



Anesthesia Department

Effect of Exercise on Urine Production

General Biology (ANE106)

Year 1/ Spring semester

Lab 6

Lecturer: Mr. Omer Sardar Taha

Assistant: Ms. Zahra Mohammad

E-mail: Omer.sardar@tiu.edu.iq

June 11, 2026



Urinary System

The urinary system is responsible for maintaining the body's internal environment by regulating water balance, electrolyte concentrations removal of metabolic wastes.



Organs of Urinary system

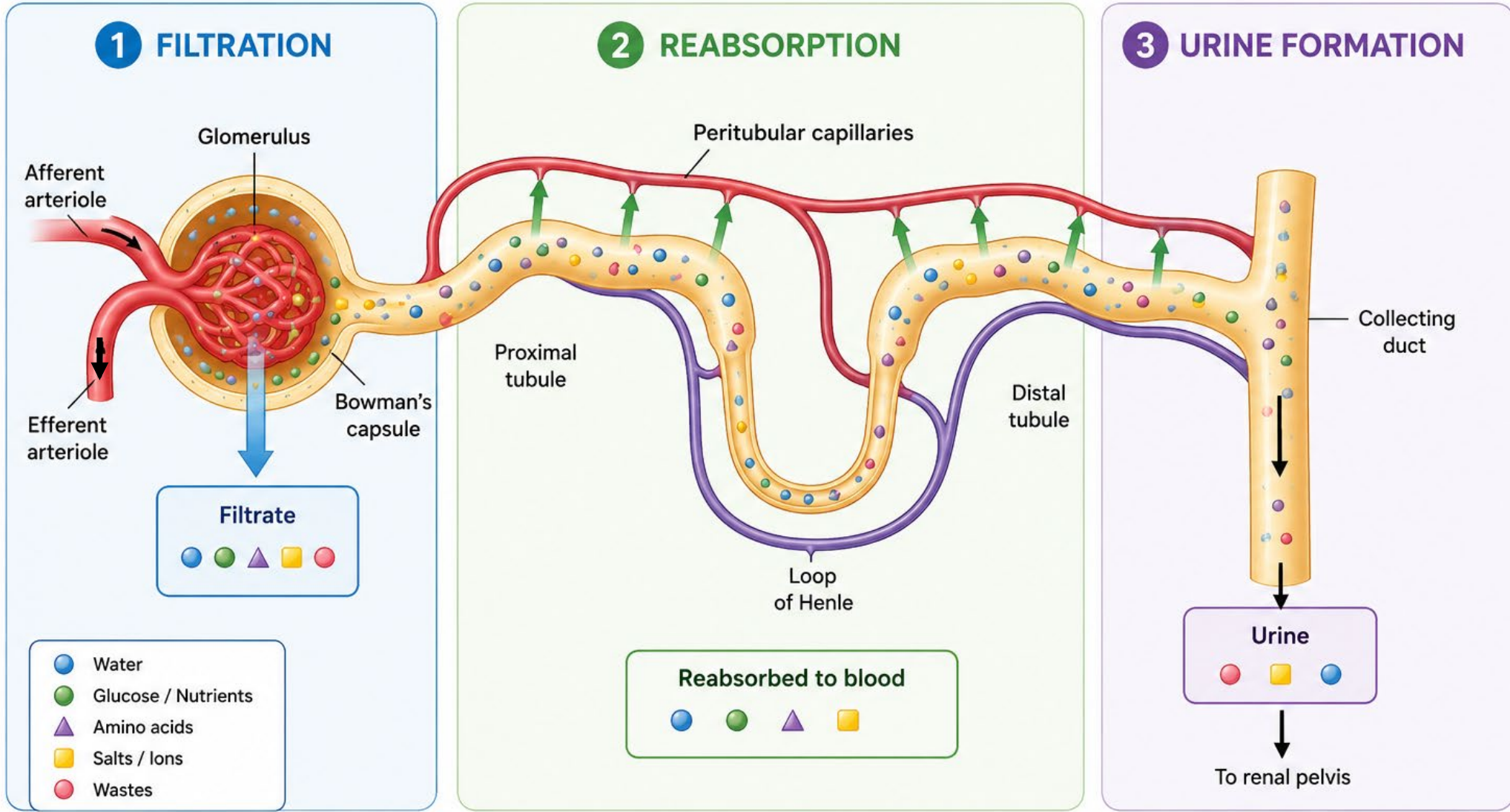
The major organs of the urinary system include the kidneys, ureters, urinary bladder, and urethra. Among these, the kidneys are the primary organs responsible for urine formation and the regulation of body fluid volume.

Urine Production

Urine is produced through three main processes occurring within the nephrons of the kidneys: filtration, reabsorption, and secretion.

During filtration, water and small solutes are filtered from the blood into Bowman's capsule. As the filtrate passes through the renal tubules, essential substances and varying amounts of water are reabsorbed back into the bloodstream, while waste products remain in the filtrate and are eventually excreted as urine.

How Nephrons Form Urine



Effect of exercise on urine production

Physical exercise produces several physiological changes that affect kidney function and urine production.

During exercise, skeletal muscles require increased oxygen and nutrient delivery, leading to an increase in heart rate and blood flow to the muscles. At the same time, body temperature rises, stimulating sweat production to help dissipate heat. Sweating results in the loss of water and electrolytes from the body.

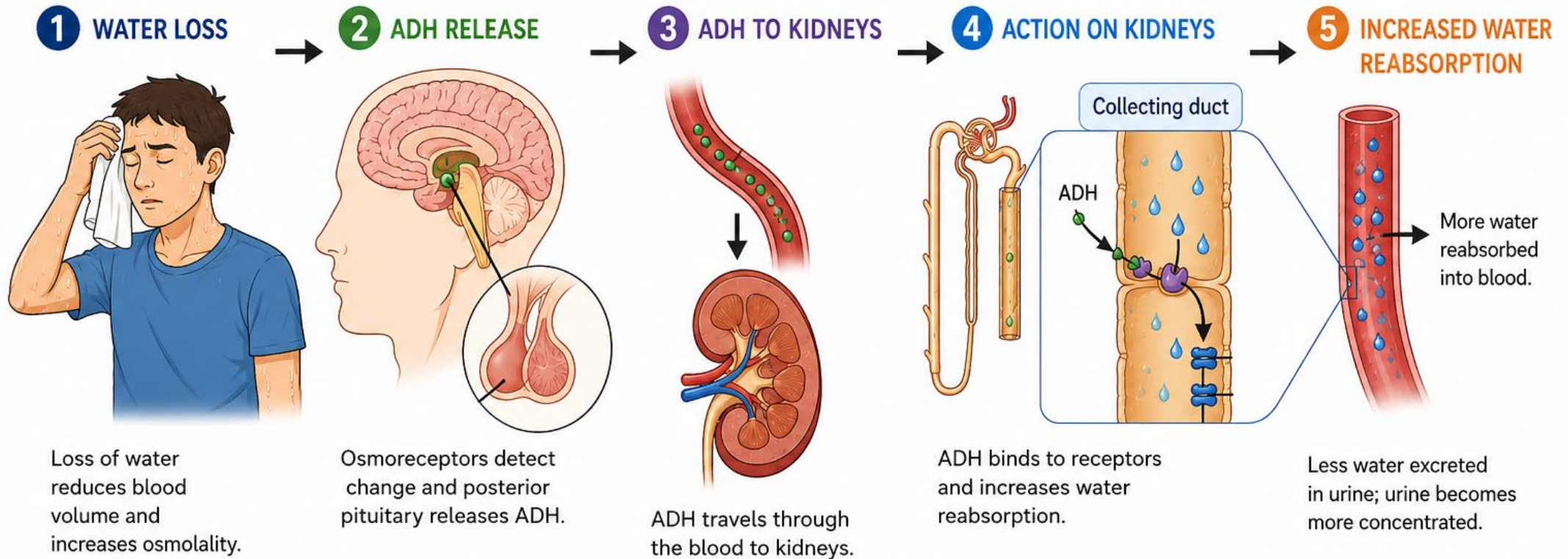


Role of ADH in maintaining fluid balance

To maintain fluid balance, the body activates mechanisms that conserve water. One of the most important responses is the increased release of antidiuretic hormone (ADH) from the posterior pituitary gland. ADH acts on the collecting ducts of the kidneys, increasing water reabsorption back into the bloodstream. Consequently, less water is excreted in the urine, resulting in a lower urine volume and a more concentrated urine sample.

ROLE OF ADH IN REGULATION OF FLUID BALANCE

Water loss (e.g., sweating, dehydration) triggers ADH release from the posterior pituitary to conserve water.



RESULT:



LESS URINE
(Less water lost)

+



MORE CONCENTRATED URINE
(Higher osmolality)

=



FLUID BALANCE MAINTAINED
Stable blood volume and osmolality.

💧 ADH helps conserve water and maintain fluid balance, especially during dehydration or after exercise.



Practical Session:

Effect of Exercise on Urine Production

Objectives

1. To investigate how physical exercise affects urine volume and urine concentration.

Principle

The kidneys maintain fluid balance by regulating water excretion in the urine. During exercise, water is lost through sweating, which stimulates the release of antidiuretic hormone (ADH). ADH increases water reabsorption in the kidneys, resulting in decreased urine volume and more concentrated urine. This experiment compares urine production between resting and exercising individuals to demonstrate the effect of exercise on fluid regulation and kidney function.

Procedure

1. Recruit healthy volunteers and divide them into two groups: Control Group (Rest) and Exercise Group
2. Ask all participants to empty their bladders before the experiment.
3. Provide each participant with 500 mL of water to standardize hydration.
4. Allow all participants to rest for 20 minutes.
5. Collect and record a baseline urine sample from each participant (0 min).
6. The Control Group remains seated quietly for 30 minutes.
7. The Exercise Group performs moderate exercise (e.g., brisk walking, jogging, or stair climbing) for 30 minutes.
8. Both groups will wait for another 30 minutes.
9. Measure and record:
 - Urine volume (mL)
 - Urine color

Compare the results between the two groups.

Result



Participant	Group	Baseline (0 min) (mL)	After 60 min (mL)	Total (mL)
P1	Control	90	175	265
P2	Control	100	190	290
P3	Exercise	95	90	185
P4	Exercise	85	95	180