

Discrimination of papillary renal cell carcinoma from benign proteinaceous cyst based on iodine and water content on rapid kV-switching dual-energy CT

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Introduction

- Benign proteinaceous cysts (BPCs) are cysts complicated by hemorrhage and proteinaceous debris → no intervention or follow-up
- Overlapping features with solid renal masses on US, CT and MRI → differentiation from papillary RCC (pRCC) is very important
- Any renal lesion with an attenuation >20 HU on postcontrast CT is indeterminate and requires second examination to determine enhancement

Dual energy
CT(DECT)

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graph TD; A[Dual energy CT(DECT)] --> B[Virtual unenhanced]; A --> C[Iodine density];
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Virtual
unenhanced

Iodine
density

Aim

- To evaluate whether rapid kV-switching DECT (rsDECT) can discriminate between pRCC and BPC by identifying a threshold of enhancement on iodine maps
- Whether there is a difference in water content of a solid pRCC and BPC

Materials and methods

Study population

- Retrospective (December 2015 and March 2018)
- Patients with BPC and histopathologically-proven pRCC who underwent rsDECT imaging.
- BPCs → stability in size for at least 2 years or purely cystic appearance on US
- Cysts <10 mm were excluded

Materials and methods

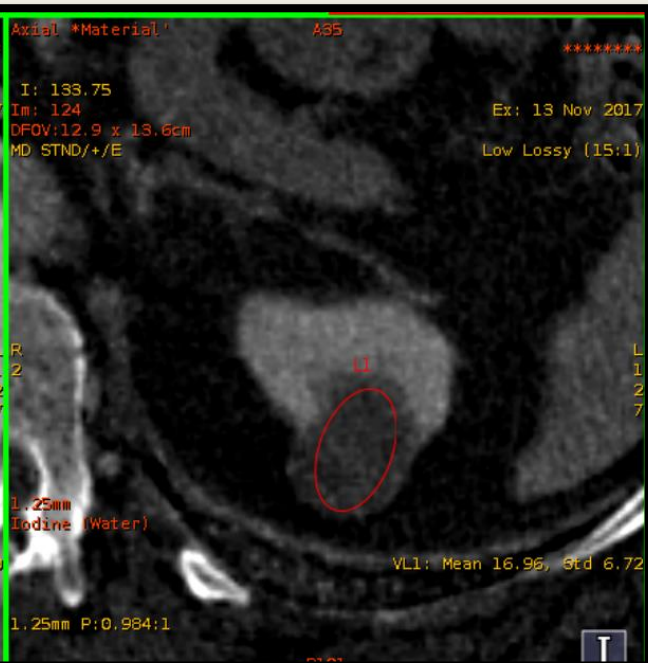
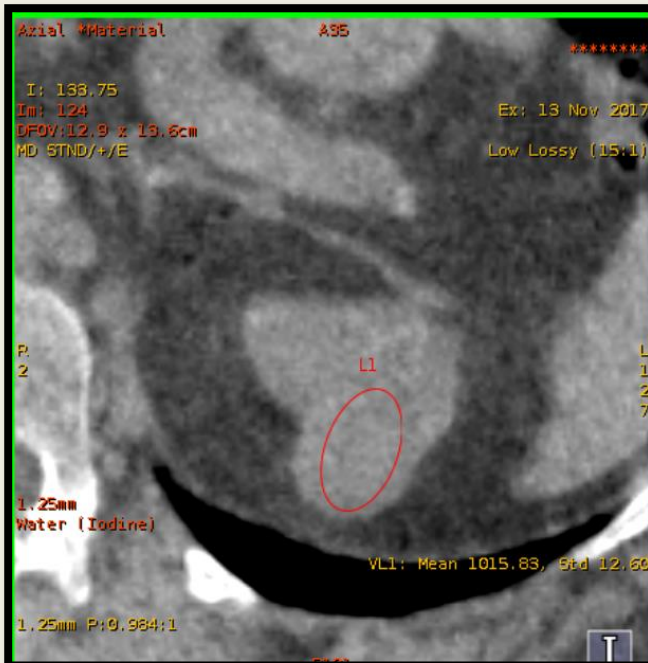
Image acquisition

- rsDECT 64-detector MDCT scanner (Discovery CT750 HD, GE Healthcare, USA)
- pRCCs → Nephrographic phase DECT (90 s)
- BPCs → Portal or nephrographic phase DECT (70-90 s)

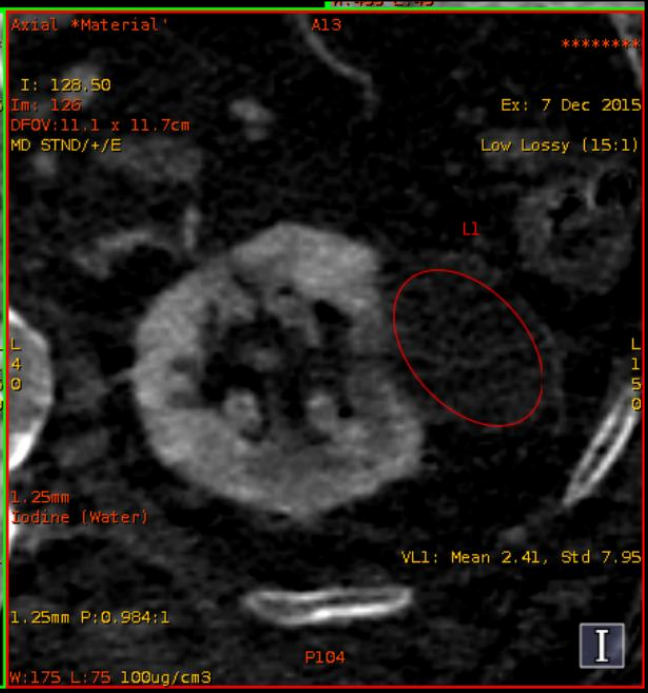
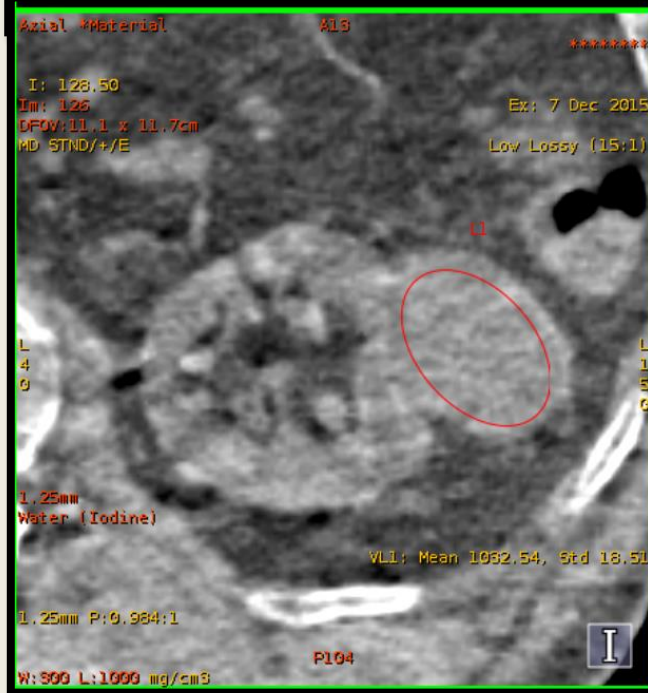
Materials and methods

Image analysis

- Gemstone Spectral Imaging Volume Viewer (GSI, AW Server; GE Medical Systems)
- Board certified radiologist, 4 years of experience in abdominal radiology



pRCC



BPC

Results

Variable	Papillary RCC (n=16)	Benign proteinaceous cyst (n=30)
Gender	2F, 14M	5F, 24M
Mean lesion size	41.5 mm	14 mm

Mean material content (mg/ml)	pRCC	BPC	p value
Iodine	1,96	0,91	<0.001
Water	1022	1013	0.014

Results

Variable	AUC	p	Cut-off (mg/ml)	Sensitivity	Specificity	PPV	NPV
Iodine content	0,941	<0,001	1,27	93%	78%	87%	87%
Water content	0.64	0.1					

Discussion

- First study to compare water content between pRCC and BPC
- Only one study in the literature with rsDECT by Zarzour JG et al, 2017. → 12 pap RCCs, 25 BPCs, iodine threshold of 1,28 mg/ml
- Variable results with dsDECT, different platforms provide different results and not comparable to each other

Limitations

- Retrospective nature
- Small sample size
- No histopathological diagnoses for BPCs

Conclusions

- An iodine content threshold of 1,27 mg/ml accurately differentiates pRCC from BPC on rsDECT.
- The difference in water content of these lesions does not seem to have a discriminative power.

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