AMSER Rad Path Case of the Month:

52-year-old female with incidental adrenal masses found on CT for suspected diverticulitis

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Allegheny Health Network

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Patient Presentation

Clinical history:

- 52 yoF
- Hx of seizures and breast mass
- Bilateral adrenal masses found incidentally on CT after suspected diverticulitis, right mass measured 5.6 cm

Pertinent social history:

- None

Pertinent physical exam findings:

- None

Pertinent Labs

	Value	Reference Range
Cortisol	5.7	0.4-22.6 ug/dL
Metanephrines	33	≤ 57 pg/mL
Electrolytes		
Na	140	136-145 mEq/L
K	3.7	3.4-4.5 mEq/L
Cl	105	98-107 mEq/L

What imaging should we order?

ACR Appropriateness Criteria

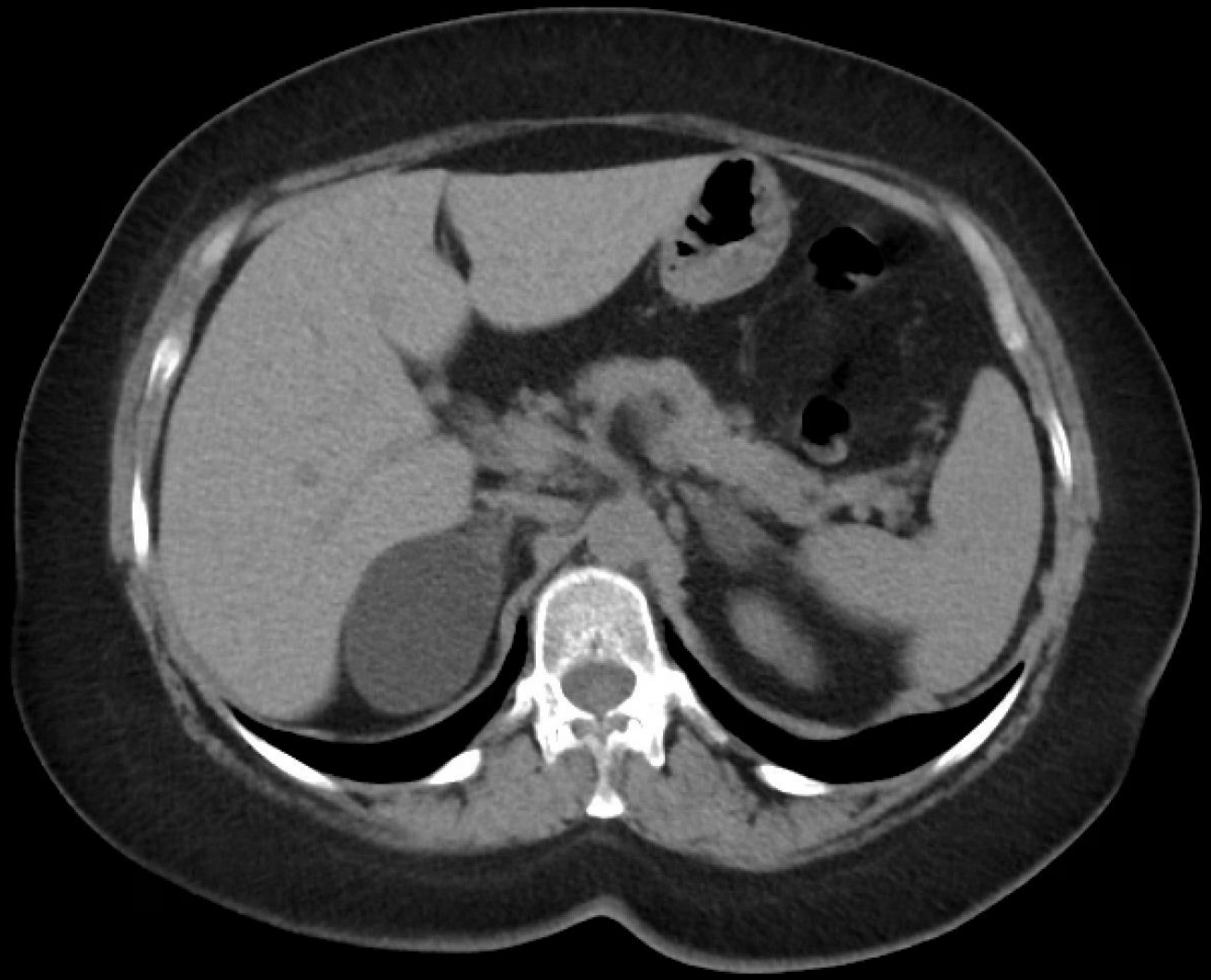
Initial imaging: CT abdomen & pelvis without contrast

Variant 4: **Indeterminate adrenal mass, greater than or equal to 4 cm on initial imaging. No diagnostic benign imaging features. No history of malignancy. Adrenal specific imaging.**

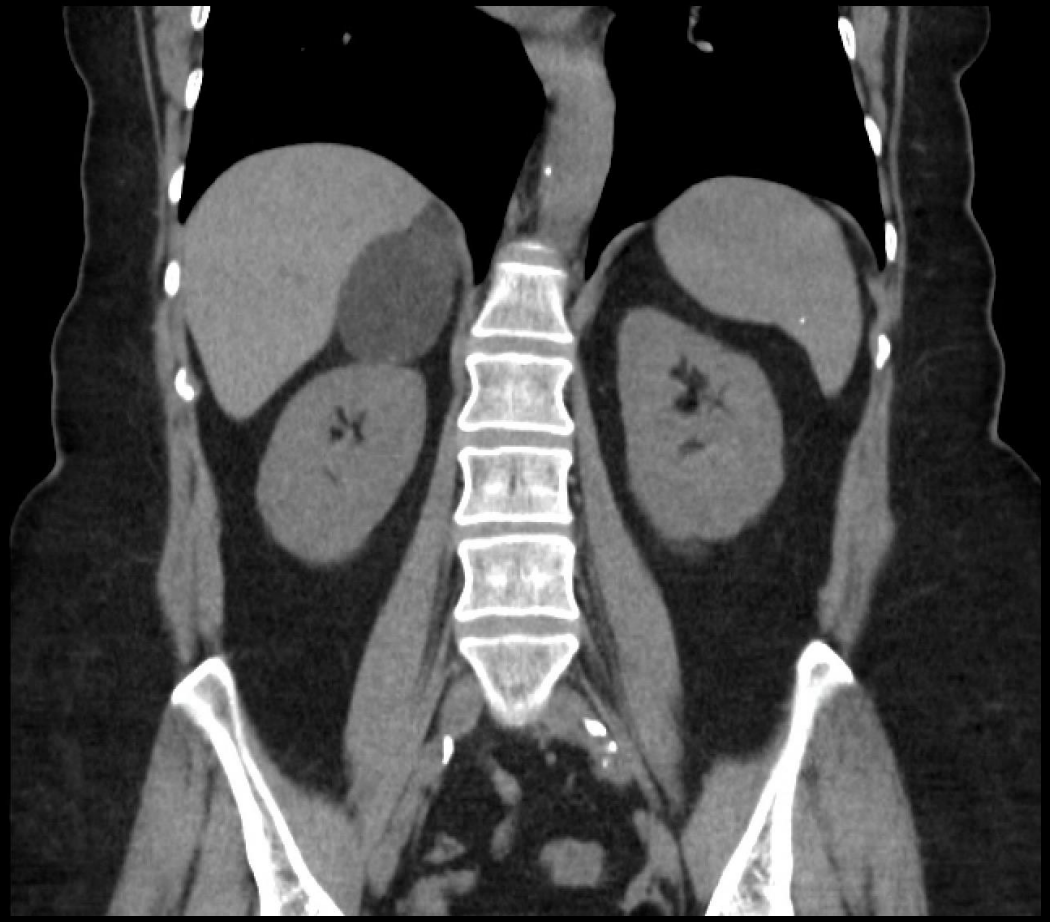
Procedure	Appropriateness Category	Relative Radiation Level
Image-guided biopsy adrenal gland	Usually Not Appropriate	Varies
MRI abdomen without and with IV contrast	Usually Not Appropriate	O
MRI abdomen without IV contrast	Usually Not Appropriate	O
CT abdomen with IV contrast	Usually Not Appropriate	☢☢☢
CT abdomen without IV contrast	Usually Not Appropriate	☢☢☢
CT abdomen without and with IV contrast	Usually Not Appropriate	☢☢☢☢
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	☢☢☢☢

Follow-up imaging performed

CT Abdomen & Pelvis (not labeled)

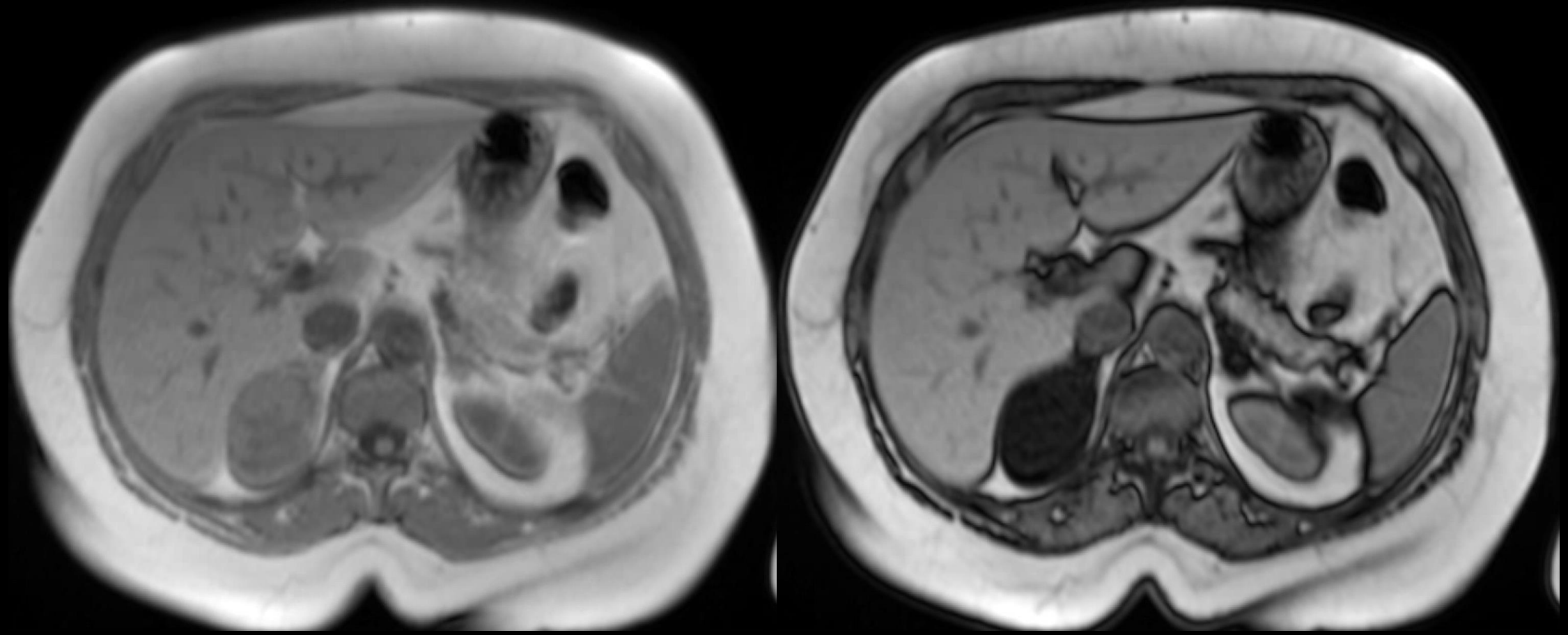


CT Abdomen & Pelvis (not labeled)



T2 MRI Abdomen (not labeled)

T1 Chemical Shift MRI Abdomen (not labeled)

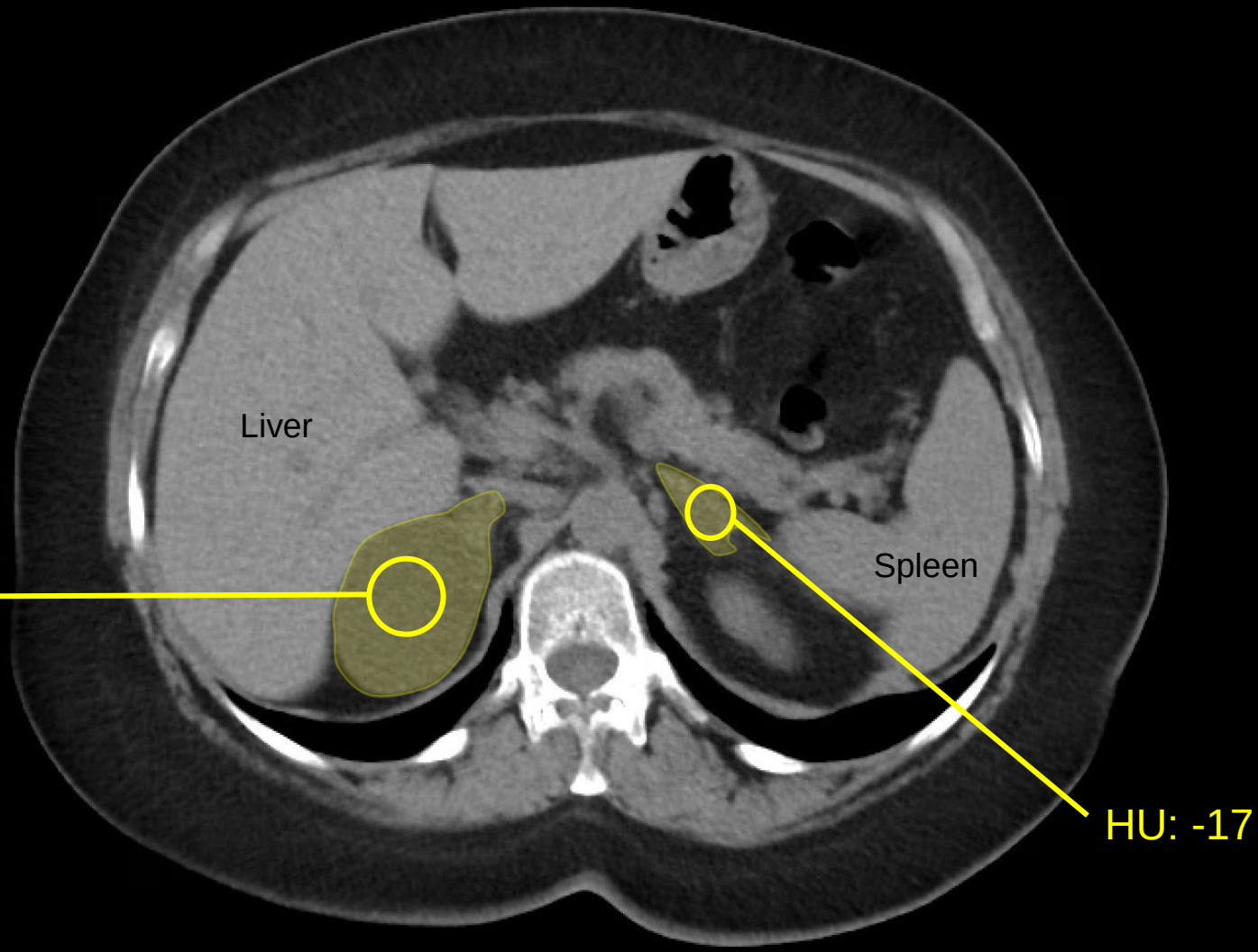


CT Abdomen & Pelvis (labeled)

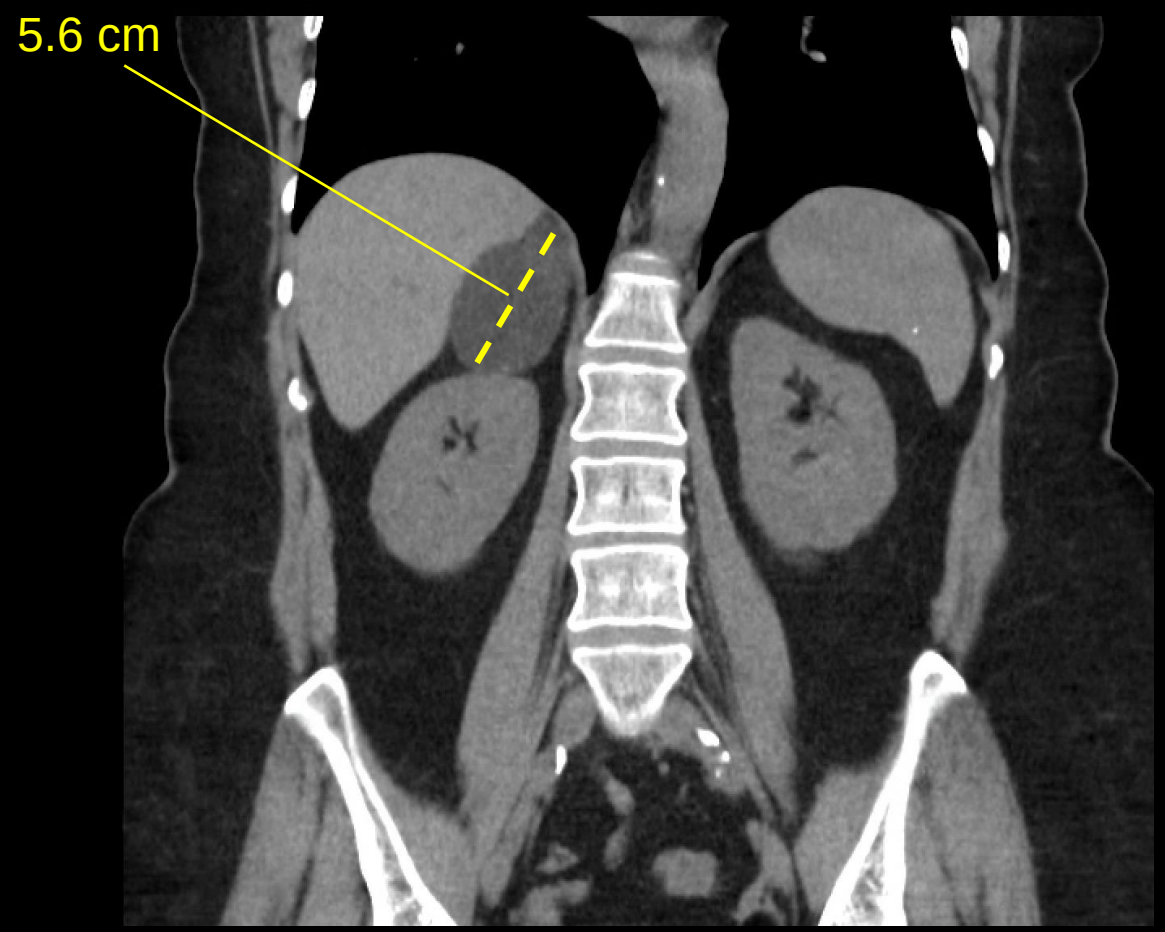
Low-density, homogenous, well circumscribed right and left adrenal masses

Right mass measures 5.6 cm

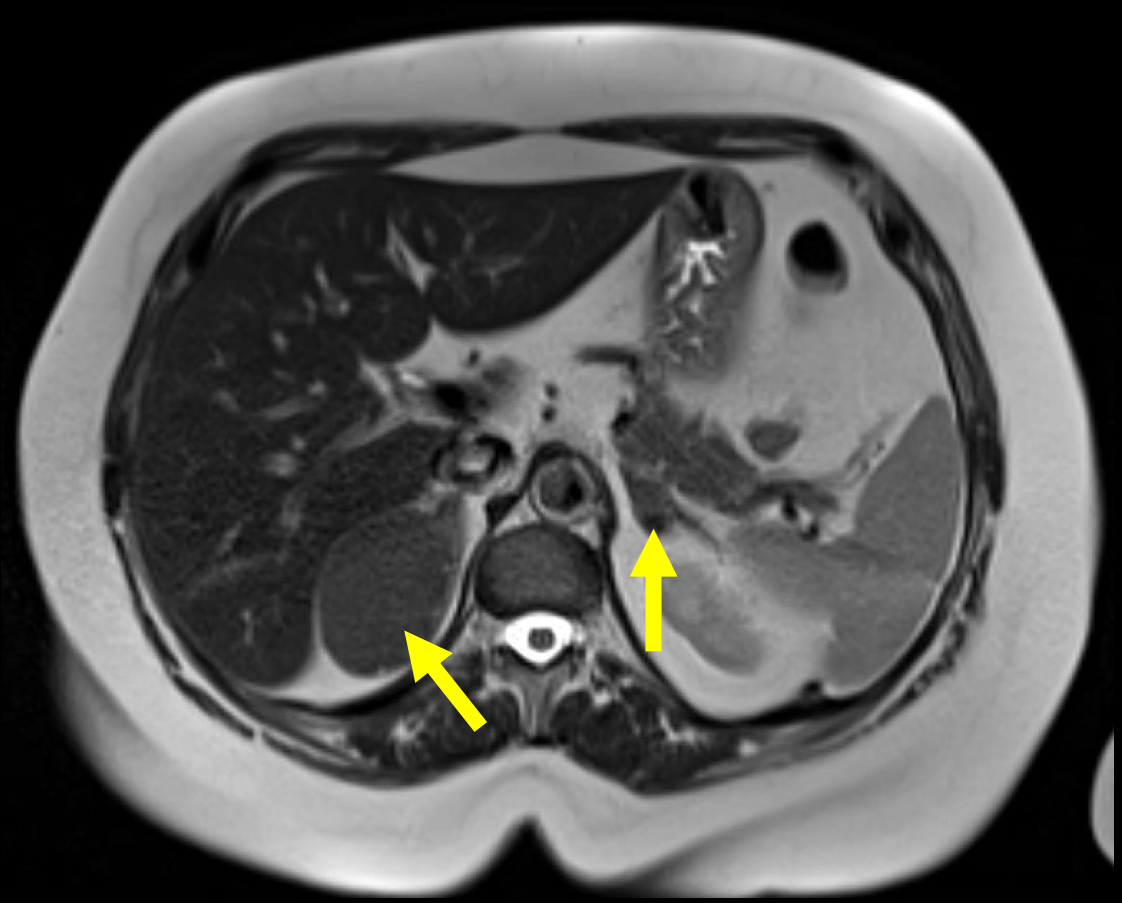
Intrinsic fat density

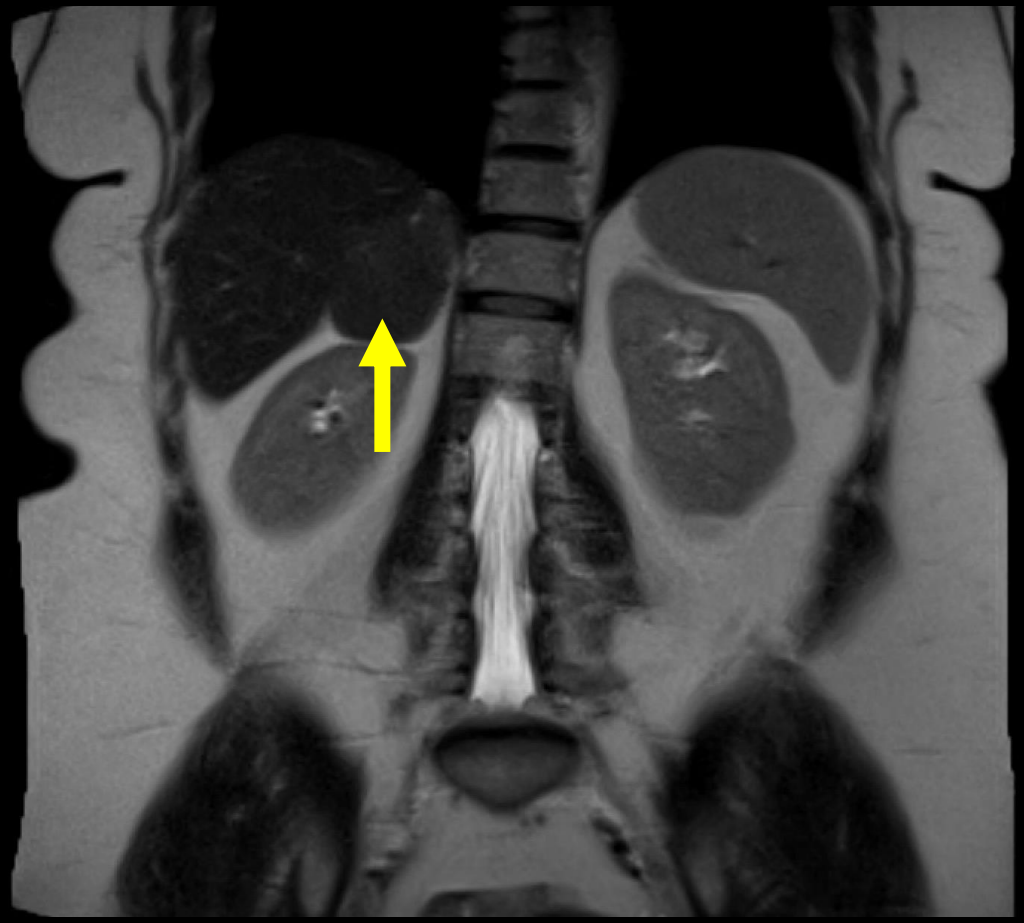


CT Abdomen & Pelvis (labeled)



T2 MRI Abdomen (labeled)





Homogenous, slightly T2 hypointense right and left adrenal masses redemonstrated

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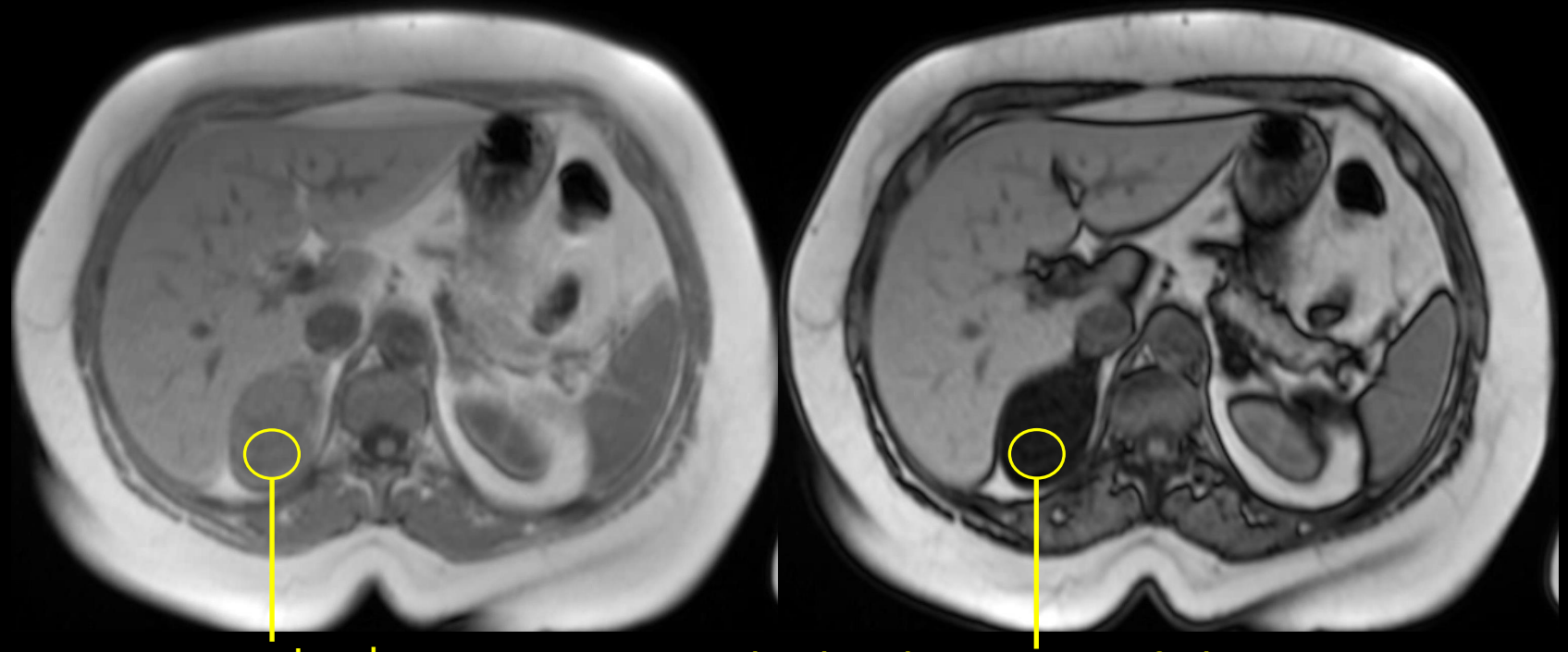
T1 Chemical Shift MRI Abdomen (labeled)



Loss of signal on out-of-phase imaging confirms presence of intracellular/microscopic fat

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Differential diagnosis based on imaging

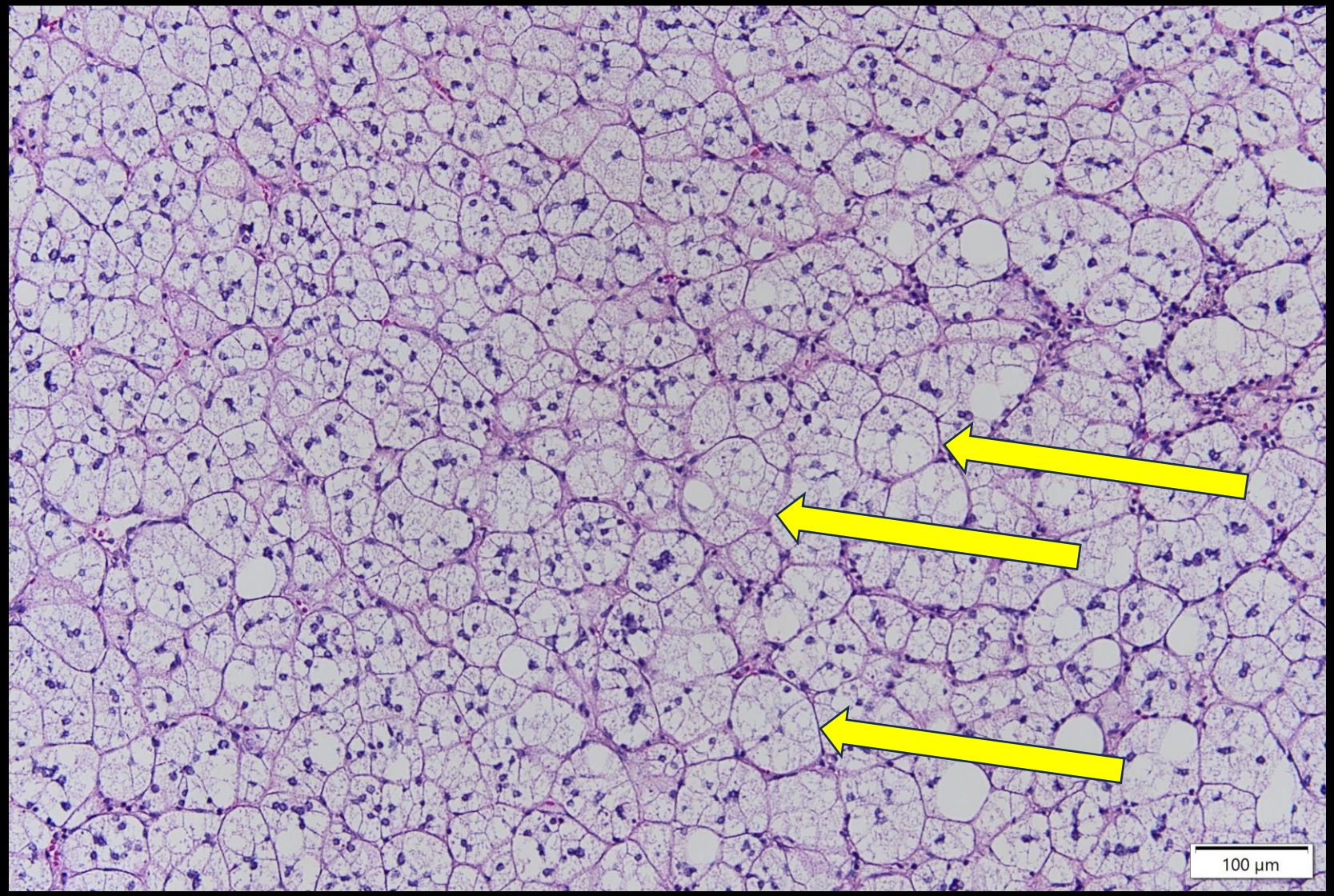
1. Adenoma
2. Myelolipoma (lipid-poor)
3. Metastasis
4. Lymphoma
5. Carcinoma

→ Because of the size of the lesion, our patient was taken for surgical resection

Gross Path (labeled)

Gross Description: 65 grams, 10.9 x 6.7 x 2.2 cm, tan-pink, disrupted adrenalectomy with a 6.7 x 5.6 x 2.2 cm area of golden-yellow, friable tissue coming out of the disrupted end and without attached periadrenal adipose tissue.

Micro Path (labeled)



Diagnosis is made by seeing a well-circumscribed lesion made of cells resembling any of the three layers of the normal adrenal gland.

Note the expanded, fasciculata-like cells covering the entire slide (3 highlighted with arrows). The cells have distinct borders, abundant foamy cytoplasm, and vacuolated resembling the zona fasciculata layer

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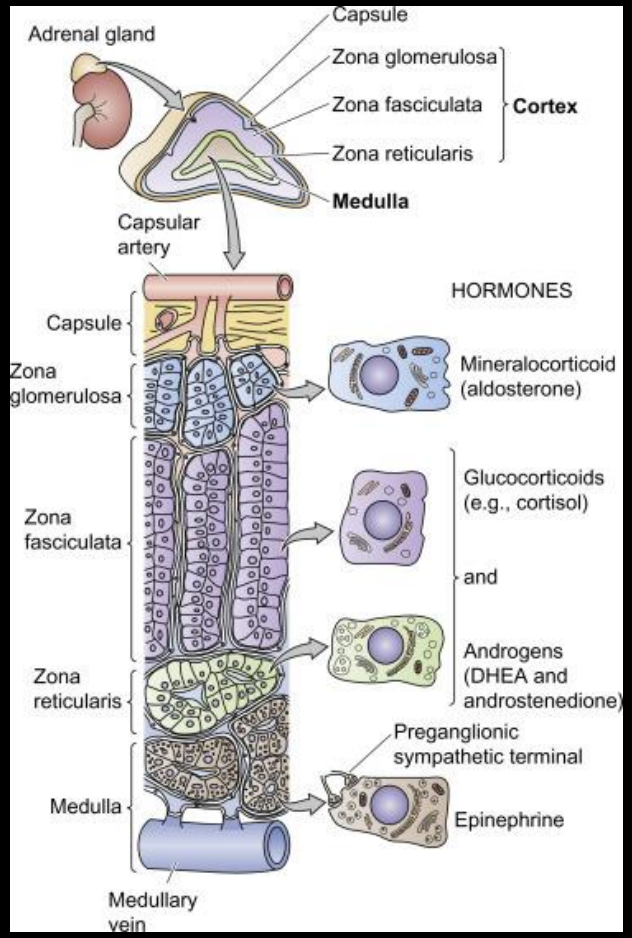
Final Dx:

Adrenal Cortical Adenoma

Case Discussion



- Background
  - Benign neoplasm originating from adrenal cortex
- Epidemiology
  - Found incidentally in 4-10% of patients on imaging
  - Rate increases with age
- Clinical Features
  - Most commonly asymptomatic (nonsecreting)
  - Significant hormone secretion can present as Cushing syndrome, primary hyperaldosteronism, or hyperandrogenism (functional)

Case Discussion

Benign vs malignant features on imaging

	Benign features	Malignant features*
CT	≤ 10 HU attenuation 15-min absolute wash-out > 60% or relative > 40%	> 10 HU attenuation
MRI	Signal intensity drop > 16.5 % on chemical shift imaging No restricted diffusion	Signal intensity drop < 16.5 % on chemical shift imaging Restricted diffusion
Size	< 4 cm	≥ 4 cm

*Note: Rate of metastasis to adrenal gland ranges from 25-72% depending on size and type of primary tumor

Case Discussion

- Treatment
  - Resection recommend:
    - Symptomatic functional adenomas
    - Nonsecreting/functional lesions ≥ 4 cm
  - 6% malignancy rate in lesions 4-6 cm
  - 25% malignancy rate in lesions ≥ 6 cm
- Prognosis
  - Nonsecreting adenomas have risk of transforming into functional adenomas at rates of 17%, 29%, and 47% at years 1, 2, or 5 years respectively
  - Risk of malignant transformation is extremely low

References:

1. Lattin GE, Sturgill ED, Tujo CA, et al. From the Radiologic Pathology Archives: Adrenal Tumors and Tumor-like Conditions in the Adult: Radiologic-Pathologic Correlation. RadioGraphics. 2014;34(3):805. doi:10.1148/rg.343130127

2. Mahmood E LC, Anastasopoulou C. . Adrenal Adenoma. 2024. https://www.ncbi.nlm.nih.gov/books/NBK539906/

3. Jones J, Knipe H, Khalighinejad P, et al. Adrenal adenoma. Radiopaedia.org Web site. . Updated 2024

4. Expert Panel on Urological Imaging, Rekha N Mody, , et al. ACR Appropriateness Criteria® Adrenal Mass Evaluation: 2021 Update. J Am Coll Radiol. 2021. doi:10.1016/j.jacr.2021.08.010

5. Carlson BM. Chapter 9 - The Endocrine System. In: Carlson BM, ed. The Human BodyAcademic Press; 2019:241–269