METHOD: With reference to clinical trials of high evidence level and public database registration, we researched trials, arms, and designs for each of 3 genotypes, oligodendroglioma (OD), astrocytoma IDH mutant and IDH wild (A-IDHm, A-IDHw). RESULTS: The standard arm common to all genotypes is follow-up (EORTC22845) for G2 low-risk, and chemoradiotherapy (CRT) for G3. Standard arm for G2 high risk, depending on a genotype, is follow-up (EORTC22845), radiation alone (A-IDHm and IDHw, A-IDHw: RTOG9802 subanalysis), or PCV chemoradiotherapy (OD and A-IDHm: 9802). Furthermore, the standard arm and the test arm were replaced by the matrix-like method on each genotype. Results in the G2/3-targeted trial, there was no standard arm all in the three genotypes. In addition, there were a design of master protocols for many genotype and a design that has arms of randomization and observation. CONCLUSION: Applying the master protocol, the possibility of novel G2/3 target trial in which the arms existing in MATRIX form was suggested. With the improvement of the genetic analysis infrastructure, prospective observational research and a well-designed intervention research plan for each genotype are required

## PEDIATRIC CLINICAL TRIALS/THERAPEUTIC STUDIES (PEDT)

### PEDT-02

**CLINICAL USAGE OF NCC ONCOPANEL/FOUNDATIONONE CDX FOR PEDIATRIC/AYA PATIENTS WITH RECURRENT MALIGNANT BRAIN TUMORS**

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BACKGROUNDS: Analyses of somatic mutations in malignant brain tumors have been used to make effective treatment strategies. NCC Oncopanel and FoundationOne CDx are custom targeted next-generation sequencing (NGS) panels. The cost for this analysis is 560,000 yen covered by National Health Insurance in Japan since June 2019. These methods can be applied for the solid cancers with no established therapies and relapsed after the standard therapies. Following these inclusion criteria, most malignant brain tumors, especially recurrent malignant brain tumors in pediatric/AYA generations, can be included. OBJECT: To report the results of our initial experiences. METHODS: In the last one year, we utilized these NGS panels for five patients with recurrent malignant brain tumors in this generations: 2 epithelioid glioblastomas; 1 anaplastic meningioma; 1 diffuse astrocytoma (gliomatosis cerebri); 1 atypical choroid plexus papilloma. RESULTS: Final recommended treatments are as follows: BRAF/MEK inhibitors, bevacizumab, or anti-PD-1 antibody for one epithelioid glioblastoma; MEK inhibitor for another epithelioid glioblastoma previously treated by BRAF inhibitor and bevacizumab; ERK1/2 inhibitors for anaplastic meningioma. The diffuse astrocytoma had IDHR132H mutation. There was no clinical trial using IDH inhibitor for recurrent diffuse astrocytoma; thus, the final recommendation for this case was rechallenge of temozolomide. To date, only one NGS for a choroid plexus papilloma has been reported (Arch Pathol Lab Med, 2017). Our case had multiple actionable gene alterations, including TERT mutation and amplification of various genes. Unfortunately, there was no druggable gene alteration among them. CONCLUSIONS: Insurance-covered cancer gene panel tests could represent effective treatment options for some malignant brain tumors in pediatric/AYA generations. If the relapse is local and can be treated by repeat resections, we think the surgery is the first-line choice. But, in another situation, information from NGS panels should be obtained positively. Efforts to increase the utility of off-label use of drugs are encouraged.

### PEDT-03

**A CLINICAL TRIAL OF DENDRITIC CELL-BASED IMMUNOTHERAPY FOR REFRACTORY BRAIN TUMORS IN CHILDREN**

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BACKGROUND/OBJECTIVES: Relapse or refractory brain tumor in childhood continue to have a dismal prognosis in spite of developing multidisciplinary treatment. Cancer immunotherapy is newly expected as next promising treatment for highly aggressive pediatric cancer. This trial was designed to evaluate the safety and clinical responses to an immunotherapy with fusions of dendritic cells (DCs) and tumor cells in patients with malignant brain tumors. DESIGN/METHODS: Patients with histopathologically confirmed high-grade or recurrent brain tumor were eligible for our immunotherapy. Autologous cultured tumor cells obtained from surgical specimens were fused with autologous DCs using polyethylene glycol. The fusion cells (FC) were inoculated intradermally in the cervical region and repeated 3–10 times in each 28–84 days cycle. Toxicity, progression-free survival (PFS), and overall survival (OS) of this trial were evaluated. RESULTS: Six patients were enrolled, three with high grade glioma and three with ependymoma. Median age at first course of immunotherapy was 10 years (range 8–25 years) and median time of follow-up from first course of immunotherapy was 13.5 months (range 3–33 months). All patients with immunotherapy were well tolerated and no adverse event without local erythema in injected site. Median progression free survival and overall survival were 18 months and 18.5 months, respectively. CONCLUSIONS: FC immunotherapy with autologous DCs and tumor cells for brain tumor in children and young adults were extremely well tolerated and encouraging. Further phase II study of FC immunotherapy is planned to improve prognosis and overcome treatment related neurological sequelae for highly malignant tumors.

## SURGICAL/INTRAOPERATIVE THERAPY/ MONITORING (STMO)

### STMO-01

**CEREBRAL EDEMA AND PERIOPERATIVE EPILEPSY DUE TO PLACEMENT OF BCNU WAFER FOR MALIGNANT GLIOMA**

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INTRODUCTION: Cerebral edema is the most frequent adverse event of BCNU wafer, which is used as local chemotherapy of malignant glioma. However, predictive factor of this event is unknown. Moreover, there is no consensus about cerebral edema and perioperative seizure, which is often observed in glioma. Here, we report risk factor of cerebral edema with BCNU placement and relationship with perioperative seizure in malignant glioma cases.

MATERIAL AND METHOD: Thirty-one case of adult malignant glioma who underwent BCNU placement in our institute between March 2013 to March 2019 were investigated. The patients were dichotomized to two groups; patient with postoperative transient cerebral edema (CE+ group) and patient without postoperative transient cerebral edema (CE- group).

RESULT: Postoperative cerebral edema associated with placement of BCNU was observed in 9 out of 31 patients (29%). Tumor malignancy was significant parameter for postoperative cerebral edema (p=0.003). Other factors such as, age, gender, laterality, tumor location, primary or recurrent, number of BCNU wafers, duration of recurrence were not significant for postoperative cerebral edema. Seizure was seen in 14 patients (45%), and cerebral edema was not significant parameter for seizure. Tumor malignancy was significant parameters for postoperative cerebral edema. Tumor malignancy was significant parameters for seizure (p=0.0004). Although postoperative seizure was observed in 4 patients (44%) with CE+ group, neither maximum volume (mean 61.1 ml) nor change ratio (mean 354%) of FLAIR-high-intensity region were not related with postoperative seizure.

CONCLUSIONS: Tumor malignancy was important factor for patients who underwent placement of BCNU wafer with postoperative cerebral edema and seizure. On the other hand, there were no relationship between postoperative cerebral edema and perioperative seizure in patients treated with BCNU wafer.

### STMO-02

**EFFICACY OF PREOPERATIVE EMBOLIZATION FOR HEMANGIOBLASTOMA**

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INTRODUCTION: Preoperative transarterial embolization (TAE) for hemangioblastoma carries a risk of cerebral infarction and hemorrhagic complications, and its safety and efficacy are controversial.

METHOD: Twenty-two cases of hemangioblastoma (cerebellar: 18 cases, medulla oblongata: 3 cases, spinal cord: 1 case) treated via direct surgery in our hospital from 2007 to 2020 were enrolled.

RESULTS: Preoperative TAE was performed in 6 cases of cerebellar hemangioblastoma (1 bilateral case) and 1 case of spinal hemangioblastoma. The cerebellar hemangioblastoma feeders were only superior cerebellar artery (SCA) in 3 cases, SCA/anterior inferior cerebellar artery (AICA)/posterior inferior cerebellar artery (PICA) in 2 cases, AICA/PICA in 1 case, and single drainer in 5 cases. Tumors were ≥30 mm in all cases (25 mm on 1 side in bilateral cases), and solid or nodular lesions were located on the upper surface of the cerebellum. Cerebellar edema was severe in five cases with