

Kidney Structure

Introduction

The kidneys are bean-shaped organs about the size of a clenched fist. They are attached to the body cavity by mesentery. Each kidney is embedded in fat which helps cushion it from shock as well as holding it in place. The kidney is structurally subdivided into three areas: the *renal cortex* which makes up the outer portion of the kidney, the *renal medulla* which represents the inner two-thirds of the kidney, and the *renal pelvis* which is a sac-like cavity. The renal pelvis empties its contents into the ureter, which leads to the urinary bladder. When the bladder is emptied, urine passes to the outside via the urethra.

Each kidney is composed of approximately one million *nephrons*. The nephrons are the functional units of the kidney. Each nephron is a filtration unit which controls the composition of the urine. The blood is brought by paired renal arteries to the kidneys where it is filtered and then carried away from the kidneys by paired renal veins. Structurally, each nephron consists of a small cup-shaped structure called the *Bowman's (nephric) capsule*. A small, winding, proximal tubule leads from each capsule and becomes the *loop of Henle (nephric loop)* which then leads to the *distal tubule*. The distal tubule fuses with the *collecting tubule* whose contents empty into the renal pelvis.

Purpose

To study the structure of a mammalian kidney.

Materials and Equipment**Materials**

sheep or hog kidney

Equipment

prepared slide of a kidney

cross-section

prepared slide of a kidney

longitudinal section

kidney model

compound microscope

dissecting tray

scalpel

probe

Procedure

Obtain a kidney and note the shape, colour, fat deposits, hilum, blood vessels, and ureter. Draw and label the above noted structures. Carefully bisect the kidney longitudinally, beginning at the hilum. Note the outer renal cortex, the inner renal medulla, and the renal pelvis. The medullary portion of the kidney is composed of wedge-shaped structures called the renal pyramids. Draw and describe the previous four structures. Using a prepared slide of the kidney, locate the renal pelvis; describe the structures observed. Make a drawing of a nephron and label the Bowman's capsule, proximal tubule, loop of Henle, distal tubule, and the collecting tubule.

Questions

1. In what portion of the kidney are the renal pyramids located?
2. Where does the ureter originate?
3. What structures of the nephron are found in the renal cortex?
4. What structures of the nephron are found in the renal medulla?
5. What major blood vessels bring blood to the kidney and carry blood away from the kidney?
6. List two major functions of the kidneys.