normal level compared (31-35 minutes) in the younger population, $p = 0.007$. Elderly patients had a lower eGFR 75.236 ± 27.51 mL/min/1.73 m2 compared to 89.569 ± 22.52 mL/min/1.73 m2 in the younger group, $p < 0.001$. Both age and eGFR are independent predictors for a longer time to achieve curative surgeries.

For the first time, we are showing that age and GFR are directly affecting the time needed to achieve an appropriate drop-in IOPTH. Preoperative evaluation of eGRF could be helpful in predicting IOPTH pharmacokinetics. These findings could help to avoid postoperative hypoparathyroidism in elderly populations.

LATE BREAKING POSTER 23

Thyroid Cancer Clinical Poster

A NOVEL METHOD FOR DOSIMETRIC PLANNING AND TREATMENT OF METASTATIC WELL-DIFFERENTIATED THYROID CANCER WITH COMBINED 131-IODINE AND STEREOTACTIC RADIOTHERAPY

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Metastases from well-differentiated epithelial thyroid cancers are sometimes treatable with radioiodine (RAI), but these lesions not infrequently partially lose their RAI avidity, resulting in sub-therapeutic RAI uptake with a lesion absorbed dose <80 Gy. These patients—as well as those whose RAI uptake becomes sub-therapeutic after previous RAI treatments or who progress despite theoretically therapeutic RAI exposure–might benefit from the combination of RAI with external beam radiotherapy (EBRT). Until now, accurate prediction of the absorbed dose from such combined radiotherapy has not been available. We have developed software with the ability to generate absorbed dose maps from such combined sub-therapeutic RAI and EBRT. This method has the promise of safely and effectively delivering combined RAI and EBRT fusion treatment that meets a target tumor absorbed dose while respecting normal organ dose limits, especially for stereotactic EBRT. We illustrate this approach using a hypothetical case below:

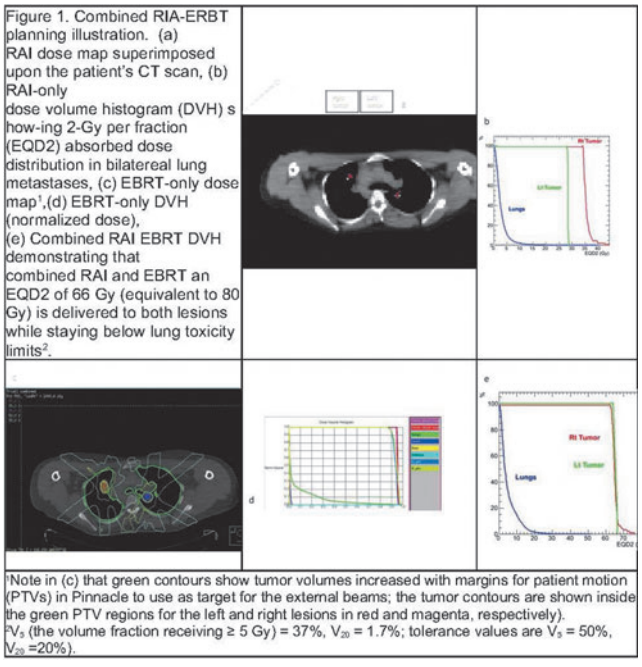

Figure 1. Combined RIA-ERBT planning illustration. (a) RAI dose map superimposed upon the patient's CT scan, (b) RAI-only dose volume histogram (DVH) s how-ing 2-Gy per fraction (EQD2) absorbed dose distribution in bilatereal lung metastases, (c) EBRT-only dose map[1],(d) EBRT-only DVH (normalized dose), (e) Combined RAI EBRT DVH demonstrating that combined RAI and EBRT an EQD2 of 66 Gy (equivalent to 80 Gy) is delivered to both lesions while staying below lung toxicity limits[2].

[1]Note in (c) that green contours show tumor volumes increased with margins for patient motion (PTVs) in Pinnacle to use as target for the external beams; the tumor contours are shown inside the green PTV regions for the left and right lesions in red and magenta, respectively).
[2]V_5 (the volume fraction receiving ≥ 5 Gy) = 37%, V_{20} = 1.7%; tolerance values are V_5 = 50%, V_{20} =20%).

This novel dosimetric radiotherapy strategy based on combined sub-therapeutic RAI and stereotactic EBRT introduces a fundamentally new treatment paradigm that leverages well-established RAI therapy, which is often sub-therapeutic alone, with widely available EBRT for treatment of nonresectable metastatic lesions in advanced thyroid cancer patients. The trial is currently open to patient accrual (NCT04892303).

LATE BREAKING POSTER 24

Thyroid Cancer Clinical Poster

FACTORS ASSOCIATED WITH NODE METASTASIS IN CENTRAL LEVEL IN THYROID CANCER

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Prophylactic dissection of the central level of the neck (CLD) is controversial, is associated with surgical complications, and is not always helpful. The selection of candidate patients for CLD is necessary; the factors that predict the presence of metastases must be identified to decide to perform CLD.

To know which factors are associated with central lymph node metastases in patients with DTC undergoing CLD.

Retrospective, cross-sectional, observational, analytical study; patients with differentiated thyroid cancer (DTC) treated with total thyroidectomy and CLD were included; variables evaluated: tumor size, glandular capsular rupture and invasion of peri-thyroid tissues, the cervical status of the lateral necks, gender, age, number of dissected nodes; and they were compared with the presence of lymph node metastases.

There were 85 patients, with a mean age of 49 years. The factors associated with the presence of metastases at the central level were: tumor size and the presence of capsular rupture with infiltration of peri-thyroid tissues (pT3).

Extrathyroid tumor extension and tumor size of 4cm or greater in CLT are the two factors that are most significantly associated with metastases at the central level; elective dissection is indicated in these patients.

LATE BREAKING POSTER 25

Thyroid Hormone Metabolism & Regulation Basic Poster

THE ROLE OF CYSTEINE IN THYROGLOBULIN BIOSYNTHESIS

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Thyroglobulin (Tg), the thyroid hormone precursor protein (MW ~330kDa), is synthesized under the influence of TSH in thyrocytes, where it represents ~50% of total protein synthesis. Tg structure has been shown to be stabilized by a multitude of disulfide bonds formed within the endoplasmic reticulum (ER). It has been suggested that oxidation of Tg cysteines to cystine may be critical for Tg structural maturation and secretion, although little is known about cytosolic cysteine availability for thyroidal protein synthesis. What is known is that in cystinosis, deficiency of a functional lysosomal cystine transporter (which provides, under physiological conditions, a cytosolic supply of cysteines) is genetically linked to hypothyroidism. To better understand the importance of cysteine availability, we examined PCCL3 thyrocytes exposed to Cys-limited medium. We noted that upon Cys-deprivation, there was a

progressive and significant decrease of Tg mRNA, suggesting either diminished *TG* gene expression or enhanced *TG* mRNA turnover. By 24h of Cys-deprivation, Tg protein synthesis (and secretion) was dramatically decreased. The formation of disulfide pairs in the ER is thought to be catalyzed by a large group of resident oxidoreductases of the ER lumen. We found that in PCCL3 cells, ER oxidoreductin-α (Ero1α) is positively regulated by TSH. To test the importance of Ero1α for Tg folding and export, we co-expressed recombinant Tg with or without recombinant Ero1α (in 293T cells) and observed that increased Ero1α expression resulted in significantly increased Tg secretion. By contrast in PCCL3 cells, siRNA knockdown of Ero1α resulted in decreased Tg expression and secretion.

Taken together, these results suggest that both cysteine availability, and the capacity to catalyze disulfide bond formation in the ER, impact on Tg expression and its subsequent secretion leading to thyroid hormonogenesis. These findings are likely to contribute to an understanding of the pathogenesis of hypothyroidism in cystinosis; moreover, this work serves as the launch point for further studies of Tg biosynthesis in relation to intracellular glutathione and sulfur amino-acid metabolism.

LATE BREAKING POSTER 26

Thyroid Nodules & Goiter Clinical Poster

AUDIT OF EXTENDING RAPID ON-SITE EVALUATION TO ALL THYROID FINE NEEDLE ASPIRATIONS

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Rapid on-site evaluation (ROSE) of thyroid fine needle aspirations (FNAs) can significantly reduce the rate of nondiagnostic Bethesda category I results. We aimed to assess if ROSE is also able to reduce the rate of Bethesda categories III and V and whether ROSE is able to improve the quality of the smears.

We conducted a retrospective study including 5,030 thyroid FNAs. We separately analyzed if nondiagnostic Bethesda I results were attributable to insufficient cellularity or due to artifacts. Furthermore, we differentiated Bethesda III and Bethesda V results into cellular without artifacts, sparsely cellular or artifacts. We hypothesized that ROSE reduces the rate of Bethesda categories I, III, and V and, in turn, increases benign and malignant cytological diagnoses (Bethesda category II and VI, respectively). We assume that this is due higher rates of satisfactory cellularity on the one hand, and due to a decrease in artifacts on the other.

3,726 aspirates were taken without ROSE and 1,304 were taken with ROSE. FNAs with ROSE not only showed a significantly lower nondiagnostic Bethesda I rate, but also a significant reduction of Bethesda III category. Combined, they decreased the need for a repeated FNA by a factor of 9.3 (non-ROSE 39.9 % *vs.* ROSE 4.3 %). With ROSE, Bethesda III and V results were less likely to be sparsely cellular compared to without ROSE. Moreover, ROSE was also associated with a significantly 8.3 times lower rate of artifacts obstructing Bethesda I, III, and V cytologies (non-ROSE 2.5 % *vs.* ROSE 0.3 %). The better diagnostic conclusiveness with ROSE not only resulted in an increase in benign Bethesda II results (non-ROSE 51.1 % *vs.* ROSE 86.5 %), but also doubled the rate of malignant Bethesda VI cytologies (non-ROSE 2.6 % *vs.* ROSE 5.1 %).

ROSE was able to generate more diagnostically conclusive FNAs and can be seen as a valuable addition to FNAs of thyroid nodules. We therefore recommend the implementation of ROSE as standard of care, especially in institutions where less than 90 % of specimens are categorized as either benign (Bethesda II) or malignant (Bethesda VI).

LATE BREAKING POSTER 27

Disorders of Thyroid Function Clinical Poster

PERSISTENT PAIN: RECURRENT SEVERE SUBACUTE THYROIDITIS FROM COVID 19 INFECTION

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Subacute thyroiditis is an acute inflammatory response in the thyroid which usually follows a viral infection. This report highlights a case of subacute thyroiditis in a patient with a history of benign COVID 19 infection without indication for supplemental oxygen or hospitalization. This case is unique in the fact that the patient required multiple doses of steroids for symptom control.

A 36-year-old female with a past medical history of hyperlipidemia, essential hypertension, obesity, type two diabetes, and recent COVID-19 infection six months prior presented to the hospital for evaluation of persistent anterior neck pain, fevers up to 100.9° F, ten pound weight loss, and palpitations. Two months before presentation she developed anterior neck pain that radiated into the left side of her neck and jaw. This was evaluated by an outpatient otolaryngologist who performed a nasopharyngeal laryngoscopy with unremarkable findings. She was placed on a muscle relaxant, ibuprofen, and a course of steroids. She saw another physician who trialed an additional course of steroids shortly after. Unfortunately she continued to experience excruciating discomfort prompting this hospitalization. Admission labs revealed that the patient's TSH was less than 0.01 uIU/mL. Her free T4 was 1.9 ng/dL and her free T3 was 3.6 pg/mL. A CT scan of the neck showed a 1.9 x 1.0 cm hypodense lesion. Further imaging with a thyroid ultrasound showed a heterogenous thyroid with generalized hypo echogenicity, decreased blood flow, without discrete nodules, cysts, or calcifications concerning for acute thyroiditis. The patient was started on intravenous methylprednisolone with improvement in symptoms. She was subsequently transitioned to oral prednisone on discharge.

Subacute thyroiditis most commonly follows a viral infection. With our patient, symptoms developed shortly after her COVID19 infection. Once a diagnosis of subacute thyroiditis is made, patients are treated with a short course of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and occasionally oral steroids which resolves most symptoms. This case was unique in that our patient required three regimens of steroids before her symptoms improved. Given these findings, a prolonged course of steroids may be indicated for covid-19 induced subacute thyroiditis.

LATE BREAKING POSTER 28

Disorders of Thyroid Function Translational Poster

OUTCOMES AND PREDICTORS OF 30-DAY READMISSION FOR HYPERTHYROIDISM: A NATIONWIDE STUDY

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