abundance and accessibility of specific targetable molecules and selection of patients who may benefit from the addition of targeted agents to radiotherapy. In the nearby future, the combination of tracers with a long and a short half-life may facilitate simultaneous imaging of different tumor characteristics. Furthermore, the introduction of integrated PET-MRI imaging will most likely provide a combination of superior anatomical and functional information.

Small studies employing adaptive radiotherapy based on functional dynamics and early response mechanisms demonstrate promising results. However, each PET tracer has demonstrated its potential as well as pitfalls regarding application in everyday clinical practice. Further validation in multicenter set-up is needed. Immunohistochemistry and gene arrays may help to select which therapeutic pathway is most suitable for an individual tumor and, therefore, which type of molecular PET imaging will be relevant. Ultimately, this should result in availability for routine clinical practice requiring stable production and accessibility of tracers, reproducibility and standardization of imaging and analysis methods, as well as general availability of knowledge and expertise.

SP-0062
Is radiation dose really the answer?
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Clinical trials are an excellent tool for evaluating the effectiveness of a single change in patient management on later outcomes. In the rapidly evolving landscape of clinical practice, a plethora of incremental changes may either exert a background effect, or be introduced during the conduct of a clinical trial. These can have the effect of blunting, or even overwhelming, the impact of the intervention being assessed in a randomized study. Using various examples from recently reported clinical trials investigating radiation dose escalation, we explore this phenomenon, and speculate on how future research may be able to adapt accordingly.

OC-0063
Multimodality imaging for target volume delineation in oropharyngeal squamous cell carcinoma
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Purpose/Objective: Multimodal imaging has the potential to increase the accuracy of head and neck squamous cell carcinoma target volume delineation. This study aims to quantify the variation in Oropharyngeal Squamous Cell Carcinoma (OSCC) Gross Tumour Volume (GTV) delineation between CT, MR and 18FDG-PET imaging.

Materials and Methods: A prospective, single centre, pilot study was undertaken where 11 patients with locally advanced OSCC (2 tonsil, 9 base of tongue primaries) underwent pre-treatment, contrast enhanced, 18FDG-PET-CT, and T1- and T2-weighted MR imaging, all performed in a radiotherapy treatment mask. GTVs were contoured by 6 clinicians (2 radiologists and 4 radiation oncologists) using CT and MRI (T1 and T2 sequences) independently and co-registered CT and MRI (rigidly co-registered using Mirada RTx v1.4, Mirada Medical, Oxford, UK). Clinical information and available diagnostic imaging was on hand during contouring. A 2 week gap was imposed between individual patient delineations to minimise recollection. The semi-automatic Schaef er adaptive algorithm contoured the 18FDG-PET GTVs. Volume and positional metrics assessed the GTV variation with imaging modality. Linear mixed effects models were used to determine GTV volume variations, accounting for inter-patient and inter-operator variability. Six delineation error metrics (described in table 1, ImSimQA, v3.1.5, OSL, Shrewsbury, UK) were used to determine the inter-observer variability in GTV position within modalities and the variation in GTV position between modalities.

Results: Volumes: The mean GTV volumes were: CT 11.9cm³ (SD = 4.5cm³); CT-MR 14.1cm³ (SD = 3.7cm³); MR 12.7 cm³ (SD = 2.5cm³); and 18FDG-PET 9.5cm³ (SD = 6.8cm³). Significant GTV volume differences were found between CT and CT-MR (p < 0.0005), CT-MR and 18FDG-PET (p < 0.0009) and MR and 18FDG-PET (p < 0.016) modalities. MR had a significantly smaller inter-operator variability (p < 0.05) compared to CT. Figure 1 shows the GTV volumes for all patients for all modalities.

Positional metrics: The CT inter-observer variability was found to be significantly higher (p < 0.05) than both MR and CT-MR modalities for all positional metrics except for the mean distance to conformity (Table 1). Differences in GTV position were found between all modalities with the exception of the positionally similar CT-MR and MR GTVs (Table 1).

Conclusions: Inter-observer variation using MRI for GTV delineation was significantly less than when using CT. The use of different imaging modalities (CT, MR and 18FDG-PET) produced significantly different GTVs which varied in volume...
or position, with no single imaging modality encompassing all potential GTV regions. These data suggest delineation based upon multimodality imaging has the potential to improve the accuracy of GTV definition, which is important for highly volumetric approaches to target volume delineation and dose escalation strategies.

**OC-0064**

Hypercellular components of glioblastoma identified by high b-value DWI: the potential for target definition

**Materials and Methods:** 21 patients (age: 23-76 years) with GB were treated by radiation therapy (RT) after surgical resection or biopsy. RT planning was based upon conventional MRI. During MRI simulation, DWI was acquired in 3 orthogonal directions with b-values of 0, 1000, and 3000 s/mm². Gross tumor volume (GTV-Gd) and FLAIR abnormality volume (FLAIR TV) were defined on post-Gadolinium T1-weighted and T2-w assays were used to reconstruct tumor heating to approximately 43°C using RF antennas for energy deposition. For accurate Hyperthermia Treatment Planning (HTP), the knowledge of patient-specific electrical tissue conductivity (σ) values is required. Currently, HTP applies literature values for σ in tumor, muscle and bladder. For a reliable reconstruction of the tissue σ from the B¹+ fields, as measurable by standard MRI systems. We have validated this method earlier using phantom experiments and in vivo simulations in the pelvic region. In the present study, in vivo 3T MRI measurements of 12 cervical (squamous cell) carcinoma patients and one ureteral adenocarcinoma patient were used to reconstruct σ values in tumor, muscle and bladder. For a reliable σ reconstruction using EPT, the size of a particular tissue type should be relatively homogenous and large enough (>3cm), therefore, the σ of 9 tumors and 7 bladder fillings could be reliably reconstructed. Results were compared to literature data.