Urology CHEAT SHEETS

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EAU Guidelines on Urolithiasis

Epidemiology, aetiology, classification and diagnosis

EPIDEMIOLOGY, AETIOLOGY, CLASSIFICATIONS:

Stone incidence depends on geographical, climatic, ethnic, dietary and genetic factors. The recurrence risk is determined by the disease or disorder causing the stone formation. Prevalence rates vary from 1% to 20%. Emerging evidence linking nephrolithiasis to the risk of chronic kidney disease.

Urinary stones can be classified according to aetiology of stone formation, stone composition (mineralogy), stone size, stone location, and X-ray characteristics of the stone.

Stones classified by aetiology:

1. **Non-infection stones.** Calcium oxalate, calcium phosphate, uric acid
2. **Infection stones.** Magnesium ammonium phosphate, Carbonate apatite, Ammonium urate
3. **Genetic causes.** Cystine, Xanthine, 2,8-Dihydroxyadenine
4. **Drug stones.**

Stone composition is the basis for further diagnostic and management decisions. Stones are often formed from a mixture of substances.

Stone classified by X-ray characteristics:

Radiopaque	Poor radiopacity	Radiolucent
Calcium oxalate dehydrate	Magnesium ammonium phosphate	Uric acid
Calcium oxalate monohydrate	Apatite	Ammonium urate
Calcium phosphates	Cystine	Xanthine
		2,8-Dihydroxyadenine
		Drug-stones (Section 4.11)

RISK OF RECURRENCE:

The risk status of stone formers is of particular interest because it defines the probability of recurrence or regrowth, and is imperative for pharmacological treatment. About 50% of recurrent stone formers have just one lifetime recurrence.

High-risk stone formers:

-General factors: Early onset of urolithiasis, familial stone formation, brushite stones, uric acid and urate stones, infection stones.
-Diseases associated with stone formation: Hyperparathyroidism, metabolic syndrome, nephrocalcinosis, polycystic kidney disease, gastrointestinal diseases, increased levels of vitamin D, sarcoidosis, spinal cord injury, neurogenic bladder.
- Genetically determined stone formation: Cystinuria, primary hyperoxaluria, renal tubular acidosis type I, 2,8-Dihydroxyadeninuria, xanthinuria, lesch-Nyhan syndrome, cystic fibrosis.
-Drug-induced stone formation
-Anatomical abnormalities associated with stone formation: Medullary sponge kidney, ureteropelvic junction obstruction, calyceal diverticulum, calyceal cyst, ureteral stricture, vesico-uretero-renal reflux, horseshoe kidney, ureterocele.

DIAGNOSTIC EVALUATION:

Diagnostic imaging:

Summary of evidence	LE
Non-contrast-enhanced CT is used to confirm stone diagnosis in patients with acute flank pain, as it is superior to IVU.	1a
Enhanced CT enables 3D reconstruction of the collecting system, as well as measurement of stone density and skin-to-stone distance.	2a

Recommendations	Strength rating
Immediate imaging is indicated with fever or solitary kidney, and when diagnosis is doubtful.	Strong
Use non-contrast-enhanced computed tomography to confirm stone diagnosis in patients with acute flank pain following initial ultrasound assessment.	Strong
Perform a contrast study if stone removal is planned and the anatomy of the renal collecting system needs to be assessed.	Strong

Diagnostic imaging during pregnancy: Only low-level data exist for imaging in pregnant women supporting US and MRI.

Recommendations	Strength rating
Use ultrasound as the preferred method of imaging in pregnant women.	Strong
In pregnant women, use magnetic resonance imaging as a second-line imaging modality.	Strong
In pregnant women, use low-dose computed tomography as a last-line option.	Strong

Diagnostic imaging in children:

Ultrasound is the first-line imaging modality in children when a stone is suspected; it should include the kidney, fluid-filled bladder and the ureter next to the kidney and the (filled) bladder. A kidney-ureter-bladder radiography (or low-dose CT) is an alternative.

Recommendations	Strength rating
Complete a metabolic evaluation based on stone analysis in all children.	Strong
Collect stone material for analysis to classify the stone type.	Strong
Perform ultrasound as first-line imaging modality in children when a stone is suspected; it should include the kidney, fluid-filled bladder and the ureter.	Strong
Perform a kidney-ureter-bladder radiography (or low-dose non-contrast-enhanced computed tomography) if ultrasound will not provide the required information.	Strong

- Diagnostics - metabolism-related

Basic laboratory analysis: biochemical work-up of urine and blood.

Analysis of stone composition: Stone analysis should be performed in all first-time stone formers (X-ray diffraction or infrared spectroscopy).

Repeat stone analysis is needed in the case of: recurrence under pharmacological prevention; early recurrence after interventional therapy with complete stone clearance and late recurrence after a prolonged stone-free period.