thyroid gland, parotids and bone marrow according to and FLT ([(18)F-fluoro-thymidine]-PET) images, before and during the treatment.

**Materials and Methods:** Patients with advanced, inoperable oesophagus and oral cavity cancer were treated with chemoradiation. (RTCT). The dose of 70 Gy in 35 fractions was delivered concurrently with three courses of cisplatin(100mg/m2) provided on the 1st, 22nd and 43rd day of treatment. FLT PET/CT was performed a week before and then on 7th and 14th day of treatment, corresponding to a dose of 14 x 2.8 Gy respectively. The whole imaging was performed while ensuring the same mode of patient’s immobilization i.e. individual thermoplastic mask. Volumes of thyroid gland, parotids and cervical vertebrae were measured on CT scans obtained before treatment and at the FLT PET time point. CT and PET images were matched to assess the level of proliferation at the organ of interest. SUV mean was used to quantify differences in proliferation level. Thyroid hormones level were assayed prior to the treatment and then, weekly during the treatment followed by the one month after completion of the treatment evaluation to assess the level of functional changes. For statistical calculation Pearson’s correlation coefficient and Wilcoxon Matched Pair Test were used, for alpha=0.5.

**Results:** Both volume and FLT SUVmean of the thyroid gland decreased during treatment (p= 0.009 and 0.03 respectively). Changes of volume of thyroid gland correlated with the decrease of FLT SUVmean in the first week of treatment. (R=0.90) Thyroid hormones levels fluctuate during and after chemoradiation. Thyroid-stimulating hormone (TSH) level measured a month after RTCT negatively correlates with FLT SUVmean in the first week of treatment (R=0.89).

Volume of homolateral and contralateral parotids decreases significantly during first week of treatment (p=0.003 and 0.01 respectively). Degree of parotid volumes changes in volume before treatment (R=0.7). FLT SUVmean reduction in bone marrow after first week of treatment reflects depletion of proliferating cells (p=0.002).

**Conclusions:** Morphologically functional changes in head and neck organs can be estimate during RTCT. Assessment of the volumetric and metabolic changes of certain organ at risk during treatment could be a predictor of their future function and can help in further individualization of treatment planning.

**POSTER DISCUSSION: YOUNG SCIENTISTS 2: LUNG AND GASTROINTESTINAL TUMOURS**

**PD-0453** Test-retest repeatability analysis of 18F-FDG PET Radiomics features in NSCLC

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**Purpose/Objective:** Besides basic measurements as SUVmax, SUVmean or tumor volume derived from 18F-FDG PET scans, more advanced quantitative imaging features are increasingly investigated for treatment monitoring and outcome prediction. This is within the context of Radiomics: extracting and mining a large number of quantitative features from medical images, where it is hypothesized that it will improve tumor characterization and outcome prediction. However, in order to use these features for future prognostic and predictive models, it is required that they are reliable. This study therefore aims to assess the repeatability of Radiomics features derived from PET images in NSCLC.

**Materials and Methods:** Eleven NSCLC patients were included retrospectively in this study. All patients underwent two baseline 18F-FDG PET scans within a one day interval, before any treatment was delivered. 60-min. emission scans were obtained on an ECAT EXACT HR+ scanner (Siemens/CTI) in 2D mode and reconstructed using OSEM2Dx16s, followed by 5mm FWHM Gaussian post-smoothing. Per patient, all lesions with adequate uptake and contrast were identified and delineated by applying one of four predefined thresholds of the maximum uptake value within the tumor (41%, 50% and 70% corrected for local background and 50% uncorrected for background) (figure 1). The extracted image features comprised 15 first-order statistics, 33 textural features derived from gray level co-occurrence and gray level run-length matrices, 51 metabolic descriptors of the intensity volume histogram (IVH) and 7 features describing the shape and size of the delineated VOI. Repeatability for every extracted image feature was assessed with the intraclass correlation (ICC) and the coefficient of repeatability (COR), expressed as a percentage of the sample estimated reference range.

**Results:** 32 lesions were selected for analysis. Repeatability analysis of shape and size characteristics of the defined VOIs revealed a good agreement between the two baseline scans, with ICC and COR values ranging from 0.94-1 and 2.8%-17.1% respectively for all 7 features.

13/15 of the considered first order statistics showed high repeatability with an ICC between 0.77-0.96 and a COR between 12.3%-38.6%. An ICC between 0.7-1 and a COR of 3.6%-37.2% was found for 28/33 textural features. From the IVH features, 40/51 were highly repeatable with an ICC and a COR of 0.78-1 and 2.8%-31.4% respectively. The overall results are summarized in table 1.

<table>
<thead>
<tr>
<th>Feature group (N)</th>
<th>High repeatability ICC0.7-0.9</th>
<th>Medium repeatability 0.70&lt;ICC&lt;0.85</th>
<th>Low repeatability ICC&lt;0.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape and size (7)</td>
<td>N ICC COR</td>
<td>N ICC COR</td>
<td>N ICC COR</td>
</tr>
<tr>
<td>First-order statistics (13)</td>
<td>14 0.91 0.57 1.17</td>
<td>14 0.91 0.57 1.17</td>
<td>14 0.91 0.57 1.17</td>
</tr>
<tr>
<td>Textural Features (33)</td>
<td>28 0.71 0.9 0.21</td>
<td>28 0.71 0.9 0.21</td>
<td>28 0.71 0.9 0.21</td>
</tr>
<tr>
<td>IVH metrics (15)</td>
<td>15 0.76 1 0.54</td>
<td>15 0.76 1 0.54</td>
<td>15 0.76 1 0.54</td>
</tr>
</tbody>
</table>

**Conclusions:** The results of this study indicate that the majority of assessed PET image features are highly repeatable and suggest that further analysis of these parameters may be warranted for treatment monitoring and outcome prediction in NSCLC.

**PD-0454** Cardiac comorbidity is a risk factor for radiation induced lung toxicity of lung cancer patients

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**Purpose/Objective:** To test the hypothesis that cardiac comorbidity before the start of (chemo)radiotherapy (RCT) is associated with an increased risk of radiation induced lung toxicity (RILT) in lung cancer patients.

**Materials and Methods:** A prospective cohort of 149 non-resectable lung cancer patients with locoregional disease was studied, that was treated with definitive (chemo)radiotherapy between 2007 and 2011 (ClinicalTrials.gov Identifiers: NCT00572325 and NCT00573040). Prior to oncological therapy, 42 (28.2%) patients had recorded treatment of cardiovascular pathologies at a cardiology department and 44 (29.5%) developed RILT, measured by dyspnea grade ≥ 2 according to CTCAE v3.0 within 6 months after radiotherapy.

**Results:** Half of the patients with cardiac comorbidity (21/42) presented with dyspnea grade ≥ 2 within 6 months after RCHT, compared to 21.5% (23/107) of those without such comorbidity. The odds ratio of RILT for a patient with a cardiac comorbidity was 3.65 (p-value < 0.001, 95% CI: 1.70 - 7.81, see Figure 1). Conversely, for common factors associated with RILT, such as mean lung dose, age, smoking status, World Health Organization performance status and Forced Expiratory Volume in 1 second no significant associations were