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(UG) How Proton Therapy and Photon Therapy Affect Secondary Cancer Rates.

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With external beam radiotherapy being a key tool in treating cancer, the possible harmful side effects, e.g. secondary cancer, need to be accounted for and hopefully minimized. As proton therapy (PT) typically spares more healthy tissue than photon therapy, PT may potentially lower the rate of secondary cancers in treated patients. Due to a lack of valid patient data, simulations are required to show this.

To obtain secondary cancer rates, firstly, matRad an open source clinical treatment planning software made in Matlab was used to create treatment plans on the patient's CT scans, then full body phantoms were combined with the CT scans. This method differs from other research as it gives more insight into the dose deposited outside the original CT scan allowing analysis to be done on the out of field organs. Finally, Monte Carlo simulations were ran using the Monte Carlo package MCsquared on the whole CT scan using the outputs and particle influences calculated from matRad. Using the results from the Monte Carlo simulations the Lifetime Attributable Risk (LAR) was calculated which is the percentage chance a given patient can develop secondary cancer due to the radiation they received from their treatment.

On average for ten head and neck cancer patients being treated with external beam radiotherapy, photons were 2.94 times more likely to cause secondary cancer in a patient when compared with PT.

These results show that treating head and neck patients with PT significantly lowers the chance of secondary cancer developing when compared to treating them with photons.

Keyword-1

Secondary Cancer

Keyword-2

Proton Therapy

Keyword-3

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