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Advanced Practice Providers

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Adrenal Incidentalomas

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Disclosures

Nicole Martinez de Andino, NP-C

Advisory Board: Salix, Clinical Area – IBS

Objectives

- Define adrenal incidentaloma and become familiar with the categories of adrenal incidentalomas.
- Outline work up of adrenal incidentalomas.
- Discuss treatment options by category of incidentalomas.

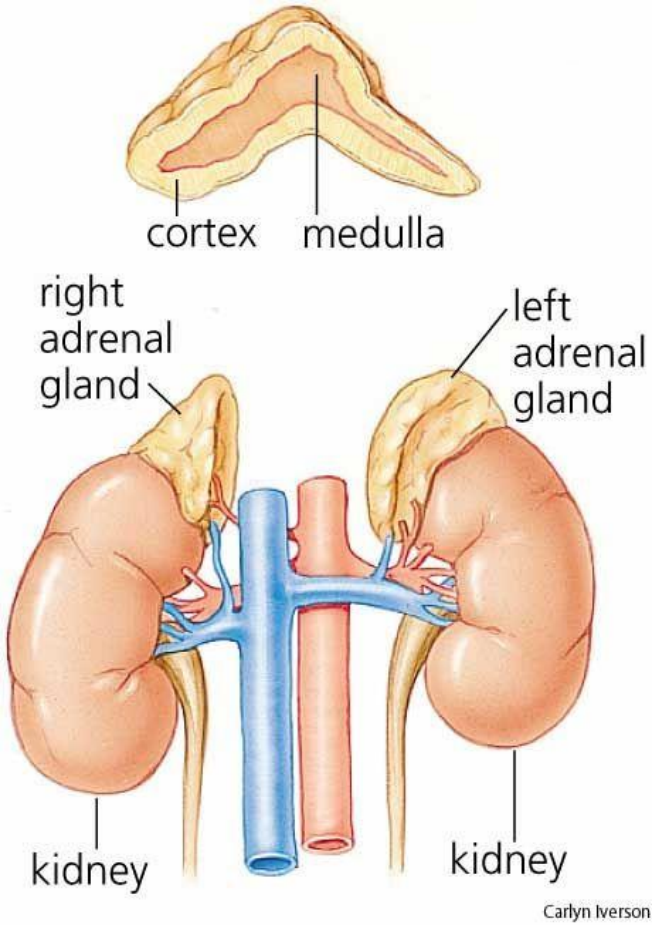
Definition: Adrenal Incidentaloma

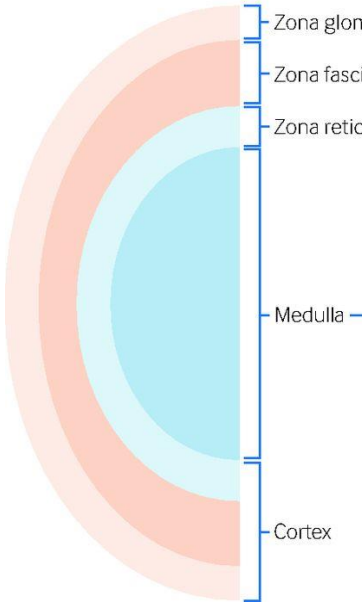
- Adrenal mass larger than 1cm found on imaging completed for a different indication
- Occurs in 4% of all patients undergoing CT scans[1]
- Incidence of 8% in autopsy series[2]
- 80% are non-functioning[3]

https://www.shutterstock.com/image-illustration/3d-rendered-medically-accurate-illustration-adrenal-1080431747

1. Terzolo M, Stigliano A, Chiodini I, Loli P, Furlani L, Arnaldi G, et al. AME position statement on adrenal incidentaloma. *Eur J Endocrinol*. 2011; 164:851–870; 2. Kloos RT, Gross MD, Francis IR, Korobkin M, Shapiro B. Incidentally discovered adrenal masses. *Endocr Rev*. 1995;16:460-484; 3. AACE/AAES Guidelines for the Management of Adrenal Incidentalomas. *Endocr Prac*. 2009: 15.

The Components of the Adrenal Gland and Consequences of Excess Hormone Production

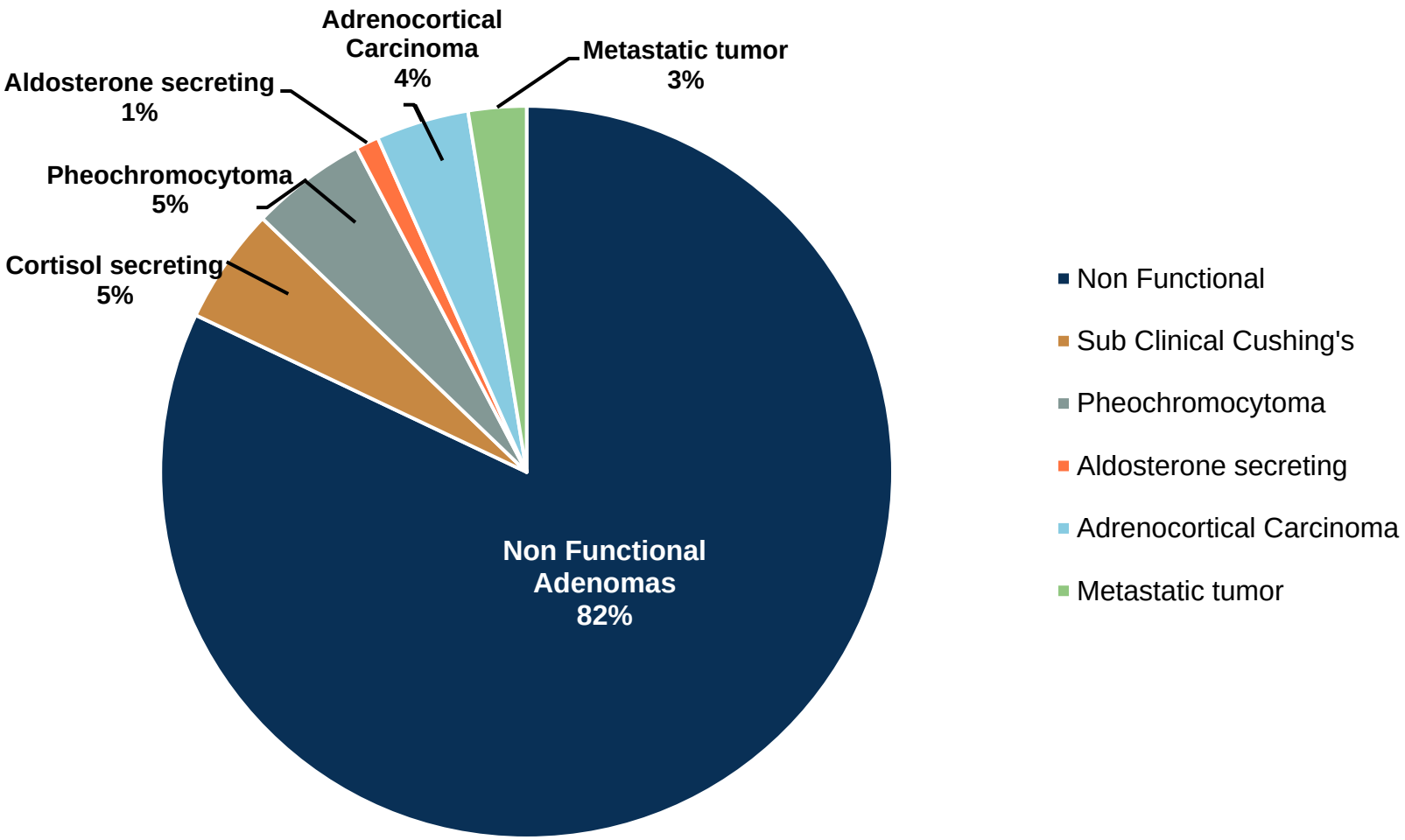




Adrenal gland	Hormones	Function	Consequences of excess production
Zona glomerulosa	Aldosterone	Regulates mineral balance	Hyperaldosteronism (Conn's syndrome)
Zona fasciculata	Cortisol	Regulates metabolism, facilitates response to stress	Hypercortisolism (Cushing's syndrome)
Zona reticularis	Dehydroepiandrosterone (DHEAS)	Facilitates early pubic/axillary hair growth, contributes to libido in females	Virilisation in females (usually associated with adrenal cancer)
Medulla	Catecholamines	Fear, fight, and flight reaction	Pheochromocytoma

Fahmy W F Hanna et al. *BMJ*. 2018;360:bmj.j5674.

Subtypes of Adrenal Incidentalomas



*Remaining are myelolipomas, benign cysts, ganglioneuromas.

Hanna FWF et al. *BMJ.* 2018; 360 doi: https://doi.org/10.1136/bmj.j5674.

Work-Up

Goal of work up is to answer 3 questions:

1. Is the tumor hormonally active?
2. Does it have radiological characteristics suggestive of malignancy?
3. Does the patient have a history of previous malignant lesion?

Components of Work-Up

History and Physical

Biochemical Testing

Imaging

Mass ⟶ Biopsy. Right?

http://i.123g.us/c/emar_doctorsday/card/300531.jpg.

When to Biopsy

- Lesion is suspected to be metastatic from a primary cancer
- Information may change the management of the patient's primary cancer
- Biochemical work up is not suggestive of pheochromocytoma
- The probability of adrenal cortical carcinoma is low

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History and Physical

What looking at and listening to your patient can tell you.

Cushing's Syndrome

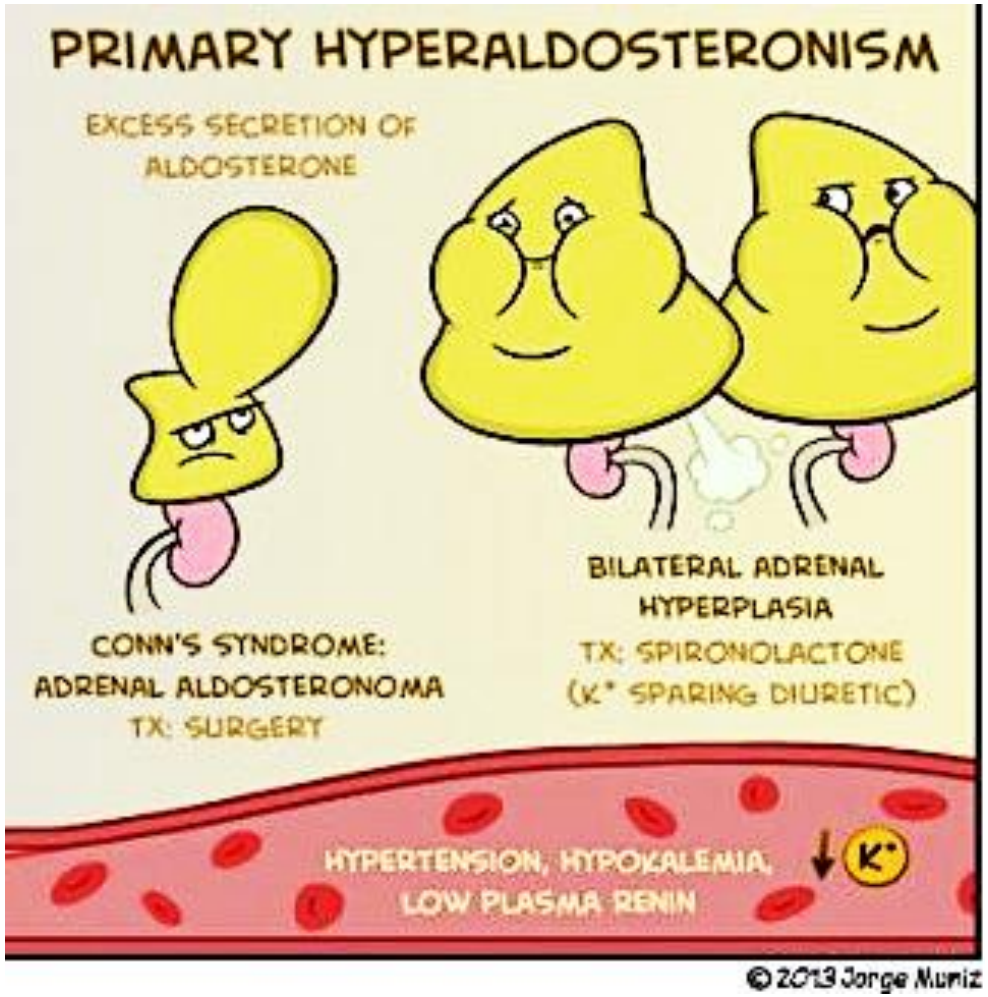
Facial Plethora

Dorsocervical Fat Pad

Striae

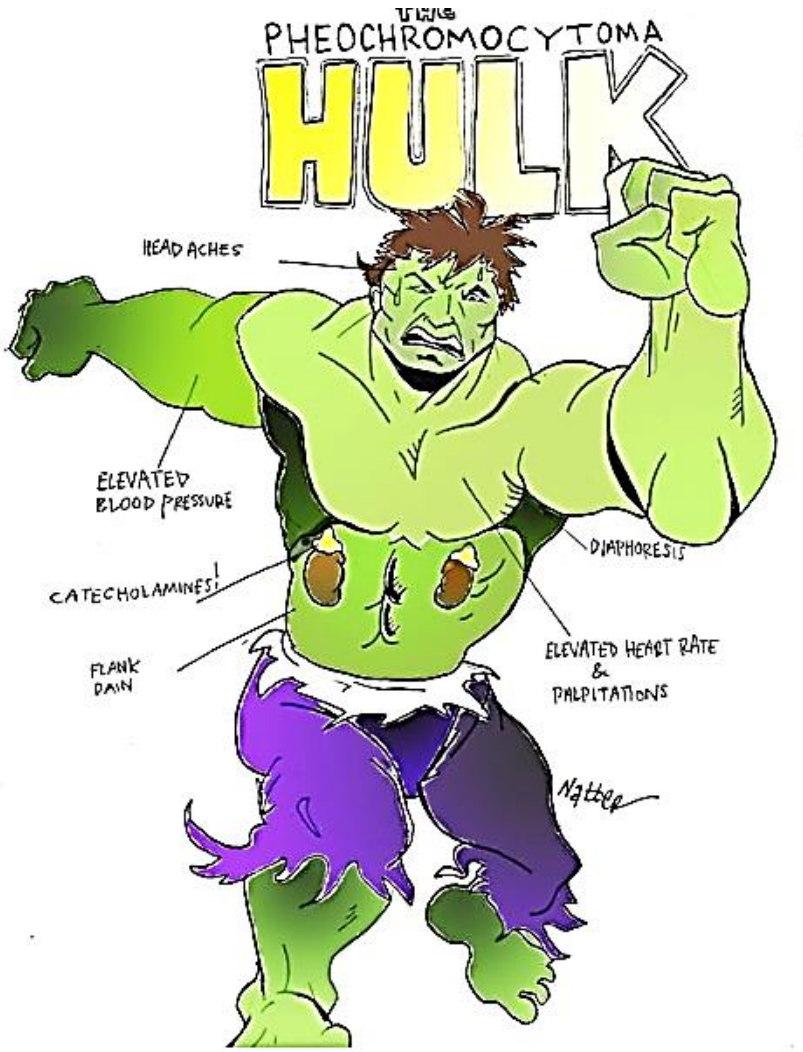
Photo: https://www.onestopnursing.org/?attachment_id=116.

Primary Hyperaldosteronism



https://i.pinimg.com/736x/51/89/ea/5189ea0a168e660cf9a5bc177eed904c.jpg.

Pheochromocytoma



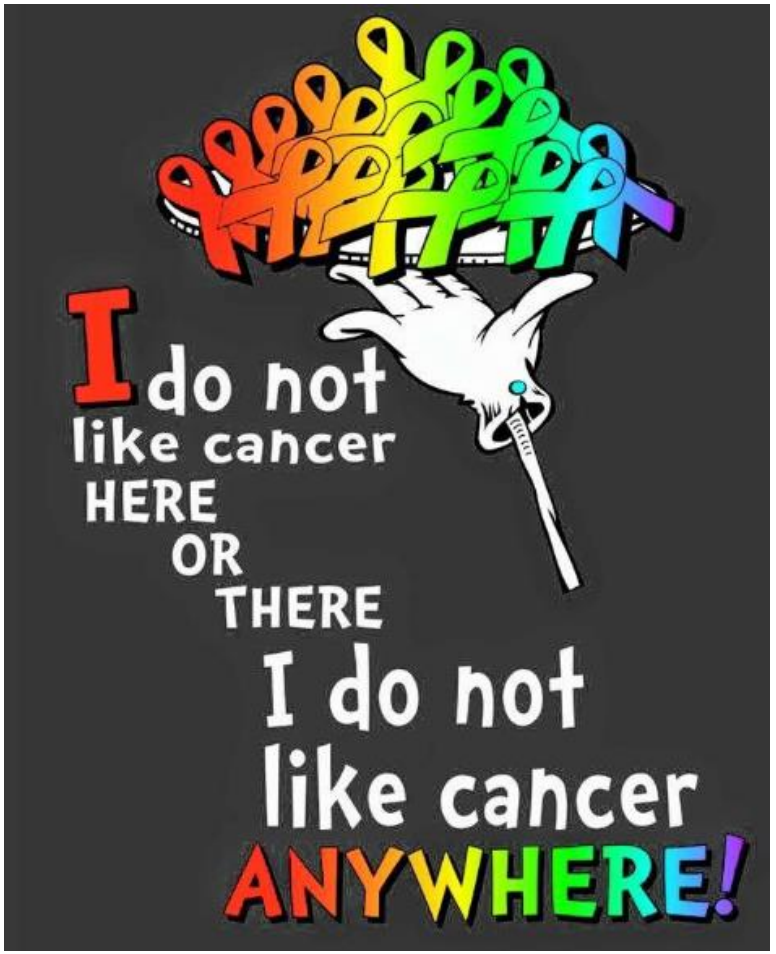
5 P's

- *Palpitations*
- *Pain*
- *Perspiration*
- Pressure
- Pallor

Photo: https://i.pinimg.com/736x/01/af/12/01af12375455fcf40c6fdcbb0db9fbd3.jpg.

Adrenocortical Cancer & Cancer Metastasis to Adrenals Gland

- Abdominal fullness, pressure, flank pain, fever from hemorrhage
- Rapidly progressive symptoms related to excess cortisol, androgens, aldosterone
- Symptoms related to primary cancer



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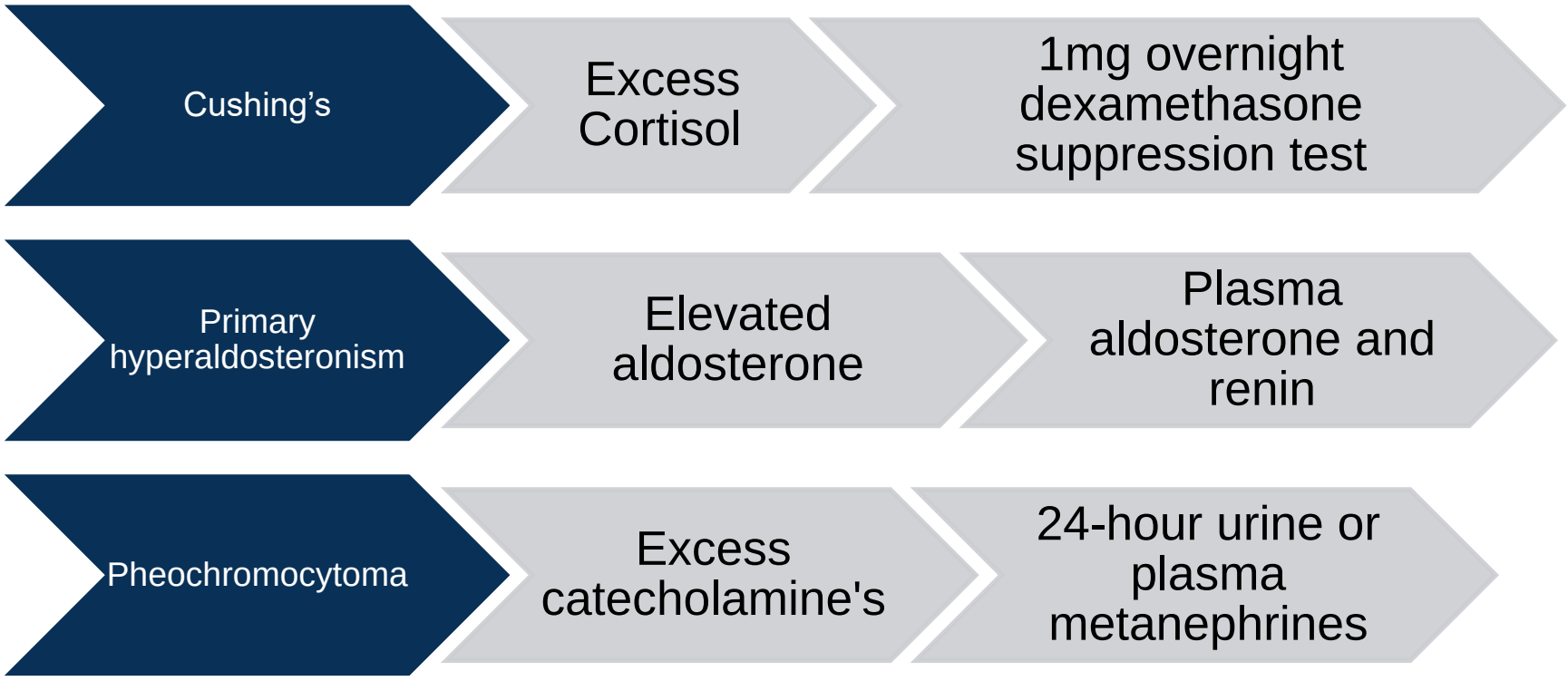
Biochemical Testing

Initial Screening Tests

Biochemical Testing



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Anatomical Imaging

The First-Line in Imaging

Imaging: Benign vs. Malignant

Benign		Malignant
Less than 4cm in size	vs.	Greater than 6cm in size or ↑ size
Smooth margins	vs.	Irregular margins
Homogenous composition	vs.	Heterogeneous or vascular composition
Less than 10 Hounsfield Units	vs.	Greater than 10 Hounsfield Units
Washout ≥50% @10 min.	vs.	Washout ≤50% @10 min.
Stable or <0.8cm/yr.	vs.	Significant growth, >1cm/yr.

https://radiologyassistant.nl/abdomen/adrenals-lesion-characterization#indeterminate-lesions-1-4-cm-adrenal-washout.

Adrenal protocol CT

- A non-contrast, contrast-enhanced scan with a delay of 60-90 sec and a delayed scan at 15 minutes
- Able to report absolute washout in percentages and mass density in Hounsfield units

https://radiologyassistant.nl/abdomen/adrenals-lesion-characterization#indeterminate-lesions-1-4-cm-adrenal-washout.

Hounsfield Units

Direct measurement of the density of an adrenal mass

- Can be negative or positive
  - Air: -1000HU
  - Water: 0 HU
  - Bone: 700-3000HU
- Adenoma <10 HU
  - Benign, but can still be functioning

Contrast Washout

Contrast Washout	
Absolute wash out = $\frac{\text{Enhanced CT (HU)} - \text{Delayed CT (HU)}}{\text{Enhanced CT (HU)} - \text{Unenhanced CT (HU)}} \times 100\%$	
Relative wash out = $\frac{\text{Enhanced CT (HU)} - \text{Delayed CT (HU)}}{\text{Enhanced CT (HU)}} \times 100\%$	
Absolute wash out ≥60% = adenoma	Relative wash out ≥40% = adenoma

https://radiologyassistant.nl/abdomen/adrenals-lesion-characterization.

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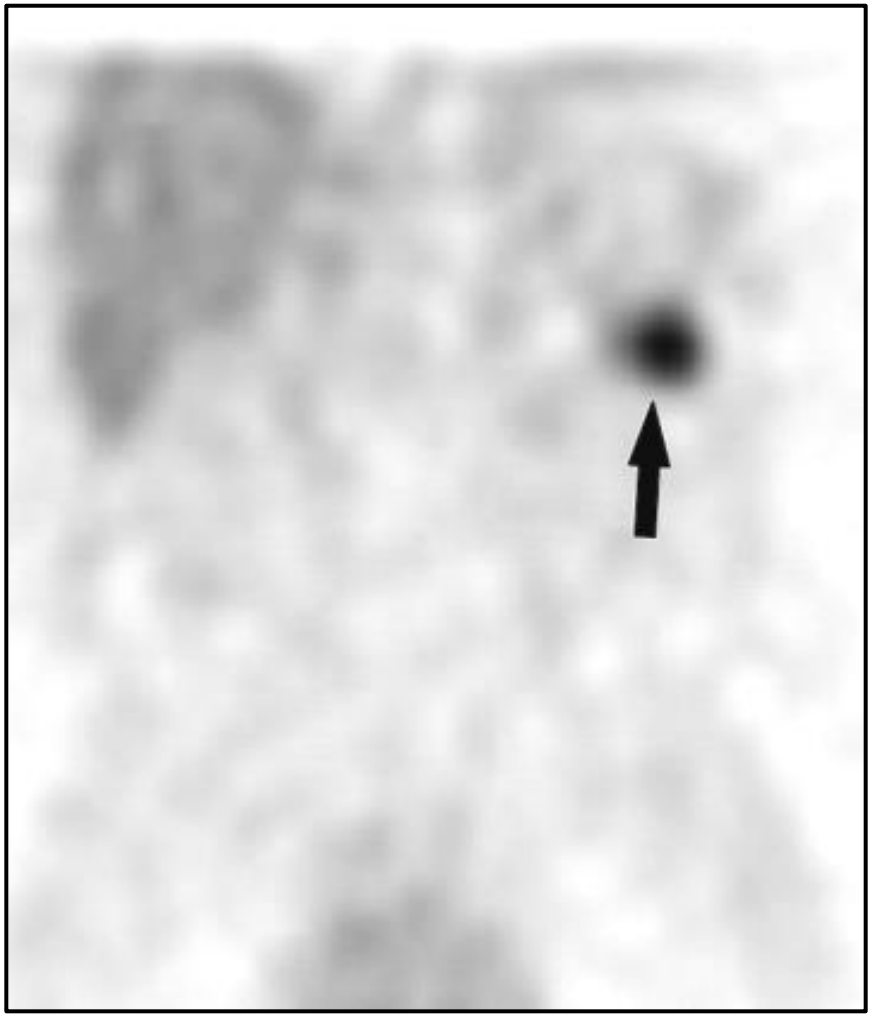
Functional Imaging

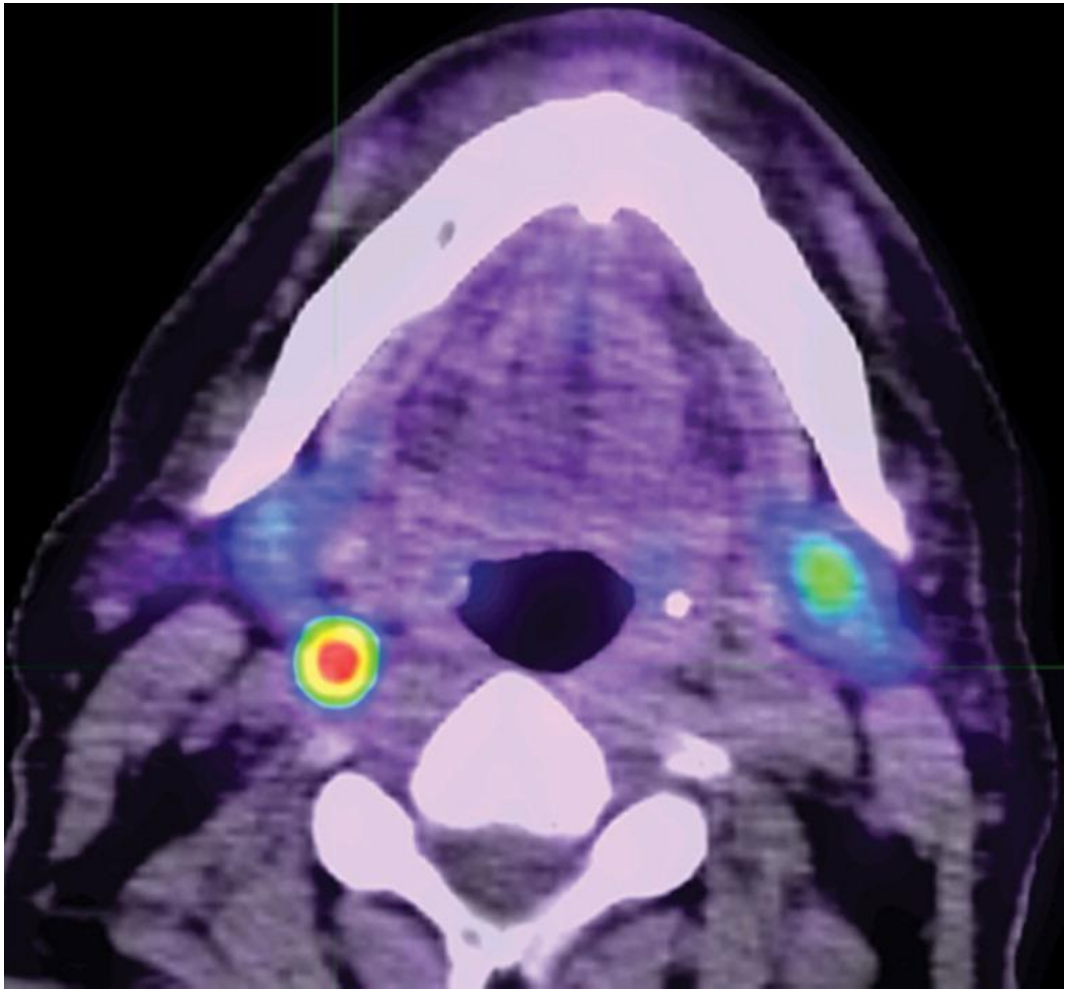
When CT and MRI Are Not Enough

Iodine-123 Meta-Iodobenzylguanidine Scan (MIBG)



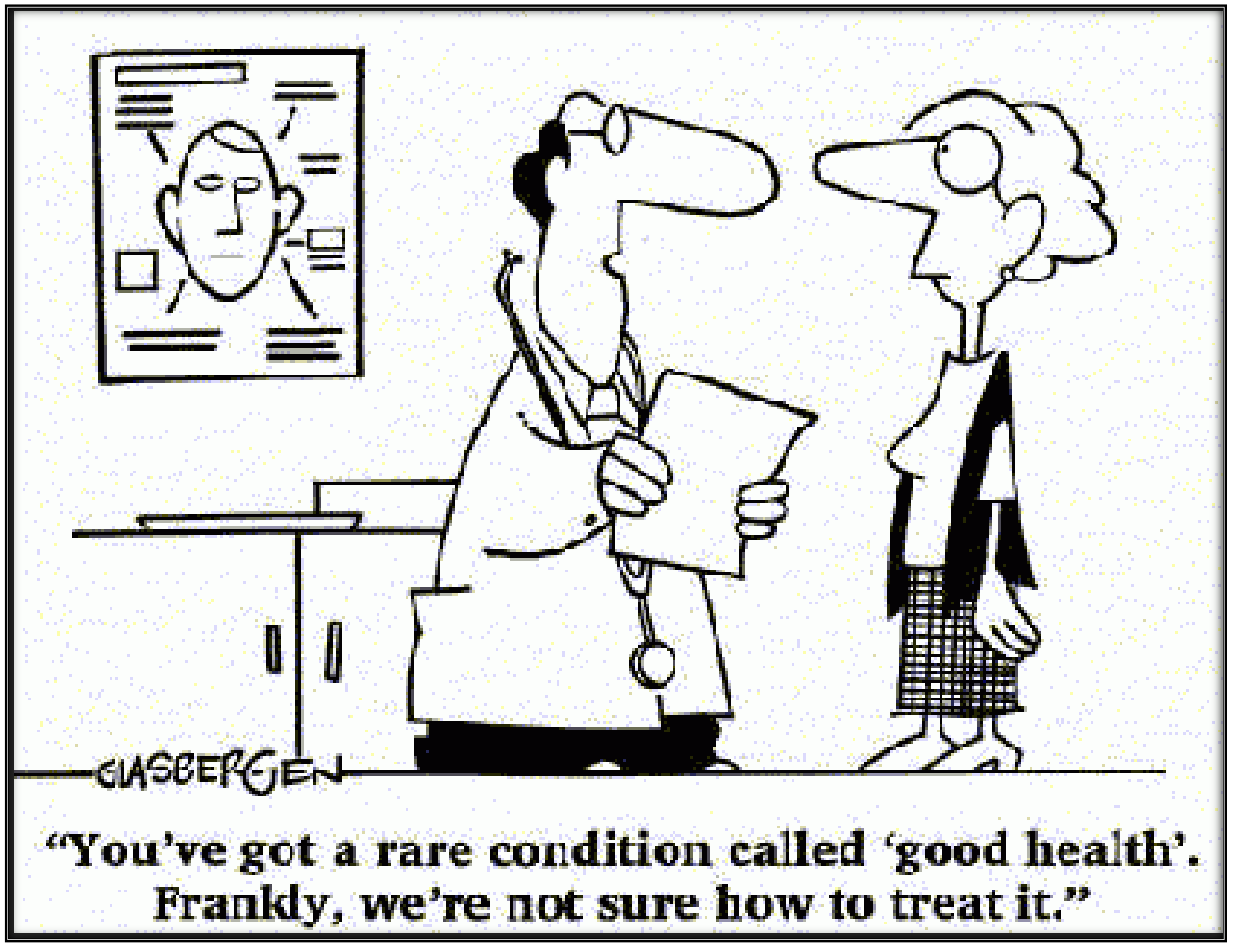
Blake MA et al. *Pheochromocytoma: An Imaging Chameleon. RadioGraphics*. 2004; 24: No. Suppl 1.

Paraganglioma on 68Ga-DOTATATE



Blake MA et al. *Pheochromocytoma: An Imaging Chameleon. RadioGraphics*. 2004; 24: No. Suppl 1.

How to Treat



https://www.bing.com/images.

Non-Functioning, Benign Mass

Repeat biochemical testing annually for up to 5 years

- Consider surgery if becomes hormonally active

Consider surgery if $\geq$ 4cm in size

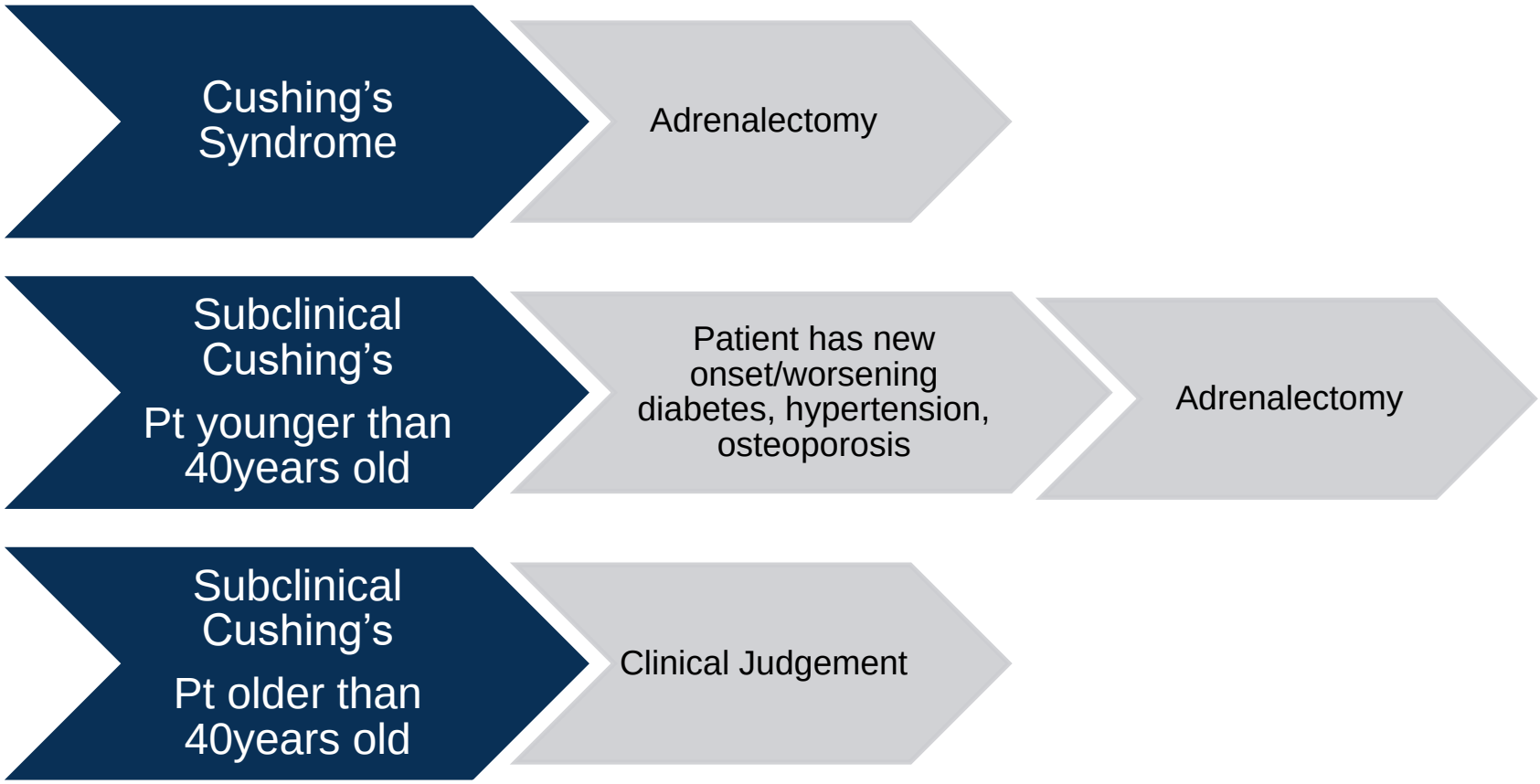
Consider repeat imaging at 6, 12, & 24 months

- Consider surgery if increases in size more than 1cm/year

No recommendations for follow up after 5 years at this time

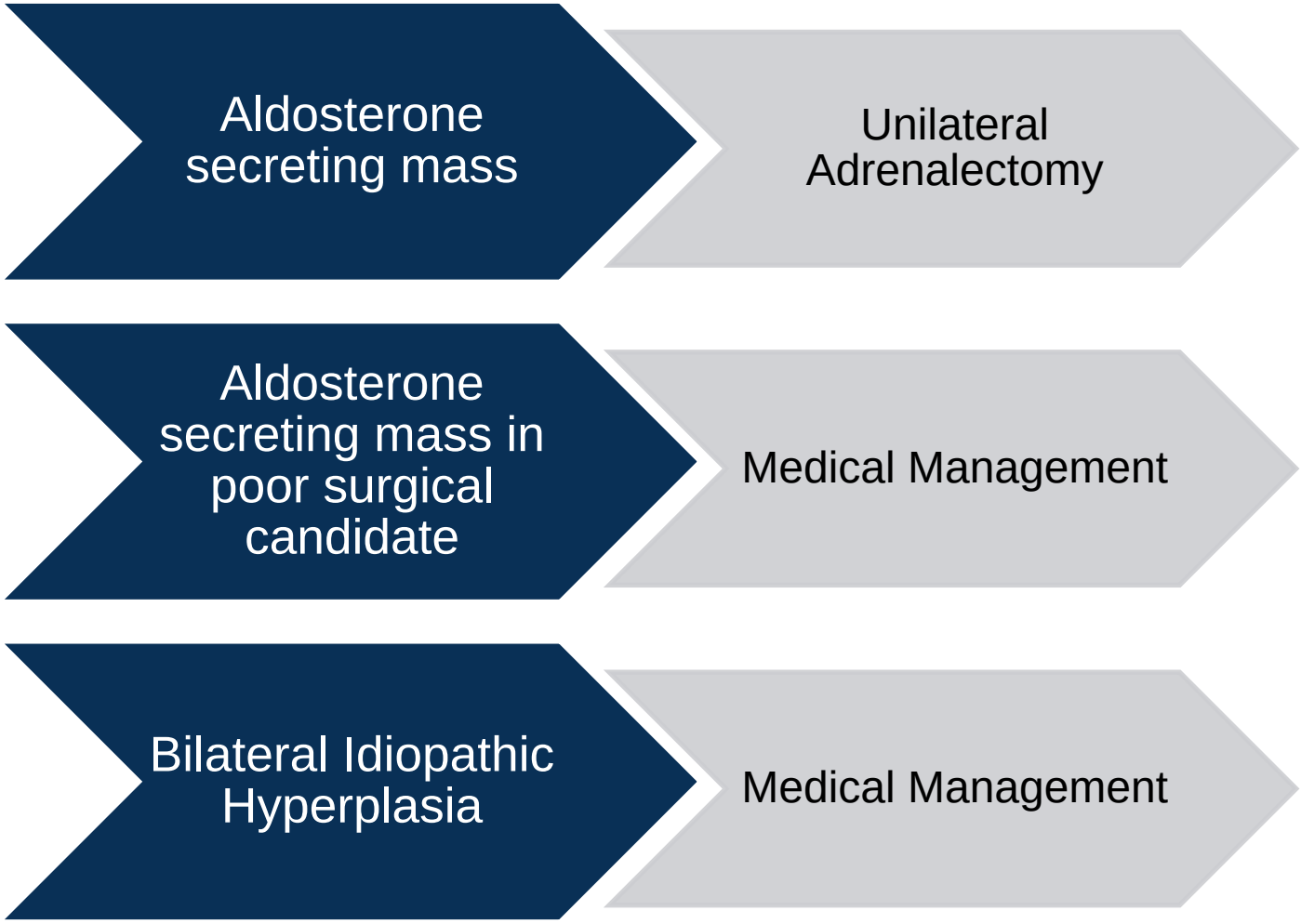
MA Zeiger et al. AACE/AAES Adrenal Incidentaloma Guidelines. *Endocrine Practice*. 2009; 15(Suppl 1)1-20.

Functioning Mass: Excess Cortisol Secretion



MA Zeiger et al. AACE/AAES Adrenal Incidentaloma Guidelines. *Endocrine Practice*. 2009; 15(Suppl 1)1-20.

Functioning Mass: Excess Aldosterone Secretion



MA Zeiger et al. AACE/AAES Adrenal Incidentaloma Guidelines. *Endocrine Practice*. 2009; 15(Suppl 1)1-20.

Functioning Mass: Pheochromocytoma

But it is not that simple!

Peri-Operative Management of Pheochromocytoma

Pre-Op

- Alpha-adrenergic blockade 1-3 weeks pre-operatively
- Some may need beta-adrenergic blockade as well
- High salt diet and liberal fluid intake 1-3 weeks pre-operatively

Intra-Op

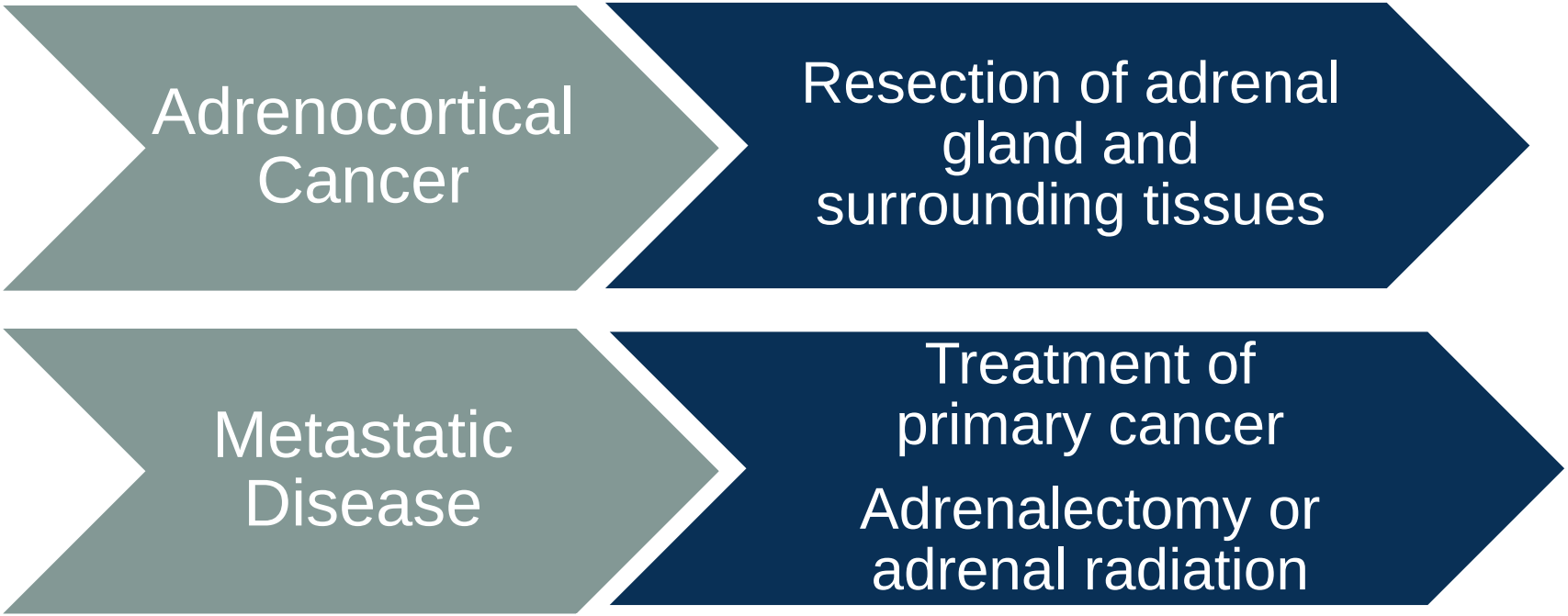
- Arterial line for hemodynamic monitoring, IV for medication & fluid administration, Central venous catheter for infusion & monitoring
- Management of abrupt changes in blood pressure, blood sugar
- Cooperation of surgeon, anesthesiologist and endocrinologist

Post-Op

- Admission to Intensive Care Unit for at least one night
- Management of hypertension, hypotension, hypoglycemia

Kinney MAO et al. *Journal of cardiothoracic and Vascular anesthesia*. Vol 16, No 3 (June) 2002 pg 359-369.

Malignant Mass



MA Zeiger et al. AACE/AAES Adrenal Incidentaloma Guidelines. *Endocrine Practice*. 2009; 15(Suppl 1)1-20.

Laparoscopic/Robotic vs. Open Adrenalectomy

Laparoscopic/Robotic

Open Adrenalectomy

https://www.augustahealth.org/adrenal/adrenal-surgery.

Robotic Surgery

- Decreased narcotic need
- Multiple quadrant surgeries
- Smaller incisions
- Precise movements

https://www.medicaldesignandoutsourcing.com/surgical-robots-grandkids-laugh-da-vinci/.


AUGUSTA
UNIVERSITY
Robotic Adrenalectomy
Left Pheochromocytoma
Dr. Aaron Bolduc
Surgical Director, Adrenal Center
Assistant Professor of Surgery
Minimally Invasive and Bariatric Surgery Division

Patient 1

39 YO F fell off of a horse.

MRI was ordered for back pain and revealed a 3.2cm left adrenal incidentaloma.

Main complaints:

- Worsening fatigue for last year, muscle cramping and weight gain of 10-12 pounds in last year.

No HA, palpitations, panic attacks, or HTN.

Patient 1

Labs:

Metanephrines **elevated**

Cortisol – normal & suppresses

Aldo/Renin – normal

DHEA – normal

Patient 1

Path:

- PASS score 3 (<4).

No symptoms.

Normal labs.

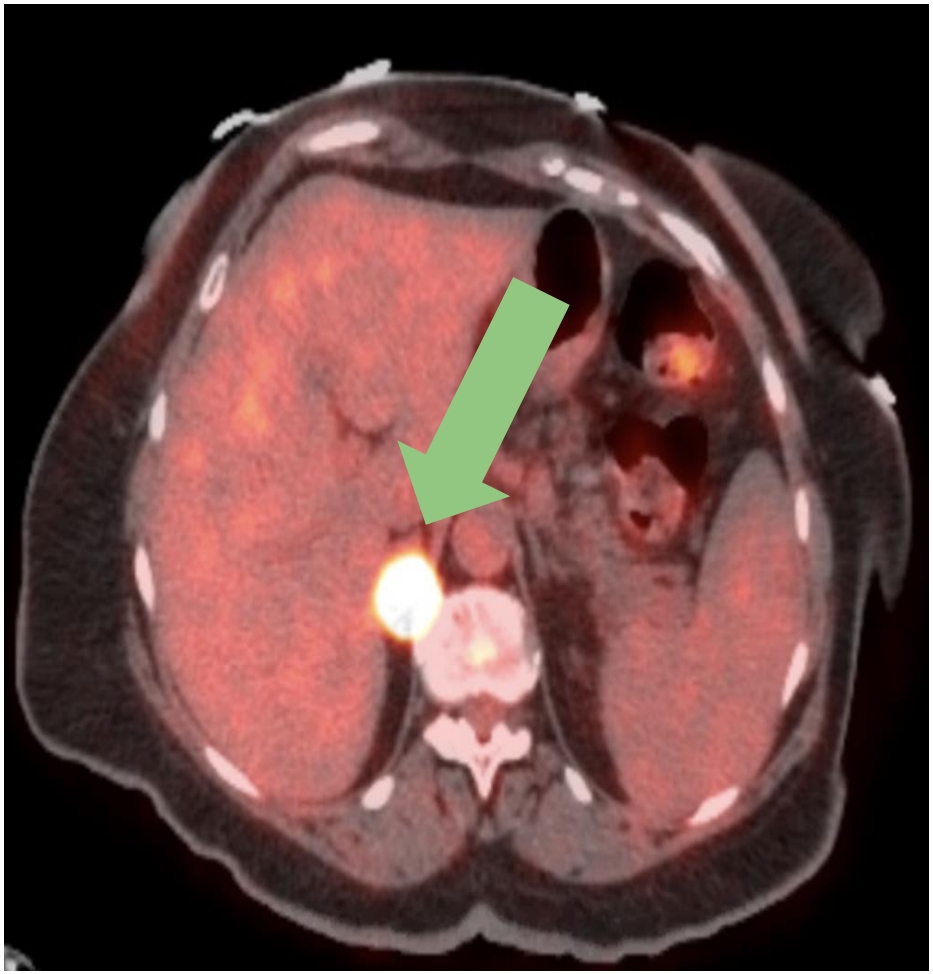
Now 3 years postop without recurrence.

Patient 2

72 YO F with a 1.7 cm Left adrenal tumor on PET.

PMH: Follicular lymphoma grade IIIa, B-cell lymphoma with a pathologic fracture of the left femur, and Nodular sclerosis classical Hodgkin lymphoma.

Specimen Referral	
NormetanepFrREF	(H) 1.3
METAP Spec Source REF	blood
MetanephrnFrREF	* <0.20
Chromogranin A REF	* (H) 125

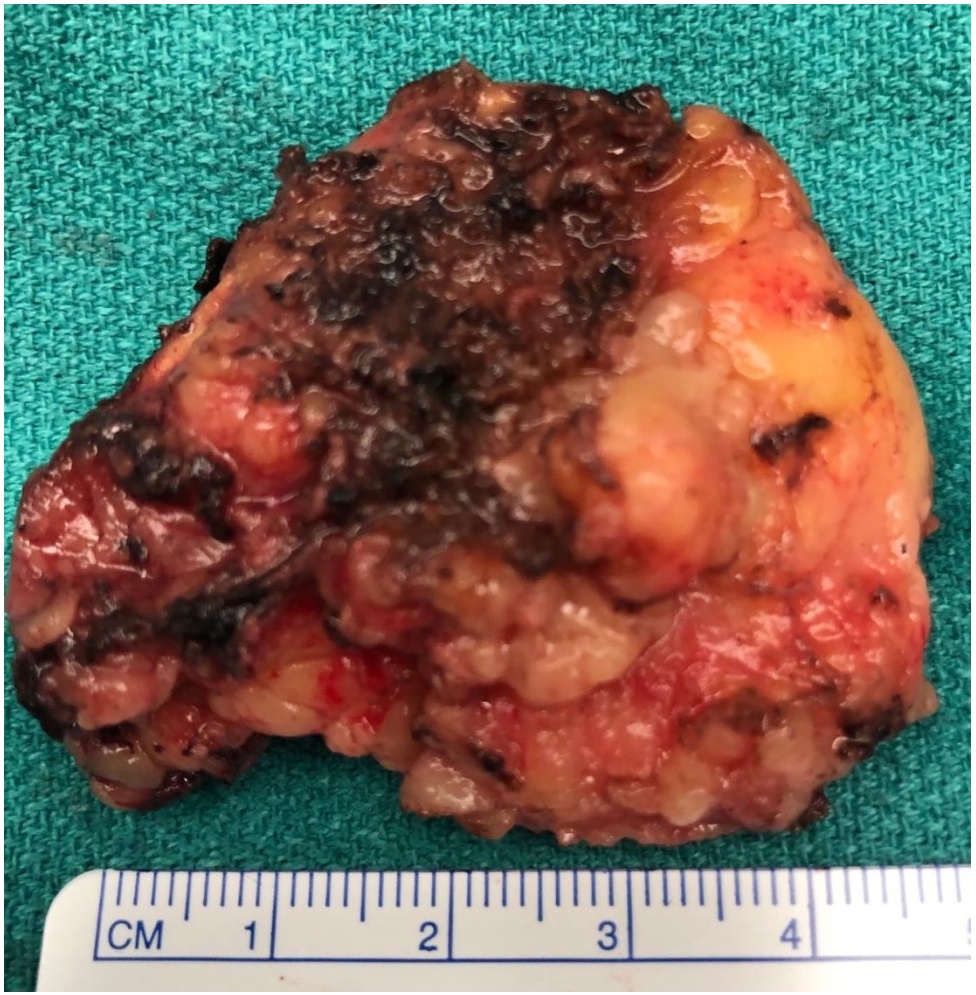


Patient 2

Path:

Pheochromocytoma

Now 3 years postop without recurrence



Patient 3

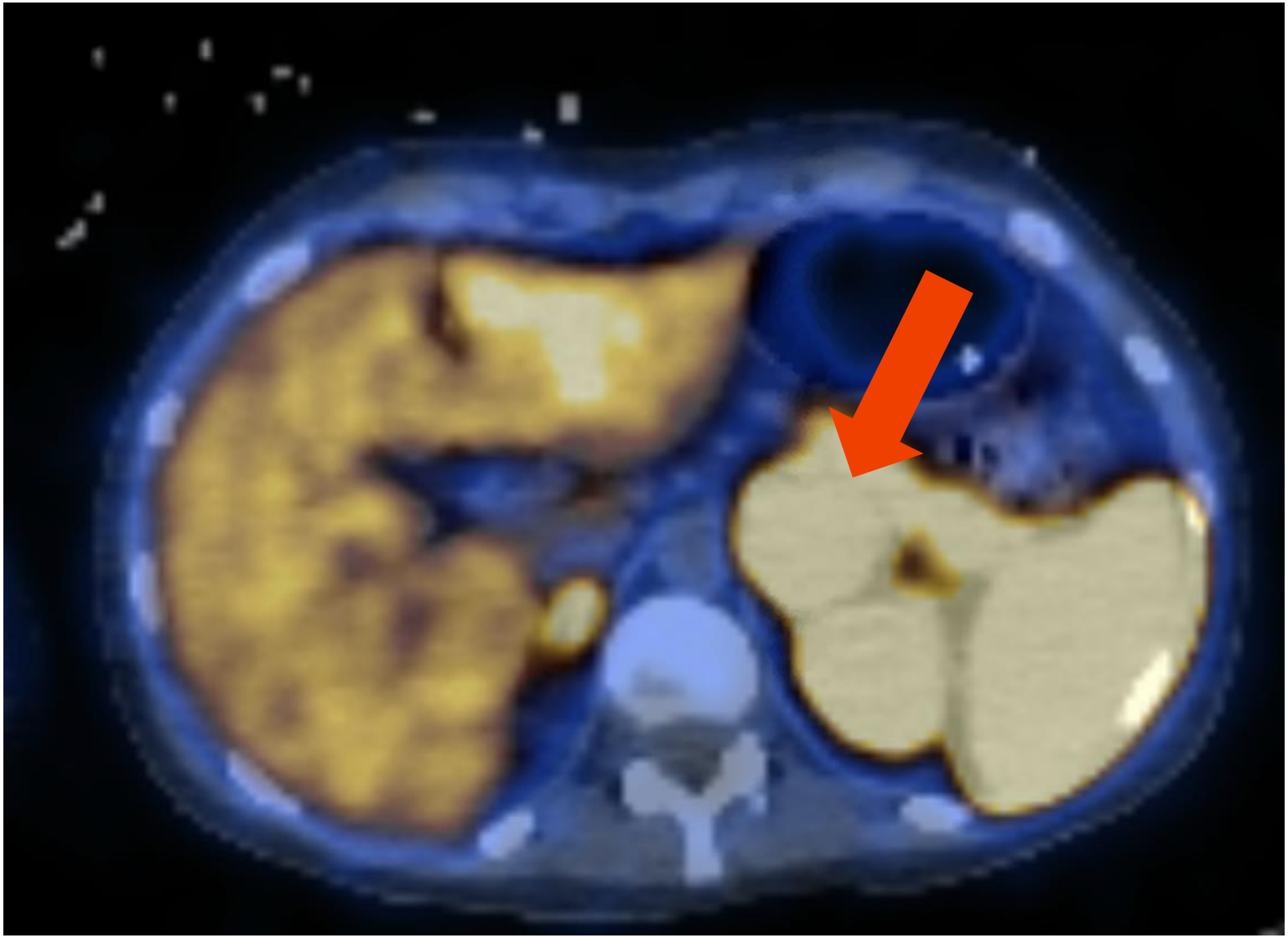
27 YO F with an optic nerve glioma

PMH: NF-1, pericarditis, Afib s/p ablation

Patient 3

TtlMetnephUrREF				* (H) 4390
ReninREF	* 4.7			
Normetnp, UrREF				* (H) 2777
NormetanepFrREF	(H) 12			
NorepiUrineREF				69
NorepinephrnREF	*Norepinephrine			
MetnUVolumeREF				* 3120
MetnUrineREF				* (H) 1613
MetnUrCollREF				24
MetnUCommentREF				Not Applicable
METAP Spec Source REF	blood			
MetanephrnFrREF	* (H) 3.4			
Epinephrine REF	* Epinephrine			
Epineph UREF				14
DopamineUREF				* (H) 421
Dopamine REF	* Dopamine			
CATP Spec Source REF	blood			
CatcholUVolREF				3120
CatcholUCollREF				24
AldosteroneREF	* <4.0			

Patient 3



Patient 3

Patient 3

BP normalized during surgery. All medications weaned off by POD3. Normotensive now.

Path:

- Pheochromocytoma.
- PASS score 4.

Now 1 year postop without recurrence.

Undergoing treatment for optic nerve tumor.

Thank You!


THE NEW MASKS ARE DESIGNED TO HELP PATIENTS FEEL MORE AT EASE...