

RESOLUTION OF Online Teleconference «III School of Infusion Therapy» July 08, 2021

*Go away the thoughts, like autumn clouds!
Let the golden spring come!
Do so pity, so weeping,
All our years pass?
Everyone wants to laugh through tears,
In the midst of sorrow sing cheerful songs,
Not to hope just with hope,
There is a cure! Well, go away sad thoughts!
Only infusion can help us,
It'll deliver the medicine to the place
And the toxins from the blood – it can anything,
Like in fairy tale – it's magical.
It opens the capillaries,
Gives vitality,
Relieves edema, disorders and fivers,
It eliminates anything harmful what is inside!*

The task of the School is to help general medicine physicians to improve their ability to administer infusion therapy in accordance with the latest trends and national and international recommendations. The doctors are trained to handle patients with currently topical nosologies containing seasonality and new diseases.

The School program was dealing with:

- Treatment of infectious diseases and food poisoning.
- Multidisciplinary aspects of the management of patients with micro-circulatory disorders.
- Blood glucose level control in patients with metabolic syndrome.

Very often the patients who come for treatment have several diseases at the same time, so the School of Infusion Therapy has made it possible to look at the problem comprehensively, from different angles.

During the teleconference the participants had a chance to participate and to ask questions while 12 reports highlighting important issues were broadcasted.

Conclusions and decisions based on discussion of reports:

1. Long COVID disguises itself as different clinical manifestations from the side of cardiovascular, nervous and endocrine system. But all of these diseases share a common pathogenesis: a systemic background inflammation and endotheliitis launching development of complications after COVID-19. A systemic background inflammation formed by an anti-inflammatory cytokine regulation disorder and hyper immune response as evidenced by high concentration of cytokines in blood - IL-1, IL-4, IL-6 and I L-17. Prescription of edaravone during long COVID makes it possible to reduce systemic background inflammation by suppression of proinflammatory cytokines, free radical neutralization and reduction of

microglia and astrocytes activation. Edaravone protects endothelium against damage and activates eNOS, inhibits iNOS and nNOS function, strengthens endothelium adhesive contacts. Due to synergy of action of the fixed combination of L-arginine and L-carnitine the signs of endotheliitis are reduced, myocardial function is improved, the heart rate is normalized, and tolerance for physical loading is increased. The xylitol based solution is an insulin independent source of energy for patients with evident chronic fatigue.

2. Development of asthenia after COVID-19 is a key clinical syndrome requiring infusion treatment. A significant asthenic syndrome is developing in many patients which significantly impairs their quality of life and significantly reduces their working capacity. The solutions containing xylitol, providing delivery of xylitol to cells without insulin involvement and restoring carbohydrate metabolism at the cellular level, should be used to restore energy balance. A pilot study has proven the effectiveness and safety of a pathogenic-based therapy with a combination of edaravone, fixed combination of L-arginine and L-carnitine, and xylitol-based solution for patients having asthenic syndrome after COVID-19. Already on the 7th day of treatment there was a definite decrease in the severity of weakness and fatigue of patients, and at the end of the study there was an improvement in working efficiency. All patients had satisfactory tolerance to the infusion program. No complications or side effects were observed during infusion therapy.
3. It is pneumonia that raises many questions about the characteristics of infusion therapy delivery because, despite of significant advances in diagnosis and treatment, pneumonia fatality rates have not changed significantly over the past 30 years and it is mentioned in meta-analysis of the international studies dealing with pneumonia. Up to 15 per cent of the hospitalized patients die within 30 days. Therefore, in today's conditions, the issue of infusion therapy for pneumonia is the most problematic one. This is particularly the case for the choice of the volume of infusion therapy and the solutions used to administer it. Thanks to the conducted international study RheoSTAT Pneumonia we have a balanced hyperosmolar solution which effectively reduces intoxication and has a high security profile (no cases of pulmonary edema were observed when it was used). The use of a balanced hyperosmolar solution during pneumonia treatment is justified by the 1-B level evidence base and high clinical effectiveness.
4. The gastrointestinal tract is home to many types of bacteria which, under normal circumstances, help the human body to digest the food received and are directly involved in the creation of local immunity. In pathological states, aggressive microflora is prevalent, producing endotoxins and increasing the intoxication of the host organism. The use of a balanced hyperosmolar solution, together with a powerful detoxification effect, stimulates the intestinal peristalsis and helps to move the pathogens further along with the further disposal of pathogenic bacteria together with fecal materials. With a balanced hyperosmolar solution at a dose of 200-400 ml per day, a double resistant detoxification effect is achieved.
5. Poisoning and food-born toxic infections are the most common causes of hospitalization in summer. The characteristic of such diseases is the rapid spread of toxins through the body and requires the correction of salt and water metabolism and the use of a powerful detoxification solution. A balanced hyperosmolar solution due to hyperosmolarity accelerates the transition of toxins from interstitial tissue to blood stream with further renal elimination by mild diuretic action of the solution. Thus, by applying a balanced hyperosmolar solution, you will get a powerful detoxification effect.
6. COPD exacerbation remains today one of the most pressing problems of internal medicine in general and pulmonology in particular. Last year the fatality rate of COPD severe exacerbation requiring hospitalization was equal to 22–43%. The pathogenic cause of this condition is an extremely acute inflammation in the respiratory tract, which results in increased labored breathing, coughing, distant wheezing, increased sputum volume and increased purulence. COPD is classified by severity into mild (short-acting bronchial spasmolytic are preferred for treatment), moderate (treatment is based on systemic corticosteroid and/or antibiotic) and severe (require hospitalization, and often a respiratory support). High doses of inhaled glucocorticosteroids (e.g., fluticasone), which are injected into the airways via a nebulizer, are an alternative to systemic steroids. It is important to use bronchial

spasmolytics and inhaled glucocorticosteroids via a nebulizer in the form of a liquid that does not contain preservatives. Antibiotics are primarily prescribed to patients if they have three main symptoms: increased labored breathing, increased sputum volume and increased purulence. Levofloxacin (as a wide-spectrum antibacterial drug) at a dose of 750 mg is a preparation of choice as far its high efficiency and safety have been proven already. Most of COPD exacerbation is caused by viral infection accompanied with significant intoxication syndrome. In such cases, it is advisable to use a balanced hyperosmolar solution to enhance physiological detoxification and accelerate the patient's recovery.

7. Chronic ischemia of the brain is characterized with chronicity, pathogenesis of which is based on vascular dysfunction and cerebral structures damaging. Small blood vessels suffer faster ("small blood vessels disease"), brain tissue trophism is damaged. Medical care for patients with chronic ischemic brain lesions primarily consists in improving cerebral blood flow, for which peripheral vasodilators and endothelium protection drugs are recommended: ready-to-use pentoxifylline improves flow properties and microcirculation; original L-arginine improves cerebral circulatory dynamics by activating of endothelium-dependant mechanism of vasodilation and provides physiological angioprotection. Metabolism in affected brain tissue can be improved with Lodyksem, cardio and neuroprotector, which can improve cerebral metabolism and blood supply to the brain; have anti-anxiety effect. The combination of electrolytes and citicoline provides for dual modulation of nerve pulse transmission, thus restoring cognitive, sensitive and motor functions of the CNS.
8. Hyperglycemia is a condition that develops when the rate of glucose entering the blood exceeds the rate of its disposal. The main cause of hyperglycemia is the disruption of glucose arrival to cells due to insulin resistance. So there's a need for an alternative energy source that acts like glucose, but can get into the cell. It is xylitol that is such a substance, therefore the use of a xylitol-containing energy solution with antiketogen action makes it possible to support the cell at a difficult moment for it and to reduce blood sugar level to normal digits. The use of the combination of L-arginine helps to restore susceptibility of receptors to insulin and L-carnitine helps to protect the heart muscle from severe complications.
9. The detection rate and complexity of treatment of micro-circulatory disorders requires a constant search for the best modern treatment method. Pentoxifylline, a molecule that for many years has served doctors with faith and truth, but has been unfairly forgotten, has gained new life and recognition in international practice. Because pentoxifylline reduces plasma and whole blood viscosity, decreases fibrinogen amount, increases red blood cells elasticity and inhibits their aggregation, inhibits activation of neutrophils, by facilitating passage through the vessels, pentoxifylline occupies a prominent place in medical practice for the treatment of micro-circulatory disorders in different branches of medicine. The cumulative effect of these favorable influences is an improvement of capillary blood flow, which is an important factor in the treatment of heart, kidney, lung and endocrine pathology. Unfortunately, pentoxifylline in ampoules has many disadvantages, such as: the heavy molecule quickly sedimentates after dissolution, resulting in a relative overdose of the drug, which results in a number of side effects. Therefore, it was necessary to find an alternative – it is use of complex, ready-to-administer pentoxifylline preparations without these defects and widely used in treatment.
10. Metabolic syndrome, atherosclerosis gradually results in ischemia in the remotest parts of the body. Therefore, it is the lower limbs that are most affected. General practitioners can influence the progression of the disease before it is too late and treatment has to continue surgically. The key to success is a pharmaceutical improvement of microcirculation within the Department of Internal Medicine. Microcirculation disorders may be divided into 3 groups: intravascular, vascular and extravascular. The problem of patients with chronic diseases is that 3 mechanisms of disorders are involved at the same time. Therefore, adequate treatment requires a scheme that will affect all levels of pathogenesis at once. L-arginine influences on the vessel wall, causes endothelium-dependant vasodilation, prevents pathological remodeling of the vessel wall. A balanced hyperosmolar solution opens precapillary sphincters in spasm and removes edema in such a way it influences an extravascular component of a disorder. A ready-to-use solution of electrolytes with pentoxifylline improves elasticity of formed elements and prevents adhesion. The application of this pathogenic treatment scheme produces a stable clinical effect.

11. Chronic kidney disease can exacerbate such illnesses as diabetes mellitus and hypertension. It is therefore important not to damage the kidney during the treatment of the underlying disease. The balanced hyperosmolar solution has proved its effectiveness due to its composition and soft diuretic action, it improves kidney circulation, protects kidney from ischemia. The solution can be used without restriction in patients with a little bit diminished kidney function. The treatment schedule is 200 ml per day for patients up to 60 kg, and more than 60 kg - 400 ml per day, with treatment lasting 7-10 days. Oral dehydration of 1,200-1,800 ml of liquid with balanced electrolyte composition (for example, ReO water) should also be applied.
12. Toxic-allergic reactions are accompanied by significant intoxication syndrome, which in its turn complicates the general state of the patient's body. In conjunction with desensitization therapy, it is essential to remove toxic metabolites from the bloodstream. The use of a balanced hyperosmolar solution makes it possible to quickly eliminate intoxication manifestations and to transport the drug directly to the origin of the pathogenic process. To continue detoxification therapy and remove symptoms of dehydration, it is necessary to apply ready-to-use oral solutions containing sorbitol and minerals.

Shumakov Valentin Aleksandrovich
Head of the «Association of Cardiac Rehabilitation
of Ukraine», Honored Doctor of Ukraine,
Doctor of Medical Sciences, Professor

