
Decision support system for predicting of adverse effects in patients with HIV
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Background. Success of many diagnostic and treatment processes are inextricably linked to the use of computerized technology on the current stage of medicine development. The aim of the present study was to create the decision support system (DSS) to predict the risk of adverse effects in persons with HIV/AIDS.

Materials and methods. We used immunogenetic markers as prognostic criteria in patients with HIV infection in alternative serial Wald analysis, which allows summarize the individual prognostic indexes (PI) and when it reaches a threshold value with a certain probability argues about the character of the disease progression. Training matrix classes had between 12 and 61 realizations, which consisted of 8 recognition features: serum levels of IL-10, TNF-α (pg/ml), absolute number of CD4+ T lymphocytes (cells/μL); determination of IL-10 and TNF-α genes genotype. Algorithm of functioning of the proposed DSS was based on the initial immunogenetic parameters values and the intersection of recognition classes characterizing the functional state of the disease process.

Results. In predicting adverse outcomes in persons with HIV we determined that reliable modulators of severe CNS lesions were minor carrier genotype of IL-10 gene, heterozygous variant of TNF-α gene, high levels of IL-10 and TNF-α in case of severe immunodeficiency. Prognostic index of these parameters was -15.32, corresponding up to 95% of implementation forecast of organic CNS lesions in people living with HIV. The most unfavorable indicators of the risk of pulmonary tuberculosis can be regarded as a combination of heterozygous variant of IL-10 gene, homozygous major allele variant of TNF-α gene, serum levels of IL-10 (≥10.0 pg/ml) and TNF-α (≥1.0 pg/ml), T-helpers count ≤200 cells/μL (PI=-15.12, CI >95%). Prognostics significance of risk factors for extrapulmonary tuberculosis in patients with HIV infection were generally similar to modulator of pulmonary tuberculosis: carrier of C/A genotype of IL-10 gene, G/G genotype of TNF-α gene, high levels of cytokines in combination with severe immunosuppression (PI=-11.32, CI >90%). Implementing prognosis of herpes viral infections were determined by the combination of IL-10 genoimmune major allele variant and heterozygous TNF-α gene variant with high cytokine production and low values of CD4+ cells (PI=-10.26, CI >90%).

Conclusions. The proposed mathematical model of the DSS may be offered for use in clinical practice to determine the risk of opportunistic infections in persons with
HIV/AIDS and can better anticipate unintended consequences taking into account the individual immunogenetic features.