Proton Cancer Therapy Tied to Lower Rate of Side Effects Than Traditional Radiation

It is associated with a lower rate of side effects requiring hospitalization.

January 8, 2020 By Benjamin Ryan

Proton therapy, a form of radiation treatment that isn't widely available in the United States, may be as effective as traditional X-ray radiation in treating cancer and has a much lower rate of severe side effects requiring hospitalization, according to a new study published in JAMA Oncology.

Both forms of radiation destroy tumor cells with beams of energy. But X-rays use photons, also found in light, while proton therapy uses protons, which are larger and heavier elements found in the nucleus of atoms. Proton therapy is more targeted and results in dramatically less radiation to healthy cells outside the cancer site.

Researchers from the Perelman School of Medicine at the University of Pennsylvania analyzed data on 1,483 people with nonmetastatic cancer who received simultaneous radiation and chemotherapy intended to be curative. About a quarter (391) received proton therapy; the rest (1,092) received X-ray (photon) treatment. The study included people with cancer of the brain, head and neck, lung, and gastrointestinal tract as well as gynecological cancer.

Within 90 days of treatment, the proportion of each patient group experiencing adverse health events that were Grade 3 or higher and required hospitalization was 11.5% (45) in the proton group and 27.6% (301) in the photon group. After adjusting the data to account for various factors that may have contributed to differences in their severe side effect outcomes, the study authors found that those who received proton treatment had a two thirds lower rate of severe side effects.

"This is exciting because it shows that proton therapy offers a way for us to reduce the serious side effects of chemoradiation and improve patient health and well-being without sacrificing the effectiveness of the therapy," the study's lead author Brian Baumann, MD, an adjunct assistant professor of radiation oncology at Penn and an assistant professor of radiation oncology at

Washington University School of Medicine in St. Louis, said in a press release.

The overall survival and disease-free survival rates were comparable between the two groups. This suggests that the lesser toxicity of the proton therapy did not diminish its therapeutic impact. It also suggests that if needed for effectiveness, proton therapy's dose could be increased without substantially increasing its toxicity. To that end, even though older study participants with a greater burden of other health conditions were more likely to receive proton rather than photon treatment, they still experienced a lower rate of side effects.

"This tells us proton therapy may allow older patients to receive the most effective combined treatments, and that older, sicker patients can more safely be included in clinical trials that use proton therapy," Baumann said.

The new study is likely to contribute to an ongoing debate over the availability of proton therapy for cancer treatment in the United States. According to the American Association of Clinical Oncology, proton therapy requires highly specialized and costly equipment, a major reason why it is available at just a few medical centers in the United States. It is expensive, and insurers may not approve it over traditional radiation.

For further reading, check out "Cancer Patients Often Wish They'd Been Told More About Side Effects."

To read a press release about the study, click here.

To read the study abstract, click here.
