



American  
Urological  
Association

Education & Research, Inc.

## Endocrine

Sarah Elfering, MD  
University of Minnesota

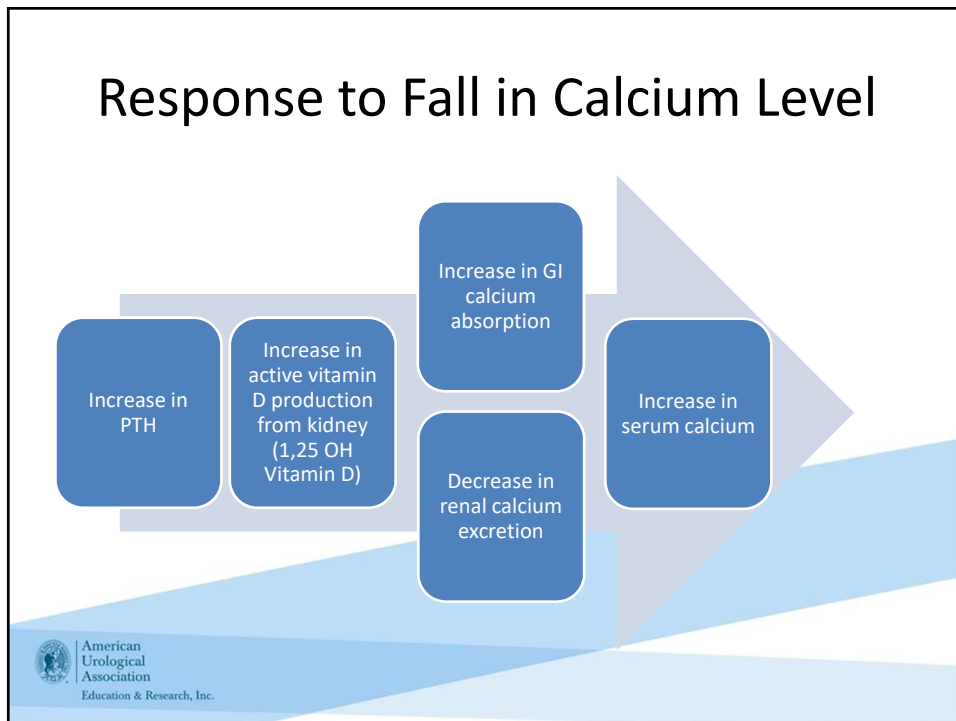
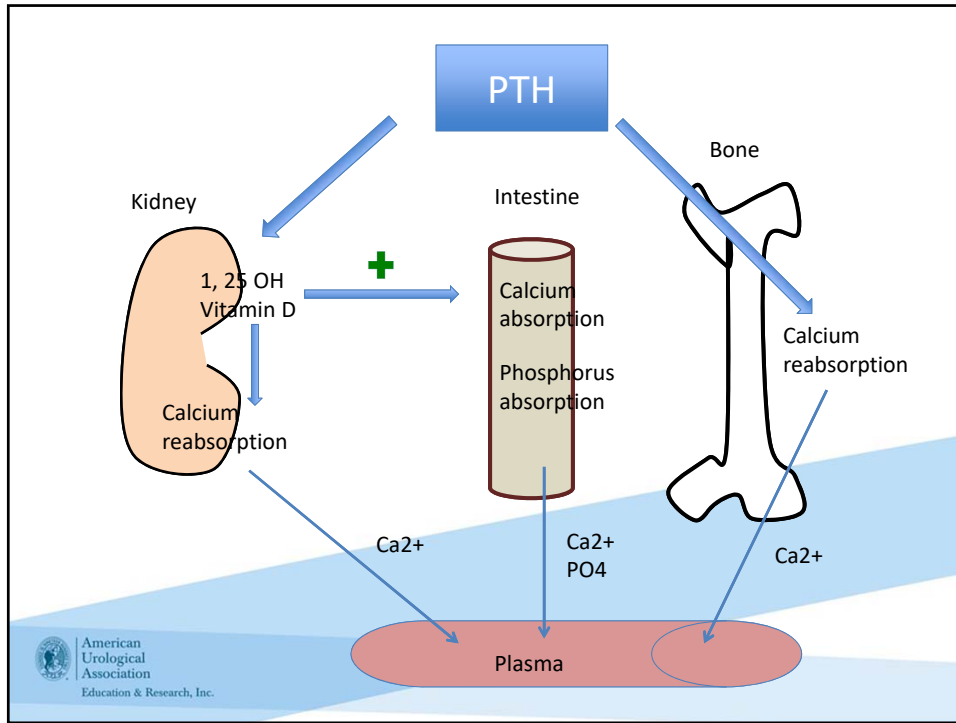
### Endocrine – as it relates to the kidney

- Parathyroid gland
- Vitamin D
- Renal calcium handling
- Endocrine causes of HTN
- Adrenal adenoma



American  
Urological  
Association

Education & Research, Inc.



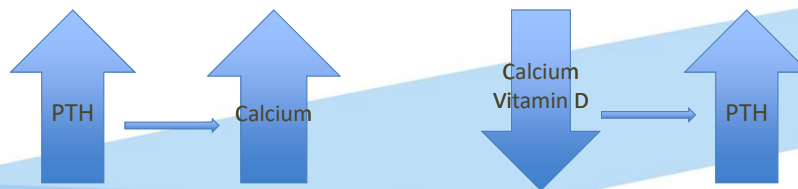
## Disorders of Calcium and Phosphorus Balance

### 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



American Urological Association  
Education & Research, Inc.

## Disorders of Excessive Vitamin D

Diseases

- Granulomatous disease (sarcoidosis, tuberculosis)
- Lymphoma

Mechanism

- High 1,25 OH vitamin D levels

Lab abnormalities

- Hypercalcemia +/- hypercalciuria

American Urological Association  
Education & Research, Inc.

## Adrenal Gland Function

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



American  
Urological  
Association  
Education & Research, Inc.

## Adrenal Incidentaloma

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

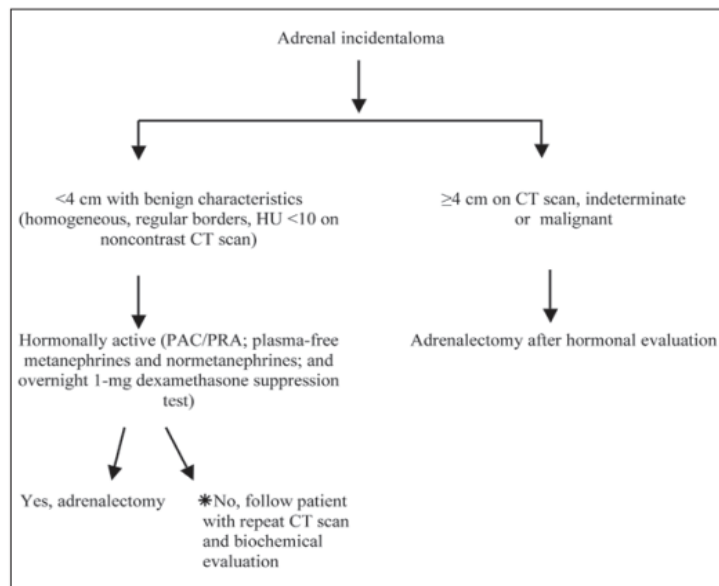


American  
Urological  
Association  
Education & Research, Inc.

Androlakis, Eur J clin  
invest 2011

# 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                     | Glucocorticoids           | Adrenal surgery<br>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 Cushing
- Recommend assessing for subclinical Cushing as these patients may develop worsening BP or cardiovascular event

## Blood Pressure in Cushing

- 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

## Question

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

## Perioperative Management Cushing Syndrome

- Stress dose steroids
- Manage high blood pressure
- Manage high blood sugar
  
- Guideline does not address subclinical Cushing



American  
Urological  
Association  
Education & Research, Inc.

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



American  
Urological  
Association  
Education & Research, Inc.

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



# 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



American  
Urological  
Association  
Education & Research, Inc.

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

# 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



American  
Urological  
Association  
Education & Research, Inc.

## Question

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



American  
Urological  
Association  
Education & Research, Inc.

## Question

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



American  
Urological  
Association  
Education & Research, Inc.

## Key points

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



American  
Urological  
Association  
Education & Research, Inc.