



**Radiology Techniques Department**  
**Special Radiological Procedures-1**

**lecture 1 1**

**Computed tomography urography (CTU)**

**By**

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## **Computed tomography urography (CTU)**

CTU is a diagnostic examination optimized for imaging the kidneys, ureters and bladder **with intravenous administration of a contrast medium.**

### **Indications**

1. Assessment normal function of kidneys
2. Hematuria
3. ureteral stricture or hydroureter
4. Hydronephrosis
5. Urinary tract stones or tumors

### **Contraindications**

**The most common contraindications to ionized radiological examination with iv iodinated contrast agent are:**

1. Pregnancy (take history from patient)
2. Allergy to iodinated contrast agents (take history from patient)
3. renal impairment (to avoid that the patient must prepare blood urea and serum creatinine tests)

**\*Most CTU protocols are triphasic examinations that include non-contrast, enhanced, and delayed images.**

**\*Non-contrast images extending from the top of the kidneys to the bladder (Fig. 1).**

## Non-contrast images (native) of the CTU used for assessment the:

1. stones
2. fat-containing lesions
3. parenchymal calcifications
4. provide baseline attenuation for assessment of lesion enhancement.

## Technique

### Most important phase of Computed tomography urography (CTU)

1. **Corticomedullary phase** (rarely used)
2. **Nephrographic phase** about 90–120 seconds after injection of contrast agent but optimal image after **100 seconds**.
3. **Excretory phase** about **7-10** minutes after injection of contrast agent.

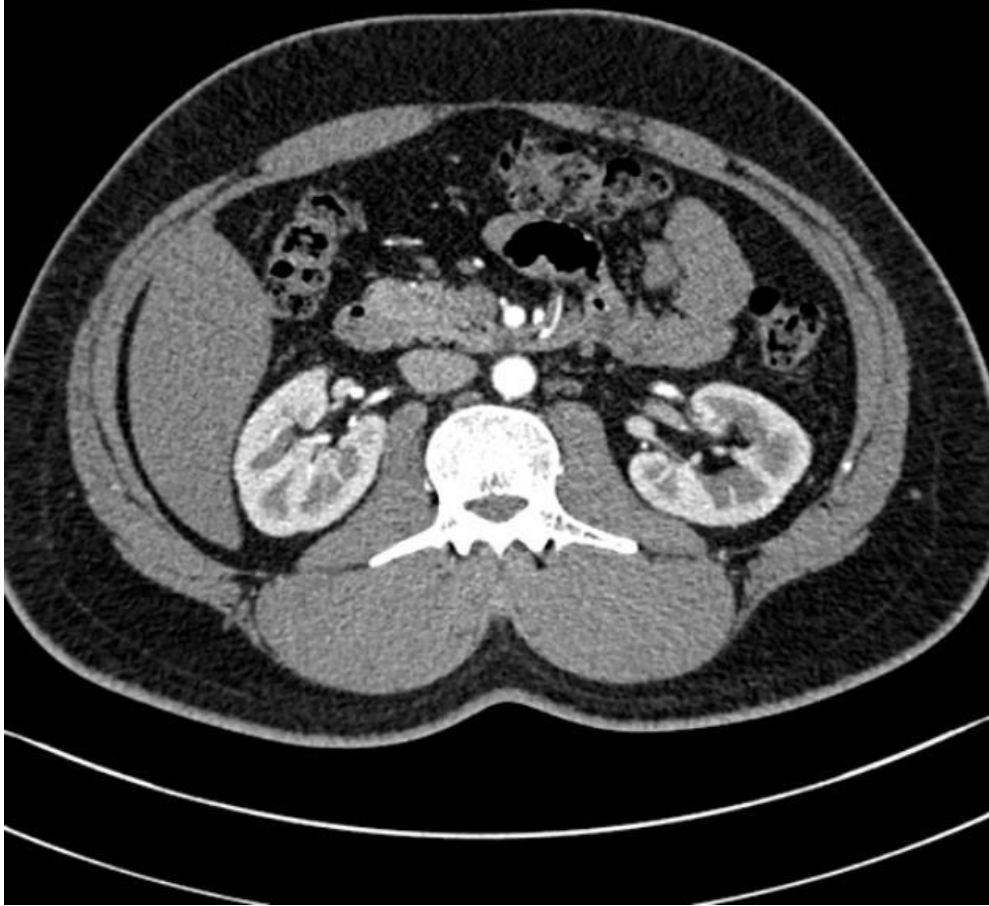
\* **Corticomedullary phase** (also known as the late arterial phase) is characterized by a greater degree of **cortex enhancement** compared to that of the **medulla** used for *separate renal cortex* from **renal medulla** (Fig. 2).

\* **Nephrographic phase** (the renal parenchymal phase) is a postcontrast injection time range in which there is an optimal **enhancement of the renal parenchyma** including the medulla used for assessment of **renal masses** and **inflammation** (Fig. 3).

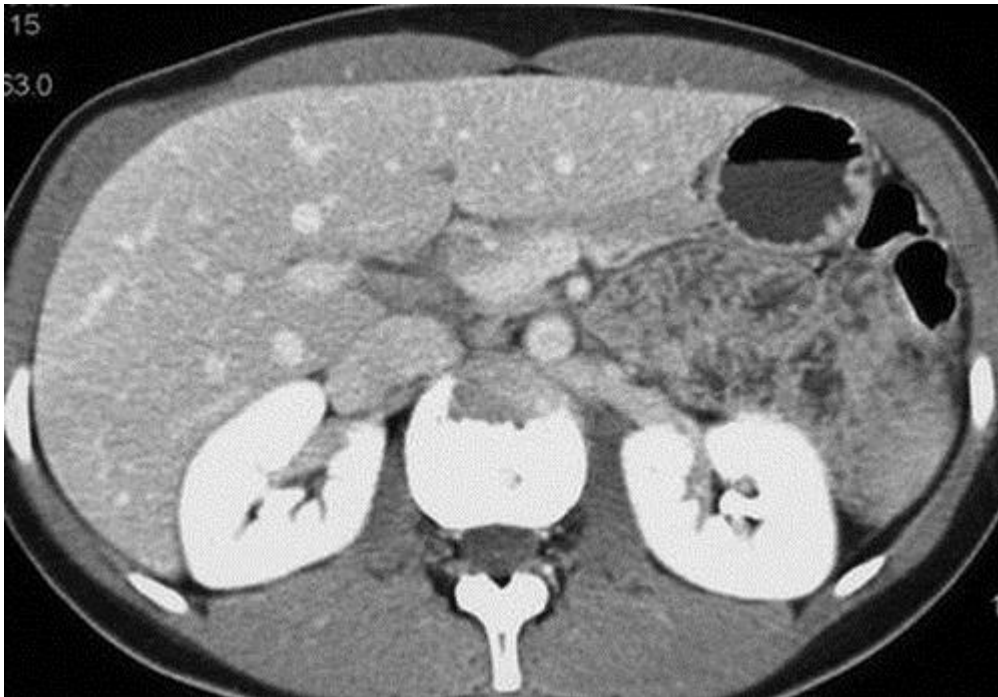
**\*Excretory phase** (pyelographic phase) is a postcontrast injection time range in which there is an optimal **enhancement of the renal collecting systems** used for assessment the **urothelium** from the **kidneys to the bladder** such as **urinary extravasation after renal trauma** (Fig. 4).



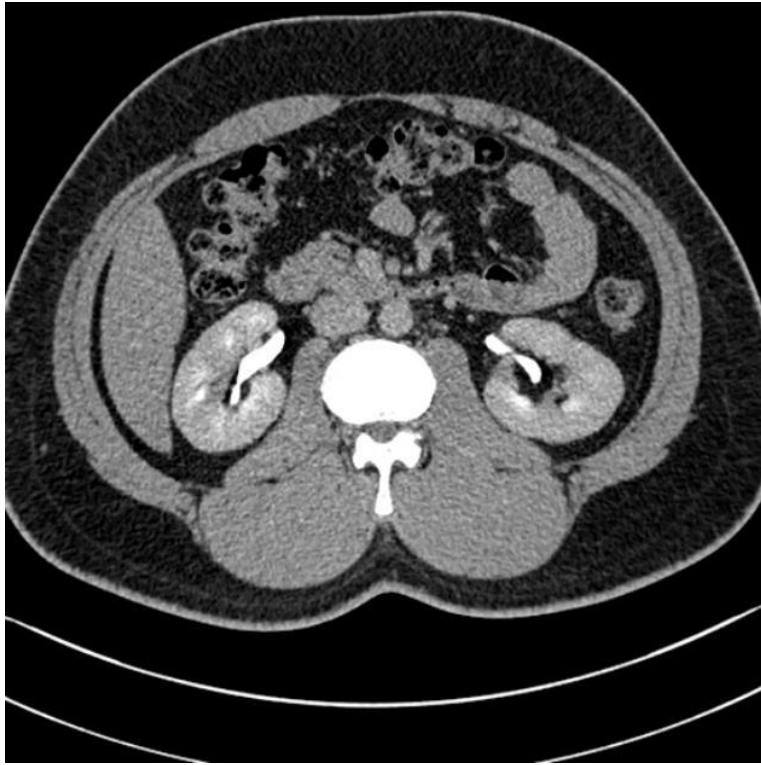
**Fig. 1. Axial non-contrast**



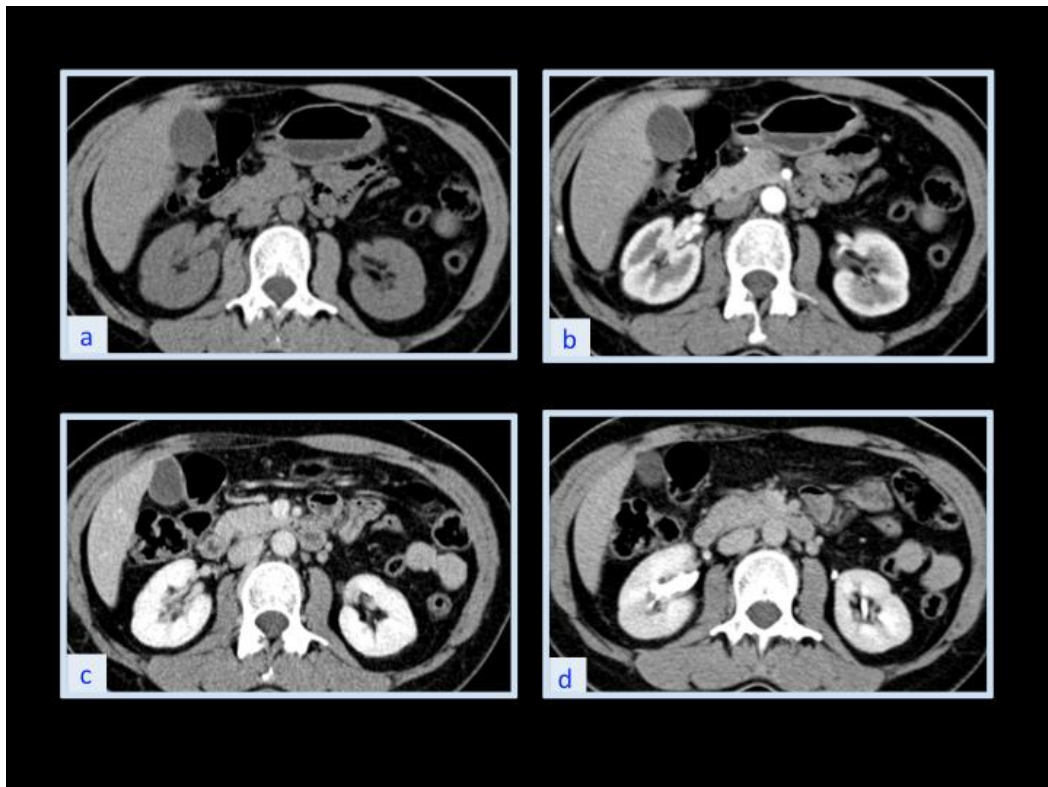
**Fig. 2. Axial Corticomedullary phase**



**Fig. 3. Axial Nephrographic phase**



**Fig. 4. Axial Excretory phase**



**Fig. 5: Normal CT nephrogram: Unenhanced (a) and contrast enhanced (b,c,d) axial CT images showing (b) normal corticomedullary phase (c) normal nephrographic phase and (d) normal excretory phase.**

