

would result in equivalent control and survival, while reducing acute and late toxicity.

**Materials and Methods:** After IRB approval, an institutional database was queried for patients with HPV or p16 positive non-metastatic oropharyngeal cancers treated with definitive radiotherapy (RT), and 306 patients were available for analysis. Patients receiving  $< 70$  or  $\geq 70$  Gy were compared for potential prognostic factors via Fischer's Exact Test. Outcomes, including locoregional control (LRC), disease free survival (DFS), and overall survival (OS) were estimated via Kaplan-Meier method, with comparisons via log-rank test.

**Results:** Median follow-up of all patients was 28 months. Patients in the low dose group ( $n=43$ ) were treated to a median of 66 Gy (range 62 – 68 Gy), compared to a median of 70 Gy (range 70 – 75.2 Gy) in the high dose group ( $n=263$ ). Patients in the high dose group were more likely to be higher ICON stage ( $p=0.012$ ) and to receive chemotherapy ( $p<0.001$ ), but were otherwise well balanced. There were no significant differences in LRC ( $p=0.748$ ), DFS ( $p=0.741$ ), or OS ( $p=0.709$ ) between the low or high dose groups, even when stratifying by ICON stage or the use of chemotherapy. Patients in the low dose group were significantly less likely to receive a reactive gastrostomy tube (PEG) ( $p=0.002$ ). While there was no difference in late grade 3 or greater toxicity between the groups ( $p=0.053$ ), of note all ( $n=22$ ) occurred in the high dose group.

**Conclusions:** Mild dose de-escalation appears to provide similar LRC, DFS, and OS for HPV positive oropharyngeal cancer patients. Even this small reduction may result in lower rates of PEG placement and perhaps late toxicity.

#### (P053) Patterns of Failure After Multimodality Treatment of

#### Esthesioneuroblastoma: High Risk for Meningeal Failure Among Patients With Dural Invasion at Long-Term Followup

Yao Yu, MD,<sup>1</sup> Ivan H. El-Sayed, MD,<sup>1</sup> Michael W. McDermott, MD,<sup>1</sup> Norbert Kased, MD,<sup>2</sup> Christine M. Glastonbury, MD,<sup>1</sup> Adam A. Garsa, MD,<sup>1</sup> and Sue S. Yom, MD, PhD, MAS<sup>1</sup>; <sup>1</sup>University of California, San Francisco, <sup>2</sup>Scripps

**Background:** In long-term followup, we have noticed late intracranial recurrences among esthesioneuroblastoma patients treated with surgical resection and postoperative therapy. The aim of this study was to describe and quantify these patterns of failure.

**Methods / Materials:** We conducted a retrospective review of records of 44 patients who received definitive-intent combined-modality therapy at our institution for esthesioneuroblastoma at either initial presentation or recurrence between March 1995 and September 2015. Patients underwent surgical resection followed by fractionated radiotherapy +/- chemotherapy. Initial and recurrent disease extent were categorized based on radiologic, operative, and pathologic findings. Between-group differences were assessed using the Kaplan-Meier method and log-rank test.

**Results:** Sixty-five percent (26/40) of patients had locoregionally advanced disease (Kadish C or D), and 36% (8/22) had high grade histology (Hyams 3 or 4). The extent of invasion was quantifiable in 33 patients; 48% (16/33) had no intracranial extension, 12% (4/33) had intracranial extension without dural/brain involvement, 21% (7/33) had dural but no brain involvement, and 18% (6/33) had invasion of dura and brain parenchyma. At a median follow-up of 98 months (range=6-191), 19/44 (43%) patients recurred; failures were: 9 local, 13 dural/leptomeningeal, 6 regional, and 6 distant (10 patients had  $\geq 2$  categories of failure). The median times to first recurrence and dural/leptomeningeal failure were 41 (range=5.9-80) and 39 months (range=6-140), respectively. Eight-year disease-free and overall survival rates were 53% and 66%, respectively. Among the 33 patients, those with  $\geq$ dural invasion ( $n=13$ ) versus those without ( $n=20$ ) were at higher risk for dural/leptomeningeal failure (40% vs 8% at 96 months, log-rank  $p=0.0257$ ). Isolated dural/leptomeningeal failures were the most common pattern of failure ( $n=5$ ) among all patients, followed by isolated local recurrence ( $n=3$ ).

**Conclusions:** Esthesioneuroblastoma patients presenting with dural invasion at the time of resection are at substantial and unique risk for long-term dural/leptomeningeal failure.

#### (P054) The Impact of Adjuvant Radiation Therapy for Malignant Salivary Gland Tumors

Meng Shao, MD,<sup>1</sup> Joseph Safdieh, MD,<sup>1</sup> Babak Givi, MD,<sup>2</sup> Anna Lee, MD,<sup>1</sup> Dylan F. Roden, MD,<sup>2</sup> Kwang Choi,<sup>1</sup> David Schwartz, MD,<sup>1</sup> and David Schreiber, MD<sup>1</sup>; <sup>1</sup>SUNY Downstate, <sup>2</sup>NYU

**Background:** The benefits of postoperative radiation therapy (PORT) for salivary gland tumors is unclear. The objective of this study was to analyze the outcomes of PORT for salivary gland tumors using the National Cancer Database.

**Methods:** Patients diagnosed with localized major salivary gland tumors who received partial or total parotidectomy from 2004-2012 were identified in the National Cancer Database. Only patients who had high grade or stage  $\geq$ III low grade disease were included. Patients were identified as having no PORT or having received PORT to a dose of 5,000-7000cGy to the head and neck region or the parotid region. In order to account for immortal time bias, those surviving  $< 6$  months from diagnosis were also excluded. Kaplan-Meier and Multivariable Cox regression were performed for the whole cohort and repeated only including those  $\leq 65$  years old to compare overall survival between those receiving PORT and those that did not.

**Results:** There were 4,068 patients identified, of whom 2,728 (67.1%) received PORT while 1,340 (32.9%) did not. The 5 year overall survival and median survival was 56% and 73.1 months, respectively for PORT compared to 50.6% and 61 months, respectively for no PORT ( $p<0.001$ ). On multivariable analysis, PORT (HR 0.78, 95% CI 0.71-0.86  $P<0.01$ ) was associated with improved survival. Older age, sub-mandibular gland location, squamous cell histology, pT3-4 disease, positive nodal disease, and positive margins were all associated with inferior survival. On repeat multivariable analysis of patients  $\leq 65$  years old, PORT remained associated with improved survival (HR 0.76, 95% CI 0.64-0.91,  $p=0.003$ ). Increasing age (HR 1.02), pT3-4 disease (HR 1.80-2.56), submandibular gland location (HR 1.67), high grade (HR 1.46), and positive margins (HR1.26) were associated with inferior survival.

**Conclusion:** In this large, database-based study, PORT was associated with improved overall survival. Large prospective studies are needed to confirm these results.

#### (P055) TCIA Imaging Database for Head and Neck Squamous Cell Carcinoma Patients Treated With Radiotherapy

Aaron J. Grossberg, MD, PhD,<sup>1</sup> Abdallah S.R. Mohamed, MD,<sup>1</sup> Sasi Karn Chamchod, MD,<sup>2</sup> William Bennett,<sup>3</sup> Kirk Smith, PhD,<sup>3</sup> Tracy Nolan, PhD,<sup>1</sup> Michael Kantor, BS,<sup>1</sup> Theodora Browne, BA,<sup>1</sup> David I. Rosenthal, MD,<sup>1</sup> and Clifton D. Fuller, MD, PhD<sup>1</sup>; <sup>1</sup>The University of Texas MD Anderson Cancer Center, <sup>2</sup>Chulabhorn Hospital, Bangkok, Thailand, <sup>3</sup>University of Arkansas for Medical Sciences

**Purpose/Objectives:** Cross sectional imaging is essential for the patient-specific planning and delivery of radiotherapy, a primary determinant of head and neck cancer (HNSCC) outcomes. Publicly shared RT data is scarce due to high complexity of RT structure data and the need for registration in time, space, and across planning sets. We here introduce an open access imaging database for patients treated with radiotherapy for HNSCC.

**Materials/Methods.** 2840 consecutive patients with HNSCC treated with curative-intent RT at MD Anderson Cancer Center from 2003 to 2013 were screened. Patients with whole-body PET-CT or abdominal CT scans both before and after RT were included ( $n=215$ ). Clinical data were retrieved from the MD Anderson Cancer Center custom electronic medical record system, ClinicStation. Using cross sectional imaging, we calculated total body skeletal muscle and adipose content before and after treatment. All files were de-identified and transferred to The Cancer Imaging Archive (TCIA) servers using the RSNA Clinical Trial Processor program. Files

were screened for errors or residual PHI using TagSniffer and Posda Tools software, reviewed by TCIA curators, then confirmed at the parent institution.

**Results.** The HNSCC collection is a dataset consisting of 130,428 DICOM files from 1266 series and 660 studies collected from 215 patients, which includes de-identified diagnostic imaging, radiation treatment planning, and follow up imaging. All imaging data are subject- and date-matched to clinical data from each patient, including demographics, risk factors, grade, stage, recurrence, and survival.

**Conclusions.** Recent advances in data archiving, patient de-identification, and image registration have allowed for the creation of a high quality RT-enriched imaging database within TCIA. Open access to these data allows for interinstitutional comparisons of complete RT details in non-randomized patient populations, allowing for a more granular understanding of three dimensional factors that influence treatment effectiveness and toxicity sparing.

#### (P056) A Proposed Revision to The kadish-morita Staging System for Esthesioneuroblastoma



Andrew Orton, MD, Daniel Evans, BS, Dustin Boothe, MD, Shane Lloyd, MD, Greg Stoddard, MStat, MBA, and Ying J. Hitchcock, MD; *University of Utah*

**Purpose/Objective(s):** Esthesioneuroblastoma (ENB) is a rare neuroendocrine malignancy of cranial nerve I that is typically staged using a system first proposed by Kadish et al. and later modified by Morita et al. We sought to determine if this system provides good survival discrimination, and propose a revision to the system.

**Materials and Methods:** The National Cancer Data Base was used to identify 1,124 adults with ENB. Patients were assigned a stage according to the Kadish system, as well as an alternative stage where nasal cavity-limited disease is combined with paranasal extension, and those with distant metastases are separated from those with regional lymph node involvement (r-Kadish). Survival discrimination was compared between the two systems using Cox, log-rank and Kaplan-Meier methodologies as well as Harrell's C and Somers' D statistics of concordance.

**Results:** Over the median follow-up period of 46 months, 264 patients (23.6%) died. Kadish stage A and B patients did not differ in their survival (log-rank  $p = 0.26$ ). Within Kadish stage D, patients with lymph node only disease and those with distant metastatic disease demonstrated significantly different survival (log-rank  $p < 0.01$ ). Log-likelihood scores for the Kadish staging system and the proposed r-Kadish system were -1710 vs. -1698, respectively (less negative values indicate superior survival discrimination between stages). Both Harrell's C (0.659 vs. 0.674  $p = 0.02$ ) and Somers' D (0.330 vs. 0.347,  $p = 0.02$ ) statistics of concordance were superior for the revised staging system (larger values indicate superior concordance between stage and observed survival).

**Conclusions:** Patients with Kadish stage A and B disease demonstrated similar survival. Patients grouped as kadish stage D experienced dissimilar survival if their disease was metastatic versus limited to lymph nodes. A revision to the system is proposed that improves survival discrimination based on anatomic extension.

#### (P057) Esthesioneuroblastoma: Evidence for the Role of Adjuvant Radiotherapy in Locally Advanced Disease



Andrew Orton, Dustin Boothe, Daniel Evans, Shane Lloyd, Marcus Monroe, Randy Jensen, Dennis Shrieve, and Ying J. Hitchcock; *University of Utah*

**Background:** Esthesioneuroblastoma (ENB) is a rare neuroendocrine tumor of the olfactory nerve. We sought to define treatment patterns and outcomes by treatment modality using a large national cancer registry.

**Methods:** The National Cancer Data Base was queried for patients with ENB treated with surgery, radiation and/or chemotherapy between 2004 and 2012. Log-rank statistics were used to compare survival outcomes by primary treatment modality. Logistic regression modeling was used to identify predictors of receipt of post-operative radiotherapy (PORT). Cox proportional hazards modeling was used to determine the survival benefit of PORT. Subgroup analyses were conducted to identify subgroups that derived the greatest benefit of PORT. Missing data were handled by multiple imputation methodologies.

**Results:** Primary surgery was the most common treatment modality (90%) and resulted in superior survival compared to radiation ( $p < 0.01$ ) or chemotherapy ( $p < 0.01$ ). On multivariate analysis, PORT was associated with decreased risk of death (HR 0.53,  $p < 0.01$ ). PORT showed a survival benefit in Kadish stage C (HR 0.42,  $p < 0.01$ ) and D (HR 0.09,  $p = 0.01$ ), but not Kadish A (HR 1.17,  $p = 0.74$ ) and B (HR 1.37  $p = 0.80$ ). Patients who received chemotherapy derived greater benefit from PORT (HR 0.22,  $p < 0.01$ ) compared with those who did not (HR 0.68,  $p = 0.13$ ). Predictors of PORT included stage, grade, extent of resection, and chemotherapy use.

**Conclusions:** We present the largest analysis of ENB to date. Best outcomes were obtained by primary surgery. The benefit of PORT was driven by patients with stages C and D disease, and those receiving chemotherapy.

#### (P058) Side by Side: Comparing Receipt of Supportive Therapy for Head And Neck Cancer at an Adjacent Private and County Hospital



Haley K. Perlow, BS, Raphael Yechieli, MD, Ben Silver, BS, Adam Jaffe, BS, Deukwo Kwon, PhD, Brian Jimenez, BS, Stuart Samuels, MD, and Stephen Ramey, MD; *University of Miami*

**Purpose:** National guidelines emphasize that consultation with speech and swallowing caregivers is essential for head and neck cancer patients. This study evaluates whether these services are received equally at an adjacent county and private hospital and examines which other demographic or treatment factors are associated with receipt of these services.

**Methodology:** This retrospective analysis examined receipt of speech/swallowing consultation among non-metastatic laryngeal or oropharyngeal cancer patients treated with radiotherapy (RT) from 01/01/2014 to 06/30/2016 at either a private hospital or an adjacent county hospital. Variables analyzed included race/ethnicity, preferred language, insurance status, immigration documentation status, gender, age, treating hospital, comorbidity score, primary treatment modalities, time to treatment initiation (TTI), and AJCC stage. Univariate (UVA) and multivariate (MVA) analyses were conducted using logistic regression.

**Results:** 239 patients were included (56 patients—county hospital and 183 patients—private hospital). 28.6% of patients received speech/swallowing therapy prior to radiotherapy (pre-RT) at the county hospital versus 54.1% at the private hospital. On UVA, not receiving pre-RT speech/swallowing consultation was significantly associated with county hospital treatment, uninsured status, increased TTI, and undocumented status. In contrast, variables associated with increased likelihood of speech/swallowing consultation pre-RT included receipt of surgery and/or chemotherapy, Non-Hispanic Black vs Non-Hispanic White, and AJCC Stage III or IV vs Stage I. County hospital treatment (OR 0.29,  $p = 0.029$ ) and increased TTI (OR 0.99,  $p = 0.033$ ) both maintained a significant association with decreased receipt of speech/swallowing consultation on MVA. MVA showed only treatment modalities were associated with increased speech/swallowing consultation: surgery before RT (OR 10.1,  $p = 0.002$ ) and surgery before chemotherapy before RT (OR 10.7,  $p = 0.001$ ) vs RT alone.

**Conclusion:** Speech and swallowing services are not received equally when comparing a county and private hospital. Quality metrics may be necessary to establish benchmarks for supportive services and reduce these disparities.