Kidney-Ureter-Bladder (KUB) X-Ray

Definition
• **The simplest radiological study available for urology patients.** It provides information on the digestive tract, the abdominal cavity, the urinary tract, the retroperitoneum, and the abdominal wall. In urology it is used mainly to detect stones and to control previously detected calcifications. Has a limited role in controlling complex urological pathologies.

Procedure
• **Performed with the patient in supine position and with antero-posterior projection.** Low kilovoltage and high milliamperage are used to enhance the contrast between soft tissues and to optimize the detection of stones. Oblique projections are useful in detecting calcifications indicative of urinary lithiasis. Image margins must be correctly centered and should include the area from the adrenal glands to the lower edge of the symphysis pubis.

Radiographic densities in KUB X-rays
• From least to most dense:
  - **Air:** appears as black.
  - **Water:** corresponds to soft tissue; appears as gray.
  - **Calcium:** corresponds to bone or calcified structures; appears as white.
  - **Metal:** corresponds to foreign bodies; appears as intense white.

Systematic interpretation
Interpreting X-rays should be complete, systematic, and thorough.
• **Bone framework:** allows evaluation of ribs, spinal column, pelvis, and femoral heads. Detects bone anomalies such as signs of degeneration, congenital pathologies, metastatic infiltration, and pathological fractures.
• **Lines of abdominal fat:** lower right posterior edge of liver, spleen line, renal outline, psoas line, and preperitoneal lines in the lateral abdominal walls. Displacement or blurring of these lines indicates an inflammatory or expansive process in the abdomen or retroperitoneum.
• **Intestinal luminogram:** the distribution of intestinal gases can indicate pathological processes such as paralytic ileus, intestinal displacement due to retroperitoneal tumors, pneumoperitoneum, and the presence of gas in the urinary tract.
• **Large masses of soft tissue.**
• **Abnormal calcifications:** urinary lithiasis, phleboliths, *calcified* aneurisms, *calcified* cysts, *calcified* lymph nodes, and prostatic calcifications.
• **Presence of foreign bodies.**

Radiological anatomy of the urinary tract
• **Kidney:** paired retroperitoneal organ; under normal conditions it is located between D₁₂-L₃, parallel to the *psoas* line. It measures approx. 11-12 cm in length.
• **Ureter:** it extends caudally over the *psoas* muscle to the iliac junction, where it is directed outward and backward, running through the pelvic segment until it enters the bladder.
• **Bladder:** round, extraperitoneal pelvic organ the outline of which can be seen in some x-rays. In infants it is located above the symphysis pubis.