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QUESTIONS

1. Discuss the role of the kidney in glucose homeostasis
2. Discuss the process of micturition
3. Explain Juxtaglomerular apparatus
4. Discuss the role of kidney in regulation of blood pressure
5. Discuss the role of kidney in calcium homeostasis

ANSWERS

1. The Maintenance of glucose homeostasis is crucial in preventing pathological consequences that may result from hyperglycaemia or hypoglycaemia. It involves Several complementary processes including glucose reabsorption, gluconeogenesis and glucose excretion

The primary mechanisms include release of glucose into the circulation via gluconeogenesis, uptake of glucose from circulation to satisfy the kidneys’ energy needs and reabsorption of glucose at the level of the proximal tube

2) Micturition is the process by which the urinary bladder empties when it becomes filled. This process involves two main steps: First the bladder fills progressively until the tension in its walls rises above a threshold level. This tension elicits the second step, which is a nervous reflex called the micturition reflex that empties the bladder or, if this fails, at least causes a conscious desire to urinate. Although the micturition reflex is an autonomic spinal cord reflex, it can also be inhibited or facilitated by centres in the cerebral cortex or brain stem.

3) It is a structure in the kidney that regulates the function of each nephron, the functional units of the kidney. The Juxtaglomerular apparatus consists of three types of cells:

1. The macula densa, a part of the distal convoluted tubule of the same nephron

2. Juxtaglomerular cells which secrete renin

3. Extraglomerular mesangial cells

The Apparatus is part of the kidney nephron, next to the glomerulus. It is found between afferent arteriole and the distal convoluted tubule of the same nephron

FUNCTION

Renin is produced by the juxtaglomerular cells which is important in the renin-angiotensin system for arterial blood pressure regulation.

Extraglomerular mesangial cells play a role in regulating GFr

Macula densa cells respond to changes in the sodium chloride levels in the tubuloglomerular feedback loop.

4) The kidneys contribute to short-term arterial pressure regulation by secreting hormones and vasoactive factors or substances e.g renin that lead to the formation of vasoactives products e.g Angiotensin II in the Renin-Angiotensin system.

The mechanisms of blood pressure control by the kidney involves

1. Intra-renal actions of the renin-angiotensin system in blood pressure control
2. Novel Control Mechanisms and sites of action for aldosterone in hypertension
3. Novel Pathways Regulating Renal solute Transport

5) The Kidney is critically important in calcium homeostasis. Under normal blood calcium concentrations almost all of the calcium that enters glomerular filtrate is reabsorbed from the tubular system back into the blood, which preserves blood calcium levels. If tubular reabsorption of calcium decreases, calcium is lost by excretion into the urine