: Frequency distribution of immune markers in B-lineage ALL.

leukocyte and called “common leukocyte antigen”, the two other most common marker on myeloid blasts are CD_{13} (71%) and CD_{33} (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%), CD_7 (11-28%), CD_2 (5-21%) and CD_{19} (3-14%). Other less frequent markers include CD_{10} (1-5%) and CD_{20} (9%).[1] The frequency of CD_{19} and CD_{20} 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.[1] We indicated that the average frequency of TdT marker in AML patients was 20% with the highest percentage in AML M_1 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 CD_{20}, in our study is lower than the previously reported frequencies.[1]

Myeloid antigens are also expressed in ALL patients. The most common antigens are CD_{13} (6-16%) and CD_{33} (3-10%). Expression of myeloid antigens worsens overall prognosis in adult patients.[1] However, a study performed on Malaysian children indicates that this condition has little impact on the prognosis of the affected children.[5]

Frequency of CD_{10} in the patients with AML in our study group is 4.4% that is consistent with reference data.

CD_{34} 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 M_1 subgroup (44%) and least common in M_5 (8%) and M_3 (4%) subgroups. One possible explanation for this finding is lower frequency of M_1 subgroup and higher frequency of M_3 subgroup in our study group, compared to the reference data.

Frequency of CD_{34} 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 M_3.[1,2] 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 M_3 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.

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