

ADVANCED HADRON THERAPY TECHNOLOGIES BASED ON THE BINARY NUCLEAR PHYSICS METHODS

Tuesday, 12 July 2022 10:40 (20 minutes)

The program of development and implementation of new diagnostic and therapy technologies based on the Proton Therapy Complex (PTC) "Prometheus" is presented. The tasks will be implemented with the close integration of the LPI, MEPhI, Center of Radiology of RF, as well as their Russian and foreign partners.

Modernization of Russian-made proton synchrotron complexes of the Prometheus system is envisaged in order to develop and implement new technologies based on them and improve existing technologies for proton and ion therapy and diagnostics. Prometheus is a unique PTC. It is a compact (outer diameter - 5 m, weight - 15 tons) synchrotron for protons with low energy consumption (up to 100 kW), which allows one to place such PTCs directly in medical centers.

It is supposed to develop proton radiography and tomography technologies using the maximum proton energy. Technologies of combined action of various types of radiation (protons-neutrons, protons-carbon ions, multi-ion therapy); targeted proton therapy technologies using promising nanoparticles and systems based on them as therapy sensitizers and active agents for diagnostics.

The latter direction involves a significant expansion of the field of modern nuclear medicine through integration with nanomedicine, which uses nanoparticles for the diagnosis and therapy of cancer, using their unique properties. The introduction of non-radioactive materials that can be activated from the outside using various external sources of nuclear particles to produce radioactivity in situ is one of the new directions of activation of nano-drugs at the site of a cancerous tumor, which can be considered as in situ production of radiopharmaceuticals [1].

Modernization of Prometheus PTC based on the developed nuclear physics technologies, their production for Russian nuclear medicine centers opens the way for solving the issue of development and introduction of new effective technologies for proton and ion diagnostics and therapy.

1. Roy I., Krishnan S., Kabashin A., Zvestovskaya I., Prasad P. Transforming Nuclear medicine with nanoradiopharmaceuticals. Review. ACS Nano. (2021).

The speaker is a student or young scientist

No

Section

1. Nuclear technology and methods in medicine, radioecology

Primary author: Dr ZAVESTOVSKAYA, I. N.

Presenter: Dr ZAVESTOVSKAYA, I. N.

Session Classification: Nuclear technology and methods in medicine, radioecology.