

Criteria of two phenotypes of GBM on MRI and Met-PET

| Features on MRI/Met-PET | High-invasive | Less-invasive/demarcated |
|-------------------------------------|---------------------------------|--------------------------|
| 1. Tumor margin | irregular | demarcated |
| 2. Enhancement of margin wall | weak~moderate/ heterogeneous | intense/ homogeneous |
| 3. Peritumoral edema | diffuse | focal |
| 4. Area of Gd+ vs Met-PET (TNR 1.4) | Gd << Met-PET | Gd \leq Met-PET |

Figure S1. Imaging phenotype on magnetic resonance imaging (MRI) in 12 GBMs. Representative images of two phenotypes are shown in the upper panel. Six patients showed the highly invasive type of tumor, and the remaining six patients presented with a less invasive and relatively well-demarcated type of tumor.

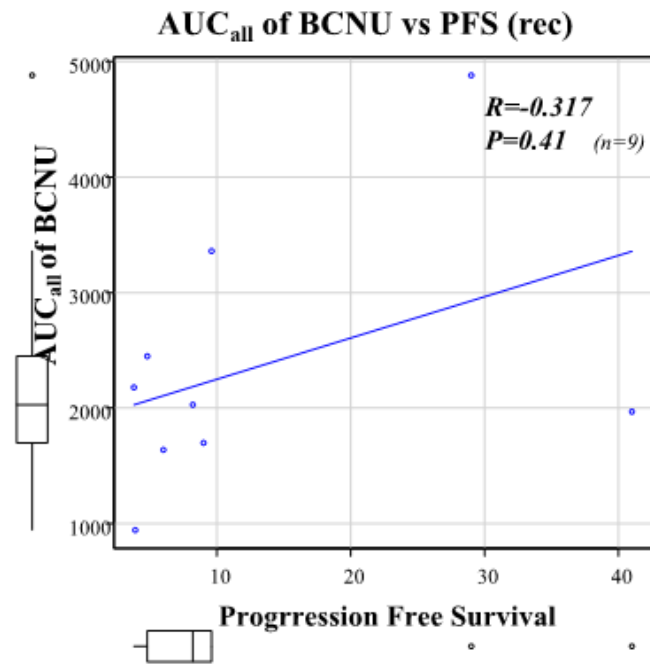


Figure S2. Spearman's regression analysis showing no correlation between PFS of recurrent GBM and AUC_{all} of BCNU in 9 patients.

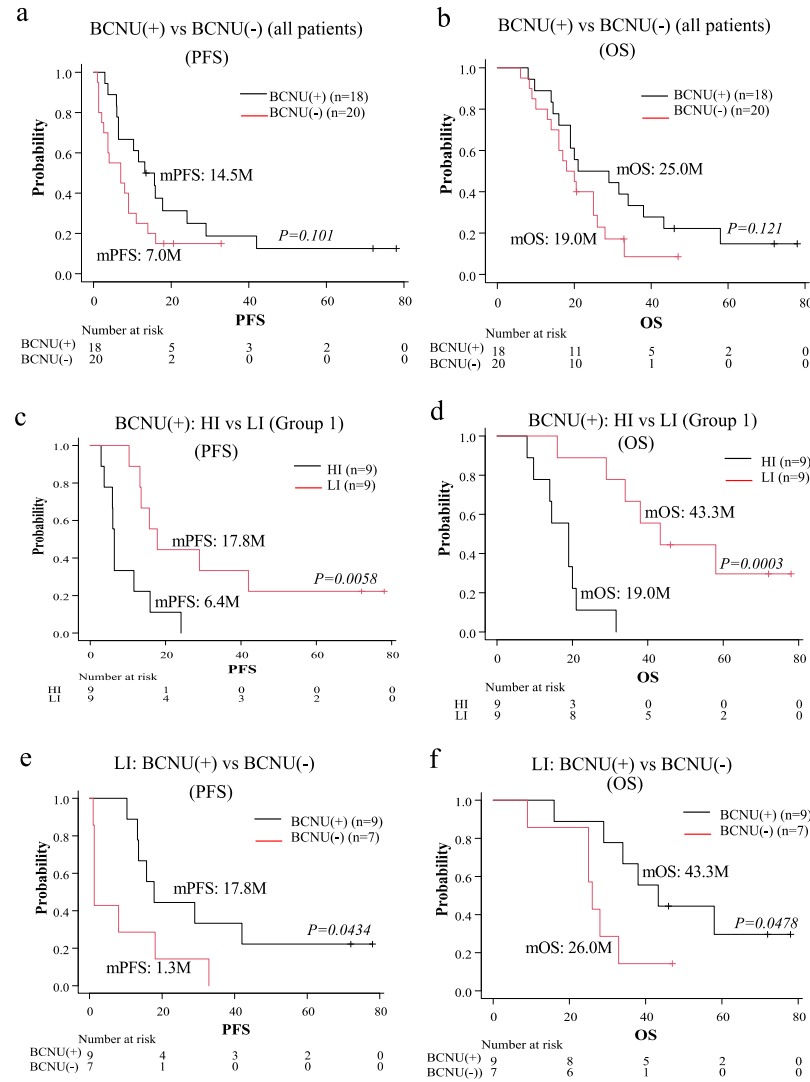


Figure S3. Kaplan-Meier survival curves showing PFS (**a**) and OS (**b**) in 38 GBM patients treated with BCNU wafers (Group 1, $n=18$) and those without BCNU wafers (Group 2, $n=20$). No significant differences in PFS or OS between Group 1 and Group 2 were found. Kaplan-Meier survival curves showing PFS (**c**) and OS (**d**) in the two phenotypes of GBM patients in the group 1. Patients with low-invasive, demarcated type GBM (LI, $n=9$) showed significantly longer PFS and OS than those with highly invasive type GBM (HI, $n=9$) (mPFS; LI: 17.8M vs HI: 6.4M, $p=0.0058$, mOS; LI: 43.3M vs 19M, $p=0.0003$). Kaplan-Meier survival curves in the patients with a low-invasive type GBM. Treatment with BCNU wafers provided significantly longer PFS (**e**) and OS (**f**) than that without BCNU wafers (mPFS; BCNU+: 17.8M vs BCNU-: 1.3M, $p=0.0434$, mOS; BCNU+: 43.3M vs BCNU-: 26M, $p=0.0478$).

Table S1. Oligonucleotide primers used for qRT-PCR.

| Genes | Sense/antisense |
|-------|--|
| CD44 | 5'-AGAAGGTGTGGGCAGAAGAA-3' 5'-AAATGCACCATTTCCTGAGA-3' |
| GAPDH | 5'-CAGTCAGCCGCATCTTCTTT-3' 5'-TGACGGTGCCATGGAATTTG-3' |

Table S2. Concentrations of carmustine (BCNU) in the cerebral spinal fluid within the tumor resection cavity for 30 days after operation in 15 patients with malignant gliomas treated with BCNU wafer.

| Sampling point (day) | Observed values (ng/mL) | | | | | | | | | | | | | | |
|--------------------------|-------------------------|------|-------|------|-------|-------|-------|-------|------|-------|------|------|------|------|------|
| | G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | G9 | G10 | G11 | G12 | G13 | G14 | G15 |
| 0.0417 | NS | NS | NS | NS | NS | NS | NS | NS | 347 | 346 | 755 | 626 | 494 | 298 | 1660 |
| 1 | NS | NS | NS | NS | NS | NS | NS | NS | 990 | 123 | 213 | 538 | 180 | 23.5 | 242 |
| 3 | 101 | 193 | 233 | 269 | 93.9 | 481 | 170 | 596 | 80.6 | 234 | 233 | 90.6 | 22.2 | 47.5 | 734 |
| 7 | 124 | 78.9 | 42 | NS | 671 | 301 | 66.4 | 16 | 184 | 139 | 190 | 158 | 62.8 | 29.9 | 405 |
| 14 | 0.2 | 2 | 0.224 | 6.05 | 74.8 | 1.53 | 10.8 | 0.201 | 23.4 | 0.625 | 2.54 | 15 | 5.78 | 0.1 | 55.2 |
| 30 | BLQ | BLQ | 0.15 | 0.25 | 0.704 | 0.182 | 0.132 | BLQ | NS | NS | NS | NS | NS | NS | NS |
| AUC (0-30day) (ng· d/mL) | 2030 | 1740 | 1640 | 1970 | 4880 | 3360 | 1090 | 2180 | 2970 | 1820 | 2450 | 1700 | 945 | 491 | 5810 |

NS: no sample

BLQ: below the lower limit of quantification