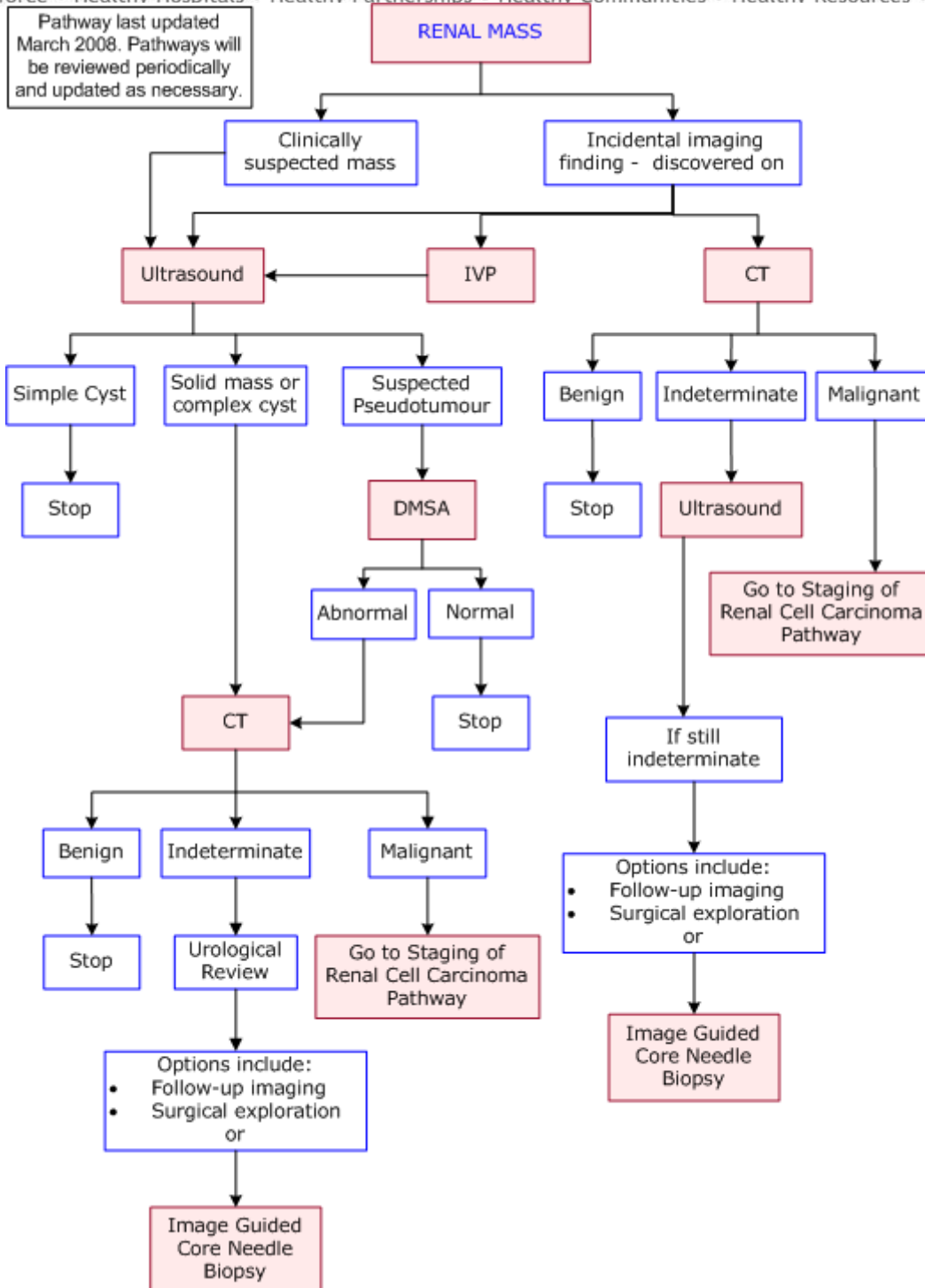




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ULTRASOUND

- Initial imaging modality of choice for evaluation of renal mass. [1-3](#)
- ~80% sensitivity for detection of renal parenchymal masses. [4](#)
- Most cost-effective study for evaluation and characterisation of a benign cyst. [3](#)



- US criteria for a simple benign cyst are: [2](#)
 - Spherical or ovoid shape.
 - Anechoic.
 - Sharply defined back wall.
 - Enhancement of through sound transmission.
- When the ultrasound criteria for a simple cyst are met, the likelihood of malignancy is extremely low. Hence asymptomatic patients with incidental renal cysts do not require additional evaluation. [1,2](#)
- Advantages: [3](#)
 - No exposure to ionising radiation.
 - Does not require use of contrast material.
 - Relatively inexpensive.
- Limitations: less accurate than CT for revealing small renal masses. [5](#)

INTRAVENOUS PYELOGRAPHY

- Moderate sensitivity (~67%) for detection of renal masses. [4](#)
- Limitations: poorly characterises lesions as benign. [4](#)
- Disadvantages: exposure to ionising radiation and use of contrast material with potential risk of complications.

COMPUTED TOMOGRAPHY

- "Gold standard" for evaluation of renal masses. [1,2](#)
- > 90% sensitivity for identifying small renal cell carcinomas. [6](#)
- Superior to US for detection and characterisation of renal masses. [4,5](#)
- Used to clarify all the hypoechoic masses or complex cysts that do not fulfil the sonographic criteria for a simple cyst. [1](#)
- Enables detection of small amounts of fat that identifies benign angiomyolipoma. [7](#)
- Bosniak classification of cystic renal masses: [2,8,9,21](#)
 - Class I: simple benign cysts (round/oval, nonenhancing, unilocular) - require no further evaluation.
 - Class II: benign simple cystic lesions that are minimally complicated (a few thin septa, fine calcification or a short segment of slightly thickened calcification in the wall or septa; nonenhancing lesions <3cm with uniform high attenuation and well defined margins) - require no further evaluation.





- Class IIF (F for follow-up): cysts that may contain multiple hairline thin septa or minimal smooth wall thickening of their wall or septa. Cyst might contain calcification that might be nodular and thick but there is no contrast enhancement. Uniformly high-attenuation lesions of >3 cm. Lesions are thought to be benign, but require follow up CT to show their stability over time and thus prove their benignity.
- Class III: more complicated cystic lesions (some malignant features: thick, irregular borders, irregular calcifications, multilocular, thickened septa) - consider fine needle aspiration biopsy.
- Class IV: clearly malignant cystic masses (thickened walls, heterogeneous, shaggy, enhancing) - surgery.
- Magnetic resonance imaging, with a comparable accuracy, is an alternative if CT cannot be performed because of contrast media reaction or renal insufficiency. [10,11](#)

DMSA SCAN

- Use limited to evaluation of "pseudotumours" caused by normal renal tissue eg column of Bertin, seen on IVP or US. [8](#)

PERCUTANEOUS IMAGE GUIDED CORE NEEDLE BIOPSY

- Image guided biopsy is useful for:
 - Evaluation of "indeterminate" renal masses on imaging studies. [12,13](#)
 - Distinguishing solitary metastases from a primary renal lesion. [13,14](#)
- Limitations:
 - Significant rate (0-23%) of non diagnostic results. [12-20](#)
 - Rarely complicated by haemorrhage and very rarely pneumothorax.
 - Needle track seeding is possible but less common than previously thought. Needle seeding caused by core needle biopsy has not been reported in the literature. [13,15-20](#)
- Recent retrospective studies using 18 gauge core needle biopsies have shown better results than previous studies using fine-needle aspiration techniques. Sensitivities and specificities for determining surgery as high as 100% have been reported. [13,15-20](#)

REFERENCES

1. Zagoria RJ. Imaging of small renal masses: a medical success story. AJR 2000;175:945-55.
2. Higgins JC, Fitzgerald JM. Evaluation of incidental renal and adrenal masses. American Family Physician 2001;63:288-94.





3. Einstein DM, Hens BR, Weaver R, Obuchowski N, Zepp R, Singer A. Evaluation of renal masses detected by excretory urography: cost-effectiveness of sonography versus CT. *AJR* 1995;164:371-5. (Level II evidence). [Click here to view reference](#)
4. Warshauer DM, McCarthy SM, Street L, et al. Detection of renal masses: sensitivities and specificities of excretory urography/linear tomography, US and CT. *Radiology* 1988;169:363-5. (Level II evidence). [Click here to view reference](#)
5. Jamis-Dow CA, Choyke PL, Jennings SB, Linehan WM, Thakore KN, Walther MM. Small (< 3-cm) renal masses: detection with CT versus US and pathologic correlation. *Radiology* 1996;198:785-8. (Level II evidence). [Click here to view reference](#)
6. Amendola MA, Bree RL, Pollack HM, et al. Small renal cell carcinomas: resolving a diagnostic dilemma. *Radiology* 1988;166:637-41. (Level IV evidence)
7. Bosniak MA, Megibow AJ, Hulnick DH, et al. CT diagnosis of renal angiomyolipoma: the importance of detecting small amounts of fat. *AJR* 1988;151:497-501. (Level IV evidence)
8. Bosniak M. The small (< 3.0 cm) renal parenchymal tumor: detection, diagnosis, and controversies. *Radiology* 1991;179:307-17.
9. Wolf JS. Evaluation and management of solid and cystic renal masses. *J Urol* 1998;159:1120-33.
10. Kreft BP, Muller-Miny H, Sommer T, et al. Diagnostic value of MR imaging in comparison to CT in the detection and differential diagnosis of renal masses: ROC analysis. *European Radiology* 1997;7(4):542-54. (Level III evidence)
11. Semelka RC, Shoenut JP, Kroeker MA, MacMahon RG, Greenberg HM. Renal lesions: controlled comparison between CT and 1.5-T MR imaging with nonenhanced and gadolinium-enhanced fat suppressed spin-echo and breath-hold FLASH techniques. *Radiology* 1992;182:425-30. (Level II/III evidence)
12. Richter F, Kasabian NG, Irwin RJ Jr, et al. Accuracy of diagnosis of guided biopsy of renal mass lesions classified indeterminate by imaging studies. *Urology* 2000;55:348-52. (Level II/III evidence)
13. Wood BJ, Khan MA, McGovern F, Harisinghani M, Hahn PF, Mueller PR. Imaging guided biopsy of renal masses: indications, accuracy and impact on clinical management. *J Urol* 1999;161:1470-4. (Level III evidence)
14. Niceforo J, Coughlin BE. Diagnosis of renal cell carcinoma: value of fine-needle aspiration cytology in patients with metastases or contraindications to nephrectomy. *AJR* 1993;161:1303-5. (Level III evidence).
15. Eshed I, Elias S, Sidi AA. Diagnostic value of CT-guided biopsy of indeterminate renal masses. *Clin Radiol* 2004; 59:262-267. (Level III evidence)
16. Shah RB, Bakshi N, Hafez KS, Wood DP, Kunji LP. Image-guided biopsy in the evaluation of renal mass lesions in contemporary urological practice: indications, adequacy, clinical impact, and limitations of the pathological diagnosis. *Hum Pathol* 2005; 36:1309-1315. (Level III evidence)





17. Hara I, Miyake H, Hara S, Arakawa S, Hanioke K, Kamidono S. **Role of percutaneous image-guided biopsy in the evaluation of renal masses.** Urol Int 2001; 67:199-202. (Level III evidence)
18. Caoili EM, Bude RO, Higgins EJ, Hoff DL, Nghiem HV. **Evaluation of sonographically guided percutaneous core biopsy of renal masses.** AJR 2002; 179:373-378. (Level III evidence)
19. Lechevallier E, Andre M, Barroil D et al. **Fine-needle percutaneous biopsy of renal masses with helical CT guidance.** Radiology 2000; 216:506-510. (Level III evidence)
20. Harisinghani MG, Maher MM, Gervais DA et al. **Incidence of malignancy in complex cystic renal masses (Bosniak category III): should imaging-guided biopsy precede surgery?** AJR 2003; 180:755-758. (Level III evidence)
21. Israel GM, Bosniak MA. **An update of the Bosniak renal cyst classification system.** Urology 2005;66:484-8.

FURTHER READING

1. Fowler C, Reznick RH. **The indeterminate renal mass.** Imaging 2001;13:27-43.
2. Zagoria RJ, Dyer RB. **The small renal mass: detection, characterization, and management.** Abdom Imaging 1998;23:256-65

Website

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