Cytogenetic Impairments of Peripheral Blood Lymphocytes during Infectious Mononucleosis

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We performed chromosomal analysis and micronucleus test of peripheral blood lymphocytes during infectious mononucleosis. The content of lymphocytes with structural chromosome aberrations and micronuclei increased in patients with pronounced clinical and hematological signs of infectious mononucleosis (acute stage). There were cells with changed number of chromosomes. These cytogenetic abnormalities persisted both during convalescence and in the delayed period after recovery.

Key Words: *chromosomes; micronuclei; lymphocytes; infectious mononucleosis*

Cytopathic processes accompanying viral infectious depend on the type of viruses and cell sensitivity. Epstein—Barr virus causing infectious mononucleosis (IM) does not destroy cells, but stimulates proliferation of infected B lymphocytes (via effects on regulatory cell factors) and determines their resistance to cytotoxic cells [1,5,7]. In patients with IM peripheral blood often contains atypical mononuclear cells (virus-transformed lymphoid elements) [3,4]. We found no published data on chromosomal aberrations in blood cells during IM.

Here we studied cytogenetic abnormalities in peripheral blood lymphocytes (PBL) from patients with IM at various stages of the disease and in delayed period after recovery.

MATERIALS AND METHODS

The peripheral blood was taken from 38 children aging 3-15 years with mild and moderate acute IM: of them 21 children were examined during pronounced clinical and hematological manifestations of the disease (acute stage, group I), 7 children during convalescence (group II), and 17 children were examined 18 months after recovery (group III). The diagnosis of IM was confirmed by detection of Epstein—Barr virus DNA in the plasma by polymerase chain reaction. Thirteen healthy children (health group IIA) served as the control.

Cell culturing and preparation of chromosomes were performed routinely [6]. We analyzed 50 metaphase plates from each patient. The number of cells with chromosomal aberrations and the number and type of these aberrations were estimated. For micronucleus test the content of culture flasks was thoroughly resuspended by shaking and centrifuged at 1000 rpm for 10 min. The supernatant was removed, while the precipitate was transferred to slides and stained with azure II and eosin for 40 min. Blast cells with micronuclei were counted.

The results were analyzed by Mann—Whitney test [2].

RESULTS

The count of cells with chromosomal aberrations in patients with pronounced clinical and hematological manifestations of IM was much higher than in the control (Table 1). This parameter decreased at later stages of the disease, but remained above the control (Table 1). The number of chromosomal aberrations in group I patients surpassed the control, remained practically unchanged during convalescence, and decreased only in delayed periods after the disease. Changes in the count of cells with impaired chromosomal structure and micronuclei were similar (Table 1).

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TABLE 1. Cytogenetic Impairments of PBL in Children with IM ($X \pm m$)

Parameter	Control (n=13)	Group I (n=21)	Group II (n=7)	Group III (n=17)
Cells with chromosomal aberrations, %	3.54±0.46	14.38±1.01*	11.43±1.84*+	8.83±0.88*oo
Number of chromosomal aberrations per cell	0.04±0.01	0.16±0.01*	0.14±0.02*	0.10±0.01*oo
Cells with structural impairments of chromosomes, %	3.54±0.46	13.90±0.99*	11.43±1.84*	8.59±0.89*oo
single fragments	0.46±0.24	1.52±0.34	0.57±0.37	0.59±0.23
paired fragments	0.62±0.27	2.48±0.63***	1.71±0.92	2.35±0.23**
centromeric breaks	0	0.86±0.30	1.14±0.40	0.71±0.34
single-strand breaks	1.69±0.44	7.62±0.75*	7.14±1.44	4.24±0.57**oo
double-strand breaks	0	0.29±0.16	0.57±0.37	0.12±0.12
circular chromosomes	0.46±0.24	0.19±0.13	0.29±0.29	0.24±0.16
dicentric chromosomes	0.15±0.15	1.24±0.32**	0.86±0.59	0.59±0.29
interchromosomal exchanges	0.46±0.24	1.14±0.35	1.43±0.72	0.71±0.42
Cells with changed number of chromosomes, %	0	0.48±0.19	0	0.24±0.16
Cells with micronuclei, %	2.87±0.38	8.93±1.81*	9.33±0.97*	5.75±0.52*o

Note. *p<0.001, **p<0.01, and ***p<0.05 compared to the control; +p<0.05 compared to group I; op<0.01 and oo$p$<0.05 compared to group II.

Paired fragments, single-strand breaks, and dicentric chromosomes were more often seen in group I patients compared to the control (Table 1). The number of paired fragments and dicentric chromosomes returned to normal during convalescence. The count of single-strand breaks decreased, but remained above the control 18 months after recovery (group III, Table 1). We found double-strand and centromeric breaks in chromosomes of patients with IM.

In group I and III patients, blood cells with changed number of chromosomes were found (Table 1).

Thus, the content of lymphocytes with structural chromosomal aberrations and micronuclei increased in patients with pronounced clinical and hematological signs of IM. There were cells with changed number of chromosomes. These cytogenetic abnormalities persisted both during convalescence and in delayed period after recovery.

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