

Renal Lesion 2017 (ACR guidance for incidentally detected renal cysts or masses identified on CT)

This module reflects updated recommendations for managing incidentally-detected renal cysts and masses (from an article published in JACR in February, 2018, updated from 2010). Factors affecting recommendations include size, attenuation and enhancement, homogeneity, complexity and growth. The increased role of biopsy since the prior white paper is addressed. Follow-up regimens and the type of further examinations are discussed. Five inter-related flowcharts are now used, to account for incidental findings detected on scans without and with IV contrast, for various features and for both cystic and solid masses. The module provides guidance primarily for initial follow-up. Recommendations for subsequent follow-up or intervention require reference to the article.

Reference:

- Herts BR, et al. Management of the Incidental Renal Mass on CT: A White Paper of the ACR Incidental Findings Committee. J Am Coll Radiol. 2018 Feb;15(2):264-273. (Updated from JACR 2010;7:754-773.)

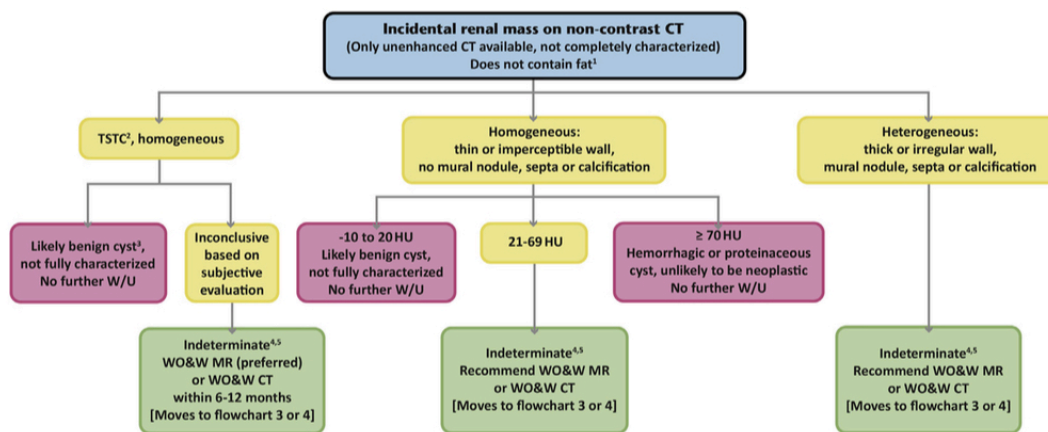


Fig 1. Flowchart for managing an incidental renal mass on noncontrast CT. ¹If the mass contains fat attenuation (a region of interest < -10 HU), refer to Figure 5. ²Too small to characterize. ³Well-circumscribed and homogeneous TSTC renal masses that are visually much lower or much higher than the unenhanced renal parenchyma are probably benign cystic lesions. ⁴MRI is preferred for characterizing smaller masses (<1.5 cm) and for detecting enhancement in suspected hypovascular masses. Ultrasound may be able to characterize a homogeneous hyperattenuating renal mass as a hemorrhagic or proteinaceous cyst. ⁵If old images are available, any renal mass that has been without change in imaging features *and* has had an average growth of ≤ 3 mm per year for at least 5 years is likely of no clinical significance and does not need further workup. HU = Hounsfield unit; TSTC = too small to characterize; WO&W = without and with; W/U = work-up.

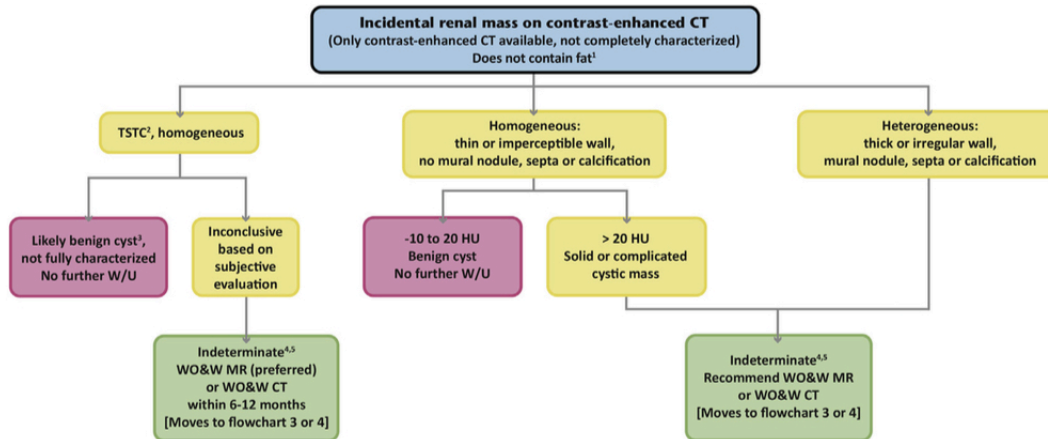


Fig 2. Flowchart for managing an incidental renal mass on contrast-enhanced CT. ¹If the mass contains fat attenuation (a region of interest < -10 HU), refer to Figure 5. ²Too small to characterize. ³Well-circumscribed and homogeneous TSTC renal masses that are visually much lower than the enhanced renal parenchyma are probably benign cystic lesions. ⁴MRI is preferred for characterizing smaller masses (<1.5 cm) and for detecting enhancement in suspected hypovascular masses. Ultrasound may be able to characterize a homogeneous renal mass as a hemorrhagic or proteinaceous cyst. ⁵If old images are available, any renal mass that has been without change in imaging features *and* has had an average growth of ≤3 mm per year for at least 5 years is likely of no clinical significance and does not need further workup. HU = Hounsfield unit; TSTC = too small to characterize; WO&W = without and with; W/U = work-up.

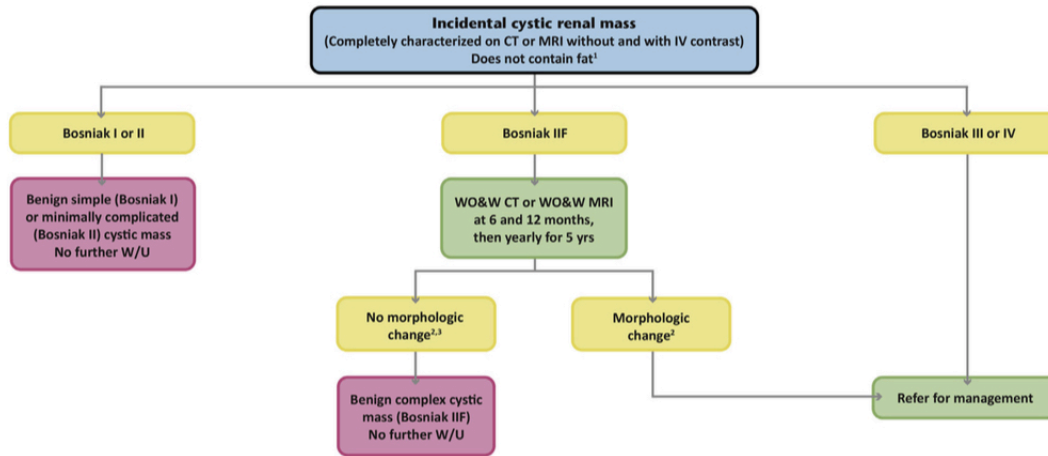


Fig 3. Flowchart for managing a cystic renal mass on CT or MRI performed both without and with IV contrast. ¹If the mass contains fat attenuation (a region of interest < -10 HU), refer to [Figure 5](#). ²Morphologic change includes increasing number of septa, thickening of the wall or septa, or development of a solid nodular component (including reclassification as Bosniak III or IV). Growth of a cystic mass without morphologic change is not indicative of malignancy. ³A Bosniak IIF cystic renal mass without change in imaging features for at least 5 years is considered stable and likely of no clinical significance. HU = Hounsfield unit; IV = intravenous; WO&W = without and with; W/U = work-up.

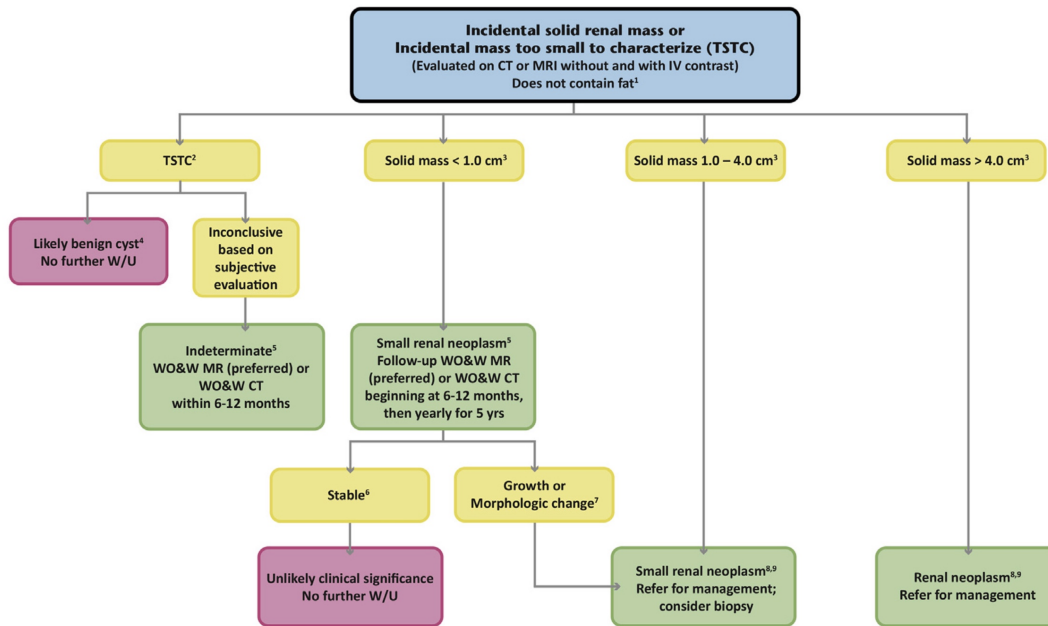


Fig 4. Flowchart for managing for a completely characterized solid renal mass or renal mass too small to characterize on CT or MRI performed both without and with IV contrast. ¹If the mass contains fat attenuation (a region of interest < -10 HU), refer to Figure 5. ²Too small to characterize. ³Size = largest diameter in any plane, follows TNM version 7 staging criteria. ⁴Well-circumscribed TSTC renal masses, either calcified or noncalcified but that are otherwise homogeneous and either visually much lower than the renal parenchyma on any phase or much higher than the unenhanced renal parenchyma, are probably benign cystic lesions that do not need further evaluation. ⁵MRI is preferred for characterizing smaller renal masses (<1.5 cm) and for detecting enhancement in suspected hypovascular masses. ⁶A renal mass without change in imaging features *and* with an average growth of ≤3 mm per year for at least 5 years is considered stable and likely of no clinical significance. ⁷Growth is defined as ≥4 mm per year average; morphologic change is any change in heterogeneity, such as a change in contour, attenuation, or number of septa. ⁸Consider biopsy, especially if hyperattenuating on unenhanced CT, or hypointense on T2WI MRI, because these are suggestive of a fat-poor angiomyolipoma. ⁹If a pathologic diagnosis is desired to determine management but biopsy is technically challenging, or there is another relative contraindication to biopsy, consider MRI to assess the signal intensity on T2WI. Fat-poor angiomyolipoma and papillary renal cell carcinoma may be hypointense on T2WI in contrast to clear cell renal cell carcinoma, which is typically heterogeneous and mildly hyperintense on T2WI. HU = Hounsfield unit; IV = intravenous; T2WI = T2-weighted imaging; WO&W = without and with; W/U = work-up.

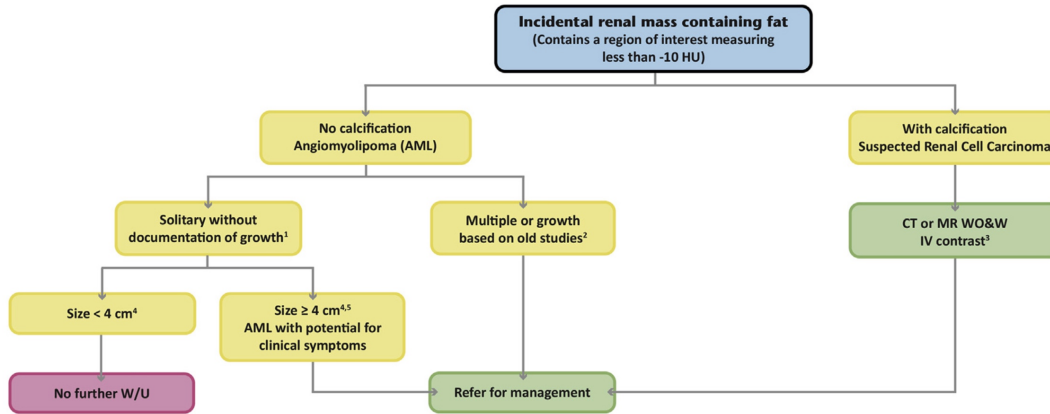


Fig 5. Flowchart for managing an incidental renal mass with a region of interest measuring fat attenuation (less than -10 HU). ¹Incidental sporadic AML (ie, no hematuria, flank pain, or perilesional hemorrhage.) ²Many urologists will follow patients with small AMLs that are rapidly growing and some patients with multiple AMLs may benefit from an evaluation for tuberous sclerosis complex. ³If only an unenhanced CT has been performed, consider CT or MR without and with IV contrast. ⁴Patients with symptomatic AMLs (hematuria, flank pain, spontaneous bleeding) should be referred to urology regardless of size. ⁵AML ≥ 4 cm or those with aneurysms greater than 0.5 cm should be referred for prophylactic treatment. AML = angiomyolipoma; HU = Hounsfield unit; IV = intravenous; WO&W = without and with; W/U = work-up.

Table 1. Features that indicate heterogeneity in a renal mass

| Feature |
|---|
| Wall thickening |
| One or more septa |
| Mural nodule(s) |
| Measurable or visible attenuation differences |
| Calcification |

Table 2. Bosniak renal cyst classification system

| Bosniak Classification | Description |
|------------------------|---|
| I | Benign simple cyst with a hairline thin wall without septa, calcification, or solid component. Homogeneous near-water attenuation density (−10 to 20 HU) without enhancement. |
| II | Benign minimally complicated cyst that may contain a few hairline thin septa that may have “perceived” but not measurable enhancement. Fine calcification or a segment of slightly thickened calcification may be present in the wall or septa. Also, a well-marginated nonenhancing homogeneous mass < 3 cm with density above simple fluid attenuation (hyperdense cyst). |
| IIIF | Usually benign complicated renal cyst with multiple hairline thin septa or minimal smooth thickening of the wall or septa. Wall or septa may contain thick and nodular calcification and may have “perceived” but not measurable enhancement. Also, a well-marginated intrarenal nonenhancing mass > 3 cm with density above simple fluid. |
| III | Indeterminate complicated cystic renal mass with thickened irregular walls or septa that have measurable enhancement. |
| IV | Malignant cystic renal mass with enhancing soft tissue components (cystic renal cell carcinoma). |

Table 3. CT and MRI criteria for defining enhancement in a renal mass

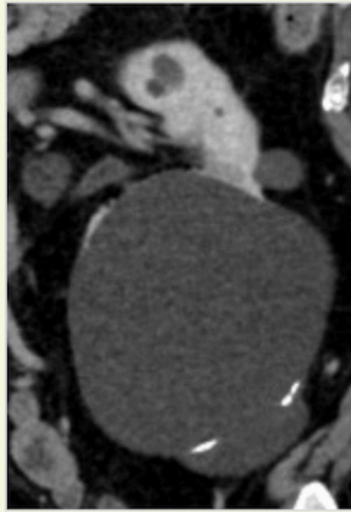
| CT Criteria: Increase in Attenuation After Contrast | |
|---|--|
| ≥20 HU | Definite for enhancement |
| >10 to < 20 HU | Equivocal for enhancement; consider factors related to beam hardening, intra-renal location* |
| ≤10 HU | No enhancement |
| MRI criteria for enhancement | |
| ≥15% increase in signal intensity after contrast | Enhancing lesion |
| Alternative method | Visible signal intensity on subtraction images |

HU = Hounsfield units.

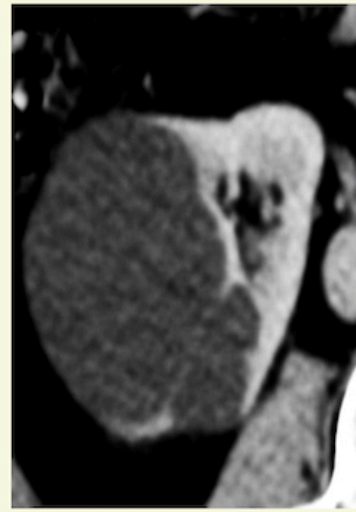
*Stricter criteria (15 HU) should be used as a cutoff for enhancement of exophytic or larger lesions not prone to these factors.



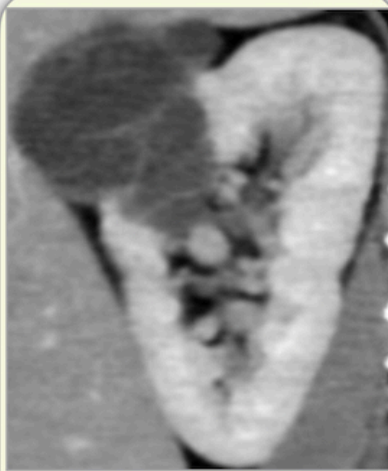
Septa: a few hairline septa without measurable enhancement



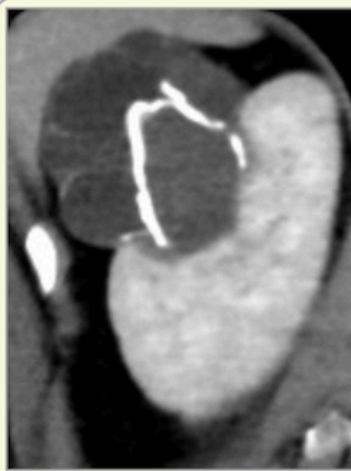
Calcification: fine or slightly thickened in the wall or septa



Septa/Wall: minimal smooth thickening, without measurable enhancement



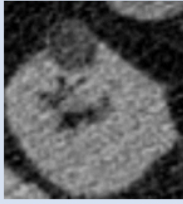
Septa: multiple thin septa



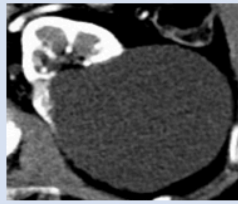
Calcification: thick, nodular in the wall or septa



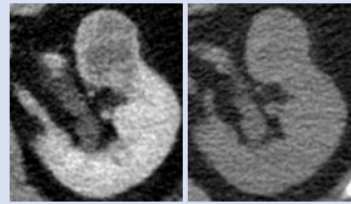
Septa/Wall: thick irregular, measurable enhancement



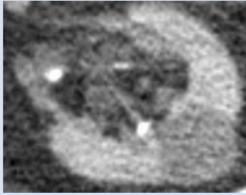
Contains fat (< -10 HU)



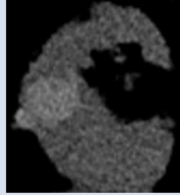
Cystic on I+ and I- (-10 to 20 HU)



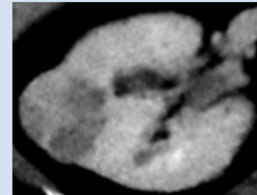
Solid on I+ and I-



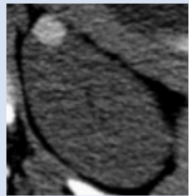
Solid on I+ (> 20 HU)



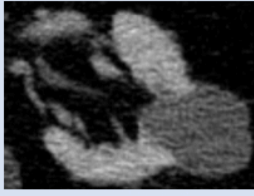
Indeterminate on I- (21-69 HU)



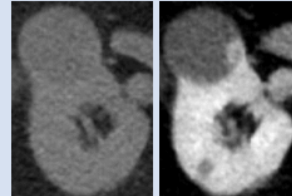
Heterogeneous on I+ or I- only



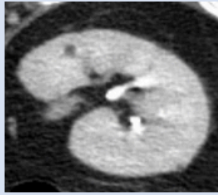
Hyperdense on I- (≥ 70 HU)



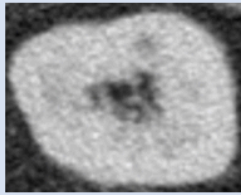
Hyperdense well marginated non enhancing



Enhancing solid components



Too small too characterize – Likely benign



Too small too characterize - Inconclusive

