Using Volumetric Modulated Arc Therapy (VMAT) Technology in Radiation Therapy to Treat Cancer Cell

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Abstract

Radiotherapy is one of the effective methods of cancer treatment, as it uses high energy to destroy cancer cells while preserving healthy tissues. This treatment aims to deliver high doses of radiation to damage tumor cells through direct and indirect effects on the DNA of cancer cells. Types of radiation therapy include both external and internal therapy, using multiple techniques such as VMAT, IMRT, SIB, 3DCRT, SRT, and others. VMAT is a prominent option, as it provides accurate treatment planning. Two cases were studied using VMAT. First case breast cancer: A total radiation dose of (40.050Gy) was used, where the target area (PTV_Tot) received (Dmax= 108.82%) of the dose. The left lung received 27.69%, The right lung received 9.09%, the heart 7.12%, and the spine cord 10.49%. The results showed a greater effect on cancer cells with reduced doses to healthy tissues. Second case prostate cancer: The same total dose (60Gy) was used, where the target area received 100%. The bladder received 34%, the rectum 18.20%, and the bulb of the penis 27%. The results showed a greater effect on cancer cells with reduced doses to healthy tissues. The results confirmed an increased dose effect on cancer cells while reducing the effect on normal cells. The results also confirmed the effectiveness of VMAT technology in increasing the target dose and reducing the side effects on normal cells, which contributes to improving treatment outcomes and accurate treatment.

Keywords

Radiotherapy, Radiation Therapy, VMAT, Cancer Cell, Normal Cell