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Endocrine

Sarah Elfering, MD
University of Minnesota

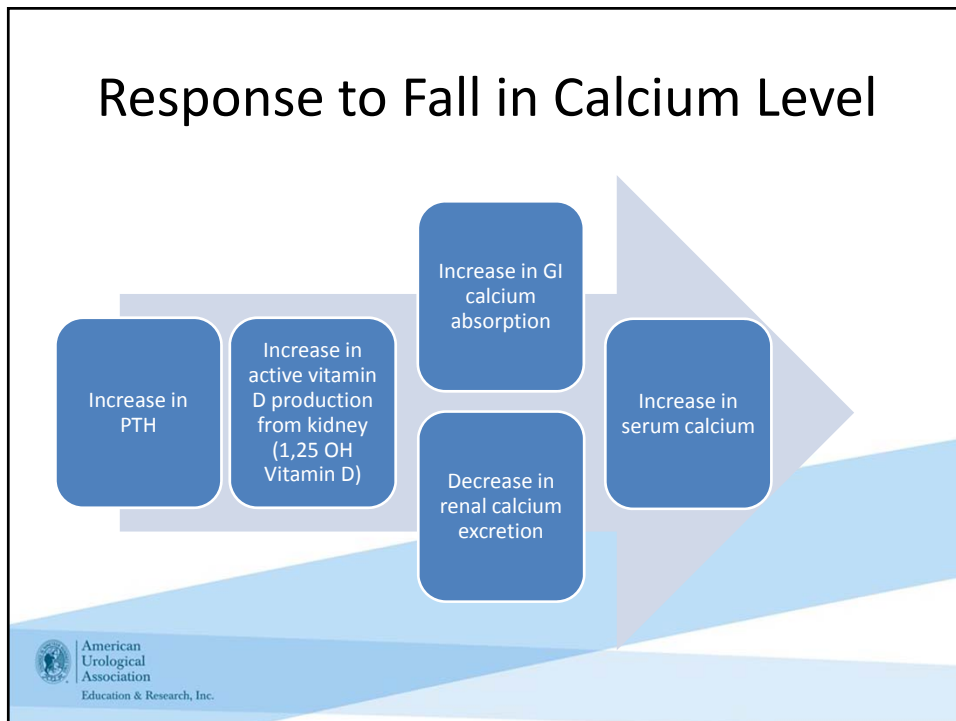
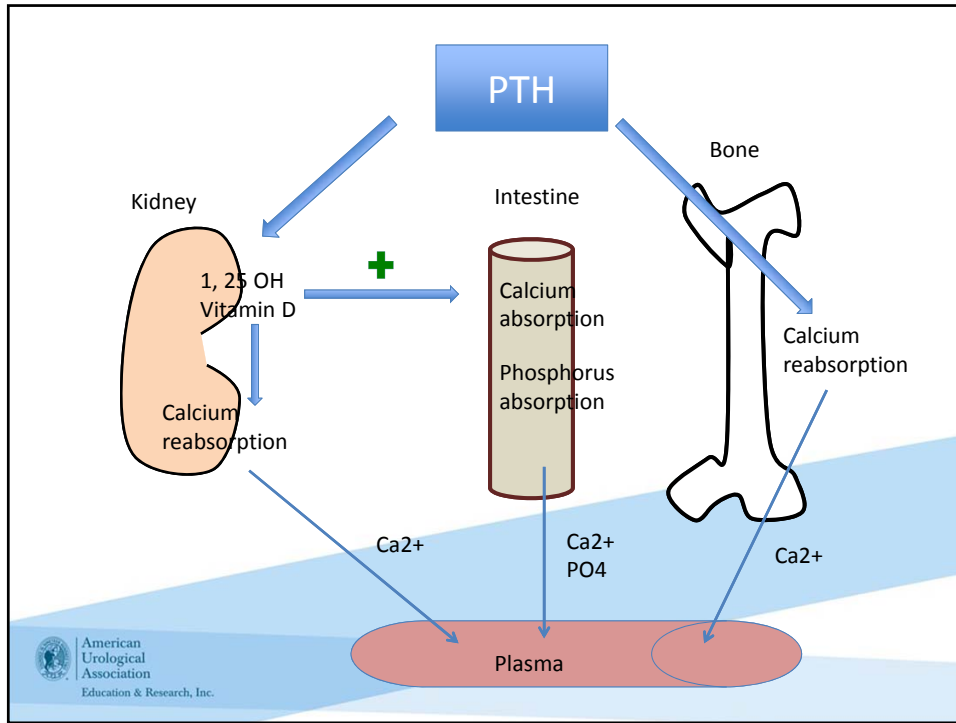
Endocrine – as it relates to the kidney

- Parathyroid gland
- Vitamin D
- Endocrine causes of HTN
- Adrenal adenoma



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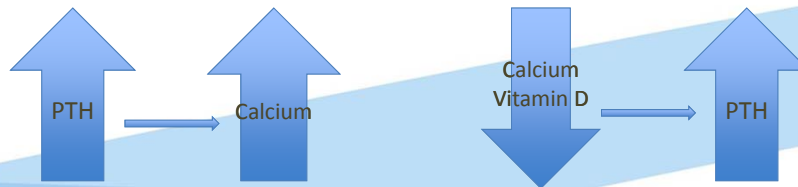
Disorders of Calcium and Phosphorus Balance

Primary hyperparathyroidism:

- hypercalcemia, hypophosphatemia
 - Kidney stones
 - Osteoporosis

Secondary hyperparathyroidism

- Parathyroid responds to lack of Vitamin D, low calcium levels
- High PTH but with low calcium levels



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Disorders of Excessive Vitamin D

Diseases

- Granulomatous disease (sarcoidosis, tuberculosis)
- Lymphoma

Mechanism

- High 1,25 OH vitamin D levels

Lab abnormalities

- Hypercalcemia +/- hypercalciuria
- Kidney stones

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Adrenal Gland Function

- Zona Glomerulosa
 - Mineralocorticoids
- Zona Fasciculata
 - Glucocorticoids
- Zona reticularis
 - Sex steroids
- Medulla
 - Epinephrine and norepinephrine



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Adrenal Incidentaloma

- Adenoma is most frequent
- Carcinoma and pheochromocytoma are less common
- Most adenoma are not functional (74%)
- 7% cortisol producing (subclinical Cushing)
- 1-2% aldosterone producing
- 4-7% pheo

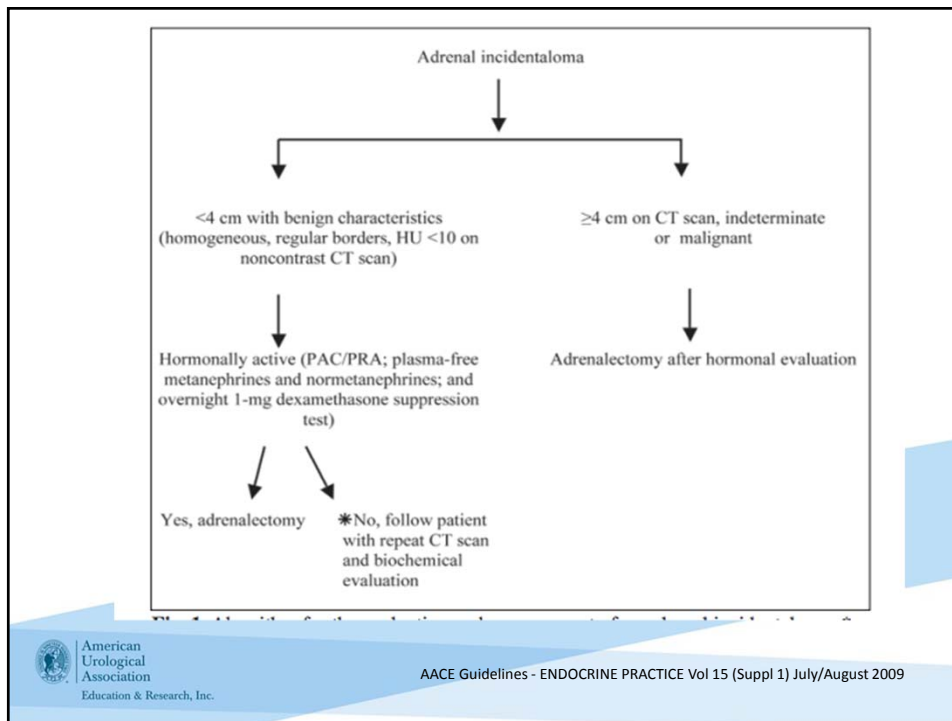


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Androlakis, Eur J clin
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Adrenal Incidentaloma

- CT with and without contrast can determine likelihood of malignancy
- <10 HU is likely benign, <4 cm likely benign
- Washout can help clarify tumors with > 10 HU
- * Pheochromocytoma is variable in terms of HU and washout



Endocrine Causes of Hypertension

Syndrome	Hormone excess	Treatment
Cushing's (hypercortisolism)	Glucocorticoids	Adrenal surgery Stop steroids
Conn's	Aldosterone (adenoma)	Adrenal surgery
Idiopathic hyperaldosteronism	Aldosterone (hyperplasia)	Adrenal surgery
Pheochromocytoma	Catecholamines	Adrenal surgery – Alpha blockade

This is not an exhaustive list, hypothyroidism, hyperparathyroidism and rare diseases would complete the list

Cushing Assess for Hormonal Excess

- 1 mg dexamethasone suppression test can assess for Cushing syndrome
- Recommend assessing for subclinical Cushing as these patients may develop worsening BP or cardiovascular event

Blood Pressure in Cushing syndrome

- The mineralocorticoid receptor can be activated by both aldosterone and cortisol
- Hypertension due to
 - Sodium reabsorption with volume expansion
 - Vasoconstriction
 - Upregulation of renin angiotensin aldosterone system



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ARS Q1:

55 year old woman has right adrenalectomy for Cushing syndrome. Post-operatively, she has blood pressure of 95/55. Serum sodium is 130 and potassium 5.8. You order NS bolus for hypotension. What is the next step in management?

- a) 3% saline
- b) Stress dose steroids
- c) Sodium polystyrene
- d) Sodium bicarbonate



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Answer: B

B. Stress dose steroids

- This patient now has adrenal insufficiency with hypotension, hyperkalemia and hyponatremia. Treatment is high dose steroids.
- Hyponatremia is not severe enough to warrant 3% saline
- sodium polystyrene contraindicated after abdominal surgery
- Sodium bicarbonate not indicated if there is not evidence of acidosis
- Hyperkalemia is mild and likely will not require shifting



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Perioperative Management Cushing Syndrome

- Stress dose steroids
- Manage high blood pressure
- Manage high blood sugar

- Guideline does not address subclinical Cushing



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AACE Guidelines - ENDOCRINE PRACTICE Vol 15 (Suppl 1) July/August 2009

Hyperaldosteronism

Assess for Hormonal Excess

- Plasma renin activity and aldosterone level
 - Patient should be normokalemic and euvolemic
 - Beware of medications that cause false positives or negatives
 - Diuretics and other BP meds
- Aldo/renin ration >20 or aldo level >15 is suggestive
- Sodium load then check aldosterone to confirm
- Adrenal vein sampling to clarify active adenoma vs contralateral adrenal hypertrophy



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Pheochromocytoma

Symptoms

- Triad:
 - headache, palpitations, and sweating
- Other signs: BP spikes, tachycardia, weight loss
- 15% have no history of hypertension

Testing

- Blood test is first step in screening
 - Plasma free metanephrines and normetanephrines
 - improved sensitivity but higher false positive rate
- Confirm with 24 hour urine metanephrines



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Perioperative Management Pheochromocytoma

- Alpha blockade 1-3 weeks pre-op
 - Phenoxybenzamine (10 mg bid up to 400 mg daily)
 - Consider metyrosine
 - prazosin and terazosin are alpha1 selective
 - Beta blockade – only after initiating alpha blockade to avoid unopposed alpha adrenergic stimulation
 - Short acting – propranolol

ARS Q2:

50 year old man has hypertension. Prior to initiating therapy, his potassium was 3.2 and serum bicarb 29. No history of tobacco. Family history negative for hypertension. After correcting hypokalemia and salt loading, aldosterone is 20 with renin activity of 0.5.

Which of the following is likely etiology of hypertension:

- a) Essential hypertension
- b) Fibromuscular dysplasia
- c) Pheochromocytoma
- d) Primary hyperaldosteronism

Answer: D

D. Primary hyperaldosteronism

– High aldosterone with suppressed renin supports this

- Lack of family history makes essential hypertension less likely
- FMD more common in young women



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ARS Q3:

60 year old woman has 4 medication hypertension and hypoK/alkalosis with aldo/renin ratio >20. CT shows a right side adenoma (<4 cm and HU <10).

The next step is:

- a) Adrenal vein sampling
- b) Renal artery duplex ultrasound
- c) Indefinite management with spironolactone
- d) Right adrenalectomy



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Answer: A

A. Adrenal vein sampling

- Incidence of adrenal adenoma increases with age
- In 60 year old, possible to have non-functional adenoma and unilateral adrenal hypertrophy on contralateral side
- Surgery recommended if she is fair surgical candidate
- Long term spironolactone can be considered in patients reluctant to have surgery or poor surgical candidates



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Key points

- Adrenal adenoma requires hormonal evaluation to determine if active
 - If active likely need adrenalectomy with appropriate perioperative management



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