CELLS WITH MULTIPLE MICRONUCLEI IN CAT SCRATCH DISEASE

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ABSTRACT

In several cytogenetic studies carried out in inhabitants of zones affected by Chernobyl accident cells with multiple aberrations have been detected. The presence of hot particles with beta and alpha activity in polluted zones has contributed to considering them as possible inductor agent. Even though the etiology of these cells has not been clearly established, viral infections are considered its most probable cause.

As a part of evaluation of the radiological impact of the Chernobyl accident, chromosome aberrations and micronuclei in lymphocytes with blockade of the cytokinesis frequencies were established in 14 children of affected areas, with the preliminary diagnosis of oncohematological affection.

The most outstanding cytogenetic finding was the presence of 4 cells that contained 7-11 micronuclei in a case, where 504 lymphocytes were analyzed and whose final diagnosis was cat scratch disease. The viral origin of this illness has been reported. This micronuclei distribution was not found in 6074 cells analyzed in the rest of the members of the group.

INTRODUCTION

The impact on the health of the Chernobyl accident has been evaluated by means of numerous studies. Among them, cytogenetic studies stand out as they use indicators of the highest sensitivity to the action of ionizing radiations. One of the most interesting findings of cytogenetic studies has been the presence of cells with multiple aberrations ("rogue cells") in some of the people studied. The presence of hot particles with beta and alpha activity in contaminated zones has contributed to considering them as a possible inductor agent.

The origin of these cells has not been clearly established, but their presence has been reported in numerous population groups that have not been exposed to chemical agents or ionizing radiations (1).

As a part of the evaluation that is developed in Cuba to children from areas affected by the Chernobyl accident, cytogenetic studies in several groups were carried out. The presence of cells with multiple micronuclei was detected during the study of a group of patient with presumed hematologic diseases, who arrived in the Island in 1990.

MATERIALS AND METHODS

The frequencies of stable chromosome aberrations and micronuclei in 14 patients with preliminary diagnosis of leukemia were established. They arrived in Cuba in 1990 from Ukrainian regions affected by the Chernobyl accident. The characteristics of these patients are shown in Table I.

TABLE I. CHARACTERISTICS OF THE STUDIED PATIENTS

NO.	AGE	SEX	DIAGNOSIS
1	4	M	ALL in remission
2	7	M	ALL in remission
3	5	M	ALL with infiltration
4	6	F	ALL in remission
5	15	F	Bone marrow aplasy
6	8	F	ALL in remission
7	14	M	Cat scratch disease
8	12	M	ALNL
9	3	M	ALL in remision
10	6	M	ALL with infiltration
11	7	F	ALL in remision
12	6	M	-
13	10	F	ALL with infiltration
14	14	M	ALL with infiltration

*ALL-Acute Lymphoblastic Leukemia.
ANLL-Acute Non-Lymphoblastic Leukemia.

For the blood cultures and for obtainig metaphases and binucleated lymphocytes methods standardized in our laboratory were used (2), which in sum are: for obtaining metaphases, cultures of 48 hours of 1mL of total blood in 10 mL of RPMI 1640 culture medium supplemented with 10% of fetal calf serum and with the presence of phytohemaglutinin; and for obtaining binucleated lymphocytes, equal rates of culture medium and blood, but volumes 4 times smaller, culture time of 69 hours and the use of cytochalasin B in concentration of 6 µg/mL. Cases in which were possible to analyze at least 200 metaphases, and 300 binucleated lymphocytes were considered.

RESULTS AND DISCUSSION

Table II and III shown the presence of observed chromosome aberrations and micronuclei respectively.

TABLE II. FREQUENCY AND TYPE OF CHROMOSOME ABERRATION (C.A.)

NO.	NO. OF METAPHASES ANALYSED	FREQUENCY OF C.A./ 100 CELLS		
		ACENTRICS	DICENTRICS	TOTAL
1	500	1.00±0.44	0	1.00±0.44
2	500	1.00±0.44	0	1.00±0.44
3	425	0.23±0.23	0	0.23±0.23
4	409	0.73±0.42	0	0.73±0.42
5	-	-	-	-
6	500	2,60±0.71	0	2.60±0.71
7	500	4.40±0.94	0.20±0.20	4.60±0.94
8	-	-	-	-
9	330	0.30±0.30	0	0.30±0.30
10	-	-	-	-
11	252	0	0	0
12	-	-	-	-
13	500	0	0	0
14	-	-	-	-

TABLE III. FRECUENCY AND DISTRIBUTION OF MICRONUCLEI(MN) PER CELL

NO.	NO. OF LYMPHOCYTES BINUCLEATED ANALYZED	FREQUENCY MN/100 CELLS	DISTRIBUTION OF MN / CEL				
			0	1	2	3	+4
1	356	2.20±0.78	348	8			
2	500	1.40±0.52	493	7			
3	345	1.40±0.63	340	5			
4	500	1.60±0.56	492	8			
5	500	2.80±0.74	489	8	3		
6	373	3.40±0.94	360	13			
7	504	11.10±1.40	484	13	2	1	4*
8	500	1.80±0.59	491	9			
9	500	0.80±0.40	496	4			
10	500	0.60±0.33	497	3			
11	500	1.20±0.49	496	2	2		
12	500	0.20±0.20	499	1			
13	500	1.20±0.49	494	6			
14	500	0.20±0.20	499	1			

* 4 cells with 7-11 micronuclei

The most outstanding cytogenetic finding was the presence of 4 cells that contained 7-11 micronuclei in case No.7. No cogent explanations were found to this phenomenon or to the high frequency of acentrics, until the diagnosis of cat scratch disease for this case was known finally.

The viral origin of this illness has been suggested based in epidemiological test (3), which lead us to believe that the most probable cause of this finding is the viral infection.

The relationship between cells with multiple aberrations "rogue cells" and virus has been suggested by several authors (4-6), and the relationship between chromosomal aberrations and micronuclei is known (7). These are the reasons why,in our case, we did not discard the possibility that cells with multiple aberrations have give origin to cells with multiple micronuclei. No typical "rogue cells" were found in analyzed metaphases.

High frequencies of acentrics in cases 1, 2 and 6; and of micronuclei in cases 1, 5 and 6 were also detected. The possibility of previous treatments with cytostatic to be the cause of these increments could not be discarded since practically all the cases had been treated before arriving in our country and it was impossible to determine the kind and duration of treatment.

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