

# MULTIPLE SMALL FEEDINGS OF THE THYROID

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## OBJECTIVES

- ⊙ Review thyroid hormone regulation
- ⊙ Brief review thyroid function testing.
- ⊙ Discuss treatment options and challenges of common thyroid conditions
- ⊙ Discuss the work up of thyroid nodules (when to biopsy?)
- ⊙ New advances in thyroid cancer treatments

## THYROID HORMONE REGULATION

- ⊙ TSH PRIMARY STIMULUS FOR T4 PRODUCTION
- ⊙ T4 (99.97%) BOUND TO PROTEIN (TBG)
- ⊙ T3 MOST ACTIVE METABOLICALLY
- ⊙ T4 ---> T3 PERIPHERAL CONVERSION

## THYROID TESTING

- ⊙ TSH
  - THE PITUITARY IS ABLE TO SENSE BOTH FREE HORMONE LEVELS (FT3 AND FT4)
  - THEREFORE TSH IS A GOOD INDICATOR OF THYROID HORMONE ACTION IN PERIPHERAL TISSUES
  - BEST SCREENING TOOL FOR DISEASE AND HELPFUL IN TREATMENT
  - PROBLEMS WITH TESTING
    - ⊙ PITUITARY DISEASE
    - ⊙ TIMING OF TESTING

## THYROID TESTING

- ⊙ FREE T4
  - INDICATES OUTPUT FROM THE THYROID GLAND
  - USED TO HELP CONFIRM DISEASE WHEN THE TSH IS ABNORMAL
  - HELPFUL IF LEVELS ARE UNSTABLE

### ⊙ FREE T3

- THE METABOLICALLY ACTIVE HORMONE
- PROBLEM - AUTO REGULATION
- MOST HELPFUL WITH DIAGNOSIS AND TREATMENT OF HYPERTHYROIDISM

### ⊙ T3U

- INDICATOR OF THYROID BINDING PROTEINS
- INVERSE RELATION TO TBG LEVELS

### ⊙ ANTIBODY TESTING

- MOST THYROID DZ. IS AUTOIMMUNE
- ANTI-THYROGLOBULIN ANTIBODY
  - ⊙ NO ADDED CLINICAL DATA
  - ⊙ USED WHEN I WANT TO MEASURE TOTAL THYROGLOBULIN IN CANCER PATIENTS
- ANTI-TPO (THYROID PEROXIDASE)
  - ⊙ BEST ALMOST 100% WITH HASHIMOTO'S THYROIDITIS AND ABOUT 85% OF PATIENTS WITH GRAVES' DZ.
- TSI - THYROID STIMULATING IMMUNOGLOBULIN
  - ⊙ USED AT THE END OF PREGNANCY TO ASSES THE RISK OF HYPERTHYROIDISM IN THE BABY.
- TSH RECEPTOR ANTIBODY (CAN BE BLOCKING OR STIMULATING)
  - ⊙ SOMETIMES HELPFUL IN THE WORK UP OF HYPERTHYROIDISM

## **THYROID TESTING**

### ⊙ THYROGLOBULIN

- LARGE PROTEIN THAT IS MADE BY THYROID CELLS AND MOST BUT NOT ALL THYROID CANCER CELLS.
- HELPFUL IN WORK UP, TREATMENT AND FOLLOW UP OF THYROID CANCER.
- HELPFUL OCCASIONALLY IN THE WORKUP OF HYPERTHYROIDISM

## **HYPERTHYROIDISM**

### ⊙ DIAGNOSIS

- DEFINITELY WORK UP IF TSH IS 0.2 OR BELOW

## DDX OF HYPERTHYROIDISM

- ⊙ GRAVES' DZ.- MOST COMMON
- ⊙ TMNG
- ⊙ SAT
- ⊙ PPT
- ⊙ HYPERFUNCTIONING NODULE
- ⊙ FACTITIOUS

## HYPERTHYROIDISM

- ⊙ TREATMENT
  - ANTI THYROID DRUGS
    - ⊙ METHINAZOLE
    - ⊙ PTU
      - NEW WARNING FOR LIVER TOXICITY
  - SURGERY
  - RADIOACTIVE IODINE (I-131)
    - ⊙ MOST COMMON FORM OF TREATMENT

## HYPOTHYROIDISM

- ⊙ DIAGNOSIS
  - OVERT HYPOTHYROIDISM
    - ⊙ LOW FREE T4 LEVELS WITH HIGH TSH (USUALLY GREATER THAN 10)
  - SUB CLINICAL HYPOTHYROIDISM
    - ⊙ NORMAL FREE T4 LEVELS WITH CONSISTENTLY HIGH TSH
    - ⊙ POSITIVE ANTI-TPO ANTIBODIES
  - ONE HIGH TSH DOESN'T MAKE A PERSON HYPOTHYROID
  
- ⊙ 1. AACE guidelines recommend treatment of patients with TSH > 5 mIU/L if the patient has a goiter or if thyroid antibodies are present. The presence of symptoms compatible with hypothyroidism, infertility, pregnancy or imminent pregnancy would also favor treatment.
  
- ⊙ TREATMENT

- ATA RECOMMENDS T4 PRODUCTS
  - EMPTY STOMACH
  - BRAND NAMES
  - WHAT IS ARMOUR THYROID OR NATURE-THYROID?
  - WHAT IS CYTOMEL OR LIOTHYRONINE?

## ○ TREATMENT GOALS

- ATA ALSO RECOMMENDS GOAL FOR TSH TO BE BETWEEN 0.5-2

## THYROID NODULES

### ○ VERY COMMON

- IN SEVERAL AUTOPSY SURVEYS 37 TO 57 PERCENT OF PATIENTS HAD THYROID NODULES
- MOST ARE NOT CLINICALLY RECOGNIZED
- RATE OF CANCER AROUND 10-15 %
- RATE OF CANCER SAME WITH MULTIPLE NODULES VS SOLITARY NODULE

## THYROID NODULES

### ○ CANCER PREVALENCE IS HIGHER IN SEVERAL GROUPS

- CHILDREN
- ADULTS LESS THAN 30 YEARS OR OVER 60 YEARS OLD
- PATIENTS WITH A HISTORY OF HEAD AND NECK RADIATION
- PATIENTS WITH A FAMILY HISTORY OF THYROID CANCER

### ○ SYMPTOMS THAT ARE CONCERNING

- RAPID GROWTH
- VOICE CHANGES

### ○ WORK UP

- ULTRASOUND
- TSH
  - IF LOW WOULD START WITH I<sup>123</sup> SCAN
  - IF NORMAL OR HIGH WOULD SUGGEST ULTRASOUND GUIDED FNA.
- ANTI-TPO
  - RATE OF CANCER SAME IN PT'S WITH HASHIMOTO'S THYROIDITIS
- ULTRASOUND GUIDED FNA
  - GREATER THAN 1.5 CM

- ⊙ NOT ONLY THE DOMINATE NODULE
- ⊙ IF 1-1.5 CM WITH CERTAIN CHARACTERISTIC

### ⊙ ULTRASOUND FINDING THAT MIGHT SUGGEST INCREASED CHANCE OF CANCER

- MICROCALCIFICATIONS
- HYPOECHOGENICITY
- HYPERVASCULARITY
- IRREGULAR MARGIN
- METASTASIS TO LYMPH NODES

### FNA RESULTS

- ⊙ Nondiagnostic
- ⊙ Benign
  - Macrofollicular or "colloid" adenomas, chronic autoimmune (Hashimoto's) thyroiditis
- ⊙ Suspicious
  - Microfollicular or cellular adenomas (follicular neoplasm)
- ⊙ Malignant

### THYROID NODULES

- ⊙ BENIGN
  - CAN STILL GROW
  - RE BIOPSY IF GROWTH RATE GREATER THAN 2MM A YEAR.

### THYROID CANCER

- ⊙ THYROGEN ABLATION
- ⊙ BRAF GENETIC MARKER FOR PAPILLARY THYROID CANCER