Renal Ablation: Patient, Lesion and Energy Selection

Ronald S. Arellano, MD, FACR, FSIR, FCIRSE
Interventional Radiologist
Massachusetts General Hospital
Associate Professor of Radiology
Harvard Medical School

Disclosures

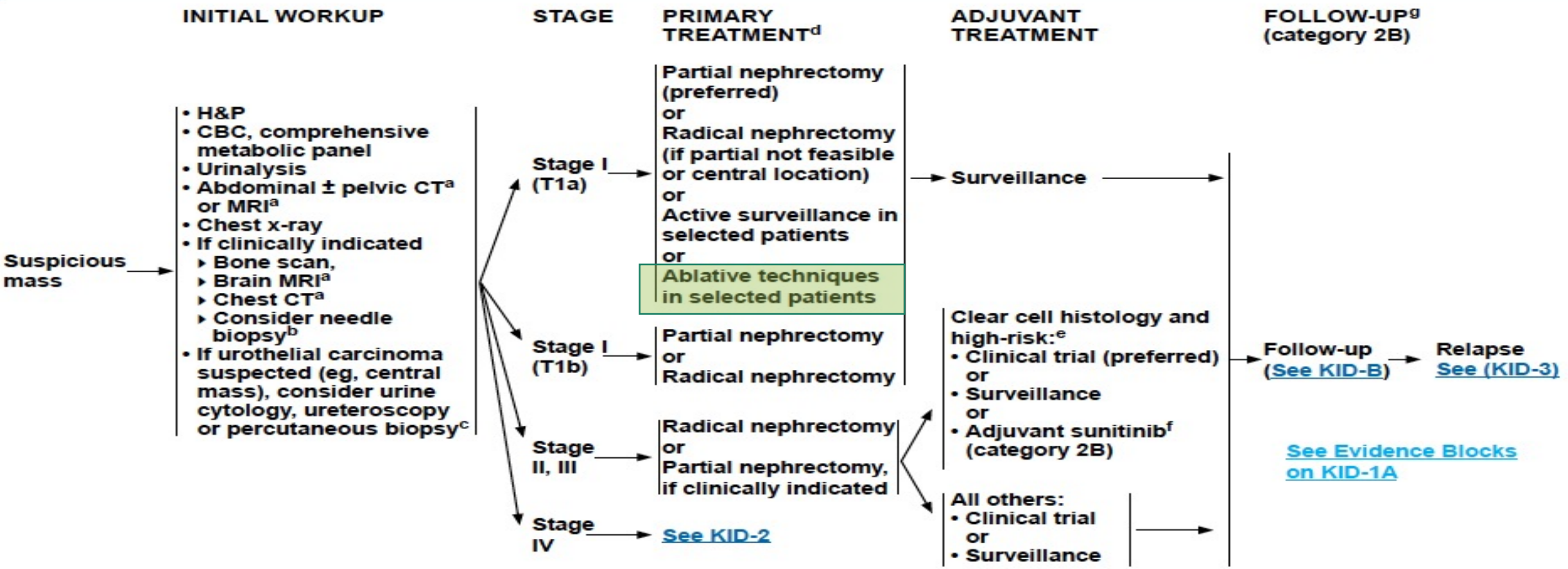
- Nothing to disclose

Objectives

- Discuss patient selection criteria for renal thermal ablation
- Discuss criteria/rationale for lesion selection
- Discuss thermal ablation options

Patient Selection

- Patient co-morbidities preclude nephrectomy
  - Age
  - Cardiovascular
  - Pulmonary
  - Prior partial nephrectomy
- Patient preference
  - Desire to avoid major surgery



[a]Contrast is strongly preferred, such as a renal protocol.
[b]Biopsy of small lesions may be considered to obtain or confirm a diagnosis of malignancy and guide surveillance, cryosurgery, and radiofrequency ablation strategies.
[c]If metastatic disease is present or the patient cannot tolerate ureteroscopy.
[d]See Principles of Surgery (KID-A).
[e]High-risk defined as: tumor stage 3 or higher, regional lymph-node metastasis, or both.
[f]Dosing of adjuvant sunitinib: 50 mg per day - 4 weeks on, 2 weeks off for 1 year.
[g]No single follow-up plan is appropriate for all patients. Follow-up should be individualized based on patient requirements.

Note: For more information regarding the categories and definitions used for the NCCN Evidence Blocks™, see page EB-1.
All recommendations are category 2A unless otherwise indicated.
Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.

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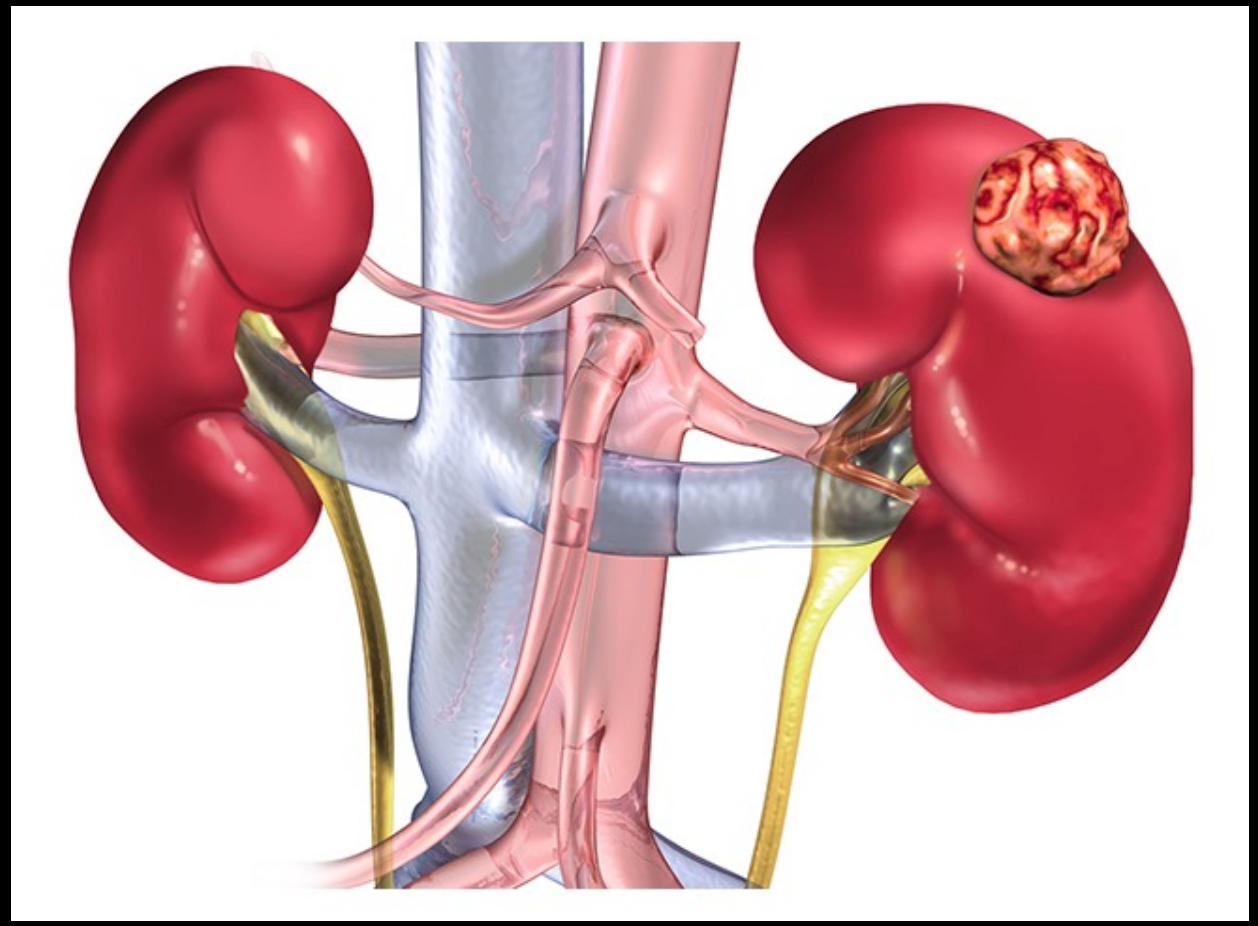
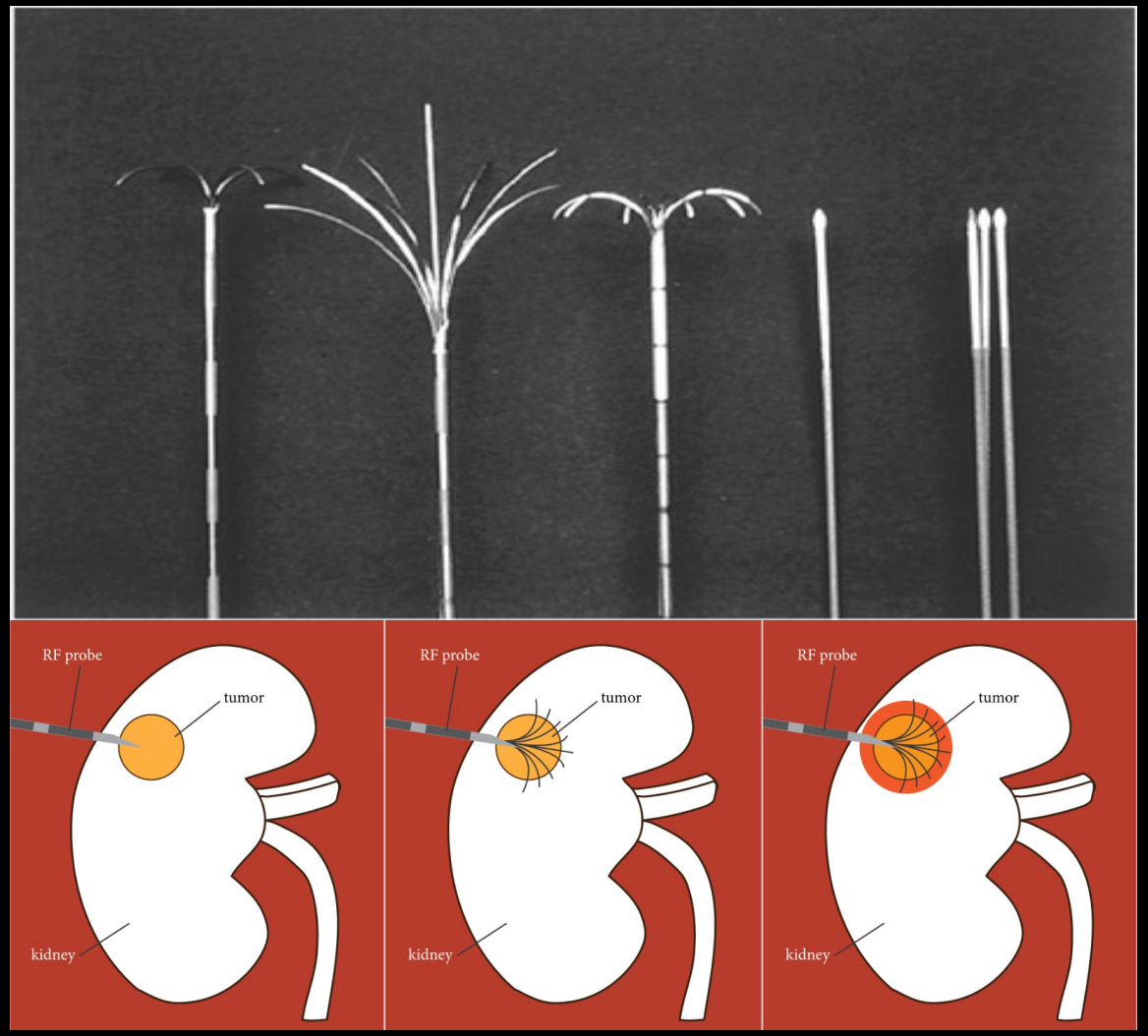
Lesion Selection

- Tumor Size
  - T1a RCC
    - Size up to 4.0 cm
    - Exophytic/Endophytic lesions
    - Central tumors*



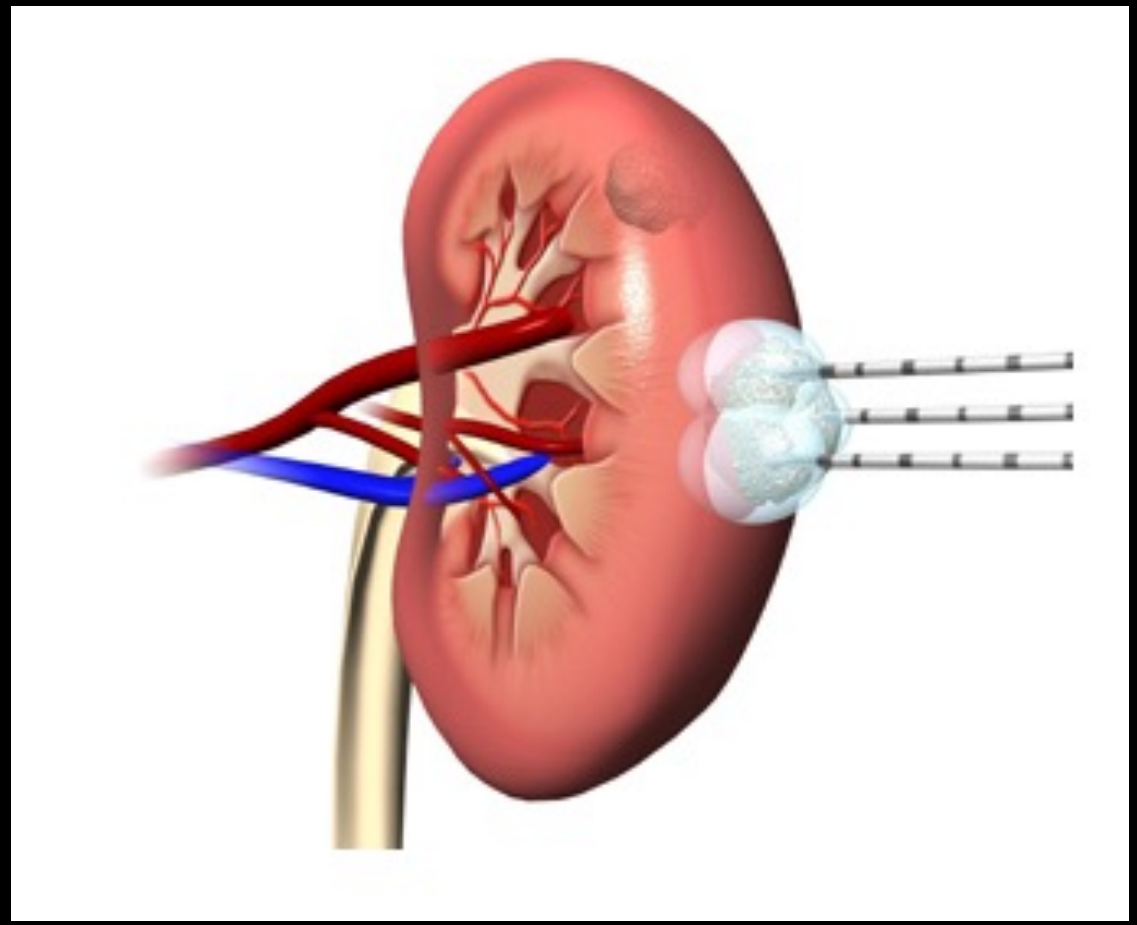
Radiofrequency Ablation

- Most data to support use of thermal ablation
- Various devices
- Treatment time variable
  - Time driven
  - Impedance driven
  - Temperature/time driven



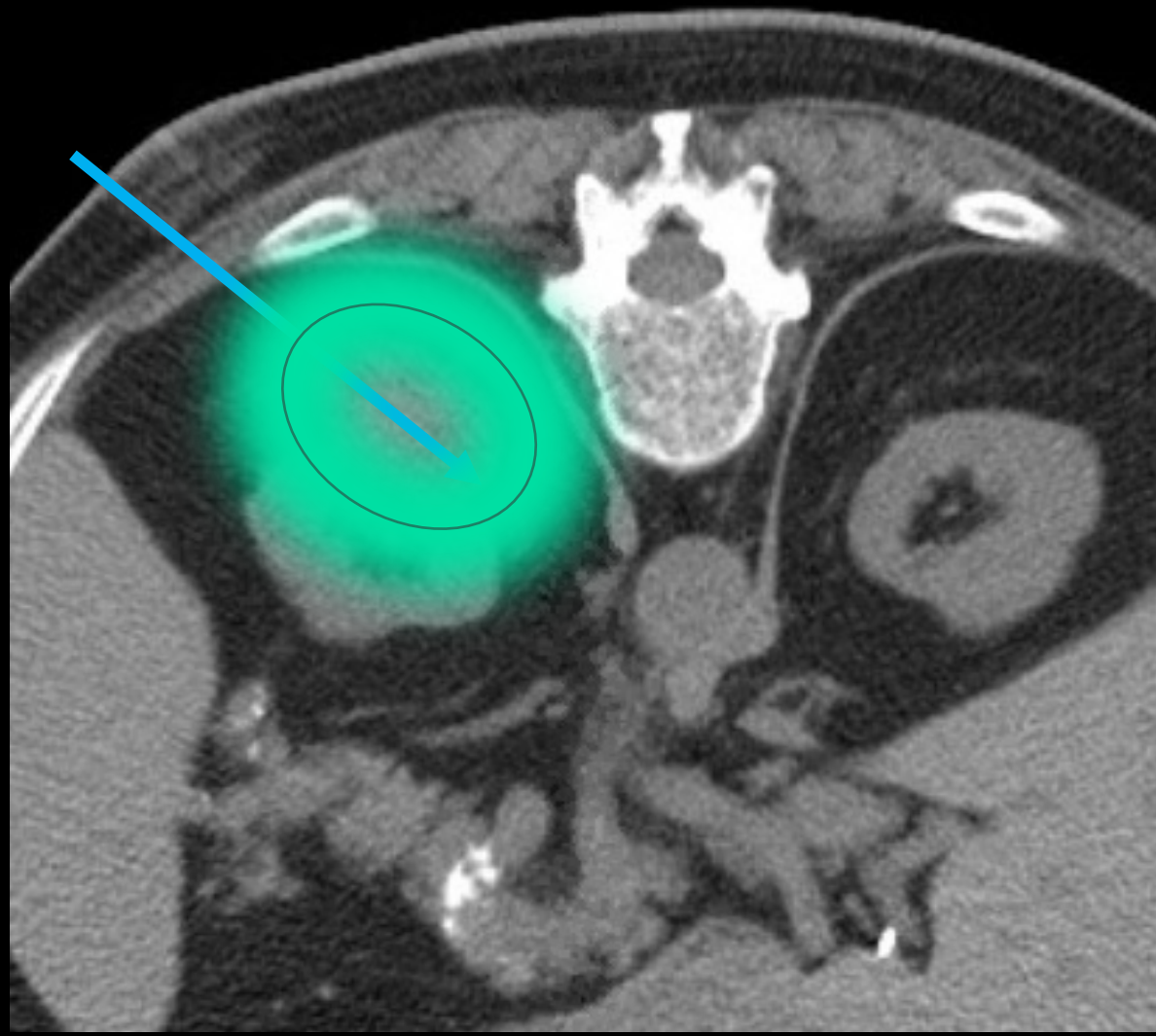
Cryoablation

- Probe selection
  - In general: 1-1.5 probes/cm of tumor
- 28-minute freeze-thaw-freeze cycle
- Visualization of Ice ball
  - May help monitor treatment



Microwave Ablation?

- Pros
  - Single antenna
  - Zone of ablation
    - “titratable’ based on energy setting
    - W x time
  - 3cm tumor: 60 W x 10 min = 4.3cm (L) x 3.6cm(W) zone of ablation
- Cons
  - Least amount of published data compared to RFA or Cryo



Microwave Ablation

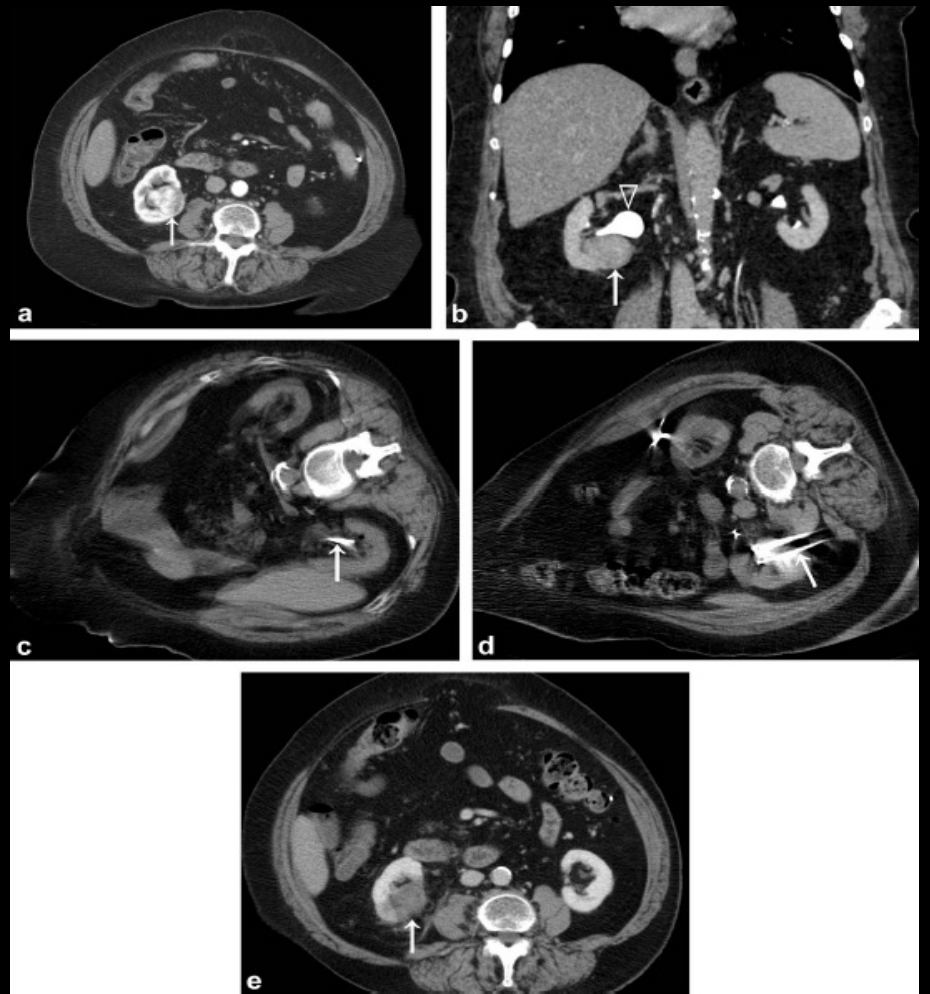
- In most instances can use single antenna
  - Option for multiple antenna for larger lesions
- Relatively shorter treatment times than cryoablation and RFA

What About Central Tumors?

- Risk of proximal ureteral or renal pelvic injury.
- Is one ablation modality better than another?

Image-Guided Percutaneous Radiofrequency Ablation of Central Renal Cell Carcinoma: Assessment of Clinical Efficacy and Safety in 31 Tumors

- Retrospective analysis of 32 patients with central RCC treated with RFA + pyeloperfusion
  - Technical success = 97.4%
  - Primary efficacy = 83.9%
  - Secondary efficacy = 96.8%
  - Major complications = 12.8%
    - Ureteral stricture (n=3)
    - Urinoma (n=1)
    - Perinephric abscess (n=1)



JVIR 2017;28(12):1643-1650

Comparison of Safety and Efficacy of Percutaneous Microwave Ablation of Central Versus Peripheral Renal Cell Carcinoma

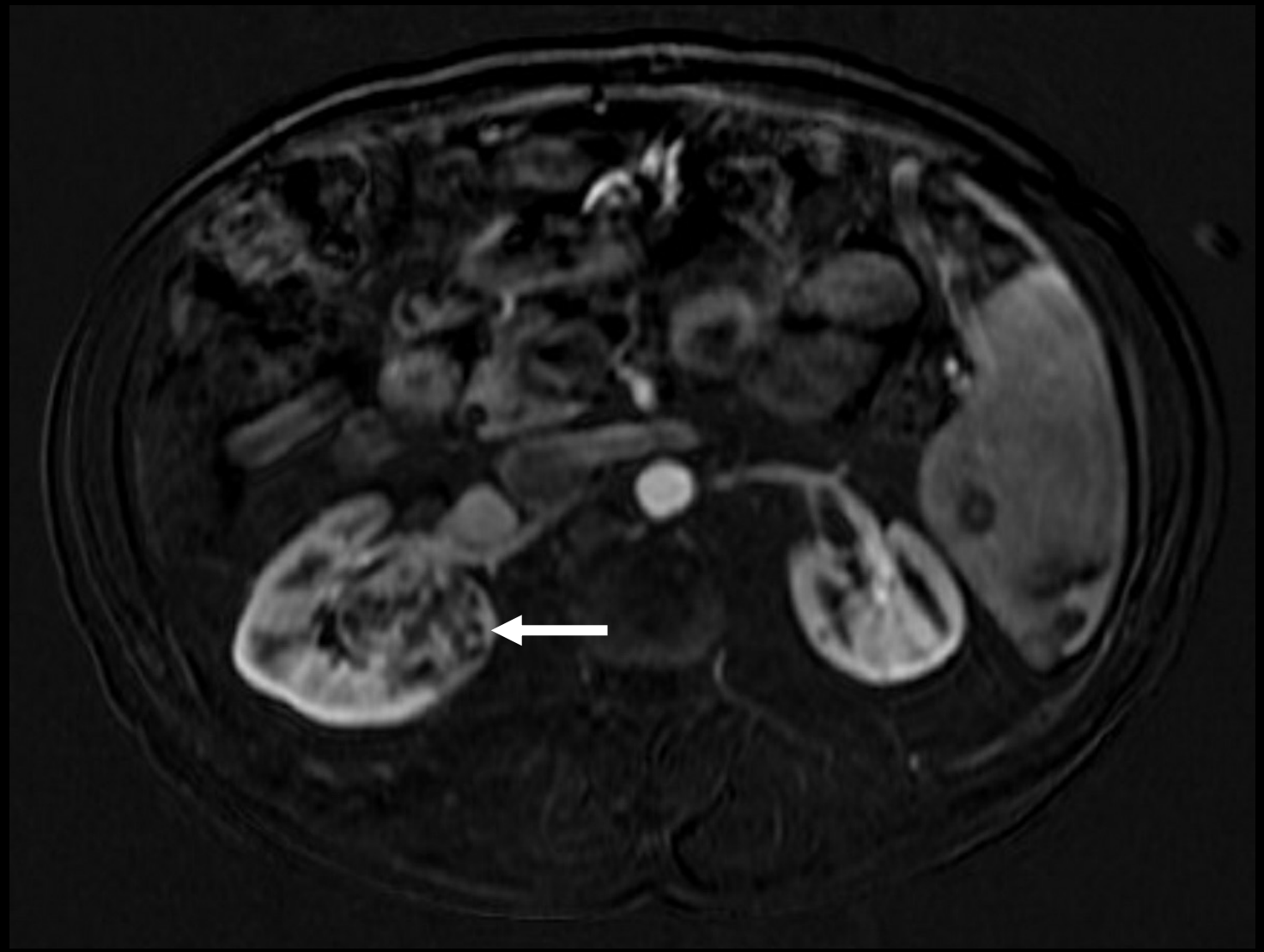
- 114 patients
- Technical success; 100%
- Primary technique efficacy: 93% (P) vs. 89%(C), p=0.49
- Adverse events: 17.7% (P) vs. 11.75% (C), p=0.34%
- Adjunctive maneuvers: 53% (C) vs29% (P), p=0.006

Cardiovasc Intervent Radiol. 2021 Feb;44(2):281-288

What About Central Tumors?

A

R



L

a

P

Cardiovasc Intervent Radiol. 2021 Feb;44(2):281-288

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b

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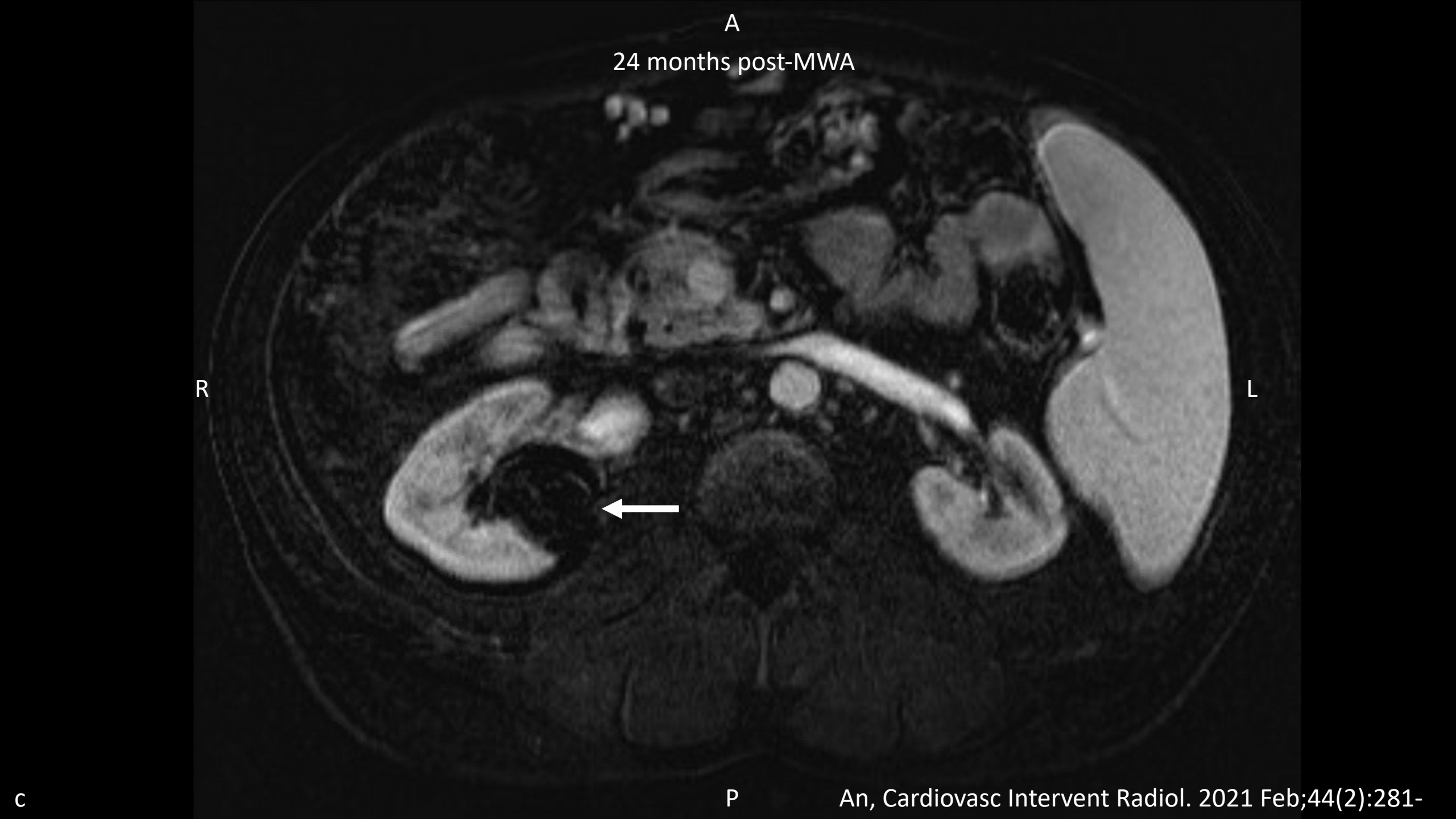


An, Cardiovasc Intervent Radiol. 2021 Feb;44(2):281-

So, Is One Type of Device “Better” Than Another?

Radiofrequency Ablation, Cryoablation, and Microwave Ablation for T1a Renal Cell Carcinoma: A Comparative Evaluation of Therapeutic and Renal Function Outcomes

- 297 patients
  - RFA = 244
  - Cryoablation = 26
  - MWA = 27
- At 2 years follow-up, no significant differences:
  - Technical success: 100%
  - Primary efficacy: RFA 95% CA= 88% MWA = 96%
  - Preservation of renal function (eGFR)
  - Adverse events : RFA = 16% CA = 11% MWA 7%

Zhou, JVIR 2019;20(7):1045-1042.

Thermal Ablation of T1c Renal Cell Carcinoma: A Comparative Assessment of Technical Performance, Procedural Outcome, and Safety of Microwave Ablation, Radiofrequency Ablation, and Cryoablation

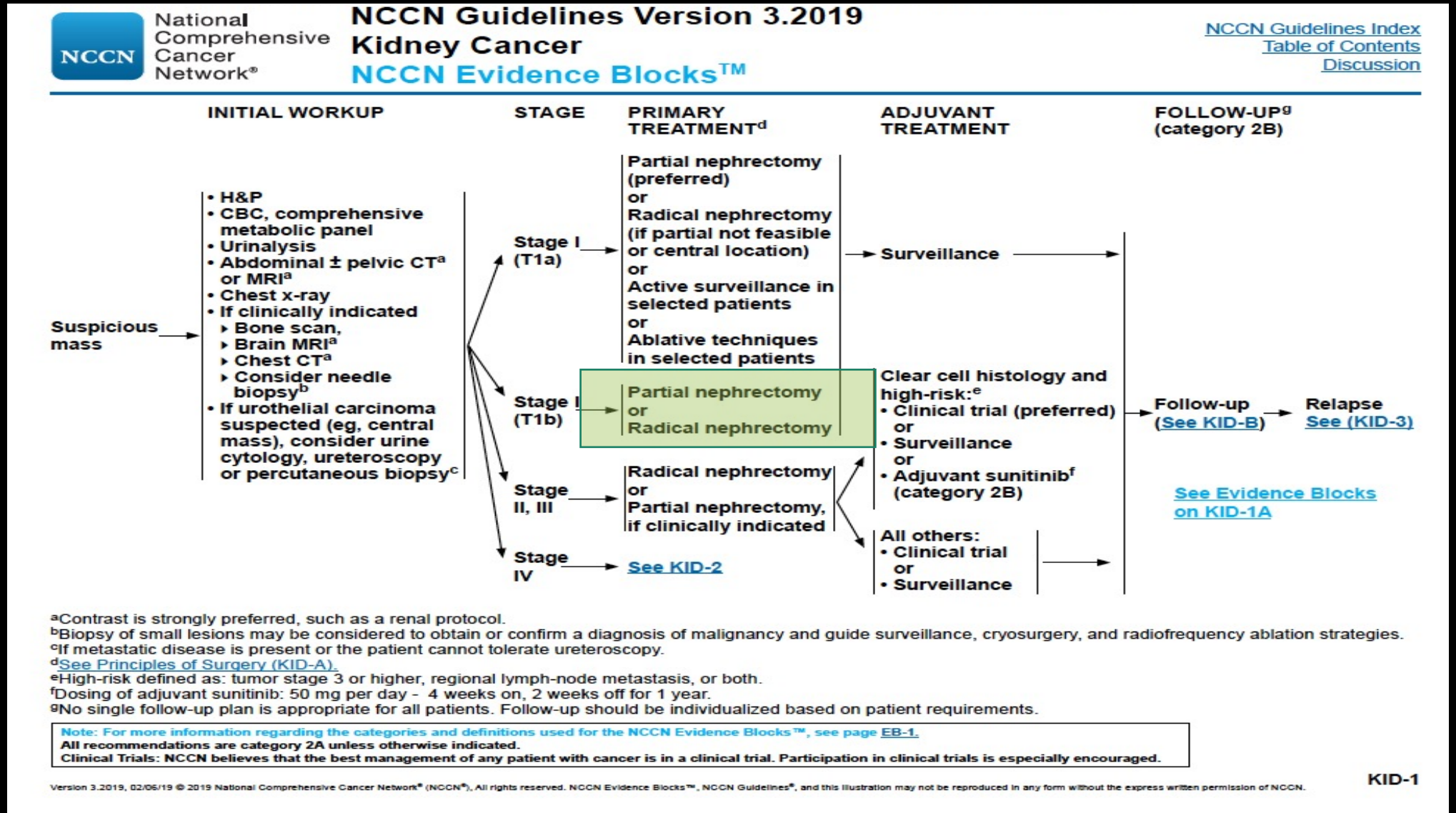
- 437 tumors
  - RFA = 347
  - Cryoablation = 46
  - Microwave = 44
- MWA a/w less ablation time, procedural time, medications compared to RFA and cryoablation

Zhou, JVIR 2018;29(7):943-951

Which to Chose and Why?

- No defined algorithm for selection of thermal ablation
- All appear to be equally effective for treatment of T1a RCC
- All have generic limitations, primarily based on risks of non-target injury
- Be assured that the device(s) you have will get the job done

What about T1b RCC?



Local recurrence and other oncologic outcomes after percutaneous image-guided tumor ablations on stageT1b renal cell carcinoma: a systematic review and network meta-analysis

Table 2. Technical efficacy, secondary technical efficacy, local recurrence and progression to metastatic disease in all studies. (Table view)

Study	Takaki et al. [10]	Atwell et al. [11]	Andrews et al. [16]	Hasegawa et al. [8]	Hebbadj et al. [14]	Gunn et al.	Shapiro et al. [12]	Grange et al. [13]	Guo et al. [15]
Technical efficacy	17/21 (81%)	45/46 (98%)	x	RFA 15/23 (65%) CA 22/23 (96%)	21/24 (88%)	30/34 (87%)	38/40 (95%)	19/22 (86.3%)	19/23 (83%)
Secondary technical efficacy	21/21 (100%)	x	x	RFA 21/23 (91%) CA 23/23 (100%)	x	31/34 (91%)	40/40 (100%)	22/22 (100%)	23/23 (100%)
Local recurrence	0/21 (0%)	1/36 (2.8%)	3/48 (6%)	RFA 3/21 (14 %) CA 2/21 (9%)	3/26 (12%)	8/34 (23.5%)	2/40 (5%)	2/23 (9%)	1/23 (4%)
Progression to metastatic disease	2/21 (9.5%)	2/36 (6%)	2/35 (6%)	RFA 1/21 (4%) CA 2/21 (9%)	x	x	0/40 (0%)	1/23 (4%)	x

Int J Hyperthermia 2021;38(1):1295-1303

Conclusions

- All ablation devices are equally effective for treatment of T1a RCC
  - Preservation of renal function
  - Technique efficacy
  - Primary efficacy
- MWA may be associated with overall less ablation and procedural times and less intraprocedural medications.
- Emerging data is encouraging for the use of thermal ablation to treat T1b RCC

Thank you

rarellano@mgh.harvard.edu