Adrenal Disorders

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Adrenal Cortex

- What is the tropic hormone that controls secretion of cortisol and androgens?
  - ACTH
  - These androgens are best called DHEA-S
    - Not controlled by LH
- Remember: Aldosterone is under control of angiotensin II
- G F R?
- Glomerulosa: Mineralocorticoids
- Fasiculata: Glucocorticoids
  - Cortisol
- Reticularis: Androgens
  - Testosterone is made to active DHT by which enzyme?
    - 5-alpha reductase → remember that this is in the adrenal and the gonads
    - Aromatase makes estrogen, and this is NOT in the adrenal

Cortisol

- Stimulated by ACTH, what is the derivation of ACTH?
  - POMC → ACTH, MSH, and endorphins
  - ACTH increases desmolase → cholesterol to pregnelone
- Pt with recurrent infections and diabetes found to have high cortisol levels. What is the mechanism?
  - IL2 production is blocked by cortisol
  - IL2 is a T cell growth factor
- What is the mechanism of action of cortisol?
  - Intracellular receptor that translocates to the nucleus
- What is the mechanism by which cortisol increases BP?
  - Increases a-receptors→ that is why it's a stress hormone
  - It is going to potentiates the effect of which hormone?
    - Catecholamines → in fact cortisol activates PNMT (NE → EPI)

Congenital Adrenal Hyperplasia

- Infant with hypotension and hyperkalemia that presents with ambiguous genitalia. She is in profound shock and found to have low cortisol levels. What newborn screening test may be useful in this patient?
  - 17 hydroxy progesterone
  - CAH → 21 B-Hydroxylase deficiency most common
- 11 B-Hydroxylase and 17 B-Hydroxylase deficiency both present with normo/hypertension

Cushing Syndrome

- What is the difference between Cushings disease vs. Cushings syndrome?
  - Disease is due to an ACTH ADENOMA
  - Syndrome is hypercortisolism in general
    - MCC?
      - Exogenous steroids.
        - » Watch for the patient who presents with non-specific fatigue, hypotension, and tachycardia who was just on steroids and they abruptly stopped them. What is the mechanism?
          - Supression of HPA or bilateral adrenal atrophy

Cushing Disease

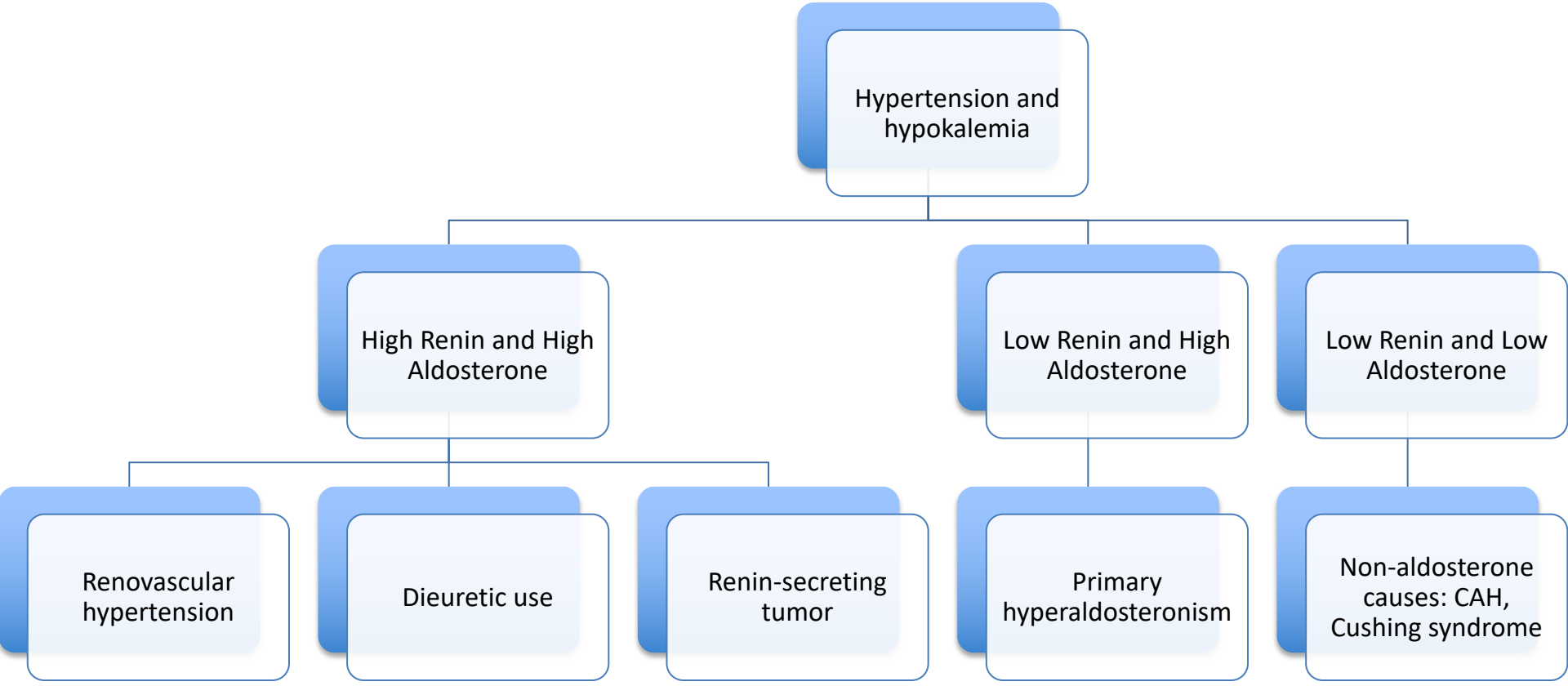
- What is your first screening test?
  - Urine free cortisol / midnight salivary→ low dose dexamethasone → ACTH levels.
- Key concept dexamethasone only affects the HPA axis
- If cortisol is high after low dose dexamethasone, you have confirmed hypercortisolism (Cushings syndrome) , what is NBS?
  - High Dose Dexamethasone
  - If ACTH is suppressed here and cortisol. What is the diagnosis?
    - Cushings disease caused by an adenoma (MRI pituitary)
  - If ACTH and cortisol are still elevated/unchanged. What is the next best step?
    - CT of chest, abdomen, pelvis
      - Ectopic ACTH secretion: High ACTH, and High Cortisol
        - » Small cell carcinoma of the lung
      - Adrenal adenoma: Low ACTH, High Cortisol

Addison's Disease

- A 27-year-old Caucasian female presents with weight loss and weakness. She feels dizzy and lightheaded. Physical exam reveals several areas of her skin including her elbows and knees are more tan than other areas. What is a proper diagnostic test for this patient?
- Cosyntropin (ACTH) stimulation test→ **Adissons Disease** (primary insufficiency)
- What are your metabolic abnormalities:
  - Hypotension, Na low, hyperK, and non-AG metabolic acidosis.
  - Hyperpigmentation secondary to increased POMC
- Pt with a hypofunctioning pituitary adenoma is found to have decreased release of ACTH. What is the likely diagnosis?
  - Secondary adrenal insufficiency
  - Normotension, normal Na and normal K
  - The important concept here again: Glomerulosa is under the control of ANGIOTENSIN II
- What is the morphology of the bacteria is going to cause a characteristic sack of blood adrenal on gross pathology?
  - Neisseria Meningitidis → gm neg diplococci → **Waterhouse Freidrichson**
    - Treat Neisserial infections: **Ceftriaxone** → 3rd gen ceph with good BBB penetration

Conn's Syndrome

- 27 yo male with HA, muscle weakness, and high BP. Na = 151 and K of 3.1. No edema on exam. What is the likely metabolic abnormality?
  - **Metabolic alkalosis + hypertension + hypokalemia** → Conn's syndrome
- What happens to patient's ionized Ca?
  - Remember Ca is bound to albumin… with alkalosis, more negative charge on albumin → Ca loads more onto albumin, low ionized Ca
- Why doesn't this patient have edema or hyper Na?
  - Na escape → ANP kicks in and causes natiuresis
- What is the aldosterone: renin ratio going to be in this patient?
  - Elevated
  - High plasma renin is going to indicate secondary hyperaldosteronism
    - Smoker with high BP refractory to BP drugs, and abdominal bruit. Dx?
      - Renal artery stenosis→ high RAAS activation



- What is the aldosterone escape?
- Mechanism where ANP kicks in to limit edema and hypernatremia.

Adrenal Medulla

- What are the cells that secrete this?
  - Chrommafin cells. Different from ECL which release…
    - Histamine
  - Derived from neural crest
- What is primarily secreted?
  - 80% epinepherine and 20% norepinepherine
- What is the metabolic byproducts made by NE and E?
  - VMA & HVA

Pheochromocytoma

- 30 female presents with intermittent HA and palp. She is sweating profusely on exam. She says this is not the first time she feels like this. What is next best step?
  - Urine Metanephrines (…and drug screen)
- What amino acids are precursors to catecholamines?
  - Phenylalanine and tyrosine
- Rule of 10%s:
- 10 %:
  - Bilateral
  - Extra-adrenal (paraganliomas)
  - Malignant
- What MEN to associate this with?
  - MEN2 A and 2 B (RET)
- Treatment:
  - **Phenoxybenzamine** prior to beta-blocker
    - Alpha-blocker (irreversible)