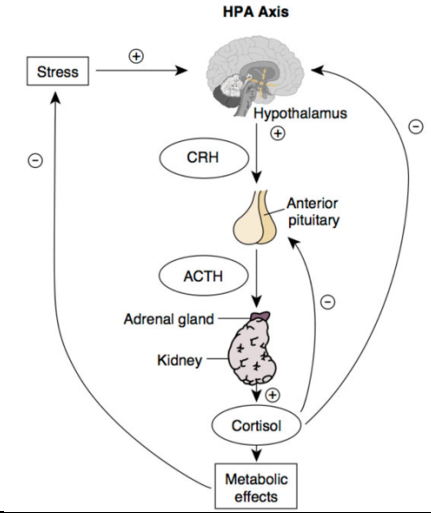
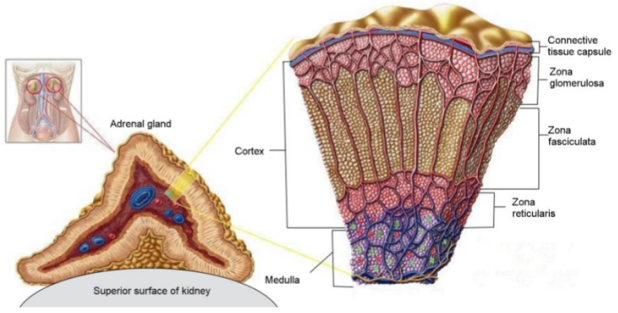
# Addison's Disease

## Background Information

| Hypothalamic Pituitary Adrenal Axis | Adrenal Gland Layers |
|---|---|
|   |   Zona glomerulosa: Mineralocorticoids (Aldosterone)<br>Zona fasciculata: Glucocorticoids (Cortisol)<br>Zona reticularis: Androgens |

Typical Hypoadrenocorticism = Addison's disease

- Deficiency of glucocorticoid and mineralocorticoid
- "Hyponatremic and/or hyperkalemic hypoadrenocorticism"

Atypical hypoadrenocorticism = Atypical Addison's disease

- Deficiency of glucocorticoid ALONE
- "Eunatremic, eukalemic hypoadreocorticism"

## Etiology

Primary (adrenal dysfunction)

1. Adrenal atrophy – typically end-stage auto-immune
2. Other – iatrogenic, neoplasia

## Typical Presentation

Age: Young to middle aged

Sex: F > Male

Breed: Any

## Clinical Signs

- Common

    - Addisonian crisis
        - Severe, acute presentation
        - Weakness/collapse
        - Hypotension, hypovolemia
        - Hx of anorexia, vomiting, +/- diarrhea, abdominal pain
        - If untreated can progress to shock and death
    - Chronic waxing and waning GI
    - PU/PD
- Uncommon
    - Neurologic
    - Trembling/shaking
    - Regurgitation, ME
    - Non-specific abdominal/neck/back pain

**Laboratory Findings**

| CBC | Chemistry |
|---|---|
| Lack of a stress leukogram (lymphopenia, eosinopenia, monocytosis and neutrophilia)<br>Inappropriately "normal" leukogram<br>Lymphocytosis<br>Eosinophilia | Hyperkalemia<br>Hyponatremia<br>Hypochloremia<br>Metabolic acidosis<br>Azotemia + Hyperphosphatemia<br>Hypercalcemia (total + iCa)<br>Hypoalbuminemia, hypocholesterolemia<br>Hypoglycemia<br>Elevated ALP and/or ALT |

**Additional Supportive Testing**

- UA: Low USG despite dehydration/azotemia
- BP: Hypotension
- EKG: Manifestations of hyperkalemia
- AUS: Small adrenals

**Diagnosis**

<u>Differentials for "pseudo-Addisonian electrolytes" (hyperkalemia and hyponatremia)</u>

- AKI
- Post-renal azotemia
- Hookworms, whipworms
- Severe GI disease

- Trauma, crush injury
- Acidosis
- Effusions/third spacing
- Pregnancy
- Artifactual hyperkalemia, medications

Chronic waning and waning illness

- Liver failure
- Malabsorptive GI disease, PLE

Screening Test

- Baseline cortisol
    - >2 rule out hypoadrenocorticism
    - <2 proceed with ACTH stim

ACTH Stimulation Test

- Confirm no exogenous glucocorticoids or progestogen are being administered by any route including topical, otic, and ophthalmic
- Cortisol assays should always be validated and subject to quantity control
    - Run at reference labs; in-house not always accurate

**Treatment**

**Addisonian Crisis**

- FLUIDS
    - Treats hypotension, hypovolemia, corrects hyponatremia, helps with hyperkalemia
- Correct hyperkalemia
    - Treat arrhythmias associated with hyperkalemia
- Treat hypoglycemia
- Consider bicarb

Then…. Start glucocorticoid and mineralocorticoid

**Long-term goals of treatment**

- Lack of clinical signs
- Normal electrolytes
- Avoid iatrogenic Cushing's
- Avoid overcorrection of mineralocorticoid supplementation
    - Overcorrection: hypertension, hypokalemia, hypernatremia
- Mineralocorticoid replacement

    - DOCP (Zycortal SQ, Percorten IM)
        - Label dose of 2.2 mg/kg q25d is usually too high for most dogs
        - Can decrease the dose or frequency to titrate to each patient
        - Decrease to a reasonable frequency and then titrate to lowest effective dose at that frequency
    - Fludrocortisone (florinef)
        - Has some glucocorticoid effects
            - Some dogs can be treated with fludrocortisone alone w/o prednisone
        - Initial dose: 0.01-0.02 mg/kg PO q24 or divided
- Glucocorticoid replacement
    - Prednisone
        - Initial ~0.5 mg/kg/d, then taper to a physiologic dose over ~1 week
        - Physiologic dose: 0.1-02 mg/kg/d
            - Titrate to lowest effective dose
            - Double during "stress"
            - Avoid iatrogenic Cushings signs
- Monitoring
    - Recheck electrolytes @ 10-14 days
        - If you see hypernatremia and hypokalemia (reverse Addisonian) the mineralocorticoid dose is likely too high
    - Recheck lytes before next DOCP injection
        - Should be normal
    - Recheck lytes any time you adjust the dose!

**Prognosis**

- Excellent!
    - Lifelong tx
    - Can be expensive
- Does atypical become typical?
    - It can but unpredictably
    - Always check electrolytes!