

Proton therapy is a cost-effective treatment for pediatric brain tumor patients

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Proton therapy, an external beam radiotherapy in which protons deliver precise radiation doses to a tumor and spare healthy organs and tissues, is cost-effective in treating medulloblastomas, fast-growing brain tumors that mainly affect children, when compared to standard photon radiation therapy, according to research presented today at the American Society for Radiation Oncology's (ASTRO's) 55th Annual Meeting.

The study used a first-order Monte Carlo simulation model to examine a population of 18-year old survivors of medulloblastoma [brain tumors](#) who were assumed to have been diagnosed at age 5 and at risk of developing 10 adverse health events, including various hormone deficiencies, [coronary artery disease](#), [congestive heart failure](#), ototoxicity, secondary malignant neoplasm and death. Primary institutional information on the cost of investment and Medicare data regarding the cost of management of the various adverse health conditions, in addition to peer-reviewed publications analyzing incidence of side effects were used in the simulation model to perform a cost-effectiveness analysis comparing proton and photon therapy from the societal perspective. Outcomes were measured in incremental cost-effectiveness ratios, with costs measured in 2012 U.S. dollars (USD), and effectiveness measured in quality-adjusted life years (QALYs). A societal willingness-to-pay (WTP) threshold of \$50,000/QALY was the benchmark.

The clinical benefits of [proton therapy](#) have been recognized in reducing side effects when compared to photon therapy, but the significant

expense of building and maintaining proton facilities and the high treatment costs have been areas of concern. The study's results demonstrate that by avoiding years of costly side effects, proton therapy can be cost-effective for children with medulloblastoma. Using current risk estimates and data on required capital investments, proton therapy for pediatric medulloblastoma treatment was not only cost-effective compared to standard photon radiation, but also found to be cost-saving in many simulations.

Results from the base case analysis showed that due to the prevention of side effects, proton therapy was cost-saving. In sensitivity analyses, proton therapy strongly remained the more appealing treatment, in part due to decreased risks of hearing loss, secondary malignancy and heart failure, resulting in cost-savings in more than 95 percent of simulations.

"We believed that proton therapy might prove to be cost-effective in treating pediatric brain tumors, and we were intrigued that it also proved to be cost-saving in the base case and in almost all of the sensitivity analysis simulations," said Raymond Mailhot Vega, MD, MPH, the presenting author of the study; a resident at Mount Auburn Hospital, the teaching hospital of Harvard Medical School; and a 2014 [radiation oncology](#) resident at New York University's Langone Medical Center. "Proton therapy might prove to be both cost-effective and cost-saving for other malignancies, too, and consequently, more cancer patients may benefit from proton therapy."

More information: The abstract, "Cost-Effectiveness of Proton Therapy Compared to Photon Therapy in the Management of Pediatric Medulloblastoma," will be presented in detail during a scientific session at ASTRO's 55th Annual Meeting at 1:45 p.m. Eastern time on Sunday, September 23, 2013.

Provided by American Society for Radiation Oncology

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