The *pol* and *env* genes evolution demonstrates the presence of a temporary structure with a characteristic increase of divergence between viruses and their last common ancestor, which grew by 1,7 (for the *pol* gene, p<0,001) and 2,4 times (for the *env* gene, p<0,001) during the observation period. The unequal rate of spread of HIV in these high-risk groups, and as a result, differences in the degree of selective pressure of the immune system onto the virus population, possibly causes two effects. On the one hand, it may cause a higher rate of evolution of viruses that spread among the heterosexuals, which is 1,5 times higher than in IDUs for *pol* gene (p<0,001) and 2,1 times for the *env* gene (p<0,001), on the other hand — the differences in positive selection effect on the individual sites, with the frequency of amino acids in these positions among different risk groups being the same (as a whole).

Malignant neoplasms in HIV patients

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Background: HIV patients are at high cancer risk; therefore, oncological care provision to them is becoming a priority. Objective: To study the clinicoepidemiologic characteristics of cancer in HIV patients, to assess their total survival rate (TSR), and to determine what factors influence TSR and interfere with anticancer therapy.

Patients and methods: The study involved 192 HIV patients with cancer who were treated at Saint-Petersburg AIDS Center in 2006–2014. Their case histories were examined in conjunction with Population Cancer Register data. The median follow-up time of the survived patients (n=73) was 2 years and 8 months (range: 1 month to 13 years). In 36% of the patients, their follow up period was more than 5 years. Results: The median age of male patients (n=142) was 34 years (range: 17–78 years). HIV was detected before cancer in 93%, and concomitantly with cancer, in 7% of the cases The median duration of HIV infection before cancer diagnosis was 5 years (range: 3 months to 19 years). Cancer was found at stages 4b or 5 according to (Pokrovsky, 2001) in 95% of cases. At the time of cancer diagnosis, ART was administered in 9,4% of cases, viral load was suppressed (HIV RNA <50 mL^{-1}) in 7,8%, and the median CD4 cell count was 100 μL^{-1} (1–1184). The most prevalent among cancers were lymphomas (n=111, 58%). At the time of diagnosis, Stage 4 cancer (TNM, Ann Arbor) was found in 80%, complications in 15,1%, and more than three complications, in 6,8% of cases. In total, 57,3% of the patients had conditions that limited anticancer therapy: CD4-cell counts below 50 μL^{-1} (28,6%), severe opportunistic infections involving CNS (28,5%) and lungs (23%), active tuberculosis (12%), WBC below 1000 μL^{-1} (3%), and Stage 4 thrombocytopenia (platelet counts below 20 000 μL^{-1}; 2,6%). Opiate-addicted patients in the non-abstinence state or alcoholic patients made 14%. TSR in HIV patients was 55% during 1 years and 39% during 5 years after cancer diagnosis. The factors that reduce TSR during 5 years include severe opportunistic infections involving the CNS (20% vs 47%, p<0,001) and the lungs (17% vs 46%, p<0,001), the long duration of HIV infection before cancer diagnosis, CD4-cell count (less than 50 vs 250 mL^{-1}), HIV RNA (above 400 vs. below 50 copies per 1 μL). Being coinfected with EBV, CMV, HCV, or HBV did not influence TSR during 5 years. ART prescribed upon cancer diagnosis improved TSR during 5 years (49% vs 20%, p<0,001), fig. 2. Conclusions: Lymphomas are the most prevalent cancer in HIV patients (58%). Most cancer are diagnosed at advanced stages (80%). In 93% of cases, HIV infection is diagnosed before cancer, ART being provided to only 9,4 of the patients. Conditions that limit anticancer therapy were found in 57,3% of HIV cases. The total 5-year survival rate in HIV patients after cancer diagnosis is 39%. ART prescribed upon cancer diagnosis significantly increases this parameter.

Structural brain changes in the early stages of HIV

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Motivation: HIV causes neurological complications with the title «HIV-associated neurocognitive disorder (HAND)». HAND occur in 50% of patients which presents a strong social problem. After the introduction of HAART (1996) the number of cases of HIV-associated dementia significally reduced, but the total number of neurocognitive disorders was not decreased.

Study aim: improve early diagnosis and monitoring of atrophic brain changes in HIV patients using quantitative evaluation methods of MRI images.

Study tasks: Further investigate changes in global and regional brain structures in HIV-infected patients in the early stages of the disease; to study the relationship between atrophic and functional changes of brain structures in HIV-infected patients in the early stages of the disease.

Patients: 24 to 48 y.o in early stage of HIV without opportunistic infections and brain lesions according to conventional MRI, no drug addicts, no hepatitis, no psychological disorders. CD4 level: 445±230 cells/ml. Disease duration: 6 to 18 months.

MBaRsIe apcrqotuoicsoitli on protocol:

Pulse sequences	Time (minutes)
Localizers	1:37
Ax T2	1:48
Sag T2	2:12

Ax FLAIR	5:08
VENBold	1:40
Cor	3:22
T1 DWI	0:55

Morphometric protocol for anatomic and lesion quantification

Pulse sequences	Time (minutes)
T1 3D	7:41
T2 VISTA	7:32
FLAIR VISTA	8:16
pause	5:00
T1 3D GAD	7:41

Used postprocessing software: FreeSurfer, FSL, AutoSeg and ABC.

Intermediate results: In order to investigate changes in the volume of brain regional structures in early-staged HIV patients, 21 HIV subjects and 20 controls were investigated using our complex developed algorithm. Voxel morphometry of basal ganglia was performed, in particular: accumbens, amygdala, caudate, hippocampus, globus pallidus, thalamus and putamen. Fig. 1 and 2 show most important results. The volumes of the structures are shown as a percentage of the intracranial volume (ICV) calculated using ROBEX software.

We found a statistically significant increase in amygdala volume. From the literature it is known that an in-depth study of the functions of the amygdala has established an active role this structure plays in determining social behavior. In particular, the increase in amygdala volume was observed in children with autism spectrum disorder (ASD) and is considered as a factor in determining the deficit of communication and social relations characteristic of this population [1]. Cremers et al. [2] found that the volume of the right amygdala is directly correlated with extraversion levels in healthy volunteers. Another study of healthy individuals showed a positive correlation between the volume of the amygdala and neuropsychiatric features that were determined by measuring the size of social relations (which include friends, family members, neighbors, colleagues) [3]. People with higher volumes of amygdala have observed greater number and higher complexity of social relations. Kanai et al. [4] found that the density of the gray matter of the amygdala is positively correlated with the size of both «real» social relations, and social relations on the Internet.

Jasper [5] studied the link between the amount and functional activity of the amygdala and the size of the social network for persons living with HIV. It is noted that in HIV-infected patients are characterized by an increase in the volume of the amygdala. Unlike amygdala volume increase in healthy volunteers, which is due to the high social activity, in HIV this can be attributed to social stimuli associated with the strengthening of social interaction. A deeper understanding of the relationship between the amygdala volume and the size of social interactions can aid in the development of new rehabilitation programs for people living with HIV.

In addition to the volume increase in amygdala, we have found statistically significant unilateral reduction in the right globus pallidus volume. In the literature, many researchers have noted a pronounced decrease in the volume of a bilateral globus pallidus in HIV-infected patients, but we did not find references to the unilateral reduction of the volume of the basal ganglia, including the globus pallidus, in patients in the early stages of HIV.

Conclusion: There is a strong need of further investigation of regional brain volume changes in patients with HIV in the early stages of disease in order to understand the underlying mechanisms of HIV-associated neurocognitive disorders as this could help preventing development of neurocognitive disorders in HIV patients.

HPV-associated cervical lesions among russian HIV-infected women in St.-Petersburg

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Background: Since the beginning of the HIV epidemic in Russia and St. Petersburg the population of HIV-infected persons increases, among whom the proportion of women with the progression of HIV infection and the development of opportunistic diseases, which include cervical cancer, increases. The persistence of high-risk human papillomaviruses (HR-HPV) has been recognized as the major risk factor associated with the development of the cervical dysplasia and cancer. Immunodeficiency, including HIV-infection, is a cofactor of human papillomavirus (HPV) in the development of the cervical dysplasia and cancer.

There are data on the regional differences in structure of the high-risk human papillomavirus types; type-specific distributions of HPV among HIV-positive women differ from those among HIV-negative women. Type-specific prevalence of high-risk human papillomavirus, risk factors for cervical precancer and cancer among Russian HIV-infected women previously was not estimated. The impact of highly active antiretroviral therapy (HAART) on papillomavirus infection and cervical diseases associated with HPV remains uncertain. Clinical research has produced conflicting evidence with regards to both the effect of HAART on HPV infection and its impact on the development, progression, regression of the HPV-related cervical disease.

The lack of data about the features of the HPV infection and HPV-associated cervical disease, depending on the severity of the HIV infection and using HAART in