

BIBLIOGRAPHY

1. *Borisov, L. B.* Microbiology and Immunology of Dental Diseases / L. B. Borisov, I. S. Freidlin // Medical microbiology, virology; immunology. Moscow: Medical News Agency, 2011. – P. 684–712.
2. *Zholudev, S. E.* "Dysbiotic changes in the oral cavity of persons using dental prostheses" / Zholudev S. E., Marenkova M. L., Novikova V. P. // Panorama of orthopedic dentistry. – 2007. – № 3. – P. 22–26.

ANALYSIS OF METHODS OF TREATMENT FOR CNS TUMORS USING MEDICAL LINEAR ACCELERATORS

A. Kaprusynka, E. Titovich, I. Tarutin

*N. N. Alexandrov National Cancer Centre of Belarus,
Minsk, Republic of Belarus
Anhelina.kaprusynka@gmail.com*

One of the methods of treatment of CNS tumors, which is used in combination with surgical treatment and chemotherapy, is external beam radiotherapy. Linear accelerators are the most useful radiotherapy equipment. They can provide precise dose delivery to the target volume being relatively easy to use, inexpensive and safe. Modern linear accelerators are multi-modal devices and give us an opportunity to choice among several methods of irradiation. Each of these methods have some advantages in treatment of a specific CNS tumor case. For this reason, it is important to make the right decision when choosing one of them. It must be suitable for the very specific case, taking into consideration all medical and physical aspects. The right analysis of these modern methods lets us provide treatment of a high quality.

Keywords: CNS tumor, medical linear accelerator, external beam radiotherapy, precision irradiation

Tumors of the central nervous system (CNS tumor) are a class of non-cancerous and cancerous growths localized in the brain and spinal cord. The important factors of choosing methods for treatment of these diseases are: the genesis of the tumor (primary or secondary), the grade of a tumor (high-grade tumor or low-grade tumor), the stage of the disease, etc.

One of the methods of treatment, which is used most often in combination with surgical treatment and chemotherapy, is external beam radiotherapy. The most useful radiotherapy equipment in the treatment of CNS tumors are linear accelerators (linac). Extremely important matter in the radiotherapy of CNS tumors is the fact that their location is always critical and requires a precise dose delivery to the target volume, in order not to damage adjacent tissues and organs, which can cause serious reducing of quality of life (blindness, deafness, inability to speak, etc.) or even death (for instance, during sessions of radiosurgery). Nowadays, linear accelerators can successfully solve this problem being relatively easy to use and inexpensive (for example, in comparison to proton accelerators), and it's safe and multimodal as well (if to compare with gamma-therapy apparatus). This is due to their wide range of optional features: the choice of radiation energy, varying dose rate, the use of beams with or without flattening filtration (FF-mode and FFF-mode), choice of treatment methods (static or with modulated intensity).

Since linacs were first used in medical practice, they have been evolved with well-engineered technologies and nowadays they can support the wide set of methods for treatment of CNS tumors: 3DCRT (3-dimensional conformal radiation therapy), IGRT (image guided radiation therapy), IMRT (intensity-modulated radiation therapy), SRT/SRS (stereotactic radiation therapy/stereotactic radiosurgery), RapidArc/VMAT (volumetric modulated arc therapy). Though the latest methods are very complex and have high functionality, at the same time, old ones are not completely replaced so far (for example, 3DCRT), which means that each of them still has some advantages in a specific cancer cases. For instance, 3DCRT methods are still actual for irradiation of the entire brain because of its simplicity and relatively quick realization, besides it saves time and money spending on the treatment without losing of medical care quality for the patient. More modern intensity-modulated methods, such as IMRT and VMAT, give us the possibility to provide high-dose precision irradiation while minimal dose on healthy tissues and organs, which cannot be achieved by using 3DCRT techniques. For example, due to the intensity-modulated methods only, it became possible to provide hypo fractionated SRT and boost methods.

Since modern linear accelerators are multi-modal devices and give us an opportunity to choice among several methods of irradiation, it is important to make the right decision when fixing on one of them. It must be suitable for the very specific case, taking into consideration all medical and physical aspects. The right analysis of these modern methods lets us provide treatment of a high quality.