ABSTRACT SUBMISSION FORM

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PRESENTATION TITLE
Interobserver GTV delineation variation on MRI versus PET-CT in oesophageal cancer

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ABSTRACT
Interobserver GTV delineation variation on MRI versus PET-CT in oesophageal cancer

Purpose:
Accurate GTV delineation is crucial for patients with oesophageal cancer treated with (chemo-)radiation. Even with ¹⁸FDG PET fusion to CT, delineation variation is a notorious problem, especially at the cranial and caudal tumour borders. MRI provides better soft tissue visualization but its use has been limited in oesophageal cancer and delineation variation is unknown. Radiation oncologists may benefit from integrating MRI in treatment preparation, especially with the development of the MRI-linear accelerator (Unity ATL1, Elekta AB, Stockholm, Sweden). The growing application of MRI in radiation oncology departments for treatment planning, image-guided adaptive radiotherapy and treatment response assessment encouraged to compare the contouring variability for oesophageal cancer on PET-CT to T2-weighted (T2W)-MRI and diffusion-weighted (DW)-MRI.

Materials & Methods:
Six patients with locally advanced oesophageal cancer underwent an integrated PET-CT (slice thickness 3 mm) and after a mean interval of 14 days an MRI scan (slice thickness 6.5 mm, T2W-MRI and DW-MRI with b-value =0,200,800s/mm²) before treatment. Clinical information was provided. Ten observers from two institutes delineated the GTV on PET-CT. After a minimum of one week, the GTV was delineated on T2W-MRI and adjusted after addition of DW-MRI. GTV volumes were determined.

To quantify the overlap between delineations, generalized conformity indices (Cigens) were calculated. For the central delineated region, in-slice delineation variation was calculated as the quadratic mean of the local observer variation (root mean square (RMS)). SDs in the position of the
most cranial and caudal delineated slice were calculated.

**Results:**
The average GTV volume of delineations on PET-CT was 40.5 cm³ (SD per patient ranged from 0.8 to 9.7 cm³), on T2W-MRI 34.8 cm³ (range 1.4 to 16.1 cm³) and on T2W+DW-MRI 32.7 cm³ (range 1.7 to 8.2 cm³). Main variation was seen at the cranial and caudal border (Figure 1). No differences were observed in Clgns (PET-CT 0.68; T2W-MRI 0.66; T2W+DW-MRI 0.68) and in-slice variation (RMS 0.13 cm on PET-CT, 0.10 cm on T2W-MRI and 0.14 cm on T2W+DW-MRI). In two cases including the oesophageal-gastric junction (EGJ), addition of DW-MRI to T2W-MRI significantly decreased caudal border variability (p=0.04 and p=0.01).

**Conclusions:**
MRI for delineation of oesophageal cancer is feasible and average delineation variation of the cranial/caudal borders equivalent to PET-CT, despite the limited experience of observers in delineation of oesophageal cancer on MRI. Most variation was seen in cranial-caudal border delineations, although addition of DW-MRI to T2W-MRI may reduce caudal delineation variation of tumours involving the EGJ. Future effort should focus on guideline development for oesophageal delineation on MRI.