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Chromosome analysis in a human hepato-blastoma cell line producing alpha-fetoprotein.

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Abstract

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KEYWORDS: Q-, G-and G-banding, ?-fetoprotein, trisomy, 8q isochromosome, human hepato-blastoma.

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BRIEF NOTE

CHROMOSOME ANALYSIS IN A HUMAN HEPATO-BLASTOMA CELL LINE PRODUCING α-FETOPROTEIN

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Abstract. Analysis of the chromosomes of a cloned human hepatoblastoma cell line, HUH-6-clone 5 by Q-, G- and C-banding revealed numerical and structural chromosome aberrations. The modal number of chromosomes was 49. Trisomies ♯12 and 20 were present in most of the cells, and 8q isochromosome was detected in all of the cells analyzed. High levels of α-fetoprotein production by this cell strain were also demonstrated.

Key words: Q-, G- and C-banding, α-fetoprotein, trisomy, 8q isochromosome, human hepatoblastoma.

A human hepatoblastoma cell line established by Doi (1) produced large amounts of α-fetoprotein and albumin *in vitro* for more than a year. In his study, chromosome analysis by conventional Giemsa strain was made on a cloned cell line in 9 passage on culture day 362. The modal chromosome number was 48 with trisomies ♯3 and 20. In the present study employing banding methods, however, 8q isochromosome was indentified instead of trisomy ♯3. We present the results of karyotype analysis and α-fetoprotein production of a longterm cultured cell line of HUH-6-clone 5.

The total number of culture days of the cloned cell line used for chromosome analysis was 1048 and for α-fetoprotein measurment, 993. Chromosome preparations were made by the air-dry method. The Q-, G- and C-banding methods (2–4) were used for chromosome analysis. Chromosomes were indentified and grouped according to the criteria set by Paris Conference (5, 6). The number of chromosomes was counted in a total of 50 metaphases and analysis of the complete karyotype was performed in another 15 cells.

The numerical results are presented in Table 1. The modal number of

chromosomes was 49. The modal karyotype was 49, XY, +12, +20, +i (8q) (Fig. 1). The karyotype summaries are shown in Table 2. In all cells analyzed

TABLE 1. DISTRIBUTION OF CHROMOSOME NUMBERS IN THE 50 CELLS ANALYZED

Number of chromosomes/cell	47	48	49	98
Number of cells	1	5	41	3

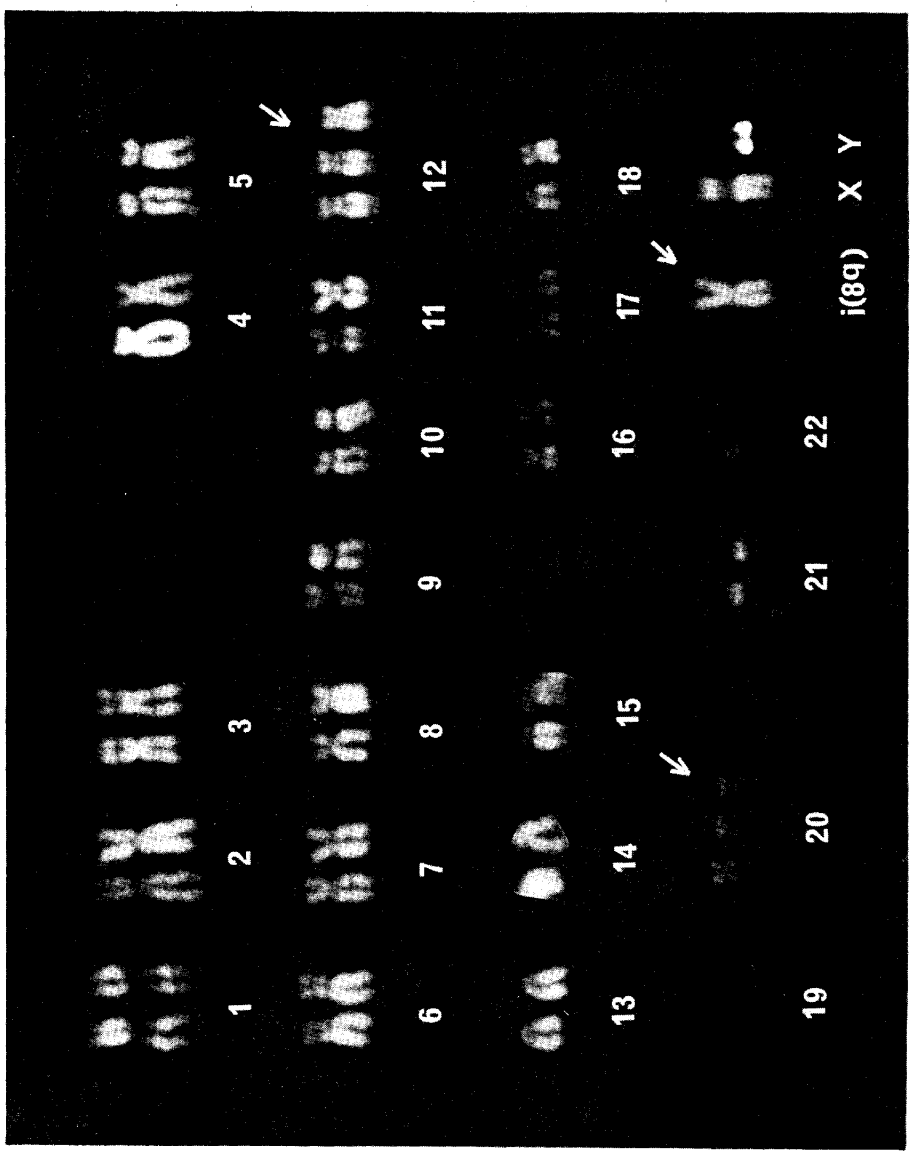

Fig. 1. Karyotype : 49, XY, +12, +20, +i (8q)

TABLE 2. KARYOTYPE ANALYSIS OF HUH-6-CLONE 5 IN 57 PASSAGES ON CULTURE DAY 1048

Cell line	Karyotype	Number of cells
HUH-6-clone 5	49, XY, +12, +20, +i[8q]	10
	49, XY, +12, +20, +i[8q], t[3q+, 6q−]	1
	38, XY, +20, +i[8q]	1
	48, XY, −8+12, +20, +i[8q]	2
	48, XY, +12, +i[8q]	1

by the banding methods, 8q isochromosome was present (Fig. 2). The α-fetoprotein content in the culture medium was determined by radioimmunoassay (7). The relationship between cell growth and α-fetoprotein is given in Fig. 3.

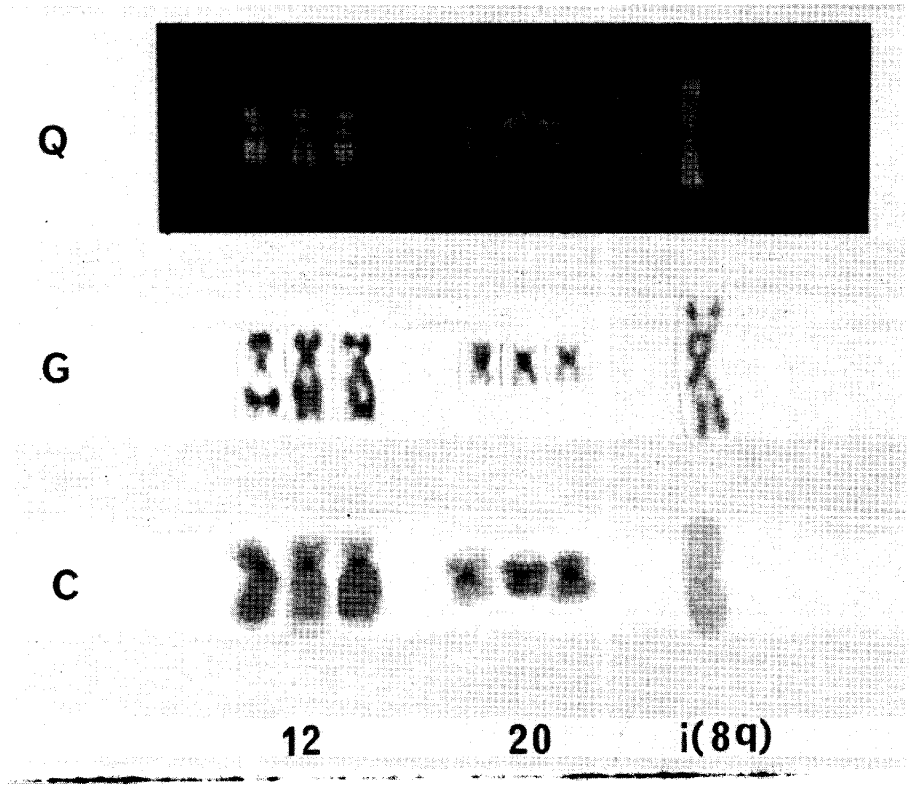

Fig. 2. Partial Karyotypes. Q=Q-bands; G=G-bands; C=C-bands.

Extraordinarily large and constant amounts of α-fetoprotein were produced during the entire phase of cell growth (cf. Rf. 1).

Recently, Wolman *et al.* (8) described an association between a single, un-

usual chromosome abnormality and enormous production of α-fetoprotein in Morris hepatocellular carcinoma 7777. The results suggest the future usefulness of this cloned cell line in determining the type of chromosome abnormality associated with production of α-fetoprotein.

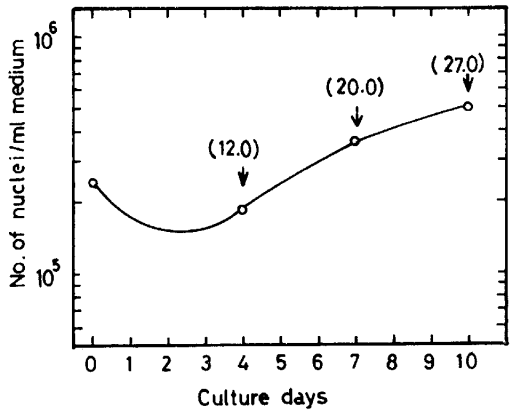

Fig. 3. Relationship between cell growth and α-fetoprotein production by HUH-6-clone 5 cells derived from human hepatoblastoma. Isolated hepatoblastoma cells on total culture day 993 were inoculated at a concentration of 24.4×10^4 cells per ml. Values in parentheses indicate α-fetoprotein concentrations [μg/ml] determined in the medium at the time of medium change on the fourth, seventh and tenth culture day. The rate of α-fetoprotein synthesis was calculated from the mean cell number and the α-fetoprotein content accumulated during the culture period between each medium change ; 0.22, 0.22 and 0.19 ng/cell/day for the fourth, seventh and tenth culture day, respectively.

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