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FEATURES OF LIPID METABOLISM DISORDERS IN PATIENTS CO-INFECTED WITH HIV/HCV

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Abstract: *The content of lipid metabolism was determined in 107 patients: with chronic hepatitis C - 36 patients, with HIV infection - 35 and co-infection of HIV/HCV – 36 patients. In the investigated patients lipid metabolism disorders were identified such as an increase of the triglycerides, low density lipoprotein, very low density lipoprotein and a reduction of high density lipoprotein contents. Significantly higher levels of triglycerides ($p<0.001$) was observed in patients co-infected with HIV/HCV compared with patients with chronic hepatitis C and HIV-infection. Systematic data analysis suggests that in patients co-infected with HIV/HCV established a strong direct relationship between the level of CD4+ cells and the degree of increase in triglycerides ($r=0,64$, $p<0.001$), atherogenic coefficient ($r=0,57$, $p<0.001$).*

Key words: *chronic hepatitis C, HIV-infection, co-infection HIV/HCV, lipid metabolism.*

Introduction. Ukraine - one of the countries of Europe, leads the unfortunate rating of the number of identified HIV positive and AIDS cases and deaths from the disease [1]. Hepatitis C virus (HCV) and human immunodeficiency virus (HIV) are characterized by their wide distribution and ability to cause health disorders in the working population, thus causing significant morbidity and mortality worldwide. Chronic hepatitis C (CHC) is observed in 60-70% of HIV-infected individuals, due to the common modes of transmission of viruses. Co-infection with HIV/HCV is an important public health problem, since viruses, acting synergistically accelerate the progression of liver disease [2]. HIV accelerates the progression of chronic hepatitis C to cirrhosis and hepatocellular carcinoma, thus increases "liver" mortality.

The literature data about the features of the lipid spectrum of blood on the background of chronic hepatitis C to date are inconsistent. The studies of lipid metabolism in this category of patients have revealed disorders, which are characterized by an increase in triglycerides (TG) and decreased high-density lipoprotein (HDL) in serum [3, 4]. According to the results of another study of blood

lipid metabolism in patients with chronic hepatitis C there is a decrease in total cholesterol (TC), low-density lipoprotein (LDL), elevated levels of triglycerides, very low density lipoproteins (VLDL) and retained unchanged HDL levels [5].

Thus, insufficient knowledge about the impact of HCV on the performance of T-cell immunity in patients co-infected with HIV/HCV proves the feasibility of their comprehensive study in order to identify their interest in the pathogenesis of this disease.

Materials and methods.A study was carried out at the Department of Infectious Diseases of Kharkiv National Medical University, located at the Regional Clinical Hospital of Infectious Diseases of Kharkiv and Kharkiv regional center for prevention and control of AIDS. Features of lipid metabolism were studied in 107 patients: 36 patients with chronic hepatitis C, 35 HIV-infected patients and 36 patients co-infected with HIV/HCV. Age of patients was 20-63 years. The comparison group consisted of 32 healthy subjects who were matched for age and sex with the patients of the studied groups.

The study of lipid metabolism of blood (total cholesterol, triglycerides, HDL, LDL) was carried out by the enzymatically-colorimetric method. A biochemical analyzer BS-300M from the company «Sinnowa» with diagnostic kits from the company "SpaynLab" (Spain). The content of VLDL in blood serum was determined by the formula of A.N.Klimov: VLDL=TG/5, where VLDL - the content of VLDL in blood serum, mmol/l; TG - triglyceride content in blood serum, mmol/l; 5 – calculation factor. Atherogenic coefficient (AC) was calculated by the formula: AC = (TC-HDL) / HDL, where AC - atherogenic coefficient or coefficient; TC - total cholesterol content in blood serum, mmol/l; HDL - HDL cholesterol content in blood serum, mmol/l [6].

Statistical analysis was performed using the software package «Statistica for Windows», 8.0. Methods that were used include: descriptive statistics (numerical description of variables - the arithmetic mean (M), average sampling error (m), definition of the significance of differences (p)), verification by Student t-test, Fisher's representative samples, and the method of correlation of structures [5].

Results. Total cholesterol (TC) in patients of all groups had no significant difference with that of the control group in patients. In the patients studied, compared to the control group, there was a significant increase of triglyceride (TG), atherogenic coefficient (AC), Low density lipoproteins (LDL), Very low density lipoproteins (VLDL) and reduction High-density lipoproteins (HDL). Significantly higher levels of TG ($p<0.001$) was observed in patients co-infected with HIV/HCV compared to patients with chronic hepatitis C and HIV separately.

When the degree of deviation from control values was determined using the analyzed attributes with the help of the normalized index t-test (Fig. 1) it was revealed that Chronic Hepatitis C patients expressed violations regarding the increase in triglycerides ($t=16,7$; $p<0.001$) and AC ($t=10,7$; $p<0.001$), LDL ($t=3,9$; $p<0.001$) and a decrease in HDL ($t=3,5$; $p<0.001$). Minor deviations from the control group include an enhanced VLDL ($t=2,5$; $p<0.05$), and the content of cholesterol were not significantly different from the control group data.

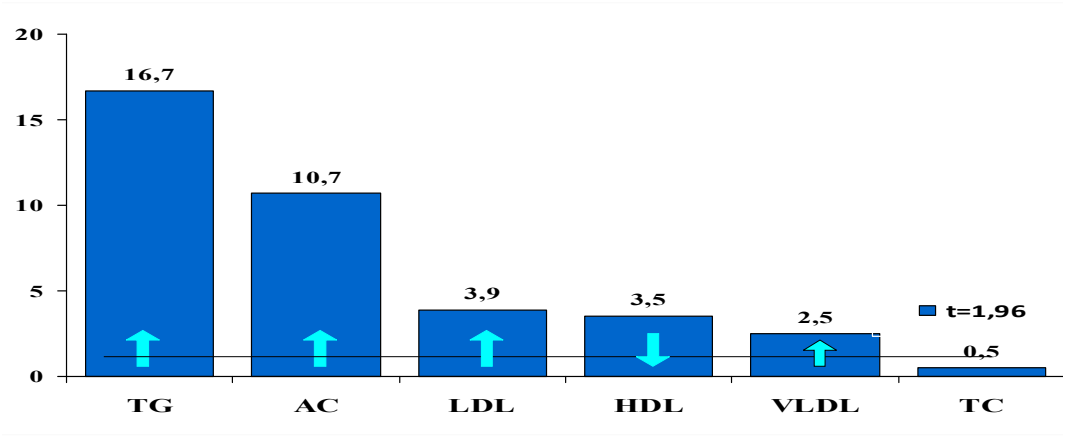

Fig. 1. The degree of deviation from the control indices of lipid metabolism in patients with chronic hepatitis C. ↑ - increase, ↓ - decrease.

In HIV-infected patients, an increase of triglycerides ($t=7,8$; $p<0,001$), VLDL ($t=7,26$; $p<0.001$), LDL ($t=4,42$; $p<0.001$) and AC ($t=3.16$; $p<0.001$). Also a decreased content of HDL ($t=3,25$; $p<0.001$), and cholesterol levels had no significant difference with the control group parameters (Fig. 2).

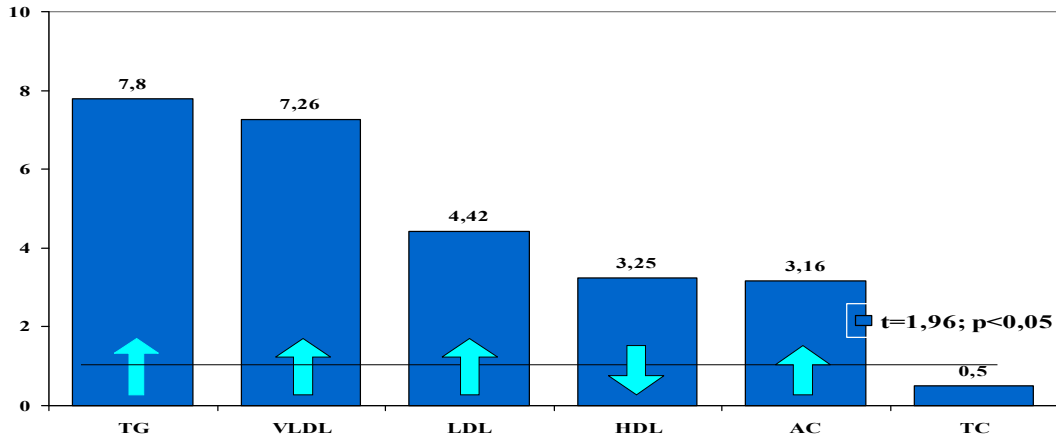

Fig. 2. The degree of deviation from the control indices of lipid metabolism in patients with HIV-infection. ↑ - increase, ↓ - decrease.

In patients co-infected with HIV/HCV significant increases in the amount of triglycerides (t=16,5; p<0.001) and TC (t=7,8; p<0.001) were noted, indicating a high risk of occurrence of cardiovascular disease in these patients. There is an increase in LDL (t=4,81; p<0.001) and VLDL (t=3,36; p<0.001) and a decrease in HDL (t=3,5; p<0.001). The content of cholesterol in patients co-infected with HIV/HCV, had no significant difference with those individuals in the control group (Fig. 3).

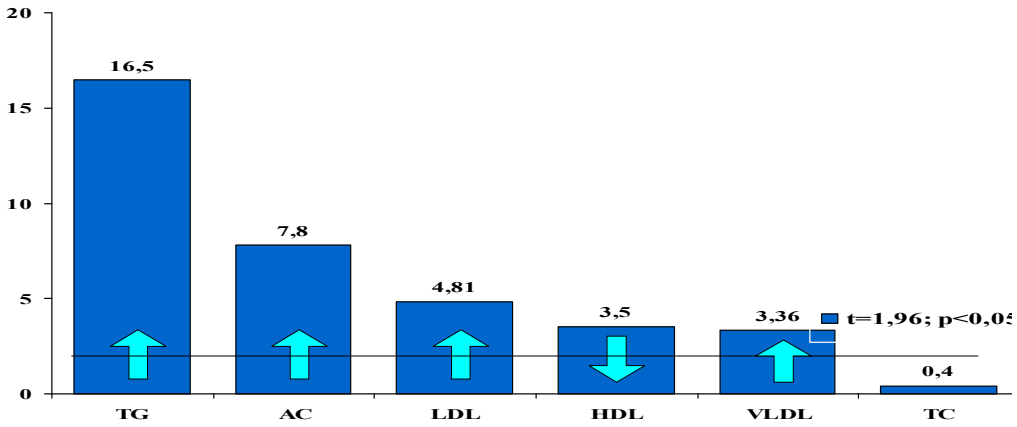

Fig. 3. The degree of deviation from the control indices of lipid metabolism in patients with HIV/HCV co-infection. ↑ - increase, ↓ - decrease.

In carrying out the correlation analysis in patients co-infected with HIV/HCV, a strong direct relationship between the level of CD4+ cells and the degree of increase of TG (r=0,64, p<0.001), AC (r=0,57, p<0.001) was established.

The results obtained reveal a violation of the state of lipid profile in HIV-infected persons with HCV and co-infection with HIV/HCV, which necessitates further study and consideration in monitoring disease and antiretroviral therapy, especially given their lifelong process.

The mathematical expression of the degree of deviation from the control range of the lipid content depending on the kind of pathology, may serve as mean values of the t-test.

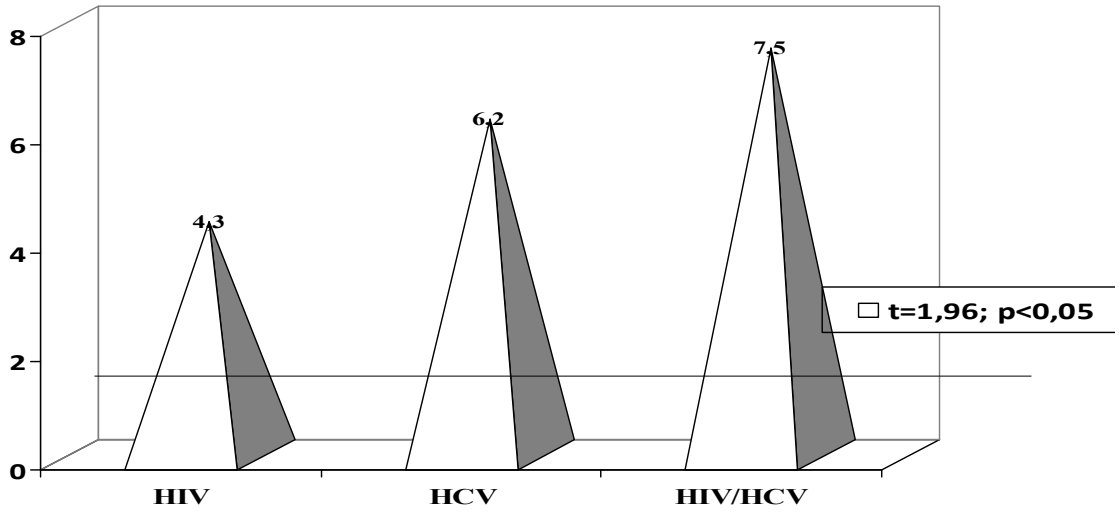

Fig. 4. Integrated assessment of the extent and direction of the deviation from the control of lipid metabolism in groups of patients

The data in Fig. 4 shows that the very pronounced manifestations of disorders of lipid metabolism are characteristic of patients co-infected with HIV/HCV (t=7,5; p<0.001) compared with patients infected with chronic hepatitis C and HIV separately. So, chronic hepatitis C potentiates lipid metabolism in HIV-infected patients.

Conclusions.

The studied patients had lipid metabolism disorders, namely increases in the serum triglycerides, atherogenic coefficient, low-density lipoprotein, very low density

lipoproteins and high-density lipoprotein reduction. Significantly higher triglyceride levels ($p<0.001$) was observed in patients co-infected with HIV/HCV compared to patients with chronic hepatitis C and HIV separately.

In carrying out the correlation analysis in patients co-infected with HIV/HCV, a strong direct relationship between the level of CD4+ cells and the degree of increase of triglycerides ($r=0,64$, $p<0.001$), atherogenic coefficient ($r=0,57$, $p<0.001$) was established.

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Особенности нарушений липидного обмена у больных ко-инфекцией ВИЧ/ХГС

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Резюме. Исследование липидного обмена крови проведено у 107 больных, из них: больных ХГС - 36, ВИЧ-инфекцией - 35, ко-инфекцию ВИЧ/ХГС - 36. У обследованных больных выявлены нарушения липидного спектра, а именно:

повышение в сыворотке крови содержания триглицеридов, липопротеинов низкой плотности, липопротеинов очень низкой плотности, коэффициента атерогенности и снижение липопротеинов высокой плотности. Достоверно более высокий уровень триглицеридов ($p<0,001$) отмечен у больных ко-инфекцией ВИЧ/ХГС по сравнению с больными ХГС и ВИЧ-инфекцией. При проведении корреляционного анализа у больных ко-инфекцией ВИЧ/ХГС установлена сильная прямая связь между уровнем CD4+ клеток и степенью повышения триглицеридов ($r=0,64$, $p<0,001$) и коэффициента атерогенности ($r=0,57$, $p<0,001$).

Ключевые слова: хронический гепатит С, ВИЧ-инфекция, ко-инфекция ВИЧ/ХГС, липидный обмен.

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Особливості порушень ліпідного обміну хворих на ко-інфекцію ВІЛ/ХГС

Харківський національний медичний університет, Україна

Резюме. Дослідження ліпідного обміну крові було проведено у 107 хворих, з них: хворих на ХГС – 36, ВІЛ-інфекцію – 35, ко-інфекцію ВІЛ/ХГС – 36. У досліджених хворих виявлено порушення ліпідного обміну, а саме: підвищення у сироватці крові вмісту тригліцеридів, ліпопротеїнів низької щільності, ліпопротеїнів дуже низької щільності, коефіцієнту атерогенності та зменшення ліпопротеїнів високої щільності. Достовірно більш високий рівень тригліцеридів ($p<0,001$) відзначено у хворих на ко-інфекцію ВІЛ/ХГС порівняно з хворими на ХГС і ВІЛ-інфекцію. При проведенні кореляційного аналізу у хворих на ко-інфекцію ВІЛ/ХГС встановлено потужний прямий зв'язок між рівнем CD4+ клітин і ступенем підвищення тригліцеридів ($r=0,64$, $p<0,001$), коефіцієнту атерогенності ($r=0,57$, $p<0,001$).

Ключові слова: хронічний гепатит С, ВІЛ-інфекція, ко-інфекція ВІЛ/ХГС, ліпідний обмін

Ключові слова: хронічний гепатит С, ВІЛ-інфекція, ко-інфекція ВІЛ/ХГС, ліпідний обмін.

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