

Appendix 2. Urologic Imaging Modalities and Diagnostic Tests

Test	Benefits	Drawbacks	Use or indication
Cytology	non-invasive test to detect urothelial malignancy	Relatively insensitive (66–79%) for bladder cancer but very specific (95–100%) for urothelial cancer (low-stage, low-grade tumours often only diagnosed on cystoscopy) Detects most high-grade tumours and carcinoma <i>in situ</i> , especially if repeated	Indicated in all high-risk patients in conjunction with adequate upper tract imaging Either cytology or cystoscopy indicated in low-risk patients; positive cytology should be confirmed by cystoscopy
Cystoscopy	Best modality to identify abnormalities in bladder	Cost, discomfort, infection, availability, etc.	Indicated in all high-risk patients in conjunction with adequate upper tract imaging Either cystoscopy or cytology indicated in low-risk patients
CT	Preferred test for detecting solid renal masses: detection rate comparable to MRI, but more widely available and less expensive Best modality for evaluating stones, renal and perirenal infections and complications Non-contrast CT usually followed by contrast CT Highest efficacy for range of underlying pathologies; shortens diagnostic workup; more sensitive and specific than IVU for microscopic hematuria	High cost and limited availability in some areas Contrast-enhanced CT: potential allergic or nephrotoxic reactions to the contrast	Has replaced IVU and US in some regions as primary urologic imaging modality for hematuria; indicated in both high-risk and low-risk individuals as initial imaging
US	Inexpensive and safe Identifies more than 90% of upper urinary tract pathologies Detects solid masses >3 cm and hydronephrosis	May miss small solid lesions (<3 cm); for 2–3 cm lesions, sensitivity 82%, specificity 91% Often require follow-up imaging; therefore cannot be considered cost saving	Excellent to characterize renal cysts
IVU	Identifies more than 90% of upper urinary tract pathologies Detects transitional cell carcinoma of kidney or ureter in masses >3 cm Widely available and cost-efficient	May miss small lesions (<3 cm); for 2–3 cm lesions, sensitivity 52%, specificity 82% (confirmed by CT); sensitivity 67% for ureteral stones Cannot distinguish masses from cysts Potential allergic or nephrotoxic reactions to the contrast	Best way of identifying <i>specific</i> anatomic features of the upper urinary tract
Tumour markers	More sensitive than cytology to identify bladder cancer	Relatively nonspecific; role in screening and diagnosis of malignancy undefined	Unknown

CT: Computed tomography; **IVU:** Intravenous urography; **US:** ultrasound

Sources:

Cohen RA, Brown RS. Clinical practice. Microscopic hematuria. *N Engl J Med* 2003; 348(23):2330-2338 PM:12788998
 House AA, Cattran DC. Nephrology: 2. Evaluation of asymptomatic hematuria and proteinuria in adult primary care. *CMAJ* 2002; 166(3):348-353 PM:11868646
 Yun EJ, Meng MV, Carroll PR. Evaluation of the patient with hematuria. *Med Clin North Am* 2004; 88(2):329-343 PM:15049581
 Grossfeld GD, Wolf JS, Jr., Litwan MS, Hricak H, Shuler CL, Agerter DC et al. Asymptomatic microscopic hematuria in adults: summary of the AUA best practice policy recommendations. *Am Fam Physician* 2001; 63(6):1145-1154 PM:11277551
 Fatica R, Fowler A. Nephrology. Office Evaluation of Hematuria. *Disease Management Project*. The Cleveland Clinic, 2003.
 McDonald MM, Swagerty D, Wetzel L. Assessment of microscopic hematuria in adults. *Am Fam Physician* 2006; 73(10):1748-1754 PM:16734050

