

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

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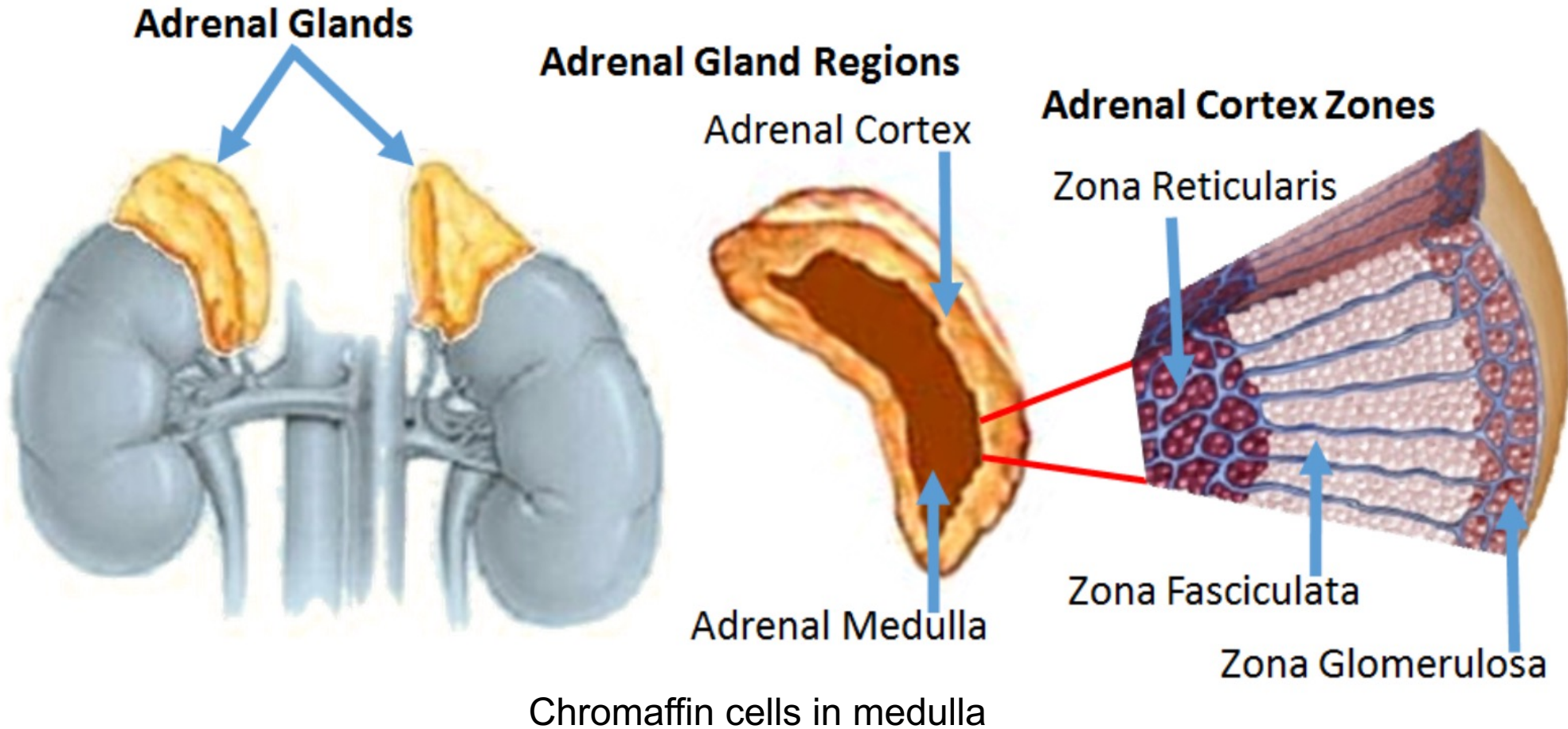
Miami Cardiac and Vascular Institute

Miami Cancer Institute

Disclosures

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

Adrenal Glands



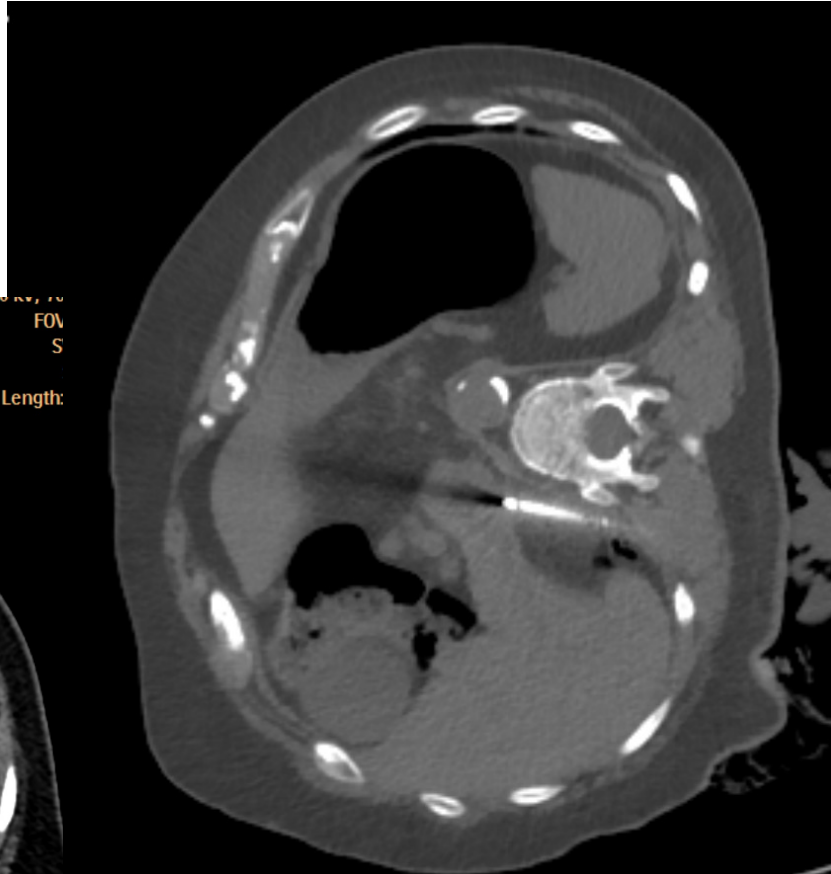
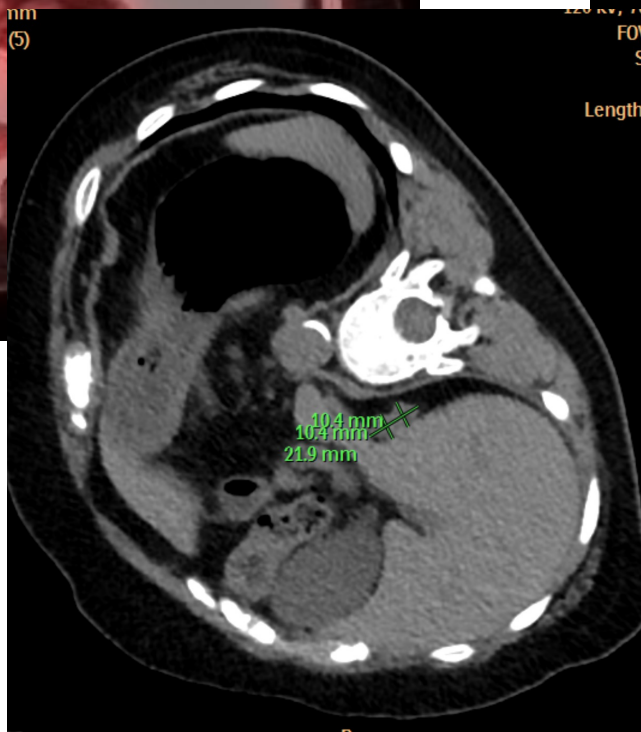
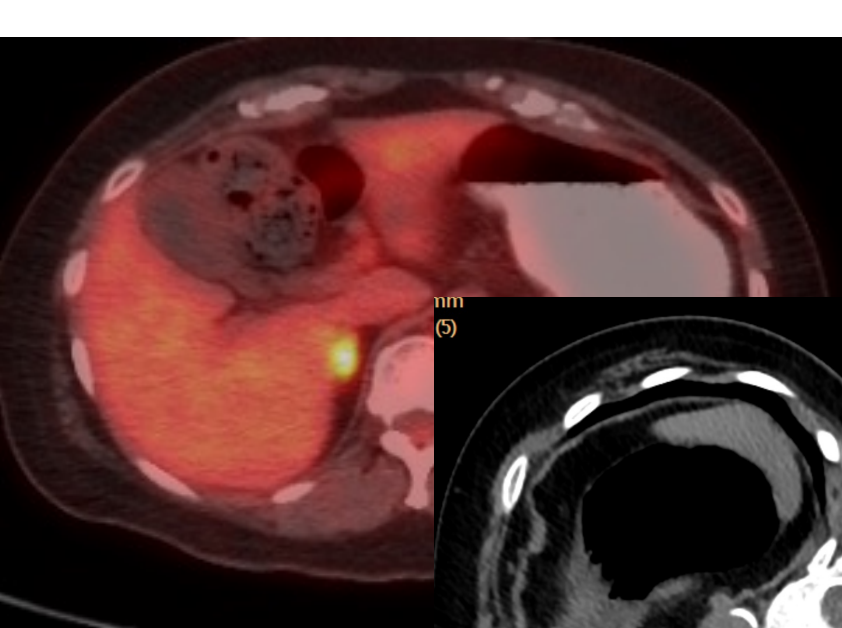
Adrenal Ablation: Indications

- 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?

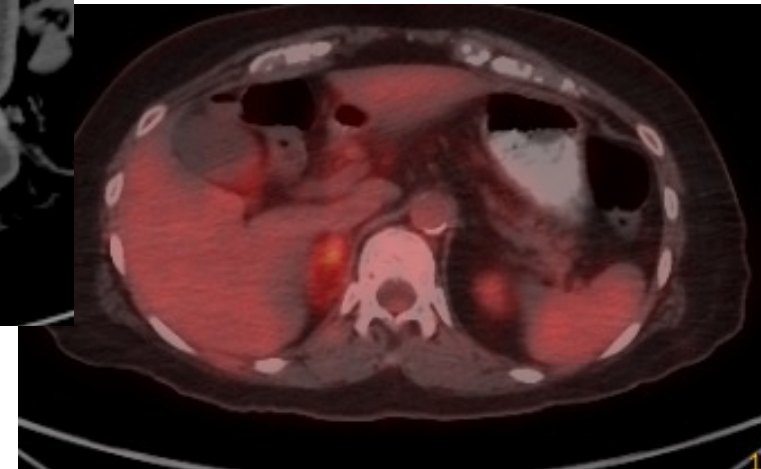
- US- Transhepatic access
- CT- Ipsilateral decubitus approach
- Energy: RFA; MW; cryoablation; IRE
- Size: Ideally less than 4.5cm

Stage IV Lung Adenocarcinoma with Adrenal Metastasis

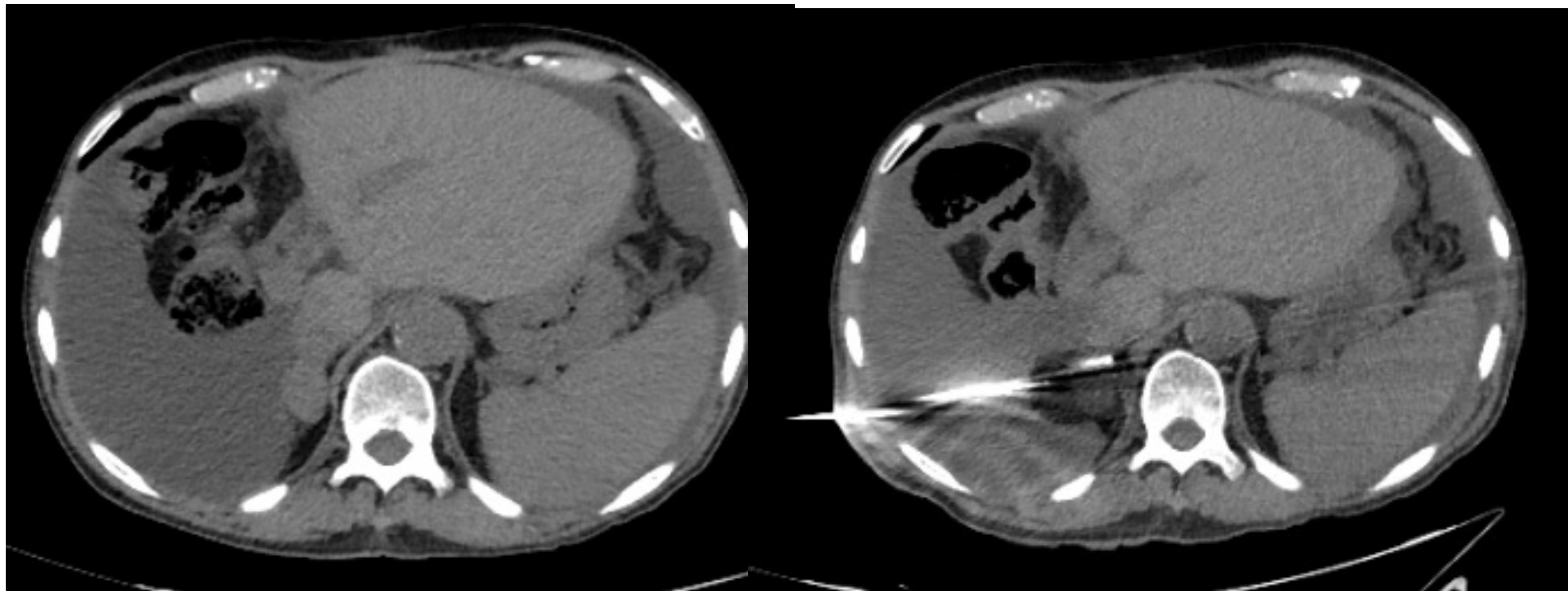


ICE Force 2.1

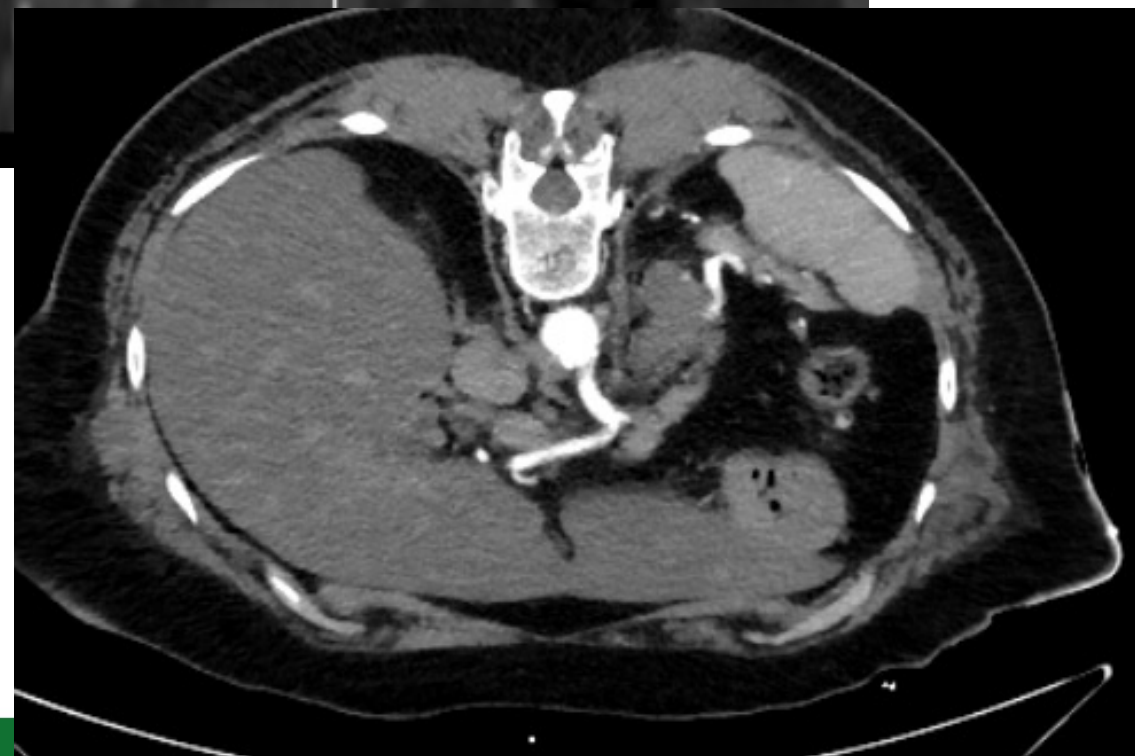
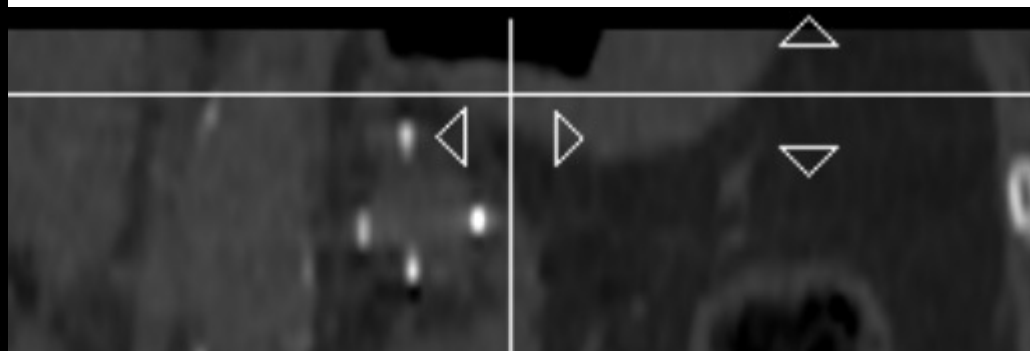
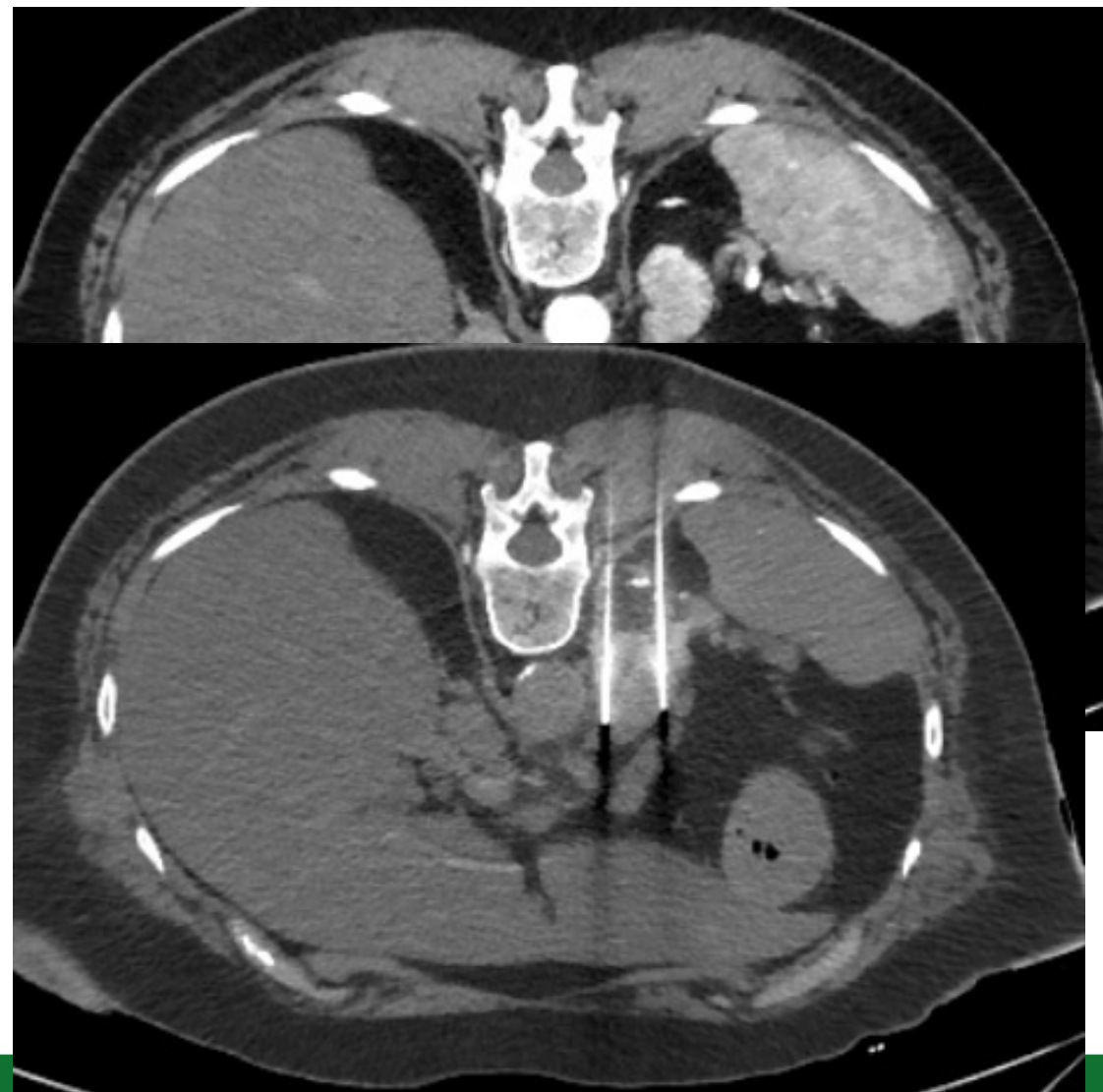
Post 2 months



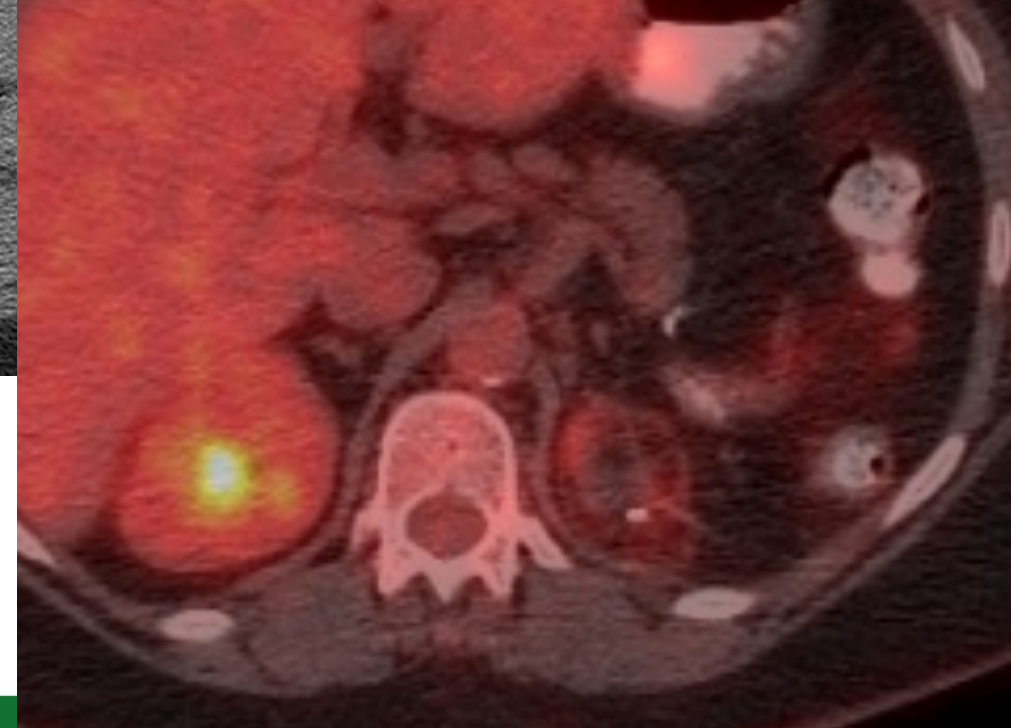
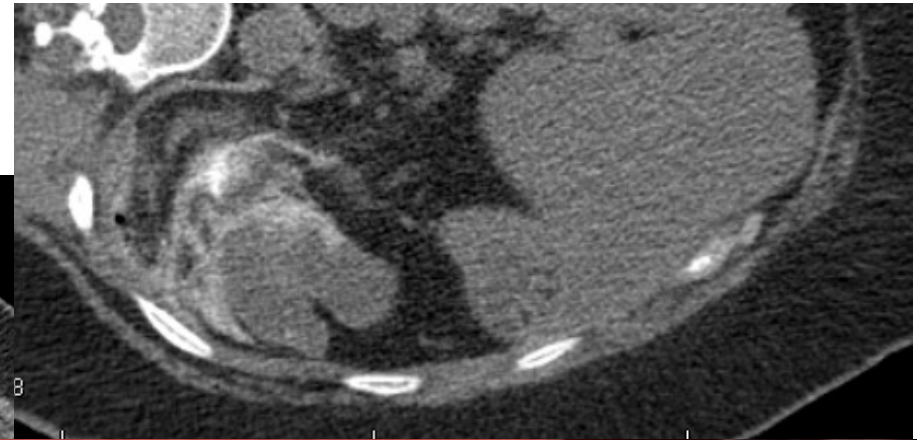
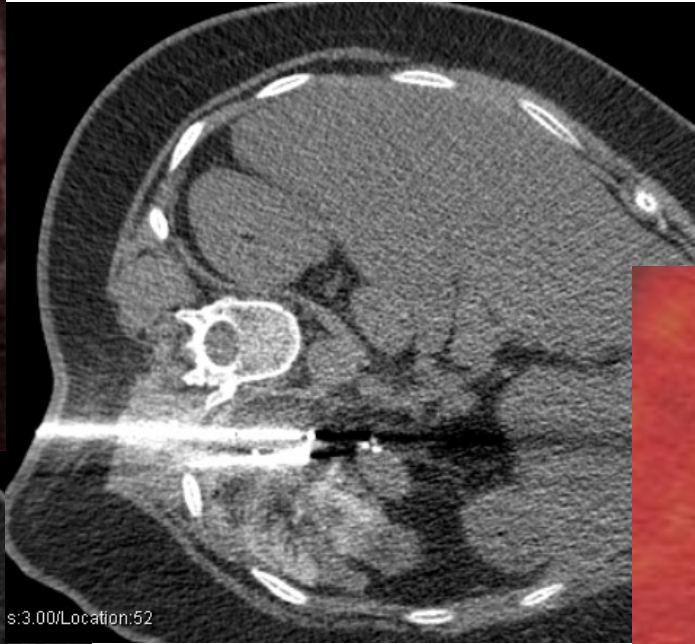
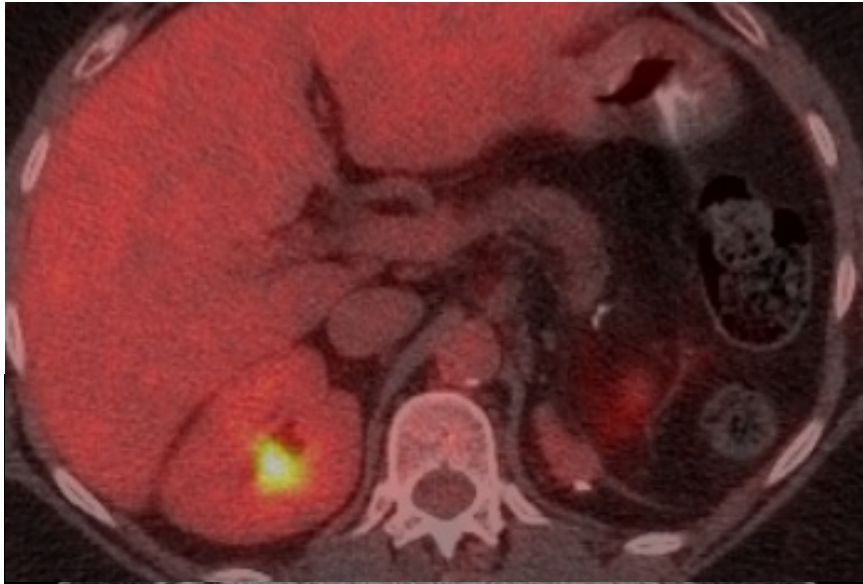
Metastatic Right Adrenal Lesion



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, $4 \text{ cm} \pm 2.5$). 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 $\leq 4.5 \text{ cm}$ (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 $\leq 4.5 \text{ cm}$ 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			
	CT	Imaging	PET/CT	Totals
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

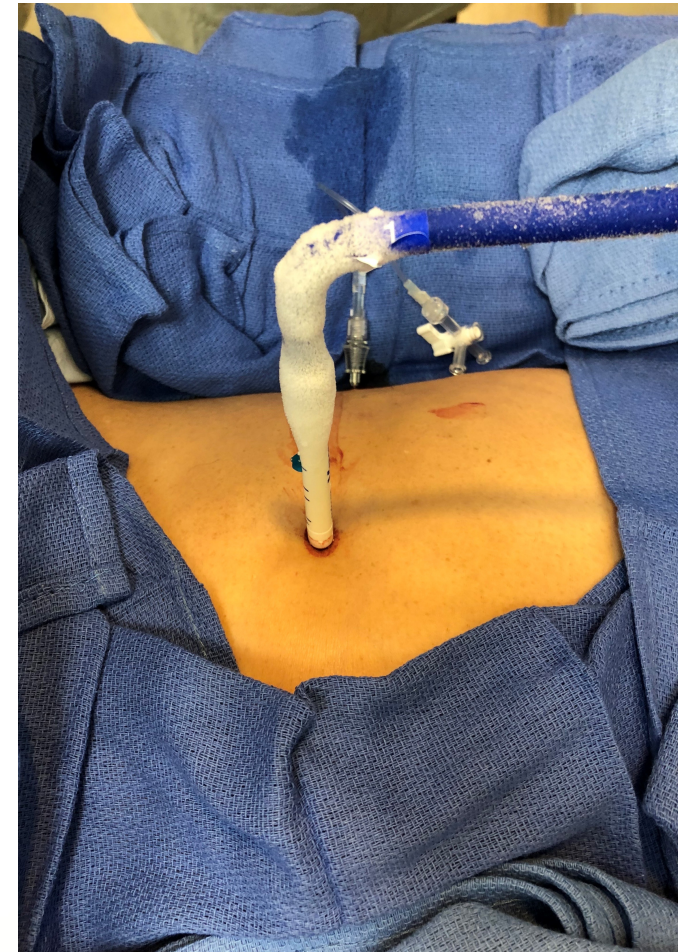
n = 62	Odds Ratio (95% CI)	P Value
Maximum tumor diameter ≤ 4.5 cm	26.36 (5.26–131.99)	< .0001
Visualization of normal adrenal tissue	8.38 (2.67–25.33)	< .0001

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 metanephrines
- Consider General anesthesia
- Phenoxybenzamine (alpha blockade) 2 weeks before (doxazosin 1mg daily)
- Beta blocker 4 days prior (metoprolol 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