MEMBRANOUS NANO TECHNOLOGIES IN MEDICINE

Devices and plasma filters for membranous plasmapheresis and cascade plasma filtration

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The intensively being elaborated project arranges the new research-and-production facility to consist of three basic units: a cyclotron processing unit for cyclotron, an operating industrial cyclotron is both an exclusive unit in Russia and CIS countries and the high-technology industrial standard for blood purification procedures which has been projected and constructed in Special Economic Zone for implementation new technologies in Science Town Dubna.

The compliance of the production and quality management system in R&P Complex to international standards is proved by the international certificates ISO 9001 and ISO 13485. The Devices and filters for medical membraneous plasmapheresis successfully passed the certification registration audit of quality management system to achieve CE certificate. The R&P Complex is successfully operating, performing serial production of track membranes (400 nanometers pore diameter) and devices for medical plasmapheresis. The production volume per year achieves 300 000 plasma filters “ROSA” and 1 000 of devices “HEMOFENIX”.

The Research-and-production Complex “ALPHA” with operating industrial cyclotron is both an exclusive unit in Russia and CIS countries and the high-technology industrial standard for blood purification procedures which has been projected and constructed in Special Economic Zone for implementation new technologies in Science Town Dubna.

The company “TRACKPORE TECHNOLOGY” jointly with ROSNANO Corporation is steadily implementing the project of development and construction. The purpose of cooperation is to set up the hi-tech domestic manufacturing of medical equipment for cascade plasma filtration, allowing to treat the following diseases: atherosclerosis, ischemic heart disease, stenocardia, cardiac failure and many others.

The implementation of this project will make it possible to domestically produce the highly competitive medical equipment and to leave foreign analogs in many parameters behind. R&P Complex “BETA” will be equipped with the latest accelerator complex (cyclotron) on the basis of krypton and xenon ions being developed by scientists from Joint Institute of Nuclear Research (JINR). The establishing of the full cycle technological complex
Accelerator complex (inc. Cyclotron) with medical nanotechnologies appliance

Filters on the basis of track membranes

Membranous plasmapheresis – extracorporeal blood correction

Membranous cascade filtration

Accelerator complex

Everything that is needed for the procedure of blood purification - plasmapheresis is being produced today in R&P Complex "ALPHA". The first industrial cyclotron in Russia has been constructed for manufacturing of a plasma filter basis as track nano membrane (lavsan film punched by half billion of accelerated argon ions), ions are accelerated and tracked in vacuum atmosphere, bombarding a film on huge speed and rewinding from one roll on another one (as a film strip).

After the bombing by argon ions there are tracks as transmembrane channels form due to irradiation. Later the pores appear on the film while passing the stage of ultraviolet processing. The impact of ultraviolet rays on the rest parts of broken molecules in tracks speed up the following chemical etching. Changing the operating mode of chemical processing: the temperature, concentration or time of processing by chemical substance during etching will make it possible to establish the nanopore dimension in membrane. We can produce membranes with pore dimension either 30 or 50 nanometers. On the second stage of a chemical processing we can vary the pore diameter in a range of some exponents.

Medicinal plasmapheresis is a process during which the blood is separated into blood cells such as: (erythrocytes, leukocytes, thrombocytes, etc.) and plasma - a liquid part of blood in which pathological and metabolic components are dissolved as carriers of the reasons of illnesses. Plasma is separated from cellular elements (erythrocyte amount) and is deleted together with pathogens and pathological elements. Plasma is replaced by various sterile solutions in human organism and the cellular elements return to the patient. Separation of plasma and erythrocyte amount is performed by a membranous plasma filter.

Membranous medical plasmapheresis

Track membranes have been invented during the research done by Mr. G. Flyorov, an academician and a nuclear physicist. He discovered that the particles while crossing cell membranes make tracks in them according to which the variety of parameters could be recognized. This unique property of track membranes makes them as some special filtrational material. The main advantage of membranous membranes with tracks nano dimension is their stability; the porosity of final pores is within 5%. No other technology in the world can show similar results. The track membrane is collected in a pocket, consisting of considerably big quantity of layers, sealed with a special technique and placed in a blue plastic box with the size about 10x10 cm. This is a plasma filter itself, which separates blood into cellular elements and plasma with hazardous and toxic substances. Special and hard conditions are needed to follow the required assembling for such plasma filter, which must be later placed in plasma filter in absolute sterile condition. So-called clean industrial zone has been specially constructed in R&P Complex "ALPHA".

During medical plasmapheresis performance plasma is removed from human body and utilized. During cascade filtration plasmapheresis plasma flows to plasma fractionator. At this stage only hazardous components can be removed selectively. The clean plasma returns back to a patient. Some specific techniques of medical treatment with cascade plasma filtration appliance are taken especially during LDL-apheresis performance or removal of low density lipoproteins. The plasma sorption procedure can be performed when the filter of the second cascade is replaced by plasma perfusion column.
Device and plasma filters for membranous plasmapheresis

The device “HEMOFENIX” for membranous medical plasmapheresis has passed the strict European quality production inspection on safety standards and product conformity and attained product CE certificate.

The devices and plasma filters for medical membranous plasmapheresis have been supplied to more than 500 medical-and-prophylactic institutions in Russia. The delivery of the first devices for cascade plasmapheresis procedure was provided for medical plasmapheresis procedures with a good therapeutic result. According to the statistics of Health and Human Services Ministry, official hospitals and private clinics. These devices are manufactured on high-tech equipment supplies. Such programme allows to extend the possibility to apply our medical techniques and methods in countries of European Union. Moreover, the first supply demands are received from Czech Republic, Rumania, Germany, and China, Haiti. Joint-Stock Company “TRACKPORE TECHNOLOGY” expresses its gratitude to the employees of Aeromobile group Centrospas of the Ministry of Emergency Measures of Russia for self-sacrificing activity and help to people.

Importance of our work

One of the main priorities for the implementation of the National project “Health” as part of public health care is to provide the population by affordable, high-tech and qualified medical service. The equipment for the membranous plasmapheresis provides assistance to patients in outpatient medical conditions, and allows to reduce the time spent by a patient in the hospital. The technology and the equipment for membranous plasmapheresis are approved very effectively during the medicine practice by a number of some medical institutions in Moscow. Medical specialists perform plasmapheresis procedures with a good therapeutic result. According to the statistics of Health and Human Services Ministry, the occurrences of death from cardiovascular disease is now called a “disease of the century”. JSC “TRACKPORE TECHNOLOGY” is developing the cascade technique as the unique and most effective one to combat this disease as century trouble. Today in the world there are devices and plasma filters of domestic and foreign production for plasmapheresis procedure for a patient, due to the high cost of filters and devices. JSC “TRACKPORE TECHNOLOGY” promotes its own techniques and supplies devices, nano plasma filters of domestic manufacture to help service to victims during contingency in Indonesia, Pakistan, India, China, Haiti. Joint-Stock Company “TRACKPORE TECHNOLOGY” expresses its gratitude to the employees of Aeromobile group Centrospas of the Ministry of Emergency Measures of Russia for self-sacrificing activity and help to people.

Supply of devices and plasma filters

Joint-Stock Company “TRACKPORE TECHNOLOGY” is interested in long-term work with medical and prophylactic institutions. The special Dealer programme is developed for the companies which operate in the market for medical equipment supplies. Such programme allows to extend the market offer with assortment integration by the advanced domestic medical equipment for plasmapheresis. At present more than 500 medical-and-prophylactic institutions are equipped with the devices for medical membranous plasmapheresis. Plasmapheresis procedures are performed in Ukraine, Kazakhstan and Belarus. The delivery of the first devices is executed in Iraq, Saudi Arabia, Turkmenistan and Tadjikistan. The attainment of CE certification gives the go-ahead to help service to victims during contingency in Indonesia, Pakistan, India, China, Haiti. Joint-Stock Company “TRACKPORE TECHNOLOGY” expresses its gratitude to the employees of Aeromobile group Centrospas of the Ministry of Emergency Measures of Russia for self-sacrificing activity and help to people.

Efficiency, technique simplicity and equipment with long-term reliability

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Devices and plasma filters for medical membranous plasmapheresis, cascade plasma filtration and hemosorption

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