

SI A&P - Full Discipline Demo - Biodigital

The Urinary System - BioDigital

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI A&P - Full Discipline Demo - Biodigital
Course	SI A&P - Full Discipline Demo - Biodigital
Instructor	Sales SI Demo

Test Your Knowledge

Match each term with the best description.

Terms:

- Bladder
- Renal medulla
- Renal hilus
- Transitional epithelium
- Urethra

Descriptions:

- Structure from which urine exits the body
- Indented medial region of kidney where blood vessels, nerves, and lymph vessels enter
- Stores urine until expelled from the body
- Inner portion of kidney containing nephron loops, collecting ducts, and blood vessels
- Stratified tissue made of multiple cell layers that change shape in response to differences in fluid pressure

Correct answers:

- 1 Urethra 2 Renal hilus 3 Bladder 4 Renal medulla
5 Transitional epithelium

Categorize each statement as true or false.

True	False
1	2

Filtration occurs within the glomerulus of the nephron.

Collecting ducts of the nephron are formed of transitional epithelium tissue.

Absorption and secretion occur in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule of the nephron.

Urine moves from the collecting duct of the nephron to the Bowman's capsule.

Correct answers:

- 1 Filtration occurs within the glomerulus of the nephron.
- Absorption and secretion occur in the proximal convoluted tubule, the loop of Henle, and the distal convoluted tubule of the nephron.
- 2 Collecting ducts of the nephron are formed of transitional epithelium tissue.
- Urine moves from the collecting duct of the nephron to the Bowman's capsule.

Exploration

The structures of the urinary system include the ____.

- ☐ kidneys
- ☐ ureters
- ☐ bladder
- ☐ All of the above



Urine is transported from the major calyces into the renal ____.

- ☐ medulla
- ☐ cortex
- ☒ pelvis
- ☐ hilus

✓

Waste is secreted into the filtrate, and the pH of the filtrate is regulated in the PCT.

- ☒ True
- ☐ False

✓

Transitional epithelium lines the ____.

- ☐ bladder
- ☐ ureters
- ☐ urethra
- ☒ All of the above

✓

Exercise 1

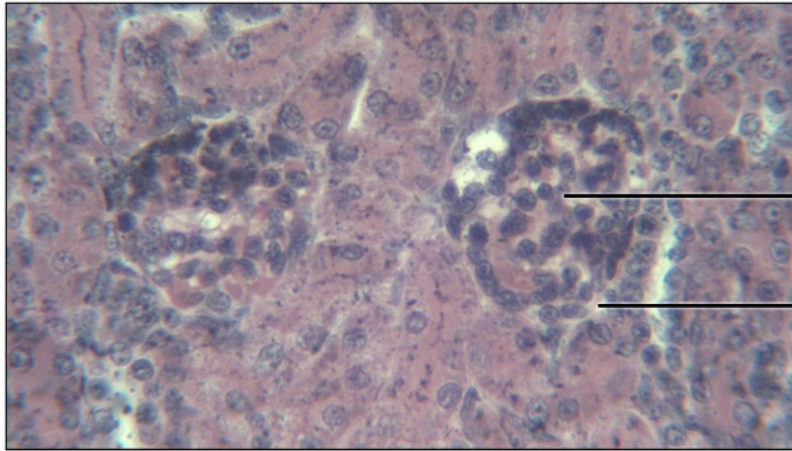
What are the functions of the glomerulus and cuboidal cells examined in this exercise?

The glomerulus functions for blood filtration in the kidney. The cuboidal cells of the collecting ducts function to retain water under the control of antidiuretic hormone.

How does the structure of the transitional epithelium contribute to its function in the urinary bladder?

The ability of the cells of the transitional epithelium to change shape allows the bladder to stretch as it stores urine and to return to its original shape when urine is released.

Photo 1: Simple Cuboidal - Cortex
(SAMPLE ANSWER BELOW)



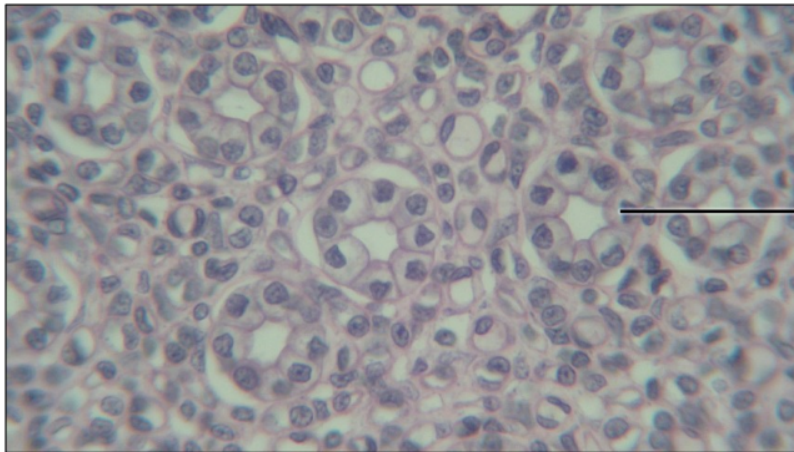
Glomerulus

Bowman's
capsule

Data Table 1: Microscopic Examination of the Urinary System
(SAMPLE ANSWER BELOW)

Slide	Magnification	Comments
Simple Cuboidal - Cortex	600X	Student comments will vary.
Simple Cuboidal - Medulla	600X	Student comments will vary.
Transitional Epithelium	600X	Student comments will vary.

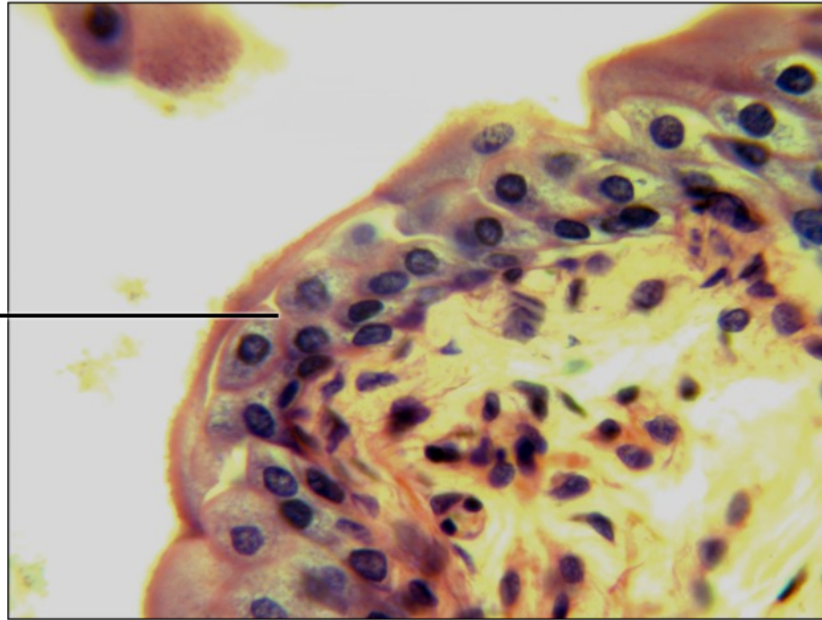
Photo 2: Simple Cuboidal - Medulla
(SAMPLE ANSWER BELOW)



Cuboidal
cell of the
collecting
ducts

Photo 3: Transitional Epithelium
(SAMPLE ANSWER BELOW)

Transitional
Epithelium



Exercise 2

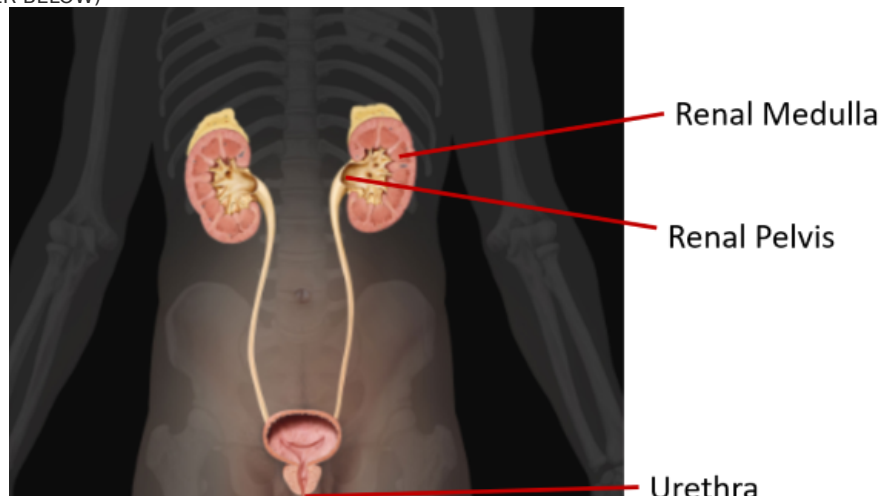
What are the functions of the renal medulla and renal cortex observed in this exercise?

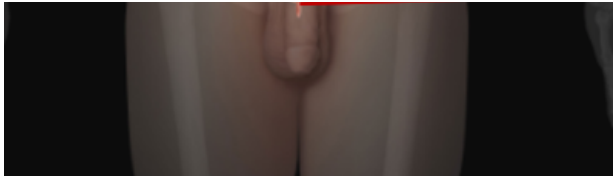
The renal medulla forms the inner portion of the human kidney and functions for the processes of secretion and absorption. The renal cortex is the outer portion of the kidney and functions for the process of filtration.

How do the descriptions of the urethra provided by the virtual model differ between the female and male anatomy?

The female urethra is described as a channel originating at the base of the bladder through which urine flows during urination with an exit hole located between the vaginal opening and the clitoris. The male urethra is described as a channel originating at the base of the bladder crossing the prostate and running along the penis to the external urethral meatus allowing both urination and ejaculation.

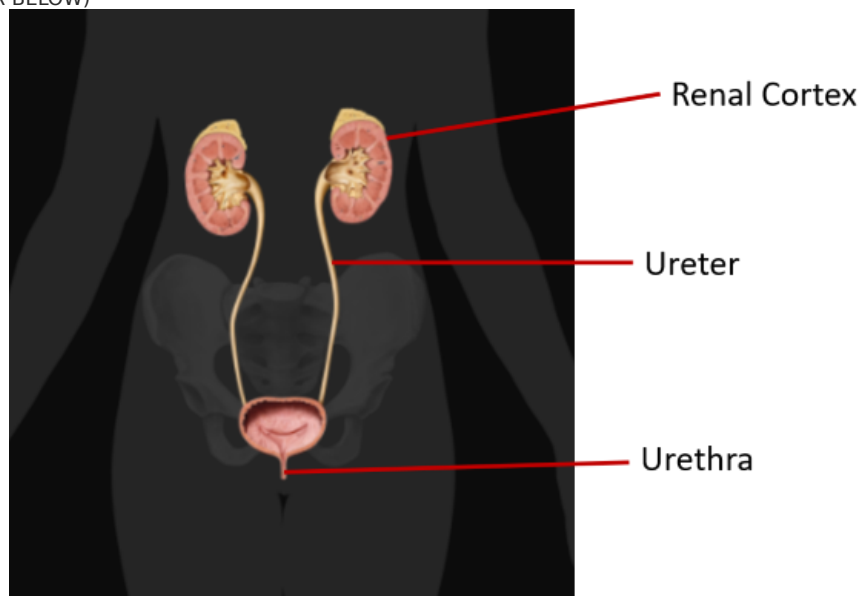
Photo 4: Virtual Model Male Urinary System
(SAMPLE ANSWER BELOW)





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Photo 5: Virtual Model Female Urinary System
(SAMPLE ANSWER BELOW)





Exercise 3

Describe where the blood is filtered in the body and the path that the urine takes out of the body.

Blood is filtered in the kidneys. Urine from the kidneys flows through the ureter, to the bladder, and then out the urethra.

What differences did you find between the male and female urethra?

The most prominent difference is the length of the urethra: the male urethra is substantially longer than the female urethra. The male urethra is located in the penis, and the female urethra runs adjacent to the vagina. The male urethra carries both urine and semen out of the body, but the female urethra carries only urine.

Photo 6: Kidneys with Renal Veins
(SAMPLE ANSWER BELOW)

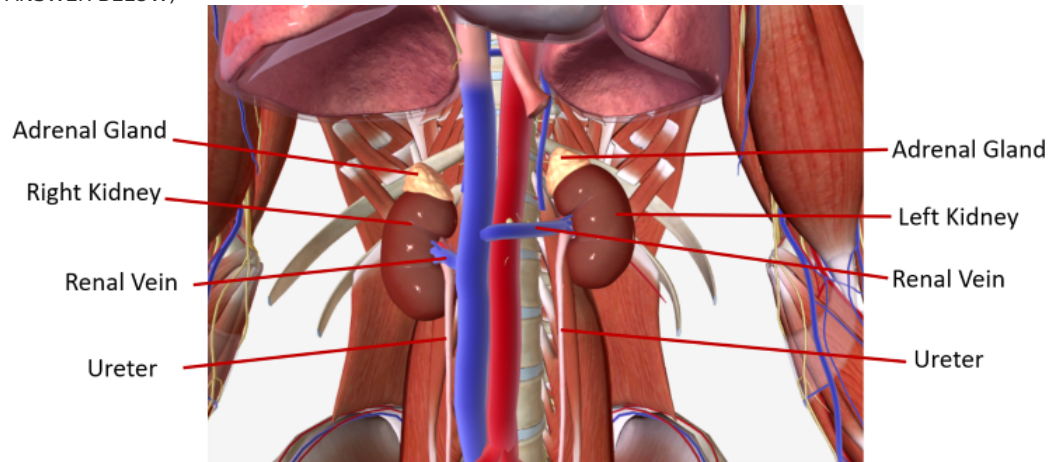


Photo 7: Kidneys with Renal Arteries
(SAMPLE ANSWER BELOW)

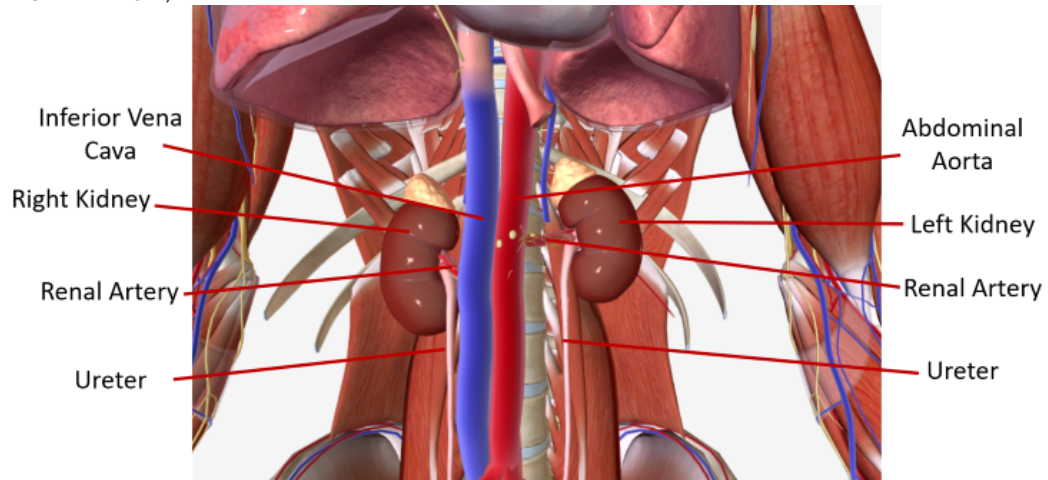


Photo 8: Male Urethra
(SAMPLE ANSWER BELOW)

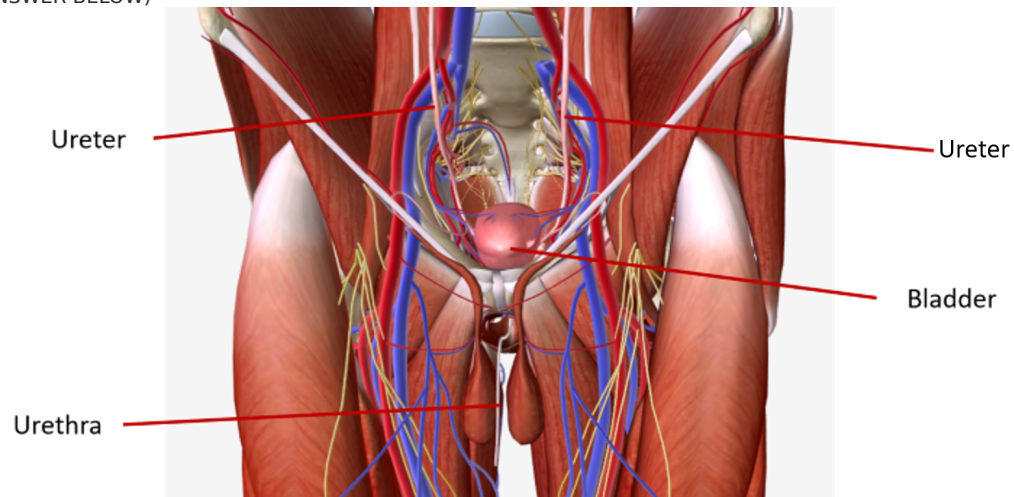
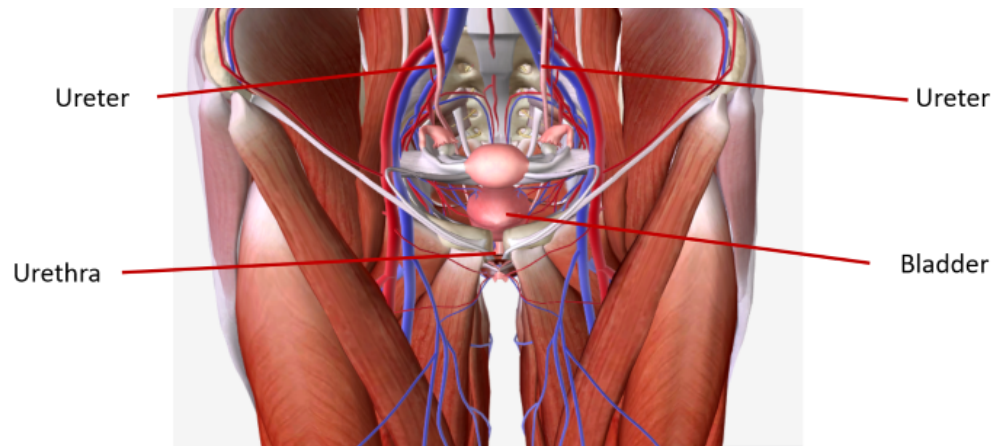


Photo 9: Female Urethra
(SAMPLE ANSWER BELOW)





Competency Review

From the kidneys, the urine is transported through the ureters to the bladder.

☐ True



☐ False

The outer portion of the kidney that contains the glomerulus and Bowman's capsule of the nephron is called the ____.

☐ renal cortex



☐ renal medulla

☐ hilus

☐ renal pelvis

Absorption and secretion occur in the ____ of the nephron.

☐ proximal convoluted tubule

☐ loop of Henle

☐ distal convoluted tubule

☐ All of the above



The collecting ducts of the nephron are formed of ____ cells.

☐ keratinized

☐ squamous epithelial

☐ cuboidal epithelial



☐ transitional epithelial

In the bladder, transitional epithelium is surrounded by connective tissue and smooth muscle that assist with contraction during the release of stored urine.

☐ True



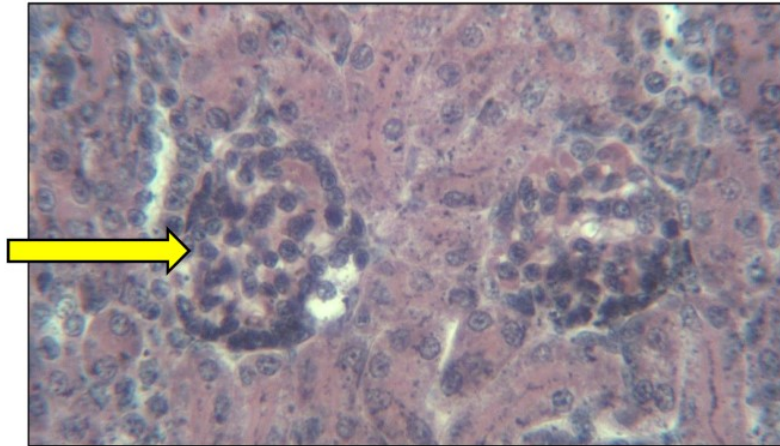
☐ False

Urine moves from the proximal convoluted tubule to the loop of Henle in the renal medulla, where water is absorbed back into the blood stream.

- ☐ True
- ☐ False

✓

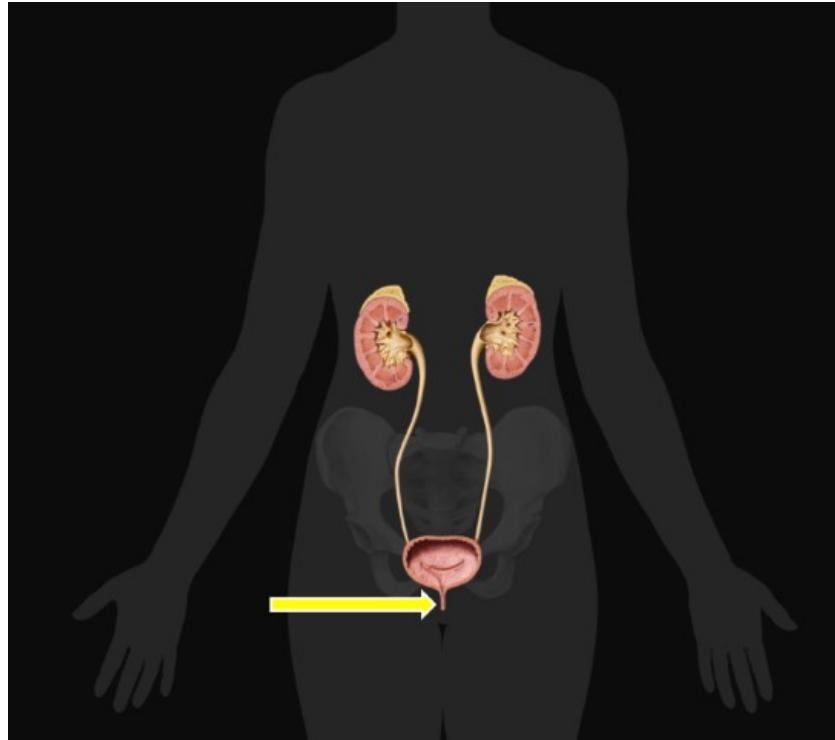
The arrow in the micrograph of kidney tissue below is indicating ____.



- ☐ a collecting tubule
- ☐ a glomerulus
- ☐ transitional epithelium
- ☐ connective tissue

✓

The arrow in the image of the virtual female model below is indicating the ____ of the urinary system.



- ☐ kidney
- ☐ ureter
- ☐ urinary bladder
- ☒ urethra



Extension Questions

Kidney stones are hard deposits made of minerals and salts that form inside the kidneys. Often, stones form when the urine becomes concentrated, allowing minerals to crystallize and stick together. Apply your knowledge of the structure and function of the kidney to predict the part of the kidney where these stones are formed. (SAMPLE ANSWER BELOW)

Kidney stones would be predicted to form in the major calyces of the kidney as these structures collect concentrated urine before it is transported out of the kidney.