



Figure 1: a) Effective doses and b) LYL-ratios.

Conclusions: The LYL attributable to cancer therapy were orders of magnitudes larger than the LYL attributable to the diagnostic scans used for radiotherapy planning. However, the uncertainty in the present estimates of LYL were considerable, and would benefit from more exact risk models.

POSTER: CLINICAL TRACK: PALLIATION/SUPPORTIVE CARE/PATIENT SUPPORT

PO-0741

Neurocognitive status as QoL index in solitary brain metastasis patients treated with WBRT vs SRS after surgery

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Purpose/Objective: Patient-(age, performance status, psychological distress), disease-(type, localization) and treatment (neurosurgery, radiotherapy, chemotherapy)-related factors may impact on cognitive functioning of metastasis patients. Neuropsychological involvement may be an important factor, reducing quality of daily life (QoL). This study aimed to evaluate difference between whole brain radiotherapy (WBRT) and radiosurgery (SRS) on neurocognitive functioning accordingly on QoL of brain metastasis patients. We did a randomized controlled trial to test our prediction.

Materials and Methods: Patients with solitary brain metastasis of solid tumors with stable systemic disease tumors and KPS \geq 70 were treated with complete surgery and randomly assigned to adjuvant WBRT (30 Gy in 10 fractions) or SRS (17-20 Gy single fraction) on surgical cavity (max diameter 3.5 cm). The primary end point was local control, secondary end points survival, quality of life and toxicity. 65 patients, fulfilling the study inclusion criteria, were treated since December 2009 to September 2012. After randomization 42 subjects were assigned to SRS group, 23 to WBRT. All subjects were tested to assess global cognitive functioning using the Mini Mental State Examination (MMSE): at baseline (T1) before radiotherapy treatment, after one year (T2) and after 2 years (T3). Preliminary results were available for 55 subjects at T1, for 25 subjects at T2, for 6 at T3.

Results: The pretreatment MMSE was available for 37 patients randomized for SRS, and 18 for WBRT. The sample did not present cognitive deficit post surgery and no statistically significant difference were found between the baseline MMSE of two groups ($P = 0,064$). Of the 25 patients underwent the follow-up MMSE at one year, 10 (40%) had improved their scores and 5 (20%) worsened in SRS group; all subjects (100%) obtained lower scores in WBRT group. From preliminary evaluations it was found a statistically significant difference between the neurocognitive performance of WBRT group and the SRS one ($P = 0,039$). Currently, there's no sufficient data at 2 years.

Conclusions: The results of this study have revealed that the long-term adverse effect of WBRT on neurocognitive functioning might not be negligible also for the quality of life of brain metastases patients.

PO-0742

Palliative radiotherapy for bone metastases. Differences in the symptomatic relief according to the primary tumor

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Purpose/Objective: Many studies have assessed the fractionation scheme to choose the most appropriate in individual cases. Various fractionation schemes can provide a response equivalent to the control of pain, although longer treatment has the advantage of a lower incidence of reprocessing the same site. The aim of our retrospective study was to evaluate the differences in requirements and the impact of different radiotherapy schedules on patients symptoms in relationship to primary tumor type and quality of life.

Materials and Methods: We analyzed 458 treatments of palliative radiotherapy for bone metastases. For these patients, we did control of pain, performance status and pain-therapy, before treatment, after treatment, and 180 days after the end of treatment. We analyzed the data using the T-test for paired data and the ANOVA test and we performed a comparison of performance status and pain in relation to the type of fractionation.

Results: We noticed an improvement in performance status and pain relief in all groups, but the pain improvement was more evident in patients treated with single fraction, while we noticed a difference of the average KI before and after RT, even if not statistically significant, in favor of the longest fractionation (30 Gy) schemes. We also have focused our attention in patients with primary tumors with expected greater overall survival, in particular, we considered patients treated for bone metastases from breast cancer. The differences between averages with ANOVA test seemed to demonstrate an advantage in favor of the 30Gy schedule for the KI (ns $p = 0.105$), while they were favorable to the single fraction of 8 Gy for the NRS ($p < 0.001$).

Conclusions: We have obtained data which are in line with the statement made in recent years on the equivalence of the various types of fractionation for the control of pain from bone metastases, but that suggest a greater attention to the radiation oncologist in the choice of the patient to be subjected to various types of fractionation. It is recommended to put a considerable amount of attention over which the clinical condition of patients, the primary tumor (breast) of patients who, for the greater life expectancy resulting from the natural history of cancer, should have a better access to a more prolonged treatment.

PO-0743

Once weekly stereotactic radiotherapy for oligometastatic patients: compliance and preliminary efficacy.

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Purpose/Objective: This retrospective analysis reports the outcomes obtained with an original once weekly stereotactic radiotherapy fractionation delivered for patients affected by evolving oligometastases from different solid malignancies.

Materials and Methods: From 2009 to 2011 patients with symptomatic and/or evolving oligometastases were submitted to a median 5-fraction-cycle of stereotactic radiotherapy by delivering only one a fraction per week in order to exploit a radiobiological rationale designed to increase the therapeutic index. Individual fractionation was mainly planned according to patient performance status, oligometastases size and site and record of previous irradiation in the same site.

Results: Thirty-six patients in stage IV UICC-TNM affected by oligometastases were treated with image-guided/intensity modulated stereotactic tomotherapy by delivering a single weekly radiation. Median age was 70 yrs (34-89 yrs). The median weekly single dose, number of fractions and overall total radiation dose were 7 Gy, 5 fractions and 35 Gy, respectively. Thirty-five (97%) patients completed the treatment schedule. No patient suffered mild or severe radiation-related side effects. Twenty-one (87%) out of 24 patients with local pain had complete symptomatic response within 30 days from the end of radiotherapy. Local control assessed at imaging after SRT was evidenced in 30 (83%) of patients. Median time to response after the end of radiotherapy was 40 days.

Conclusions: This original radiotherapy regimen delivering only a single stereotactic dose per week seems to be highly feasible with an interesting high rate of efficacy for patients with oligometastases from different solid tumors. Overall, the once weekly treatment is very compliant in advanced cancer stage especially for elderly and frail patients.

POSTER: CLINICAL TRACK: STEREOTACTIC RT

PO-0744

re-EBRT for prostate cancer local relapse after radical, post-operative or salvage RT: toxicities and outcome

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Purpose/Objective: To retrospectively evaluate external beam re-irradiation (re-EBRT), delivered to the prostate or prostatic bed for local recurrence after radical or post-operative/salvage radiotherapy.

Materials and Methods: 17 pts have been treated with re-EBRT at our Department between 2/2008 and 8/2012. Previously RT included radical RT 13 pts (12 pts with EBRT and 1 pt with brachytherapy, post-operative RT (2 pts) or salvage RT (1 pt), 1 pt not reported. All pts had local relapse in the prostate or prostatic bed with no distant metastasis: was performed in all but 1 pts, and all the pts had total body computer tomography (CT) or ¹¹C-choline positron emission tomography scan. One pt. was previously treated also with 3D-CRT for lymph node recurrence with complete remission.

The mean age, iPSA and Gleason Score (GS) at diagnosis were 61 yrs (49-67), 15 ng/ml (4.57-67) and 6 (4-9), respectively.

The re-EBRT technique included 3D IGRT, stereotactic RT, IMRT, stereotactic RT + IMRT, CyberKnife respectively in 1,8,6,1,1 pts. The following schedules were employed: 25 Gy/5 fr(12 pts), 30 Gy/6 fr(4 pts) and 15 Gy/3 fr (1 pt). Four pts were included in a previous study. Concomitant hormonal therapy (HT) was administered in 7 pts. Toxicity and tumor response were evaluated using Radiation Therapy Oncology Group/European Organization for Research and Treatment of Cancer and Response Evaluation Criteria In Solid Tumors criteria. Biochemical and clinical response, using radiologic criteria, was also registered.

Results: Acute toxicity included: 3 G1, 1 G2 genitourinary events; 1 G1, 1 G2 gastrointestinal events. Late toxicities (> 6 months of f.u., data available in 9 pts): 5 pts with no toxicity; 2 G1 gastrointestinal and 1 G1 genitourinary events respectively.

The mean interval between the primary treatment and the clinical local relapse was 64 months, and the mean follow-up after re-EBRT was 24 months (5-30). Two pts died for the prostate cancer progression at distant sites: the interval between re-EBRT and the death was 30 mo. for each. The remaining 15 patients are alive: 12 with no evidence of disease and 3 pt is alive with disease in clinical control with HT.

Conclusions: In our single institution preliminary experience re-EBRT of local relapse of the prostate cancer appears feasible and well tolerated. Local control was excellent (non local recurrence was registered within mean follow-up of 2 years) and 70% of patients alive with non evidence of disease. Longer follow-up and bigger patient series is warranted in order to confirm these promising early findings.

PO-0745

FFF delivered SBRT in the treatment of lymph node oligometastases: feasibility and early clinical results

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Purpose/Objective: While research in the physics domain for Flattening Filter Free Beams (FFF) beams is increasing, there are few clinical data of FFF beams in clinical practice. Here we reported early clinical results of SBRT and FFF delivery in isolated lymph node oligometastatic patients.

Materials and Methods: Between October 2010 and March 2012, 34 patients were treated with SBRT for oligometastatic lymph node metastasis using Volumetric Modulated Arc Therapy (RapidArc on

Truebeam platform). We retrospectively evaluated a total of 25 patients for isolated lymph node metastases in abdomen and/or pelvis treated with SBRT and FFF (28 treatments). Prescription doses were 45 Gy in 6 consecutive fractions of 7.5 Gy for all 28 treatments. The inclusion criteria were: age≥18years, WHO performance status ≤ 2, histologically-proven of primary cancer disease, M1 stage with primary cancer site radically treated with complete response/resection or stable, no other site of disease in progression (a maximum of 3 lymph node sites of disease to treat), diameter of lymph node Target less than 5 cm, Abdomen/pelvic site, no previous surgery or RT in the region to treat, obtained informed consent. Chemotherapy, when prescribed, was interrupted from 20 days before the simulation to the first evaluation after the end of SBRT treatment, as scheduled. Acute toxicity was recorded and scored according to CTCAE v.4. Local control evaluation was scored by means of CT scan and/or PET scan, according to PERCIST criteria.

Results: All 25 FFF SBRT patients completed the treatment. Acute gastrointestinal toxicity was minimal: one patient showed Grade 1 gastrointestinal toxicity. Three other patients presented Grade 2 toxicity. No Grade 3 or higher was recorded. All toxicities were recovered within one week. The preliminary clinical results at the median follow up of 195 days are: complete response in 12 cases, partial response in 11, stable disease in 5, with an overall response rate of 82%; no local progression was recorded.

Conclusions: Data of acute toxicity are excellent for patients treated with SBRT with VMAT using FFF beams. Preliminary clinical results showed a high rate of local control in irradiated lesion. Further data and longer follow up are needed to assess late toxicity and definitive clinical outcomes.

PO-0746

Consequential effects of ablative ionizing radiation on tumor stromal fibroblasts from lung tumors

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Purpose/Objective: Cancer-Associated Fibroblasts (CAFs) are major components of solid malignancies and play central roles on cancer sustainability. In the context of radiotherapy, collateral effects of ablative ionizing radiation (AIR) on stromal components of tumors remain understudied. In this work we have examined the impact of AIR on CAFs from human lung tumors.

Materials and Methods: CAFs prepared from resected human lung tumors were exposed to AIR (1x18Gy). Intrinsic radio-sensitivity was evaluated by checking viability and extent of DNA-damage responses at escalating radiation doses. Proliferation, migration and invasion rates were monitored in label-free assays by xCELLigence system. Inflammatory mediators, as well as regulators of angiogenesis and tumor growth were analyzed by multiplex protein assay in conditioned medium (CM) from irradiated and control CAFs. Additionally the entire secretory protein profile was examined by mass spectrometry. In functional assays, the potential effects of CAFs released factors on the proliferative and migratory capacity of lung tumor cell (H520 and H522) and on endothelial cells (HUVEC) was also investigated.

Results: Our results show that CAFs survive ablative doses of radiation, but cells enter a senescent state associated with reduced proliferation and invasion. A lowered MMP-1 expression and the stabilization of focal contacts via integrins were responsible mechanisms behind the reduced cell motility. On the other hand, analyses of the secretory profile revealed a reduced expression of angiogenic factors like SDF-1a and TSP-2, and altered expression of tumor regulators such as bFGF, PEDF and MIF upon radiation. No prominent differences were observed on the behaviour of tumor cells or endothelial cells exposed to irradiated and control CAF-CM

Conclusions: AIR provoked a reduction in the proliferative and migratory abilities of CAFs, along with a transformation of their secretory profile. These radiation-induced changes on tumor resident fibroblasts could influence the behaviour of adjacent cells in the tumor tissue and hence influence therapeutic outcomes. Downstream consequences of the changes observed in this study merits further investigations.

PO-0747

Analysis of radiation effects after stereotactic radiotherapy of brain metastases using MRI cine-loops.

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