A review of dosimetric and toxicity modeling of proton versus photon craniospinal irradiation for pediatrics medulloblastoma.

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Abstract

BACKGROUND: Craniospinal irradiation (CSI) is the standard radiation therapy treatment for medulloblastoma. Conventional CSI photon therapy (Photon-CSI) delivers significant dose to surrounding normal tissue (NT). Research into pediatric CSI with proton therapy (Proton-CSI) has increased, with the aim of exploiting the potential to reduce NT dose and associated post-treatment complications. This review aims to compare treatment outcomes of pediatric medulloblastoma patients between Proton- and Photon-CSI treatments.

MATERIAL AND METHODS: A search and review of studies published between 1990 and 2016 comparing pediatric (2-18 years) medulloblastoma Proton- and Photon-CSI in three aspects - normal organ sparing and target coverage; normal organ dysfunction and second malignancy risks - was completed.

RESULTS: Fifteen studies were selected for review and the results were directly compared. Proton-CSI reported improved out-of-field organ sparing while target coverage improvements were inconsistent. Normal organ dysfunction risks were predicted to be lower following Proton-CSI. Secondary malignancy risks (SMRs) were generally lower with Proton-CSI based on several different risk models.

CONCLUSIONS: Proton-CSI conferred better treatment outcomes than Photon-CSI for pediatric medulloblastoma patients. This review serves to compare the current literature in the absence of long-term data from prospective studies.

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