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Cytokines serum levels influence immunodeficiency in HIV-infected persons

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Objective. Cytokines are involved in controlling the homeostasis of the immune system in HIV infection/AIDS patients. The measurement of cytokines in plasma in people with HIV may provide additional information to complement prognostic markers and understand disease progression. We aimed to determine the IL-4, IL-10 and TNF- α profiles in Ukrainian HIV-infected individuals with different CD4 T-cell levels and hypothesize that elevated plasma cytokine levels are associated with severity of immunodeficiency and influence to pathogenesis of HIV infection.

Materials and methods. We examined serum levels of IL-4, IL-10, TNF- α among 118 HIV-infected European Ukrainians (68 % male, 32 % female; age at diagnosis (32,61 \pm 0,87) years), and 30 healthy controls using ELISA. Patients were divided into groups depending on the levels of CD4 T lymphocytes. Group I included 52 people with T-helper cell counts \geq 350 cells/ μ L, group II - 66 patients with T-helper cell counts \leq 200 cells/ μ L.

Results. In the cytokine profile of HIV-infected people the increased levels of pro-inflammatory cytokine TNF- α compared to controls (group I – (0.77 \pm 0.08), group II – (2.34 \pm 0.69), healthy controls – (0.51 \pm 0.32) pg/mL, $p < 0.05$) and the anti-inflammatory IL-10 (group I – (3.99 \pm 0.99), group II – (20.08 \pm 0.44), healthy controls – (1.68 \pm 0.32) pg/mL, $p < 0.001$) were demonstrated. No significant difference in IL-4 between surveyed groups and comparison group was found (group I – (0.54 \pm 0.08), group II – (0.68 \pm 0.07), healthy controls – (0.81 \pm 0.07) pg/mL, $p > 0.05$). Patients with CD4 T lymphocyte levels \leq 200 cells/ μ L showed significantly higher plasma concentration of TNF- α and IL-10 compared with the group I ($p < 0.05$), which leads to the existence of deep imbalance of immune response in the later stages of the disease. Among HIV-infected from group II mean serum concentrations of TNF- α higher than that of group I in 3 times ($p < 0.05$). A significant increase in the concentration of IL-10 detected in patients with severe immunodeficiency (IL-10 levels in group II was 5 times higher, $p < 0.05$), which may indirectly indicate a more active involvement of IL-10 during disease progression. In favor of this assumption also indicates strength of correlation in patients of group II between the concentration of this cytokine and the index of opportunistic infections compared with TNF- α (IL-10: $r = 0.23$, $p < 0.05$; TNF- α : $r = 0.21$, $p < 0.05$); severity of the disease (IL-10: $r = 0.43$, $p < 0.05$; TNF- α : $r = 0.25$, $p < 0.05$).

Conclusions. HIV-infection is associated with an increase in serum levels of TNF- α and IL-10. Immune imbalance due to changes in concentrations of cytokines is more pronounced in HIV-infected persons with severe immunodeficiency with CD4 T lymphocyte counts \leq 200 cells/ μ L.