IMMUNOCORRECTIVE EFFECTS OF MAGNETOTHERAPY ADMINISTERED IN PATIENTS WITH THERMAL INJURY

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Introduction

The severe thermal injuries comprising more than 20% of body surface lead to the generalized reaction of the organism described as a „systemic inflammatory reaction syndrome" (SIRS). This kind of injury represents a strong signal for the immune system. The way of immune response depends on the range and intensity of the injuring signal and on the potential reactive abilities of the system. If the both elements are reciprocally balanced and the intensity of signal does not exceed the potential defensive abilities of immune system, the healing of injury proceeds without severe complications and the health status of patient may gradually improve. The immunoregulatory activity of thymic-dependent Treg lymphocytes represents one of the most important mechanisms by which the immune system may supervise and control the intensity of posttraumatic inflammation.
The recent observations [1] describing the immunocorrective influence of low-frequency magnetic field seem to indicate that the magnetotherapy can be considered as a potential valuable component in the treatment of severe burn injuries.

Aim of investigations

The study was aimed to determine the influence of magnetotherapy (Viofor JPS) on the immunoregulatory functions of immune system, including the activity of Treg lymphocytes, in patients suffering from burn injuries.

Material and methods

The group of 40 patients (25 men and 15 women, age from 20 to 55 years with burn skin injuries in range from 20 to 50% of body surface) was enrolled to the study. 20 of them were treated on the conventional way and the remaining 20 received in addition the magnetotherapy [2], (Viofor JPS magnetic field generator, 14 daily expositions, 15 min each, according to M1P2 programme, with the use of a large ring applicator. The induced homogenous magnetic field represented basic pulses frequency of 180 – 190 Hz and magnetic induction B = 3,2 μT, mean, and = 40 μT at the peak of pulse). The control group consisted of 20 healthy men.

The immunological tests conducted before the treatment and after 3 months of therapy were performed on the mononuclear cells separated from the blood (PBMC) [3]. The cells were functionally tested in the microculture system (response to PHA and to Con A, production of cytokines IL-1β, IL-1ra, IL-6, IL-10 and TGF-β) and qualitatively/quantitatively analysed by cytometry for the presence of chosen phenotypes $CD3^+$, $CD19^+$, $CD16^+CD56^+$, $CD4^+$, $CD8^+$ and $CD4^+CD25^{high}$ with co-expression of CD152-PE, CD69-PC5, CD62L-FITC molecules.

Results

After magnetotherapy the reactivity of T lymphocytes to PHA and to ConA increased significantly, the production of pro-inflammatory cytokines IL-1β and IL-6 decreased and the production of anti-inflammatory cytokine IL-1ra considerably increased. The production of immunoregulatory cytokines IL-10 i TGFβ increased also after magnetotherapy. In addition, in this group of patients the increase of the percentage of T $CD4^+$ lymphocytes has been observed. No such a changes were observed in the group of patients treated on the conventional way.
The mean percentage values of Treg lymphocytes ($CD4^+CD25^{high}$) in the both groups of patients were significantly lower before the treatment than in the control group. These values increased considerably after magnetotherapy. The similar changes were observed for the subpopulation of lymphocytes $CD4^+CD25^{high}$ with co-expression of CD152 and CD62L receptors which are characteristic for regulatory T lymphocytes (Treg). The percentage values of lymphocytes $CD4^+CD25^{high}$ with co-expression of $CD69^+$ receptors were significantly higher in the both groups of patients before the treatment than in the control group, and further increased after magnetotherapy.

Conclusion

The administration of magnetotherapy in patients with severe burn injuries improves immunoregulatory capacity of immune system, including the actrivity of Treg lymphocytes and contributes for better therapeutic results.

References

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