Neutron application has a long history in medicine as a possible therapy modality (1). Its origin goes back to 6 years after the discovery of the neutron by Chadwick in 1932. The clinical trial results have obviously shown that the neutron irradiation is more effective compared to other type of irradiations for treatment of certain tumors (1). Following these results, neutron therapy started to be used in clinics in the early 1970s (1).

Neutron therapy as a high Linear Energy Transfer (LET) radiation has some distinct advantages in radiotherapy treatments (1,2). If a cancer cell is damaged by low LET radiation such as; electrons, photons and protons, the probability by which a damaged cell gets repaired itself and continue to grow is more than that the probability related to the same case with high LET radiation (2,3). Also, the required radiation dose to kill the same number of cancerous cells by neutrons is about one third in comparison with photons (4). Clinical reports showed that a full course of treatment with neutrons consists of 12 treatment sessions, compared to 30-40 treatments with photons or electrons. While, recent studies on side effects of neutron therapy have showed that the side effects for fast neutron therapy are similar to those of low LET radiotherapy. To this end, treatment of extended inoperable salivary gland, paranasal sinuses, advanced squamous cell carcinomas of the head and neck, advanced prostate cancer, soft tissue sarcomas, melanomas and brain tumors showed significant advantages of neutron therapy compared to radiotherapy using photons.

Keywords: Neutron therapy, Radiotherapy, Linear Energy Transfer (LET), Cancer treatment

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All authors wrote the manuscript equally.

Ethical considerations
Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author. Also, this article does not contain any studies with human or animal subjects.
Implication for health policy/practice/research/medical education

Neutron application has a long history in therapy because it has some advantages in cancer treatment. The required radiation dose to kill the same number of cancer cells by neutrons is about one third in comparison with photons. Moreover, the side effects for fast neutron therapy are similar to those of low linear energy transfer therapy. To this end, treatment sessions in neutron therapy is much less than that of photons or electrons.

References


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