

# Re-irradiation for Medulloblastoma

## National guidelines for the Swedish Workgroup of Paediatric Radiotherapy (SBRG)

### Background

Newly diagnosed patients with medulloblastoma have a 5-year survival of 81% for standard risk and 70% for high risk patients (1). Standard treatment includes surgery, craniospinal irradiation (CSI) 23,4 Gy (standard risk) or 35,2-36 Gy (high risk) and a boost to the tumour-bed with a total dose of 54-55 Gy and chemotherapy. Despite this treatment some patients will experience relapse and re-irradiation is an important part of the salvage therapy (2). Studies on re-irradiation for recurrent medulloblastoma are small retrospective studies including selected patients and the results should be interpreted with caution. Only selected patients with recurrent medulloblastoma may be considered for re-irradiation.

### Re-irradiation

- All patients with recurrent medulloblastoma should be discussed for possible re-irradiation at a multidisciplinary tumour board with a radiation oncologist present. This should be done before the relapse treatment is initiated.
- All patients with recurrent medulloblastoma eligible for re-irradiation should be discussed at the National paediatric radiotherapy conference (SBRG).
- Toxicity after prior radiotherapy and the age of the child must be taken into consideration before deciding on possible re-irradiation and the size of the target volume.
- Re-irradiation should be considered as a part of the treatment at first recurrency, especially for patients with a limited tumour burden and prior low or standard risk treatment (18-23,4 Gy) (2).
- Re-irradiation for recurrent medulloblastoma in children could offer disease control in some patients, especially in patients with focal intracranial recurrency (3).
- Several studies report that re-irradiation of large volumes due to leptomeningeal spread or repeated re-irradiation due to new recurrences is futile (3, 4).
- Patients with a recurrent SHH medulloblastoma seem to have limited gain from re-irradiation (5).
- Patients with recurrency after prior treatment for high risk medulloblastoma can rarely be eligible for re-irradiation with curative intent and should rather be offered palliative radiotherapy to relieve symptoms.
- Target volumes should be tailored considering the extent and localisation of the recurrence and prior radiotherapy.

### Re-CSI

Patients that received low or standard risk CSI (18-23,4 Gy) at primary treatment, should be considered for re-CSI at recurrence, especially if presenting with limited leptomeningeal spread (5) or recurrence outside the index tumour area.

Suggested dose is 1,8 Gy x 15, in total 27 Gy.

### Re-CSI + Boost to recurrence

If possible, a focal boost to the area of recurrence should be added to the re-CSI.

Limited numbers (1-3) of spinal metastases should be boosted up to a cumulative dose max of 60-66 Gy<sub>EQD2</sub>.

Size of the re-treatment volume and time between irradiations must be taken under consideration. More caution should be taken at larger re-irradiation volumes and shorter interval between irradiations.

Intracranial recurrences should be boosted aiming at a total re-irradiation dose of 40-45 Gy, i.e. a boost of 1,8 Gy x 7-10 fractions. But the dose of the boost has to be individualised after considering organs at risk nearby and cumulative doses in the area.

### Local re-irradiation, intracranial or spinal

Patients with limited (1-3) sites of relapse localized within the index tumour-bed or in conjunction with one or two other deposits could be offered local irradiation to a limited volume, 40-45 Gy with conventional fractionation (5).

Cumulative dose to spinal target 58,5 Gy<sub>EQD2</sub> (50,5-66,0) (3)

### **Doses to organs at risk (in plan sum)**

Cumulative doses should not exceed 100-135 Gy<sub>EQD2</sub> (5).

Cumulative doses in the spinal canal should not exceed 66 Gy<sub>EQD2</sub> (6).

For other doses to organs at risk please see National Guidelines (SBRG), Re-irradiation for Ependymoma.

### **References**

1. Tsang DS, Laperriere NJ. Re-irradiation for Paediatric Tumours. Clin Oncol (R Coll Radiol). 2019;31(3):191-8.
2. Wetmore C, Herington D, Lin T, Onar-Thomas A, Gajjar A, Merchant TE. Reirradiation of recurrent medulloblastoma: does clinical benefit outweigh risk for toxicity? Cancer. 2014;120(23):3731-7.
3. Tsang DS, Sarhan N, Ramaswamy V, Nobre L, Yee R, Taylor MD, et al. Re-irradiation for children with recurrent medulloblastoma in Toronto, Canada: a 20-year experience. J Neurooncol. 2019;145(1):107-14.
4. Bakst RL, Dunkel IJ, Gilheeny S, Khakoo Y, Becher O, Souweidane MM, et al. Reirradiation for recurrent medulloblastoma. Cancer. 2011;117(21):4977-82.
5. Gupta T, Maitre M, Sastri GJ, Krishnatry R, Shirsat N, Epari S, et al. Outcomes of salvage re-irradiation in recurrent medulloblastoma correlate with age at initial diagnosis, primary risk-stratification, and molecular subgrouping. J Neurooncol. 2019;144(2):283-91.
6. Nieder C, Grosu AL, Andratschke NH, Molls M. Update of human spinal cord reirradiation tolerance based on additional data from 38 patients. Int J Radiat Oncol Biol Phys. 2006;66(5):1446-9.