

health, rather than obesity (defined by BMI), plays a role in thyroid cancer. We performed a retrospective review of our thyroid cancer cohort to evaluate the association between metabolic health and severity of thyroid cancer. Objectives: 1. Association between dyslipidemia and stages of thyroid cancer 2. Association between dysglycemia and stages of thyroid cancer. Methodology: The Scripps Clinic Thyroid Cancer Cohort includes 656 patients diagnosed with thyroid cancer from 2017-2020 in the Scripps Health System. IRB approval for our study was obtained in January 2020. Inclusion criteria: 1. Confirmed thyroid cancer on surgical pathology 2. First available lipid profile at least 6 months prior to diagnosis 3. First available HbA1c at least 6 months prior to diagnosis. A total of 214 patients with an available lipid profile were included in the analysis. Of those, 148 had an available HbA1c. Definitions used: 1. Dyslipidemia - total cholesterol  $\geq$ 200 mg/dl or HDL  $<$ 40 mg/dl in males,  $<$ 50 mg/dl in females or triglycerides  $\geq$ 150 mg/dl. 2. Dysglycemia - HbA1c  $\geq$ 5.7%. Thyroid cancer stages were compared in patients with and without dyslipidemia and dysglycemia. Subgroup analysis was performed for patients above age of 55 years (n=103) due to difference in AJCC staging. **Results:** A larger proportion of dyslipidemic patients (28.4% vs 18.1%) had stage 2-4 thyroid cancer, but the difference was not statistically significant (p 0.07). A larger proportion of dysglycemic patients (36.3% vs 15.6%) had stage 2-4 thyroid cancer, a statistically significant difference (p 0.003). Similar findings were noted on subgroup analysis: a larger proportion of dyslipidemic (15.2% vs 8.2%) patients had Stage 3-4 thyroid cancer without statistical significance (p 0.1), while a statistically significant higher percentage of dysglycemic patients (20% vs 2.7%, p 0.01), had stage 3-4 thyroid cancer. A larger proportion of advanced thyroid cancer cases was noted in patients with both dyslipidemia and dysglycemia as compared to patients with only one abnormality or none. **Conclusions:** 1. Poor metabolic health, particularly dysglycemia, is associated with advanced stages of thyroid cancer, especially in the  $\geq$ 55 years age group. Dysglycemia with dyslipidemia confers highest probability of advanced thyroid cancer. 2. Mechanisms by which dysglycemia affects thyroid cancer severity requires further rigorous study. 3. Based on our study, we recommend a thorough discussion regarding risk of advanced thyroid cancer in patients with poor metabolic health and thyroid nodules.

## Thyroid

### THYROID CANCER

#### *Effectiveness of Different Thyroid Stimulating Hormone Thresholds for Thyroid Hormone Withdrawal - Aided Radioiodine Ablation in Patients With Differentiated Thyroid Cancer: A Systematic Review and Meta - Analysis*

Tatiana Rojas, Mrs.<sup>1</sup>, Paola Solis-Pazmino, MD<sup>2</sup>, Eddy Lincango-Naranjo, MD<sup>3</sup>, Tannya Ledesma, Mrs.<sup>4</sup>, Benjamin Alvarado-Mafla, MD<sup>5</sup>, Francisco J. Barrera, MD<sup>6</sup>, Jorge Luis Salazar Vega, MD, MSc<sup>7</sup>, Cristhian García, MD<sup>8</sup>, Oscar J. Ponce, MD<sup>9</sup>, Juan Pablo Brito, MD<sup>9</sup>.

<sup>1</sup>Universidad San Francisco de Quito, Quito, Ecuador, <sup>2</sup>Stanford University, Palo Alto, CA, USA, <sup>3</sup>Knowledge and Evaluation Research Unit, Mayo Clinic, Rochester, Minnesota, <sup>55905</sup>, USA,

Rochester, MN, USA, <sup>4</sup>Universidad Central del Ecuador, Quito, Ecuador, <sup>5</sup>CaTaLiNA: Cancer de tiroides en Latinoamerica, Quito, Ecuador, <sup>6</sup>Plataforma INVEST Medicina UANL-KER Unit Mayo Clinic (KER Unit México), School of Medicine, Universidad Autonoma de Nuevo Leon, Monterrey, México, Monterrey, Mexico, <sup>7</sup>Hospital de Especialidades Eugenio Espejo - Centro Integral de Endocrinología y Diabetes ENDOCARE, Quito, Ecuador, <sup>8</sup>Surgery Department, Hospital de Especialidades Eugenio Espejo, Quito – Ecuador, Quito, Ecuador, <sup>9</sup>Mayo Clinic, Rochester, MN, USA.

**Background:** Patients with differentiated thyroid cancer (DTC) may benefit of radioiodine ablation (RAI) to reduce the probability of thyroid cancer recurrence. Guidelines recommend that thyroid stimulating hormone (TSH) of  $>$ 30mIU/L before RAI to optimize treatment response. However, evidence regarding this recommendation is conflicting. We conducted a systematic review and meta-analysis to compare outcomes (thyroid cancer recurrence and survival at 10 years of follow up) of stimulated TSH threshold before RAI with primary analysis focus on  $<$ 30 mIU/L versus  $\geq$ 30 mIU/L, and subgroup analysis on  $<$ 90 mIU/L versus  $\geq$ 90 mIU/L in patients with DTC after initial total thyroidectomy.

**Methods:** The protocol for this study is registered and available online (CRD42020158354). Briefly, we searched several databases from their inception to April 2020. Reviewers, working independently and in duplicate selected studies for inclusion, extracted data, and evaluated each study's risk of bias. We excluded studies that used recombinant human thyroid stimulating hormone before ablation. **Results:** We included five retrospective cohort studies, which enrolled a total of 2,514 patients. Risk of bias was low in four studies and high in one study. Mean age was 47 years old (ranged from 40.7 to 47.9) and most of them were female (69%). The most common DTC type was papillary thyroid cancer (78%). From those articles that reported tumor characteristics, 48% had a size  $\leq$ 2cm (T1b) and 47%  $>$ 2cm. Moreover, 73% of the patients had no regional lymph metastasis (N0). Two studies reported radioiodine mean dose given of 30 and 100 mci. A total of 301 patients were included in the TSH threshold  $<$ 30 mIU/L group and 1788 patients in the TSH  $\geq$ 30 mIU/L group. Comparing stimulated TSH threshold before RAI ( $<$ 30 mIU/L versus  $\geq$ 30 mIU/L), there was difference in recurrence at 1 year (RR 2.46 (C.I. 1.09-5.55) and at 20 years (RR 1.71 (C.I. 1.19 – 2.47). However, there was no difference in mortality at 20 years (RR 0.53 (Confidence Interval (C.I.) 0.12-2.23). In addition, 10-years recurrence was not different when we compared  $<$ 90 mIU/L versus  $\geq$ 90 mIU/L TSH (RR 1.06; 95%CI: 0.88 – 1.27). **Conclusions:** Mortality do not differ between recommended TSH goal ( $\geq$ 30 mIU/L) vs  $<$ 30 mIU/L in thyroid hormone withdrawal-aided radioiodine ablation in DTC patients. However, the risk of recurrence is reduced when patients achieved a TSH level  $>$ 30 UI/mL. These results suggest that patients may need to reach a stimulated TSH  $\geq$ 30 mIU/L stimulated TSH threshold to be treated. Randomized trials are needed to confirm these findings.

## Thyroid

### THYROID CANCER

#### *Efficacy of Differential Diagnosis of Thyroid Nodules by Shear Wave Elastography, the Stiffness Map*

Myung Hi Yoo, MD, PhD<sup>1</sup>, Hye Jeong Kim, MD, PhD<sup>1</sup>, In Ho Choi, MD, PhD<sup>1</sup>, Suyeon Park, MD, PhD<sup>1</sup>, Sumi Yun, MD, PhD<sup>2</sup>, Hyeong Kyu Park, MD, PhD<sup>1</sup>, Dong Won Byun, MD, PhD<sup>1</sup>, Kyoil Suh, MD, PhD<sup>1</sup>.

<sup>1</sup>SoonChunHyang University, Seoul, Korea, Republic of,

<sup>2</sup>Samkwang Medical Laboratories, Seoul, Korea, Republic of.

**Background:** Fine-needle aspiration (FNA) is the first step in the differential diagnosis of thyroid nodules. However, malignancy rate of the indeterminate FNA is reported as 20-50 %. We aimed to evaluate the efficacy of shear wave elastography (SWE), the map of stiffness in the differential diagnosis of the histopathology of thyroid nodules. **Methods:** We retrospectively reviewed the medical records of 258 consecutive patients who visited the thyroid clinic for thyroid nodules and who underwent SWE before ultrasound-guided FNA and/or core-needle biopsy. We analyzed the EI using the total nodular region of interest method by the Q-Box Trace program. Thyroid nodules were divided into 4 categories according to maximum elasticity ( $E_{Max}$ ) and nodule depth/width (D/W) ratio; Category 1 ( $E_{Max} \geq 42.6$  kPa &  $D/W < 0.9$ ), Category 2 ( $E_{Max} < 42.6$  kPa &  $D/W < 0.9$ ), Category 3 ( $E_{Max} \geq 42.6$  kPa &  $D/W \geq 0.9$ ) and Category 4 ( $E_{Max} < 42.6$  kPa &  $D/W \geq 0.9$ ). The cutoff value of  $E_{Max}$  was set using ROC curve analysis to predict follicular neoplasm (FN) from nodular hyperplasia (NH). Cutoff value for nodule D/W ratio was set using ROC curve analysis to differentiate malignant nodule. **Results:** FN showed the lowest  $E_{Max}$  among all pathologies and lower  $E_{Max}$  than NH ( $p < 0.05$ ). FN was distributed mostly in the category 2 (70%) and NH was distributed mainly in the category 1 (73.9%). CLT belonged mostly to the category 1 (57.1%). PTC belonged in majority to the category 3 (58.9%) and the rest to the category 1 (25%). So NH was the most frequent pathology group in category 1. FN was the most frequent pathology group in the category 2 and PTC was the most frequent pathology group in the category 3. **Conclusion:** SWE showed characteristic patterns of various pathology groups reflecting the degree of fibrosis and the information of  $E_{Max}$  and nodule depth/width (D/W) ratio determining the category was useful to predict the pathology of thyroid nodules along with the advantage of noninvasiveness.

## Thyroid

### THYROID CANCER

#### *Evaluation of Thrombotic Risk in Thyroid Cancer*

Chukwuka Akamnonu, MD, David A. Cohen, MD.

Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ, USA.

**Introduction:** Current guidelines from the International Society of Thrombosis and Hemostasis recommend limited screenings for deep vein thrombosis (DVT) or pulmonary embolism (PE) with no identifiable precipitating factor (termed unprovoked). There is paucity of data with regards to thyroid cancer screening in the setting of an unprovoked VTE. Studies from Europe have shown an association between VTE and thyroid cancer; however, these studies do not account for differences in iodine availability, thus the need for studies in the United States. Understanding the

risk of thyroid cancer as a provocative factor in developing a deep venous thrombosis (DVT) or pulmonary embolism (PE) may be able to facilitate case detection of disease and prevent future morbidity and mortality from thyroid cancer and/or VTE. **Objectives:** The primary objective of this study is to understand the risk of developing VTE in the setting of thyroid cancer. **Methods:** In this retrospective chart review study, we reviewed electronic medical records of patients with a history of DVT or PE between ages 18-99, presenting to all outpatient clinics at a single academic medical center in New Jersey between October 1, 2015, and Dec 31, 2018. We screened for coexistent cancer history among this group, and from this sample we further isolated cases of thyroid cancer. **Results:** 345 patients were found to have a history of VTE. 187 were female (54%) and 113 (29%) had a history of malignancy. The most common cancers were breast (19%), colorectal (9%), leukemia (9%), prostate (8%), and lymphoma (8%). Thyroid cancer accounted for 2% of all discovered cases. **Conclusion:** In this retrospective analysis, 2% of all patients with VTE and cancer carried a diagnosis of thyroid cancer. Although this suggests a relatively low risk, given the medical burden of a venous thromboembolism and the comparable proportion of thyroid cancer in all new cancer cases, thyroid cancer should be considered a provoking factor in unprovoked VTE.

## Thyroid

### THYROID CANCER

#### *Histological Study on the Thyroid Tissue Adjoining the Noninvasive Thyroid Follicular Neoplasm With Papillary-Like Nuclear Features, Seeking a Possible Association With Hashimoto's Thyroiditis*

Paola N. Pereira, Miss, medical school student.

São Leopoldo Mandic University, Campinas, São Paulo, Brazil.

Papillary thyroid carcinoma (PTC) is the most frequent type of thyroid cancer (TC), and advances in ultrasound methods resulted in better and higher detection of this tumor. Thus, the increase in the incidence of PTC is due to the detection of microcarcinomas by ultrasound, as well as partially, due to the increased diagnosis of the encapsulated and/or well-defined non-invasive follicular variant of thyroid papillary carcinoma (NIEFVPTC). Recently, there was a change in the histological classification of NIEFVPTC, currently known as non-invasive follicular thyroid neoplasm with papillary-like features (NIFTP), thus the clinical evidence leads to an excellent prognosis once it's an indolent neoplasia, dismissing additional treatments as lymphadenectomy and radioiodotherapy, therefore reducing psychological impact. This study was approved by the ethics and research committee and addressed the analysis and review of histological slides of thyroid neoplasia that currently meet the criteria for NIFTP. Furthermore, the study sought to evaluate the concomitant existence of NIFTP with histological findings consistent with Hashimoto's Thyroiditis (HT). Underlying studies evoke a possible increase in the imperil of developing PTC when associated with HT. It should be noted that this morphological correlation is poorly described in the literature. Accordingly, a retrospective study was carried out by histological review of 232 cases diagnosed as PTC from total thyroidectomies with cervical lymphadenectomy from