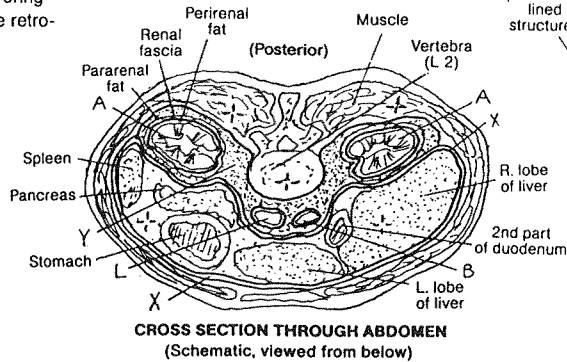


XI. URINARY SYSTEM KIDNEYS & RELATED RETROPERITONEAL STRUCTURES

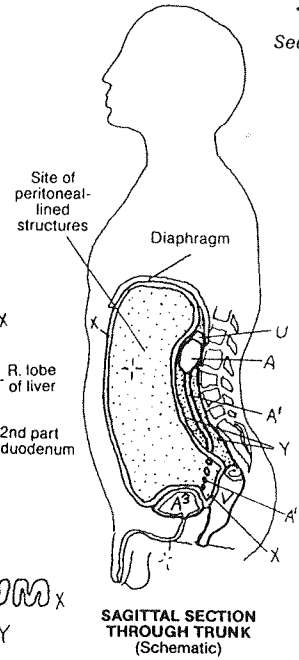
CN: Use red for B, blue for L, and a very light color for X (use a color, not gray). (1) Color the various structures in the abdominal cavity. Part of the peritoneum (X), whose title is among the upper diagrams, is shown covering much of the right side. (2) At the upper right, note the relationship of the retroperitoneum to the parietal peritoneum.

- KIDNEY^A
- URETER^{A'}
- URINARY BLADDER^{A²}
- AORTA^B
- & BRANCHES:^B
- CELIAC A. & BRS.^C
- SUPRARENAL A.^D
- SUP. MESENTERIC A.^E
- RENAL A.^F
- TESTICULAR A.^G
- INF. MESENTERIC A.^H
- COMMON ILIAC A.^I
- INTERNAL ILIAC A.^J
- EXTERNAL ILIAC A.^K
- INFERIOR VENA CAVA^L
- & TRIBUTARIES:^L
- INTERNAL ILIAC V.^M
- EXTERNAL ILIAC V.^N
- COMMON ILIAC V.^O
- TESTICULAR V.^P
- RENAL V.^Q
- SUPRARENAL V.^R
- HEPATIC VS.^S
- ORGANS & DUCTS:^{*}
- ESOPHAGUS^T
- SUPRARENAL GLAND^U
- RECTUM^V
- DUCTUS (VAS) DEFERENS^W

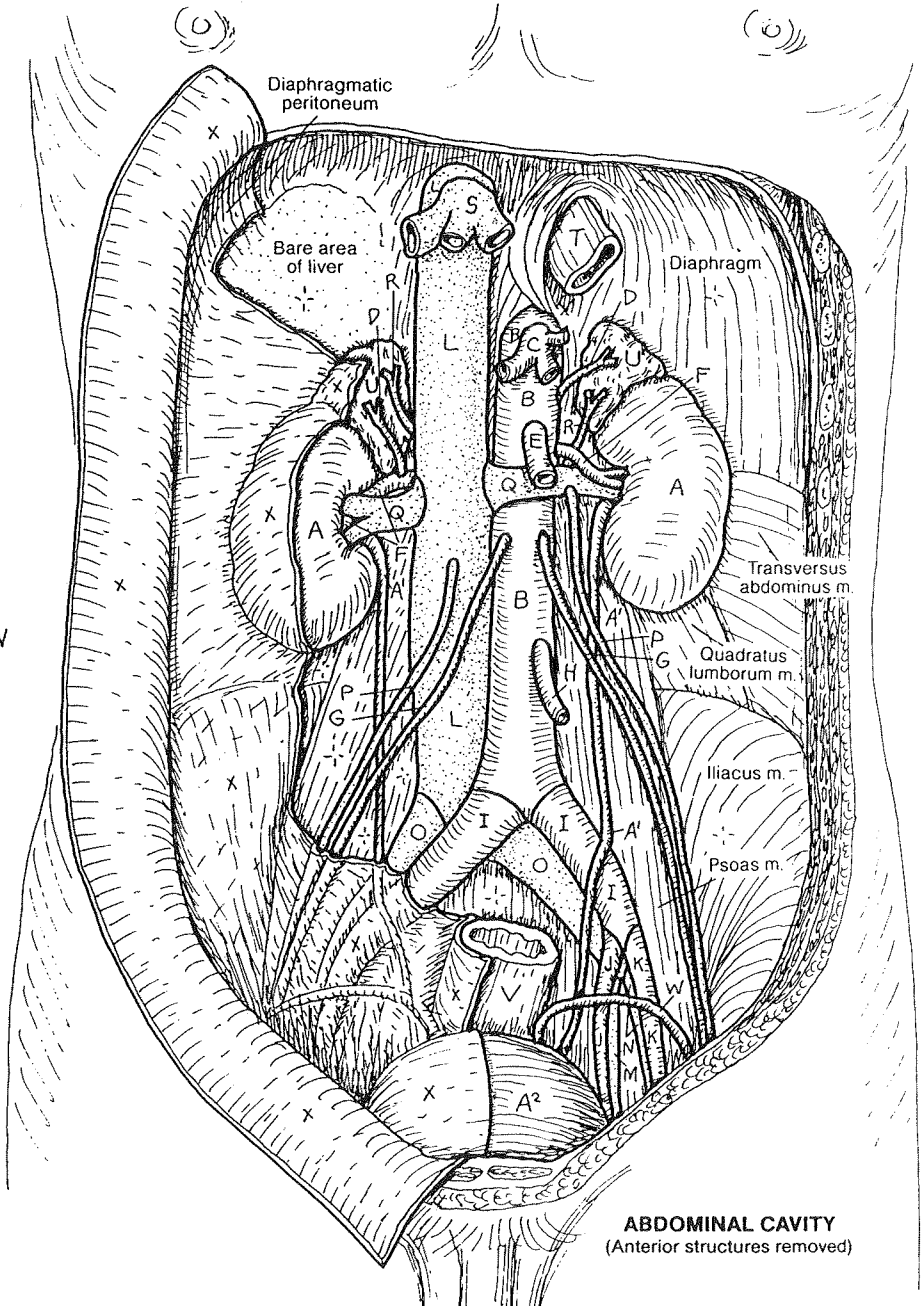


CROSS SECTION THROUGH ABDOMEN
(Schematic, viewed from below)

PARIETAL PERITONEUM^X
RETROPERITONEUM^Y



SAGITTAL SECTION THROUGH TRUNK
(Schematic)



ABDOMINAL CAVITY
(Anterior structures removed)

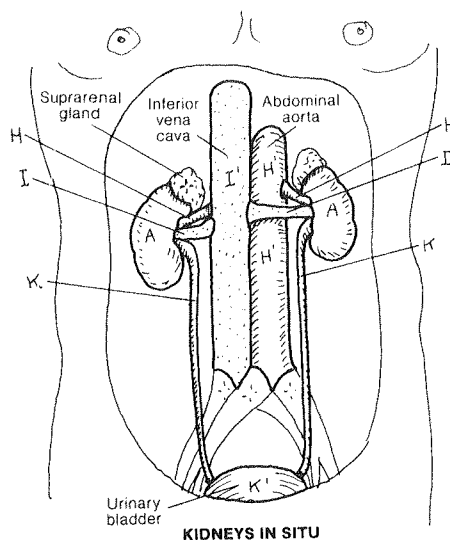
The paired kidneys and ureters lie posterior to the parietal peritoneum of the abdominal cavity; they are, therefore, in the retroperitoneum. During fetal development, some abdominal structures arise in the retroperitoneum (e.g., kidneys), and some become retroperitoneal as a result of movement of visceral organs (e.g., ascending/descending colon, pancreas). The abdominal aorta and its immediate branches and the inferior vena cava and its immediate tributaries are all retroperitoneal. Arteries and veins travel between layers of peritoneum to reach the organs they supply/drain. Lymph nodes, lumbar trunks, and the cysternal chyli (not shown) are all retroperitoneal. The ureters descend in the retroperitoneum and under the parietal peritoneum to reach the posterior and inferior aspect of the bladder. Pelvic viscera and vessels lie deep to the parietal peritoneum.

The kidneys are encapsulated in perirenal fat, secured by an outer, stronger layer (renal fascia). Each kidney and its fascia are packed in pararenal fat. These compartments do not communicate between left and right. Such a support system permits kidney movement during respiration but secures them against impact forces.

XI. URINARY SYSTEM

KIDNEY STRUCTURE

Use red for H, blue for I, yellow for K, and very light colors for B, E, G, and J. (1) Begin with the large illustration and note that the thickness of the renal capsule (A) has been greatly exaggerated for coloring purposes. Color the cut edges of blood vessels in the cortex (B). Also color the titles and arrows reflecting blood and urine flow. (2) Complete the overview diagram at the top of the plate.

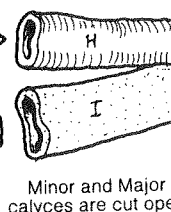


- PERIPHERAL PART: ***
- RENAL CAPSULE A
 - CORTEX B
 - MEDULLA (PYRAMID) C
 - PAPILLA D
- INNER (CENTRAL) PART: ***
- MINOR CALYX E
 - MAJOR CALYX F

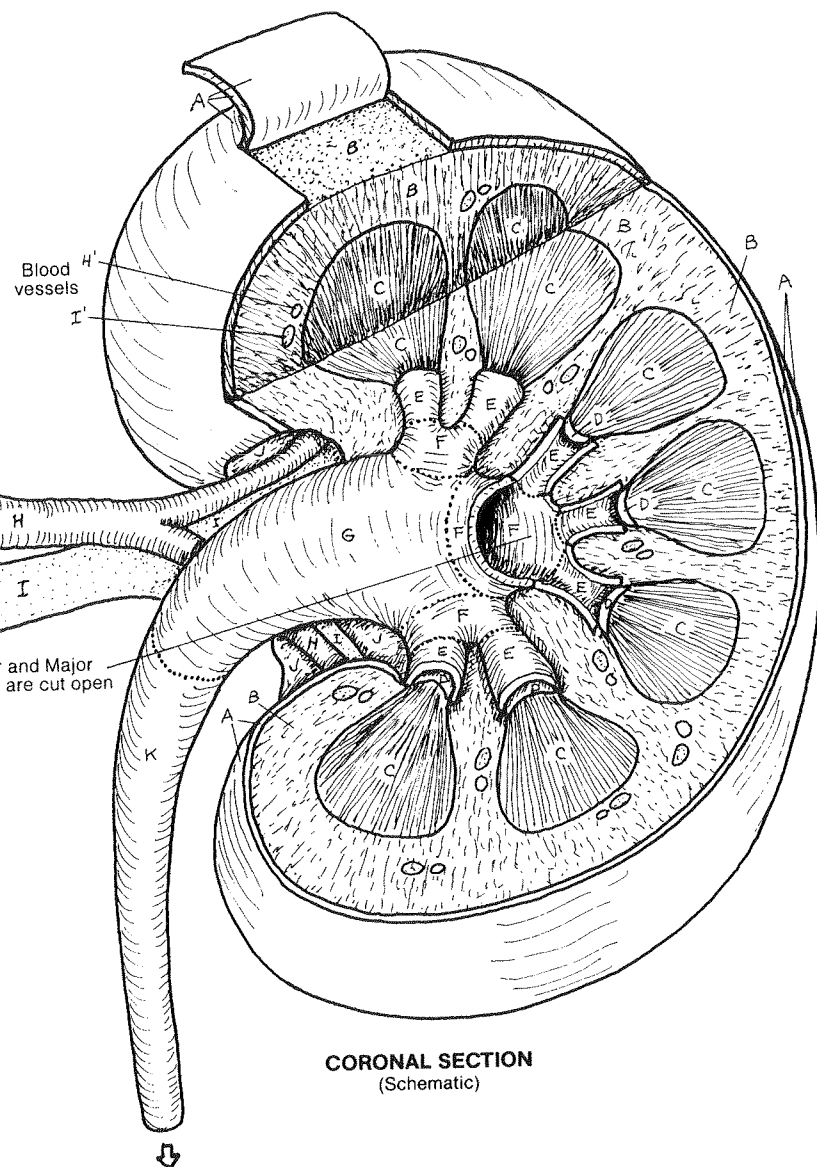
- HILUS: ***
- RENAL PELVIS G
 - RENAL ARTERY H
 - OXYGENATED BLOOD H'
 - RENAL VEIN I
 - DEOXYGENATED BLOOD I'
 - RENAL SINUS J
 - URETER K
 - URINE K'

1300 mL/min H' (Into both kidneys)

1299 mL/min I' (Out of both kidneys)



Minor and Major calyces are cut open



CORONAL SECTION
(Schematic)

0.7 mL/min K'

The kidney consists of filtering capsules, tubules and blood vessels tightly pressed together into what is called the parenchyma. The parenchyma of the kidney consists of an outer cortex covered on its surface by a thin fibrous capsule, and an inner medulla consisting of pyramids of straight tubules. The cortex reaches down between the pyramids (renal columns). The cortex consists of convoluted tubules and filtering capsules. The apex of each medullary pyramid forms a papilla which fits into the small cup-shaped funnel called the minor calyx. These funnels, numbering 8-18, open into three much larger major calyces all of which open into the cavity called the renal pelvis. In the concavity of the kidney (the hilus), in an area called the renal sinus, the renal pelvis narrows to form the proximal ureter, sharing the area with the renal artery and vein.

Renal blood flow (the amount of blood flowing through the kidneys) is about 1300 mL per minute (both kidneys). About 125-130 mL of plasma is filtered into the renal tubular systems each minute. Less than 1% of that filtered plasma (about 0.7 mL) is actually excreted as urine. Clearly, the kidney is in the water conservation business!