

specificity of 75% each (cut-off value = 1.6) ( $p = 0.0226$ ,  $AUC = 0.76172$ ). Conversely, the T/N ratio had no association with IDH mutation ( $p = 0.6$ ). The ROC curve revealed no reliable prediction of IDH mutation using the T/N ratio ( $p = 0.606$ ,  $AUC = 0.60577$ ). **CONCLUSION:**  $^{11}\text{C}$ -methionine PET parameters can predict MGMT promoter methylation but not IDH mutation status.  $^{11}\text{C}$ -methionine uptake may have limited potential to reflect DNA methylation processes in grade II and III gliomas.

## NI-03

#### USEFULNESS OF IMP-SPECT IN PREOPERATIVE GRADE EVALUATION OF INTRAORBITAL TUMOR.

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**INTRODUCTION:** The frequency of intraorbital tumors is small as 0.9% of all brain tumors, but its pathological type is diverse. Among them, the diagnosis of whether particularly malignant tumor scan clinically, is extremely important. Nuclear medical testing is essential for non-invasive differential diagnosis in brain tumors. SPECT, good malignancy differentiation, evaluation of malignancy, usefulness such as differentiation of non-tumorous lesions have been reported many. However, there are few reports that SPECT was useful in preoperative differential diagnosis of orbital tumors. Since  $^{123}\text{I}$ IMP-SPECT was useful in preoperative differential diagnosis of intraorbital tumors, we report some literature considerations. **METHOD:** Among the 27 cases of intraorbital tumors that were operated on in our clinic between August 2005 and August 2016, 14 cases of SPECT prior to surgery were examined for the usefulness of preoperative differential diagnosis. Breakdown of cases, as the malignant tumor, two cases of malignant lymphoma, MALT lymphoma 2 cases, adenoid cystic carcinoma 1 case, in one case plasma cytoma, as a benign tumor, false tumors 4 cases, three hemangioma cases, neurocytoma 1 case it was. **RESULTS:** In IMP early image, accumulation of clear IMP was observed in all six cases of malignant tumors. In benign tumors, there is no accumulation in hemangioma and neurosheath, there is a strong accumulation in one of the four cases in false tumors, it was observed mild accumulation in the remaining two cases. Tumor to normal ratio of IMP early image was an average of 2.39 in six malignant tumors and 1.52 in 8 benign tumors. **CONCLUSION:** This time, we examined the usefulness of  $^{123}\text{I}$ IMP-SPECT in preoperative differential diagnosis of intraorbital tumors. The T/N ratio of intraorbital malignant tumors is higher than benign tumors, and it was thought to help to evaluate preoperative malignancy of intraorbital tumors.

## NI-04

#### WHICH RADIOLOGICAL IMAGING IS BEST TO DISCRIMINATE RADIATION NECROSIS FROM TUMOR PROGRESSION? - SUBANALYSIS OF SYSTEMATIC REVIEW FOR RADIOLOGICAL DIAGNOSIS OF RADIATION NECROSIS -

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**BACKGROUND:** It is challenging to discriminate radiation necrosis from tumor progression, especially in malignant glioma. Therefore many radiological imaging studies have been reported. In this study, we performed a systematic review of radiological diagnosis for radiation necrosis and analyzed the best radiological imaging for malignant glioma. **METHODS:** We divided diagnostic approaches into two categories as follows-CT and MRI (conventional radiological imaging studies), and SPECT and PET (nuclear medicine studies). Our librarians conducted a comprehensive systematic search on Pub Med, Cochrane Library, and the Japan Medical Abstract Society up to March 2015. The searching keywords included radiation necrosis, recurrence, imaging modalities such as MRI, diagnosis, and differential. In a meta-analysis, diagnostic odds ratio (DOR) was calculated. A subanalysis was performed, dividing into tumor types, gliomas and metastatic brain tumors. **RESULTS:** Of 188 and 239 records extracted from the database, 20 and 26 studies were included in the meta-analysis after exclusion of case reports and studies with incompatible content and insufficient information. Gd-enhanced MRI exhibited the lowest sensitivity (63%) and DOR (2.2). On the other hand, combined multiple imaging studies including MRS and perfusion image displayed the highest sensitivity (96%) and DOR (5.9). In the subanalysis for glioma, Gd-enhanced MRI and  $^{18}\text{F}$ -FDG-PET revealed low DORs (1.7 and 2.3). Conversely,  $^{18}\text{F}$ -FET-PET and combined multiple imaging studies showed high DORs (6.8 and 5.9). **CONCLUSIONS:** Gd-enhanced MRI had low diagnostic ability for differentiation of radiation necrosis. In glioma patients,  $^{18}\text{F}$ -FDG-PET was not useful to discriminate radiation necrosis

from tumor progression. Combined multiparametric imaging including lesional metabolism and blood flow could enhance diagnostic accuracy and be useful to differentiate radiation necrosis from tumor progression even in glioma patients.

## NI-05

#### CLINICOPATHOLOGICAL ANALYSIS AND METHIONINE PET ANALYSIS IN PATIENTS WITH GLIOMATOSIS CEREBRI

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**OBJECTIVE:** Gliomatosis cerebri (GC) was defined as the tumor infiltrating into more than three lobes in WHO2007, but was deleted in WHO2016 because they include genetically heterogeneous tissues. However, we often encounter the cases with strongly invasive glioma. Then, we clinically analyzed the cases of GC. **PATIENTS AND METHODS:** Seven cases (five men, median age: 57 years (23-89y)) diagnosed as GC in our hospital were included. Data of methionine-positron emission tomography (Met-PET), IDH and p53 mutation, MIB1-labeling index (LI) by immunohistochemistry were searched. We compared the accumulation areas of the Met-PET with the hyperintensity area (T2/FLAIR-high) and gadolinium-enhanced area on the MRI. We also examined a biopsy method, sites and a treatment regimen and analyzed overall survival (OS) and progression-free survival (PFS). **RESULTS:** The primary symptoms were disorientation in five, epileptic seizure and abnormal vision were two, respectively. The largest lesion area with the image was T2/FLAIR-high, followed by Met-PET and Gd in all. The surgical methods were stereotactic biopsy (2), navigation-guided biopsy (2), endoscopic biopsy (1), and craniotomy (2). The average of tumor/normal ratio in Met-PET was 2.92 (1.97-5.0). The pathological grade was diagnosed as Grade III in 4 and Grade II in 3. IDH1R132H was negative in all, p53 was positive in 5, and an average of MIB-1LI was 12% (2-35). The radiotherapy was performed in 6 cases, and, temozolomide was given to all, and bevacizumab was in 3. Six patients died of a tumor. Median PFS and OS were 8mos and 16.5mos, respectively. **CONCLUSION:** Because the GC cannot expect improvement by surgery, it is necessary to obtain the pathological diagnosis by a quick and correct biopsy, and the neurologic deterioration by the biopsy technique should be avoided. The Met-PET suggesting the highest grade site was useful for the plan of the biopsy site.

## NI-06

#### MOLECULAR DIAGNOSIS, $^{11}\text{C}$ -METHIONINE UPTAKE AND PROGNOSIS IN GRADE 2 AND 3 GLIOMAS

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**OBJECT:** The revised 2016 WHO Classification of Tumours of the Central Nervous System incorporates genetic alterations into the classification system, with the goal of creating more homogenous disease categories with greater prognostic value. In this study, we reclassified 103 consecutive lower grade gliomas using the revised 2016 WHO classification and examined for  $^{11}\text{C}$ -methionine uptake and prognosis. **METHODS:** 103 consecutive lower grade glioma patients (Grade 2 in 41 patients, Grade 3 in 62 patients) treated at Tokyo Medical and Dental University Hospital from 2000 to 2018 were included in this study. The IDH1/2, ATRX and 1p19q status were analyzed using tumor samples. The tumor-to-normal ratio (T/N) of  $^{11}\text{C}$ -methionine uptake was calculated by dividing the maximum standardized uptake value (SUV) for the tumor by the mean SUV of the normal brain. **RESULT:** In the integrated diagnosis, 11 astrocytomas and 17 anaplastic astrocytomas were diagnosed as "IDH-mutant", while 14 astrocytomas and 29 anaplastic astrocytomas were diagnosed as "IDH-wild". In the 32 oligodendroglial tumors, 12 oligodendrogliomas and 9 anaplastic oligodendrogliomas were diagnosed as "IDH-mutant and 1p/19q-codeleted". The concordance rate with 1p19q co-deletion and ATRX retention was 94.7%. The median T/N ratios in oligodendroglial tumors with "IDH-mutant and 1p/19q-codeleted" were 1.83 in Grade 2 and 2.83 in grade 3, which were significantly higher than those in astrocytic tumors with "IDH-mutant" (G2: 1.38, G3:1.62). Kaplan-Meier survival analysis revealed that oligodendroglial tumors with "IDH-mutant and 1p/19q-codeleted" had significantly better outcomes regardless of WHO grade. Overall survival was 90.9% at 5 years and 77.9% at 10 years in oligodendroglial tumors with "IDH-mutant and 1p/19q-codeleted". **CONCLUSIONS:** The results indicated that lower grade glioma categories reclassified with molecular classification correlate with the T/N ratio of methionine and the prognosis.