

# Brainstem necrosis

Brainstem **necrosis** is a rare, but dreaded complication of **radiation therapy**; however, data on the incidence of **brainstem** injury for tumors involving the **posterior fossa** in photon-treated patient cohorts are still needed.

Clinical characteristics and dosimetric parameters were recorded for 107 pediatric patients who received photon radiation for **posterior fossa tumors** without brainstem involvement from 2000-2016. Patients were excluded if they received a prescription dose <50.4 Gy, brainstem maximum dose <50.4 Gy, or had fewer than two magnetic resonance imaging (MRI) scans within 18 months after radiation. Post-radiotherapy MRI findings were recorded and brainstem toxicity was graded using National Cancer Institute Common Terminology Criteria for Adverse Events v5.

The most common histologies were **medulloblastoma** (61.7%) and **ependymoma** (15.9%), and median age at diagnosis was 8.3 years (range: 0.8-20.7). Sixty-seven patients (62.6%) received craniospinal irradiation (median: 23.4 Gy, range: 18.0-39.6) as a component of their radiotherapy, and 39.3% and 40.2% of patients received an additional involved field or whole posterior fossa boost, respectively. Median prescribed dose was 55.8 Gy (range 50.4-60.0). Median clinical and imaging follow-up were 4.7 years (range: 0.1-17.5) and 4.2 years (range: 0.1-17.3), respectively. No grade  $\geq 2$  toxicities were observed. The incidence of grade 1 brainstem necrosis was 1.9% (2/107). These patients were by definition asymptomatic and experienced resolution of imaging abnormality after 5.3 months and 2.1 years, respectively.

Risk of brainstem necrosis was minimal in this multi-institutional study of pediatric patients treated with photon radiotherapy to tumors involving the posterior fossa with no cases of symptomatic brainstem injury, suggesting that brainstem injury risk is minimal in patients treated with photon therapy <sup>1)</sup>.

<sup>1)</sup>

Devine CA, Liu KX, Ioakeim-Ioannidou M, Susko M, Poussaint TY, Huisman TAGM, Aboian M, Brown D, Zaslowe-Dude C, Rao AD, Orlina LT, Rawal B, Mueller S, Marcus KJ, Terezakis SA, Braunstein SE, Haas-Kogan DA. Brainstem injury in pediatric patients receiving posterior fossa photon radiation. *Int J Radiat Oncol Biol Phys*. 2019 Aug 28. pii: S0360-3016(19)33688-0. doi: 10.1016/j.ijrobp.2019.08.039. [Epub ahead of print] PubMed PMID: 31472183.

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