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Boron neutron capture therapy (BNCT) for glioblastoma multiforme: A phase II study evaluating a prolonged high-dose of boronophenylalanine (BPA) ☆

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Corrected Proof

Abstract

Background and purpose

To evaluate the efficacy and safety of boron neutron capture therapy (BNCT) for glioblastoma multiforme (GBM) using a novel protocol for the boronophenylalanine–fructose (BPA-F) infusion.

Patient and methods

This phase II study included 30 patients, 26–69 years old, with a good performance status of which 27 have undergone debulking surgery. BPA-F (900mg BPA/kg body weight) was given i.v. over 6h. Neutron irradiation started 2h after the completion of the infusion. Follow-up reports were monitored by an independent clinical research institute.

Results

The boron-blood concentration during irradiation was 15.2–33.7 µg/g. The average weighted absorbed dose to normal brain was 3.2–6.1 Gy (W). The minimum dose to the tumour volume ranged from 15.4 to 54.3 Gy (W). Seven patients suffered from seizures, 8 from skin/mucous problem, 5 patients were stricken by thromboembolism and 4 from abdominal disturbances in close relation to BNCT. Four patients displayed 9 episodes of grade 3–4 events (WHO). At the time for follow-up, minimum ten months, 23 out of the 29 evaluable patients were dead. The median time from BNCT treatment to tumour progression was 5.8 months and the median survival time after BNCT was 14.2 months. Following progression, 13 patients were given temozolomide, two patients were re-irradiated, and two were re-operated. Patients treated with temozolomide lived considerably longer (17.7 vs. 11.6 months). The quality of life analysis demonstrated a progressive deterioration after BNCT.

Conclusion

Although, the efficacy of BNCT in the present protocol seems to be comparable with conventional radiotherapy and the treatment time is shorter, the observed side effects and the requirement of complex infrastructure and higher resources emphasize the need of further phase I and II studies, especially directed to improve the accumulation of ¹⁰B in tumour cells.

Keywords: [Glioblastoma](#), [BNCT](#), [Quality of life](#), [Toxicity](#), [Survival](#)

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☆ The study was conducted as a project within the Swedish Brain Tumour Study Group.

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