Pituitary Mass

- Small (<1cm)
  - Incidentaloma (confirm non-functional by checking the top 3 functional dz w/ IGF-1, PRL and 24hr urine, repeat MRI in 6mo and then Qyr thereafter to follow growth as it may actually be an early macroadenoma, no Tx)
  - Microadenoma (functional, usually just make one hormone occasionally ≥1)
  - Non-Pituitary Mass (check free alpha-subunits and if negative consider non-pituitary tumors)
  - Pituitary Hyperplasia (loss feedback inhibition makes the pituitary enlarge and look like a tumor)
- Large (>1cm)
  - Macroadenoma (generally non-functional b/c would have presented when much smaller)
    - S/S: indirect Suprasellar S/S 2/2 Compression
      - Pituitary (**deficiency of other hormones esp GH, increase in prolactin from loss of dopamine inhibition**)
      - Mass Effect: Optic Chiasm (**bitemporal hemianopsia**), CN palsy (**olfactory changes**), CSF Space (headache, meningismus, sudden HA, N/V, AMS), Other: Sinuses, Bone, Brain
      - **Apoplexy** (pituitary hemorrhagic infarction usually w/ underlying pituitary adenoma resulting in sudden headache, visual changes, opthalmoplegia, AMS, most concerning symptom is acute hypotension from secondary adrenal insufficiency, other RFs: DM, Coumadin use, radiation, etc, Tx: emergency needing NS decompression and hormones but sometimes they resolve w/ partial pan hypo pit)
    - Tx: TSS then XRT

Secondary Hypo (in order of incidence) Low ADH aka Central Diabetes Insipidus (refer)

- Panhypopituitarism
  - Etiology
    - trauma, surgery, radiation
    - mass (cyst, **Pituitary Adenoma esp w/ Apoplexy, Craniopharyngioma** in young**, Meningioma/Lymphoma/Met** in old)
    - infection (TB)
    - infiltration (**Sarcoid, Hemochromatosis, Langerhan's Histiocytosis X**)
    - autoimmune aka Lymphocytic Hypophysitis
    - genetic (PROP-1, Pit-1 mutation)
    - infarction (DM, after Coronary Bypass, vasculitis, carotid aneurysm, cavernous sinus thrombosis**, Sheehan's Syndrome** (during pregnancy the pituitary doubles in size but w/o a concomitant increase in blood supply resulting in anoxia but during obstetrical hemorrhage during birth full out ischemic infarction occurs, 1/10,000 cases, can present months later))
  - **NB Empty Sella Syndrome** (some process in sella turcica causes expansion of bone thus a radiographic diagnosis, could be normal and often seen in multiparous women whose pituitary has been compressed by increased CSF but you should also think that a process like a mass, cyst, etc was there prior and now no longer there, only Tx if hormone problem)
  - Dx: Hormone Levels and Pituitary MRI w/ Contrast
  - Tx: Hormone Replacement first glucocorticoids then thyroid then others if necessary based on Sx and Tx underlying cause
- Low GH
  - S/S
    - Larson's Dwarfism (defect in GH receptor) vs Classic Dwarfism (defect in GH production) but cases are now being discovered in adults w/ Sx of obesity, DL, osteoporosis, poor muscle mass, etc
  - Dx
    - NB GH is a bad measurement b/c it waxes/wanes over the day and w/ exercise, stress, infection, etc therefore a one-time measurement is inaccurate
    - Screen: IGF-1
    - Confirm: Insulin/Hypoglycemia Stimulation Test (give ? Units of insulin, hypoglycemia results which should stimulate GH, measure GH Q1/2hr, if GH deficiency then GH does NOT elevate to >?mcg/L at 2hrs) NB Arginine Stimulation Test (similar but does not induce hypoglycemia, easier, etc)
  - Tx
    - GH replacement (SC QD) is controversial esp in adults, SEs: edema, arthralgia/myalgia, hyperglycemia, paresthesia, etc
- Low FSH/LH (refer)
- Low TSH (refer)
- Low ACTH (refer) NB always Tx this first w/ steroids before you Tx any other primary hypo-dz
- Low PL (refer)

Secondary Hyper (in order of incidence) NB High ADH aka SIADH

- High PL aka Hyperprolactinemia
  - Physiology & S/S
    - Hypothalamus (NB no true PRH) +TRH/Suckling vs –Dopamine/Estrogen

        - Pituitary (Prolactin)
        - Target Organs
            - Breast (galactorrhea)
            - Uterus (synergizes w/ progesterone to prepare uterus from implantation)
            - Hypothalamus (inhibits GnRH which inhibits LH/FSH which inhibits E/P and T causing the most common S/S: Both: infertility, decreased libido, growth arrest, delayed puberty, osteoporosis, F: amenorrhea, M: small testis, ED, gynecomastia) (1° Pre-Menopausal Female)
            - Suprasellar Symptoms if macroadenoma (1° Male / Post-Menopausal Women)
            - Soft Tissue (? and if severe then b/c of spill-over effect elicits a GH effect)
    - Etiology (nl PRL <20ng/mL)
        - Primary (PRL >200 ng/L)
            - Prolactinoma (65%)
        - Secondary (PRL <100 ng/L)
            - Idiopathic (20%)
            - Medications (10%)
                - Dopamine Antagonists: Methyldopa
                - Decreased Dopamine Synthesis: Neuroleptics esp Haldol, Antiemetics esp Metoclopramide, Cimetidine, Verapamil
            - Stalk Effect 2/2 something that compresses the stalk that holds dopamine inhibitory neurons
            - Pregnancy 2/2 estrogen then suckling (most common)
            - Hypothyroidism 2/2 loss of feedback inhibition on TRH in hypothalamus
            - Renal Failure 2/2 decreased clearance
            - Other: Stress, High Carb Diet, Cirrhosis
            - Any local dz to the breast even Zoster, trauma, etc of Breast
    - Tx
        - Rule Out Secondary Causes and Tx accordingly (make sure what you see on MRI is a prolactinoma vs hypothyroidism induced hyperplasia or another tumor resulting in stalk effect and thus high PRL levels)
        - If Prolactinoma then if
            - + Suprasellar S/S then TSS ± Radiation along w/ medical management
            - - Suprasellar S/S then just medical management
                - Dopamine Agonist (at 1mo check PRL levels w/ goal of nl range, SEs (orthostasis, psychosis, rhinitis, N/V), tolerance does develop, contraindicated if pt has lung/valve/retroperitoneal fibrotic disease as they are ergot derivatives), if fail meds then surgery
                    - Cabergoline: Qwk, expensive, less SEs more effective
                    - Bromocriptine: BID, cheap, more SEs, less effective
                    - Pergolide: Qd, cheap, less SEs (not FDA approved)
- High GH aka Adult-Acromegaly (after epiphysis closure, "weird looking") vs Child-Gigantism (before epiphysis closure, "big & tall")
    - Physiology
        - Hypothalamus (GHRH) +SRH +Hypoglycemia +Dopamine vs –Hyperglycemia AND – Dopamine if acromegaly
        - Pituitary (GH)
        - Liver (Insulin-like Growth Factor-1 aka IGF-1 aka Somatomedin C)
        - All Tissue (IGF-1 acts like glucagon creating energy from hepatic gluconeogenesis and also causes anabolism)
    - S/S (organomegaly except brain/eye, changes are often missed by pt/family b/c changes are so slow)
        - Bone (arthralgia, bony overgrowth, increase in hand/foot/hat/ring size w/ doughy consistency, protuberant jaw, carpel tunnel syndrome, frontal bossing, protuberant jaw, widening between teeth)
        - CV (HTN, hypertrophic cardiomyopathy (most common cause of death!!!))
        - Endo (impotence, etc b/c GH looks prolactin, DM)
        - Derm (coarsening of facial features, hyperhydrosis, acanthosis, skin tags, macroglossia)
        - GI (colon polyps/cancer (second most common cause of death!!!))
        - Pulm (OSA, hoarseness)
    - Etiology
        - Primary
            - GH Pituitary Adenoma
    - Dx
        - NB GH is a bad measurement b/c it waxes/wanes over the day and w/ exercise, stress, infection, etc therefore a one-time measurement is inaccurate
        - Screen: IGF-1 level
        - Confirm: Oral Glucose Intolerance Test (give 100g of glucose and measure GH at 2hrs, if tumor present then GH is NOT suppressed to <5ng/mL at 2hrs) then do an MRI
    - Tx (regardless of hormone or suprasellar symptoms)
        - Tran-Sphenoidal Surgery (TSS) then Radiation ± Medication (b/c often too large to be completely excised)
            - Somatostatin (Octreotide) GH secretion inhibitor
            - Pegvisomat (Somavert) GH receptor antagonist
- High FSH/LH (refer)

- High ACTH (refer)
    - Cushing's Disease (refer)
    - Nelson's Syndrome (when you remove adrenals for whatever reason you are removing negative feedback resulting in a hypertrophied pituitary w/ high ACTH)
- High TSH (refer)
- Panhyperpituitarusm