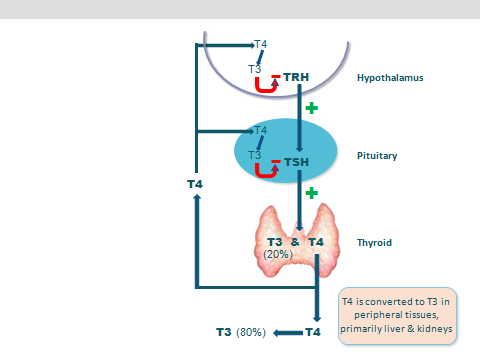
**Thyroid Disorders in Pediatrics**

Thyroid Gland Embryology– Lateral lobes form from the 4th pharyngeal pouch and migrate from the lingual region to the base of the neck by 12 weeks gestation

* Thyroid Hormone Physiology:
  + Major hormones released by the thyroid gland include Thyroxine (T4) and Triiodiothyroine (T3)
  + T3 plays the pivotal role in affecting physiology, principally binding to the thyroid hormone receptor
  + T4 is the predominant circulating form
* Pertinent History and Exam Findings:
  + **Overproduction of Thyroid Hormone**:
    - History: Anxiety, mood swings, behavioral problems, inability to concentrate, sleep disturbances, palpitations, heat-intolerance, fatigue, muscle weakness, tremors, increased appetite, diarrhea, weight loss
    - Physical Exam: Accelerated linear growth, tachycardia, hypertensive, tongue fasciculation, firm enlarged goiter +/- bruit, tremors, prominent stare, lid lag, proptosis, proximal muscle weakness, hyper-reflexive,
  + **Underproduction of Thyroid Hormone**:
    - History: Slow growth, constipation, fatigue, weakness, cold intolerance, heavy or irregular menses
    - Exam Findings: pale or dry skin, thin/brittle hair or nails
      * infants: macroglossia, open posterior fontanel with wide sutures, icterus, hoarse cry
* Work Up:
  + Initial Screening Labs:
    - **Concern for Overproduction**: TSH, Free T4 (FT4), Total T3, Thyroid Stimulating Immunoglobulin (TSI), Thyroid Receptor Antibody (TRAb), CBC with differential, CMP
    - **Concern for Underproduction**: TSH, FT4, Thyroid Peroxidase (TPO) Antibody, Thyroglobulin (TG) Antibody
* Interpretation of Laboratory Findings:
  + **Overproduction**: Elevated FT4, Elevated Total T3, Suppressed TSH, Positive TSI and/or TRAb
    - AST, ALT, White blood cell count and ESR may be elevated
  + **Underproduction:** 
    - Primary: Low FT4, Elevated TSH, Positive TPO and/or TG Antibody
    - Central: Low FT4, Low/normal TSH
* Thyroid Disorders:
  + **Hyperthyroidism:** 
    - Neonatal Graves’ disease
    - TSH receptor activating mutations
    - Graves’ disease
    - Thyrotoxic phase of thyroiditis
    - Surreptitious ingestion of levothyroxine
    - TSH-dependent hyperthyroidism including pituitary TSH-secreting tumors
    - Resistance to thyroid hormone
    - Toxic multinodular goiter
    - Solitary thyroid nodule
    - Intrinsic activating mutation of the TSH receptor (Leclere’s disease)
  + **Hypothyroidism:**
    - Secondary Hypothyroidism: CNS process (tumor, cranial irradiation), drugs (steroids)
    - Primary:
      * Congenital Hypothyroidism Thyroid dyshormonogenesis, thyroid agenesis, ectopic thyroid gland, maternal anti-thyroid medication use, or autoantibody transferChronic lymphocytic thyroiditis (“Hashimoto’s thyroiditis”
      * Euthyroid Sick Syndrome/ Non-thyroidal Illness
      * Subacute thyroiditis / Other thyroiditis
      * Drug induced hypothyroidism: thioamides, lithium, amiodarone, excessive iodine exposure
      * Iodine deficiency
      * Infiltrative or storage disorders of thyroid gland
      * Iatrogenic hypothyroidism: post-irradiation; thyroidectomy