and 3 occurred in 11 out of 30 pts (anemia grade 3: 2 pt; anemia grade 2: 4 pts; leucocytopenia grade 3:2 pts; leucocytopenia grade 2: 7 pts; thrombocytopenia grade 2: 4 pts) and required dose reduction of HU in 8 pts, dose reduction of I in 1 patient and G-CSF subcutaniously in 8 pts. No febrile neutropenia, no interruption of the treatment due to toxicity and no treatment related death occurred.
**Conclusion:** The combination of I (600 mg/d) and HU (1000 mg/d) was well tolerated and effective as maintenance treatment in this study. Pts with secondary GBM seem to be more likely to benefit.

**2512** POSTER

**Predicting survival in an unselected glioblastoma multiforme population – use of the RTOG recursive partitioning analysis**

O. McArdle, C. Faul. *St Luke's Hospital, Radiotherapy, Dublin, Ireland*

**Background:** Glioblastoma multiforme (GBM) is associated with median survival of 6−12 months. Curran et al [1] used recursive partitioning analysis to identify patients with significant differences in survival. Scott et al [2] used the technique to re-analyse data from RTOG 83−02 and found that 72 Gy hyperfractionated radiotherapy (HRT) was not superior to database estimates, correctly predicting the negative outcome of RTOG 90−06 illustrating the utility of this technique.
We postulate that recursive partitioning analysis may facilitate patient selection for intensive treatment in a general clinic setting. We designed a retrospective study to investigate whether groups with significant differences in median survival were identified in our unselected clinic population.
**Materials and Methods:** Patients with a histological diagnosis of GBM referred between January 1998 and December 2005 were eligible. Clinical notes, operative notes and radiotherapy prescriptions and plans were analysed. Patients were assigned to an RTOG class and median survival was calculated for each RTOG class. The Kaplan Meier method was used to calculate the median survival. The log rank test was used to examine if the survival times in the different RTOG groups were significantly different.
**Results:** 188 patients were identified. In 12 cases there was insufficient information available to assign an RTOG class. An accurate date of death could not be established for 26 of the patients who were known to have died – these patients were excluded from the survival analysis. Median survival in each RTOG class is listed in table 1. At the time of analysis 6 (3%) patients were alive with a median survival in the range of 21−50 months. Median survival times for the four RTOG classes were significantly different with $p < 0.001$.
**Conclusion:** The classification of patients with malignant glioma according to the RTOG recursive partitioning analysis produces patient subgroups with significantly different median survival figures in a general clinic population. This is the first time the RTOG classes have been validated outside a trial environment. The RTOG recursive partitioning analysis is a useful tool when assessing patients in the clinic for radical treatments.

Table 1. Median survival according to RTOG class

| RTOG class | No. of patients (%) [Total N = 176] | Median survival (mo) |
|---|---|---|
| 3 | 22 (13) | 10.72 |
| 4 | 61 (35) | 8.11 |
| 5 | 48 (27) | 6.72 |
| 6 | 45 (25) | 5.62 |

**References**

[1] Curran et al. J Natl Cancer Inst. 1993 May 5;85(9):704−10.
[2] Scott et al. Int J Radiat Oncol Biol Phys. 1998 Jan 1;40(1):51−5.

**2513** POSTER

**Radiation brain necrosis after stereotactic radiosurgery of the intra-cranial lesion**

M. Takahashi, T. Inomata, Y. Uesugi, T. Tatsumi, T. Shinbo, I. Narabayashi. *Osaka Medical College, Radiology, Takatsuki, Japan*

**Background:** Stereotactic radiosurgery (SRS) has become an important therapeutic approach for the treatment of not only malignant brain tumors but also benign tumors or other intracranial diseases such as arteriovenous malformation (AVM). Because this treatment allows a dose increase in the target volume and a reduction of normal tissue exposure, it can improve patient quality of life and control disease. However, high radiation doses bear an increased risk of radiation brain necrosis as late sequelae.
We analyzed the characteristics of cases of radiation necrosis as late sequelae after SRS in our institute and clarified the risk factors of radiation necrosis.
**Methods:** We treated 360 cases of intracranial disease by SRS between December 1998 and March 2007 in our institute. We regarded as radiation brain necrosis if the patient had some radiological abnormal findings around the irradiated field, and deteriorated some neurological complaints required medical care at three months or more after SRS. Cases of local recurrence, defined as increasing the lesions consecutively, were left out of this study. Using the above criteria, 18 patients were classified as having radiation brain necrosis, and we analyzed the backgrounds, methods of irradiation, and characteristics of these patients, retrospectively.
**Results:** The rate of radiation injury after SRS was 5.1% (18/360). The mean age of these 15 patients was 58.3 years old (range: 30−74). Nine cases were male and 9 were female. Ten cases were treated for brain metastases (7: lung cancer, 2: breast cancer, 1: hepatic cell carcinoma), 5 cases for meningioma, 2 cases for glioblastoma, and 1 case for AVM. The regions of the lesions were the frontal lobe: 1 case, the temporal lobe: 5 cases, the occipital lobe: 2 cases, the parietal lobe: 4 cases, the basal skull: 4 cases, and the cerebellum: 2 cases. Six cases had past histories of irradiation of the same area of SRS treatment. The mean peripheral dose (D95) was $18.4 \pm 3.6$ Gy, and the mean maximum dose of the target (Dmax) was $26.3 \pm 8.3$ Gy. The value of Dmax/D95 was more than 2 in 3 cases. Late toxicity occurred 5 to 36 months after SRS (mean: 13.1 months, median: 12 months). Headache was experienced by 2 patients, dizziness and convulsion by 1 patient, motor paralysis by 8 patients, numbness by 3 patients, and disturbances of cranial nerves by 5 patients. In magnetic resonance imaging, expansion of the peritumoral high signal areas on T2-weighted images was shown in all patients, and an increase of enhanced lesion on Gd-MRI was shown in 8 cases. In 4 cases, craniotomy was performed and the lesions were determined pathologically to be radiation necrosis.
**Conclusion:** The rate of radiation brain necrosis as late sequelae after SRS was 5.1%. Meningioma, past irradiation history and a Dmax/D95 value of over 2 were the important risk factors of radiation injury.

**2514** POSTER

**Contribution of $^{18}$F-FET PET in radiation therapy planning of high-grade gliomas**

H. Vees[1], H. Zaidi[2], O. Berrebi[2], F. Buchegger[2], G. Dipasquale[1], R. Miralbell[1], O. Ratib[2], D.C. Weber[1]. [1]*University Hospital, Radiation oncology, Geneva 14, Switzerland;* [2]*University Hospital, Nuclear Medicine, Geneva 14, Switzerland*

**Background:** The aim of this study was to assess the contribution of $^{18}$F-fluoro-ethyl-tyrosine ($^{18}$F-FET) PET/CT to 3D conformal radiation therapy (3DCRT) planning of high grade gliomas.
**Materials and Methods:** A total of 6 high-grade glioma patients (grade III, 3 patients and IV, 3 patients) underwent 3DCRT planning using dynamic PET/CT studies (0−30 min. after injection of 200 MBq of $^{18}$F-FET). A set of 3 triangulation lasers identical, to those used on linacs, were used for patient positioning. The CT descended from the PET/CT was used for radiotherapy planning and dose calibration without fusion of an additional simulation CT. In 3 patients PET/CT was performed median 14 days (range, 10−20) after partial resection and 3 had the PET/CT after biopsy. The target volumes were defined by 2 experienced radiation oncologists based on CT/MRI and PET/CT datasets, and by simple segmentation of the PET images.
**Results:** Dynamic PET imaging ($3 \times 10$ min.) was evaluated and all tumors showed clearly a rapidly and significant tracer uptake exceeding uptake in normal brain (median SUVmax. 1.22). The uptake peak was observed between 10 and 20 min. after injection. The median SUVmax. was 4.33 (range 3.56−4.74) and the median SUVmean was 3.38 (range 3.08−3.59). $^{18}$F-FET PET/CT allowed unequivocal identification of all high grade gliomas. In 3 patients $^{18}$F-FET PET/CT detected multicentric tumors. In one of these patients MRI showed 3 suspected lesions while PET/CT indicated only 2. This result was confirmed by follow-up imaging. The MRI of the other 2 patients visualized only 1 tumor lesion in each case while PET/CT uptake detected a second tumor of 1.5 cm and 2.0 cm of diameter, respectively. The $^{18}$F-FET PET/CT findings let to significant changes in the PTV in 4 patients compared with CT/MRI imaging alone. Interobserver variability for tumor volume delineation was smaller using additional PET/CT in all cases, when compared to CT/MRI-based target volumes.
**Conclusions:** The use of $^{18}$F-FET PET/CT had an important impact on the 3DCRT planning of high-grade gliomas. This imagery modality led to significant modification of 3DCRT techniques in a majority of patients.