## The use of pet texture analysis to predict lymph node metastases in patients with oesophageal cancer

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**Purpose or Objective**: The prognosis of oesophageal cancer (OC) is poor, with overall 5-year survival approximately 15%. The presence of lymph node metastases (LNMs) is a major prognostic indicator and the ability to identify LNMs is important. Texture analysis of medical images enables additional information to be extracted from routine staging investigations and quantifies intra-tumoural characteristics via non-invasive methods. The aim of the study is to obtain preliminary data investigating the association of texture variables and LNMs.

**Material and Methods**: A prospectively maintained database including clinical, radiological and pathological details of consecutive OC patients with biopsy proven adenocarcinoma in South East Wales from October 2010 to August 2013 was retrospectively analysed. All patients underwent PET/CT staging. Consecutive patients were grouped into those with and without LNMs on endoscopic ultrasound (EUS), considered the superior staging investigation for loco-regional assessment. Texture analysis of the primary tumour was carried out on the PET images using PET-STAT, software developed and written in the Matlab-based open source software CERR. The tumour was outlined with ATLAAS, a learning algorithm for optimised automatic segmentation developed at Cardiff University. Seventeen variables including SUVmax, metabolic tumour volume (MTV), total lesion glycolysis (TLG) and intensity variability (IV) were calculated. Table 1 details all variables calculated. Patients with primary tumour volume less than 5 ml and distant metastatic disease were excluded. Independent T-tests were used to identify promising texture variables for future study. A p-value <0.05 was considered significant. Primary outcome was LNMs on EUS.

**Results**: Eighty-one patients underwent staging with PET/CT and EUS [male 67, median age 66 (range 42-82)]. Forty patients were staged as N0 on EUS, with 41 having evidence of regional lymph node metastases. Independent T-tests demonstrated significant differences between patients with and without LNMs for MTV [mean 38.45 v 21.71; t(56.03)=-2.449, p=0.017], TLG [mean 328.72 v 208.66; t(74.721)=-2.023, p=0.047], Coarseness [mean 0.010 v 0.013; t(79)=3.107, p=0.003], Entropy [mean 6.15 v 5.91; t(79)=-2.075, p=0.041] and IV [mean 21.09 v 13.45; t(64.366)=-2.458, p=0.017].

**Conclusion**: Preliminary results have shown a number of texture variables that have the potential to predict LNMs. On-going work at our institution is investigating the added benefit of texture analysis when developing robust clinical predictive models.

### PO-0703
## Perioperative chemotherapy versus neoadjuvant chemoradiotherapy for esophageal adenocarcinoma

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**Purpose or Objective**: Perioperative chemotherapy (pCT) and neoadjuvant chemoradiotherapy (nCRT) are well-established therapies to improve survival for resectable non-metastatic esophageal carcinoma. However, the optimal type of treatment for esophageal adenocarcinoma is currently under debate. Until now, limited evidence is available to determine whether pCT or nCRT is most beneficial with regard to toxicity, pathologic outcome and survival. Therefore, the aim of this study was to compare toxicity, pathologic outcome and survival after pCT versus nCRT and surgery in patients with esophageal adenocarcinoma.

**Material and Methods**: Consecutive patients who underwent pCT or nCRT followed by esophagectomy for cancer between October 2006 and September 2015 in a single institution were analyzed. The pCT regimen consisted of intravenous administration of epirubicin, cisplatin and capecitabin, whereas nCRT consisted of paclitaxel and carboplatin with concurrent radiotherapy. Toxicity of grade 3 or higher was scored according to the National Cancer Institute Common Terminology Criteria for Adverse Events. Data on surgical procedures, complications and follow-up were collected from a prospectively maintained database. Full propensity score-matching was applied to generate matched sets of cases based on pretreatment covariates in order to create comparable groups. Univariable analysis was performed to determine differences between the two groups. Disease-free survival (DFS) and overall survival (OS) were assessed using the Kaplan-Meier method and log-rank test.

**Results**: A total of 189 eligible patients were identified of whom 19 were discarded after propensity matching; 86 underwent pCT and 84 received nCRT. During preoperative therapy, thromboembolic events occurred more frequently in the pCT group (18% vs. 0%, p<0.001), while leukopenia occurred more frequently in the nCRT group (25 vs. 11%, p=0.013). Complete resection with no tumor within 1 mm of the resection margins (R0) was achieved in 90% of patients in the pCT group, as opposed to 96% in the nCRT group (p=0.103). Pathologic tumor regression was more frequently observed in patients who underwent nCRT compared to pCT (p<0.001). There was no significant difference between the groups with regard to risk of surgical complications, length of hospital stay or in-hospital mortality. Both treatments resulted in comparable 3-year DFS (49% vs. 53% for pCT and nCRT, respectively, log-rank p=0.774) and OS rates (48% vs. 51%, log-rank p=0.842) (Figure 1).



**Overall survival**
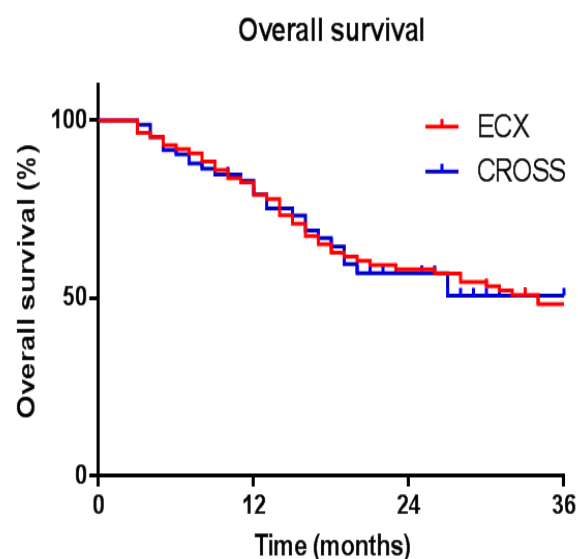
**Conclusion**: Perioperative chemotherapy (MAGIC) and neoadjuvant chemoradiotherapy (CROSS) were associated with comparable toxicity and postoperative morbidity. Although neoadjuvant chemoradiotherapy was associated with improved tumor regression compared to perioperative chemotherapy, this finding did not translate into improved R0 resection or 3-year survival rates.

### PO-0704
## Patterns of replase in stage III thoracic esophageal squamous cell carcinoma patients after surgery

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**Purpose or Objective:** To evaluate the patterns of recurrence and its value in target delineation for postoperative radiotherapy(PORT) in patients with stage III thoracic esophageal squmous cell carcinoma(ESCC) after esophagectomy.

**Material and Methods:** 395 patients with stage III thoracic ESCC treated with radical esophagectomy from Jan, 2008 to Dec, 2011 were enrolled in this study. No patients has accepted preoperative adjuvant therapy. There were 302 males and 93 females; median ages was 60 years old (range 33-83). There were 33 patients located in upper-, 273 in middle- and 89 in low-segment. 375 patents has operated with two-field and 22 with three-field esophagectomy. The median number of dissected lymph nodes were 10 per case (range 1-34). There were 244 with stage IIIA, 106 with IIIB and 45 with IIIC. There were 97 patients received with surgery alone, 212 with postoperative chemotherapy(POCT), 86 with PORT(30 with POCT and PORT). Diagnosis of recurrence was parimarily based on CT images, some of which were biopsy-confirmed. The location and time of tumor recurrences were analyzed.

**Results:** The overall failure rates was 75.7%(299/395). Locoregional recurrence(LR) was found in 48.4% of patients, distant metastasis(DM) in 16.2%, and LR plus DM in 4.3%; the total rate of LR and DM were 52.7% and 20.5%, respectively. There were 208 patients recurred with LR, 26.9%(56) recurred in supraclavicular/neck(51 in supraclavicular), 69.7% (145) in mediastinum, and 19.7% (41) in upper abdomen (38 in para-aortic lymph node). 92.8% of LR involved locoregional lymph nodes; the rate of anastomotic recurrence was 5.1% (20/395). Further analysis showed that upper-mediastinal recurrence accounted for 88.7% of mediastinal recurrence. The estimated 1-, 3-, and 5-year accumulated LR rates for all patients were 32.2%, 55.1% and 60.1%. Multivariate COX and logistic regression analysis showed that TNM stage and adjuvant therapy were independent factor for LR ($p<0.05$); PORT could reduce LR, especially in patients with middle-thoracic segment, IIIA and IIIB disease, two-field esophagectomy, less than 6 dissected lymph node or severe adhesion at surgery ($p<0.05$); but POCT did not decrease LR.

**Conclusion:** The recurrence rate was very high in stage III thoracic ESCC patients, LR was the main pattern of failure; TNM stage was one of the most important factor for LR. PORT could reduce LR but POCT could not. Upper-mediastinum was the most common site of recurrence, followed by supraclavicular and para-aortic regions; these areas should be consedered the key target of PORT.

## PO-0705
**Clinical outcomes for inoperable HCC treated with SBRT: results on 71 patients and 102 lesions.**
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**Purpose or Objective:** Aim of this study is the evaluation of feasibility and efficacy of SBRT in the treatment of unresectable hepatocellular carcinoma (HCC).

**Material and Methods:** Patients with 1-3 inoperable HCC lesions with diameter<6cm were treated by SBRT. Prescription dose was 36-75Gy in 3-6 fractions. SBRT was delivered using the volumetric modulated arc therapy technique with flattening filter free photon beams. The primary end points of this study were in-field local control (LC) and toxicity. Secondary end points were overall survival (OS) and progression free survival (PFS).

**Results:** From February 2011 and April 2015, 71 patients with 102 HCC lesions were irradiated. All patients had Child-Turcotte-Pugh class A or B disease. Median follow-up was 9 months (range 5-43 months). Actuarial LC at 1 and 2-years was 92% and 81%. An Equivalent Dose >100Gy was a significant prognostic factor for LC in univariate analysis, with a 1-2 years LC rates of 99%-94% for a subgroup of lesions treated with a BED≥100Gy and 58% -29% for lesions treated with a BED <100Gy (p<0.001). Median OS was 25 months. Actuarial OS at 1 and 2 years was 70% and 60%, respectively. Univariate analysis showed that OS is correlated with LC (p<0.02), BED>100 (p<0.05) and Cumulative GTV<5cm (p<0.04). Median PFS was 9 months. Grade≥3 toxicity was observed in 7 patients (18%). No classic RILD was observed.

**Conclusion:** Our study shows that SBRT is a safe and effective treatment for selected patients with inoperable HCC. Local control rates and toxicity profile were encouraging.

## PO-0706
**Supraclavicular lymphnode disease is not an independent prognostic factor in esophageal cancer**
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**Purpose or Objective:** In the TNM 7 staging, supraclavicular lymph nodes (SCN) are considered distant metastasis and thus prognostically unfavourable. This is one of the reasons for a generally accepted policy to treat these patients with supraclavicular disease spread and without further distant metastases with definitive chemoradiation (dCRT), irrespective of N stage. However, the worse prognostic value of a supraclavicular disease may be questioned. We analysed the prognostic value of supraclavicular disease in dCRT for esophageal cancer.

**Material and Methods:** We retrospectively analyzed 207 patients treated between 2003 and 2013 with a standardized protocol of definitive chemoradiation (dCRT) for esophageal cancer to identify the prognostic value of metastasis in the supraclavicular lymphnodes on treatment failure and survival, with special attention to the relation between supraclavicular disease and N stage. All patients were treated with external beam radiotherapy (50.4 Gy in 28 fractions) combined with weekly concurrent paclitaxel 50 mg/m2and carboplatin AUC2.

**Results:** Median follow up time for patients alive was 43.3 months The median overall survival (OS) for all patients was 17.5 months. OS at 1, 3 and 5 year was 67%, 36.1% and 21.3% respectively. For patients with a metastasis in a supraclavicular lymph node, overall survival was 23.6 months compared to 17.1 months for patients without a metastasis in the SCN (p=0.51). In multivariate analyses , higher cT status, cNstatus and tumor length were found prognostically unfavorable, but a positive supraclavicular lymph node was not of independent prognostic value for survival (p=0.67). The relationship between SCN involvement and N stage was analyzed separately. Median OS for tumors with SCN involvement and N0/1 disease was 49.0 months (15.4-82.6) compared to 17.4 months in patients with N2/3 disease (95%CI 99-24.8 p=0.097). Median diseasefree survival (DFS) for tumors with SCN involvement and N0/1 disease was 51.6 months (95%CI 0-108.5) compared to 8.2 months in the N2/3 group (95%CI 6.2-10.1 p=0.028). No significant difference in