Cox multivariable regression model was used to determine the association of post-treatment maximum standardized uptake value (SUVmax) as a continuous variable with DFS and CSS after adjustment for age at diagnosis, stage, radiotherapy dose, use of concomitant chemotherapy, use of salvage surgery, sex and performance status.

Results: A total of 287 patients were treated with radical radiotherapy over the time period of the study and 56 had post-treatment response assessment with PET/CT. Median age of the study cohort was 60.5 years (IQR, 53-66). Median radiotherapy dose was 54Gy (IQR, 53.6-54). Among a total of 56 patients, concurrent chemotherapy was offered in 53 (95%) patients. Mean post-treatment SUVmax for the primary tumour and node were 2.6(±3.9) and 4.3(±6.7). On multivariable analysis (MVA), post-treatment SUVmax for the primary tumour had a significant association with CSS (hazard ratio (HR): 1.39, 95% confidence interval (CI): 1.13-1.70, p=0.002). The HR for post-treatment nodal SUVmax was 1.09 (95% CI: 0.88-1.36, p=0.4). The association of post-treatment SUVmax of primary (HR: 1.01, 95% CI: 0.86-1.18, p=0.88) or node (HR: 1.10, 95% CI: 0.92-1.31, p=0.31) with DFS was not statistically significant.

Conclusions: The current population-based study shows significant correlation of presence of FDG avid residual tumour with CSS. Every one unit increase in post-treatment SUVmax of the primary tumour was associated with 39% increase in the relative risk of death. Although post-treatment nodal SUVmax showed similar direction of association, the overall association was not statistically significant which could be attributed to the limited sample size. The study highlights the importance of post-treatment PET based response assessment in patients with anal SCC and early institution of salvage treatment in presence of FDG avid residual tumour to avoid potentially fatal consequences. Further validation of this finding with randomized clinical trial is warranted.

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CAN WE USE HOUNSFIELD UNIT RANGES AS SURROGATES FOR FUNCTIONAL LUNG AVOIDANCE IN 4-DIMENSIONAL COMPUTERIZED TOMOGRAPHY SIMULATION DATASETS: A PILOT STUDY

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Purpose: Radiation pneumonitis (RP) is a common toxicity following radiation therapy (RT) to the thorax. Research is ongoing to establish 3-dimensional maps of functional lung for the purpose of avoidance in RT planning to reduce the risk of significant RP. We investigate various combinations of Hounsfield Unit (HU) ranges in 4-dimensional computerized tomography (4DCT) datasets versus known measures of lung function based on spirometry, in an effort to develop a readily available CT density surrogate for areas of healthy functional lung.

Materials and Methods: Our local Research Ethics Board (REB) approved this pilot study in 2016. All patients who had a 4DCT simulation for RT planning of lung cancer were screened. Only patients with pulmonary function tests (PFT) or spirometry available within 90 days of 4DCT were included. Patients were excluded if 4DCT was inadequate due to the presence of artifacts, or scan length is too limited. Total of 91 consecutive patients met the selection criteria for analysis. The PFT data were tested for correlation with various 4DCT variables to assess the strength of possible relationships. This included the standard approach of contouring the entire lung seen in the average intensity pixel (Ave-IP), as well as assessing subsets of this volume based on HU range, i.e. excluding the low attenuation areas (LAAs) regions (defined as any pixel with HU < -860) or looking at various HU

ranges (e.g. -800 to -600 HU). Analysis was via linear regression, and GNU PSPSS was used to calculate Pearson's and Spearman rank correlation and p-values.

Results: There were 42 males and 49 females with average age of 71 years (range 53-92). The mean FVC was 2.66L (0.94-4.70, SD=0.80) and mean FEV1 was 1.79L (0.54-3.23, SD=0.60). Linear regression plots of FVC or FEV1 versus Ave-IP showed weak correlation for FVC (R^2=0.23), and no association for FEV1 (R^2=0.01). Pearson and Spearman rank correlations were 0.48 and 0.47 for FVC, and 0.12 and 0.15 for FEV1 respectively with p-values significant for FVC (p<0.00001) but not FEV1 (p=0.259). By excluding LAA regions, FVC correlation improved from low to moderate (Spearman r values went from 0.47 to 0.57). When focusing on lung tissue in the HU range between -800 and -600, the FEV1 correlation with 4DCT data went from negligible to a low strength correlation, bordering on moderate (Spearman r values went from 0.15 to 0.46, p<0.001).

Conclusions: Our work suggests 4DCT "total lung" volumes poorly correlate with FVC and not at all with FEV1. Further study is required to validate the link between lung contoured on 4DCT plans and functional lung to allow sparing.

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HYPOFRACTIONATED RADIOTHERAPY FOR SOFT TISSUE SARCOMAS - EARLY EXPERIENCE WITH 35GY IN 5 FRACTIONS

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Purpose: Radiotherapy (RT) plays an important role in the management of soft tissue sarcoma (STS). STS have a low alpha/beta ratio and so are sensitive to fraction size. This together with the practical advantages of a shorter treatment schedule for both the patient and the healthcare system prompted us to investigate the use of 35Gy in 5 fractions given on alternate days over two weeks, an EQD2 of 70Gy, using an alpha/beta ratio of three. We report here our initial experience.

Materials and Methods: Twelve patients with newly diagnosed or metastatic STSs were treated between January 2018 and February 2019. Treatments were planned using VMAT or SBRT and delivered with image-guidance with daily CBCTs. No patient received concomitant systemic therapy.

Results: The most prevalent histologies were liposarcoma and angiosarcoma. Five patients received neoadjuvant radiotherapy for newly diagnosed STS and, the remainder, palliative RT for oligometastatic disease for pain and/or radiological progression. RT was a well-tolerated treatment. Among those treated with palliative intent, one patient with a lesion in the manubrium presented pain flare after 2 fractions and dermatitis Grade 1 at the end of RT, while six patients presented dermatitis Grade 1 during the month following RT. No progression of disease was seen during follow-up. Of the patients treated pre-operatively, one to the popliteal region developed a wound infection and dehiscence while two patients treated to the upper limb had no wound healing issues following surgery. The two other patients are waiting for surgery.

Conclusions: A treatment schedule of 35Gy in 5 fractions appears to be well tolerated, with only mild acute side-effects and good control of the disease. These hypothesis-generating findings should be taken with caution given the small number of patients and short follow-up. We will open a phase I/II trial for preoperative RT for patients with newly diagnosed STS.*oligometastatic*