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### **Dose distribution and clinical response of glioblastoma treated with boron neutron capture therapy.**

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The dose distribution and failure pattern after treatment with the external beam boron neutron capture therapy (BNCT) protocol were retrospectively analyzed. BSH (5g/body) and BPA (250mg/kg) based BNCT was performed in eight patients with newly diagnosed glioblastoma. The gross tumor volume (GTV) and clinical target volume (CTV)-1 were defined as the residual gadolinium-enhancing volume. CTV-2 and CTV-3 were defined as GTV plus a margin of 2 and 3cm, respectively. As additional photon irradiation, a total X-ray dose of 30Gy was given to the T2 high intensity area on MRI. Five of the eight patients were alive at analysis for a mean follow-up time of 20.3 months. The post-operative median survival time of the eight patients was 27.9 months (95% CI=21.0-34.8). The minimum tumor dose of GTV, CTV-2, and CTV-3 averaged 29.8+/-9.9, 15.1+/-5.4, and 12.4+/-2.9Gy, respectively. The minimum tumor non-boron dose of GTV, CTV-2, and CTV-3 averaged 2.0+/-0.5, 1.3+/-0.3, and 1.1+/-0.2Gy, respectively. The maximum normal brain dose, skin dose, and average brain dose were 11.4+/-1.5, 9.6+/-1.4, and 3.1+/-0.4Gy, respectively. The mean minimum dose at the failure site in cases of in-field recurrence (IR) and out-field recurrence (OR) was 26.3+/-16.7 and 14.9GyEq, respectively. The calculated doses at the failure site were at least equal to the tumor control doses which were previously reported. We speculate that the failure pattern was related to an inadequate distribution of boron-10. Further improvement of the microdistribution of boron compounds is expected, and may improve the tumor control by BNCT.

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