

# **Adrenal Ablation: When is it Appropriate and How to Do it Safely!**

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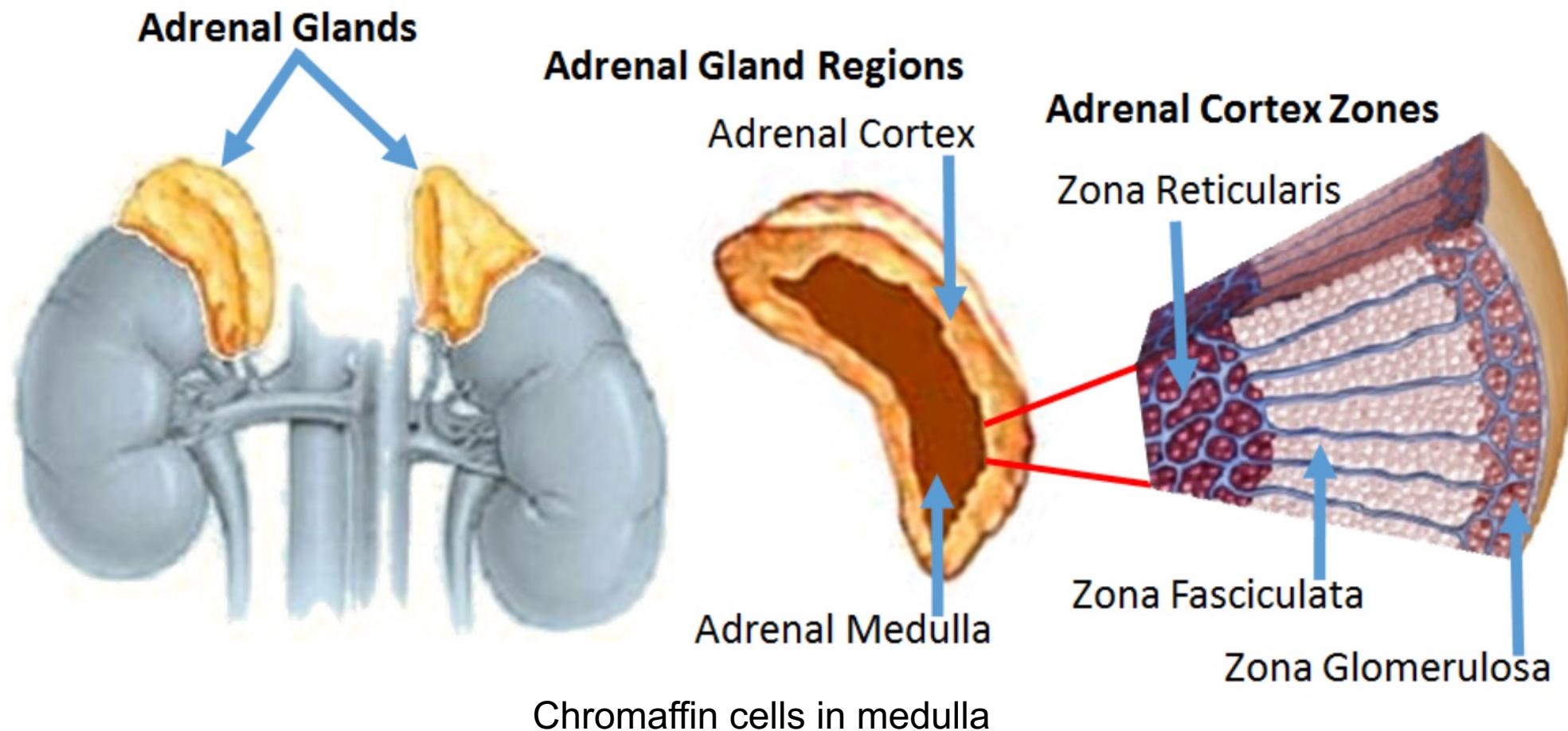
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# Disclosures

- Consultant: Boston Scientific (BTG); Sirtex; BD (Bard); VentureMed; Philips Healthcare, Biotronik
- Speaker: Cook Medical; Penumbra; BD Bard and Terumo

# Adrenal Glands



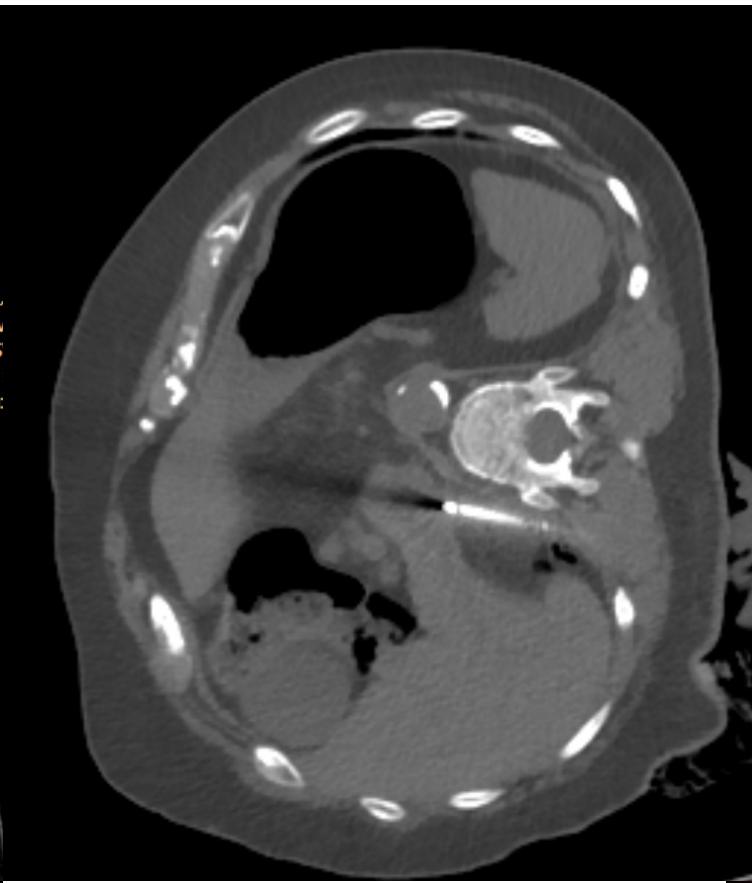
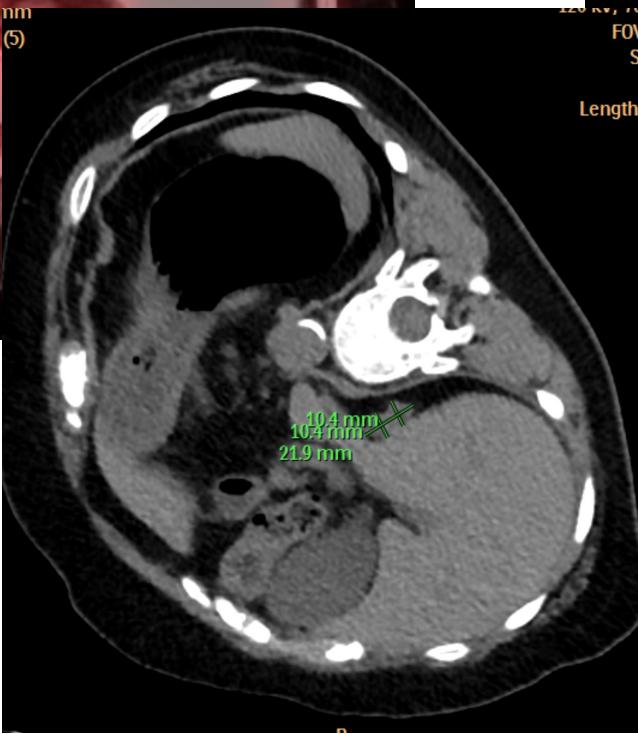
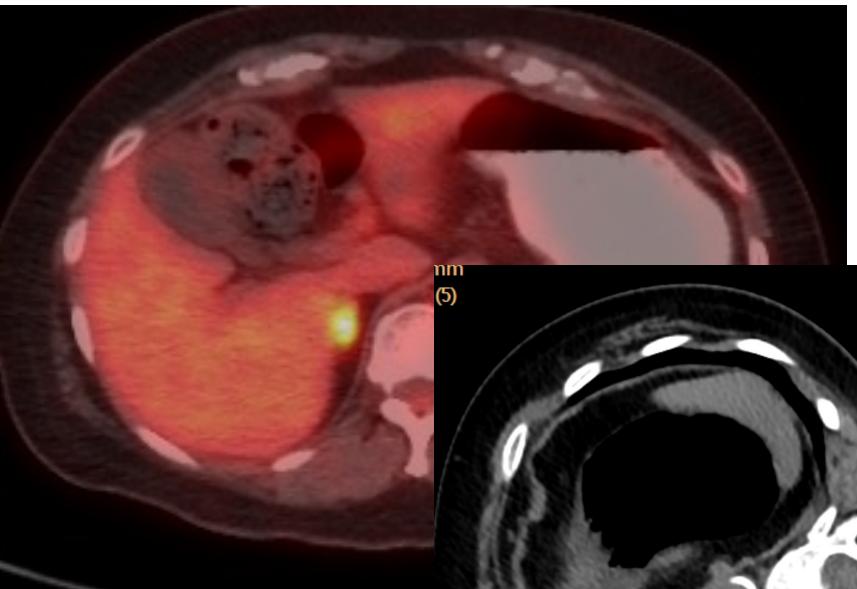
# Adrenal Ablation: Indications

- Oligometastatic Disease Patients unable or unwilling to undergo surgical resection
  - Open or Laparoscopic adrenalectomy
- Bilateral adrenal masses
- Primary (Hormonally active) adrenal masses
- Small adrenocortical carcinoma
- Palliation for painful large adrenal masses

# Adrenal Ablation: How do to?

- US- Transhepatic access
- CT- Ipsilateral decubitus approach
- Energy: RFA; MW; cryoablation; IRE
- Size: Ideally less than 4.5cm

# Stage IV Lung Adenocarcinoma with Adrenal Metastasis

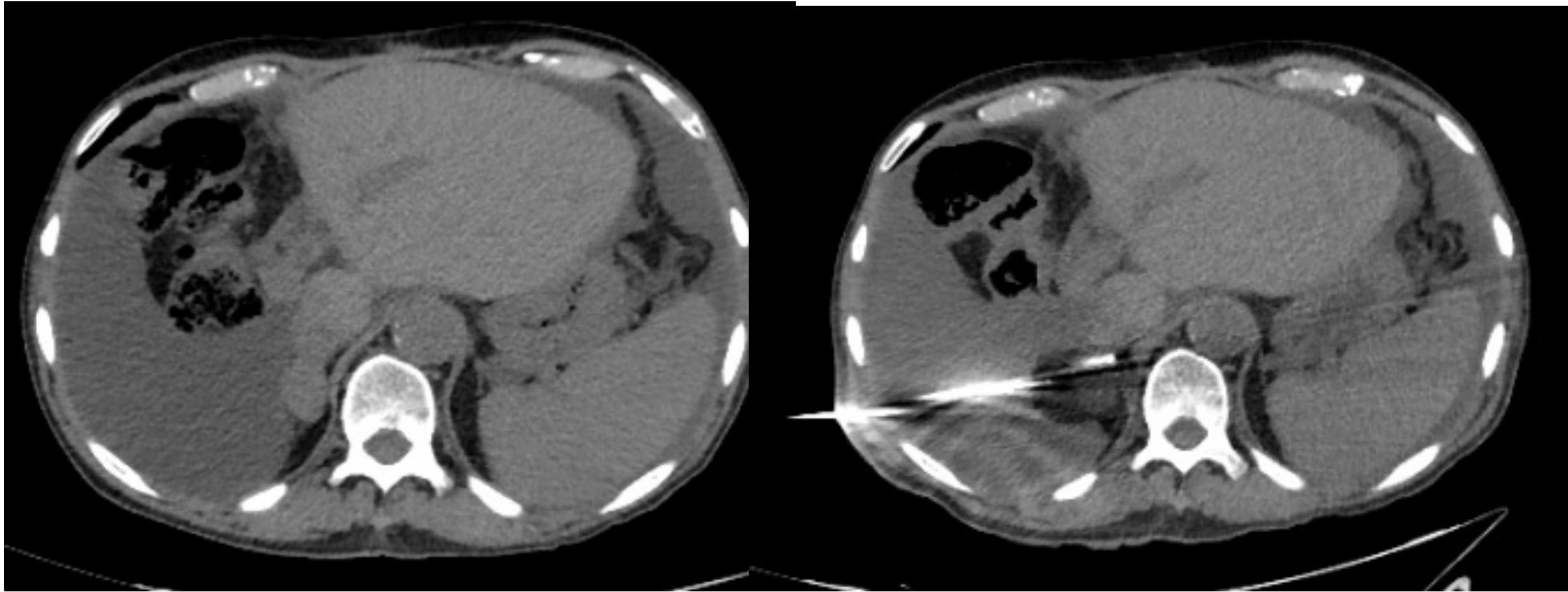


ICE Force 2.1

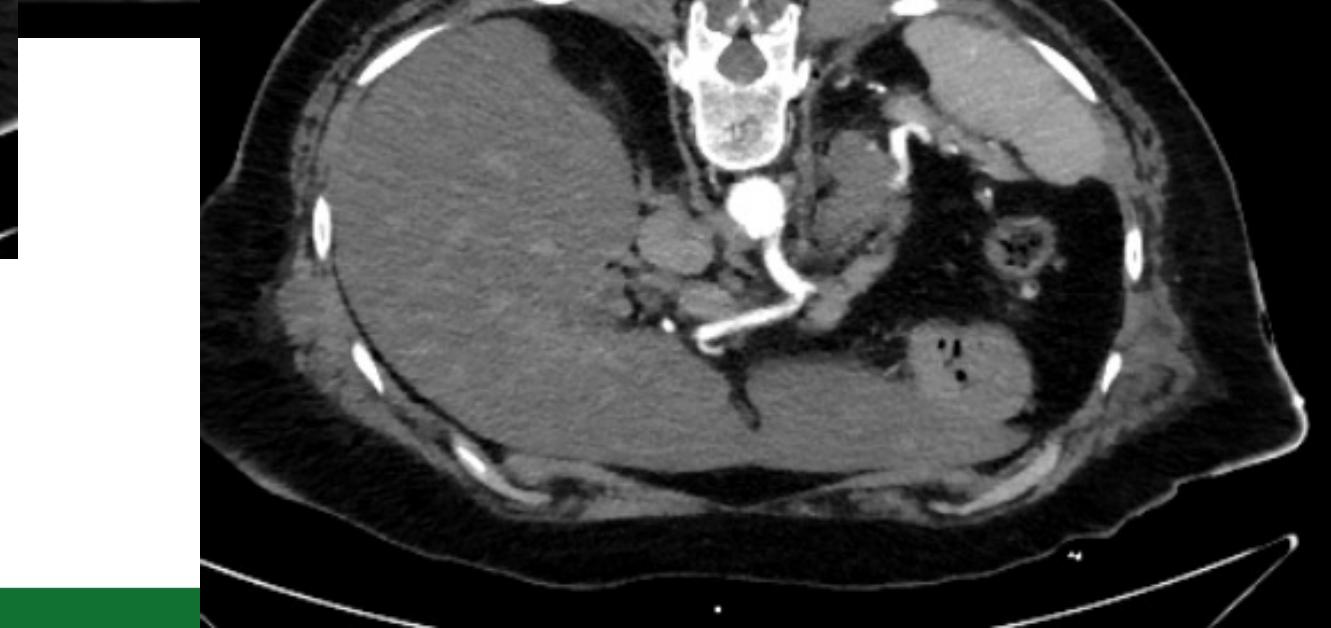
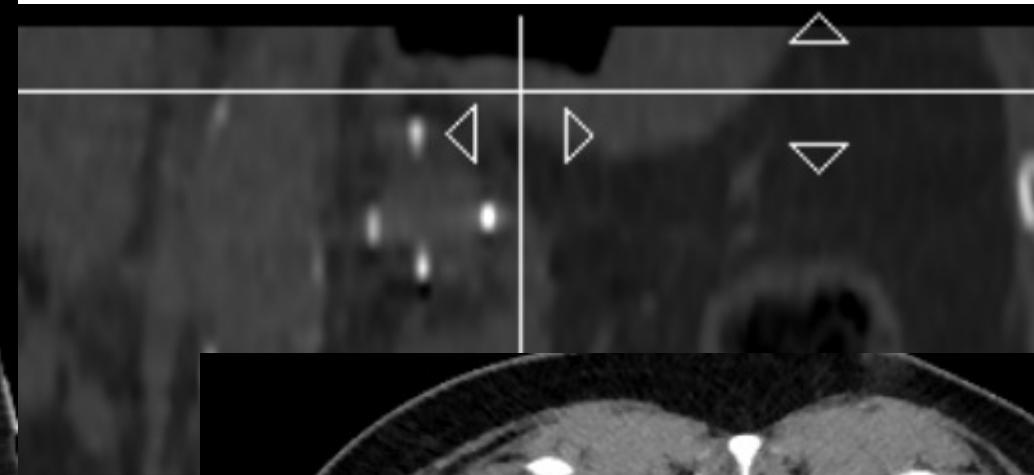
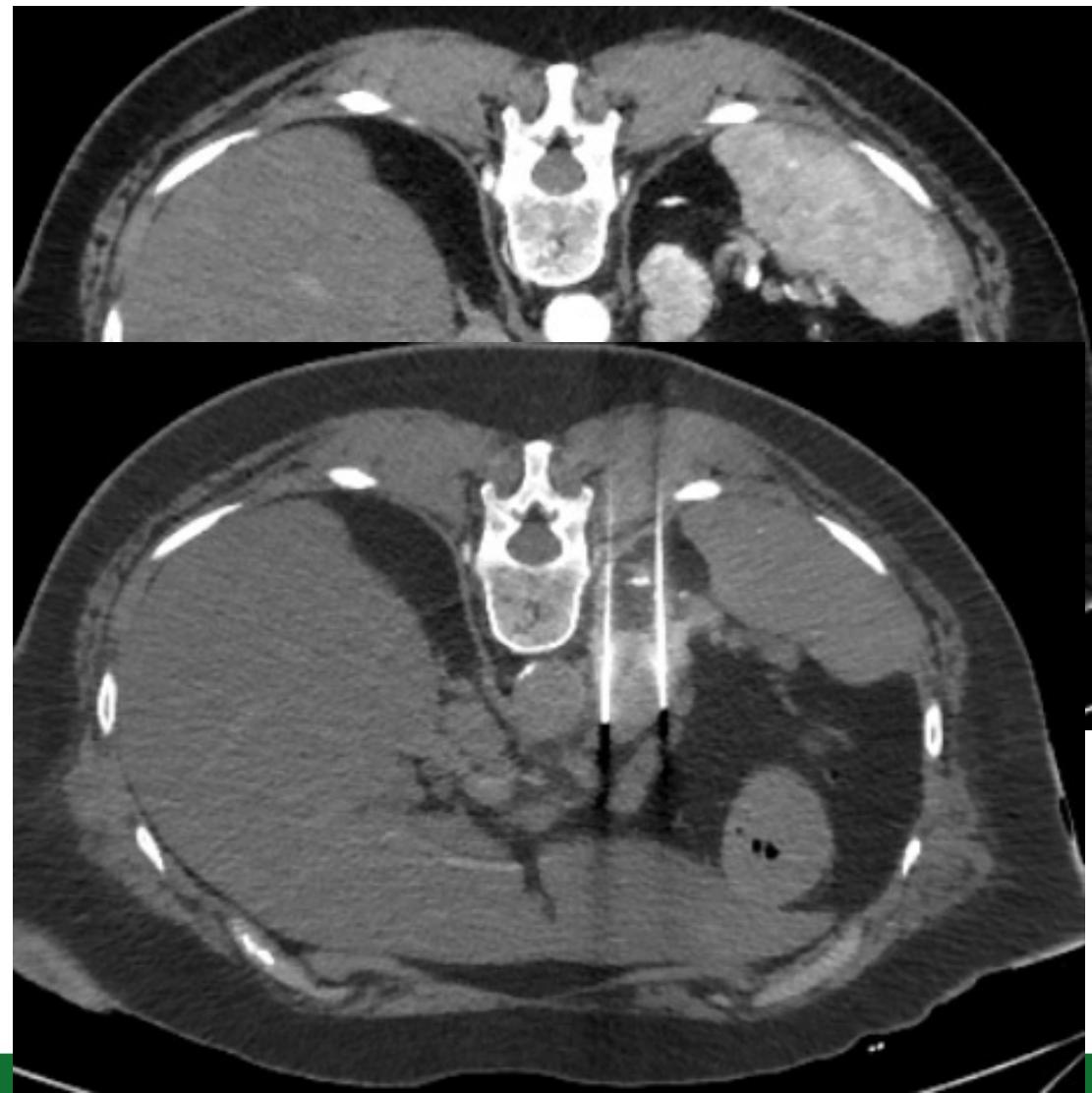


Post 2 months

# Metastatic Right Adrenal Lesion

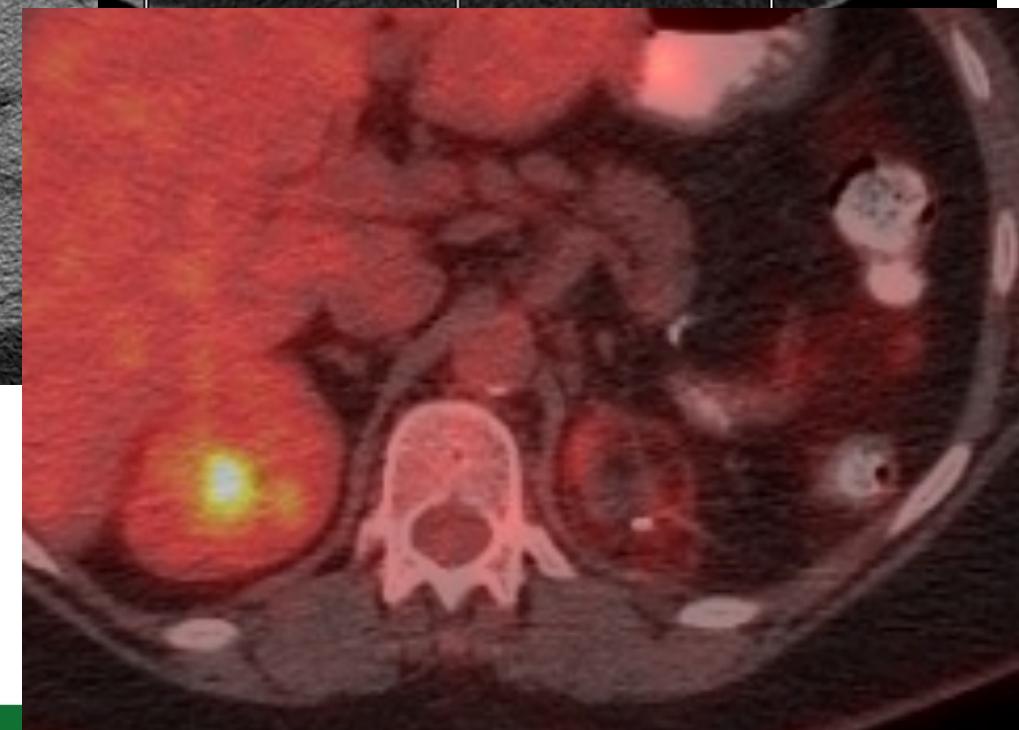
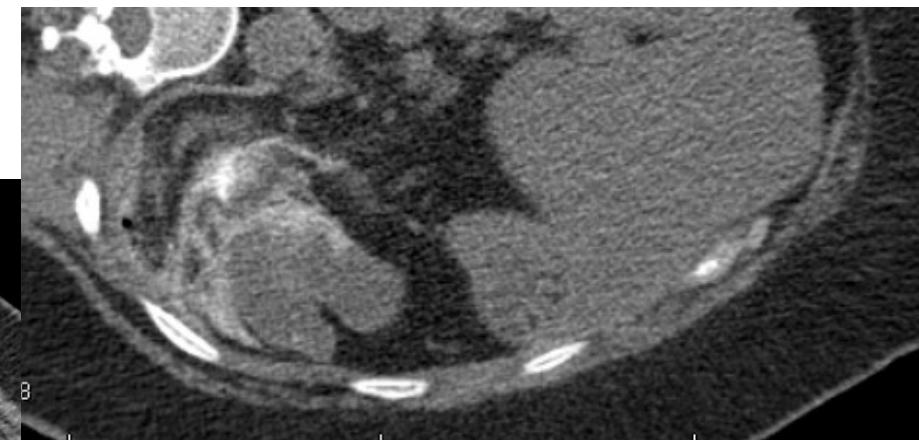
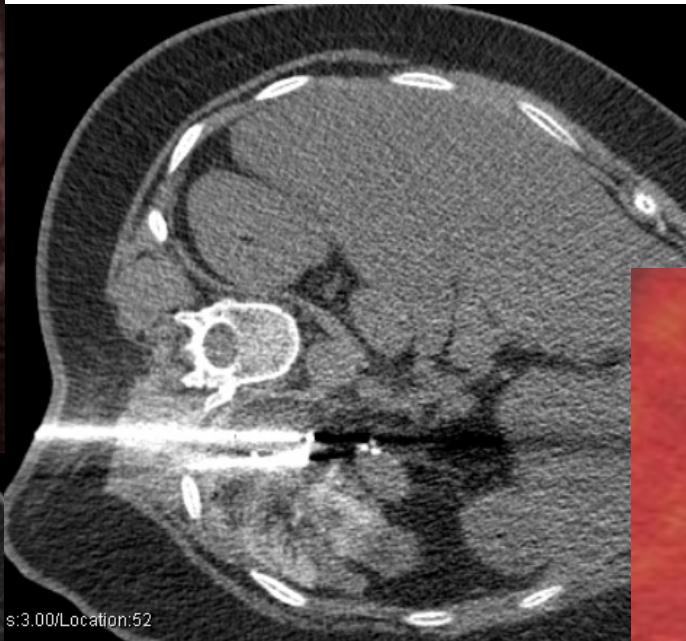
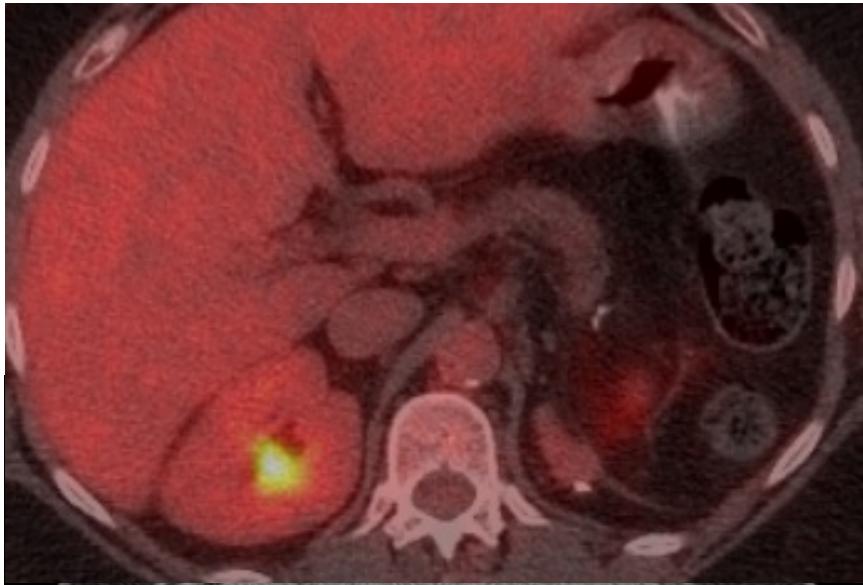


# Left Adrenal Met



62 yo female post left nephrectomy left adrenal met

12 years later



# Adrenal Ablation: Technique?

- Careful evaluation to exclude pheochromocytoma
- Best results-Size of lesion (less than 4.5cm)
- Risk of Catecholamine Surge:
  - Identification of normal adrenal tissue adjacent to target mass
  - No previous radiation or ablation
  - Mass less than 4.5cm
- Alpha adrenergic block protocol
- General anesthesia and radial arterial line

# Peri-Procedural Preparation

- Always consider Risk of Hypertensive Crisis (HC) 6%-43%
- HC- catecholamine release from the adrenal medulla
- During thermal treatment or freezing thawing phase
- What are the risk factors for HC?
  - Lesions less than 4.5cm
  - Amount of normal adrenal tissue treated
  - BMI < 24
  - BP >130mm

# Catecholamine Surge during Image-Guided Ablation of Adrenal Gland Metastases: Predictors, Consequences, and Recommendations for Management

J Vasc Interv Radiol 2016; 27:395–402

## ABSTRACT

**Purpose:** To identify retrospectively predictors of catecholamine surge during image-guided ablation of metastases to the adrenal gland.

**Materials and Methods:** Between 2001 and 2014, 57 patients (39 men, 18 women; mean age,  $65 \text{ y} \pm 10$ ; age range, 41–81 y) at two academic medical centers underwent ablation of 64 metastatic adrenal tumors from renal cell carcinoma ( $n = 27$ ), lung cancer ( $n = 23$ ), melanoma ( $n = 4$ ), colorectal cancer ( $n = 3$ ), and other tumors ( $n = 7$ ). Tumors measured 0.7–11.3 cm (mean, 4 cm  $\pm$  2.5). Modalities included cryoablation ( $n = 38$ ), radiofrequency (RF) ablation ( $n = 20$ ), RF ablation with injection of dehydrated ethanol ( $n = 10$ ), and microwave ablation ( $n = 4$ ). Fisher exact test, univariate, and multivariate logistical regression analysis was used to evaluate factors predicting hypertensive crisis (HC).

**Results:** HC occurred in 31 sessions (43%). Ventricular tachycardia ( $n = 1$ ), atrial fibrillation ( $n = 2$ ), and troponin leak ( $n = 4$ ) developed during HC episodes. HC was significantly associated with maximum tumor diameter  $\leq 4.5$  cm (odds ratio [OR], 26.36; 95% confidence interval [CI], 5.26–131.99;  $P < .0001$ ) and visualization of normal adrenal tissue on CT or MR imaging before the procedure (OR, 8.38; 95% CI, 2.67–25.33;  $P < .0001$ ). No HC occurred during ablation of metastases in previously irradiated or ablated adrenal glands.

**Conclusions:** Patients at high risk of catecholamine surge during ablation of non-hormonally active adrenal metastases can be identified by the presence of normal adrenal tissue and tumor diameter  $\leq 4.5$  cm on pre-procedure CT or MR imaging.

# Catecholamine Surge during Adrenal Met Ablation

- 57 pts/ 64 lesions 2001 to 2014
- 4.5cm average
- 38 cryo, RFA, RFA + ETOH 10, 4 MW
- HC occurred in 31 pts (46%)
- Seen in patients with adrenal lesions less than 4.5cm
- Seen in lesions with normal adrenal tissue seen

**Table 2 . Treatment Modalities and Image Guidance Used for Ablation Sessions**

	MR			Totals
	CT	Imaging	PET/CT	
Cryoablation	24	12	2	38
RF ablation	20	0	0	20
RF ablation and EtOH injection	10	0	0	10
Microwave ablation	3	0	1	4
Totals	57	12	3	

EtOH = dehydrated ethanol; PET/CT = positron emission tomography/computed tomography; RF = radiofrequency.

**Table 4 . Likelihood of Hypertensive Crisis Depending on Tumor Size and Visualization of Normal Adrenal Tissue as Determined by Univariate Logistic Regression Analysis**

n = 62	Odds Ratio (95% CI)	P Value
Maximum tumor diameter ≤ 4.5 cm	26.36 (5.26–131.99)	< .0001
Visualization of normal adrenal tissue	8.38 (2.67–25.33)	< .0001

# Catecholamine Management Protocol (METS)

- Reversible alpha-antagonist: Doxazosin 1mg daily for 14 days prior
- 25 mg metoprolol daily for prior 4 days prior
- Should reduce the severity of BP response but not the risk of HC

# Catecholamine Management Protocol (Functioning Tissue))

- Work with endocrinologist
- Permanent Alpha antagonist Phenoxybenzamine (14-28 days)
- 25 mg metoprolol daily for prior 4 days prior (hypotension)



# Pheochromocytoma

- High risk of HC
- Urine or plasma metanephhrines
- Consider General anesthesia
- Phenoxybenzamine (alpha blockade) 2 weeks before (doxazosin 1mg daily)
- Beta blocker 4 days prior (metaprolol 25mg)

# Summary

- Always consider hypertensive crisis with adrenal biopsy or ablation
- Low threshold for blockage
- If HC occur stop ablation; treat the hypertension.
  - Fluid; vasodilators
- All Adrenal ablations with anesthesia support:
  - General with arterial lines and blockade with all patients