

Niere - so gut, und doch so selten durchgeführt



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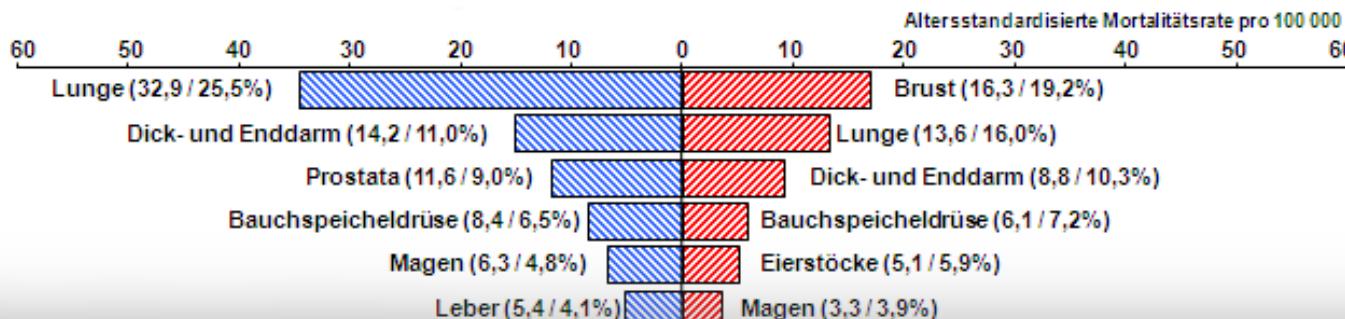
GEFÄßZENTRUM
Passau

zertifiziert durch

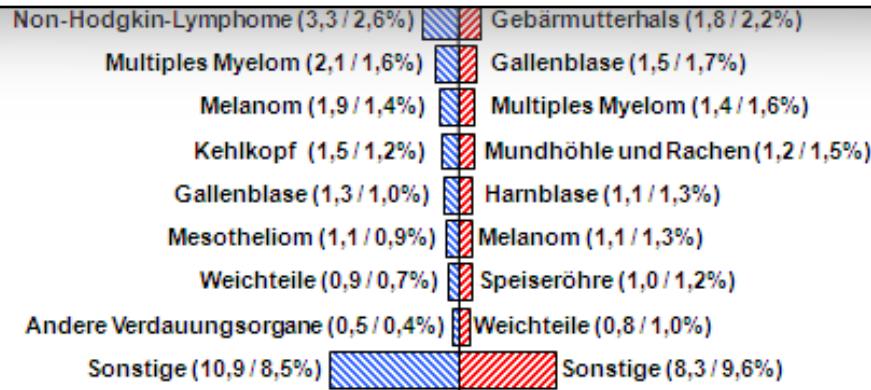
Deutsche Röntgengesellschaft Deutsche Gesellschaft für Gefäßchirurgie



Mortalitätsrate des NZK in Deutschland 2010



- 2-4% aller Npl.
- ca. 12.000 Neuerkrankungen p.a. in D 2012



Nikolaus Becker
Babine Holzmüller
Abteilung Epidemiologie von Krebskrankheiten
Deutsches Krebsforschungszentrum Heidelberg

Deutscher Krebsatlas
Quelle: DKFZ

Entstehung kleines NZK in 9 Jahren



2011

Natürlicher Verlauf des Nierentumors

- RCC: slow growth rate 2-5 mm/year
but finally unpredictable
- 55-60% indolent RCC
- 20-25% grow aggressively
- DD atypical cysts, oncocytoma, angiomyolipoma
- relation of patient's age and tumor size
- >85yrs: RCC rel. death rate doubled since 70'S

Behandeln oder nicht?

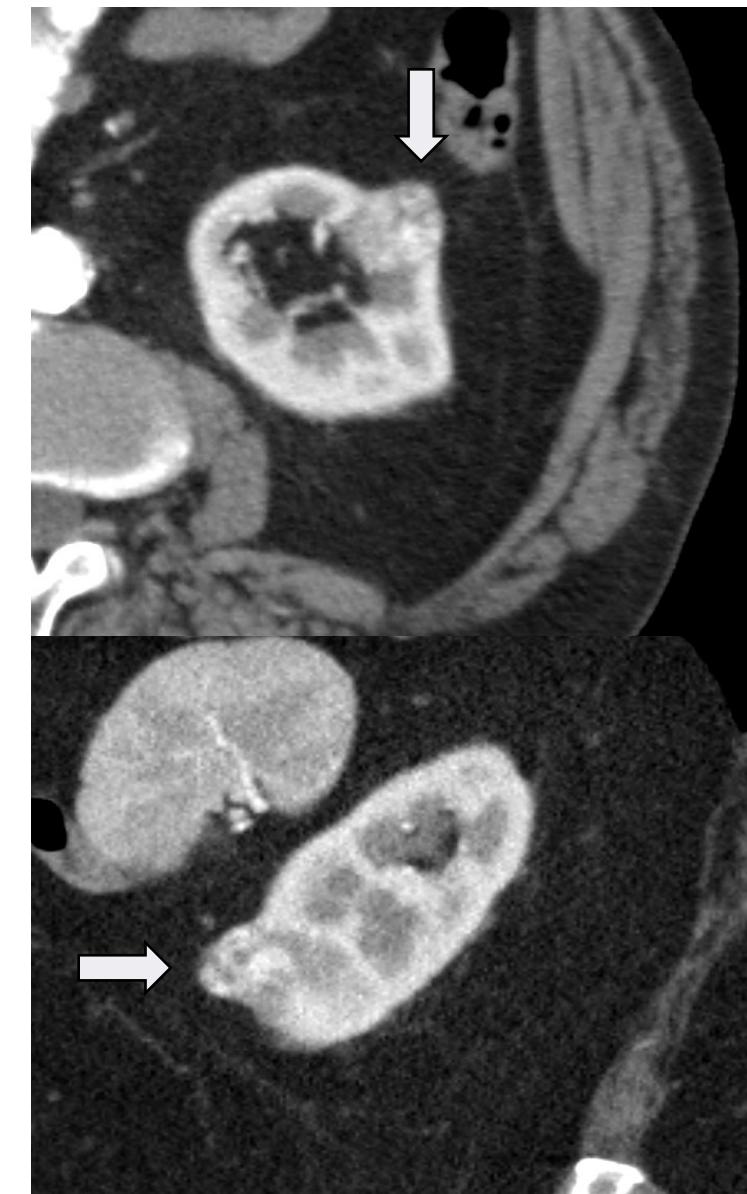
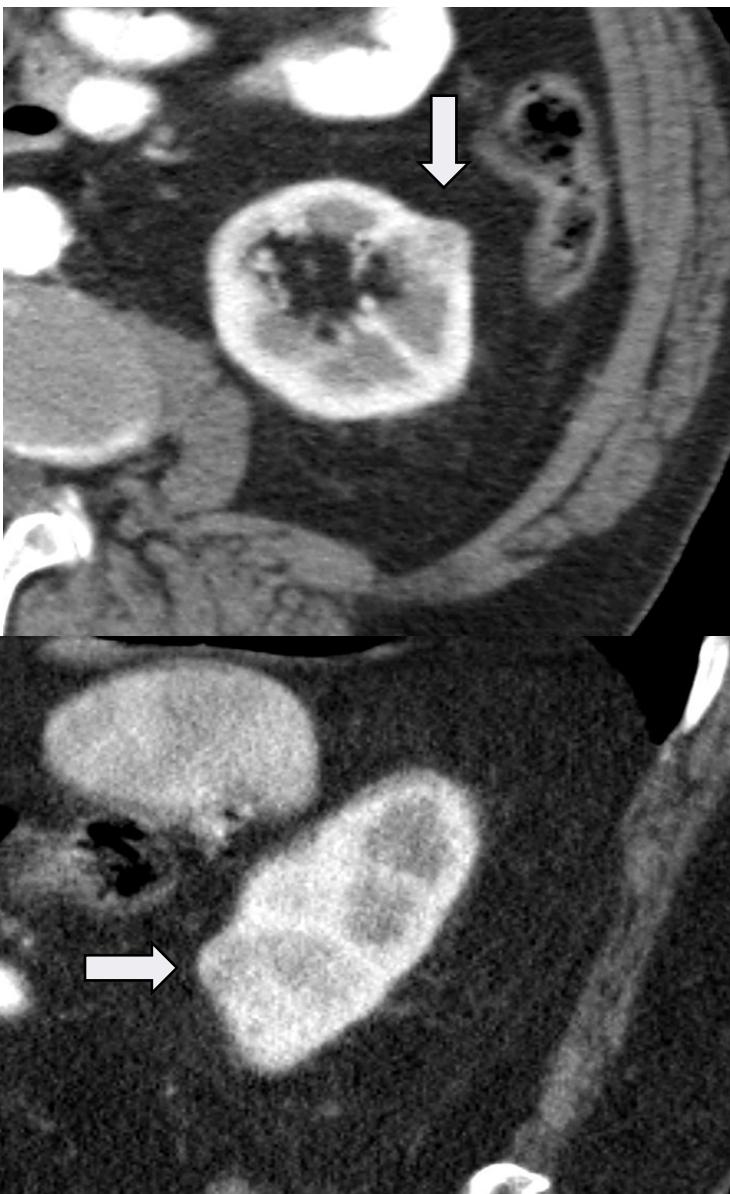
Behandlung bei

- jungen Patienten
- lineares TU Wachstum
- „fitte“ Patienten
- lange Lebenserwartung
- TU behandelbar
- biopt. bewiesenem TU

Active Surveillance bei

- >70 Jahren
- kein/langs. TU Wachstum
- rel. Komorbidität
- begrenzter Lebenserwartung

Wachstum kleines NZK in 3 Jahren



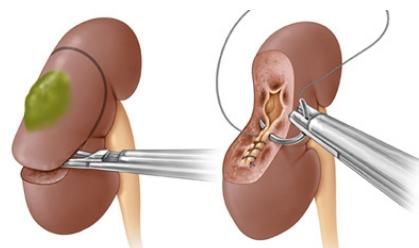
3 years later
10 mm growth

Behandlungsoptionen



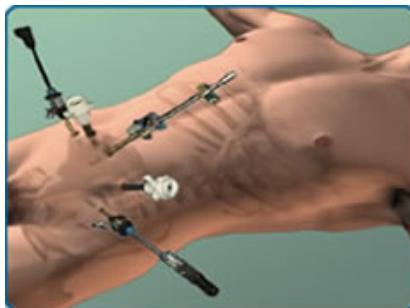
picture from internet

RN
Radikale Nephrektomie



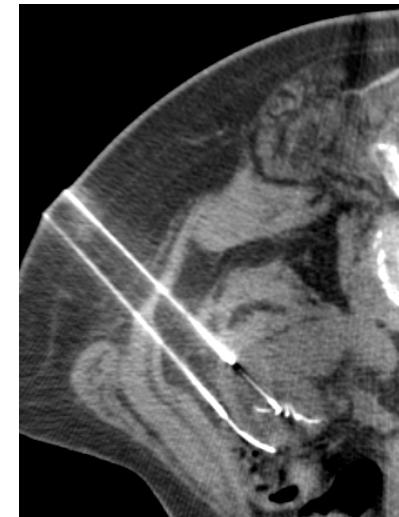
picture from internet

PN
Partielle Nephrektomie



picture from internet

LN
Laparoskopisch
partielle Nephrektomie
radikale Nephrektomie



AT
Thermoablation

Kryotherapie
Mikrowelle
Radiofrequenz



picture from internet

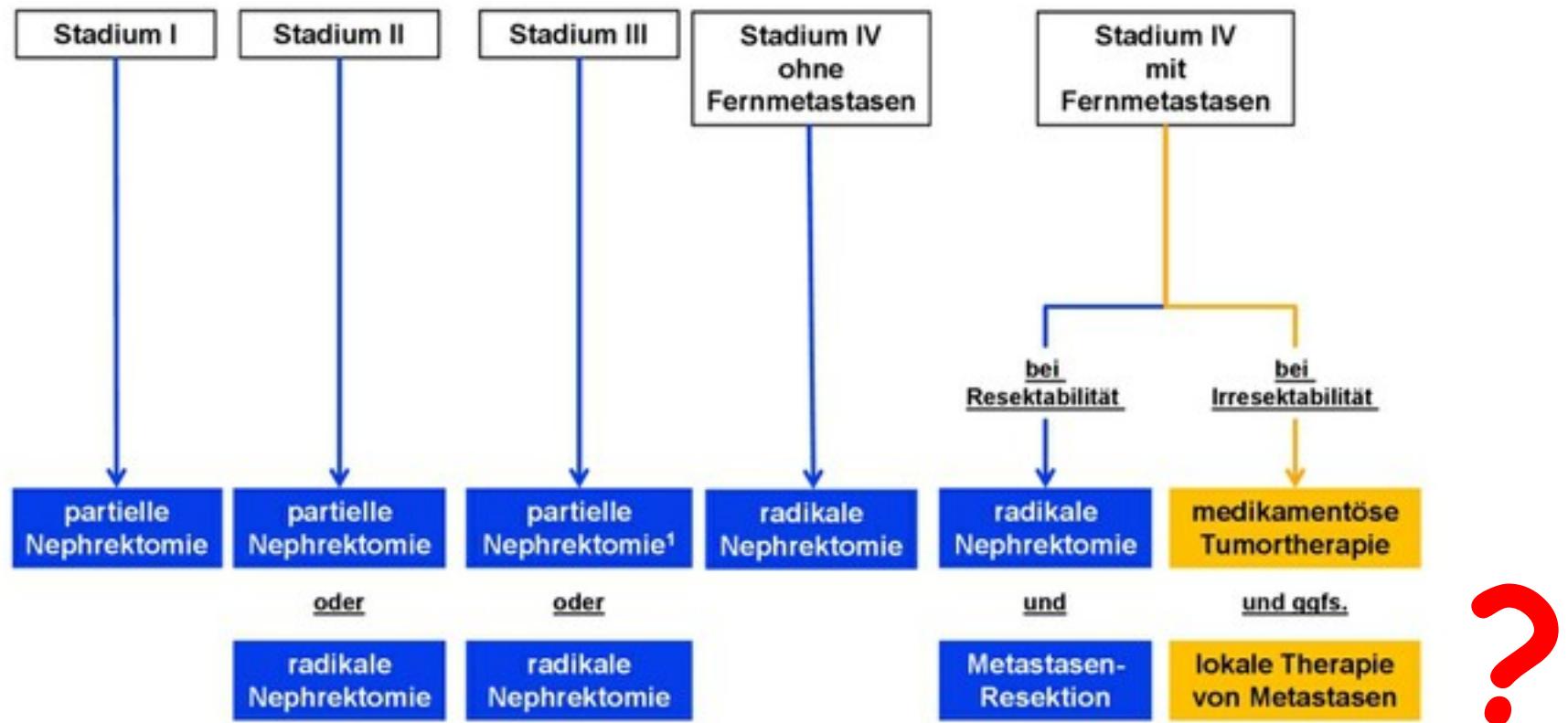
AS
Active Surveillance

Was muß die Therapie bieten?

- atraumatic
- microinvasive
- highly technologized
- clinically proven and
- oncologically effective **tumor ablation**

without renal function impairment ...

Wer soll's machen?



Wer soll's machen?

- EAU recommends (open) NSS in SRC
 - oncological outcome
 - prevention of chronic kidney disease
 - prevention of cardiovascular events
 - feasibility for the elderly

Wer soll's machen?

EAU further says:

- thermal ablation provides no real advantage
- thermal ablation must be much more precisely worked out



What is the challenge...

Radical Nephrectomy



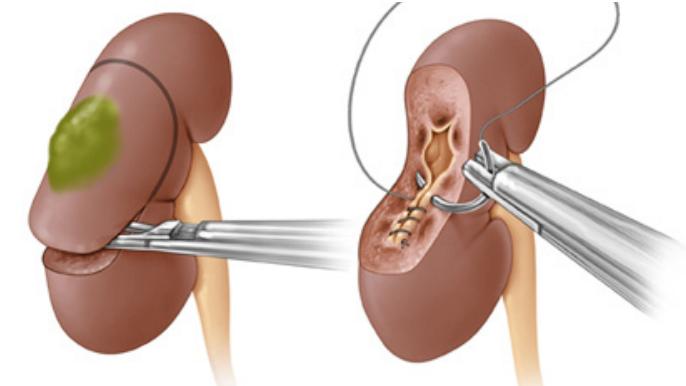
internet

- eGFR deterioration $eGFR < 60$
34% pre OR 59% post OR 68% after 30 mo.
 - renal insufficiency occurs more often after RN than after PN
 - increased morbidity in the elderly



What is the challenge...

Partial Nephrectomy
(open, lap.)



www.mayoclinic.com

- renal function better than after RN
- oncological outcome worse in SRC
 - 541 pat. <5 cm RCC, randomized study (EORTC)

10-yr. OS

PN

75.7%

RN

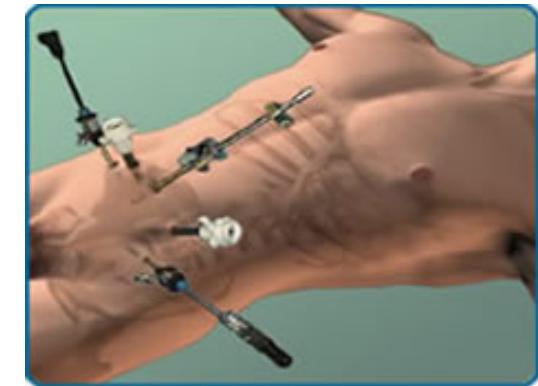
81.1%



What is the challenge...

Lap. Partial Nephrectomy/Ablation

- technical complex
- only experienced centers
- 10% conversions to open procedure



In a 336 pat. single center experience:

35.7% complications

factors: size, TU penetration, age!

major 6.6%, 3.3% nephrectomy

Thermaablation: Wie wird's gemacht?

... und was führt zum Erfolg?



Welche Bildgebung?

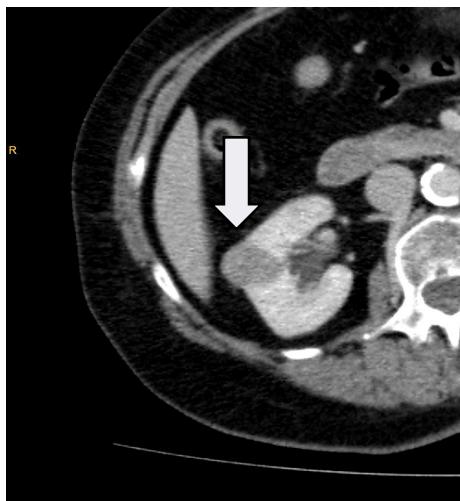


CT/ Ultraschall

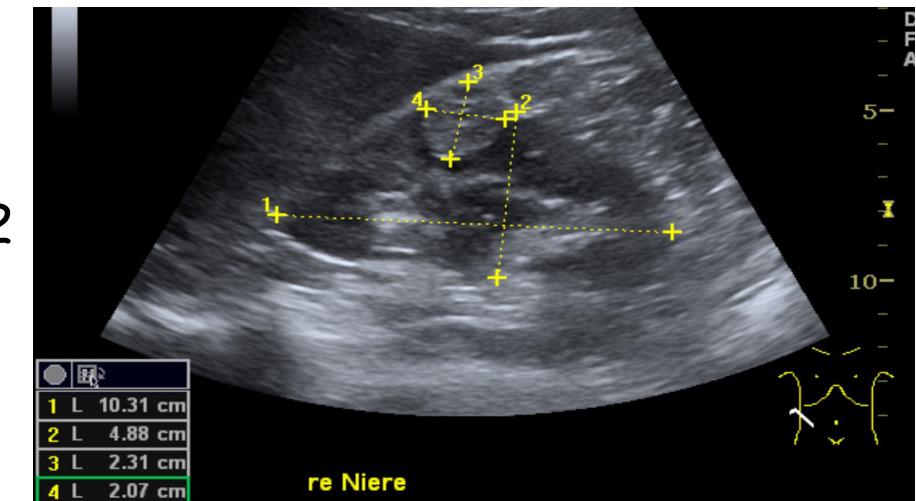


growth of small RCC within 8 years

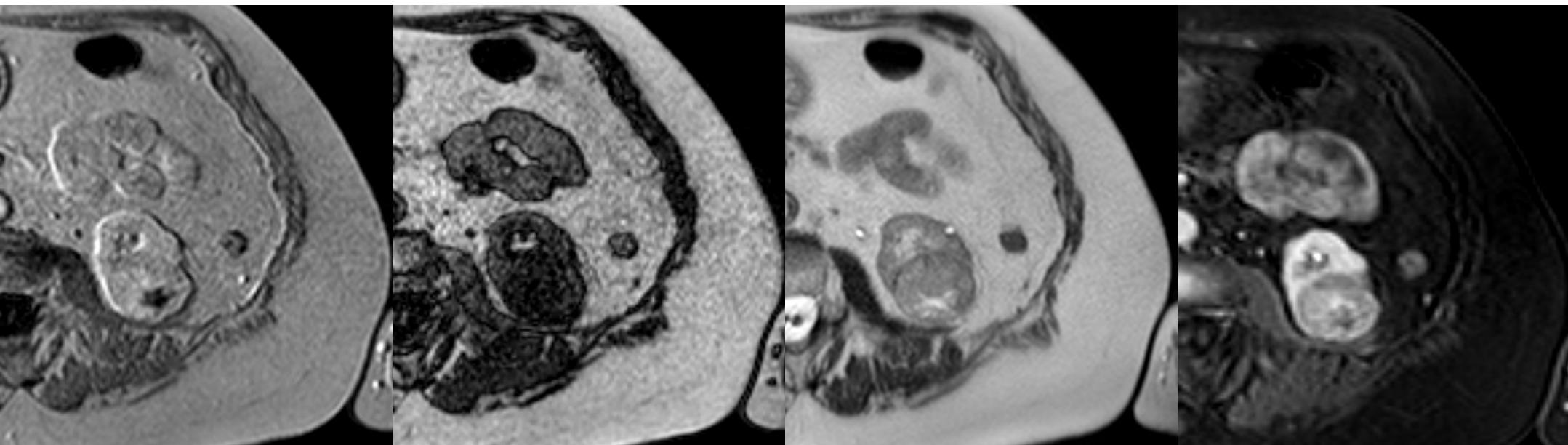
2004



2012



MRT



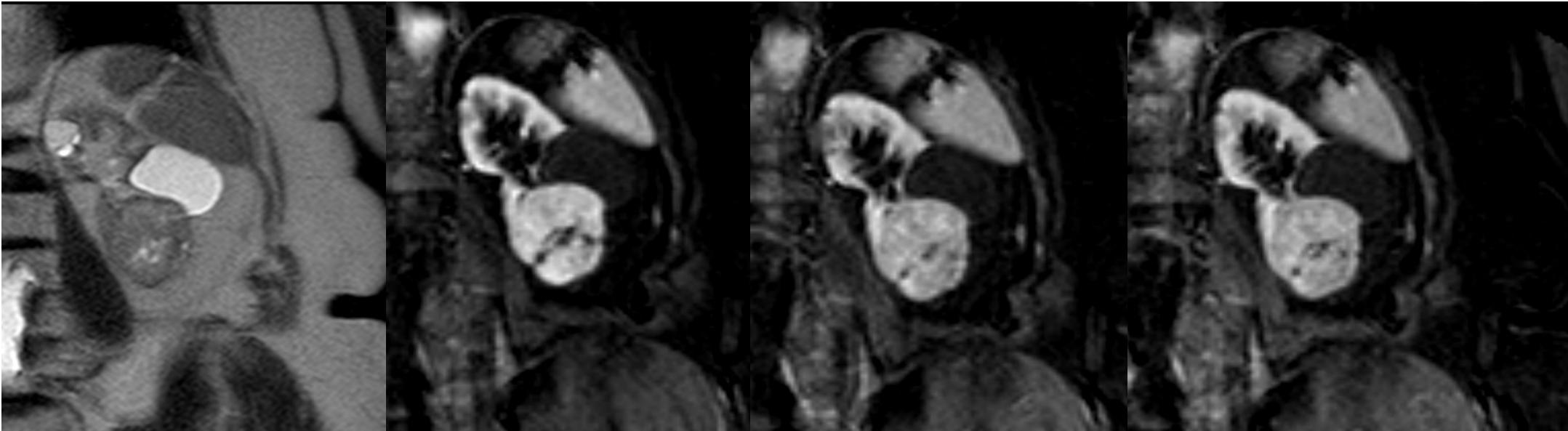
in phase

opp. phase

T2w

ce T1 FFE

MRT



T2w

ce T1 FFE

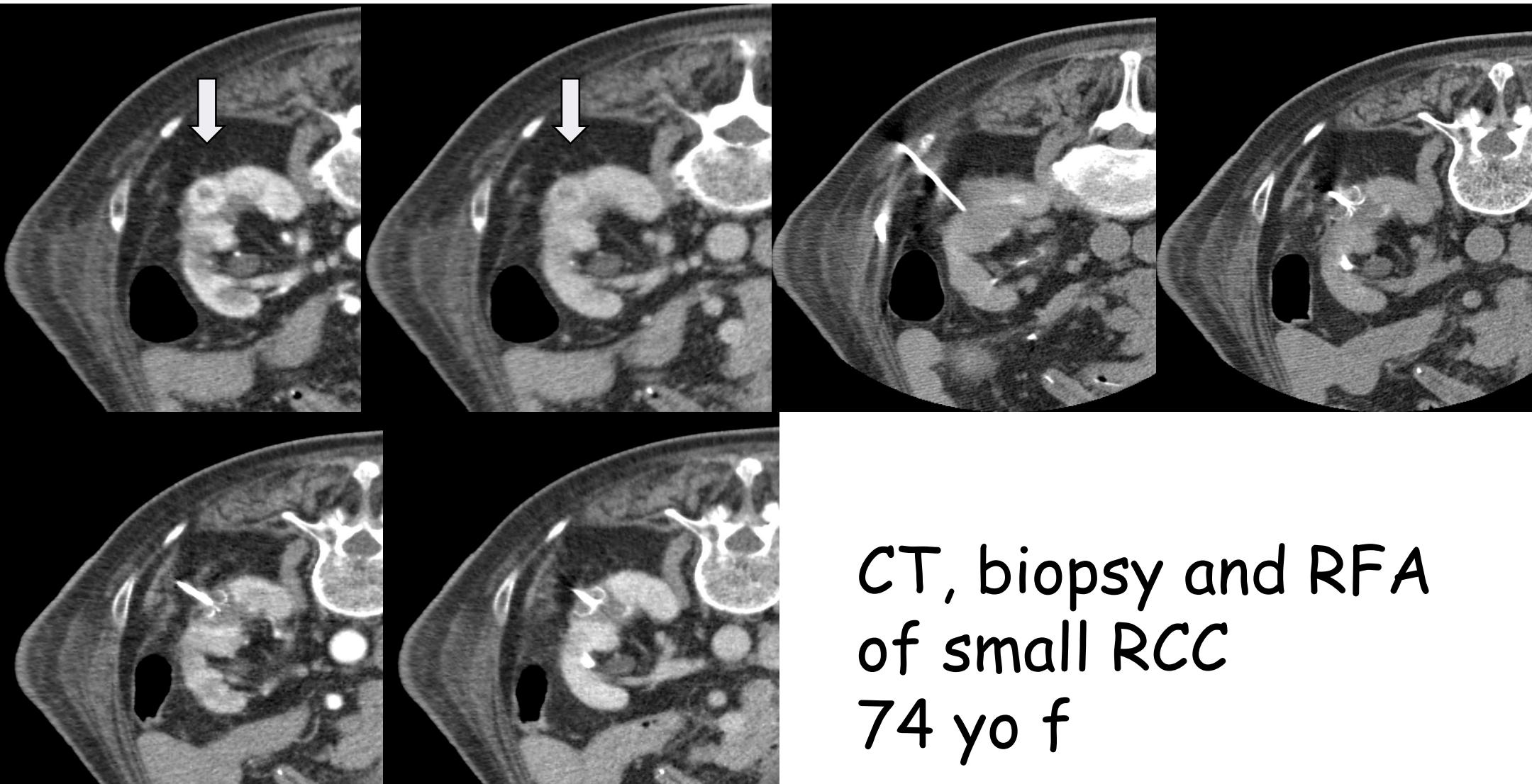
ce T1 FFE

ce T1 FFE

Ablationstechnik

CT-guidance
urinary catheter
sedation / GA
positioning prone>supine
safe approach



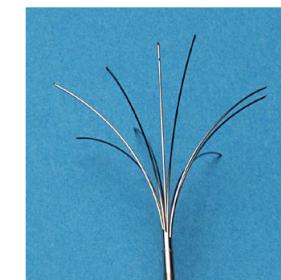
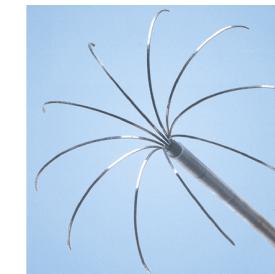


CT, biopsy and RFA
of small RCC
74 yo f



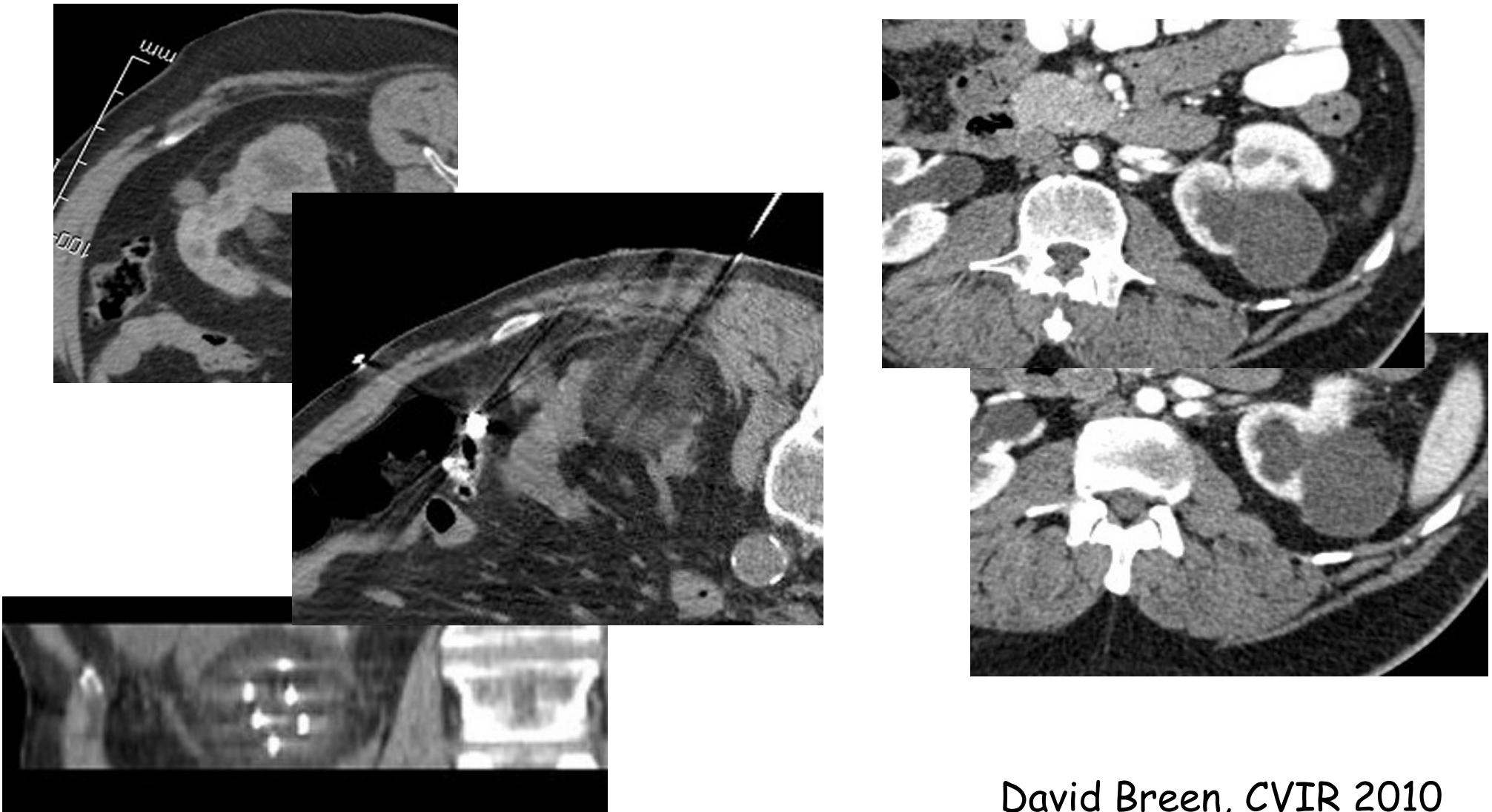
RFA, Mikrowelle oder Kryo?

Standard: Radiofrequenzablation



Take the system you are used to!

Modern CT guided Cryoablation



David Breen, CVIR 2010

Comparison



RFA

MW



frequency

- 350-479kHz

- 2450 MHz

heat generation

- frictional heat
- ionic agitation

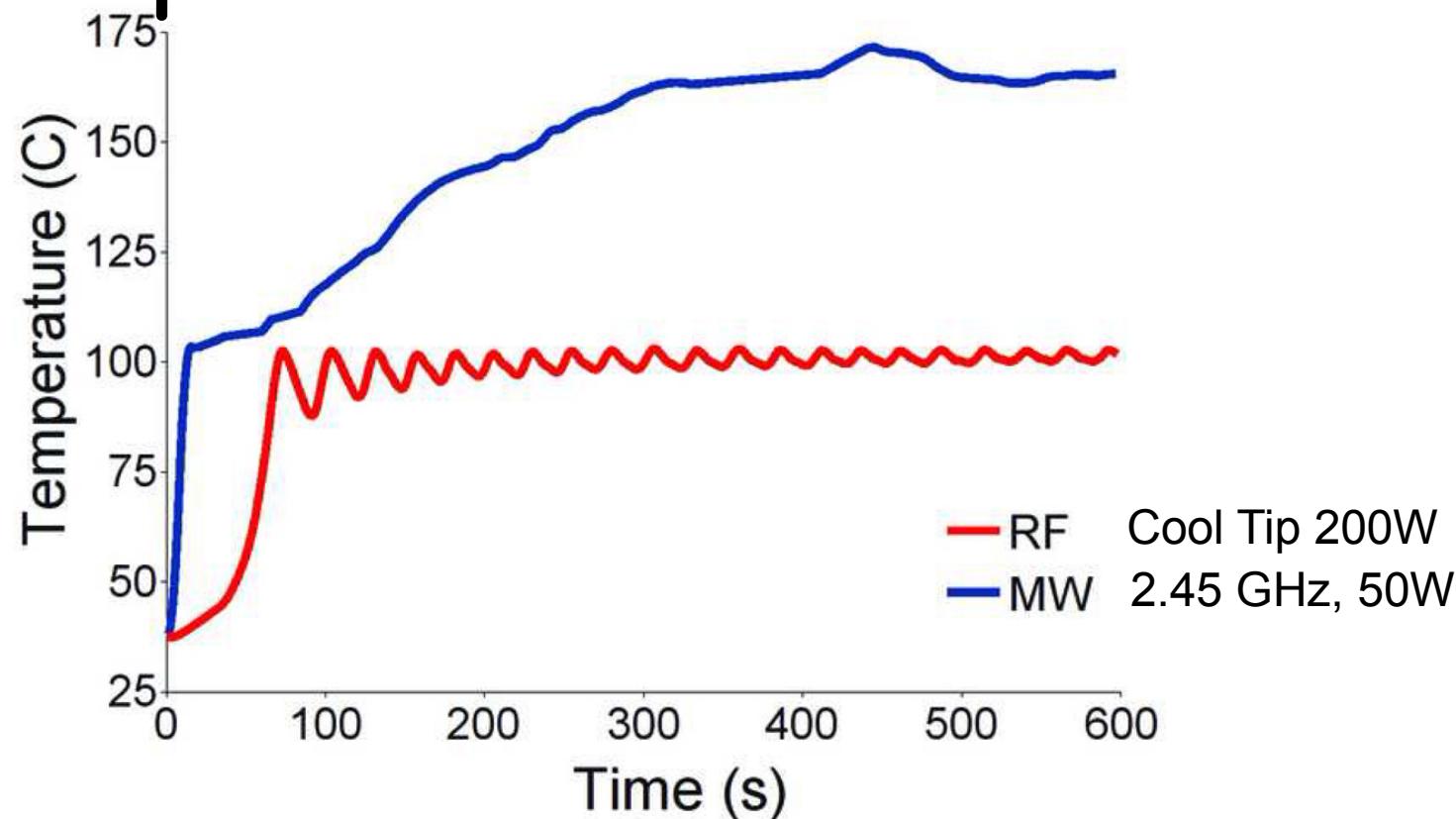
- frictional heat
- H₂O agitation

electrical field

- conductive heat
- current flow

- conductive heat
- dipol antenna

Comparison Microwave / RF



Course of temperature or time in porcine kidney, 5 mm distance to probe

Was soll behandelt werden?



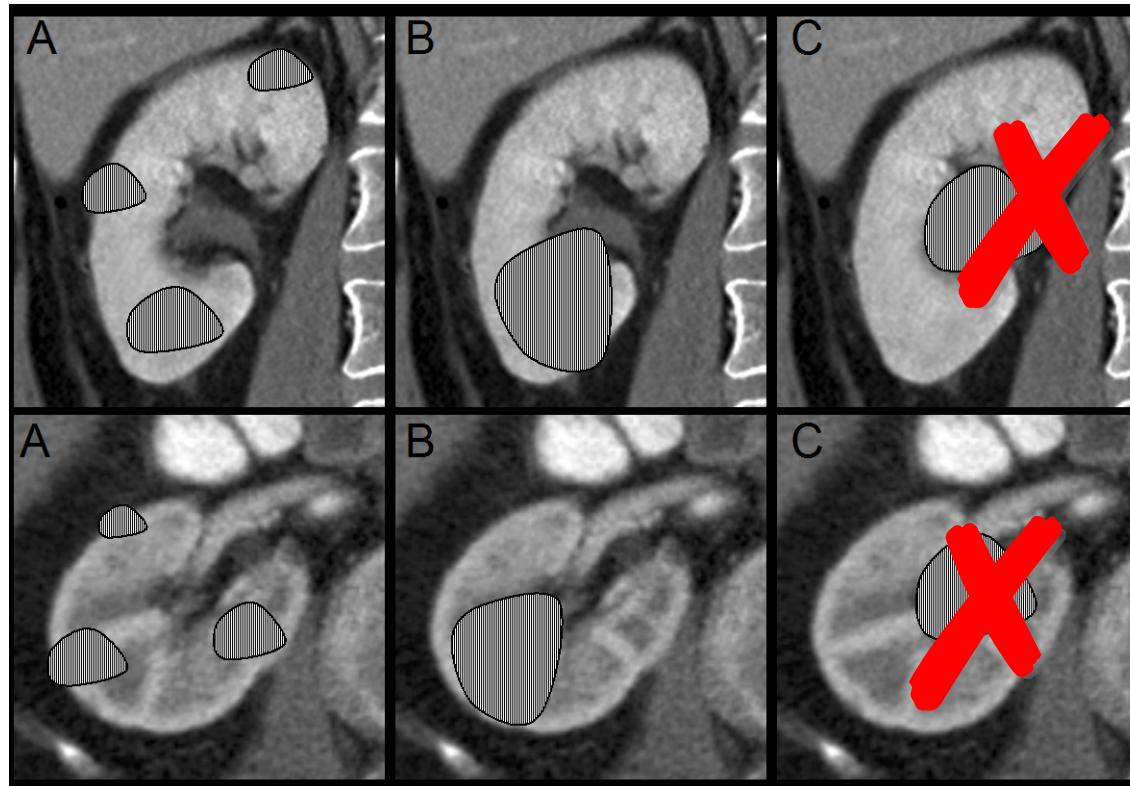
Was soll behandelt werden?

- multiple or sekundäre Tumore
 - M. v. Hippel-Lindau
- Einzelnieren
- metastas. NZK
- OP-Verweigerung
- Einzelfallentscheidung



Savage World J Urol 2000

Keine zentralen Tumore!



- T1-Tumore
- nicht zentral
- keine NBKS Infiltration
- > 3 cm Größe:
Embolisation?

Zentrale Ablation möglich?

Wingo MS, Leveillee RJ: Central and deep renal tumors can be effectively ablated:
radiofrequency ablation outcomes with fiberoptic peripheral temperature monitoring
J Endourol. 2008 Jun;22(6):1261-7

41/146 RCC in 39 pat endophytic
mean size 2.7 cm (range 1.0-5.0 cm)
mean FU 29 Mo.

37 of 41 (90.2%) endophytic, hilar or central located TU
single RFA procedure

It is, but not recommended!

And if, prefer cryoablation ...

Kleine NZK behandeln!



Success rate in lesion < 4 cm nearly 100%

Zagoria: 95 RCC < 3,7 cm 100% ablated

Gervais: 67 RCC < 4 cm 100% ablated

Breen: 86 RCC <3.7 cm 100% ablated

Veltri: 115 RCC <3.0 cm 93% ablated

Increase in size by 1 cm doubles risk of recurrence

Biopsieren!



- up to 1/3 is benign
- Metaanalysis 1375 lesions (mean size 2.64 cm)
malignant 53.9% unknown 33.5% benign 12.7%
- Size dependancy of benignity
2770 Nephrectomies
<3cm 25% <2cm 30% <1cm 44%

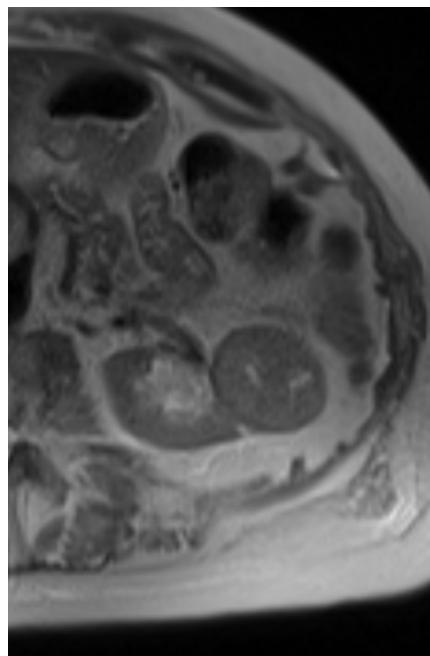
Therapie bei Einzelnieren?

Raman JD Thomas J, Lucas SM et al.: Radiofrequency ablation for T1a tumors in a solitary kidney: promising intermediate oncologic and renal function outcomes
Can J Urol. 2008 Apr;15(2):3980-5

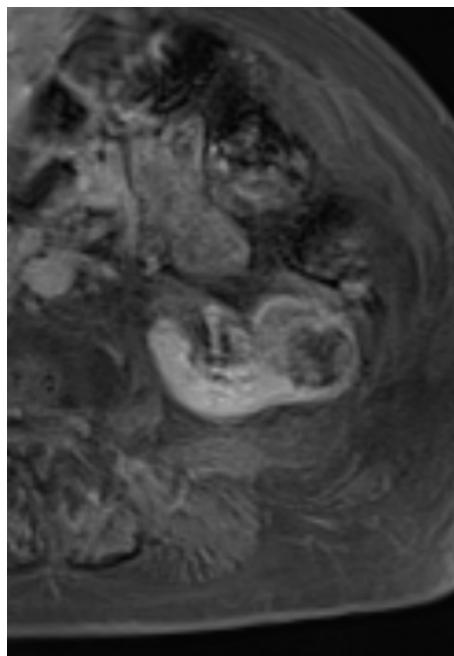
**21 RFA 16/242 pat singul. TU < or= 4 cm
in single kidneys
biopsy: RCC in 75%**

mean. pat age	66.1 years
mean TU size	2.6 cm (range, 1.1-4.0)
FU	30.7 mo (range, 1.5-66.0)
14/16	(88%) no recurrence
GFR	54.2 ml/min/1.73m ² pre intervention 47.5 ml/min/1.73m ² last control (p = 0.015)

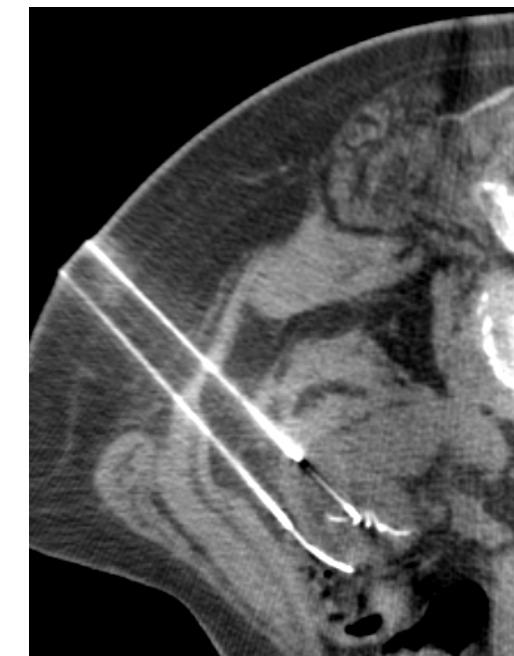
Was man behandeln sollte ...



4 cm TU



19G biopsy & glucose dissection bended needle

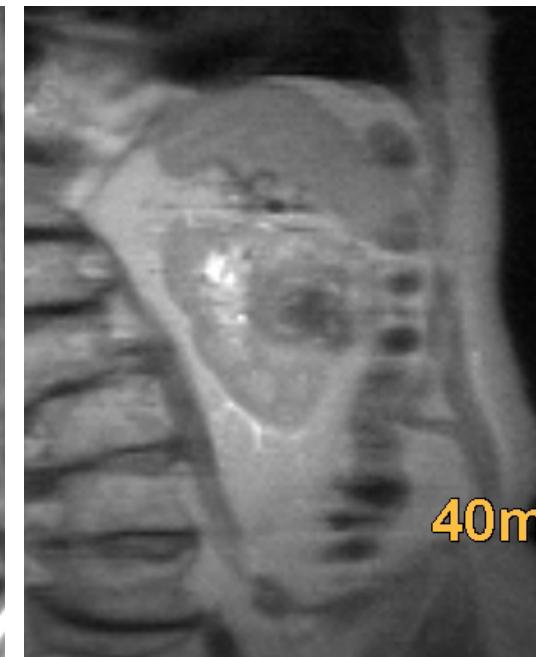
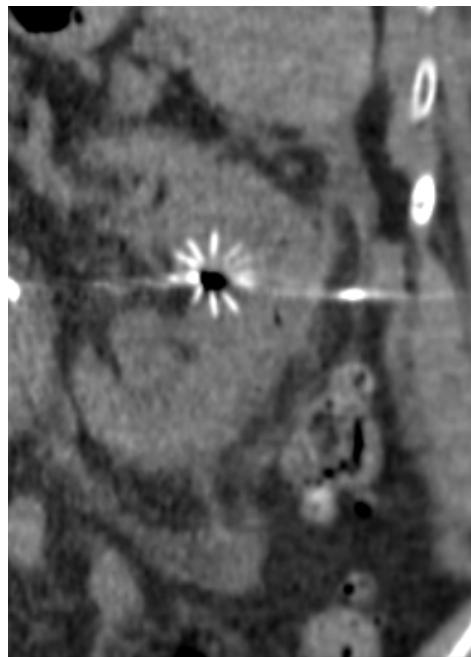


B.H. 83 y.o. f, compensated renal failure eGFR 42 ml/min/1.73m²

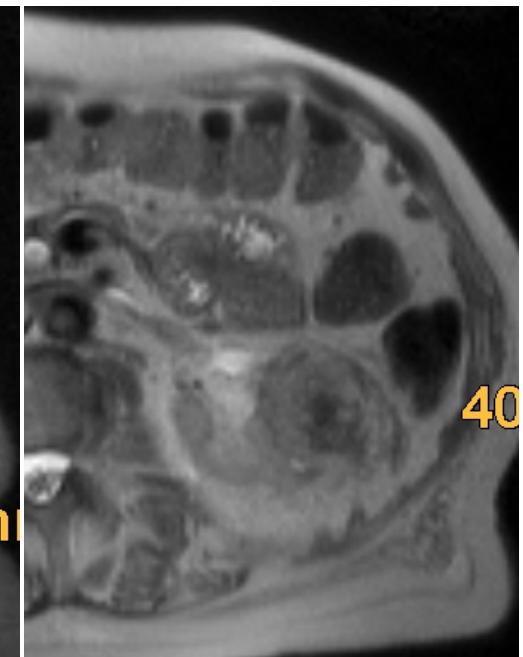
Was man behandeln sollte ...



4 cm LeVeen



8 weeks



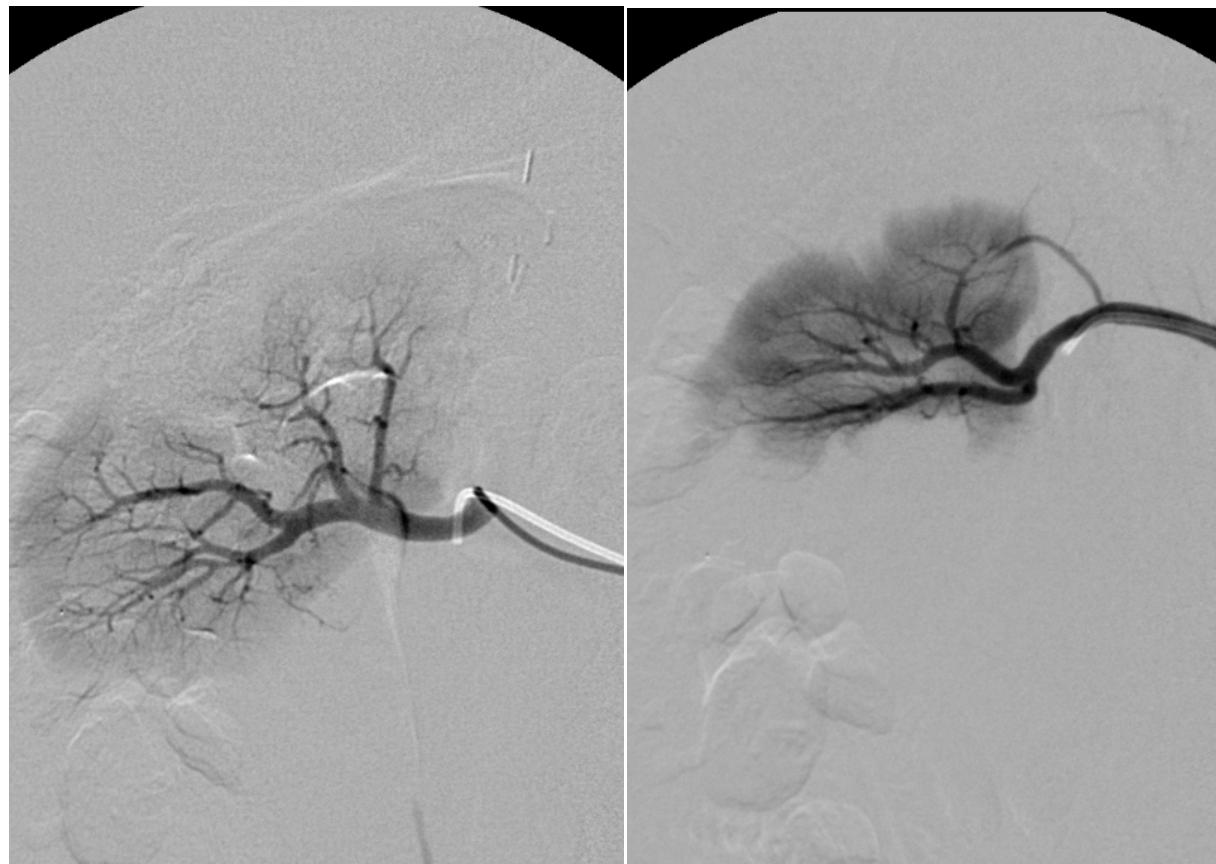
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Was man behandeln kann ...



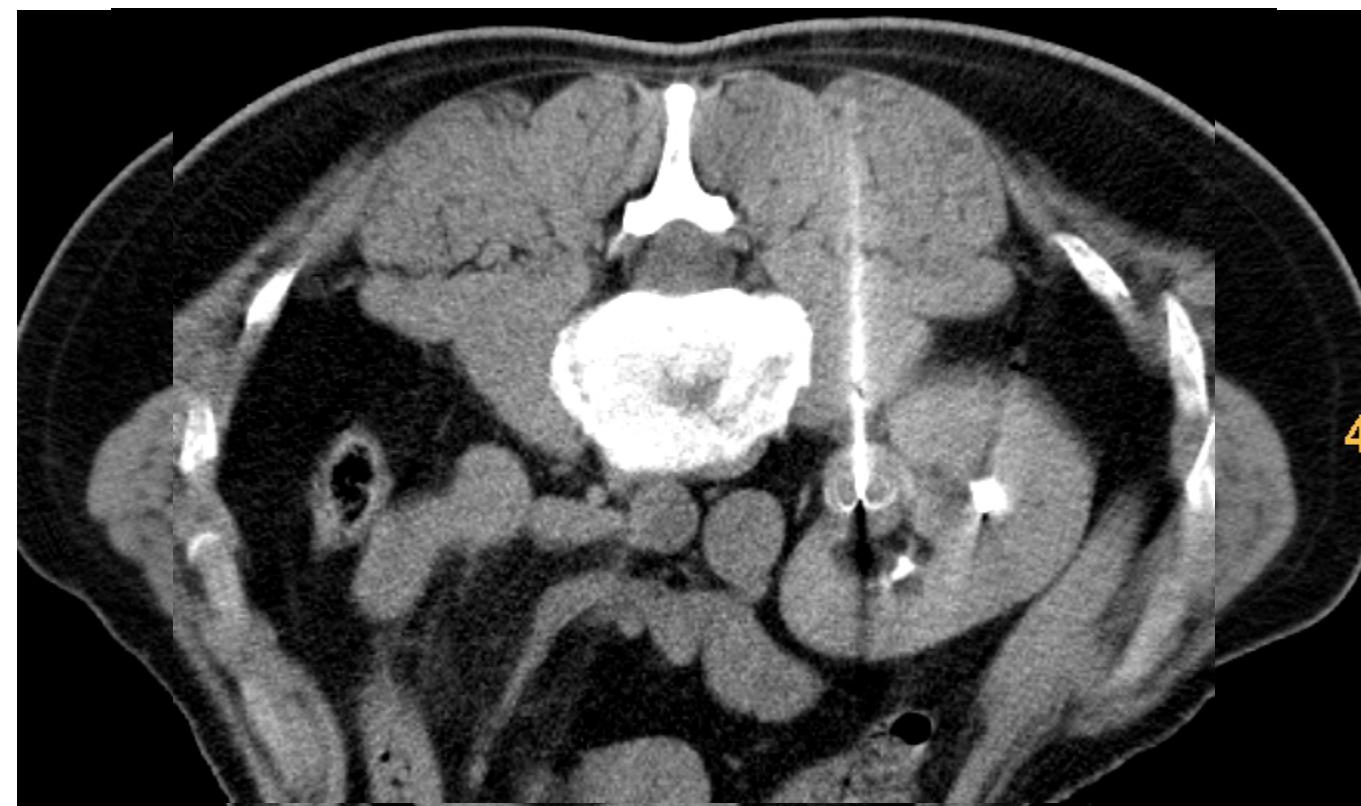
W.K. 49 y.o. male, nephrectomy left, pulm. metas, crea 1,7 mg/dl

Was man behandeln kann ...



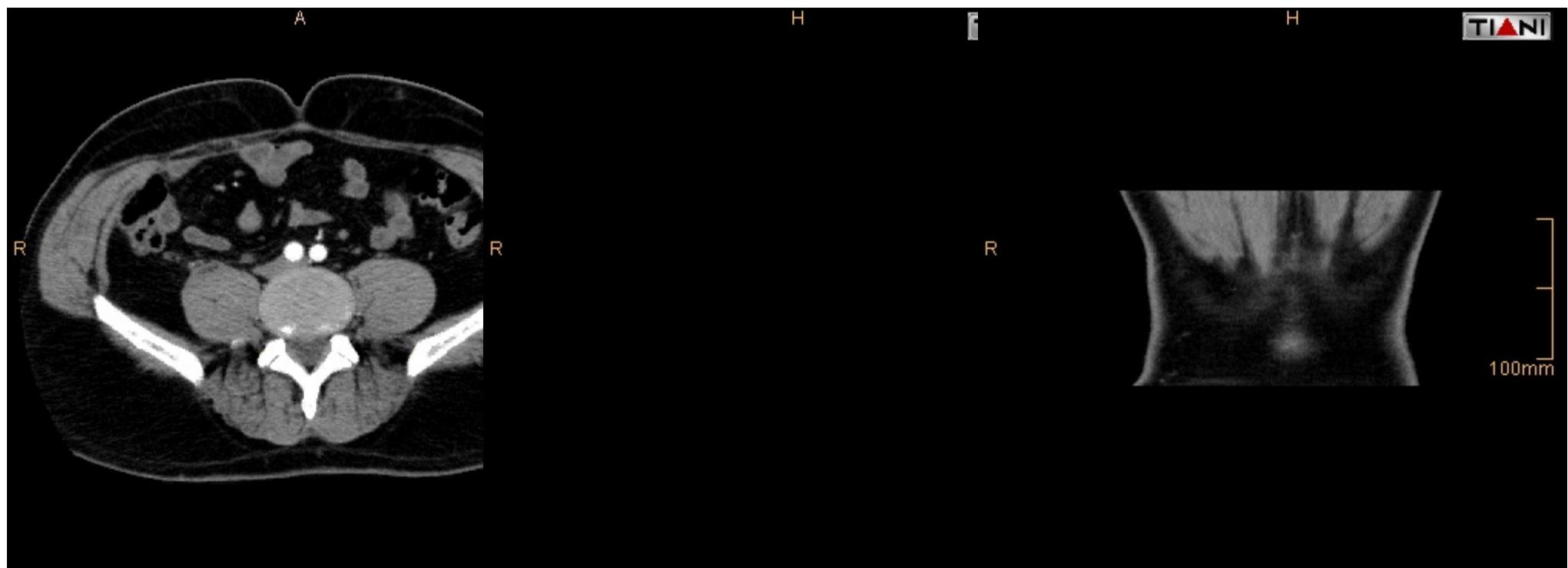
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Was man behandeln kann ...



W.K. 49 y.o. male, nephrectomy left, pulm. metas, crea 1,7 mg/dl

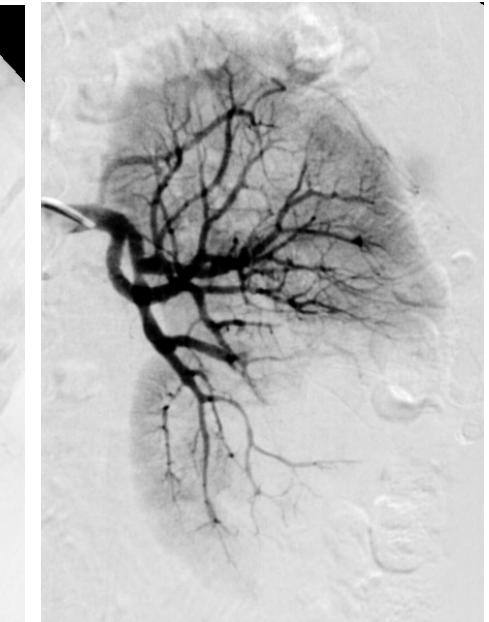
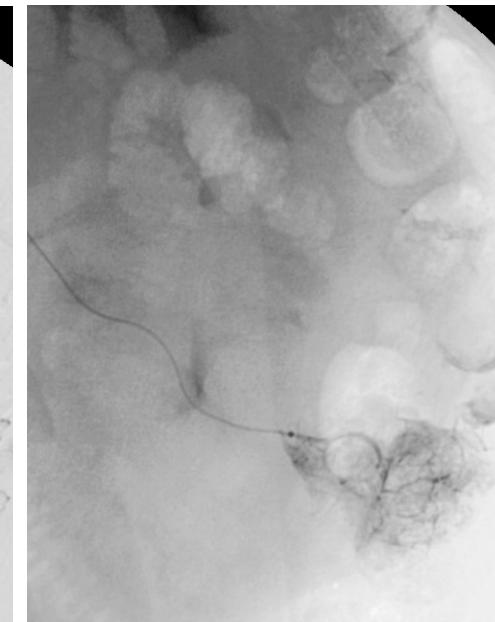
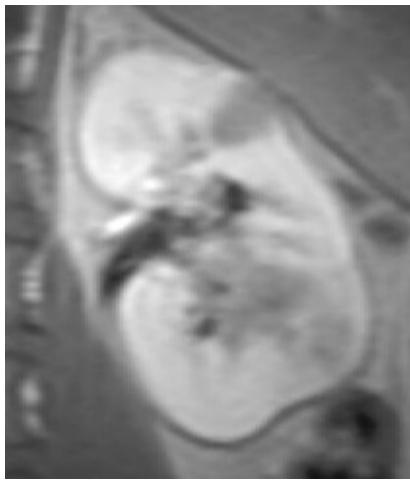
Was man behandeln kann ...



4 weeks after

W.K. 49 y.o. male, nephrectomy left, pulm. metas, crea 1,7 mg/dl

... was man nicht behandeln darf!

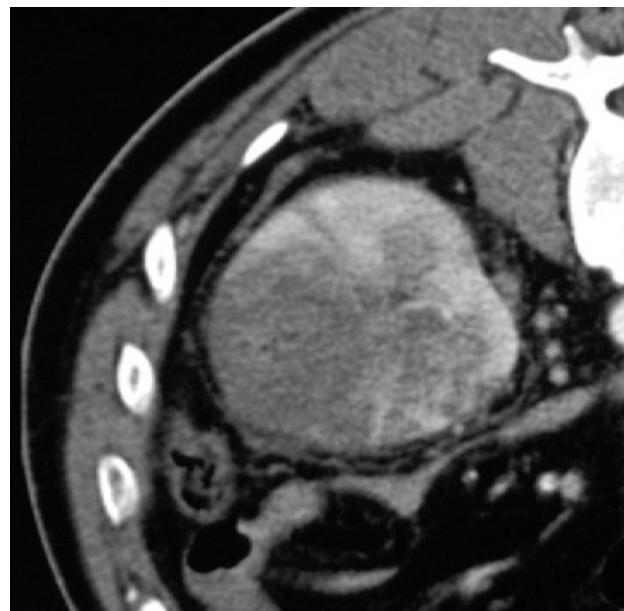


1.5 & 4 cm RCC, Mets.

superselektive embolisation

39 y.o. male

... was man nicht behandeln darf!



Ce CT, necrosis

39 y.o. male



infiltration of renal vein

No ablation!

Ergebnisse



Study	Design	comparative group(s)	No. of patients	No. of tumours	Mean tumour size	Exophytic	Parenchymal, central or mixed	Type of RFA	Follow-up, mo
Ganguli et al.	retrospective	NA	66	72	2.7	47	25	Percutaneous	1
Lucas et al.	retrospective comparative	RN or PN	RFA 86	NR	RFA 2.34	NR		NR	RFA 22.0
Weight et al.	retrospective comparative	LC	RFA 88	RFA 109	RFA 2.5	NR		Percutaneous	6
Wingo and Leveillee	Case series	NA	131	146	1.0–5.3	41	105	Percutaneous and laparoscopic	29
Bensalah et al.	retrospective comp	laparoscopic	RFA 38	NR	RFA 2.3	NR		Laparoscopic	RFA 15
Breen et al.	Case								16.7
Stern et al.	retro comp								RFA 30
Zagoria et al.	Case								13.8
Hegarty et al.	retro comp								RFA 12
Matin et al.	retro comp								24.2
Gervais et al.	retro								28
Matsumoto et al.	retrospective	NA	91	109	2.4	NR		Percutaneous and laparoscopic	19
Wah et al.	Controlled clinical trial	CG	RFA 17	RFA 11	3.1	NR		Percutaneous	
DiMarco et al	Case series	NA	66	91	2.0	53	38	NR	9.0

PubMed.gov research 9/12

Thermal ablation kidney	196
Cryoablation kidney	580
Radiofrequency ablation renal cell cancer	333
Cryoablation renal cell cancer	250
Microwave ablation renal cell cancer	24

Langzeitergebnisse

Study	TU/Pat	Mean FU	Mean TU size	Biopsy %	RCC %	Single Tr. success	3&5y rec.-free rate	3&5y CSS	3&5y OS
McDougal 2005	23/19	55	3.1	100%	87%	69%	n.a.	100%& 100%	64%& 55%
Levinson 2008	34/31	62	2.1	100%	51%	97%	90%@3 1 mo	100%@ 57 mo	58%@ 57 mo
Tracey 2010	243/208	27	2.4	93%	79%	93%	93%& 93%	95%& 99%	n.a.& 85%
Takaki 2010	51/51	34	2.4	n.a.	n.a.	82%	n.a.& 98%	100%& 100%	n.a.& 75%
Ferakis 2010	39/31	61	3.1	0%	n.a.	98%	92% &89%	n.a.	n.a.
Ji 2011	106/106	32	n.a.	100%	85%	98%	98%@ 32 mo	100%@ 32 mo	100%@ 32 mo

Autor/Jahr	Methode	Patienten	Mittl. Größe (cm)	TU-frei	Verlauf (Monate)
Uchida 95 [63]	perk. US	2	n.a.	2/2	7,5
Delworth 96 [12]	OP	2	5	2/2	1,5
Bishoff 99 [5]	lap.	8	2	8/8	7,7
Gill 00** [18]	lap.	32	2,3	31/32	16,2
Harada 01 [21]	perk. MRT	4	4	n.a.	n.a.
Rukstalis 01 [51]	OP	29	2,2	28/29	16

Kryotherapie

	Patients	Size	TU free	FU
	684	2.8 cm	98.7%	17.7 Mo.

Gill 05 [19]	lap	56	2,3	54/56	36
Hegarty 06 [22]	lap.	164	2,5	161/164	36
Schwartz 06 [55]	lap.	85	2,6	84/85	10
Miki 06 [41]	perk. MRT	13	<4,5	11/13	35
Permpongkosol 06 [48]	perk. CT	21	2,1	19/21	12,3
Atwell 07 [3]	per. CT/US	40	3,4	38/40	8
Weld 07 [65]	lap.	22 (31)*	2,1	21/22	36

alle/mittel **684** **2,8** **98,7%** **17,7**

Onkologische Ergebnisse

Gupta A, Raman JD, Leveillee RJ et al. General anesthesia and contrast-enhanced computed tomography to optimize renal percutaneous radiofrequency ablation: multi-institutional intermediate-term results. J. Endourol. 2009 Jul;23(7):1099-105

151 pat 163 masses mean FU 18 months (1.5-70)

1-5.4 cm (mean 2.3 cm)

70% were renal cell cancer

complete initial ablation in 97%

5/163 had viable tumor 3/5 endophytic

local recurrence 3.3%

metastases 1.3%

Overall 1-/3-year rec.-free survival 97% and 92%

Onkologische Ergebnisse

Lewinson AW, SU LM Agarwal et al.: Long-term oncological and overall outcomes of percutaneous frequency ablation in high risk surgical patients with a solitary small renal mass. J Urol. 2008 Aug;180(2):499-504

31 pat 34 RFA sessions

1.0 to 4.0 cm single rcc (median 2.0)

mean FU 61.6 mo (median 62.4, range 41 to 80).

3/31 recurrence (7, 13 & 31 mo)

rec. free overall survival rate 90.3%

metastasis free and cancer specific survival rate 100%

overall survival rate 71.0%

(9 pat died due to other deseases)

Onkologische Ergebnisse

Ji C. et al **Laparoscopic** radiofrequency ablation of renal tumors: 32 months
Mean follow-up results of 106 patients. Urology 2011 Jan epub ahead

106 pat.

0.9 to 5.5 cm tumors

all previous biopsy, in 84,9% RCC

Mean FU 32 mo. (12 to 48).

1/106 incomplete

1/106 resected, but no tumor

local tumor control 98.1% (104/106)

cancer free survival 97.8%

cancer specific and overall survival 100%

Ergebnisse bei Einzelnieren

Mylona 2009

24 RFA 18 Pat

single TU (range 1.0 to 7.0 cm)
in single kidneys

FU **31.2 mo** (range 12 - 72)

11% recurrence

tu < 3 cm no recurrence

eGFR without change!

Raman JD 2008

21 RFA 16 Pat

single TU 2.6 cm (range 1.1-4.0)
in single kidneys

FU **30.7 mo** (range 1.5-66.0)

11% recurrence

eGFR

pre 54.2 ml/min/1.73m²

last 47.5 ml/min/1.73m² ($p = 0.015$)

Nierenfunktion nicht verschlechtert

Stern JM et al. Radiofrequency ablation of small renal cortical tumours in healthy adults
Renal function preservation and intermediate oncological outcome
BJU. 2009; 104:786-789

63 Pat. (4 ASA I, 59 ASA II)*

1.0 to 4.0 cm single tumors (median 2.1)

89% previous core biopsy , in 75% RCC

mean FU 34 Mo. (1 to 80)

1/63 recurrence (55 mo. After RFA)

20% compensated renal insufficiency

eGFR pre RFA 76.3 mL/min/m²

post RFA 74.3 mL/min/m²

Kryo besser als RFA?

Kunkle DA, Uzzo RG: Cryoablation or radiofrequency ablation of the small renal mass: a meta-analysis. *Cancer.* 2008; 15:113

medline search:

47 studies (1375 TU)

cryoablation (86% lap.)

RFA (94% perc.)

no differences pat. age ($P = .17$)

lesion size ($P = .12$)

follow-up ($P = .53$)

need of 2. interv.

RFA >> Cryo (8.5% vs 1.3%; $P < .0001$)

recurrence

RFA >> Cryo (12.9% vs 5.2%; $P < .0001$)

Komplikationen sind selten

- Urinfistel → Drainage
 - Hämaturie → Ø
 - Hämatom / Blutung → Ø, Embolisation
 - Organschäden → vermeiden!

Summe aller Komplikationen < 5 %

Thermoablation kleiner NZK?

- atraumatisch
- mikroinvasiv
- funktionserhaltend
- klinisch sicher
- onkologisch effektive **tumor ablation**

Wenn nur die Urologen nicht wären



Vielen Dank!



Benedetta Bionichi

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