Acta Medica Okayama

Volume 34, *Issue* 2 1980 *Article* 5

APRIL 1980

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Abstract

Chromosome studies of a malignant lymphoma cell line derived from the brain were made by Q- and G-banding techniques. The modal number of chromosomes was 45. Complex structural rearrangements were present, but the 14q+ marker chromosome frequently seen in malignant lymphomas was not identified in the cell line. The main karyotype in cells analyzed was 45, X, -Y, del (2) (q21q23), t (3;?) (p25;?), t (p12;?), -8, 11q+, 18q+, +mar. Absence of the 14q+ may be explained by: firstly, clones which possessed 14q+ marker chromosome in brain tumor cells may have been selected out with increasing culture time and repeated passages; or secondly, the presence of the 14q+ marker chromosome depends on the type of lymphoma.

KEYWORDS: brain lymphoma, tissue culture cell line, chromosome, negative 14q+.

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*PMID: 6450513 [PubMed - indexed for MEDLINE]

Acta Med. Okayama **34**, (2), 117—122 (1980)

—— BRIEF NOTE ——

CHROMOSOME ANALYSIS OF A BRAIN MALIGNANT LYMPHOMA CELL LINE

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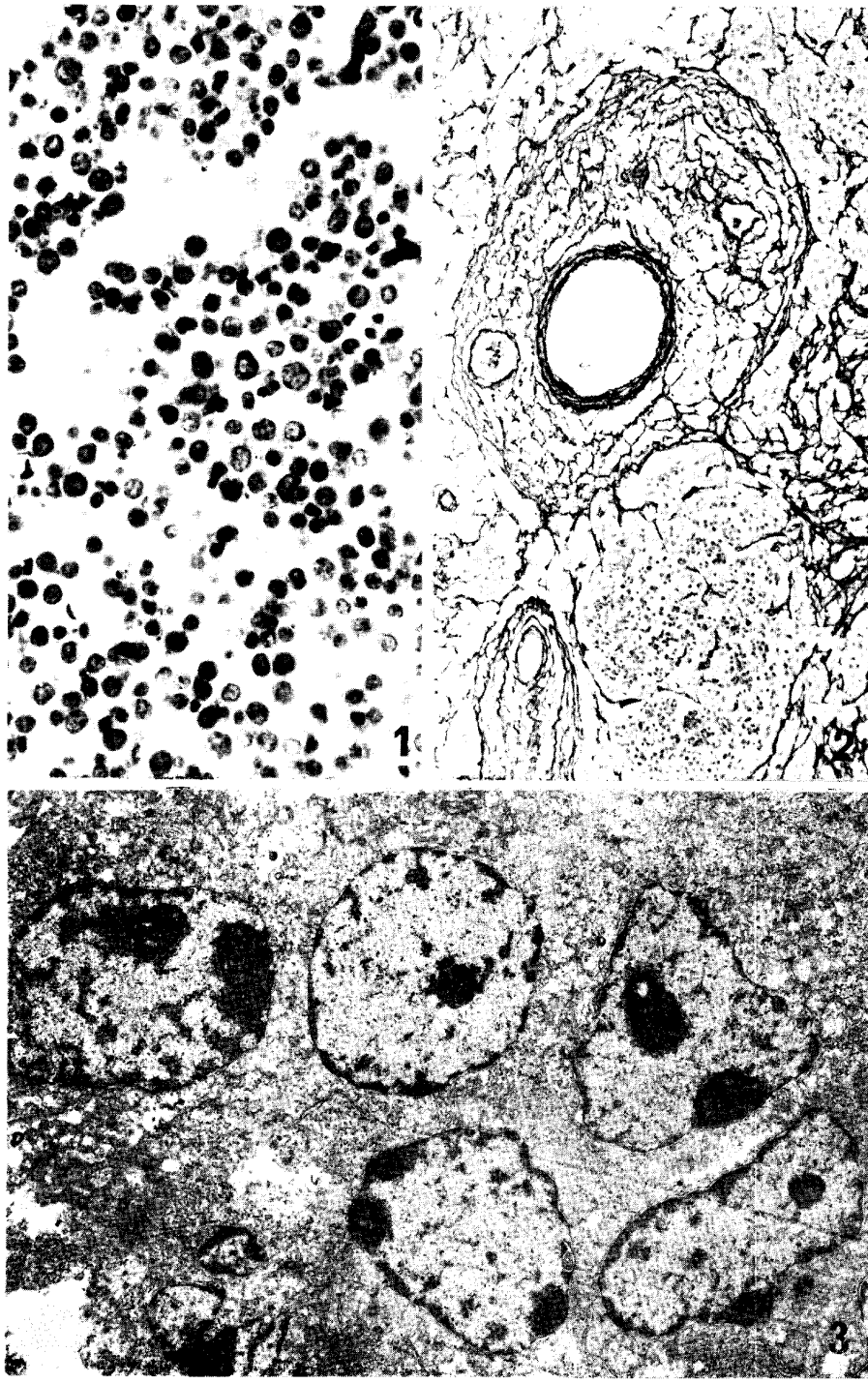
Received December 7, 1979

Abstract. Chromosome studies of a malignant lymphoma cell line derived from the brain were made by Q- and G-banding techniques. The modal number of chromosomes was 45. Complex structural rearrangements were present, but the 14q+ marker chromosome frequently seen in malignant lymphomas was not indentified in the cell line. The main karyotype in cells analyzed was 45, X, −Y, del (2) (q21q23), t (3; ?) (p25; ?), t (7; ?), t (p12; ?), −8, 11q+, 18q+, +mar. Absence of the 14q+ may be explained by: firstly, clones which possessed 14q+ marker chromosome in brain tumor cells may have been selected out with increasing culture time and repeated passages; or secondly, the presence of the 14q+ marker chromosome depends on the type of lymphoma.

Key words: brain lymphoma, tissue culture cell line, chromosome, negative 14q+.

Chromosome abnormalities are known to be associated with malignant disease in man, *e.g.*, Philadelphia chromosome in chronic myelogenous leukemia (CML). CML is, however, sometimes negative for the Ph^1 chromosome (1). Recently, a translocation that involves the long arm of chromosme 14 has been observed in cells from patients with various kinds of lymphoid malignancy (2, 3). The presence of this 14q+ marker chromosome may vary with the type of lymphoma (4). In primary intracranial malignant lymphoma, Yamada *et al.* (5) found a translocation between chromosomes No. 1 and 14 in a 65-year-old female with reticulum cell sarcoma. To the best of our knowledge, this is the first case of the chromosome 14q+ abnormality in a brain tumor. In contrast to their report, we detail a karyotype with negative 14q+ in a brain malignant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lymphoma cell line.

The patient was a 22-year-old male who had developed a right hemiparesis progressively since June 1977. In 1978, he was admitted to the Department of Neurological Surgery, Okayama University Hospital, and craniotomy for a left frontal tumor was performed four times, *i.e.*, in May, June, July and November. In December of the same year, he died of increasing intracranial pressure due to recurrence ; necropsy indicated no other origin than the brain throughout the body. Histologically, the tumor was made up of poorly differentiated lymphocytes (Fig. 1), and showed a clear-cut cuffing pattern (Fig. 2). Electron microscopically, these lymphocytes appeared monotonous, and had round to oval nuclei with very condensed chromatin along the nuclear membrane. Cytoplasm was rather small compared to the nucleus and poor in intracytoplasmic organellae (Fig. 3). Immunologically, these lymphocytes proved to be B-cells. The details will be reported in the near future.

The present material came from tumor obtained at the fourth craniotomy. Chromosome analysis using Q- and G-banding methods (6, 7) was made of the cells obtained from the 12th passage on the culture day 32. Cultured cells were kindly provided by Dr. I. Miyoshi, Department of Medicine (Second Clinic), Okayama University Medical School. A detailed report regarding establishment of the cell line will appear elsewhere. Chromosomes were prepared using the air-dry method, and were identified according to the criteria set by the Paris Conference (8).

The number of chromosomes was counted in a total of 50 metaphases, and analysis of the complete karotype was performed on another 25 cells. The distribution of chromosome numbers are shown in Table 1. The modal number of chromosome was 45. As shown in Table 2, the main karyotype in cells analyzed was 45, X, −Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?), t (7 ; ?) (p12 ; ?), −8, 11q+, 18q+, +mar. Common chromosome abnormalities were −Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?), t (7 ; ?) (p12 ; ?), −8, 11q+, +mar (Figs. 4, 5). There was no 14q+ marker chromosome.

One can surmise the following reasons for the absence of 14q+ marker chromosome : Clones carrying 14q+ marker chromosome might be selected out with increasing culture time and repeated passages, but this is not clear because chromosome analysis was not performed on the brain tumor itself. Secondly, as stated before, Fukuhara and Rowly (4) identified 14q+ in 17 out of 27 pa-

Fig. 1. Poorly differentiated lymphocytes with nuclear irregularity in size and shape ; note numerous cell debris in the background. H. E., ×400.

Fig. 2. Perivascular cuffing pattern. Silver, ×40.

Fig. 3. Several lymphocytes showing round to oval nuclei with prominent nucleoli, and rather small cytoplasm with poorly developed organellae. ×3, 200.

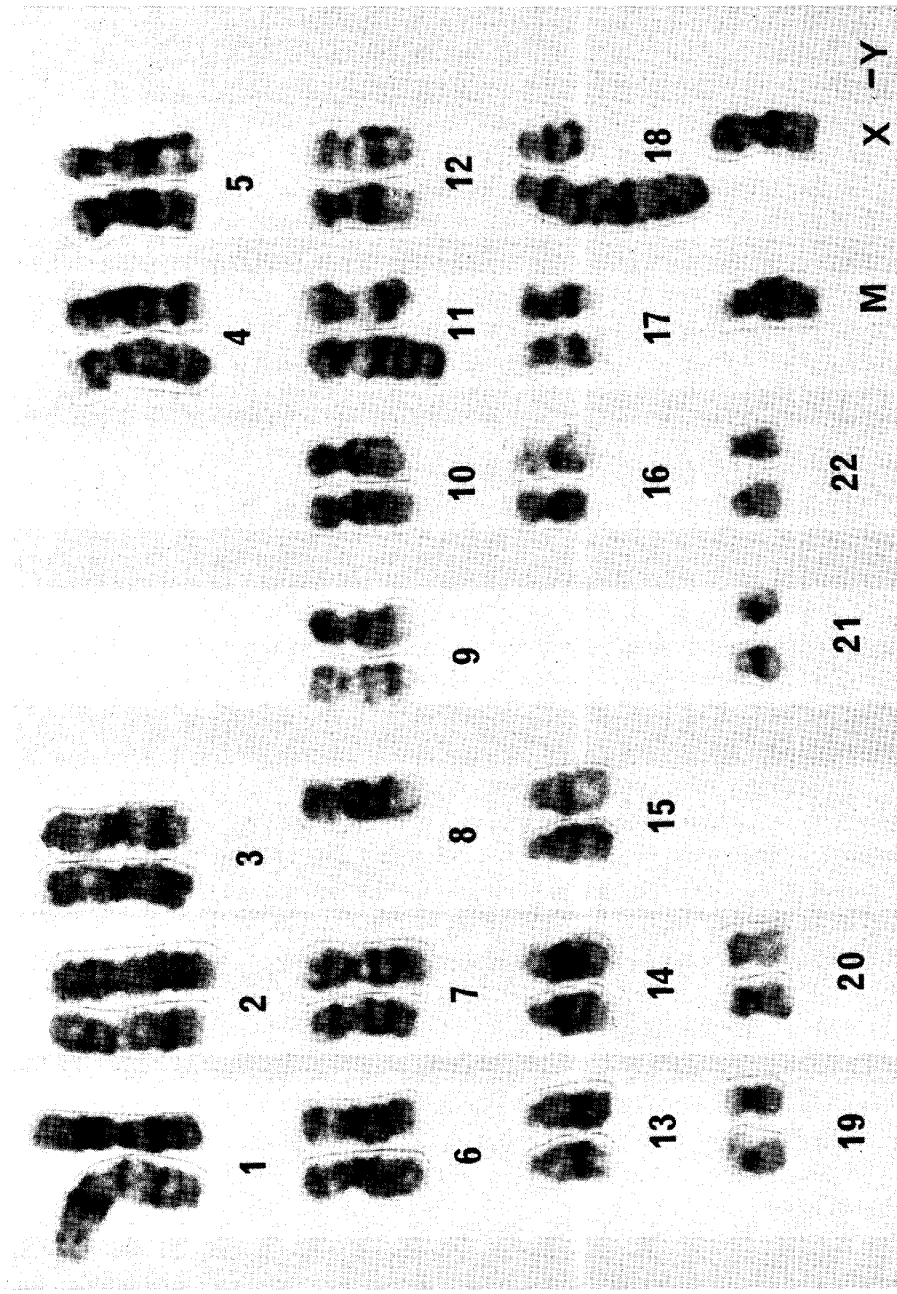

Fig. 4. Karyotype: 45, X, -Y, del (2) (q21q23), t(3; ?) (p25; ?), t (7; ?) (p12; ?), -8, 11q+, 18q+, +mar.

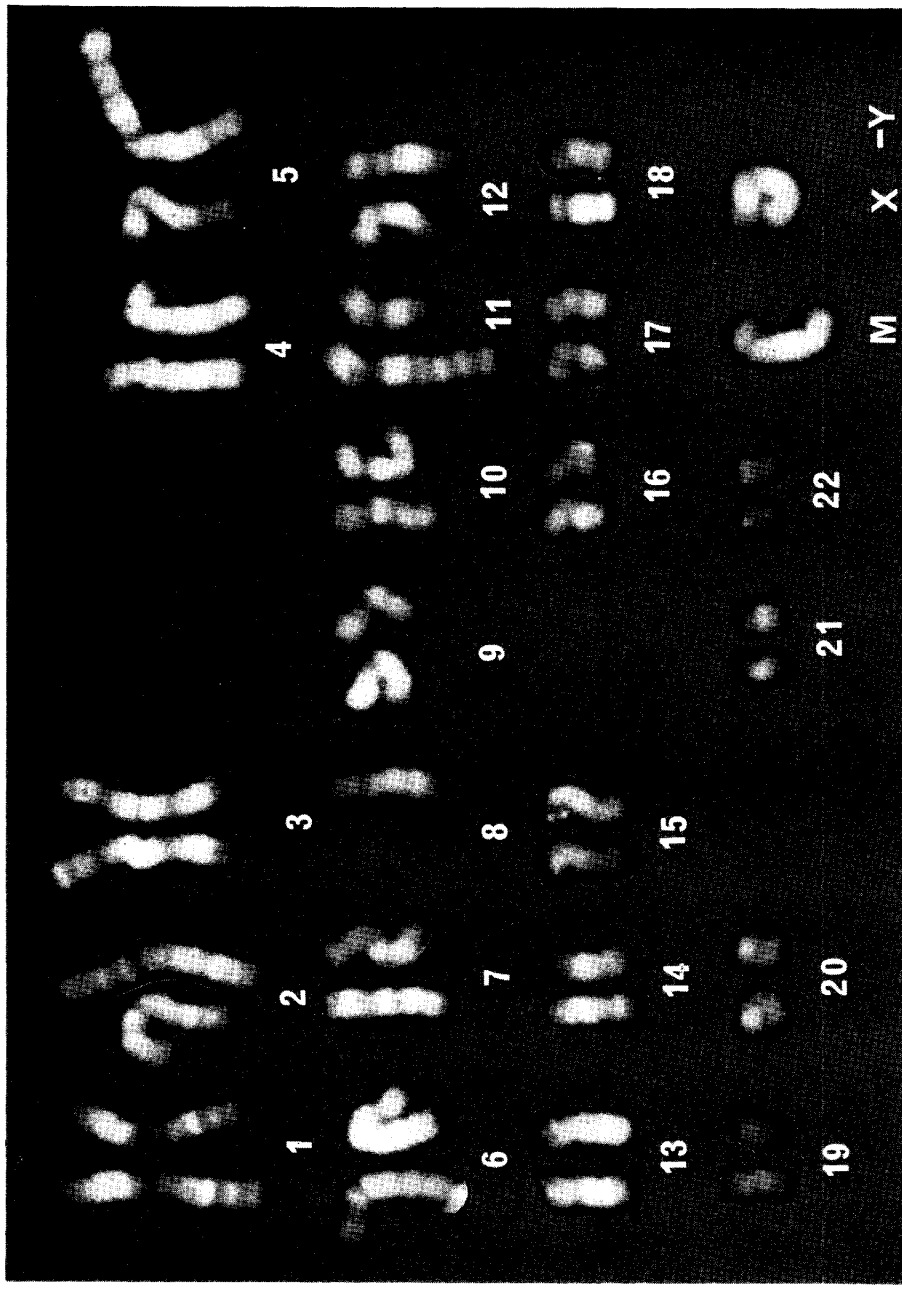

Fig. 5. Karyotype ; 45, X, −Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?), 5p+, t (7 ; ?) (p12 ; ?), −8, 11q+, ⟦+mar.

TABLE 1. DISTRIBUTION OF CHROMOSOME NUMBERS OF A BRAIN MALIGNANT LYMPHOMA CELL LINE IN 50 CELLS

Number of chromosomes/cell	44	45	46	90
Number of cells	1	46	0	3

TABLE 2. KARYOTYPE ANALYSIS OF A BRAIN MALIGNANT LYMPHOMA CELL LINE IN THF 12TH PASSAGE ON THE CULTURE DAY 32

Karyotypes	Number of cells
45, X, -Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?), 5p+, t (7 ; ?) (p12 ; ?), -8, 11q+, +mar	1
45, X, -Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?), t (7 ?) (p12 ; ?), −8, 11q+, 18q+, +mar	18
45, X, -Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?), −5, t (7 ; ?) (p12 ?), −8, 11q+, +2mar	1
45, X, -Y, del (2) (q21q23), +3q−, t (3 ; ?) (p25 ; ?), t (3 ; 13) (p21 ; q21), t (7 ; ?) (p12 ; ?), −8, 9q−, 11q+, −13, +mar	2
45, X, -Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?), 5p+, t (7 ; ?) (p12 ; ?), −8, 11q+, 17p+, +mar	1
45, X, -Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?), t (7 ; ?) (p12 ; ?), −8, 11q+, 16p+, +mar	1
44, X, -Y, del (2) (q21q23), t (3 ; ?) (p25 ; ?)4p+, t (7 ; ?) (p12 ; ?) −8, 11q+, −18, +mar	1

tients with non-Burkitt's lymphoma, and concluded that the frequency of the 14q marker varied with the type of lymphoma. Therefore, more cases with malignant lymphoma in the brain need to be studied to clarify the meaning of specific chromosome aberration.

Acknowledgment. Our sincere thanks are due to Prof. J. Sato, Division of Pathology, Cancer Institute, for his invaluable advice and encouragement.

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