



Benha University
Faculty of Science
Department of Zoology

Selective topics in zoology (404 Z)

Year: 2018/2019

Semester: Second

Level: Fourth level

Date: 29/5/2019

Sepe: Zoology program - Zoology & Chemistry program

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A- Explain the following: (6 marks)

1) Kidney regulates of arterial pressure.

The kidneys play a dominant role in **long-term** regulation of arterial pressure by excreting variable amounts of sodium and water. The kidneys also contribute to **short-term** arterial pressure regulation by secreting vasoactive factors or substances, such as renin, that lead to the formation of vasoactive products (e.g., angiotensin II).

2) Aldosterone concentrates urine.

Due to either elevated plasma K^+ or angiotensin II. It regulates the movement of water and Na^+ across the collecting duct epithelial cells. Na^+ is reabsorbed from the filtrate and K^+ is secreted into the renal tubule from the blood. Because water follows Na^+ , aldosterone concentrates urine, increases the volume of the blood and blood pressure

3) Calcium and fatty acids are not freely filtered in urine.

Because they are partially bound to the plasma proteins. Almost one half of the plasma calcium and most of the plasma fatty acids are bound to proteins, and these bound portions are not filtered through the glomerular capillaries.

B- Write short notes on the following: (10 marks)

1) Renin-angiotensin II-aldosterone system:

The renin-angiotensin system regulates blood pressure and fluid balance in the body. When blood volume or sodium levels in the body are low, or blood potassium is high, cells in the kidney release renin. Renin converts angiotensinogen, which is produced in the liver, to the hormone angiotensin I. An enzyme known as ACE or angiotensin-converting enzyme found in the lungs

Best wishes



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metabolizes angiotensin I into angiotensin II. Angiotensin II causes blood vessels to constrict and blood pressure to increase. Angiotensin II stimulates the release of the hormone aldosterone in the adrenal glands, which causes the renal tubules to retain sodium and water and excrete potassium. Together, angiotensin II and aldosterone work to raise blood volume, blood pressure and sodium levels in the blood to restore the balance of sodium, potassium, and fluids. If the renin-angiotensin system becomes overactive, consistently high blood pressure results.

2) Sweat formation:

Sweat gland is a tubular structure tangled with the blood capillaries. This close association of tubes allows wastes (namely water, salts, and urea) to diffuse from the blood into the sweat gland. When body temperature rises, the fluid (sweat) is released from the gland, travels through the duct, and reaches the skin surface through openings called pores.

3) Nephron structure:

Each kidney in the human contains about 1 million **nephrons**, each capable of forming urine. The kidney cannot regenerate new nephrons. Therefore, with renal injury, disease, or normal aging, there is a gradual decrease in nephron number. Each nephron contains (1) **Malpighian body**, which is made up of a glomerulus and a Bowman's capsule. The glomerulus is a mass of convoluted blood capillaries supplied by a wide afferent arteriole and drained by a narrow efferent arteriole. (2) **The uriniferous tubule**, which is divided into three parts; a proximal convoluted tubule, Henle's loop, and a distal convoluted tubule which opens into a collecting tubule. The collecting tubules of all excretory units are joined together forming a duct of Bellini, which runs up to the pelvis.

Best wishes