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Clonal chromosomal abnormalities showing multiple-cell-lineage involvement in acute myeloid leukemia

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Abstract

To determine whether one or more hematopoietic-cell lineages are involved in acute myeloid leukemia (AML), we designed a technique that simultaneously identifies a cell as malignant and determines its lineage. We used numerical clonal chromosomal abnormalities, which are readily detected, to indicate neoplasia, and monoclonal antibodies in an alkaline phosphatase-antialkaline phosphatase detection procedure to identify lineages as granulocytic-monocytic, erythrocytic, or megakaryocytic. Examination of bone marrow from 12 patients with AML showed metaphases of granulocytic-monocytic lineage with abnormal karyotypes in all patients. In seven patients, we also detected abnormal karyotypes in the erythrocytic or megakaryocytic lineage. In all four patients with monosomy 7, both granulocytic-monocytic and erythrocytic cells were affected. Two of four patients with trisomy 8 also had evidence of multiple-lineage involvement, but in two the erythrocytic lineage had normal karyotypes, suggesting an origin at a progenitor-cell stage committed to granulocytic-monocytic development. Multiple-lineage involvement was found in AML both arising de novo (four of five analyzable cases) and following another cancer (three of four analyzable cases). These data demonstrate multiple-lineage involvement in a high proportion of cases of AML and suggest that many cases originate from the multipotent hematopoietic cell or from an earlier progenitor cell.