Colégio Diocesano de São José (5ª)

Biology Lab Record

Dissection and examination of a pig kidney

by

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1. Introduction:

The mammalian kidney is a vital organ responsible for maintaining the body's internal environment by regulating water and electrolyte balance, removing waste products from the blood, and assisting in the maintenance of blood pressure. The main function of the kidney is to filter blood and produce urine. The kidney also produces important hormones. One hormone, called erythropoietin, stimulates the production of red blood cells in the bone marrow.

The purpose of conducting a dissection and examination of a pig kidney is to gain a deeper understanding of the structure and function of a mammalian kidney. By dissecting and examining an organ that closely resembles the human kidney, students and researchers can observe its anatomical features and investigate its various components firsthand. For example, through the dissection process, individuals can identify and study the external and internal structures of the pig kidney, such as the renal artery, renal vein, renal pelvis, medulla, cortex, and nephrons.

2. Materials:

✓ Pig kidney	1	✓ Dissecting board	1
✓ Scissors	1	✓ Scalpel	1
✓ Disposable gloves	2	✓ Forceps	1
✓ Pins	1	✓ Dissecting board	1

(Fig.1 Pig kidney)

(Fig.2 Scissors)

(Fig.3 Disposable gloves)

(Fig.4 Pins)

(Fig.5 Dissecting board)

(Fig.6 Scalpel)

(Fig.7 Forceps)

3. Procedures:

The pig kidney was measured the size with a ruler (Fig.8). Kidney with a pin was located the renal artery, renal vein and ureter (Fig.9). The kidney was cut in half to create front-side slices. The kidney contralateral to the renal hilum was incised and traversed through the cortex, medulla, pelvis, ureters, and renal vessels (Fig.10). Kidney with some pins were located the renal cortex, renal medulla, minor calyx, renal column, renal pyramid, ureter, renal pelvis and renal papilla (Fig.11).

(Fig.8 The kidney was measuring the size)

(Fig.9 A pin located 3 things on the kidney)

(Fig.10 The kidney was cut)

(Fig.11 some pins were

locating the internal structure of the kidney)

4. Results:

1. The size of the pig's kidney: length 13.1 cm, width 7.7 cm

(Fig.1 The length of the kidney)

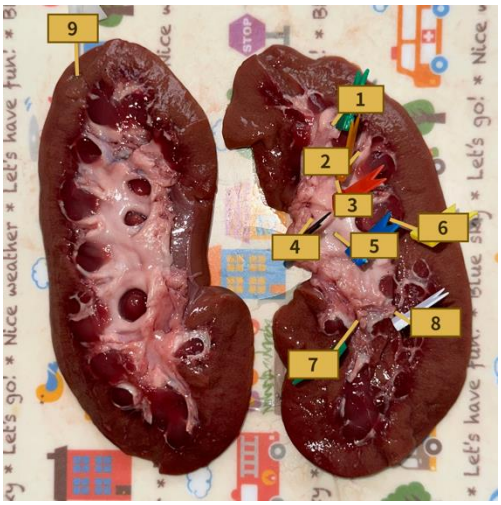
(Fig.2 The width of the kidney)

2. Pin and take a photo of the external structure of pig kidney. Stick the photo in the space below and mark the labels.

(Fig.3 External structure of the pig kidney)

Key:
(10) renal hilum
(Renal vein, renal artery and ureter was cut off before the experiment so it cannot be labeled.)

3. Pin and take a photo of the internal structure of pig kidney. Stick the photo in the space below and mark the labels.

(Fig.4 Internal structure of the 

pig kidney)

Key:

1.Renal column	6.Renal medulla
2.Minor calyx	7.Renal papilla
3.Major calyx	8.Renal cortex
4.Ureter	9.Renal pyramid
5.Renal pelvis	

5. Discussions:

The size of the pig kidney was 13x7.7 cm. It has a reddish-brown colour. The pig's kidney was in reddish brown colour because it contains red blood cell. The reddish region is the renal cortex and the reddish-brown region is the renal medulla. The function of kidney is to regulate water content in the body and remove metabolic wastes from the body.

Before the experiment, the renal artery of the pig's kidney was cut off. Therefor we were not able to observe the difference between the renal artery and the renal vein. The renal artery and the renal vein could be differentiating in colour and size. The colour of the artery would have a reddish or brighter in colour compared to the vein. The artery is thicker and has a smaller diameter compared to the vein. The function of the renal vein is to remove the blood from kidney. It carries filtered blood from the kidneys to the vena cava. The renal artery helps in supplying the blood to the kidney from the heart. It carries unfiltered blood form the aorta to the kidneys. The ureters are tubular structures that connects the kidney to the urinary bladder. It transports urine from the renal pelvis into the bladder.

The renal cortex contains the glomeruli and the bowman's capsule. The process occur between the glomeruli and the bowman's capsule is ultrafiltration. This process happens under the effect of high hydrostatic pressure. Water and other small molecules are forced out through the walls of the glomerulus and the bowman's capsule, forming a fluid called glomerular filtrate in the capsule. The filtrate from the blood would become urine through the process of reabsorption along nephron. The nephron is made of two parts, the bowman's capsule and the kidney tubule. The kidney tubule can be divided into 4 parts, the proximal convoluted tubule, the loop of Henle, the distal convoluted tubule and the collecting duct. The filtrate passes through the proximal convoluted tubule, all glucose and some salts are reabsorbed into the blood capillaries by diffusion and active transport. This makes the filtrate more dilute and the increase in water potential. At the loop of Henle, the high-water potential causes the water in the filtrate to return to the blood by osmosis. The distal convoluted tubule and the collecting duct is located behind the loop of Henle. They selectively reabsorb or secrete specific substance to maintain electrolyte balance and regulate urine concentration. The reabsorption of water is regulated by antidiuretic hormone (ADH). Most of the water reabsorption occurs in the collecting duct. Due to the presence of ADH, the collecting duct become more permeable to water, allowing for its reabsorption and the production of concentrated urine.

6. Conclusion:

Through experiments in dissecting and examining pig kidneys, we learned to observe the external and internal structures of the kidney, such as the renal artery, renal vein, renal pelvis, medulla, cortex, and nephrons. This allows us to no longer just learn knowledge from books. This experiment allows us to have a deeper understanding of the structure of mammalian kidneys and their location. We also understand teamwork and collaboration. As part of a team, we communicated with each other while performing dissections, found problems without blaming each other, and helped each other solve them, promoting teamwork and collaboration skills. Everyone worked together to share observations and discuss findings to make this experiment a success.

During the experiment, everything went smoothly. The only drawback is that when we dissected the pig kidneys, we asked members of other groups to help. We can't complete the entire experiment alone. This is where we did poorly in this experiment. We realized this is an area we need to improve. Next time we have the opportunity to experiment, we will try our best to complete the entire experimental process ourselves.