

total resection of 5-ALA positive lesion, i-CT and postoperative MRI revealed 14 (78%) residual tumors. I-CT revealed 7 (50%) in all residual tumor. **DISCUSSION:** Hemorrhage, brain edema, air, invasive lesion, and limitation of resolution of CT might make difficult to detect residual tumor.

**CONCLUSION:** I-CT may be useful to detect residual tumor even with 5-ALA and improve resection rate.

#### STMO-04

##### LOCAL CONVECTION-ENHANCED DELIVERY OF CHEMOTHERAPY AS TREATMENT FOR BRAIN TUMORS

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**BACKGROUND:** Convection-enhanced delivery (CED) of therapeutic agents is a promising local delivery technique that has been extensively studied as a treatment for CNS diseases over the last 2 decades. Applying this technique to treat brain tumors, we have been working to develop novel local chemotherapy against brain tumors. In the meanwhile, clinical trial against diffuse intrinsic brain tumor aiming at Japanese “shonin” approval is recruiting patients. In this study, potential of local CED based chemotherapy against supratentorial brain tumor is discussed. **METHODS:** Until today, we have evaluated the safety and efficacy of local CED of nimustine hydrochloride against supratentorial malignant glioma patients in the three prospective, single institute, nonrandomized, open-label studies. Among those, one study recruited the recurrent malignant glioma patients whose enhanced tumor can be surgically resected. After the resection of the tumor, CED of ACNU was performed targeting the surrounding brain. Temozolomide was also given for 5 days during this trial. **RESULTS:** Seven patients; 4 male and 3 female, age 33–71 y.o. (median 54 y.o.), were treated in this study. Five patients suffered glioblastoma and two suffered anaplastic astrocytoma. After the treatment, all seven patients lived longer than a year; one survived three years, one survived four and a half years, and one with glioblastoma is still alive after 5 years. **DISCUSSION:** Potential efficacy of local chemotherapy delivering nimustine hydrochloride with CED against recurrent malignant glioma was suggested. Further study is required to pave the way for this strategy against supratentorial malignant gliomas.

#### STMO-05

##### SURGICAL AND FUNCTIONAL OUTCOME OF AWAKE SURGERY FOR INSULAR GLIOMA

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**BACKGROUND:** Insular glioma is still challenging entity for neurosurgeons because of its deep location and the surrounding vascular structures and eloquent white matter fibers. Objective. To clarify the surgical and neurofunctional outcome of awake surgery for patients with insular glioma (IG). **METHODS.** We conducted a retrospective review of 42 consecutive patients with insular glioma (IG) and non-insular glioma (non-IG) who underwent awake craniotomy. In addition to surgical outcome including operative complication, the detailed objective neurocognitive evaluation were also analyzed. **RESULTS:** Ten IG and 32 non-IG patients were included in this study. Preoperative tumor volume in IG group was smaller than non-IG group (15.3cc, 21.9cc,  $p=0.14$ ). More patients (8 in 12) in IG patients had tumor in the right hemisphere than non-IG group (12 out of 32,  $p=0.06$ ). All the resection were performed according to the functional boundary decided by the cortical and subcortical mapping. Preoperatively, IG patients showed better cognitive function in the TMT-B and categorical fluency test ( $p=0.035$ ,  $p=0.026$ , respectively). Postoperatively, the median residual volume and the resection rate in IG and non-IG group were 2.2cc vs 0cc ( $p=0.10$ ) and 85.5% vs 100% ( $p=0.025$ ) respectively, suggesting better resection in non-IG group. In terms of complications, 2 patients (20%) in IG group showed infarction in acute postoperative MR images and mild hemiparesis which recovered completely at 3-month evaluation after operation. In contrast, 16 out of 32 non-IG patients (50%) demonstrated new impaired neurocognitive function, which still persisted at final follow-up in 9 out of 16. Most of their postoperative MR images showed no ischemic lesion, suggesting white matter disconnection as main cause of new deficits. More non-IG patients demonstrated the prolonged time in TMT-A than IG patients at 3-month evaluation. **CONCLUSION:** Subcortical white matter disconnection, not ischemic change, are the main reason of postoperative neurocognitive dysfunction in non-IG patients.

#### STMO-06

##### SMART CYBER OPERATING THEATER REALIZED BY INTERNET OF THINGS - RESULTS OF CLINICAL STUDY FOR 56 CASES -

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**PURPOSE:** Unlike conventional operating rooms that provide a sterilized space, we have developed a Smart Cyber Operating Theater (SCOT) in which the room itself performs treatment as a single medical device. We report the clinical results of 3 types of SCOT. **METHODS:** Basic SCOT packaged with intraoperative MRI (0.4Tesla) was introduced in Hiroshima University in 2016. Standard SCOT networked with middleware OPeLiNK was introduced to Shinshu University in 2018, and Hyper SCOT introduced to Tokyo Women's Medical University in 2019. **RESULTS:** The average of all 56 patients was 44 years old. There were 38 brain tumors (68%), 11 functional diseases (19%), and 7 orthopedic diseases (13%). Basic SCOT is used for 41 cases (56; 73%) with 22 gliomas, 10 epilepsies, 7 bone tumors, and 2 benign brain tumors. Standard SCOT with 20 networked devices is used for 14 cases (56; 25%) with 6 gliomas including brain stem and thalamus, 6 pituitary tumors and 2 benign brain tumors. The strategy desk can display a variety of digital data synchronized in time, and the review and comment functions also operate. It is useful for remote advice through mutual communication via strategy desk. Hyper SCOT was used in February 2019 for the first case (1/56 cases; 2%). MRI images were taken with an average of 1.3 shots with good image quality. For 46/56 neoplastic lesions (82%), additional removal of residual tumor was performed in 31/46 cases (67%), and 26/46 cases (57%) were totally removed, with an average removal rate of 89.2%. There was no reoperation (0%) within 1 month in all cases. **CONCLUSIONS:** Three types of SCOT contributed to planned surgical outcome including maximal tumor resection without serious related complications. We will proceed with verification of clinical effects, and develop robotized devices, and utilize AI for strategy desk at Hyper SCOT.

#### STMO-08

##### INFLUENCE OF WIDE OPENING OF THE LATERAL VENTRICLE ON SURVIVAL FOR SUPRATENTORIAL GLIOBLASTOMA PATIENTS WITH RADIOTHERAPY AND CONCOMITANT TEMOZOLOMIDE-BASED CHEMOTHERAPY

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**BACKGROUND:** The prognosis for glioblastoma (GBM) varies among patients. Ventricular opening during surgery has been reported as a prognostic factor for GBM patients, but the influence of ventricular opening itself on patient prognosis remains controversial. **OBJECTIVE:** Accumulating evidence has suggested that the subventricular zone (SVZ) harbors a neural stem cell niche and is associated with gliomagenesis. Several reports have hypothesized that aggressive characteristics of GBM in contact with the SVZ may be associated with the recruitment of neural stem cells from the SVZ that have abilities associated with invasive proliferation, leading to poor prognosis. We presumed that the degree of ventricular opening would correlate with the degree of SVZ resection and with prognosis in GBM patients. This study therefore investigated whether the degree of ventricular opening correlates with prognosis in GBM patients treated with the standard protocol of chemo-radiotherapy. **METHODS:** Participants comprised 111 patients with newly diagnosed GBM who underwent surgery and postoperative radiotherapy and TMZ-based chemotherapy from 2005 to 2018. We classified 111 patients into “No ventricular opening” (NVO), “Ventricular opening, small” (VOS; distance < 21 mm) and “Ventricular opening, wide” (VOW; distance > 21 mm) groups. We evaluated the relationship between degree of ventricular opening and prognosis using survival analyses that included other clinicopathological factors. **RESULTS:** Log-rank testing revealed age, KPS, extent of resection, MGMT status, IDH1 mutation, and degree of ventricular opening correlated significantly with overall survival. Multivariate analysis identified the degree of ventricular opening (small vs. wide) as the most significant prognostic factor (hazard ratio = 3.674;  $p < 0.0001$ ). **CONCLUSIONS:** We demonstrated that wide opening of the lateral ventricle (LV) contributes to longer survival compared with small opening among GBM patients. Our results indicate that wide opening of the LV may correlate with the removal of a larger proportion of tumor stem cells from the SVZ.

#### STMO-10

##### SURGICAL RESECTION FOR PRIMARY MOTOR CORTEX GLIOMA, TWO CASE REPORTS

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