modulus. Magnetic resonance elastography (MRE) is an epoch-making method capable of non-invasively imaging the elasticity of internal organs. We have examined the elasticity of meningiomas and pituitary adenomas and reported their usefulness. This time, we measured the glioma elasticity and verified usefulness of MRE.

METHOD: Twenty-four gliomas (mean age 51.8±15.7 years, male: female = 17: 7) who underwent tumor resection after MRE imaging from July 2017 to May 2020 were targeted. The average elasticity was measured as an evaluation of tumor elastic modulus by MRE. Gliomas were divided into a low-grade glioma group (LGG: Grade 1, 2) and a high-grade glioma group (HGG: Grade 3, 4). Then, a comparative statistical study was conducted.

RESULTS: The average values of the average elasticity of LGG group (9 cases) and HGG group (15 cases) were 1.8±0.8 kPa and 2.5±0.8 kPa, respectively. The average elasticity was significantly higher in the HGG group (p=0.023). In the ROC analysis, the cutoff value was 2.1 kPa (sensitivity 70%, specificity 70%). Therefore, it was suggested that the tumor is likely to be HGG when the average elasticity is 2.1 kPa or more.

DISCUSSION: The glioma elasticity by preoperative MRE was significantly higher in the HGG group. Based on actual surgical experience, the tumor seems to be hard in the HGG group, and it was judged to be consistent with this our MRE research. The preoperative evaluation of glioma elasticity by MRE was considered useful, and it might help in planning a surgical strategy considering malignant grade.

NI-04

EVALUATION OF POST BORON NEUTRON CAPTURE THERAPY FOR RECURRENT MENINGIOMA USING FLUORIDE-LABELED BORONOPHENYLALANINE PET

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We have applied boron neutron capture therapy (BNCT) for 46 recurrent high grade meningiomas (HGM). Twelve cases among them, fluoride-labeled boronophenylalanine positron emission tomography (18F-BPA-PET) were utilized before and after BNCT to evaluate the tumor activity. The lesion to normal brain (L/N) ratios of 14 lesions of these 11 cases were investigated. In all cases L/N ratio decreased after BNCT. The L/N ratio of recurrent (HGM) was 3.2±1.5 (mean±SD) before BNCT and 2.1±0.6 after that. In contrast enhanced MRI, 13 out of 14 lesions shrank or unchanged at least 3 months after BNCT, while one lesion transiently increased and then decreased within 3 months, showing pseudoprogression. In addition, 6 of 12 lesions which could be followed on MRI for more than 3 months progressed after 8 months. 4 of them were performed PET at the time of progressing. The L/N ratio of 2 progressing lesion which were diagnosed as recurrence due to continuously increasing were showed increasing. The L/N ratio of the other 2 lesions which were diagnosed radiation necrosis due to unchanged or shrinkage showed decreasing. Moreover, some systemic metastasis detected in PET image. F-BPA-PET seems to be useful for the evaluation of tumor activity.

NI-08

UTILITY OF MULTIPLE POSITRON EMISSION TOMOGRAPHY TRACERS IN THE DIAGNOSIS OF BRAIN TUMORS ACCORDING TO THE 2016 WORLD HEALTH ORGANIZATION CLASSIFICATION

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OBJECTIVE: Magnetic resonance imaging alone is not sufficient for the diagnosis and therapy outcomes in brain tumors. We herein examined the utility of positron emission tomography (PET) studies for diagnosis in brain tumors. METHODS: Between April 2009 and June 2020, 320 patients with central nervous diseases, including 140, 65, 52, 52, and 11 patients with glioma, metastatic brain tumor, malignant lymphoma, meningioma, and demyelinating disease, respectively, underwent PET studies (FDG, MET, FLT, and FMISO) in our department. Lesion/normal (L/N) ratios for FDG, MET, and FLT and lesion/blood ratio (L/B ratio) for FMISO were compared. The glioma subtypes were compared based on the 2016 World Health Organization classification (IDH-mut, Codel, IDH-wt, GBM), and metastatic brain tumors, malignant lymphomas, meningiomas, and demyelinating diseases were compared with GBM. RESULTS: In glioma, the cutoff MET L/N ratios to distinguish between IDH-mut and Codel, IDH-mut and GBM, Codel and GBM, and IDH-wt and GBM were 3.61, 4.42, 4.92, and 4.33, respectively, and the cutoff FLT L/N ratios to distinguish between IDH-mut and IDH-wt, IDH-mut and GBM, Codel and GBM, and IDH-wt and GBM were 3.43, 6.46, 3.39, and 7.56, respectively. The cutoff FDG and MET L/N ratios between metastatic brain tumors and GBM were 2.27 and 4.89; the cutoff FDG L/N and FMISO L/B ratios between malignant lymphoma and GBM were 4.68 and 2.13; and the cutoff FDG and MET L/N ratios between meningioma and GBM were 1.58 and 4.36. Demyelinating disease and GBM were distinguishable by FDG, MET, and FLT L/N ratios of 2.29, 3.32, and 5.85, and FMISO L/B ratio of 1.68. CONCLUSION: Four PET tracers were required to differentiate glioma subtypes. FDG and MET are useful for distinguishing GBM from metastatic brain tumor, malignant lymphoma, and meningioma, whereas accumulation was lower for all four PET tracers in demyelinating diseases than in GBM.

NI-09

AMIDE PROTON TRANSFER (APT) IMAGE IS USEFUL FOR DIAGNOSTIC IMAGING OF GLIOMA

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INTRODUCTION: APT image(APT),which images the concentration of amide groups that increases in tumors, is expected to be applied clinically in diagnostic imaging of glioma. PURPOSE: APT was compared with MET-PET based on the pathological diagnosis results, and it was retrospectively verified that APT was useful for diagnostic imaging of glioma. METHODS: A total of 46cases with glioma (WHO 2016 Grade: GII/III/IV) and Pseudoprogression were included. APT measured the APT measurement value by placing the region of interest in the tumor part. MET-PET was administered with 370MBq and the accumulation ratio(TNR) between the tumor part and the normal part was measured. RESULTS: The APT measurement value in all cases was 2.22±1.01 and the TNR was 2.58±1.50,and a correlation was observed between the APT measurement value and the TNR($r=0.6$, $p<0.001$).When the accuracy of discrimination between GII/III/IV (32cases) and Pseudoprogression(14cases) by APT measurement was verified, the sensitivity was 91% and the specificity was 100% at the threshold of 1.81. In the verification of malignancy diagnosis, the measured APT value of GII (6cases) was 2.18±0.43,the measured APT value of GIII (11cases) was 2.67±0.69,and the measured APT value of GIV (15cases) was 2.99±0.61.The measured value showed a significant difference. The measured APT value in the oligodendroglioma group (GII/III:10cases) was 2.37±0.66,the TNR was 3.52±1.41,and the measured APT value in the astrocytoma group (GII/III: 7cases)Was 2.67±0.45 and TNR was 2.41±0.87.In the oligodendroglioma group, the measured APT value was lower and the TNR was higher than in the astrocytoma group. CONCLUSION: It was suggested that APT may have the same diagnostic ability as MET-PET in diagnosing malignant tumors and distinguishing between recurrence and Pseudoprogression. Patients with an actual APT of 1.81 or higher should consider treatment strategies, and follow-up may be an option for patients with an APT of <1.81.APT,which is not affected by the blood-brain barrier, has little variation in measured values and is considered to be useful for diagnostic imaging of glioma.

NI-10

T2/FLAIR MISMATCH SIGN AND METHIONINE PET UPTAKE IN GRADE II AND III GLIOMAS

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BACKGROUND: Recent study suggests that "T2/FLAIR mismatch" sign is specific MRI finding for isocitrate dehydrogenase mutated (*IDH*-mut) 1p19q non-codeleted gliomas (Grade II and III astrocytic tumors). T2/FLAIR mismatch sign may be useful for predicting the histological type of glioma before surgery. However, it is not known what this finding reflects. Therefore, we examined the correlation between T2/FLAIR mismatch sign and uptake of methionine with positron emission tomography (MET-PET), and molecular classification of glioma.

METHODS: 74 glioma patients (grade II: 30 cases, grade III: 44 cases) with preoperative MRI and MET-PET who underwent surgical resection during 2000–2019 were included in this study. MR scans were evaluated by 3 independent reviewers to assess presence/absence of T2/FLAIR mismatch sign. The tumor-to-normal (T/N) ratio of methionine uptake was calculated by dividing the maximum standardized uptake value (SUV) for the tumor by the mean SUV of the normal brain. We examined the relationship between *IDH* mutation, 1p/19q codeletion, mismatch, and T/N ratio of MET-PET.

RESULTS: Out of the 74 cases, astrocytic tumors (A group: *IDH*-mutant, 1p19q non-codeleted) were 21 (28%), oligodendroglial tumors (O group: *IDH*-mutant, 1p19q codeleted) were 19 (26%), and *IDH* wild tumors (W group) were 34 (46%). The T2/FLAIR mismatch sign was present in 16 cases (22%). The T/N ratio of MET-PET in the tumor with T2/FLAIR mismatch sign was 1.56, which was significantly lower than that in the tumor without mismatch sign (2.01, p=0.016). T2/FLAIR mismatch sign was found in 7 (33%)