

## HLA Antigens and Their Correlation with Lipid Metabolism Indices in Patients with Psoriasis

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### Abstract

The article provides the authors' data on the correlation of HLA antigens with lipid indices in psoriasis patients in the Khabarovsk Krai. The study of psoriasis patients revealed the increased incidence of HLA- A 1 ( $p < 0,001$ ); B13 ( $p < 0,001$ ); B 17 ( $p < 0.001$ ) and negative A28 ( $p < 0.001$ ); B7 ( $p < 0,01$ ); Cw 3 ( $p < 0,01$ ); Cw 4 ( $p < 0.01$ ).

The study shows the connection of total lipids, triglycerides and total cholesterol indices with the increased frequency of HLA-A 1 ( $p < 0,001$ ); B13 ( $p < 0,001$ ); B17 ( $p < 0.001$ ) in psoriasis patients.

**Keywords:** psoriasis, genetic predisposition, HLA antigens, lipids (total lipids, triglycerides, total cholesterol).

**Introduction.** Psoriasis is one of the most common dermatoses. Its incidence among the population of different countries ranges from 0.1% to 2.8% [4, 11].

The problem of psoriasis is relevant in connection with the increased incidence of its especially severe forms in recent years, i.e. psoriatic arthritis, psoriatic erythroderma, psoriatic pustulosis (including children) often leading to disability and, in particularly severe cases, to lethal outcomes [7, 10].

The predisposition mechanism has not been revealed but it can be assumed that there is an associative connection of psoriasis with histocompatibility antigens of HLA system [3, 12]. It has been determined that the incidence of psoriasis in combination with HLA-B13 and HLA-B17 is most common, while in case of arthropathic psoriasis it is HLA-B 27 [3].

HLA determinants play a major role in the pathogenesis of psoriasis as it has been proved that the dominant role in the development of psoriasis is assigned to genetic factors [4]. It has been found that the frequency of histocompatibility antigens (HLA-A, B, C) in patients with psoriasis in the Khabarovsk Krai is represented by phenotypes HLA-A1, HLA-B13 and HLA-B17 ( $p < 0.001$ ). This is consistent with published data for other regions [8, 9, 12].

The biological role of histocompatibility antigens formed a new clinical trend called «HLA and Disease," which is actively developed both by foreign and domestic researchers. The level of certain HLA antigens in humans is significantly higher in case of some diseases. This suggests a genetically determined predisposition, a "programmed risk" of susceptibility to some form of a disease. The «HLA and Disease" trend has made a practical contribution in the diagnosis of dermatological diseases.

The establishment of a correlation between diseases and the antigens of the main histocompatibility complex not only allows us to identify groups at higher risk of developing a disease, but also to identify groups of patients with a specific course or pathogenesis of the disease, to carry out differential diagnosis of the disease, to determine prognosis and to develop optimal treatment [6].

**The purpose of the study** is to explore the HLA antigens and their relationship to lipids in patients with psoriasis in the Khabarovsk Krai.

**Materials and Methods.** In a comprehensive research of different groups of patients, as part of the «HLA and Disease" studies in the Khabarovsk Krai, a group of patients with psoriasis (85 people) was studied.

The identification of histocompatibility antigens was held in the Zonal Center of Immunological Tissue Typing at KGBUZ Blood Transfusion Station of the Khabarovsk Krai Ministry of Healthcare (G.B. Kalatushkina is head of the laboratory). Peripheral blood

lymphocytes were studied by means of complement-dependent cytotoxicity test using P.Terasaki microtechnique [14]. The control group consisted of 1600 blood donors.

In order to determine the correlation between histocompatibility antigens and a disease the criterion of relative risk was calculated:

$$RR = \frac{fn(1 - fk)}{fk(1 - fn)}$$

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**Formula 1. The calculation of the criterion of relative risk of correlation between tissue compatibility antigens and a disease**

Biochemical analyzes: total lipids were determined by means of sulfophosphovanillin reaction, total cholesterol by S.ILCA (1962) method and triglycerides with a set of “Bio-test” chemicals («Lachema», Czechoslovakia).

**Results.** It has been found that the frequency of histocompatibility HLA antigens of A, B and C loci in patients with psoriasis in the Khabarovsk Krai is represented by the phenotypes HLA-A1 , HLA-B13 and HLA-B17 ( $p < 0,001$ ) [5]. The obtained data are presented in Table 1. As shown in Table 1, there are antigens with higher and lower frequency of occurrence.

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<sup>1</sup> RR – relative risk

fn - fraction antigen carriers among patients

fk - antigen carrier fraction in the control group

antigens	Khabarovsk blood donors (n=1600), Antigen frequency, %	Psoriasis patients (n=85), Antigen frequency,%	Relative risk (RR)
Locus A			
A1	20.80±1.015	37.50±5.25***	2.31
A2	47.25±1.248	56.50±5.37	1.44
A3	24.00±1.068	15.30±3.90	0.59
A9	24.00±1.068	18.8±4.24	0.75
A10	15.80±0.120	16.50±4.03	1.07
A11	14.50±0.880	14.10±3.77	1.00
A19	15.80±0.910	10.60±3.34	0.66
A28	5.40±0.570	1.18±1.17***	0.12
Locus B			
B5	12.50±0.830	16.50±4.03	1.42
B7	21.50±1.030	8.24±2.98**	0.35
B8	12.00±0.810	7.06±2.78	0.60
B12	17.00±0.930	12.90±3.64	0.75
B13	11.75±0.810	48.20±5.42***	7.00
B14	5.00±0.650	4.71±2.30	1.04
B15	9.00±0.720	2.35±1.64	0.30
B16	1.00±0.810	8.24±2.98	0.70
B17	8.80±0.710	25.90±4.75***	3.65
B18	10.70±0.770	7.06±2.78	0.68
B21	3.40±0.450	4.71±2.30	1.57
B22	4.40±0.510	-	-
B27	9.80±0.740	10.60±3.34	1.12
B35	23.20±0.110	14.10±3.77	0.56
B40	12.00±0.810	12.90±3.64	1.13
B41		1.18±1.17	-
Locus C			
Cw1	4.70±0.530	5.88±2.55	1.38
Cw2	18.20±0.960	9.41±3.17	0.49
Cw3	23.40±1.060	10.60±3.34**	0.41
Cw4	12.70±8.320	2.35±1.64**	0.205
Cw5	0.86±0.230	-	-
Cw6	15.90±0.910	18.80±4.24	1.26
Cw7	-	1.18±1.17	-
Note/ Statistical validity: ***p<0.001; ** p<0.01			

The increased frequency of the HLA- A1 was  $37.50 \pm 5.25$  (control group  $20.80 \pm 1.015$ ), the frequency of HLA-B13 was  $48.20 \pm 5.42$  (control group  $11.75 \pm 0.810$ ), the frequency of HLA- B17 was  $25.90 \pm 4.75$  (control group  $8.80 \pm 0.710$ ) ( $p < 0.001$ ).

The reduced frequency of occurrence was found in HLA A- 28,  $1.18 \pm 1.17$  (control group  $5.40 \pm 0.570$ ) ( $p < 0.001$ ), HLA Cw3  $10.60 \pm 3.34$  (control group  $23.40 \pm 1.060$ ) ( $p < 0.01$ ) and HLA Cw4  $2.35 \pm 1.64$  (control group  $12.70 \pm 8.320$ ) ( $p < 0.01$ ).

There is substantial evidence of the fact that psoriasis is not only a multifactor disease with a high genetic component, but it also involves a variety of other disorders at the level of homeostasis.

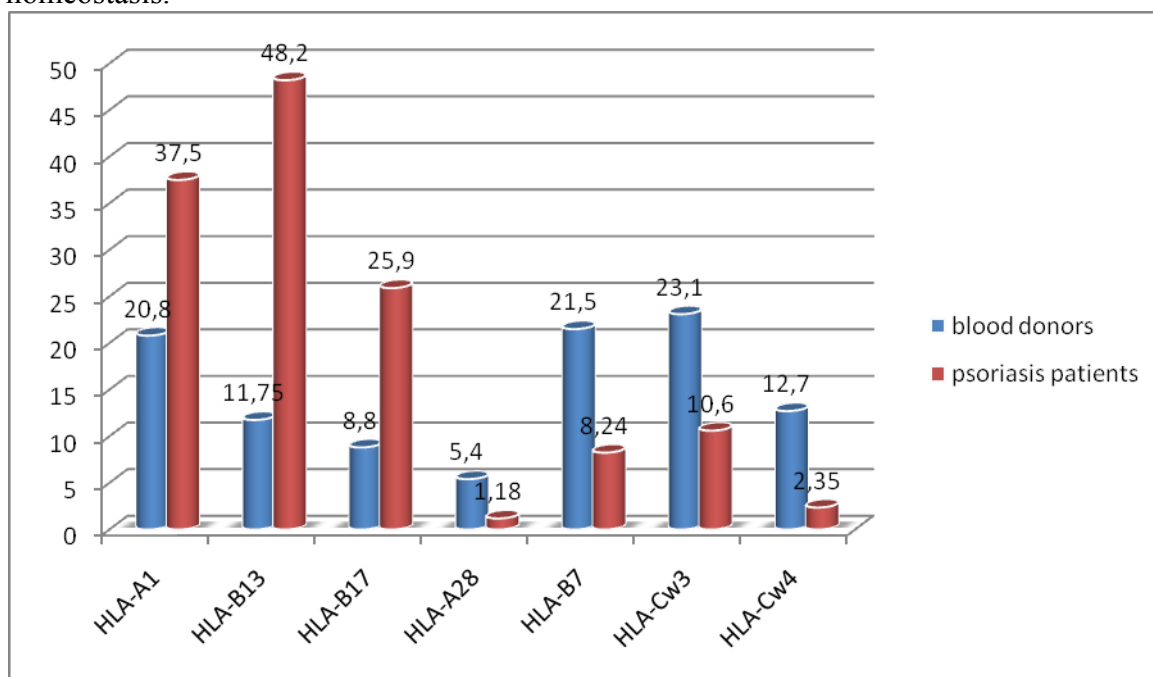


Fig.1. HLA-antigens in patients with psoriasis in the Khabarovsk Krai

Psoriasis is currently viewed as a systemic disease caused by a complex of pathogenetic mechanisms, among which great importance is attached to immunological and metabolic disorders, in particular, lipid metabolism.

Table2

Dynamics of lipid metabolism in patients with psoriasis depending on the HLA phenotype

HLA	Total lipids g /L		Triglycerides mol/L		Total cholesterol mol/L	
	n	$\bar{x} \pm 2m$	n	$\bar{x} \pm 2m$	n <sub>1</sub>	$\bar{x} \pm 2m$
A1	17	$6.80 \pm 0.40^{***}$	15	$1.93 \pm 0.36^{***}$	14	$4.23 \pm 0.22^{***}$
B17	12	$7.70 \pm 0.64^{***}$	12	$2.00 \pm 0.25^{***}$	12	$4.35 \pm 0.26^{***}$
B13	21	$7.09 \pm 0.49^{***}$	18	$1.66 \pm 0.26^{***}$	19	$4.55 \pm 0.16^{***}$
Здоровые	30	$5.91 \pm 0.18$	30	$1.11 \pm 0.08$	30	$5.2 \pm 0.22$

p - the validity of differences between the indices before treatment and the control group of healthy individuals ( $p < 0.001$ ,  $t > 2$ ).

The psoriasis patients with histocompatibility antigen HLA-A1, HLA-B13 and HLA-B17 ( $p < 0.001$ ) showed biochemical changes in terms of lipid metabolism (total lipids, triglyceride



and total cholesterol). Similar publications were not available to us. However, the study of HLA system and its correlation with indicators of lipid metabolism is of particular interest.

The total lipids in psoriasis patients with HLA-A1 antigen totaled  $6.80 \pm 0.40$  g / L, HLA-B13  $7.09 \pm 0.49$  g / L and HLA-B17  $7.70 \pm 0.64$  g / L, which was significantly different from the indices in the control group of healthy individuals ( $p < 0.001$ ). Figures of total lipids in psoriasis patients with antigen HLA-A1 were significantly higher.

Triglycerides in psoriasis patients with antigen HLA-A1 totaled  $1.93 \pm 0.36$  mmol/L, HLA-B13  $1.66 \pm 0.26$  mmol /L and HLA-B17  $2.00 \pm 0.25$  mmol/L, which was significantly different from the indices in the control group ( $p < 0.001$ ). The level of triglycerides in psoriasis patients with HLA-A1 antigen was significantly higher.

The total cholesterol in psoriasis patients with antigen HLA-A1 totaled  $4.23 \pm 0.22$  mmol/L, HLA-B13 was  $4.55 \pm 0.16$  mmol/L and HLA-B17 was  $4.35 \pm 0.26$  mmol / L, which was significantly different from the indices in the control group of healthy individuals ( $p < 0.001$ ). The figures of total cholesterol in psoriasis patients with antigen HLA A1 were significantly lower.

### Conclusion:

1. The histocompatibility antigens in psoriasis patients of the Khabarovsk Krai (85 people) have been defined. The immunogenetic indicators of HLA system have been analyzed. The increased incidence of HLA- A1 ( $p < 0.001$ ); HLA-B13 ( $p < 0.001$ ); HLA- B17 ( $p < 0.001$ ) and decreased HLA- A28 ( $p < 0.001$ ) HLA - B7 ( $p < 0.01$ ); HLA-Cw3 ( $p < 0.01$ ); HLA-Cw4 ( $p < 0.01$ ) have been identified.

2. The correlation between the immunogenetic determinants (HLA system) and the indices of lipid metabolism in psoriasis patients with higher frequency of HLA-A1 ( $p < 0.001$ ); HLA-B13 ( $p < 0.001$ ); HLA-B17 ( $p < 0.001$ ) has been identified.

3. The indices of the total lipids in psoriasis patients with antigen HLA-A1 ( $p < 0.001$ ); HLA-B13 ( $p < 0.001$ ); HLA-B17 ( $p < 0.001$ ) were significantly higher.

4. The indices of triglycerides in psoriasis patients with antigen HLA-A1 ( $p < 0.001$ ); HLA-B13 ( $p < 0.001$ ); HLA-B17 ( $p < 0.001$ ) were significantly higher.

5. The indices of total cholesterol in psoriasis patients with antigen HLA-A1 ( $p < 0.001$ ); HLA-B13 ( $p < 0.001$ ); HLA-B17 ( $p < 0.001$ ) were validly lower.

6. Psoriasis patients need a complex clinical, biochemical, immunological and immunogenetic examination for the diagnosis, rational treatment and prevention.



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