In accordance with the basic ideas of metabolomics any cellular response is reflected in the changing composition of body fluids (blood, urine, seed or cerebral). Consequently, the features of the metabolism of the tumor cell should be reflected in the metabolic profile of the body [10]. Blood is a very convenient object for studying by luminescent methods. The mechanism of chemiluminescence is associated with processes of free radical oxidation of membrane lipids of cells which are responsible for the regulation of proliferation metabolism receptor function of cells and intercellular interaction [2,4,11]. In a physiologically normal state there is a balance between pro- and antioxidants in the body which allows to regulate processes of free radical oxidation in cells. Violation of the balance of pro- and antioxidants in favor of the former leads to the development of oxidative stress which can provoke various damage to cellular components (DNA, proteins, lipids) [1,3,4]. Chemical analysis of radicals is impossible because of their enormous reactivity therefore they usually determine stable reaction products in which radicals took part. However, the chemiluminescence method is very sensitive precisely when free radicals are detected. It should be noted that the luminometer determines not the concentration of radicals but the reaction rate in which they form and does not depend on their reactivity. It is known that the intensity of spontaneous luminescence of biological objects is too small in comparison with the light that causes it. Therefore, to enhance chemiluminescence various activators are used. It is compounds reacting with active forms of oxygen or organic free radicals during which product molecules are formed in the excited state and the luminescence occurs when molecules migrate to the ground state [3]. The addition of luminol to biological samples increases the intensity of chemiluminescence up to 1000 times. At the same time, it is noted that the information given by spontaneous chemiluminescence and luminol-enhanced is not identical [2,3,5]. Luminol-enhanced chemiluminescence is mainly determined by the concentration amount of hypochlorite and hydrogen peroxide or hydroxyl radicals and superoxide while spontaneous chemiluminescence primarily depends on the rate of lipid peroxidation in the system. As shown that activation of low-density lipoprotein peroxidation is possible with active oxygen species, but only in the presence of Fe3+ ions in water-soluble form [6]. Studies on chemiluminescence of neoplasms have shown that superweak luminescence of cancerous tumors is much lower than that of healthy tissues which indicates an increased level of antioxidants in tumors [2,11,12]. Antioxidants suppress the processes of radical oxidation in the tumor and remove the i(prohibition) of cells for division and as a result cells begin to unrestrictedly and unregulatedly divide. The value of luminescence is an integral characteristic that is difficult to interpret for diagnostic purposes therefore, a comprehensive study of the different types of luminescence of blood serum is necessary. The aim of this study was to determine results of spontaneous, Fe3+ -induced and luminol-enhanced chemiluminescence of blood serum from healthy people and gastrointestinal tract cancer patients.

**Materials and methods.** The subject of the study was the blood serum of healthy people and patients with cancer. The first group consisted from conditionally healthy people who did not complain about their health condition. The second group consisted from stomach cancer patients and the third –with colorectal cancer. As Fe3+ ion source was used crystalline composition Fe2(SO4)3*9H2O labeling reagent grade, Luminol (5-amino-2,3-dihydro-1,4-phthalazinedione) were used firm ACROS preparation (USA), purity 98%. The main method for studying the spontaneous chemiluminescence (SChL), Fe3+-induced chemiluminescence (Fe3+IChL), luminol-enhanced chemiluminescence (LEChL) was the spectrofluorimetric analysis which was performed on a JASCO spectrophotometer FP-8200 (Japan). Adapted well-known techniques have been used to determine SChL, Fe3+IChL and LEChL [7,8,9]. The maximum luminescence of blood serum under these conditions was recorded at a wavelength of 450 nm. The measurements were carried out in triplicate with the minimum sensitivity level of the spectrofluorimeter. Databases with the results of the research were formed using MS Excel. Statistical analysis of the results was carried out using the program STATISTICA 10.0 (StatSoft).

**Results.** The diagnosis of all cancer patients was confirmed by clinical, histological, laboratory and instrumental methods of research. In group 1 (n=7) the intensity of SChL varied from 320.81 to 337.12, the average value was 329.68. The intensity of Fe3+IChL ranged from 3952.84 to 4893.92, the average value was 4275.97. Results of LEChL varied from 8015.21 to 8961.57, the average value was 8395.92. In second group (stomach cancer patients, n=6) the intensity of spontaneous chemiluminescence varied from 172.43 to 201.07, the average value was 187.30. The intensity of Fe3+-induced chemiluminescencevaried from 2613.67 to 2975.12, the average value was 2730.18. The intensity of SChL, Fe3+IChL and LEChL was lower in groups of cancer patients than in conditionally healthy people. The intensity of SChL, Fe3+IChL and LEChL in second group were significantly decreased compared with the same data in the first group (p<0.005). Also the intensity of SChL, Fe3+IChL and LEChLin third group of colorectal cancer patients were significantly decreased compared with the same data in the first group (p<0.003). The intensity of Fe3+ -induced and luminol-improved chemiluminescence in the group of colorectal cancer patients was higher than the intensity of spontaneous chemiluminescence and was slightly less than in the group of stomach cancer patients. The intensity of spontaneous, Fe3+-induced and luminol-enhanced
METALLOTHIONEINS PROTECT AGAINST OBESE-INDUCED OXIDATIVE STRESS IN YOUNG WOMEN

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Obesity is rapidly increasing all over the world and pretends to be the global medical and social problem. Frequency of persons with overweight and obesity in the world has doubled since 1980, and by 2016, more than 1.9 billion adults with overweight and over 650 million with obesity, the main part of which belongs to young people (http://www.who.int/mediacentre/factsheets/fs311/en/). Because the oxidative stress is the main cause of progress of different pathologies and not too much is known about this phenomena under obesity, we were inspired to study the parameters of oxidative stress, concentration of multifunctional stress-related and metal-binding proteins metallothioneins and the level of molecular lesions in the blood of obese women (32 < body mass index < 37).

Materials and Methods. About 15 women from each of two groups (control (C) and obesity (O)) were screened.

References:
2. Vinnik Y.A., Beletsvy Y.P., Zhukov V.I., Zaitseva O.V., Kniga V.G., Moiseenko A.S. The use of chemiluminescent analysis in the evaluation of the structural and functional state of plasma membranes in patients with colorectal cancer [electronic resource]. - Access mode: http://repo.knmu.edu.ua/bitstream/123456789/819/1/%D0%8F%D0%B8%D0%BC%D0%B8%D0%BC%D0%B8%D0%85%D0%BC%D0%B1%D1%80%D0%80%D0%BD%D1%88.pdf - Date of access: 06/26/2012. (in Russian)

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