CURRENT PROBLEMS OF THE DIAGNOSTIC AND TREATMENT TACTICS OF PURULENT-INFLAMMATORY DISEASES AND SEPSIS

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Purulent-inflammatory processes and sepsis cause various degrees of intoxication, while most often there is the change of the amount or chemical structure of certain plasma proteins. Albumin is one of such protein that can not only form complexes with metabolites, but also change its conformation [1].

During the treatment process of patients with severe pathology, insufficient attention was paid to the microscopic processes that occur in the patients' bodies, particularly in their blood. Clinical studies of the level of human serum albumin (HSA) have proven its important diagnostic value for assessing the condition of patients and the course of their diseases [2]. The basis for this is the ability of albumin to form complexes with the products of bacterial metabolism - toxins, which ensures its detoxification function. The body's protection from toxic compounds is carried out by the patient's immune system. However, it provides only the elimination of high molecular foreign substances with a molecular weight of at least 5000 Da. Elimination of low-molecular-weight toxins is ensured by the blood transport proteins.

Over the last years, the diagnostic value of the method of fluorescence spectroscopy (MFS) was demonstrated on the disease models "*in vitro*" [3] and "*in vivo*", which was used in clinical practice for patients with sepsis [4] and burn injury [5]. The main characteristics that are used in the framework of MFS are the intensity of fluorescence $I_F(X)$ and the position of the maximum of the fluorescence band $\lambda_{max}(X)$ of the blood serum (BS) of patients, which are the functions of the concentration of native albumin molecules and are expressed through the corresponding characteristics of native and pathological albumin molecules (changes of the state of the albumin molecules are the result of loading of albumin with toxic products that the liver and other detoxification organs do not have time to remove from the body). We proposed the modified concept of the diagnostic and therapeutic approach of purulent-inflammatory diseases and sepsis.

The proposed diagnostics of sepsis is to define X_O – extremely minimal concentration of native albumin in the blood of patients with sepsis. In the case $X > X_O$ albumin molecules eliminate toxins in the patient's body. In the case of presence of endogenous intoxication (EI) in the body, HSA eliminates toxins, increasing the number of "pathological" albumin molecules.

Now we illustrate briefly in Fig. 1 the behavior of fluorescence spectra (FS) of two patients with sepsis. Significantly different trends in FS behavior were found: shift of λ_{max} for patients with preseptic pathology and sepsis to the long-wavelength region and decrease in fluorescence intensity. Both vectors of changes did not have any correlation with the standard laboratory-biochemical parameters of the conventional control of these patients. Now we will illustrate briefly the behavior of fluorescence spectra (FS) of two patients with sepsis in Fig. 1. Significantly different trends in the behavior of FS were revealed: bias of λ_{max} for patients with preseptic pathology and sepsis to the long-wavelength region and decrease of the fluorescence intensity. Both vectors of changes did not have any correlation with the standard laboratory-biochemical parameters of the conventional control of these patients. The behaviour of I_F and λ_{max} of blood serum (BS) of patients significantly depends on the severity of the disease, as well as on the treatment tactics. Bacteremia was diagnosed in the both patients. For both of them, a thorough clinical and laboratory examination was carried out, antibiotic therapy and infusion therapy in significant volumes were prescribed. However, the results of standard clinical and laboratory data were not sufficiently informative. Sepsis-epiduritis was diagnosed in both patients. At the same time, the first patient had a massive retroperitoneal intrapelvic phlegmon, which was removed with some delay, which caused severe sepsis. Only her young age, the absence of concomitant diseases and the effective and long-term treatment ensured the recovery of this patient. A decisive role of MFS was successfully used for the diagnosis and management of the treatment process.

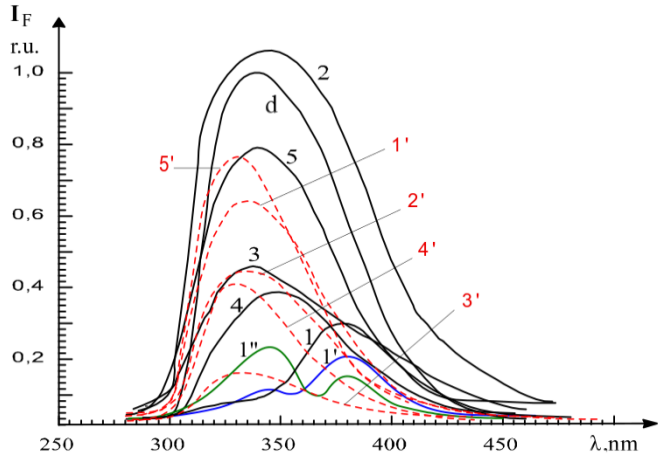

Fig. 1. Spectra of fluorescence of the blood serum of the patient with sepsis who was treated at the Emergency Hospital in 2001–2002: 1 – 28.12.2001; 1′–30.12., 1″– 02.01.2002; 2 – 04.01.2002; 3 – 12.02.2002; 4 – 19.03.2002; 5 – 04.06.2002 and the patient with sepsis-epiduritis, who was treated in 2002 at the Emergency Hospital: 1′ – 03.06; 2′ – 05.06; 3′ – 06.06; 4′ – 07.06; 5′ – 10.06 and blood serum of the donor (d). λ_{ex} = 280 nm. (340 nm – "normal peak", 380 nm – "septic peak").

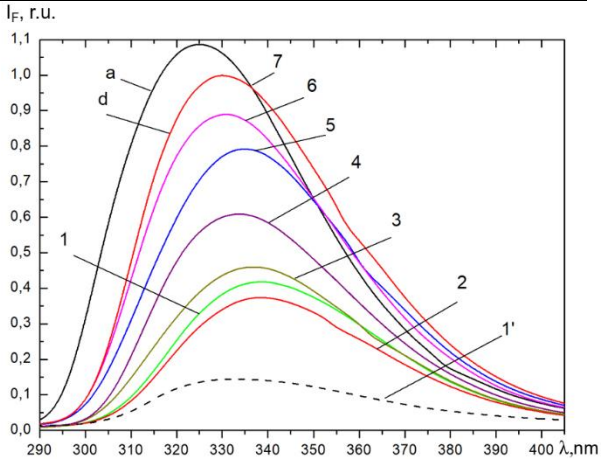

Fig. 2. Fluorescence spectra of the blood serum of the patient with the burn injury who was hospitalized in 2017 in the dynamics of treatment, a patient with sepsis (1′) who was treated in 2002, a donor (d) and a 20% solution albumin (a). λ_{ex} = 280 nm.

As a result of the detailed analysis of the results obtained within the framework of MFS, we modeled the scenarios of the behavior of the FS of the BS of the patient on December 30, 2001 and 2.01.2002 (Fig. 1, curve 1′ and curve 1″). The right peaks of these curves indicate the gradual decrease in the concentration of the pathological albumin molecules, and the left peaks, respectively, indicate an increase of the concentration of complete albumin in the patient's blood. At the next measurement on January 4, 2002. (protein fractions were at the lower limit of normal) the intensity of the corresponding FS band were increased unexpectedly. The only possible explanation for the phenomenon of growth of the mentioned band in this patient was the presence during this period of treatment of transient hypervolemia – the volume of daily intravenous infusions at this time was 8-10 liters. The patient was admitted to the hospital against the background of already manifesting septic condition. MFS helped to identify the septic peak in the long-wave region (Fig. 1, curve 1) and to decide on the further rational choice the treatment tactics. Further studies of the FS of BS of this patient (Fig. 1. curves 3, 4) proved that bacteremia was not overcome completely in her body, although the long-wave septic peak disappeared. However, the competitive struggle between bacteremia and compensatory capabilities of the patient's body in combination with complex medical measures continued. Only the subsequent long treatment process of this patient led to the final suppression of bacteremia and recovery of this patient (Fig. 1, curve 5). Curve 1 is very interesting from the point of view of the ideology of biomarkers. λ_{max} = 345 nm indicates that it was in the CARS state. The main contribution to the FS is given by the pathological albumin molecules, and the meager contribution of FS at λ_{max} = 345 nm indicating that she was in a CARS state. This confirms that in this condition, even a small amount of normal albumin molecules ensured the survival of this patient in a severe septic condition.

For the second patient (Fig. 1, dashed curves), the source of the infection in his body was removed operatively at the beginning of the treatment process, so he did not even go into the SIRS state. Detailed monitoring of the treatment process within the framework of the MFS showed that the behavior of the fluorescence curves during the recovery of this patient is consistent qualitatively with the behavior of the recovery of the previous patient. Unfortunately, during the treatment of the above-mentioned patients, whose monitoring were followed within the framework of MFS, no pathogenetic concept was proposed, and therefore, infusion of donor albumin solutions was not used.

During the treatment process of patients with burn injuries, significant progress has been made in recent years. Local treatment of burn wounds aimed at restoring of microcirculation, creating of antibacterial protection and stimulating of reparative processes are traditionally relevant. After surgical necrectomy and preparation of wounds, their autodermoplasty is performed. Wounds that are not covered with autodermografts are temporarily closed with lyophilized xenoimplants saturated with silver. This

leads to the decrease of pain syndrome, loss of water, proteins and electrolytes from the wound, prevents the development of infection process and promotes marginal and islet epithelization.

The results of FS of BS of the patient with a burn injury into the dynamics are depicted in Fig. 2 (area of the burn surface is 28 %). The appropriate treatment was prescribed to him: antibiotic therapy, infusion therapy with a volume of up to 3 liters daily, as well as, if necessary, infusion of 10% donor albumin (February 6, 10,100 ml each day). It is obvious that a noticeable EI took place here. During the first 5 days, his condition noticeably worsened: a decrease of I_F and growth of λ_{max} (Fig. 2, curves 1, 2). It is obvious that there was a noticeable EI. Therefore, correction of the treatment process was carried out using infusions of donor albumin. It is obvious that they improved significantly the work of the body's detoxification systems with subsequent normalization of endogenous albumin synthesis by the liver. As a result, the fluorescence intensity of the patient's BS gradually increased, and the long-wave shift leveled off (Fig. 2, curves 3–7). After that, the patient was discharged from the hospital in the satisfactory condition.

Conclusions. The method of diagnostics of purulent-inflammatory diseases and sepsis was proposed within the framework of the MFS. It has been established that the structure of FS of BS in patients with these diseases is the effective marker of its severity. At the same time, in patients with severe sepsis, the structure of FS of BS is double-peaked, which reflects the presence of two types of albumin molecules in the blood of patients. Spectral-fluorescence characteristics obtained within the framework of MFS have a pre-manifest character. Usually, these changes are registered 24–48 hours before the appearance of obvious clinical and laboratory signs of the significant change of the general somatic condition of patients. The modern approach for the diagnostics and effective control of the treatment process within the framework of MFS and biomarkers using infusions of donor albumin solutions is proposed.

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ОСОБЛИВОСТІ ГОРМОНАЛЬНОГО СТАТУСУ У ПАЦІЄНТІВ З ІХС ТА ЦД 2 ТИПУ НА ГРУНТІ МЕТАБОЛІЧНОГО СИНДРОМУ ПРИ ЗАСТОСУВАННІ ТЕЛМІСАРТАНУ У СКЛАДІ КОМПЛЕКСНОЇ ТЕРАПІЇ

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Проблема вивчення синтропічної патології ішемічної хвороби серця (ІХС) та цукрового діабету (ЦД) 2 типу на грунті метаболічного синдрому (МС) актуальна і потребує подальших досліджень[1, 2]. Відомо про вплив телмісартану на рецептори ангіотензину 2, що розташовані в структурах головного мозку, з регуляцією функціонального стану гіпоталамо-гіпофізарної системи [3–6]. Однак динаміка гормонального статусу (у вигляді змін пролактину, кортизолу, вільного тироксину та тиреотропного гормону гіпофізу), що характеризує стан хворого в процесі лікування телмісартаном, залишається вивченою недостатньо, що й зумовлює доцільність проведення дослідження.

Мета: оцінити зміни гормонального статусу у пацієнтів з ІХС та ЦД 2 типу на грунті МС при застосуванні телмісартану у складі комплексної терапії.