

UNIT 5 REVIEW - KEY

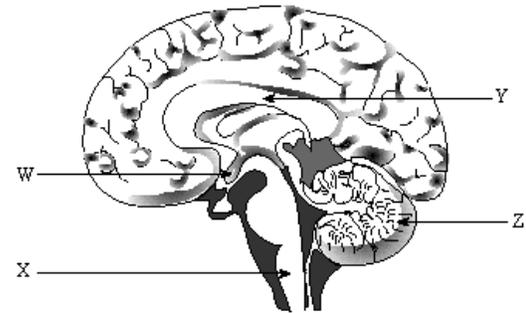
1. Explain how a neuron maintains a resting potential and why this is important.
Sodium-potassium pump. 3 Na⁺ out, 2 K⁺ in, Creates: polarity of -65mV, concentration gradient for both Na⁺ and K⁺.
2. Describe the upswing and downswing of an action potential with respect to membrane polarity and movement of ions.
upswing: - **Sodium gates open allowing sodium ions to diffuse into the axoplasm.**
- **Depolarization results in a change in the polarity across the membrane from -65 mV to +40 mV.**
downswing: - **Potassium gates open allowing potassium ions to diffuse from the inside to the outside of the axoplasm.**
- **Repolarization results in a change in the polarity across the membrane from +40 mV to -65 mV.**
3. Describe the events that occur between the time a nerve impulse reaches the end of an axon and the release of the neurotransmitters.
 - **The nerve impulse at the end of the axon increases the permeability of the presynaptic membrane to calcium ions.**
 - **Calcium ions enter the axon.**
 - **Calcium ions cause the microfilaments attached to vesicles to contract.**
 - **The vesicles with the neurotransmitters bind to the presynaptic membrane.**
4. What happens to neurotransmitters after they are released into the synaptic cleft?
 - **The neurotransmitters diffuse across the synaptic gap.**
 - **The neurotransmitters bind to receptors at the postsynaptic membrane.**
 - **The neurotransmitters are broken down by hydrolytic enzymes.**
 - **After the neurotransmitters are broken down, their components are re-absorbed into the presynaptic membrane.**
 - **The neurotransmitters are re-absorbed into the presynaptic membrane.**
5. Compare the structural similarities and differences of motor and sensory neurons.
similarities:
 - **both have axons**
 - **both have dendrites**
 - **both are myelinated**
 - **both have cell bodies**
 - **both have long fibres**
 - **both have myelinated fibres**differences:
 - **Motor neurons have branched dendrites on the cell body.**
 - **Sensory neurons have shorter axons / motor neurons have longer axons.**
 - **Sensory neurons have longer dendrites / motor neurons have shorter dendrites.**
 - **Sensory neurons have a myelinated dendrite and axon / motor neurons only have a myelinated axon.**
6. a) Explain why the knee-jerk reflex still functions in a person with a severed spinal cord.
The reflex is a complete circuit from receptor to muscle, so no control is needed from the brain.
b) Why is there is no sensation of the stimulus?
No nerves will be able to transmit impulses up the spinal cord past the injury, so the brain can neither sense the stimulus nor can it respond to it.
7. Which part of the nervous system controls hunger and regulates body temperature?
a) thalamus b) cerebellum **c) hypothalamus** d) cerebral cortex e) medulla oblongata
8. Damage to the medulla oblongata may result in
a) hearing loss. b) impaired growth **c) breathing difficulty** d) loss of coordination.
9. Stimuli coming to the brain are screened and channeled by the
a) cerebrum b) cerebellum c) hypothalamus **d) thalamus**
10. A drug was observed to have the following effects: **accelerated heart rate, dilation of pupils, reduced peristalsis.** The nervous system affected by this drug is the:
a) central b) somatic c) peripheral **d) sympathetic**
11. The hypothalamus is involved in regulating all of the following except
a) water balance b) blood pressure c) body temperature **d) conscious thought**
12. For the most part it is proper to associate the
a) sympathetic nervous system with acetylcholine and emergency situations
b) parasympathetic nervous system with noradrenalin and emergency situation
c) sympathetic nervous system with noradrenalin and emergency situations
d) parasympathetic system with acetylcholine and emergency situations

13. Consciousness is best associated with the
 a) whole brain b) frontal lobe only **c) cerebrum** d) whole central nervous system
14. The cerebrum in humans
 a) is responsible for memory b) controls balance exclusively
 c) is the largest part of the brain **d) both a and c** e) all of the above
15. Motor control of muscles originates in the
 a) parietal lobe **b) cerebellum** c) frontal lobe d) medulla oblongata e) temporal lobe
16. Which of these would you best associate with motor control?
 a) medulla and hypothalamus **b) frontal lobe and cerebellum**
 c) thalamus and parietal lobe d) occipital lobe and thalamus
17. The main nerve tract that transmits information between the two cerebral hemispheres of the brain is the
 a) thalamus b) cerebellum **c) corpus callosum** d) medulla oblongata

18. Know the following terms:
definitions in back of book

19. Identify the structures in the diagram to the right and give one function of each.

	STRUCTURE	FUNCTION
W	hypothalamus	
X	Medulla oblongata	
Y	Corpus callosum	
Z	cerebrum	



URINARY SYSTEM

i.	excretion	process by which body rids itself of metabolic wastes
ii.	ammonia	toxic waste product of protein/nitrogen compound metabolism
iii.	urea	compound that body converts NH ₃ to when producing nitrogenous wastes
iv.	Uric acid	another nitrogenous waste product excreted by the kidneys
v.	creatinine	a nitrogenous waste from breakdown of creatinine phosphate in muscle cells
vi.	kidneys	principle organs of excretion, filter blood, control blood volume, adjust blood pH
vii.	ureters	tubes that carry urine from kidney to bladder via peristalsis
viii.	Urinary bladder	muscular sac that stores urine, empties via urethra
ix.	urethra	carries urine from bladder to outside of body, passes through penis in males
x.	cortex	outer region of organ such as kidney. In kidney, contains glomeruli, capsule, tubules
xi.	medulla	inner region of kidney. Striated due to presence of many collecting ducts. Salty.
xii.	pelvis	hollow region inside kidney to which collecting ducts lead, and into which urine collects
xiii.	nephrons	functional unit of kidneys that perform all the kidney's functions
xiv.	Bowman's capsule	Cup-like open end of the nephron, contains glomeruli
xv.	Proximal convoluted tubule	Found in cortex region of nephron, site of selective reabsorption in nephron
xvi.	Distal convoluted tubule	Found in cortex region of nephron, site of tubular excretion in nephron
xvii.	Collecting duct	reabsorbs water, carries urine to renal pelvis
xviii.	glomerulus	tuft of capillaries through which blood is filtered, under high pressure, in kidneys
xix.	Peritubular capillary network	network of capillaries that surrounds nephron and reabsorbs water and nutrients from filtrate
xx.	Pressure filtration	first step in urine formation, occurs in glomeruli, forces small molecules into Bowman's capsule
xxi.	filtrate	the solution containing wastes plus water and small nutrients that is filtered from the blood
xxii.	Selective reabsorption	2nd step of urine formation, H ₂ O, nutrients, salts reabsorbed actively & passively into blood
xxiii.	Tubular excretion	step of urine formation in which wastes like penicillin, histamine added to urine, ADH acts here
xxiv.	Antidiuretic hormone	ADH, released by pituitary gland, causes distal tubule and collecting duct to reabsorb more water

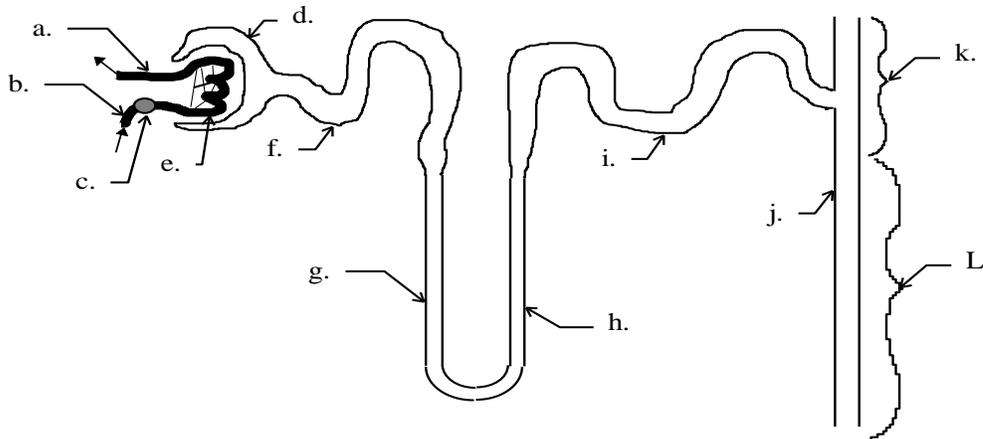
Part B - Short Answers

- Urea is a waste product from **AMINO ACID** metabolism and is made in the **LIVER** and excreted by the **KIDNEYS**.
- The primary type of waste found in urine is **NITROGENOUS** waste.
- The outermost portion of the kidney is called the **CORTEX**. The middle layer is called the **MEDULLA**. Urine collects in the cavity called the renal **PELVIS**.
- Arrange the following in the correct sequence in which they function in urine formation:

collecting duct	distal convoluted tubule	Bowman's Capsule	proximal convoluted tubule	loop of Henle
BOWMAN'S CAPSULE	PROXIMAL CONVOLUTED TUBULE	LOOP OF HENLE	DISTAL CONVOLUTED TUBULE	COLLECTING DUCT

- Name a substance that is filtered, maximally reabsorbed, and still in urine. **WATER OR NACL**
- Glucose is not normally found in the urine; it is reabsorbed totally by means of **ACTIVE TRANSPORT**.
- When ADH is present, urine production **DECREASES**.
- If the blood is acidic, **HYDROGEN** ions are excreted in combination with **AMMONIA**, while **SODIUM** and bicarbonate ions are reabsorbed.
- The functional units of the kidneys are called **NEPHRONS**. Each kidney has about one **MILLION** of them.
- Please label the following parts on the diagram of the nephron.

A. AFFERENT ARTERIOLE	E. GLOMERULI	I. DISTAL CONVOLUTED TUBULE
B. EFFERENT ARTERIOLE	F. PROXIMAL CONVOLUTED TUBULE	J. COLLECTING DUCT
C. JUXTAGLOMERULAR APPARATUS	G. Descending Limb of LOOP OF HENLE	K. CORTEX Region of Kidney
D. BOWMAN'S CAPSULE	H. ASCENDING Limb of Loop of Henle	L. MEDULLA Region of Kidney



- Using the letters from the above, indicate the location or locations that best fit the description:

a) Glucose is reabsorbed?	F	b) Impermeable to H ₂ O	H
c) Impermeable to salt	G, J	d) responsible for hypertonic urine	G, H
e) site of pressure filtration	E	f) place where pH is adjusted	F, I
g) releases Renin to increase blood pressure	C	h) contains dissolved proteins	A, B
l) ADH primarily acts here	I, J	j) site of selective reabsorption	F
k) site of tubular excretion	I	l) bicarbonate ions actively reabsorbed here	I
m) region with the "saltiest" cells	L	n) H ₂ O reabsorbed here	F, G, I, J
o) penicillin would be excreted here	I	p) contains urine	J
q) cells here would have a lot of mitochondria	F, I	r) wastes leave the blood here	E

- If the blood is alkaline, fewer **HYDROGEN** ions are excreted and fewer **SODIUM** and bicarbonate ions are reabsorbed.
- One end of the nephron is shaped into a double-layered, cup-like structure which may be called a **BOWMAN'S CAPSULE**.
- Many collecting ducts join together to empty into the **PELVIS**.
- The duct that carries urine from the bladder to the outside is the **URETHRA**.
- The ureter carries urine from the **KIDNEY** to the **BLADDER**.
- The solution produced when blood is filtered through the walls of the glomerulus and the nephric capsule is called the **FILTRATE**.
- The force that causes filtration is **BLOOD PRESSURE**.
- The organs of excretion most responsible for ridding the body of CO₂ are the lungs.
- Aldosterone is a hormone that is produced in the **CORTEX** of the **ADRENAL** glands.
- Aldosterone regulates the levels of **SODIUM** ions and **POTASSIUM** ions in the blood. It causes the nephron to **ABSORB** more sodium back into the blood and **EXCRETE** more potassium from the blood into the urine.
- The renal vein would carry blood that is **LOW** in oxygen and **LOW** in urea.
- The renal artery would carry blood that is **HIGH** in oxygen and **HIGH** in urea.
- Explain how the conditions in the renal medulla result in the production of urine which is hypertonic to blood.
 - The renal medulla contains a high concentration of Na⁺, Cl⁻ and urea making it hypertonic to the filtrate.
 - When the filtrate passes through the renal medulla, water moves from the filtrate into the renal medulla where the peritubular network absorbs it.
 - The filtrate, having lost water, is now hypertonic to body fluids.
 - ADH causes water reabsorption from the collecting duct making urine more hypertonic.
- Explain how ADH secretion affects the composition of the blood.
 - ADH causes the collecting duct to become more permeable to water.
 - More water is re-absorbed into the blood.
 - The blood becomes less concentrated.
 - The volume of the plasma increases.
- List the structures, in the correct order, through which a sodium ion passes as it travels through the tubule from the renal artery to the renal vein.
afferent arteriole → glomerulus → Bowman's Capsule → proximal convoluted tubule → peritubular capillaries
- Know the following terms: - see definitions in text.