ROLES OF SOME MARKERS OF ACTIVATION AND APOPTOSIS IN PSORIASIS

The various forms of psoriasis demonstrate multidirectional changes of the expression of markers of lymphocyte positive and negative activation. Study of activation markers allow identifying different lymphocyte subpopulations, establishing their role in development and progressing of psoriasis as they characterize connected with cellular cycle processes of activation (CD25) and apoptosis (CD95).

Keywords: Psoriasis, immunology, apoptosis.

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Introduction

Psoriasis is one of the most widespread chronic dermatosis. Now psoriasis is considered as chronic dermatosis of multifactorial nature with dominant role in the development of genetic factors, characterizing by hyperproliferation of epidermal cells, disorder of keratinization, inflammation in the derma, changes in the different organs and tissues. In the pathogenesis of psoriasis the key role is given to Th-1-dependent autoimmune process, which triggering factors include unknown autoantigen, genetic and medium factors (Novikov, Kononov et al., 2003). The great interest calls the study of apoptosis in the patients with psoriasis as one of complication of the clinical picture. Programmed cellular death by apoptosis plays a major role in homeostasis regulation, i.e. control of proliferation, differentiation, and elimination of immune response. On the one side, multiple investigations indicate about disturbance of the mechanisms of keratinocyte apoptosis in psoriasis (Krueger and Bowcock, 2005; Laporte, Galand, Fokan et al., 2000). On the other hand, lymphocyte apoptosis is the key mechanism in immune regulation and supporting the “peripheral tolerance” (Kapuler, 2006; Yarilin, 1996). The damage of the mechanisms of lymphocyte apoptosis seems to be poor studied.

It is considered that apoptosis is realized through activation of expression on the lymphocytes of the superficial CD95 receptor (Fas/ÃPO-1) and its connection with ligand FASL. Classical specific receptors for apoptosis induction belong to the TNF-alfa receptor superfamily. They include Fas/CD95, TNF-alfa receptor type 1 (TNFR1), DR3/WS1-1, DR4/TRAIL-R1, DR5/TRAIL-R2, DR6, containing “the domain of death” in the cytoplasmatic site providing activation of the caspase cascades. Fas/CD95 expresses on the hepatocytes and circulating T-cells of memory. CD95 is not induced on the “resting” T-cells CD45RA+ and is poorly induced on the B-lymphocytes. At cell activation CD95 expresses predominantly on the neutrophils, hepatocytes, T-lymphocytes CD4+, that characterizes their high sensitivity to FASL-induced apoptosis. FASL expresses actively on activated T-lymphocytes and, cooperating (as membrane-associated or soluble protein) with Fas/CD95, it becomes the basic mechanism of apoptosis of the cell-targets in various diseases (Kazanceva, 2000; Laporte et al., 2000).

The elucidation of the mechanisms of lymphocyte apoptosis disorders in psoriasis allows not only deeper understanding of pathogenesis of this dermatosis, but also planning new ways and approaches to immune correcting therapy.

Materials and methods

The study included 112 patients with psoriasis. From heparinized peripheral blood of the patients on the 3% gelatin there were isolated intact lymphocytes. Blood samples obtaining was carried out before and after ending of the treatment.
The content of the lymphocyte population in the peripheral blood was determined with the help of monoclonal antibodies to markers CD3 (T-lymphocytes), CD4 (T-helpers/inducers), CD8 (T-suppressors/cytotoxic), CD16 (natural killers), CD20 (B-lymphocytes), CD25 (lymphocytes with receptor to IL-2), CD95 (lymphocytes with receptor to apoptosis) with indirect plaque assay. The principle of a method consists of attachment of human erythrocytes, sensibilized with monoclonal antibodies LT3, LT20, LT4, LT8, LT16, LT25, LT95, and LT HLA-DR on the surface of lymphocytes.

The group of comparison (n=54) included healthy people of the same age, as the studied patients.

Results and discussion

Study of activation markers enables defining various lymphocyte subpopulations, establishing their role in development and progress of psoriasis, as they characterize the processes of activation (CD25) and apoptosis (CD95) connected with the cellular cycle.

As it may be seen from the data presented, the content of T lymphocytes with markers CD25 in the studied group of the patients was exceeded the data of the control, but not reliably. The analysis of data showed 1.1 times higher growth of these cells in the patients with a progressing stage of disease in comparison with the stationary form and control; but this difference was not reliable (p>0.05). At the progressing stage of disease the reliable growth of CD8 cytotoxic T lymphocytes was revealed.

<table>
<thead>
<tr>
<th>TABLE 1. THE PARAMETERS OF MARKERS OF POSITIVE AND NEGATIVE ACTIVATION IN THE PATIENTS WITH DIFFERENT FORMS OF PSORIASIS</th>
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Note: * - p<0.05; ** - p<0.01; ***- p<0.001

The literature about the role APO-1/Fas (CD95) receptors in process of apoptosis shows that the degree of its expression may reflect level of the programmed cell death.

The study of level CD95 cells showed its little reduced content in the patients with psoriasis (p>0.05). The analysis of data in relation to the stage of disease has shown multidirectional changes. So, at the stationary stage the content of CD95 cells was registered above the control data, and at the progressing stage of disease was 1.1 times lower than the control. The difference between parameters CD95 cells was 1.2 times and reliable (p<0.05). The decrease in expression of CD95 receptor cells indicated about decrease of mature T cells in the blood flow which were rather resistant to apoptogenic stimulus.

The analysis of the data according to the forms of disease revealed that at vulgar form the content of CD25 lymphocytes was found 1.1 times higher than in the control, but not reliably (p>0.05). And exudative form differed by the high content of CD25 lymphocytes reliably exceeding the data of controls and parameters of vulgar form of psoriasis (p<0.05). Arthropathic form of psoriasis was characterized by the low content of CD25 lymphocytes, 1.4 times lower of the control data and 1.6 times lower than at vulgar form (p<0.01). At the erythrodermic form of psoriasis the content of CD25 lymphocytes was recorded 1.1 times below than the control values (p<0.05).
The analysis of the data of CD95 cells did not reveal reliable differences from the control at stable and progressing stages of psoriasis. There were also not revealed reliable differences from the control at vulgar and exudative forms of psoriasis. The arthropathic form of psoriasis was characterized by the 1.2 times reduced content of CD95 lymphocytes. At erythrodermic form of psoriasis the reduction of CD95 cells was 1.6 times lower of the control data (p<0.001). It is necessary to emphasize, that at erythrodermic form the content of CD95 cells were found reliably lower than in the other forms of psoriasis that indicated about suppression of apoptosis. As we have noted, the investigated markers characterize connected with cellular cycle processes of activation (CD25) and apoptosis (CD95). The activated cells can participate in the cellular cycle resulting to mitotic cell division (positive activation). The opposite outcome of cell activation, that is, cell apoptosis induction and its death are also possible. In the patients with vulgar form of psoriasis there was noted small shift to increase in marker of positive activation. At the exudative form, the potential of positive cell activation grows comparing to both the control and other forms of psoriasis. It is known, that the result of outcome of activation depends on presence of the “survival factors”, which role some cytokines are capable to carry out (IL-2, IFN-gamma, IL-4). Increase of “grows factors” activates the T-cellular immunity, in the affected skin there is superexpression of cytokines of the T-helpers type 1 (Th-1) including interferon-gamma and tumor necrosis factor, and reduction of cytokine expression of T helpers type 2 (IL-4 and IL-10). The arthropathic form of psoriasis was characterized by inhibition of receptor expression of both positive and negative activation; this was rather connected with different trigger mechanisms of this form of psoriasis, and possibly with therapy performed. For erythrodermic form of psoriasis there was characteristic inhibition of the expression of the markers of positive and negative activation.

Thus, at the various forms of psoriasis there are observed multidirectional changes of the expression of markers of lymphocyte positive and negative activation. Psoriasis induces changes of qualitative and functional parameters of cellular immunity that results in proliferation and predifferentiation of lymphocytes. Study of activation markers allows identifying the different lymphocyte subpopulations, establishing their role in development and progressing of psoriasis. At activation of T lymphocytes the cytokine IL-2 and its receptors play a key role in development, maturing and regulation of immune response supporting proliferation of activated T and B lymphocytes.

The study of the role of markers of activation and apoptosis in psoriasis seems to be significant because the results received will promote understanding of the complex mechanisms of the pathogenesis of disease and improvement of the methods of diagnosis and therapy.

References

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