**SS 02 NR(HN)-01  08:00**
Temporal bone chondroblastoma: imaging characteristics with pathologic correlation
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**PURPOSE:** Chondroblastoma commonly involves temporal bone in the craniofacial region, but its imaging features have not been elucidated. This study aimed to describe the imaging features of temporal bone chondroblastoma (TBC) with their pathologic correlation.

**MATERIALS AND METHODS:** Radio-pathologic correlation was performed in five patients with TBC from our database and in 11 patients identified through a PubMed search.

**RESULTS:** TBCs commonly involve the squamous part, temporal and infratemporal fossae, temporomandibular joint, and tympanic cavity, with the following features: high attenuation with calcification, heterogeneity, low signal intensity (SI) on T2-weighted imaging (T2WI) with enhancement, a smooth interface to the brain, and strong hypermetabolism on FDG PET/CT. The heterogeneous low SI on T2WI was correlated with various histopathologic components including calcification and hemosiderin deposition.

**CONCLUSION:** TBC usually appears as an expansile, heterogeneous, hypermetabolic mass in the middle cranial fossa, frequently with low SI on T2WI, reflecting various degrees of calcification and hemosiderin deposition.

**SS 02 NR(HN)-02  08:10**
Necrotic lymph nodes as an imaging biomarker for risk stratification in tongue squamous cell carcinoma
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**PURPOSE:** Tongue squamous cell carcinoma with cervical lymph node metastasis has a poor prognosis, and a subset of patients with aggressive disease experience treatment failure. Our aim was to determine whether the extent of metastatic lymph node burden on preoperative CT or MRI can serve as an imaging biomarker to predict treatment failure in tongue squamous cell carcinoma.

**MATERIALS AND METHODS:** We identified patients with tongue squamous cell carcinoma and preoperative neck CT or MRI. Demographic and clinical variables were recorded. We retrospectively classified the metastatic lymph node burden on CT or MRI as with or without necrosis and assessed radiologic extracapsular spread. Biopsy, subsequent imaging, or clinical follow-up was the reference standard for treatment failure. Cox proportional hazard regression analyses of clinical, demographic, and anatomic variables for treatment failure were performed.

**RESULTS:** Seventy-three patients were included with a mean follow-up of 31 months. In univariate analysis, the following variables had a statistically significant association with treatment failure: necrotic lymph nodes, sublingual space involvement, depth of invasion, and clinical N-stage. The multivariate Cox proportional hazard model resulted in a model that included necrotic lymph nodes and N-stage as independent predictors of treatment failure.

**CONCLUSION:** In tongue squamous cell carcinoma, patients with necrotic lymph node metastases are at higher risk for treatment failure. Necrotic lymph nodes may serve as an imaging biomarker to tailor individual treatment regimens.
**SS 02 NR(HN)-03  08:20**

**Discrimination of human papillomavirus status using CT texture analysis in oropharyngeal squamous cell carcinomas**

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**PURPOSE:** The human papilloma virus (HPV) status is an important prognostic factor in patients with oropharyngeal squamous cell carcinoma (OPSCC). The purpose of this study was to evaluate the use of texture analysis for distinguishing HPV-positive and HPV-negative OPSCC in primary tumor and metastatic lymph nodes.

**MATERIALS AND METHODS:** This retrospective study comprised 100 patients with primary OPSCC and 63 patients with metastatic lymph nodes who have known HPV status and underwent pretreatment contrast-enhanced CT between August 2011 and April 2017. The tumor heterogeneity on CT was assessed using TexRAD software. The imaging features of primary tumor and metastatic lymph node were also evaluated. Differences between HPV-positive and HPV-negative groups were analyzed using χ² test for categorical variables and Mann-Whitney U test for continuous variables. For heterogeneity parameters, ROC curve analysis was performed for discrimination of HPV status.

**RESULTS:** The HPV-positivity was 37.0% for the primary tumors and 50.8% for metastatic lymph nodes. Patients who had HPV-positive OPSCC were more likely to present with N-positive disease (p = 0.005). HPV-positive groups demonstrated more frequently well-defined border of primary tumor (p < 0.001) and cystic nodal metastasis (p = 0.011) than HPV-negative groups. Significant differences were seen in all CT texture analysis parameters with fine and medium spatial scaling filter (mean, p = 0.029; SD, p < 0.001; entropy, p < 0.001; MPP, p = 0.006; skewness p = 0.004; kurtosis, p < 0.001 for fine filter, mean, p = 0.003; SD, p < 0.001; entropy, p < 0.001; MPP, p = 0.002; skewness p = 0.005; kurtosis, p = 0.027 for medium filter) between HPV-positive OPSCC and HPV-negative OPSCC. The Standard deviation (SD, p = 0.042), entropy (p = 0.028), mean positive pixels (MPP, p = 0.005) and kurtosis (p = 0.027) with fine filter were significantly different at metastatic lymph nodes according to HPV status. Entropy with medium filter was the best discriminator between HPV-positive and HPV-negative OPSCC (AUC = 0.811) for primary tumor and mean positive pixels with fine filter (AUC = 0.661) for metastatic lymph nodes.

**CONCLUSION:** We found significant differences in heterogeneity parameters from texture analysis performed on pretreatment contrast-enhanced CT, according to HPV status in OPSCC. CT texture analysis can be additional tool for evaluation of HPV status in patients with OPSCC.

**SS 02 NR(HN)-04  08:30**

**Usefulness of US-guided core needle biopsy as a diagnostic tool for workup of cervical pathology in immunocompromised hemato-oncology patients**

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**PURPOSE:** To evaluate diagnostic performance and safety of ultrasound (US)-guided core needle biopsy (CNB) of cervical lesions in immunocompromised hemato-oncology patients. In immunocompromised hemato-oncology patients, excision biopsy is regarded as standard method for histopathologic diagnosis of cervical nodes. However, rapid diagnosis and bleeding control are crucial in these patients, which may be beneficial if we could use percutaneous method such as CNB, instead of surgical intervention.

**MATERIALS AND METHODS:** We retrospectively searched electronic medical records in our medical institute for the US-guided core needle biopsy of cervical lymph nodes in immunocompromised hemato-oncology patients. From 2012 January to 2017 April, 142 nodes in 128 patients (M:F = 76:52; mean age, 46.3 years; range, 7-87 years) were enrolled. We reviewed the histopathologic results and complication rate of these cases.

**RESULTS:** Among 142 cases of cases, 100 cases were confirmed as malignant lymphomas, 9 as leukemia, 15 as benign lymph node, and 18 others (nonspecific lymphadenopathy 5, mycobacterial infection 3, tumor necrosis 2, epidermal inclusion cyst 1, infectious mononucleosis 1, metastasis of the papillary thyroid carcinoma, 1; insufficient samples 5). There were 5 cases of insufficient samples to determine detailed subtypes of disease, but only 2 of them were required additional excisional biopsy in order to make management decision. Molecular or immunochemical tests were performed in almost all cases, 116 cases, which helped to make clear decision on pathologic diagnosis. There was no major complication during and after CNB.

**CONCLUSION:** US-guided CNB is a good and safe diagnostic tool for the workup of histopathologic diagnosis of immunocompromised hemato-oncology patients.
**Effect of fat saturation and multishot 2D navigated interleaved acquisition on head and neck diffusion-weighted MRI**

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**PURPOSE:** Head and neck diffusion-weighted MRI (DWI) can provide valuable information, but influence of fat suppression and multishot acquisition on image quality has not been thoroughly investigated. We aimed to comprehensively compare the image quality of the head and neck DWI at 3T using two fat saturation techniques of short tau inversion recovery (STIR) and spectral presaturation with inversion recovery (SPIR). In addition, SPIR was used with both single- and multi-shot echo-planar imagings (ssEPI, msEPI).

**MATERIALS AND METHODS:** Total 57 participants underwent three DWI sequences of ssEPI-STIR, ssEPI-SPIR, and msEPI-SPIR for the head and neck region. Two independent neuroradiologists assessed 5-point visual scores for fat saturation uniformity and image distortion. The contrast-to-noise ratio (CNR) and apparent diffusion coefficient (ADC) were measured in the pons, cerebellar white matter, parotid gland, lymph node, palatine tonsil, and semispinalis muscle, and compared among three DWI sequences.

**RESULTS:** Mean visual score for fat saturation uniformity was highest in ssEPI-STIR, followed by msEPI-SPIR and ssEPI-SPIR (p < 0.001). As for image distortion, mean visual score was highest in msEPI-SPIR, followed by ssEPI-STIR and ssEPI-SPIR (p < 0.001). CNR was lower in ssEPI-STIR than in other sequences in most cases (p < 0.001), and tended to be higher in msEPI-SPIR than in ssEPI sequences. ADC was higher in msEPI-SPIR than in ssEPI sequences (p < 0.05).

**CONCLUSION:** msEPI-SPIR provided the best image quality, with relatively homogeneous fat suppression, less image distortion, and higher CNR than ssEPI-STIR and ssEPI-SPIR. ADC may have been higher in msEPI-SPIR, which necessitates cautious application of the previously reported ADC to clinical settings.
CONCLUSION: Intra-labyrinthine hyperintensity is seen in perilymphatic space of the patients with IAC mass. Perilymphatic hyperintensity and delayed enhancement in patients with IAC mass is significantly correlated with the longitudinal tumor size on precontrast and 4 hours delayed 3D-FLAIR MRI.

SS 02 NR(HN)-07  09:00
"Value addition of US over Sestamibi in detection of parathyroid nodules in diagnosed cases of hyperparathyroidism" retrospective data from a single institution
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PURPOSE: To evaluate the value addition of ultrasound (US), over Sestamibi scan in patients with hyperparathyroidism. To establish the percentage of cases where US detected nodules in Sestamibi negative cases of hyperparathyroidism.

MATERIALS AND METHODS: Retrospective study from year 2013 to 2017. A total of 250 patients of Hyperparathyroidism who had both US and Sestamibi scan for parathyroid localization and were operated at our institution were included. US localized parathyroid as a hypoechoic ovoid nodule with arc of vascularity. Diagnostic findings were recorded. Among them 175 patients (70%) were positive on both Sestamibi scan and US and 65 patients (26%) were Sestamibi negative and were detected on US. Remaining 10 patients were negative on both US and Sestamibi. Of which 5 patients (2%) had Methionine PET and 5 patients (2%) had no further imaging done.

RESULTS: Of the 250 patients, 175 patients (70%) were positive on both Sestamibi scan and US and 65 patients (26%) were Sestamibi negative and were positive on US only. Remaining 10 (4%) patients were positive on Sestamibi, but negative on US. Of which in 5 patients (2%) the nodules were located in the mediastinum and 5 (2%) patients the nodules were located in neck. Of the nodules localized on both Sestamibi and US 173 patients (98.8%) were true positive at Surgery. Of the nodules localized only on US 61 patients (93.8%) were true positive at surgery. US detected nodules in Sestamibi negative cases in 26% cases and of which true positive at surgery were 24.4%.

CONCLUSION: US finds true positive parathyroid nodules in significant number of Sestamibi Negative cases (24.4% in our study) and finds additional nodules in cases where Sestamibi showed only one nodule which changes the plan of surgery and preoperative counselling of patient. It gives precise localization and size of the nodule(s).

CLINICAL RELEVANCE: US is recommended, and when well utilized has capabilities to localize even tiny and small parathyroid nodules (between 0.5-1.5 cm and more) where the parathyroid Sestamibi scan is often negative. This detection and localization of the nodules on US in Sestamibi negative cases of symptomatic hyperparathyroidism offers the patient an option of minimally invasive surgery, and a focused parathyroidectomy can be performed instead of a four gland exploration surgery.

SS 02 NR(HN)-08  09:10
Ultra-low-dose versus low-dose CT of the paranasal sinuses with using volumetric 320-row detector CT system
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PURPOSE: To evaluate image quality of low-dose (LD) and ultra-low-dose (ULD) protocol in the paranasal sinus CT using single volumetric 320-row multidetector CT technique.

MATERIALS AND METHODS: From September to December 2016, Both of LD including 135 kVp and 5 mAs and ULD including 80 kVp and 5 mAs paranasal CT protocols were simultaneously performed on 40 patients using single volumetric 320-row multidetector CT device. LD CT images assigned to control group and ULD CT images also assigned to study group. Image quality for bony structures, air filled structures and soft tissues were independently assessed for each group by three blinded observers using a three-point grading scale (0 = not diagnostic, 1 = partially diagnostic, 2 = diagnostic). Effective dose was calculated from the dose-length product.

RESULTS: The effective radiation dose which calculated for the control group scans was 0.037 ± 0.003 mSv. But, it was 0.0099 ± 0.001 mSv for the study group scans. The effective radiation dose of study group was statistically significant lower than control group (p < 0.001). Despite significant lowering of the radiation doses, image qualities were sufficient for evaluating all the bony structures, air filled structures and soft tissues except for eye muscle, retrobulbar fat and eye bulb.

CONCLUSION: Our results present that LD and ULD protocols provide significant dose reduction without the loss of diagnostic image quality for paranasal sinus CT. Paranasal sinus CT imaging can be performed at very low radiation exposure maintaining high image quality using a single volume 320-row detector CT device using 135 kVp and 80 kV with 5 mAs.
Interobserver reproducibility of maximal axial diameter and tumor volume measurements from CT of patients with head and neck squamous cell carcinoma

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PURPOSE: There is a lack of reported data on the reproducibility of computed tomography (CT) measurements of maximum tumor diameter and tumor volume for head and neck squamous cell carcinoma. This study aimed to evaluate the interobserver reproducibility of these measurements.

MATERIALS AND METHODS: Eighty consecutive patients who underwent neck CT for initial evaluation of head and neck squamous cell carcinoma were included in this retrospective study. Two radiologists independently measured the maximal axial diameter and volume of tumors. The reproducibility between the two observers was assessed using 95% Bland-Altman limits of agreement, reproducibility coefficient, within-subject coefficient of variation, and intraclass correlation coefficient with subgroup analysis according to tumor location. Logistic regression analysis was performed to identify the risk factors for high variability in tumor volume.

RESULTS: The 95% limits of agreement for maximal axial diameter and tumor volume were ± 22.3% and ± 42.8%, respectively. The within-subject coefficient of variation and reproducibility coefficient were 7.9% and 0.564 for maximal axial diameter and 22.9% and 5.069 for tumor volume. All intraclass correlation coefficients for maximal axial diameter and tumor volume demonstrated excellent agreement (all intraclass correlation coefficients > 0.9). Peritumoral infiltration (odds ratio: 7.189; confidence interval: 1.815-28.469; p = 0.005) was an independent risk factor for high interobserver variability.

CONCLUSION: Changes in maximum axial diameter and tumor volume of less than 22.3% and 42.8%, respectively, were in the range of measurement error on CT. The presence of peritumoral infiltration on CT increases the error in tumor volume measurement.
PURPOSE: The purpose of this study was to determine the diagnostic value of dual-energy CT (DECT)-derived iodine quantification to characterize the head and neck squamous cell carcinoma (HNSCC) at initial diagnosis.

MATERIALS AND METHODS: We retrospectively enrolled a total of 26 patients (M:F = 21:5; mean age, 61.7 years) with initially diagnosed as HNSCCs identified on their contrast-enhanced CT examination using a double-layer detector DECT (IQon CT, Philips healthcare) during the recent 10 months. To quantitatively measure the iodine concentration (IC), we draw a region of interest on the focal thyroid lesions that were positioned-matched with their both US and cytopathologic reports, as well as ipsilateral parenchyma and common carotid artery. Then we compared the mean IC of nodule (IC_N), normalized IC of nodule over parenchyma and common carotid artery (IC_NA ratio, IC_NA ratio, respectively) between three groups; papillary thyroid carcinoma (PTC), benign solid nodule and cyst.

RESULTS: From a total of 76 focal thyroid lesions (mean size, 1.9 cm), 46, 17 and 13 were assigned into PTC, benign solid nodule and cyst. All of median IC_N (mgI/ml) were significantly different between three groups for discriminating each other (0.60 [0.33-0.88], 3.15 [2.29-4.01], 4.30 [3.13-5.48], for benign cyst, PTC and benign solid nodule, respectively, all p < 0.001). Similarly, IC_NA ratio and IC_NA ratio, respectively between three groups; papillary thyroid carcinoma (PTC), benign solid nodule and cyst.

CONCLUSION: Iodine quantification using DECT might be useful for characterization of focal thyroid lesions detected by contrast-enhanced neck CT examination.
Feasibility of deep convolution neural network with paranasal sinus X-ray imaging for sinusitis recognition

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PURPOSE: Sinus X-rays are still initially used in the evaluation of paranasal sinusitis which was diagnosed by the opacification of the sinuses and air/fluid level and best seen in the Water’s view of the paranasal sinus (PNS). The objective of this study to investigate the ability of deep learning for significant sinusitis recognition with the PNS X-ray imaging depends on quantitative and qualitative data.

MATERIALS AND METHODS: A total of 486 patients, which included 243 normal and sinusitis subjects each, underwent Water’s view PNS X-ray scan. We used patch images were extracted maxillary sinus region and data was augmented as adding equivalent pattern images in pre-processing step. We implemented on the data to differentiate between normal and sinusitis subjects with the deep convolutional neural network (CNN) model for sinusitis recognition. Finally, classification results were quantitatively assessed by accuracy. The results of classification were quantitatively assessed by accuracy and evaluated using the activated feature maps in each layer. Two radiologists were reviewed all classified images to validate labeling.

RESULTS: We compared the results of our approaches to investigate the effect for quantity and quality of data for sinusitis recognition using the deep CNN learning. The accuracy of recognition was 99.99% for training dataset and 97.32% for test dataset. Figure 1 shows the representation for learned hierarchical activated feature map with input PNS X-ray image. Deep learning recognized low intensity (green color) as the feature of normal (A, B) case and high intensity (pink color) as feature of sinusitis (C, D). These activated features of the sinusitis were visually confirmed to be closely correlated with the features evaluated PNS X-ray reading by radiologists.

CONCLUSION: The sinusitis recognition using deep learning with PNS X-ray depends on the quantity and quality of data. Deep learning with PNS X-ray image can be used as an adjunct to diagnose the classification of sinusitis.