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Factors predisposing to sepsis in infant

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Abstract
The article deals with the HLA - genetic profile of children with sepsis. The findings suggest that positive associations related antigen HLA-A10 and HLA-B21in the group of children suffering from sepsis. Conversely the presence of the antigen HLA-B13 with rare phenotype combined with the disease.

Keywords: sepsis, infant, predisposing factors

Introduction

Relevance. It is well known that in critical conditions, including sepsis the constituent part of homeostasis disorders is a shift in the immune system, which in its turn is controlled by a genetically predetermined characteristics of the body's reaction to the pathological effects of various etiology [1, 2]. As the immune system provides oversight of the objects carrying genetically xenogenetic information, including metabolic control, both for low molecular weight and high molecular weight compounds the role of hereditary predisposition factors in the pathogenesis of the disease being under study is fundamentally important [3-4].

Currently, there are a lot of literary information on genetically determined features of the immune response to pathological agents [5]. According to modern concepts, the HLA system performs important functions such as the interaction of immune competent cells of the body, the launch and implementation of the immune response of a particular type, which ultimately determines the course and outcome of the inflammatory process [6, 7].

In this regard, it was of interest to study the distribution of histocompatibility of genes HLA I type in the study of pathology.

Materials and Methods: We performed a study of the incidence of HLA antigens in 163 children ill with sepsis aged 1 month to 1 year. Septicemic form of sepsis made 109 patients, and septicopyemic shape made 54 patients. The comparison group consisted of 83 patients with local infection. The research results were compared with data of healthy Uzbek population

The study frequency of HLA antigens in sepsis among children yielded the following results.

The study of the distribution of HLA system antigens in patients with various forms of infectious inflammatory process (local infection septicopyemic form, septicemic form of sepsis) indicates a clear difference in the distribution of HLA-antigens in the two groups.

Results

Analysis of HLA-phenotypes in studied patients with sepsis, as can be seen from the data presented to the Table., Points to the fact of antigens HLA-A10 and B21 accumulation in the indicated sample compared with healthy individuals. Thus, it in patients with local infections (acute uncomplicated pneumonia) (Table 4, Figure 2) frequency of antigen HLA-A10 in the phenotype was 30.1% in patients with sepsis septicemic form of sepsis this phenotype occurred in 41, 3% of cases, compared with 12, 2% of healthy population ($p < 0.01$), and septicopyemic form of sepsis in our study was characterized by frequency of occurrence of HLA-A10 33.3%, which was significantly higher than in the healthy part of the population ($p < 0.02$).

Thus, the received data show positive associations related to antigens HLA-A10 and HLA-B21, in a group of children suffering from sepsis. Conversely, the presence of antigen in the HLA-B13 in phenotype individuals rarely combined with the disease.

Table 1: The distribution of antigens of HLA system in patients with various forms of infectious inflammatory process (local infection septicopyemic form, septicemic form of sepsis)

HLA antigen	HLA antigen incidence,%			
	Healthy persons n = 131	Sick children		
		Local infection n = 83	Septicemic form of sepsis n = 109	Septicopyemic form of sepsis n = 54
A1	16,0	24,1	23,8	16,6
A2	39,7	32,5	34,8	29,6
A3	23,7	27,7	20,1	29,6
A9	32,8	32,5	22,1	24,0
A10	12,2	30,1**	41,3***	33,3**
A11	17,6	15,6	13,7	16,6
Aw19	6,1	4,8	5,5	5,5
A28	7,6	4,8	5,5	5,5
B5	29,0	16,8	17,4	5,5***
B7	8,4	14,4	6,4	11,1
B8	9,2	9,6	10,1	0
B12	13,0	8,4	15,5	11,1
B13	20,6	20,4	6,4**	0
B14	4,6	2,4	6,4	0
B15	10,7	10,8	8,2	18,5
B16	5,3	4,8	5,5	0
B17	5,3	4,8	10,1	5,5
B18	5,3	12,0	3,6	11,1
B21	4,6	8,4	21,1*) ***	29,6***) ***
Bw22	3,1	2,4	1,8	5,5
B27	4,6	3,6	6,4	0
B35	19,1	40,9***	29,3	11,1**)
B40	5,3	7,2	8,2	11,1
Bw41	0	6,02	1,8	0

Note: * - $p < 0.05$; ** - $P < 0.02$; *** $P < 0.01$ - significance of differences with a group of healthy individuals; *) - $P < 0.05$; **) - $P < 0.02$; ***) $P < 0.01$ - compared with patients with local infection.

The frequency of the HLA -B21 in the analyzed group was lower than in the total sample of sick persons and not statistically different from that of the healthy part of the population. The frequency of HLA- B13 phenotype in patients with local infection was also close to that of the control.
The frequency of the HLA -B21in children with septicemic form of sepsis was 21,1% and was significantly different (P<0,01), not only from the control group, but also from a group of sick children of local infection (P<0,05). The relative risk value an presence of phenotype HLA-B21 in this group was 5.4 units respectively.
Assessment of some clinical parameters of general state of septic children, depending on their HLA genotype revealed accumulation of HLA-A10 antigen in groups of patients of extremely severe condition 55,1% compared to 12,2% (P<0.01).

Table0 2: The distribution of HLA-antigens, depending on clinical parameters of general condition in infants

HLA-antigen	The frequency of HLA, %			
	Healthy individuals n=131	Sick		
		Moderate severity n=24	Heavy n=109	Extremely heavy n=29
A1	16,0	12,5	24,7	41,2*
A2	39,7	33,3	33,9	24,1
A3	23,7	29,1	21,1	10,3
A9	32,8	25,0	26,6	24,1
A10	12,2	33,3***	35,7***	55,1***
A11	17,6	29,1	10,1	13,7
Aw19	6,1	4,6	6,4	6,9
A28	7,6	4,6	3,6	10,3
B5	29,0	16,6	11,9	24,1
B7	8,4	8,3	11,0	10,3
B8	9,2	8,3	12,8	0
B12	13,0	12,5	12,8	10,3
B13	20,6	16,6	11,9	10,3
B14	4,6	4,1	3,6	0
B15	10,7	8,3	14,6	6,89
B16	5,3	4,1	5,5	0
B17	5,3	2,4	4,6	13,7
B18	5,3	12,5	2,7	10,3
B21	4,6	4,1	19,2***	27,5***
B22	3,1	4,1	1,8	6,9
B27	4,6	4,1	2,7	6,9
B35	19,1	50,0***,*)	23,8	20,6
B40	5,3	8,3	7,3	10,3
Bw41	0	4,1	2,7	6,9

Note: * - p <0.05 ** - p <0.02; *** P <0.01 - significance of differences with a group of healthy individuals; *) - P <0.05; **) - P <0.02; ***) P <0.01 - significance of differences with the group of children with very severe status.

HLA-B21 antigen also more common in severe and very severe general condition of the sick child -19,2% and 27,5%, respectively (P<0,01 in each case), whereas in average severity of the clinical status, the figure was close to the level observed in the healthy part of the population (4,1% vs. 4,6%). In extremely severe general condition of patients with sepsis increased frequency of occurrence of the antigen HLA-A1 was also observed. This figure in this group was equal to 41,2% against 24,7% in patients with status qualified as "severe general condition," and 12,5% - in average severity of general condition (P<0,05).
Analysis of HLA-phenotypes features depending on the availability of burdened history of sepsis (tab. 2) showed that among sick children with burdened history antigen HLA_B21 is more common (26,9% versus 7,3% in patients without a laden history and 4,6% in the group of healthy individuals, P<0,01 in both cases).

Conclusions

1. It can be concluded that in general, the presence in the phenotype of HLA-A10, HLA-B21 and HLA-B35, together with infectious factors increase the risk of predisposition to sepsis during childhood. Thus, the presence of HLA-B21 in the phenotype is associated with more severe pathological process involving in OPA 3 or more organs. HLA-B21 antigen is detected significantly more often in children who had severe and extremely severe clinical status in the peak of the disease. Thus, these data indicate that HLA-B21 antigen is a genetic marker associated with generalized course of infectious and inflammatory process.
2. The presence of HLA-B13 antigen in the phenotype has been connected with a negative association with the disease in the total sample of patients and at a significantly lower occurrence of generalized infection that makes it possible to classify.
3. Thus, the identified features of the distribution of HLA antigens in children with sepsis, reflecting the severity of the pathological process, point to the feasibility of using them as additional diagnostic criteria for determining the risk group and prognosis of the disease course.

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