

# Proton therapy cuts side effects for pediatric head and neck cancer patients

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The precise targeting and limited dosing of radiation via proton therapy is proving to be an advantage in ongoing efforts to reduce treatment side effects among head and neck cancer patients, according to a new study of pediatric patients from researchers at the Perelman School of Medicine at the University of Pennsylvania. The results were presented Monday at the 55th annual meeting of the American Society for Radiation Oncology (ASTRO) conference.

"Children are especially susceptible to the side effects of radiation therapy, and treating them for head and neck cancers poses an additional challenge due to the risk of radiation to developing tissues," said the study's lead author, Christine Hill-Kayser, MD, an assistant professor of Radiation Oncology in Penn's Abramson Cancer Center. "Our findings using proton therapy for these [patients](#), however, show that side effects are milder than those which are typically seen among children undergoing conventional radiation. We hope that this will translate to mean fewer late effects as they survive their cancer."

Although physicians have hypothesized about reduced toxicity and side effects with proton therapy because the modality spares most normal tissue from damage, clinical data on the new approach have not yet matured, particularly among pediatric [cancer patients](#). The present study sought to shed more light on the issue by following a group of 25 patients, ranging in age from 1 to 21 years, all of whom received proton therapy at Penn Medicine's Roberts Proton Therapy as part of their [treatment](#) for various head and neck cancers, including

[rhabdomyosarcoma](#), Ewing's sarcoma, and salivary gland tumors, among others. Treatment toxicity was evaluated every week during proton treatment and every one to three months thereafter.

After a median of 13 months after treatment, 19 patients (76 percent) have no evidence of disease, 3 patients (12 percent) had developed local recurrence, and 5 (20 percent) had tumors that seemed to be stable. One patient died of their cancer. The authors note that these outcomes are generally equivalent to those that would be expected with more traditional x-ray therapy. More significant, however, were the greatly reduced side effects observed in the study, compared to the prevalence seen among [head and neck cancer](#) patients undergoing x-ray treatment. "The side effects profile was really very mild, with basically no high-grade toxicity," says Hill-Kayser, who conducted the study along with colleagues from both Penn Medicine and the Children's Hospital of Philadelphia.

The most common side effects were fatigue and dermatitis. The researchers noted that while skin reactions are often seen during radiation treatment, this study seemed to indicate a somewhat greater reaction than expected when proton treatment was followed by certain chemotherapies, including actinomycin-d and doxorubicin, which can interact with radiation and cause radiation sensitivity. That finding helped the research team refine their approach to minimize that side effect. "If we started those drugs right away after proton therapy, it seemed the dermatitis was worse," Hill-Kayser said. "So we learned that after proton therapy, we wanted to hold those drugs and not give them for a month to six weeks, so the patient had time to recover from the skin toxicity before it got worse."

Another common side effect of radiation therapy—especially among head and [neck cancer](#) patients—can be weight loss and nutritional problems, but those were also only found to be a mild concern for the

patients in the current study. "It's common to lose some weight during radiation treatment because the mouth and throat get inflamed, but we found that very few patients in our study lost more than 10 percent of their body weight during the course of treatment. We found that we could minimize that weight loss by using a gastrostomy tube to give tube feedings, but even when we didn't do that, the weight loss was manageable. This was likely the case because proton therapy allowed us to decrease the [radiation](#) dose to the mouth and throat compared to equivalent plans using x-ray therapy."

Over one to three months, all of the study patients fully recovered from any acute [side effects](#) from the proton treatment. Hill-Kayser expects that this study will help to reinforce the growing consensus that "pediatrics is one of the areas where [proton therapy](#) is going to provide a lot of benefit."

Provided by University of Pennsylvania School of Medicine

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