Amoeboid Movement Configuration and Mitotic Indices of Lymphoid Cells from Children with Acute Lymphoblastic Leukaemia

U. Sjögren
Department of Internal Medicine, University Hospital of Lund, Lund, Sweden

Summary

Bone marrow smears from 21 untreated patients with ALL have been morphologically analysed. There was a positive correlation between the percentages of lymphoid cells with amoeboid movement configuration (AMC) and the mitotic indices. A high proportion of cells with AMC seems to indicate a more favourable prognosis in spite of differences in subsequent treatment. It is suggested that studies of the incidence of AMC may serve as a prognostic tool in ALL.

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It is well documented that leukaemic blast cells have low mitotic indices (MI) and some recent investigations have shown that mitotic counts may give prognostic information in various forms of myeloid leukaemias (7, 8).

The aim of the present study was to describe the incidence of AMC in the lymphoid cells of the bone marrow smears from children with acute lymphoblastic leukaemia (ALL). Since it is rather laborious to calculate the MI in every single case of leukaemia, it may be justified to study the relation between AMC and MI, i.e. to investigate if it is possible to replace MI determinations by a parameter easier to acquire. It is also shown that the incidence of AMC may give information of prognostic significance.

Material and Methods

The investigations described below were performed immediately after the first admission.

Patients

During 1968-73 21 consecutive patients, 9 girls and 12 boys, aged 1-15, were examined. WBC 1,400-280,000. Twelve patients had WBC below 20,000. None of the patients had received steroids or cytostatics. Afterwards the children were treated with antimetabolites, corticosteroids and vinca alkaloids in combination of irradiation of the neural axis if necessary. Seven of the patients are still alive.

Bone marrow examination. The bone marrow smears were stained with May-Grünwald-Giemsa. Through examination of 1,000 nucleated cells the percentages of lymphoid cells were determined. AMC was defined as a ratio long cell axis/short cell axis ≥ 2. 1,000 lymphoid cells were counted in each proband.

By counting 3,910–26,080 lymphoid cells the mitotic indices were calculated.

Statistics

Non-parametric statistics were used. The results are given as median and interquartile range. The Fisher exact probability test was used to assert significance of the results. The Spearman rank correlation test was corrected for ties.

Results

The lymphoid cells comprised 84-99% of all nucleated cells.

The median proportion of AMC was 7.8% (Q₁ – Q₃ 4.3–11.8) and the median MI was 0.47% (Q₁ – Q₃ 0.29–0.73).
Discussion

It is desirable to get prognostic information as early as possible during the course of ALL. Thus cytologic studies have revealed at least 4 subgroups with different prognosis (2, 3). It is also well known that cases of ALL with chromosomal abnormalities have shorter survival times than patients with normal karyotypes (2). However no correlation between cytologic sub-classification and chromosome abnormalities has been established (2). Studies of the kinetic behaviour of human leukaemic cells with 3H-thymidine labelling and calculations of MI have been fruitful in order to establish treatment schedules (1). There is a good correlation between the labelling indices and MI as expressions of the proliferative activity of the lymphoblasts in ALL (6). Neither cytologic studies nor calculations of the blast cell kinetics seem to be useful as routine procedures however.

In this paper there is a good correlation between AMC and MI. Only hypothesis for this relation can be made. The cells with AMC are actually moving (4, 5) and it is possible that these cells are in a stage immediately preceding the mitotic phase in the cell cycle of the non-resting leukaemic blasts. There are only 21 ALL patients in this material so the prognostic conclusions ought to be temperate. The therapeutic attitude seem to have become more aggressive during the observation period but in spite of minor differences in treatment of the children some interesting results have been obtained. Thus determinations of AMC seem to give a prompt estimation of the mitotic activity of the leukaemic cells and high proportions of AMC cells in the bone marrow of ALL patients with normal WBC counts may be a favourable prognostic sign.

References

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Dr. Ulf Sjögren, Department of Internal Medicine, University Hospital of Lund, S-221 85 Lund, Sweden