GENETICA POLONICA
Vol. 28 1987 No. 1 - 2

AN ANALYSIS OF SATELLITE ASSOCIATIONS OF HUMAN ACROCENTRIC CHROMOSOMES
I. AN ANALYSIS OF CHROMOSOME PATTERNS IN NEWBORNS[1]

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Summary. The frequency of individual acrocentric chromosome satellite associations was analysed in sixty one newborns (34 males and 27 females). No significant differences were detected in the percentage of metaphases with associations between male and female newborns. Associations consisting of two chromosomes were mostly observed between chromosomes 21 - 21 (in the group of homologous pairs) and between chromosomes 21 - 22 and 14 - 21 (in the group of nonhomologous pairs). Individual acrocentric chromosomes were involved in satellite associations at a different frequency. In the group of male and female newborns chromosome 21 entered into associations most frequently and chromosome 15 — most rarely. The sequence of individual acrocentric chromosomes in satellite associations in male and female newborns was similar and can be presented as follows: 21>22>14>13>15.

Satellite associations of human acrocentric chromosomes were the subject of many studies aimed at the explanation of the causes of that phenomenon (Ferguson-Smith, Handmaker 1961; Wollenberg et al. 1982; Schwarzacher, Wachtler 1983) and its characteristics (Warburton et al. 1976; Miller et al. 1977; de Capoa et al. 1978). It has been found that the frequency of satellite associations depends on the applied cell culture technique (Mattevi, Salzano 1975), the kind of cells (Higurashi, Conen 1971), the cell cycle (Sigmund et al. 1979) and the age of the studied people (Liem et al. 1977, Hansson 1979). Satellite associations may be one of the causes of meiotic or mitotic nondisjunction and may lead to different chromosomopathy syndromes: trisomy 13 and 21, monosomy 21, as well as to the Robertsonian translocations. For that reason, an analysis of the frequency of the entry of individual human acrocentric chromosomes into associations is based on the identification of individual chromosome pairs stained with the band method. Such analyses results in frequency distributions of chromosome entry into associations (Taysi 1975, Jacobs et al. 1976, Mattei et al. 1976, Galperin-Lemaitre et al. 1977, Ardito et al. 1978, Davison et al. 1981). The

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so far detected participation of individual chromosomes in satellite associations was obtained in studies of adult groups and the results differ from each other. The aim of our studies on the association patterns of satellite acrocentric chromosomes in man was to analyse that phenomenon in the selected age groups of the same population, to study the inheritance mode of association patterns and to estimate the influence of some external factors on that phenomenon. In the present paper we present results of newborn population studies.

MATERIAL AND METHOD

The studies were carried out on 61 newborns including 34 males and 27 females. Metaphases were obtained from macroculture of lymphocytes from heparinized umbilical cord blood according to Moorhead et al. (1960). Leukocytes were separated by spontaneous sedimentation at room temperature. The culture medium was Eagle's fluid 1959 (MEM) with the addition of penicillin cryst. at 100 jm./ml., streptomycin at 100 μg/ml and PHA-M (Difco) at 0.1 ml/10 ml medium. 1 ml of a studied person's serum with the suspension of morphotic elements and 1 ml of the calf fetal serum were added to 6 ml of the culture medium. Colcemid at the dose of 0.2 μg/ml was added 2h before the end of the culture. A hypotonic shock was performed at 20°C for 17 min. using 0.075 M KCL. Fixation was done with a mixture (at the temp. of 4°C) of methyl alcohol and glacial acetic acid (3 : 1). The metaphases were stained into G bands acc. to Seabright (1971). Attention was paid to maintaining strictly identical conditions of culture and to making microscopic preparations. 50 metaphases stained into G bands and having associations were analysed for each newborn under a microscope. Simultaneously, the number of metaphases without associations was noted. Satellite associations were classified according to the criteria given by Cohen and Shaw (1967) and extended by Zang and Back (1968). In human karyotype there occur both large (group D, pairs 13, 14 and 15) and small (group G, pairs 21 and 22) acrocentric chromosomes. The mentioned chromosomes occur in pairs, therefore, the number of possible combinations in association composed of two chromosomes is: $(1 \times 1)=1$ for a homologous pair and $(2 \times 2)=4$ for a nonhomologous pair. In the association consisting of three chromosomes a combination of a homologous pair with other chromosome or of a nonhomologous pair with other chromosome (three different chromosomes) is possible; the number of possible combinations is: $(1 \times 1) \times 2=2$; $(2 \times 2) \times 2=8$. Combinations of two different nonhomologous pairs, of two homologous pairs, of homologous and nonhomologous pairs are possible in the association composed of four chromosomes; the number of possible combinations is: $(2 \times 2) \times (2 \times 2)=16$, $(1 \times 1) \times (1 \times 1)=1$, $(1 \times 1) \times (2 \times 2)=4$, respectively. Taking the above statements into consideration, one can obtain proportions made for any set of associations under the assumption that the frequencies of individual chromosome entry into association do not differ from one another significantly. These proportions are as follows:

1. Satellite associations consisting of two chromosomes in the combinations:

D-D	:	D-G	:	G-G
15	:	24	:	6

2. Satellite associations consisting of three chromosomes in the combinations:

D-D-D	:	D-D-G	:	D-G-G	:	G-G-G
20	:	60	:	36	:	4

3. Satellite associations consisting of four chromosomes in the combinations:

D-D-D-D	:	D-D-D-G	:	D-D-G-G	:	D-G-G-G	:	G-G-G-G
15	:	80	:	90	:	24	:	1

The tendency of individual acrocentric chromosomes to enter into satellite associations was expressed by the index of associations (IA=the number of chromosomes of a specific type in associations divided by the total chromosome number of chromosomes of this type).

Calculation of the association index was performed on the basis of 50 metaphases with associations per person. Statistic studies were performed using *t*-Student's test. The remaining numerical data in the paper were treated statistically using the fraction test for large samples as well as the conformity test χ^2 and independence test χ^2. The concept of proportions means that we considered totally individual numerical values contained in horizontal rows of a given table. The concept of frequency means that we considered separately individual numerical values, comparing them to each other.

RESULTS

Table 1 shows the mean frequencies of satellite associations in newborn metaphases. The fraction test for large samples showed no significant differences between male and female groups (Table 1). The observed proportions, as well as those expected for types of associations consisting of two, three and four chromosomes have been analysed. Statistically significant differences have been found for types of associations consisting of two chromosomes in both male and female groups, as well as in the entire studied group, whereas no significant differences were found for types of associations consisting of three and four chromosomes. In the case of associations consisting of two chromosomes statistically significant differences were detected between the observed and expected frequencies in the studied groups. The D-D type was observed to have a smaller number of associations as compared to the assumed ones, whereas the G-G type had a larger number of such associations. No significant differences were found in both studied sexes in the D-G type. No significant differences in frequencies of individual types of associations consisting of two, three or four chromosomes were found between the sexes, except the G-G type. It was observed that the females had a larger number of associations consisting of two chromosomes in the G-G type.

Table 1. Mean frequencies of satellite associations at metaphases in newborns

Groups of newborns	No.	Number of analysed metaphases	Metaphases with associations		Total number of		Mean No. of associations per metaphase	Mean number (metaphases with associations)		
			No.	%	associations	chromosomes associations		associations per metaphase	chromosomes per association	chromosomes in association per metaphase
Males	34	2632	1700	64.6	2081*	4479*	0.79	1.22	2.15	2.63
Females	27	2201	1350	61.3	1608	3420	0.73	1.19	2.13	2.53
Totally	61	4833	3050	63.1	3689	7899	0.76	1.21	2.14	2.59

* Including two associations of five chromosomes.

Table 2. Proportions of all possible satellite associations composed of two chromosomes in the type D-D

Groups of newborns No.	Proportions	Association type						Test χ^2
		13 - 13	13 - 14	13 - 15	14 - 14	14 - 15	15 - 15	
Males 34	Observed	51	148	128	39	118	19	$P<0.001$
	Expected	33.5	134.1	134.1	33.5	134.1	33.5	
	Fraction test	<0.01	>0.1	>0.1	>0.1	>0.1	<0.01	
Females 27	Observed	27	105	76	28	118	9	$P<0.001$
	Expected	24.2	96.8	96.8	24.2	96.8	24.2	
	Fraction test	>0.1	>0.1	<0.05	>0.1	<0.05	<0.01	
Totally 61	Observed	78	253	204	67	236	28	$P<0.001$
	Expected	57.7	230.9	230.9	57.7	230.9	57.7	
	Fraction test	<0.01	>0.05	<0.05	>0.1	>0.1	<0.001	

Table 3. Proportions of all possible satellite associations composed of two chromosomes in the type D-G

Groups of newborns No.	Proportions	Association type						Test χ^2
		13 - 21	14 - 21	15 - 21	13 - 22	14 - 22	15 - 22	
Males 34	Observed	189	202	133	130	146	127	$P<0.001$
	Expected	154.5	154.5	154.5	154.5	154.5	154.5	
	Fraction test	<0.01	<0.001	>0.05	<0.05	>0.1	<0.05	
Females 27	Observed	125	148	99	115	132	109	$P<0.001$
	Expected	121.3	121.3	121.3	121.3	121.3	121.3	
	Fraction test	>0.1	<0.01	<0.05	>0.1	>0.1	>0.1	
Totally 61	Observed	314	350	232	245	278	236	$P<0.001$
	Expected	275.8	275.8	275.8	275.8	275.8	275.8	
	Fraction test	<0.05	<0.001	<0.01	<0.05	>0.1	<0.01	

ASSOCIATIONS CONSISTING OF TWO CHROMOSOMES

Tables 2, 3 and 4 present proportions of all possible associations between two acrocentric chromosomes in the D-D, D-G and G-G types, respectively. A hypothesis has been put forward that the observed proportions of all associations between two acrocentric chromosomes are in agreement with the expected proportions. The results are summarized in Tables 2, 3 and 4. Such a hypothesis should be rejected in all the studied types of associations, except the G-G type in the male group (Table 4). Using the fraction test for large samples each association consisting of two chromosomes was checked for the observed frequency as compared to the assumed one in different types. On the basis of the results (Tables 2, 3 and 4) significant differences were found between the observed and assumed frequencies, first of all between chromosomes: 21 - 21; 15 - 15; 14 - 21 in the male group, female group and in the entire studied group. For associations 21 - 21 and 14 - 21 the number of observed associations was larger than the assumed number, whereas for association 15 - 15 the number of the observed associations was smaller than the assumed one. The frequency was also compared between male and female groups for each type of association consisting of two chromosomes. The fraction test for large samples showed no significant differences between the sexes, except association 14 - 15 ($P<0.01$). In the further consideration (concerning associations consisting of two chromosomes) the assumption that the frequencies of individual chromosome entry into associations do not differ significantly from one another is not required. The frequencies of satellite associations formed by different pairs of homologous chromosomes in the male, female and in the entire studied group were compared by the fraction test for large samples. Significant differences were found in the studied groups for all comparisons of pair 21 - 21, except a comparison with the pair 22 - 22 in the male group. Significant differences in the studied groups were also found for all the comparisons of pair 15 - 15. For the remaining associations formed by individual pairs of homologous chromosomes large differences were detected when frequencies in the studied groups were compared. A similar

Table 4. Proportions of all possible satellite associations composed of two chromosomes in the type G-G

Group of newborns No.	Proportions	Association type 21 - 21	21 - 22	22 - 22	Test χ^2
Males	Observed	75	228	56	$P>0.05$
34	Expected	59.8	239.3	59.8	
	Fraction test	<0,05	>0.1	>0.1	
Females	Observed	82	205	41	$P<0.001$
27	Expected	54.6	218.6	54.6	
	Fraction test	<0.001	>0.1	<0.05	
Totally	Observed	157	433	97	$P<0.001$
61	Expected	114.5	458	114.5	
	Fraction test	<0.001	<0.05	>0.05	

comparison was made for individual pairs composed of nonhomologous chromosomes. Significant differences were found in the studied groups for most comparisons of pairs 21 - 22 and 14 - 21 as compared to the remaining associations composed of nonhomologous pairs. The remaining pairs consisting of nonhomologous chromosomes were also compared and a large differentiation was found.

ASSOCIATION CONSISTING OF THREE AND MORE CHROMOSOMES

Numerical data are presented in Tables 5, 6, 7 and 8 for the corresponding types D-D-D, D-D-G, D-G-G, G-G-G. A hypothesis about an agreement between the observed and expected proportions was put forward. Using the χ^2 — test significant differences were detected in the D-D-D type in the male group and in the entire studied group; in the D-D-G type in the female group and in the entire studied group; in the remaining groups of these types differences were not significant. No significant differences were found in the D-G-G and G-G-G types in the male and female groups, as well as in the entire studied group. The observed frequency was compared with the expected frequency in individual types for each association composed of three chromosomes using the χ^2 — test. On the basis of the results (Tables 5, 6, 7 and 8) significant differences were found between the observed and

Table 5. Proportions of all possible satellite associations composed of three chromosomes in the type D-D-D

Groups of newborns No.	Proportions	Association type						Test χ^2
		13-13-14	13-13-15	13-14-14	13-14-15	13-15-15	14-14-15	14-15-15	
Males	Observed	4	4	10*	14	1	5	2	$P<0.05$
34	Expected	4	4	4	16	4	4	4	
Females	Observed	0	2	4	9	2	3	1	$P>0.1$
27	Expected	2,1	2.1	2.1	8.4	2.1	2.1	2.1	
Totally	Observed	4	6	14*	23	3	8	3	$P<0.05$
61	Expected	6.1	6.1	6.1	24.4	6.1	6.1	6.1	

* Statistically significant differences in relation to the expected values

expected frequencies in the D-D-D types for associations 13-14-14 in the male groups as well as in the entire studied group. In the D-D-G type significant differences were found for association 13-14-22 in the male group, for association 14-15-21 in the female group and for the association 13-14-22, 13-15-21, 14-15-21 and 15-15-22 in the entire studied group. In the D-G-G type significant differences were found for association 14-21-21 in the male group as well as in the entire studied group. In the type G-G-G no significant differences were found. Using the χ^2 — test the observed frequencies were compared between the male and female groups in the considered types of associations composed of three chromosomes. No significant differences were found except association 14-15-21 in the D-D-G type. Of the total number of 45 various types of associations in the studied sample, 11 — in the male

Table 6. Proportions of all possible satellite associations composed of three chromosomes in the type D-D-G

Groups of newborns No.	Proportions	Association type										Test χ^2
		13-13-21	13-13-22	13-14-21	13-14-22	13-15-21	13-15-22	14-14-21	14-14-22	14-15-21	14-15-22	15-15-21	15-15-22	
Males	Observed	7	4	23	26*	10	14	3	4	18	20	2	1	$P>0.1$
34	Expected	4.4	4.4	17.6	17.6	17.6	17.6	4.4	4.4	17.6	17.6	4.4	4.4	
Females	Observed	3	4	8	16	7	6	1	3	22*	10	4	0	$P<0.05$
27	Expected	2.8	2.8	11.2	11.2	11.2	11.2	2.8	2.8	11.2	11.2	2.8	2.8	
Totally	Observed	10	8	31	42*	17*	20	4	7	40*	30	6	1*	$P<0.01$
61	Expected	7.2	7.2	28.8	28.8	28.8	28.8	7.2	7.2	28.8	28.8	7.2	7.2	

* Statistically significant differences in relation to the expected values.

Table 7. Proportions of all possible satellite associations composed of three chromosomes in the type D-G-G

Groups of newborns No.	Proportions	Association type										Test χ^2
		13 - 21 - 21	13 - 21 - 22	13 - 22 - 22	14 - 21 - 21	14 - 21 - 22	14 - 22 - 22	15 - 21 - 21	15 - 21 - 22	15 - 22 - 22		
Males	Observed	7	18	4	9*	16	5	5	14	5		$P>0.1$
34	Expected	4.6	18.4	4.6	4.6	18.4	4.6	4.6	18.4	4.6		
Females	Observed	6	11	5	6	12	4	1	12	4		$P>0.1$
27	Expected	3.3	13.5	3.3	3.3	13.5	3.3	3.3	13.5	3.3		
Totally	Observed	13	29	9	15*	28	9	6	26	9		$P>0.1$
61	Expected	8	32	8	8	32	8	8	32	8		

* Statistically significant differences in relation to the expected values

Table 8. Proportions of all possible satellite associations composed of three chromosomes in the type G-G-G

Groups of newborns No.	Proportions	Association type		Test χ^2
		21 - 21 - 22	21 - 22 - 22	
Males	Observed	10	4	$P>0.1$
34	Expected	7	7	
Females	Observed	4	4	$P>0.1$
27	Expected	4	4	
Totally	Observed	14	8	$P>0.1$
61	Expected	11	11	

sex and 13−in the female sex were composed of four chromosomes. Other association types were not presented. Therefore, no studies were performed regarding comparison of the observed and expected frequencies in different types consisting of four chromosomes. The studied sample was found to have only two associations consisting of five chromosomes, and no associations consisting of six and more chromosomes.

PROPORTIONS OF INDIVIDUAL ACROCENTRIC CHROMOSOME ENTRIES INTO SATELLITE ASSOCIATIONS

While comparing hypotheses it was assumed that the frequencies of individual chromosome entry into associations do not differ from one another. On the basis of the χ^2 — test the hypothesis of agreement between the observed and expected proportions should be rejected with the risk of error ($P<0.001$) in the male and female groups, as well as in the entire studied group. This means that individual acrocentric chromosomes have different frequencies of their entries into satellite associations. The observed frequency of entery into association was compared

Table 9. Proportions of individual acrocentric chromosome entrance into satellite associations

Groups of newborns No.	Proportions	Chromosome					Test χ^2
		13	14	15	21	22	
Males	Observed	887	895	684	1090	923	
34	%	19.8	20.0	15.3	24.3	20.6	$P<0.001$
	Expected	895.8	895.8	895.8	895.8	895.8	
	Fraction test	>0.1	>0.1	<0.001	<0.001	>0.1	
Females	Observed	582	678	520	876	764	
27	%	17.0	19.8	15.2	25.6	22.4	$P<0.001$
	Expected	684	684	684	684	684	
	Fraction test	<0.001	>0.1	<0.001	<0.001	<0.001	
Totally	Observed	1469	1573	1204	1966	1687	
61	%	18.6	19.9	15.2	24.9	21.4	$P<0.001$
	Expected	1579.8	1579.8	1579.8	1579.8	1579.8	
	Fraction test	<0.01	>0.1	<0.001	<0.001	<0.01	

with the expected frequency for each chromosome in the male and female groups, as well as in the entire group using the fraction test for large samples. The results are summarized in Table 9. It was observed that there is a larger number of associations with chromosome 21 and a smaller number with chromosome 15 than it was assumed in the male and female groups as well as in the entire studied group. Besides a smaller number of associations with chromosome 13 and a larger number of associations with chromosome 22 as compared to the expected number were found in the female group as well as in the entire studied group. Only for chromosome 14 the differences between the observed and expected values were nonsignificant in the male and female groups as well as in the entire studied group. The frequencies of individual chromosome entries into associations were compared between the male and female groups. It was found that chromosome 13 entered into associations more frequently in the male group ($P<0.05$) and no significant differences were found for the remaining chromosomes. Table 10 presents IA values for individual

Table 10. The frequency of individual acrocentric chromosome entrance into satellite associations. Means of the index of associations (IA)

Chromosome	Male No.=34	Female No.=27	Comparison of IA between sexes	Total No.=61 IA±mean
13	0.260±0.071	0.215±0.071	<0.05	0.241±0.074
14	0.263±0.054	0.251±0.076	>0.1	0.258±0.065
15	0.201±0.061	0.192±0.061	>0.1	0.197±0.070
21	0.320±0.088	0.324±0.091	>0.1	0.322±0.089
22	0.271±0.090	0.283±0.087	>0.1	0.276±0.088

acrocentric chromosomes in the male, female and entire studied groups. The largest IA value was observed for chromosome 21 and the smallest for chromosome 15. The mean IA values were compared to one another in individual studied groups. Significant differences were revealed for all comparisons of association indices of these two chromosomes except IA comparison for chromosome 13; 15 ($P>0.1$) and chromosomes 21; 22 ($0.1>P>0.05$) in the female sex. The mean IA values were also compared between the sexes. Significant differences were found for chromosome 13 ($P<0.05$). Results of comparison of the frequencies of individual acrocentric chromosome entries into associations were also compared to one another. Statistically significant differences were found in the studied groups for all comparisons with chromosomes 21 and 15. Significant differences were also found in comparing the frequencies of entering into associations for chromosomes 13; 14, 13; 22 and 14; 22 in the female and in the entire studied groups.

DISCUSSION

As no representative group of newborns studied for satellite associations has been found in the available literature, results of our studies could be compared only with other age groups. In the case of associations formed by different pairs

of homologous chromosomes in our studies the pair of chromosomes 21 was observed most frequently. Similar results were observed by Taysi (1975), Jacobs et al. (1976), Mattei et al. (1976), Ardito et al. (1978), Davison et al. (1981) in a group of normal adults. In the mentioned papers no comparisons of the frequencies of satellite associations formed by individual pairs of homologous chromosomes have been made. In our studies it has been found that the pair of chromosomes 21 entered into satellite associations more frequently than the remaining homologous pairs in all studied groups except pair 22 in males, where the difference was insignificant. The pair of chromosomes 15 entered into satellite associations most rarely and the difference was significant for all the comparisons in both sex groups and in the entire studied group. Of the possible combinations of associations composed of nonhomologous pairs the largest frequency of entering into satellite associations was found for chromosomes 21 - 22 in the male, female and entire studied groups. A comparison of the frequency of entry into satellite associations of chromosomes 21 - 22 to that of the remaining associations composed of nonhomologous pairs appeared to be significant for most comparisons in the male, female and entire studied groups. Similar results were also obtained when chromosomes 14 - 21 were compared. In a group of adults the highest frequency of associations, as observed by Taysi (1975) and Mattei et al. (1976), was found for chromosomes 21 - 22 also within the associations composed of nonhomologous pairs. In the mentioned papers no comparison has been made between individual parts of associations composed of nonhomologous pairs between each other. Many authors observed a tendency towards an increased entry of chromosome 21 into satellite associations in the population of normal persons (Taysi 1975, Mattei et al. 1976, Davison et al. 1981). In our studies it has been observed that chromosome 21 entered into associations most frequently, whereas chromosome 15 — most rarely in both sex groups and in the entire studied group and that these differences are statistically significant as compared to the expected values. IA value was also the highest for chromosome 21 and the lowest for chromosome 15 in the male and female groups and in the entire studied group. No significant differences were found in the frequency of entry into satellite associations for two chromosomes with regard to the sexes. Similar results were obtained by Taysi (1975) and Davison et al. (1981), the only difference being that such a participation in associations for these chromosomes was observed by Taysi (1975) both in the group of control adults and in the group of parents of Down syndrome children. Davison et al. (1981) observed such a participation for chromosomes 21 and 15 in a group of children with Down syndrome, in a group of mothers having Down syndrome children and in a group of control male adults. In the studies of both authors no statistically significant difference in the entry of chromosome 21 into associations was found between different groups. Results obtained in our studies concerning the comparison of individual acrocentric chromosome entry into satellite associations showed no significant differences for all comparisons concerning chromosomes 21 and 15 in the studied groups. The participation of individual acrocentric chromosomes in associations of both sex groups was similar and can be presented as follows: 21>22>14>13>15. Other

authors observed the following participation of individual acrocentric chromosomes in associations: Jacobs et al. (1976) — 21>22>14>15>13 in the group of adults; Mattei et al. (1976) — 21>13>22>15>14 in the age group from 10 to 45 years; Ardito et al. (1978) — 13>21>22>14>15 in the group of normal adults. A number of publications suggest that satellite associations involving chromosome 21 are observed more frequently in parents of Down syndrome children than in the control persons (Hansson, Mikkelsen 1974, 1978; Hansson 1979; Jacobs, Mayer 1981). However, there appeared other reports, in which no significant increase of satellite associations was observed in parents of children with trisomy 21 (Cooke, Curtis 1974; Taysi 1975). Hansson and Mikkelsen (1978) as well as Jacobs and Mayer (1981) published data concerning parents of children with Down syndrome. These authors observed significant increase in the frequency of satellite association involving chromosome 21 in parents, who were found to have nondisjunction.

CONCLUSION

1. No significant differences were revealed in the percentage of metaphases with associations between newborns of male and female sexes.

2. Associations composed of two chromosomes were observed most frequently between chromosomes 21 - 21 (in the group of homologous pairs) and between chromosomes 21 - 22 and 14 - 21 (in the group of nonhomologous pairs).

3. Individual acrocentric chromosomes entered into satellite associations with different frequency. In the group of male and female newborns chromosome 21 entered into associations most frequently and chromosome 15 — most rarely.

4. The sequence of individual acrocentric chromosomes in satellite associations in male and female newborns was similar and can be presented as follows: 21>22>14>13>15.

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ANALIZA WZORÓW ASOCJACJI SATELITARNYCH AKROCENTRYCZNYCH CHROMOSOMÓW CZŁOWIEKA WYBARWIONYCH TECHNIKĄ PRĄŻKÓW G I. ANALIZA WZORÓW U NOWORODKÓW

Streszczenie

U 61 noworodków (34 płci męskiej i 27 płci żeńskiej) analizowano częstość wchodzenia poszczególnych chromosomów akrocentrycznych w asocjacje satelitarne. Nie stwierdzono istotnych różnic w liczbie metafaz z asocjacjami między noworodkami płci męskiej i żeńskiej. Asocjacje złożone z dwóch chromosomów obserwowano najczęściej między chromosomami 21 - 21 (w grupie par homologicznych) oraz między 21 - 22 i 14 - 21 (w grupie par niehomologicznych). Poszczególne chromosomy akrocentryczne wchodziły w asocjacje satelitarne z różną częstością. W grupie noworodków płci męskiej i żeńskiej w asocjacje wchodził najczęściej chromosom 21, natomiast najrzadziej chromosom 15. Kolejność udziału poszczególnych chromosomów akrocentrycznych w asocjacjach satelitarnych u noworodków płci męskiej i żeńskiej była jednakowa i przedstawiała się następująco: 21>22>14>13>15.

АНАЛИЗ САТЕЛИТАРНЫХ АКРОЦЕНТРИЧЕСКИХ АССОЦИАЦИЙ ХРОМОСОМ У ЧЕЛОВЕКА, ОКРАШЕННЫХ ТЕХНИКОЙ ПОЛОСОК G I. АНАЛИЗ ХРОМОСОМНЫХ АССОЦИАЦИЙ У НОВОРОЖДЕННЫХ

Резюме

У 61 новорожденного (34 мужского пола и 27 женского) анализировалась частота вхождения отдельных акроцентрических хромосом в сателитарные ассоциации. Не обнаружено существенных разниц в проценте метафаз с ассоциациями между новорожденными мужского и женского пола. Ассоциации, складывающиеся из двух хромосом, наблюдались чаще всего между хромосомами 21 - 21 (в группе гомологических пар) и между хромосомами 21 - 22 и 14 - 21 (в группе негомологических пар). Отдельные акроцентрические хромосомы входили в сателитарные ассоциации с различной частотой. В группе новорожденных мужского и женского пола чаще всего в ассоциации входил хромосом 21, а реже всего — хромосом 15. Очерёдность участия отдельных акроцентрических хромосом в сателитарных ассоциациях у новорожденных мужского и женского пола была одинакова и представлялась следующим образом: 21>22>14>13>15.