

not evaluable for response. No severe toxicity was reported. Five patients (5%) are alive with no evidence of disease, 52 patients (49%) live with tumor a 32 (30%) died of disease and 17 (16%) were lost to follow-up. There were 9 long term survivors (>2 years) among 21 patients treated before September 2002.

**Conclusion:** Small portion of the patients can be cured with second course of radiotherapy and in many cases palliation can be obtained. Toxicity of re-irradiation is low when modern techniques allowing for sparing of normal tissues are used.

## Poster presentations (Wed, 2 Nov) Stereotactic radiotherapy

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POSTER

### Stereotactic body radiotherapy of colo-rectal metastases: results of a Danish phase-II study

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**Background:** In retrospective studies, resection of liver metastases results in long term survival in 25–30% of patients with colo-rectal metastases (CRM) in the liver. Unfortunately, most patients with CRM are considered inoperable. Alternative methods for treatment of metastases are therefore warranted. Radio-frequency ablation and stereotactic body radiotherapy (SBRT) may be alternative treatments of inoperable patients. We have tested the effect of SBRT in the treatment of patients with CRM in a phase II trial.

**Methods and materials:** Sixty-nine patients with each 1–6 CRM in liver, lung or suprarenal gland were included into the trial. The patients were immobilized by the Elekta stereotactic body frame (SBF) or a custom made body frame. SBRT was given on standard LINAC with standard multi-leaf collimator. Central dose was 15 Gy  $\times$  3 within 5–8 days.

**Results:** Preliminary results of the study showed that 82% of the tumours were controlled by SBRT. Progression free survival after 2 years was 15% and survival was 28%. No difference in survival was observed between patient treated for hepatic- and patients treated for extra-hepatic CRM. In general, toxicity was limited. However, 47% of the patients experienced grade >1 toxicity within 6 months after SBRT. Most frequent side effects were nausea, diarrhoea, pain and skin reaction.

**Conclusions:** SBRT in patients with CRM resulted in high probability of local control and acceptable survival rate. The toxicity after SBRT of CRM was moderate. The final results with more than 2.5 years follow-up time will be available at the meeting.

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POSTER

### Gamma knife stereotactic radiosurgery for nasopharyngeal carcinoma

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**Background:** To describe the features of selected patients and to review the treatment results of nasopharyngeal carcinoma (NPC) patients receiving stereotactic radiosurgery (SRS) after external beam radiotherapy (EBRT).

**Materials and methods:** Between November 1998 and January 2005, 10 patients (7 men, 3 women) with initial stages IIB (n=4), III (n=2) and IVA (n=2) were treated in Marmara University Hospital Gamma Knife Treatment Unit. All patients had biopsy-proven NPC and the median age was 56 years (range 37 to 67). Four patients received SRS as a boost following primary EBRT, 1 patient was treated for the persistent disease in nasopharynx and 5 received the treatment for a first (n=4) or a second (n=1) recurrence. The median SRS dose range from 7 to 20 Gy (median, 11 Gy) and the median dose of EBRT was 70 Gy (range 66 to 73).

**Results:** After a median follow-up of 12 months local control rate was 75% and the survival rate was 33% (median 12 mos). All the patients delivered SRS as a boost displayed local control but 1 patient suffered from a temporal lobe necrosis as a late complication at the 7<sup>th</sup> month follow-up. Three out of 5 patients having persistent or recurrent diseases revealed local control whilst 1 patient showed local progression and 1 patient received EBRT for a second recurrence after SRS.

**Conclusions:** More clinical experience and the data are required to allocate SRS in the treatment of primary and recurrent NPC. Hence we aimed to report our preliminary results in this retrospective study.

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POSTER

### Stereotactic body radiation therapy for lung metastases: impact on overall survival

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**Background:** Hypofractionated or single dose stereotactic body radiation therapy (SBRT) for a limited number of lung metastases from assorted primary tumors has been documented to be feasible and to yield excellent local tumor control. The specific aim of this analysis was to determine if SBRT contributes to prolonged survival in a patient population with systemic disease manifestation.

**Methods:** Between 8/01 and 11/04, 50 patients were treated by SBRT for lung metastases (1–4 metastases, median 1) with maximum diameter <6 cm. A sequential tomotherapeutic intensity-modulated radiation therapy technique (Peacock IMRT, Nomos) was used to deliver 3 fractions of 12 Gy to a total dose of 36 Gy. Doses were prescribed as the minimum dose to the planning target volume (PTV) which included safety margins of 5 mm axially and 10 mm cranio-caudally to the gross tumor volume (GTV). We analyzed overall survival in this population.

**Results:** The median GTV and PTV treated was 16 and 43 cm<sup>3</sup> (range GTV: 1–135 cm<sup>3</sup>; PTV: 12–256 cm<sup>3</sup>). At a respective mean and median follow-up of 8.8 and 7.0 months, 8 patients have expired. Median time to death in those patients was 3.8 months. Cause of death was new metastatic disease to lung, liver and/or brain. At the time of death, 7/8 patients had documented local control of SBRT treated lesions. The clinical follow-up in patients alive ranges from 1.5 to 34 months (mean 9.4, median 7.4 months). Of 34 patients treated before 1/04 (minimum follow-up 12 months), 27 are alive at the time of analysis. Of those, 20 patients are alive with imaging confirmed systemic disease progression (19 with new metastatic disease in the lung or in other organs, including 2 with local recurrence or lack of response to SBRT).

**Conclusions:** SBRT in patients with a limited number of pulmonary metastases results in encouraging one year survival rates and may result in an increased intermediate-term survival for a subset of patients. However, cause of death in the majority of cases was systemic disease progression indicating that SBRT can only be one tool in the multi-disciplinary disease management for this patient population. The non-invasive character of this treatment modality may contribute to maintaining not only local tumor control, but also the quality-of-life (QOL) in this patient population. Our ongoing research includes quantitative QOL assessment tools and correlation with serum markers for normal tissue injury.

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POSTER

### 3D-1H-MRSI metabolite quantitation reproducibility in human brain using a stereotactic immobilization/repositioning device

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**Purpose/Introduction:** There is growing interest in using 3-D <sup>1</sup>H-MRSI to assess metabolic changes in brain pathologies over time. To date, one of the major difficulties encountered in doing this has been the issue of reproducible patient positioning in order to ensure that the same VOI is precisely selected for each successive scan. We have previously found that MRSI-determined NAA/CRE and CHO/CRE can be reproducibly measured to within ~6% and ~12% respectively, in an MRS-brain phantom (2D-PRESS, 16<sup>2</sup> matrix, 1.0 cc/voxel, TE/TR: 144/2000 ms).

In the current work, we present the results of repeated 3D-<sup>1</sup>H-MRSI measurements in normal human volunteers, wherein the problem of reproducible positioning is solved through the use of a stereotactic immobilization/repositioning frame, fitted and secured in place within the standard MRI scanner head coil.

**Subjects and Methods:** Ten healthy volunteers were repeatedly scanned during four separate sessions, over a time period of two weeks. Scans were performed on a 1.5T GE scanner, using a quadrature head coil, with 5APx5LRx4SI 1.0cc voxels completely contained within a 220 cc PRESS volume. A Gill-Thomas-Cosman (GTC) stereotactic immobilization frame individually fitted to each volunteer ensured minimal variation (~1 mm) in PRESS-VOI repositioning across successive scans. Two MRS scans with TE/TR=30/1500 ms and TE/TR=144/1500 ms were acquired consecutively during each session. T2-weighted anatomic images were taken before