in British Columbia (BC), while controlling for physician case volume and rurality of patient residence. **Methods and Materials**: The BC Cancer Registry (BCCR), a population-based provincial database, was used to identify all patients in BC diagnosed for the first time with a primary non-thyroid HNC and treated with radiotherapy between 2006 and 2011. Patient demographics, pathology, stage, treatments, and death data were abstracted. Chart review of all patients was performed using the British Columbia Cancer Agency Information System (CAIS). Patients were categorized as residing in large, small and rural local health authorities (LHAs) using BC Stats and BC Ministry of Health information. **Results**: The five-year distant control (DC) and OS were 89% and 70%; in 367 (40%); PORT was used in 452 (49%); and CCT in 80 (9%). LVI: 115 (13%); PNI: 416 (46%). Bilateral ND was performed among British Columbia Cancer Agency treatment centres after controlling for rurality, physician case frequency, IMRT use, and other patient and tumour characteristics. **Results**: 2330 HNC patients were included in our study. The five-year head and neck cancer survival (HNCSS) for the Abbotsford, Fraser Valley, Southern Interior, Vancouver and Vancouver Island centres was 72%, 71%, 73%, 75% and 68%, respectively (p = 0.54), while OS was 59%, 60%, 60%, 65% and 56%, respectively (p = 0.06). On multivariable analysis, after controlling for age, gender, cancer stage, anatomical site, treatment and physician case frequency, neither HNCSS (HR range = 0.92-1.03; p = 0.57-0.91) nor OS (HR range = 0.93-1.07; p = 0.47-0.92) was significantly different by treatment centre. OS was also not significantly different for patients treated by physicians with low case frequency (HR = 0.96; 0.77-1.19; p = 0.72) and middle case frequency (HR = 1.01; 0.83-1.23; p = 0.91) in reference to high case frequency. There was no significant difference in OS among patients living in rural LHAs (HR = 0.97; 0.85-1.11; p = 0.67) and small LHAs (HR = 1.13; 0.86-1.47; p = 0.38) in reference to large LHAs. **Conclusions**: There was no significant difference in survival among British Columbia Cancer Agency treatment centres after controlling for differences in rurality, physician case volume and other potential confounding variables.

20 IMPACT OF LYMPH NODE DENSITY ON DISTANT METASTASIS AND SURVIVAL IN RESECTED ORAL CAVITY SQUAMOUS CELL CARCINOMA Ali Hosni, David Goldstein, Shao Hui Huang, Wei Xu, Yugao Song, Andrew Bayley, Scott V. Brattman, John Cho, Meredith Giuliani, Georges Farha, Lee Chin, Amanpreet Dhillon, Stephanie Lim-Reinders, Jindyn Cifuentes Gaitan, Tatiana Konrad, Drew Brotherston, Curtis Caldwell, Justin Lee, Irene Karam, Ian Poon University of Toronto, Toronto, ON

**Purpose**: Lymph node density, number of positive lymph nodes/total number of excised lymph nodes has been shown to be associated with outcomes in multiple malignancies. In this study, the impact of LND on distant metastasis (DM) and overall survival (OS) in oral cavity squamous cell carcinoma (OSCC) was investigated. **Methods and Materials**: Retrospective review of pN0-2 OSCC patients treated between 1994-2012 with curative surgery with neck dissection (ND) +/- post-operative radiotherapy (PORT) with or without concurrent chemotherapy (CCT). LND was subjected to multivariable analysis (MVA) of DM and OS, adjusted for PT3-4 category, extracapsular extension (ECE), high histological Grade (G3), lymphovascular invasion (LVI), perineural invasion (PNI), and tumour subsite. **Results**: Overall 914 patients were identified; median age: 61 years (18-92); median follow up: 51 months (1-189); PT3-4: 283 (31%); pN-classification: N0: 482 (53%), N1: 128 (14%), N2a: 6 (0.5%); N2b: 225 (24.5%); N2c: 73 (8%); median number of dissected nodes: 36 (6-125); median number of pN+: 2 (1-49); median LND for pN+: patients: 0.06; ECE: 187 (20%); G3: 147 (16%); LVI: 115 (13%); PNI: 416 (46%). Bilateral ND was performed in 367 (40%); PORT was used in 452 (49%); and CCT in 80 (9%). The five-year distant control (DC) and OS were 89% and 70%; respectively. pT3-4 (p < 0.001), G3 (p < 0.001), LVI (p = 0.0013), and PNI (p < 0.001) were all associated with high LND. On MVA, LND > 0.06 was associated with more DM (HR = 1.8; 95%CI = 1.1-3.1; p = 0.017) and lower OS (HR = 2; 95%CI = 1.4-2.8; p = 0.001). In subgroup analysis of pN2 patients (n = 304): higher LND (> 0.14) was associated with lower five-year DC (67%, p = 0.014) and OS (25%, p = 0.01), and on MVA within the pN2 subgroup, both higher LND (p < 0.001) and ECE (p = 0.006) were associated with lower OS. **Conclusions**: High LND is associated with higher rate of DM and lower OS in OSCC. LND should be assessed in pN2 patients in future prospective trials to select patients for adjuvant therapies.

21 CAN INTRATREATMENT PET CT-BASED ADAPTIVE RADIOTHERAPY REDUCE TREATMENT MARGINS IN HEAD AND NECK CANCERS? Georges Farha, Lee Chin, Amanpreet Dhillon, Stephanie Lim-Reinders, Jindyn Cifuentes Gaitan, Tatiana Konrad, Drew Brotherston, Curtis Caldwell, Justin Lee, Irene Karam, Ian Poon University of Toronto, Toronto, ON

**Purpose**: Modern radiation therapy (RT) techniques offer precise delivery to the defined targets in head and neck cancer (HNC) while respecting surrounding critical organ tolerances. This is due in part to the enhanced ability to define the gross tumour volume (GTV) with supplemental imaging such as MRI and PET scans. As a standard, a high dose clinical target volume (CTV) of 5 mm is added to the GTV to further ensure complete coverage of gross disease. However, HN tumours often shrink during RT, which suggests that the high dose CTV margin during treatment may be greater than the original 5 mm, thus leading to overdosage of normal tissues. This study intends to quantify the potential gain of an adaptive technique that maintains the CTV to a changing gross tumour volumes in a series of HNC patients treated with chemoradiotherapy. **Methods and Materials**: A prospective study in 2009 enrolled advanced HNC patients undergoing curative IMRT to receive a dynamic pre-treatment FDG PET-CT simulator scan, which was also repeated intratreatment (IT) between the 10th and 15th fraction. Fifty-two patients were evaluated. Two radiation oncologists separately contoured GTVs in the pre- and IT scans to account for inter-observer variability. Rigid fusion of the planning CT to pre- and IT PET-CT scans was performed. Margin expansions ranging from 5-5 mm were performed on the IT treatment CTV to volumetrically match the original CTV (as defined by the treating radiation oncologist), based on optimal Dice Similarity Indices (DSI). An identical process took place with the IT PET CT scan, where the IT GTV margins were expanded to the original treatment CTV. **Results**: Fifty-two patients were evaluated with a total of 152 targets (50 primaries and 102 LNs). Volume matching given by DSI showed that the pre-treatment GTV needed an average 7.22 ± 4.75 mm expansion to optimally match the clinical CTV while the IT GTV required a margin of 8.27 ± 4.18 mm. On average, the radial size of the primary CTV decreased by 1.05 ± 3.59 mm between pre- and IT scans but 17 patients (32.7%) had a shrinkage over 5 mm and six patients (11.5%) had tumour growth of more than 5 mm. Nineteen patients had a paradoxical response between the primary and the LNs. On multivariate analysis, after controlling for smoking history, HPV status and stage, non-smokers only showed significant shrinkage in both primaries (mean = 2.34 ± 0.64, p = 0.0004) and LNs (mean = 2.52 ± 0.92, p = 0.008). In total, primaries and LNs had similar outcome with a mean of 1.14 ± 3.99 mm and 0.67 ± 3.63 mm respectively (p = 0.54). **Conclusions**: Our results show that HNC tumour shrinkage during RT is highly variable. A subset of patients is highly responsive to treatment where an adaptive approach to reduce treatment margins (CTV) may reduce normal tissue toxicities. Non-smokers respond better than smokers while HPV-positive patients don’t seem to have an early response at two to three weeks.