cases in the A group, 0 (0%) case in the O group and 9 (26%) cases in the W group, and the positive rate was significantly higher in the A group (p=0.013).

CONCLUSIONS: "T2/FLAIR mismatch" sign was a specific finding for astrocytic tumor, and the cases with positive "T2/FLAIR mismatch" sign had significantly lower MET-PET uptake than that with negative cases.

NI-11

CLINICAL SIGNIFICANCE OF INTRACYSTIC DIFFUSION HYPERINTENSITY LESIONS REMAINING AFTER TREATMENT OF INTRACRANIAL GERM CELL TUMOR

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BACKGROUND AND PURPOSE: About 30% of intracranial germ cell tumors are mixed germ cell tumors and teratomas are often found as those components. Intense chemoradiotherapy is performed according to the malignancy of the histopathology, but high-intensity lesion inside the cystic tumor on diffusion weighted imaging (DWI) sometimes remains after completion of the chemoradiotherapy. In this study, we examined the clinical significance of the DWI high-intensity lesion remaining in the cyst. METHODS: Five patients after initial chemoradiotherapy were resected residual tumor by craniotomy at our hospital from 2009 to 2019. Preoperative gadolinium-enhanced MRI defined the non-contrast-enhanced part of the tumor as intracystic, and DWI intensity was classified by its look as low-intensity, equal-intensity, and high-intensity compared to the cortex of the same slice. DWI signals in the solid area, cyst wall, and cyst were evaluated. RESULTS: All cases were mature teratoma in histopathology, and no other tumor components were observed. On DWI, the cyst wall and solid part were visualized with low signal. High-intensity lesions and equal-intensity lesions in the cyst cavity were found in 3 and 1 cases, respectively. In these cases, pathological findings revealed a keratin-like substance in the cyst. DISCUSSION: The intracystic high and equal intensity lesions on DWI removed after completion of chemoradiotherapy are considered to reflect the keratin-like component of mature teratoma. If DWI- high intensity and equal intensity lesions remain in the cyst of the tumor after the completion of chemoradiotherapy, tumor shrinkage cannot be expected even if the chemotherapy is strengthened. In such cases, we should consider to removing them by surgery. CONCLUSION: When DWI high and equal intensity lesions are found in the cysts of tumors remaining after chemoradiotherapy for intracranial germ tumors, it is possible that mature teratoma remains.

NI-13

THE EFFECTIVENESS AND LIMITATION OF SURVIVAL PREDICTION IN PRIMARY GLIOBLASTOMA USING MACHINE LEARNING-BASED TEXTURE ANALYSIS

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INTRODUCTION: Clinical application of survival prediction of primary glioblastoma (pGBM) using preoperative images remains challenging due to a lack of robustness and standardization of the method. This research focused on validating a machine learning-based texture analysis model for this purpose using internal and external cohorts. METHOD: We included all cases of IDH wild-type pGBM available of preoperative MRI (T1WI, T2WI, and Gd-T1WI) from the databases of Kansai Molecular Diagnosis Network for CNS tumors (KN) and The Cancer Genome Atlas (TCGA). Of 242 cases from KN, we assigned 137 cases as a training dataset (D1), and the remaining 105 cases as an internal validation dataset (D2). Furthermore, we extracted 96 cases from TCGA as an external validation dataset (D3). Preoperative MRI scans were semi-quantitatively analyzed, leading to the acquisition of 489 texture features as explanatory variables. Dichotomous overall survival (OS) with a 16.6 months cutoff was regarded as the response variable (short/long OS). We employed Lasso regression for feature selection, and a survival prediction model constructed for D1 via cross-validation (M1) was applied to D2 and D3 to ensure the model robustness. RESULTS: The population of predicted short OS by M1 significantly showed poorer prognosis in D2 (median OS 11.1 vs. 19.4 months; log-rank test, p=0.03), while there was no significant difference in D3 (median OS 14.2 vs. 11.9 months; p=0.61). In the comparative analysis using t-SNE, there was little variation in the feature distribution among three datasets. CONCLUSION: We were able to validate the prediction model in the internal but not in the external cohort. The presented result supports the use of machine learning-based texture analysis for survival prediction of pGBM in a localized population or country. However, further consideration is required to achieve a universal prediction model for pGBM, irrespective of regional difference.

NI-17

EVALUATION OF PREOPERATIVE APPARENT DIFFUSION COEFFICIENT (ADC) OF PERITUMORAL FLAIR HIGH LESION AND HISTOPATHOLOGICAL FEATURES IN PATIENTS WITH GLIOBLASTOMA

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OBJECTIVE: In removal of the glioblastoma, maximum and safe removal is desired for recurrence prevention with functional preservation. In recent years, the setting of the removal range has also been studied not only the contrast enhanced lesions, but also the surrounding FLAIR high signal lesion. We are studying the prediction of the site that is likely to occur recurrence in the FLAIR high signal lesion of glioblastoma, and we are focusing on the ADC of pre-operative MRI as an index. The purpose of this study is to evaluate the ADC and the actual pathological tissue image in the FAIR high signal lesion around the contrast enhanced lesion of glioblastoma. METHOD: We examined the case of removal of the glioblastoma treated in our department. Analysis was performed using a pathological tissue specimen of excised tumors and their surrounding tissues in each case, and the ADC value of pre-operative MRI. Pathological tissue image and ADC values of FAIR high signal lesion were compared. RESULTS: 19 tissue samples which were taken from the FLAIR high signal lesion around the contrast enhanced tumor from 10 cases. For a total of 19 locations, it was compared with the histopathological features of the site. As a result, in the low part of the ADC value in the preoperative MRI relatively had high cell density of atypical cells, it was often exhibited findings that infiltration of tumor cells is suspected. CONCLUSION: In general, ADC is said to suggest an increase in cell density and thus infiltration of tumor cells. However, the same findings were obtained in the pre-operative MRI examined this time. Since ADC also suggests cell density and tumor infiltration in pre-operative MRI, ADC of pre-operative MRI was considered useful for examination of the removal range and radiation therapy planning in surgery for glioblastoma.

NI-19

USE OF ^{11}C-METHIONINE PET FOR DECISION OF DISCONTINUATION OF ADJUVANT CHEMOTHERAPY WITH TEMOZOLOMIDE

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BACKGROUND: The aim was to clarify whether positron emission tomography with ^{11}C-methyl-L-methionine (met-PET) is useful to decide on discontinuation of TMZ-adjuvant therapy in patients with residual diffuse astrocytic tumor. METHODS: Subjects were 44 patients with residual tumor comprising 17 with IDH1-mutant diffuse astrocytoma (DA), 13 with IDH1-mutant anaplastic astrocytoma (AA), and 14 with IDH1-wild glioblastoma (GB). All patients received TMZ-adjuvant chemotherapy (median, 12 courses), and whether to discontinue or continue TMZ-adjuvant chemotherapy was decided on the basis of the tumor-to-normal ratio in standardized uptake value from met-PET (T/N); patients with T/N < 1.6 immediately discontinued TMZ, and patients with T/N > 1.6 were either to continued or discontinued TMZ. Progression-free survival (PFS) was compared between patients with T/N > 1.6 and T/N < 1.6 in each tumor type. Median observation period was 434 days after met-PET scanning. RESULTS: The number of patient who underwent recurrence was 10 in DA, 7 in AA, and 11 in GB. All patients showing T/N > 1.6 underwent tumor recurrence. PFS was significantly longer in patients with T/N < 1.6 than T/N > 1.6 in DA and AA ($p < 0.01$ in both types), but was no significant difference between 2 groups in GB ($p = 0.06$). Sixteen of 17 patients (94%) in DA and AA showed recurrence from residual tumor, whereas 4 of 11 patients (36%) in GB showed recurrent tumor at remote regions which were different from residual tumor. CONCLUSIONS: The present study suggested that met-PET is beneficial to decide to discontinue adjuvant chemotherapy with TMZ in patients with residual tumors of DA and AA, but not useful for patients with GB. Reasons for unsuccessful results in GB might have been small sample size, failure of establishing the cut off value in T/N, recurrences at remote regions where not be assessed by met-PET.

NEURO-COGNITIVE FUNCTION/QOL/PATIENT CARE/PALLIATIVE CARE (NQPC)

NQPC-02

LONG-TERM SURVIVAL IN PATIENTS WITH PRIMARY INTRACRANIAL GERM CELL TUMORS TREATED WITH SURGERY, PLATINUM-BASED CHEMOTHERAPY, AND RADIOTHERAPY: A SINGLE-INSTITUTION STUDY

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PURPOSE: In the present study, we performed a retrospective review of patients receiving carboplatin based chemotherapy followed by radiotherapy for newly diagnosed primary intracranial germ cell tumors. In order to identify an optimal germ cell tumor treatment strategy, we evaluated treatment outcomes and toxicity and compliance.

METHODOLOGY: This study included 110 consecutive patients with newly diagnosed primary intracranial germ cell tumors. The drug doses and administration schedule of carboplatin-etoposide (CARB-VP) were as follows: carboplatin (300 mg/m2 daily for 1 days), and etoposide (100 mg/m2 on days 1 to 3). Ifosfamide-carboplatin-etoposide (ICE) treatment comprised ifosfamide (1500 mg/m2 daily for 3 days), carboplatin (300 mg/m2 daily for 1 days), and etoposide (100 mg/m2 daily for 3 days). Patients with germinomatous germ cell tumors (pure germinoma or germinoma with STGC) basically receive three cycles of CARB-VP and a total dose of 30Gy whole ventricular radiotherapy. We delivered combination therapy consisting of combined ICE chemotherapy and craniospinal irradiation followed by the complete resection of the residual tumor for nongerminomatous malignant germ cell tumors.

RESULTS: The median follow-up time was 11.0 years (range, 0.5–37.8 years). The 5-year total survival rates of germinomatous and nongerminomatous germ cell tumors were 97.2% and 66.7%, respectively. The 10-year and 20-year total survival rates of germinomatous germ cell tumors were 95.7% and 90.0%, respectively. Adverse events related to carboplatin based chemotherapy are not detected. Furthermore, no treatment-related deaths were observed.

CONCLUSIONS: Our treatment with surgery, carboplatin based chemotherapy followed by radiotherapy is effective in treating primary intracranial germ cell tumors, especially in germinomatous group.

NQPC-08

SHORT-TIME INTENSIVE REHABILITATION FOR PATIENTS WITH NEWLY DIAGNOSED GLIOBLASTOMA

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PURPOSE: Many reports presented that patients with GBM had stable HRQoL during their remission time. However, there are few reports on the situation of ADL that is the basis of QOL. This prospective study was designed to evaluate the effectiveness of intensive rehabilitation for physically disabled patients with GBM after the initial treatment. PATIENTS and METHOD: Sixteen patients with newly-diagnosed glioblastoma presenting with severe physical disabilities were registered after the completion of postsurgical radiation therapy combined with TMZ. All patients were evaluated by means of a core set of clinical scales of Functional Independence Measure (FIM), Sitting Balance score, Standing Balance score, and Minimental State Examination (MMSE). Patients were evaluated before the beginning and at the end of rehabilitation treatment. The daily rehabilitation program consisted of individual 180-min. sessions of treatment, seven days a week, for four to six consecutive weeks. Speech therapy was included when aphasia was diagnosed. RESULTS: Fifteen of 16 patients presented with improved physical functioning score, and seven of 16 patients returned to their independent life at home, CONCLUSION: A short-time intensive rehabilitation (4 to 6seeks) is effective for GBM patients during TMZ withdrawal period after the postoperative radiation therapy. This effective program requires close teamwork with the medical cooperation teams in the medical and rehabilitation hospitals: explanation to patients of the significance of the short-term rehabilitation, which is different from stroke rehabilitation, adjustment of hospitalization date considering radiotherapy and chemotherapy schedule, and adjustment of MRI imaging or bevacizumab administration schedule during rehabilitation.

PCNSL (ML)

ML-01

PATHOLOGICAL CHARACTERISTICS OF PRIMARY CENTRAL NERVOUS SYSTEM LYMPHOMA WITH ATYPICAL RADIOLOGICAL FINDING

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BACKGROUND: If the brain tumor is suspected to be a primary central nervous system lymphoma (PCNSL) on radiological findings, it is general to perform biopsy to obtain the pathological diagnosis. Glioblastomas (GBs) must be distinguished from PCNSLs. In addition to commonly used contrast-enhanced T1-weighted imaging, diffusion-weighted image (DWI), and apparent diffusion coefficient (ADC) value, the following characteristics of PCNSLs were reported to be essential for this purpose: 1) no increase in blood flow on perfusion images obtained by the arterial spin labeling (ASL) method; 2) less microbleeding on T2*-weighted images (T2*). However, we experienced some exceptional cases. PURPOSE: To clarify the histopathological features of PCNSLs those had atypical radiological findings. METHOD: 62 consecutive PCNSL cases (40 males, 22 females, mean age 65.4 years, range 35–84) treated in our department from April 2013 to March 2020 were retrospectively analyzed. We compared the following features between 47 biopsy cases showing typical image findings as PCNSLs (Group A) and 15 surgically resected cases with atypical findings (Group B), 1) number of blood vessels per hyper 10 fields, 2) occupying area of blood vessels per unit area, 3) immunoreactivity of vascular endothelial growth factor (VEGF), and 4) germinal center B-cell (GCB) subtype. RESULTS: In Group A, the number of blood vessels in the tumor was 39.3 on average, and the area occupied by blood vessels was 3.8%. In Group B, the former was 133.2, and the latter was 9.9%. There was no significant difference in VEGF expression and GCB subtype. CONCLUSION: In PCNSLs showing with high blood flow and microbleeds, the blood vessels were rich and partial bleeding was confirmed histologically. We should analyze much more cases to set the threshold both of the ADC value and the absolute value of blood flow calculated by the ASL method to distinguish between PCNSLs and GBs.

ML-02

CHEMOTHERAPY FOR PATIENTS WITH RELAPSED OR REFRACTORY PRIMARY CNS LYMPHOMA

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BACKGROUNDS: Standard of care for patients with primary CNS lymphoma (PCNSL) has been high-dose methotrexate (HD-MTX)-based multiagent immunochemotherapy, particularly with R-MPV-A with or without whole-brain radiotherapy (WBRT), however, the optimal treatment for relapsed/refractory (r/r)PCNSL has not been established yet. Approval of a second-generation BTK inhibitor, tirabrutinib, for r/rPCNSL in Japan in March 2020, prompted us to evaluate retrospectively efficacy of R-MPV-A for r/rPCNSL to compare their activities. PATIENTS: Histologically proven PCNSL patients treated at relapse in our institution from April 2000 to November 2019 were analyzed. Outcomes were compared between those treated with RMPVA or other regimens. RESULTS: Among 148 PCNSL patients identified, 73 had at least one relapse, of whom 47 received salvage chemotherapy including 23 treated with RMPVA, 14 with HD-MTX monotherapy, and 11 with DeVIC (DEX, etoposide, ifosfamide, CDBCA). Median age/KPS were 69 yo (20–87)/ 80 (40–100), 27 patients had received prior WBRT. RMPVA was given at the first relapse in 11 patients, median number of RMPV cycles was 8 (1–4 cycles: 10; 8 cycles 13). CR/CRu were achieved in 19 (83%), response rate was 87%, while there were two PDs (9%). After median follow-up of 21.9 months, the median PFS after salvage RMPVA was 13.0 m (95%CI: 9.1–16.9), 1-year overall survival (OS) was 82%, median OS was 70.0 m (95%CI: 12.9–127.1), which were longer than those in 24 patients with salvage treatment other than RMPVA (mPFS 4.4 m, P=0.054; mOS 13.6 m, P=0.009). Median PFS and OS for HD-MTX monotherapy were 5.1m and 36.6 m, while those for DeVIC were 4.4 m and 9.1 m, respectively. Treatment was generally well-tolerated but there was one treatment-related death. CONCLUSIONS: Salvage RMPVA at relapses was active and associated with longer survival compared with other regimens, necessitating further development of salvage regimens incorporating tirabrutinib in the future studies.

ML-04

THE INFLUENCE OF SURGICAL INTERVENTION FOR HIGH-DOSE METHOTREXATE CHEMOTHERAPY IN THE PATIENTS WITH PRIMARY CENTRAL NERVOUS SYSTEM LYMPHOMA

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OBJECT: Surgical resection is not the standard of treatment for primary central nervous system lymphoma (PCNSL). Some recent studies suggest that resection might be beneficial. The aim of this study was to examine the effect of surgical treatment in terms of the time from surgery to chemotherapy.

METHODS: We retrospectively analyzed all patients with PCNSL treated at Hokkaido University Hospital between 2001 and 2018 to assess the effect of selection for resection on the response of Methotrexate chemotherapy. We identified the days from surgery to chemotherapy, complications, the response of Methotrexate (CR/CRu rate) and prognostic factors including progression free survival (PFS) and overall survival (OS).