



# Adrenal Masses

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**Dr. Mohammed Alsbou**

MD, MSc, MRCS

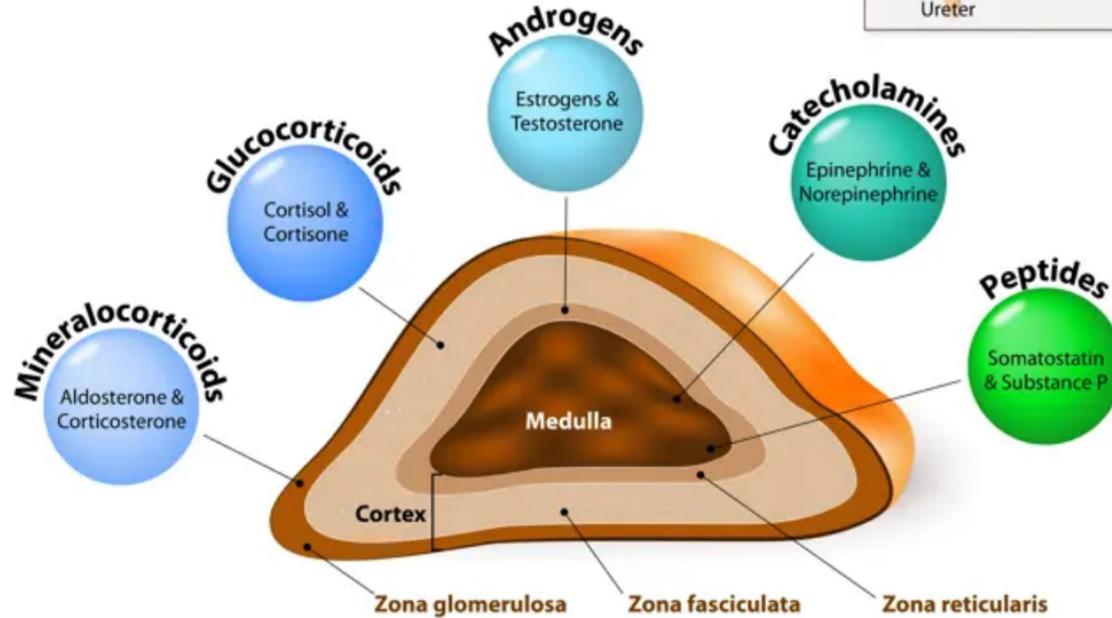
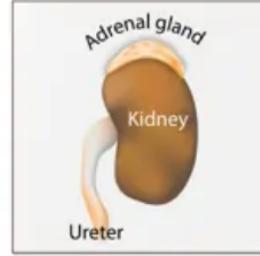
**Mu'tah University**

**Faculty Of Medicine**

**Department of General Surgery**

# ADRENAL GLAND

(hormones)



# THE ADRENAL GLANDS

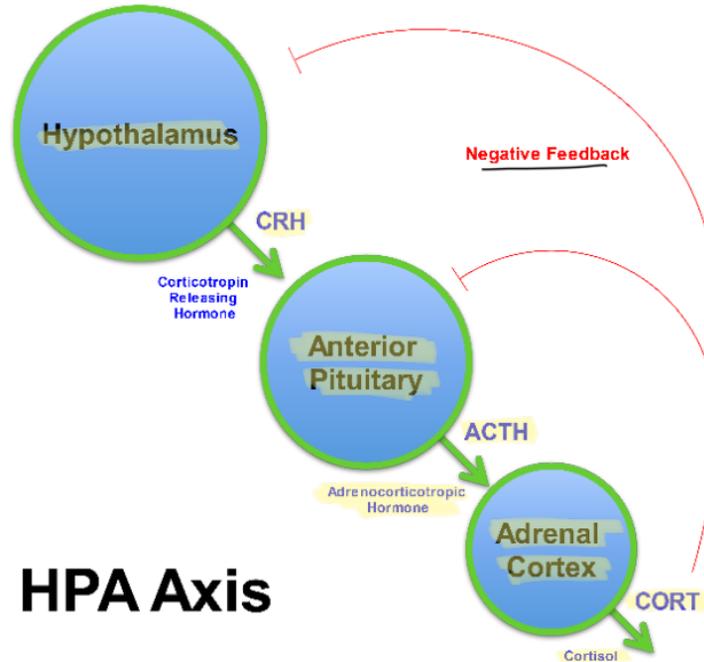
## Adrenal cortex:

- Zona glomerulosa... Mineralocorticoids (salt)
- Zona fasciculata.....Glucocorticoids (sugar )
- Zona reticularis.....Sex Hormones

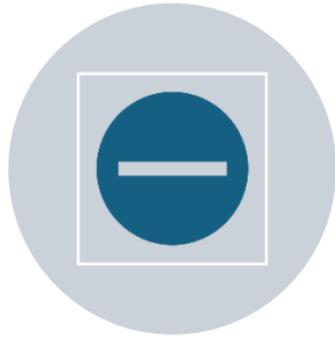
## Adrenal medulla :

- Adrenalin , Noradrenaline& Dopamine  
(Autonomic system)

# Hypothalamic – pituitary – adrenal axis



# Adrenal masses



NON –  
FUNCTIONAL



FUNCTIONAL

# Adrenal incidentaloma

Most of them non-functional adrenal mass

More than 1 cm

Asymptomatic

Found incidentally

Diagnosed by radiological imaging

Up to 15 % of them bilateral

If found to be malignant □ 50% chance of being metastatic

Mets . tends to be large /bilateral/ irregular/inhomogeneous

# All patient with incidentaloma should undergo

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Bp & serum k+

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24 -hr. urine free cortisol or low dose dexamethasone suppression test

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Plasma fractionated metanephrine

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Female with virilization or male with feminization should have estrogens & androgens level

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If results are normal and mass < 4 cm ; observe & repeat imaging in 3-6 months

CT → Find the Mass → Test if it Functional  
or Not → "All test Are Normal" → See the Size

**Incidental Adrenal Mass (>1 cm) diagnosed on CT/MRI**  
 Hormonal evaluation in all patients

1. Dexamethasone (1 mg) suppression test
2. Plasma or 24-h urine metanephrines
3. If hypertensive, include plasma aldosterone:renin ratio

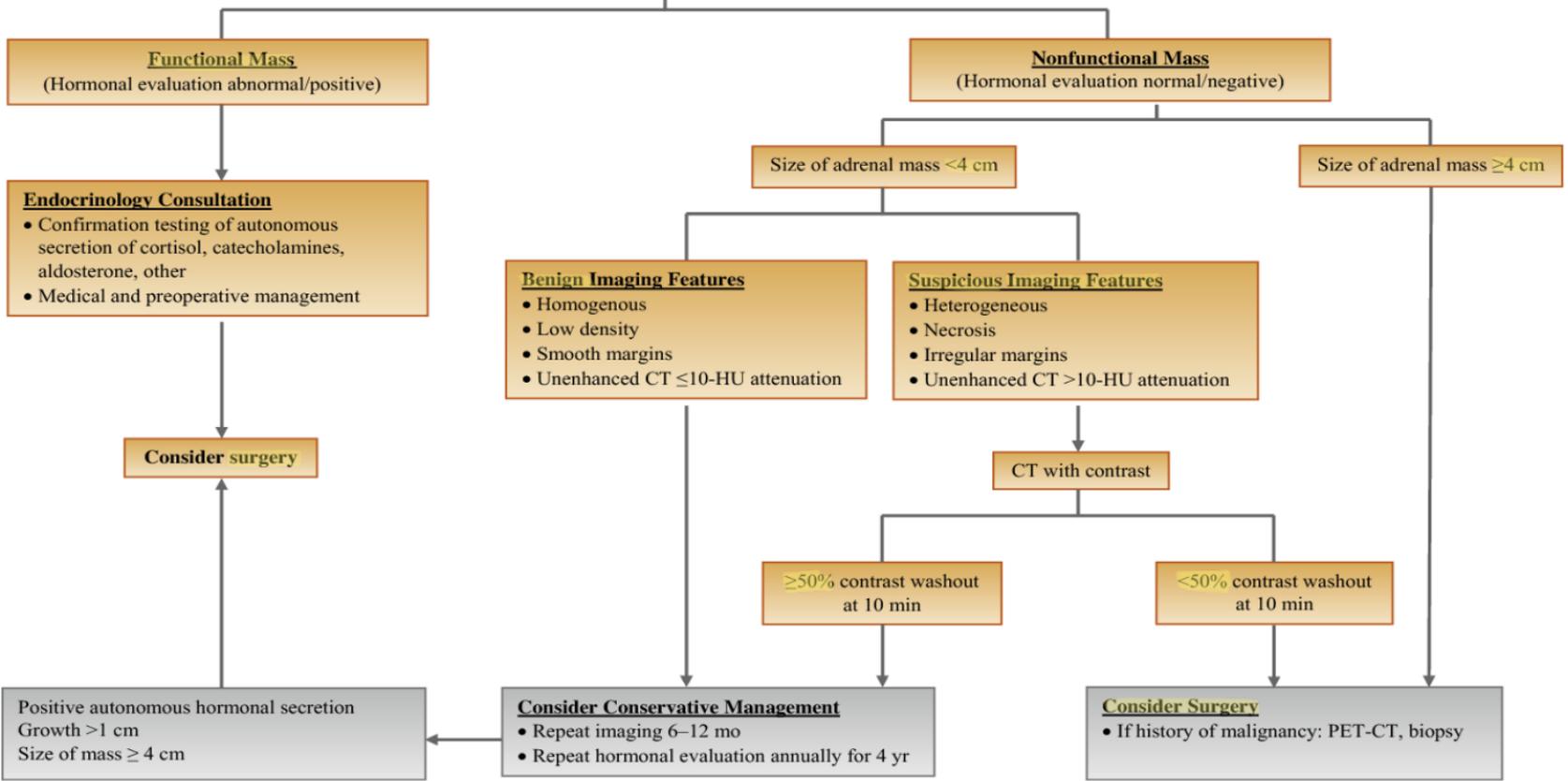


Figure 11. Management of Incidental Adrenal Masses

# Indication for adrenalectomy of incidentaloma



Functioning tumor

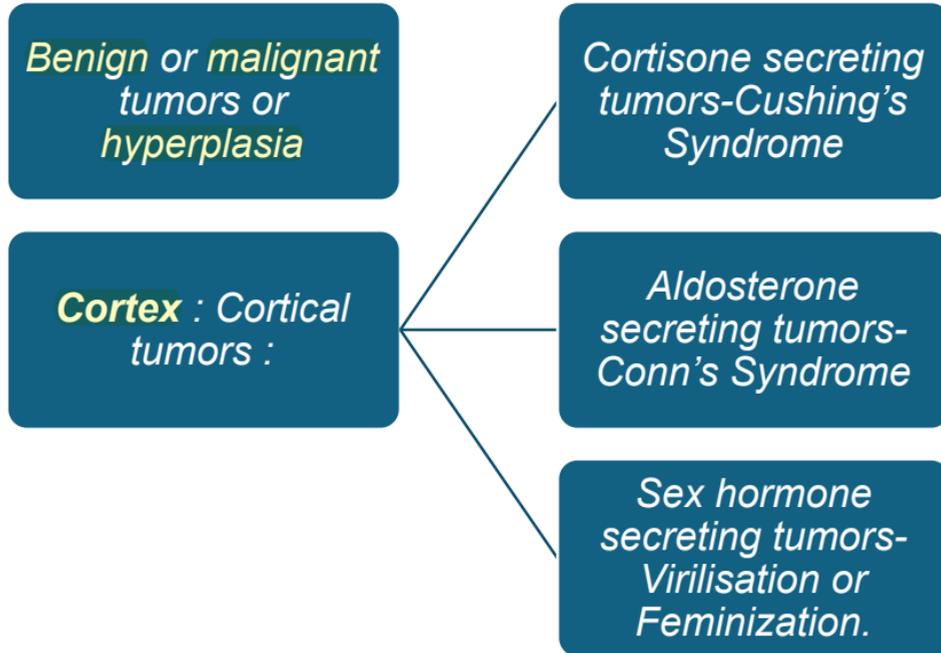


Mass >4-6 cm



Imaging suspicious for ca

# Functional Adrenal Abnormalities





# Diffuse Hyperplasia

- *Primary or a consequence of stimulation by trophic hormones leading to hypercortisism , Conn's disease or Adrenogenital syndrome*

# Medulla



Tumors secreting  
adrenaline/nor-adrenaline



( Pheochromocytoma )



# Cushing's Syndrome



**Primary adrenal disease:**

Adenoma

Carcinoma

Primary adrenal hyperplasia “  
ACTH independent



**Secondary adrenal disease:**

Primary pituitary micro-adenoma

Non pituitary source “Ectopic  
ACTH syndrome “

# Cushing's Syndrome

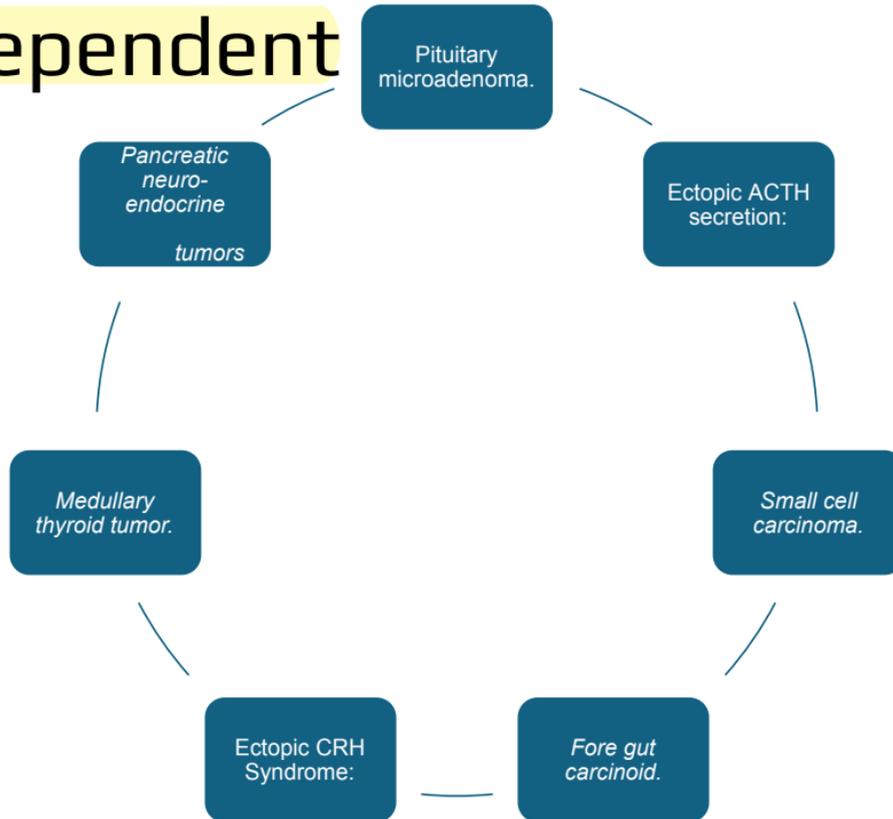
Excess circulating cortisol that occurs as a result of endogenous steroid hyper secretion, due to:

ACTH dependent

ACTH independent disease

Exogenous steroid medication.

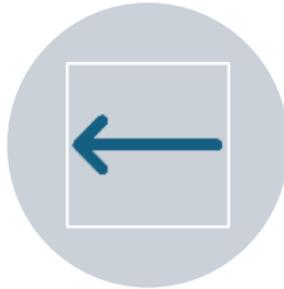
# ACTH-Dependent



# ACTH Independent



ADRENOCORTICAL  
ADENOMA



BILATERAL  
NODULAR  
HYPERPLASIA



ADRENAL  
CARCINOMA.

# Cushing's Syndrome

excess of circulating cortisol

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Commonest cause is iatrogenic; *administration of steroids for the treatment of other diseases*

*RA, Sarc*

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*ACTH-secreting pituitary adenoma (Cushing's disease)*

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*Ectopic ACTH –secreting tumor (bronchogenic, pancreatic, thymic ca)*

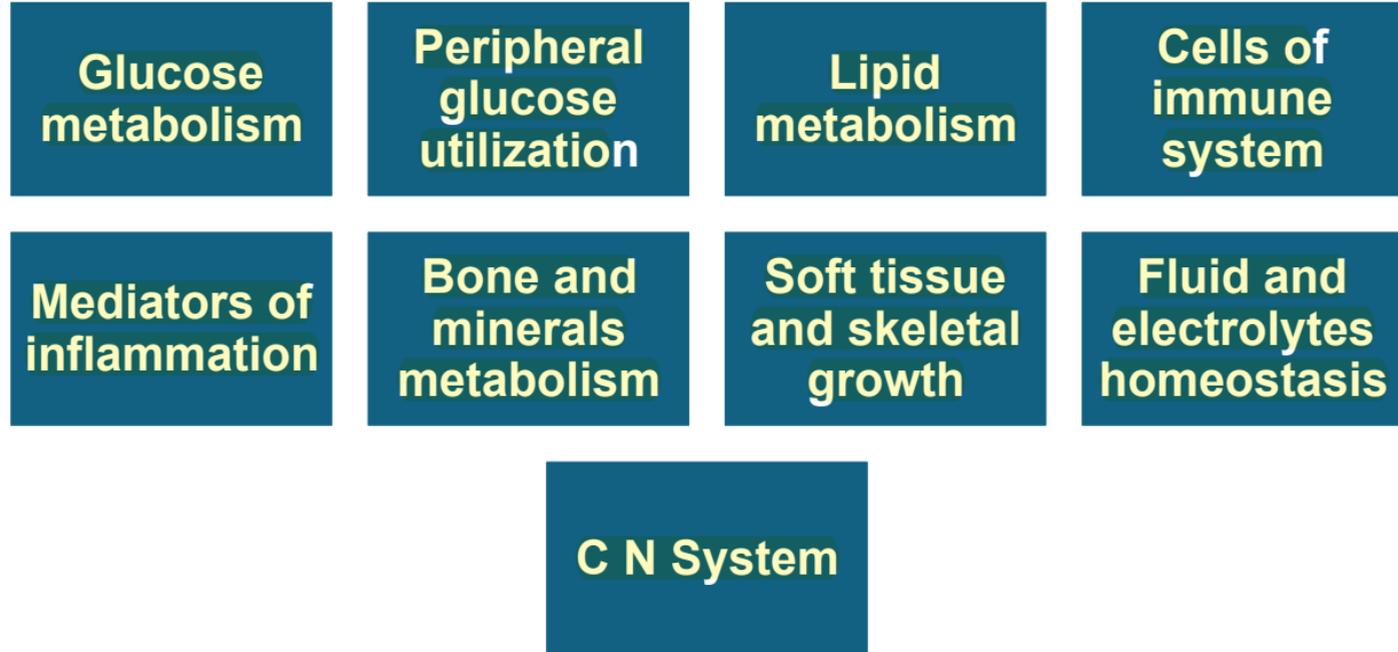
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*Non-pituitary related (bilateral adrenal hyperplasia)*

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*Adrenal tumors*

# Action of glucocorticoids

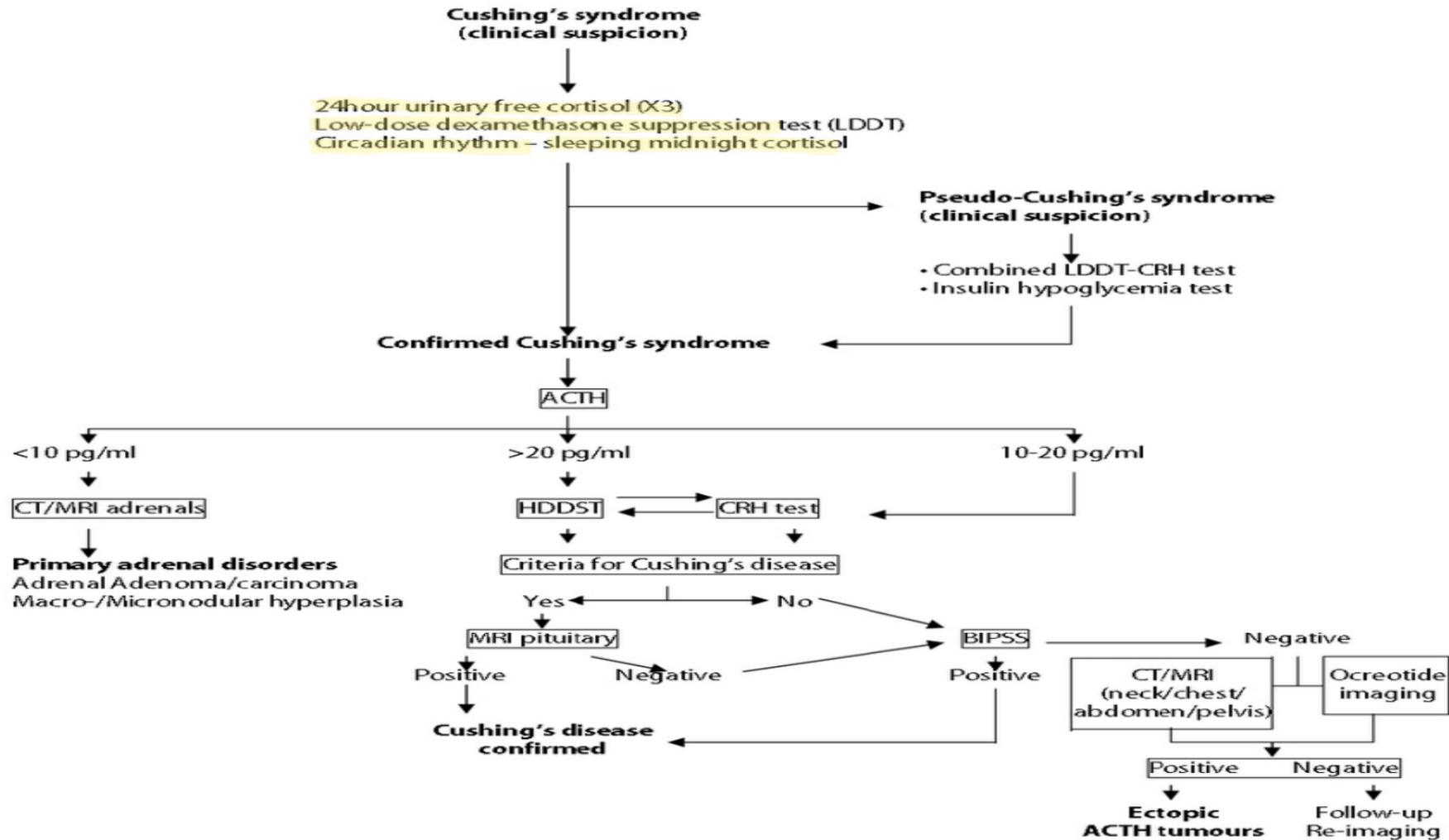


# presentation

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- Facial plethora
- Moon face
- acne
- Buffalo hump
- Hirsutism and Virilism
- Truncal central obesity
- Striae(pink/purple)
- Muscle weakness
- Osteoporosis
- edema
- Hypertension
- Glucose intolerance( 20 % DM)
- Hypokalemic metabolic alkalosis
- Loss of connective tissue





After high dose dexamethasone

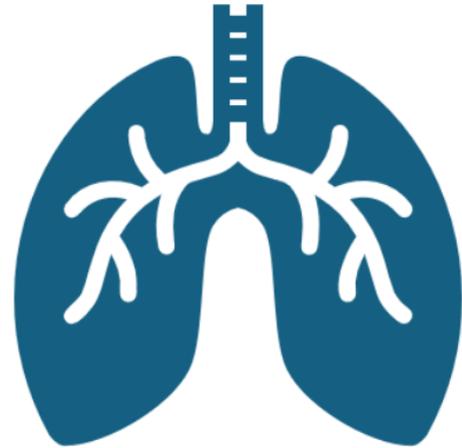
Low ACTH = Adrenal disease

High ACTH = Extra-adrenal  
cause.

# Ectopic ACTH Secretion

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- **Symptoms of the primary disease:**
  - Small cell carcinoma of the lung
  - Carcinoid
  - Medullary Ca of Thyroid
  - Other primary carcinomas





# Anatomical details

Pituitary: Skull X ray ,      C T ,      M R I

Adrenals: U S ,      C T ,      M R I

Scintigraphy - cholesterol scan  
- N P 59 scan

- Search for ectopic ACTH source
  - C T chest
  - Angiography

# Plan of Management



Pituitary adenoma : Microadenectomy

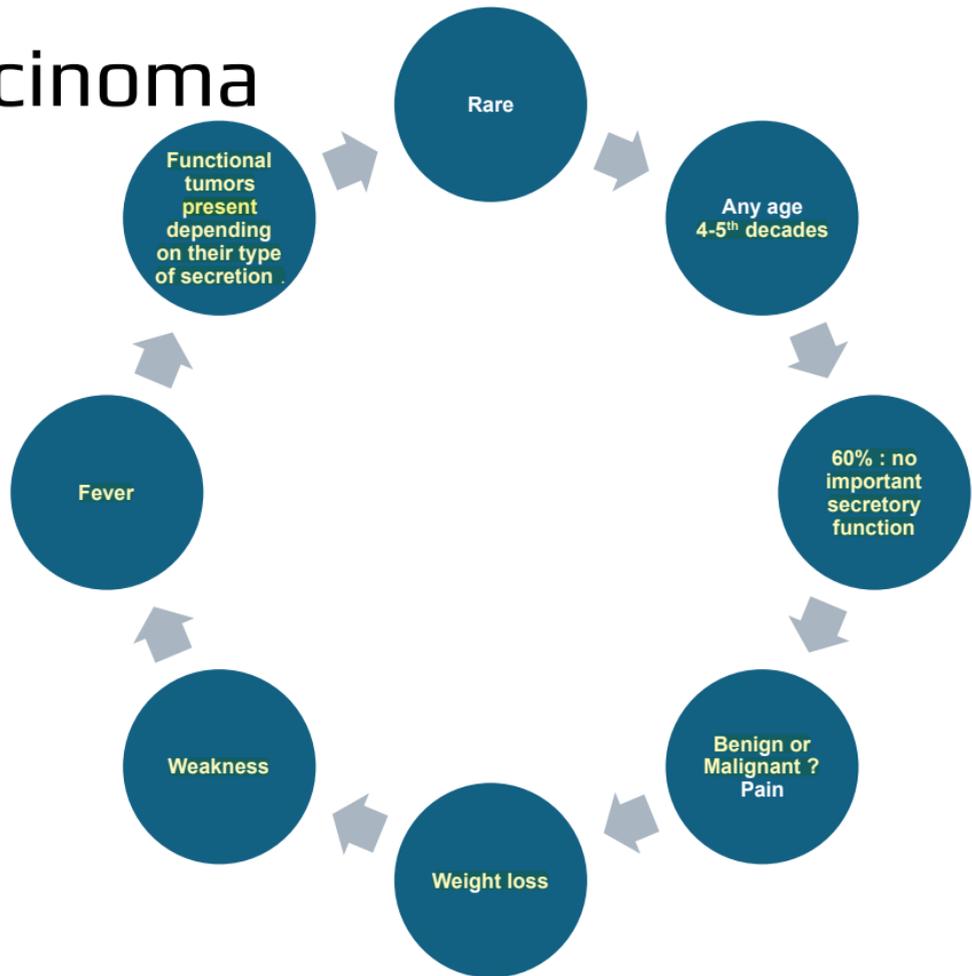


Hyperplasia : Bilateral adrenalectomy



Solitary adenoma: Unilateral adrenalectomy

# Adrenocortical Carcinoma



# Treatment



When possible  
Surgical resection



Radiotherapy



Chemotherapy

# Aldosteronism

## \* Conn's Syndrome\*

Primary due to : tumor ( Adenoma )

nodularity

hyperplasia

Secondary due to: Excess stimulation by Angiotensin

Commonest cause is :

“Aldosterone producing Adenoma “

**Incidence:** Females more than males

30—60 years of age

1% of patients investigated for hypertension

Pathophysiology

*Excess secretion*

Aldosterone :

Promotes sodium absorption

Promotes water retention

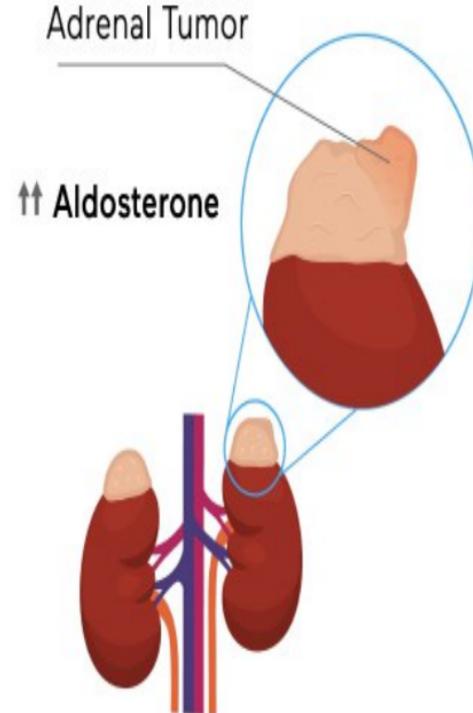
Increase potassium secretion

## Clinical features

Clinical suspicions should be raised whe

- Hypertension occur with hypokalemia.
- Moderate to severe hypertension
- Hypokalemia *Persistence*
- Muscle weakness
- Malaise
- polydipsia

## CONN'S SYNDROME



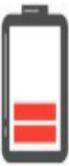
High BP



Low blood potas:



Polyuria



Fatigue

# Investigation

Blood : Hypokalemia

Plasma aldosterone

Urine : Increase urinary  
potassium

Imaging : U S

C T

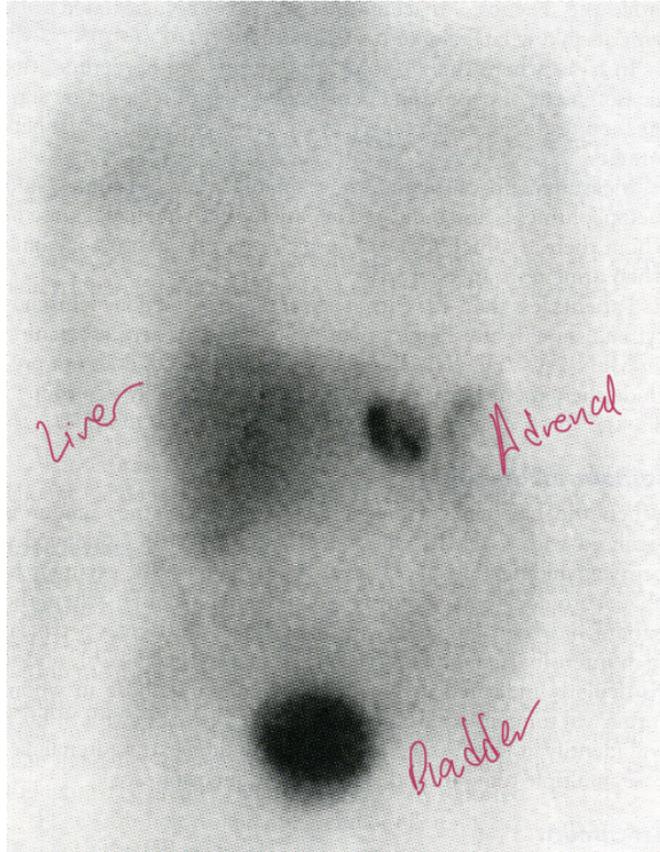
M R I

Iodocholesrerol isotope  
scan

الساليد  
الي بجه

Adrenal vein sampling

invasive



Injection  
in the Blood  
And Uptake  
By the Adrenal  
Gland



## Treatment

- Spironolactone →  $K^+$  sparing
- Adrenalectomy



# Phaeochromocytoma *(Medulla)*

Is rare

Usually benign

Arise from chromaffin cells of the sympathetic system

Symptoms are due to catecholamines

*Are derived from the neural crest:*

Phaeochromocytoma

Neuroblastoma

Paraganglioma

Ganglioneuroma

# Phaeochromocytoma

Rule of 10's

10%  
bilateral ,

10% are  
malignant

10 % in  
children

10%---Exrta-  
adrenal ,

10 %  
multiple

10 % not  
ass. with  
HTN

10 %familial

# phaeochromocytoma

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90% ---solitary – adrenal

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0.1% of patients investigated for hypertension

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Average size is 5 cm

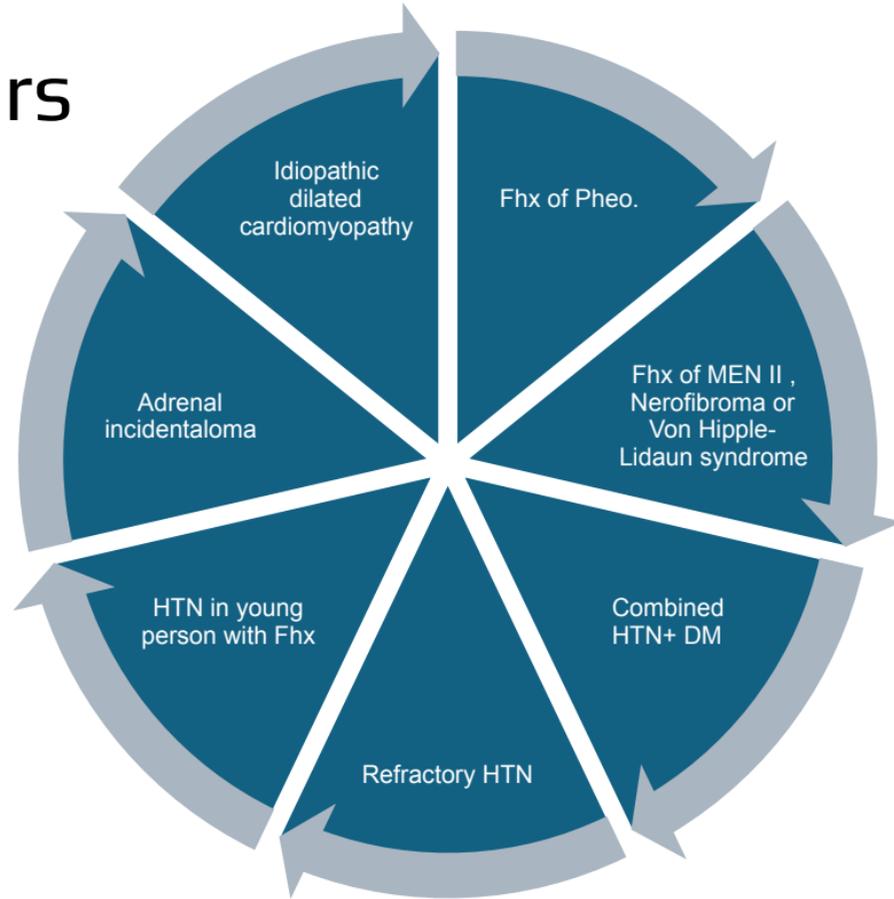
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Discovered early because of catecholamines effects

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Mostly secretes adrenaline

# Risk factors



# Symptomatology



PALPITATION



HYPERTENSION



SWEATING  
AND PALLOR



ANXIETY



CHEST PAIN &  
WEAKNESS  
50%

# Symptomatology

- Attacks often occur spontaneously but may be precipitated by vigorous exercise, Alcohol, tobacco and drugs : Anesthesia, phenothiazines & tricyclic antidepressants.

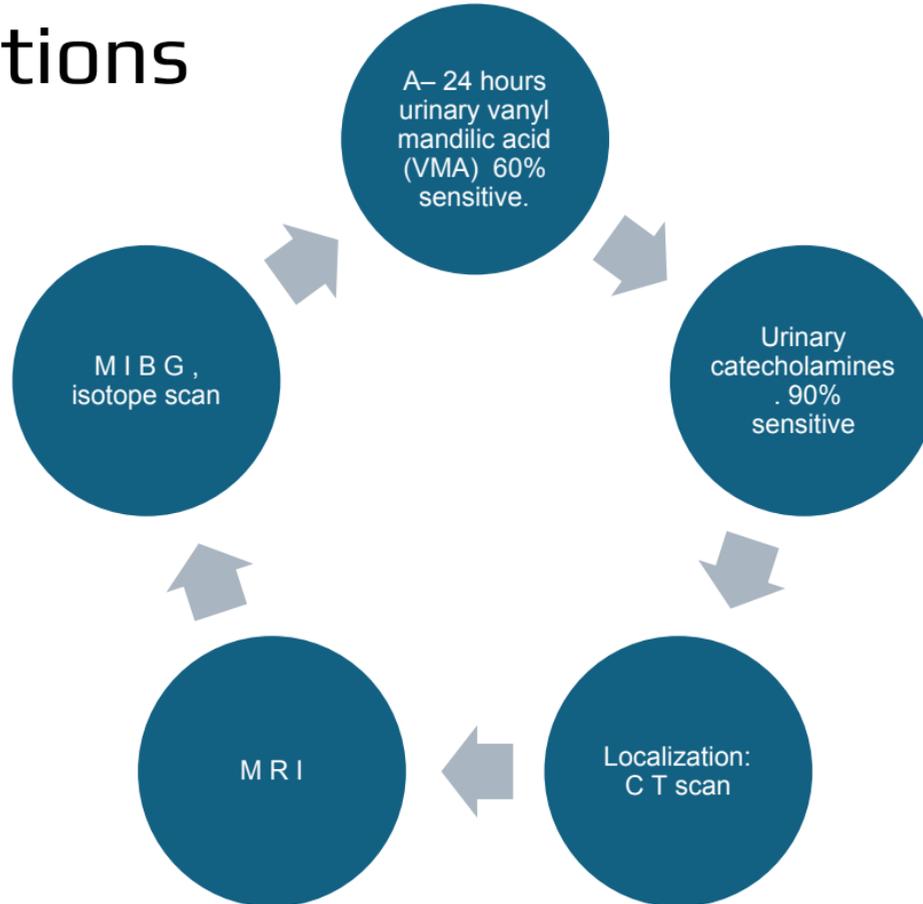
# Clinical associations

\* Multiple endocrine neoplasia type 2

Phaeo , medullary thyroid ca, hyperparathyroidism

\* Neurofibromatosis .  
10% of patients with neurofibromatosis may develop phaeochromocytoma

# Investigations



high level of  
Catecholamine

# Management: =Adrenalectomy

Preoperative  
management  
\*\*give  
antihypertensive  
(combined  
alfa & B-  
blockers)

لنزم الالينيت

لو  $\alpha$  لحاله

راح يسهل بـ بتشكل قوي

Operative  
management  
\*\*stabilization  
of Bp  
Central Arterial  
line

Post operative  
management  
\*\* death is  
usually due to  
cardiac  
arrhythmia and  
stroke

- ICU

- Continuous Monitoring  
Bp

.  $\downarrow$   $\Rightarrow$  start  
Catecholamine  
+ vasopressor  
Bp  $\downarrow$  غني

Thank you

