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# Phase II study of border zone stereotactic radiosurgery with bevacizumab in patients with recurrent or progressive glioblastoma multiforme

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## Abstract

**Purpose:** Recurrent glioblastoma is universally fatal with limited effective treatment options. The aim of this phase 2 study of Border Zone SRS plus bevacizumab was to evaluate OS in patients with recurrent GBM.

**Methods:** Patients with histologically confirmed GBM with recurrent disease who had received prior first-line treatment with fractionated radiotherapy and chemotherapy and eligible for SRS were enrolled. Bevacizumab 10 mg/kg was given day -1, day 14, and then every 14 days until disease progression. 1-14 days before BZ-SRS procedure, patients underwent brain MRI /MRS. MRS with measurement of choline-to-N-acetyl aspartate index (CNI) area  $\geq 3$  was targeted for SRS.

**Results:** From 2015-2017, sixteen of planned 40 patients were enrolled. The median age was 62 (range, 48-74Y). 3/16 (0.188) participants experienced grade 2 toxicity. No AEs were reported. The mOS was 11.73 months compared to 8.74 months ( $P = 0.324$ ) from date of SRS for the BZ-SRS and institutional historical controls, respectively. PFS-6 and OS-6 were 31.2% ( $p = 0.00294$ ) and 81.2% ( $p = 0.058$ ), respectively. Of 13 evaluable for best response: 1 CR ( $p = 0.077$ ), 4 PR ( $p = 0.308$ ), 7 SD ( $p = 0.538$ ), and 1 PD ( $p = 0.077$ ). 11/16 participants had MRS scans with an estimated probability that MRS changes a treatment plan of 0 (0, 0.285).

**Conclusion:** BZ-SRS with bevacizumab was feasible and well tolerated. There is no significant survival benefit using BZ-SRS with bevacizumab compared to institutional historical controls. Secondary analysis revealed a trend toward improved PFS-6, but not OS-6 after BZ-SRS. MRS scans did not result in changes to SRS treatment plans.

**Keywords:** Bevacizumab; Glioblastoma; High-grade Glioma; Spectroscopy; Stereotactic Radiosurgery.

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