>48cc group was 90% vs 46% (chi square p = .001). ROC curve analysis of our oropharyngeal subgroup revealed similar results with a cut off of 48cc with AUC of 0.802 (0.677-0.927) and sensitivity / specificity of 86%/70%. The RR for the <48cc and >48cc group was 88% vs 40% (chi square p = .001). The likelihood of not responding increased by 1.8% for 1cc increase in TTV for the entire cohort and by 2.4% for our oropharyngeal subgroup.

**MULTIVARIATE LOGISTIC REGRESSION MODEL FOR RESPONSE**

**ODDS OF NON RESPONDING (P): LOG(P) = 4.075 + 0.018 X TTV – 0.478 X AVGHB – 1.575 (IF STAGE 3)**

Conclusion: Our study shows that the TTV is a significant and independent prognostic factor in patients with locally advanced head and neck cancer in terms of predicting local control. Implications for existing management paradigms include, stratification according to TTV in future randomized trials and consideration of altered fractionation and/or dose escalation to the primary disease for patients with TTV $>48cc$.

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Prognostic role of FDG PET-CT performed before and during radiotherapy for nasopharyngeal cancer

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**Purpose or Objective:** To evaluate the prognostic value of 18F-FDG PET-CT performed prior to (prePET) and during the third week (iPET) of radiation therapy (RT) in patients with newly diagnosed nasopharyngeal carcinoma (NPC).

Material and Methods: Thirty patients with newly diagnosed NPC treated with radical RT and Cisplatin-based chemotherapy underwent prePET and iPET. The median follow up was 26 months (range 8-66). AJCC staging included 12 patients in stage II, 8 in stage III and 10 in stage IV. The maximum standardised-uptake-value (SUVmax), metabolic-tumour-volume (MTV) and total-lesional-glycolysis (TLG) of primary tumour (PT), the index-node (IN) (defined as lymph node with highest TLG), total lymph nodes (TN) and combined primary tumour and nodal (PTN), and their % reductions in iPET were analysed, and results were correlated with 2-year loco-recurrence-free-survival (LRFS), regional-failure-free-survival (RFFS), distant-metastatic-failure-free-survival (DMFFS), disease-free-survival (DFS), and overall-survival (OS), using Kaplan-Meier (KM) analysis. Optimal-cutoffs (OC) were derived from Receiver-Operating-Characteristic curves for the best combined sensitivity and specificity.

**Results:** For LRFS, the only statistically significant predictor was reduction in primary tumour MTV by $>50\%$ in iPET (95.2% vs 75.0%, p = 0.024). For other treatment outcomes, only nodal or combined PTN predicted treatment outcomes. The IN SUVmax (pre-PET OC=10.45g/mL and iPET OC=8.15g/mL) and TLG (pre-PET OC=90g and iPET OC=33.4g) provide the overall best predictor of outcome, with significant associations with RFFS (iPET only), DMFFS (prePET), DFS (prePET and iPET) and OS (prePET): For RFFS, iPET IN SUVmax and TLG were best predictors: the 2-year KM survivals were 100% vs 50%, p < 0.001 and 100% vs 44%, p = 0.032 respectively. For DMFFS, prePET IN SUVmax and TLG were best predictors: 100% vs 51.9%, p = 0.004 and 100% vs. 47.6%, p = 0.002. For DFS, prePET IN TLG and iPET IN SUVmax were best predictors: 87.5% vs. 33%, p = 0.045 and 78.7% vs. 20%, p = 0.01. For OS, prePET IN TLG and iPET IN TLG were best predictors: 100% vs 72.7%, p = 0.048 and 91.7% vs 68.6%, p = 0.05. The IN metabolic parameters demonstrated stronger correlation with outcome than PT or PTN, and equivalent correlation to the TN except IN was better in predicting OS.

Conclusion: The metabolic parameters of prePET and iPET can provide complementary prognostic biomarkers of patient outcomes. These parameters may have a role in adaptive therapy for NPC, and identifying the best treatment strategy for precision individualised chemo-radiotherapy combinations. We have demonstrated IN to be a useful novel imaging biomarker for predicting all treatment outcomes, and offers additional potential advantage of ease of generation and reproducibility compared to TN or PTN.