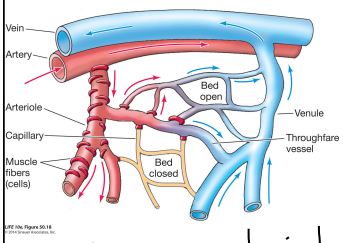
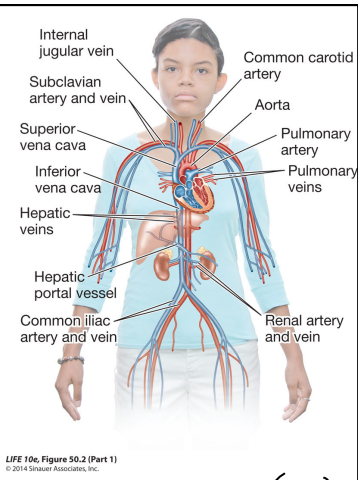
Local and systemic control of blood pressure





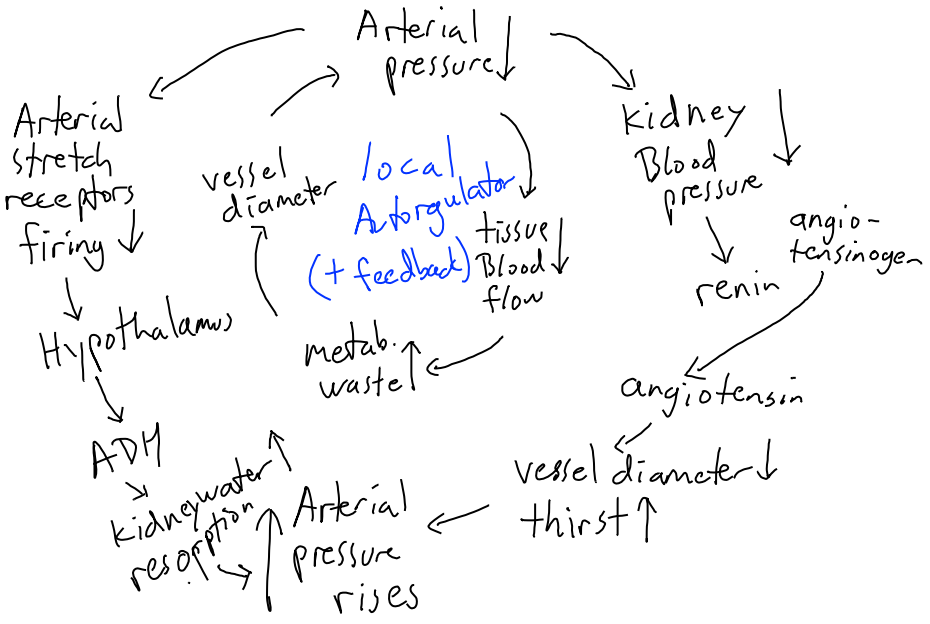
mean arterial pressure
Cardiac Output
Total peripheral resistance

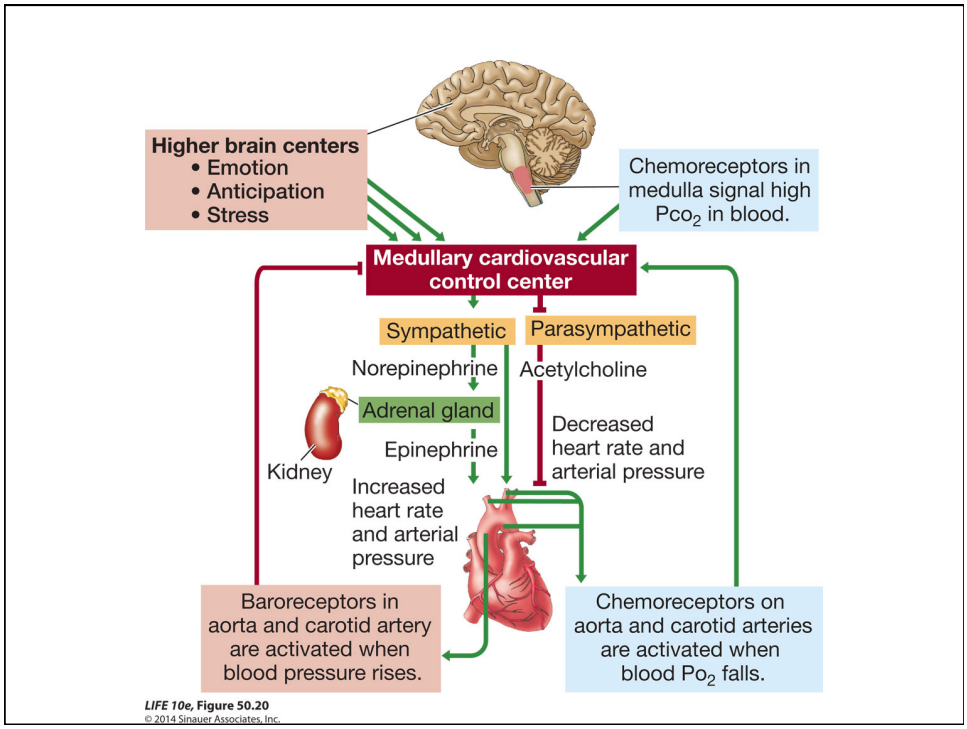
$MAP = CO \times TPR$

$MAP = HR \times SV \times TPR$

Heart rate (HR)
Stroke volume (SV)

Local and systemic control of blood pressure





LIFE 10e, Figure 50.20
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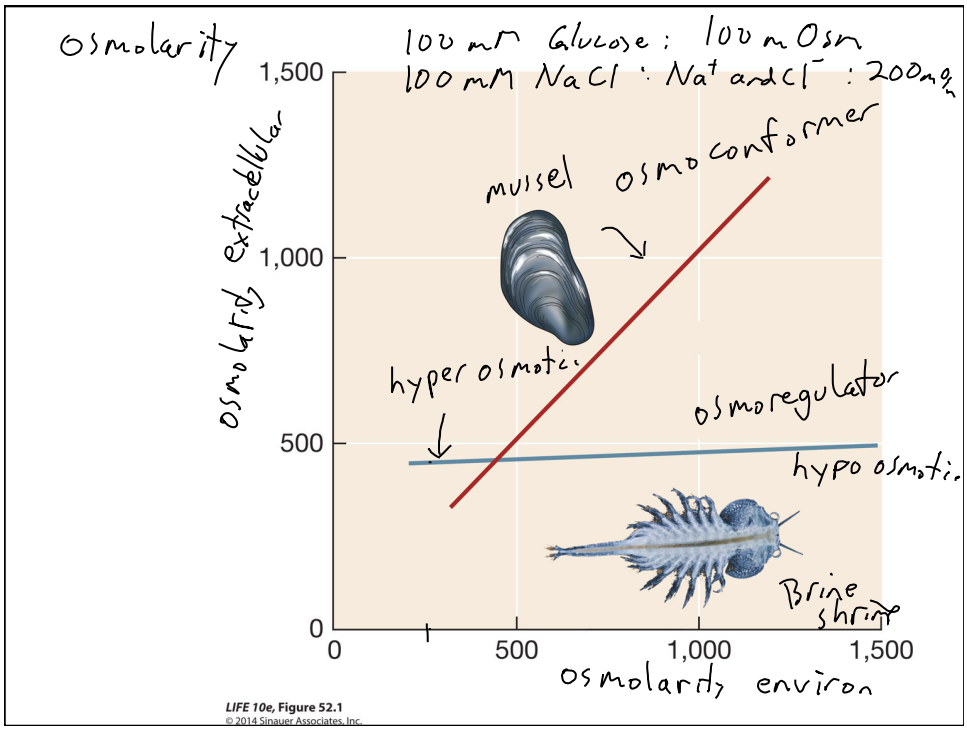

LIFE 10e, Figure 52.1
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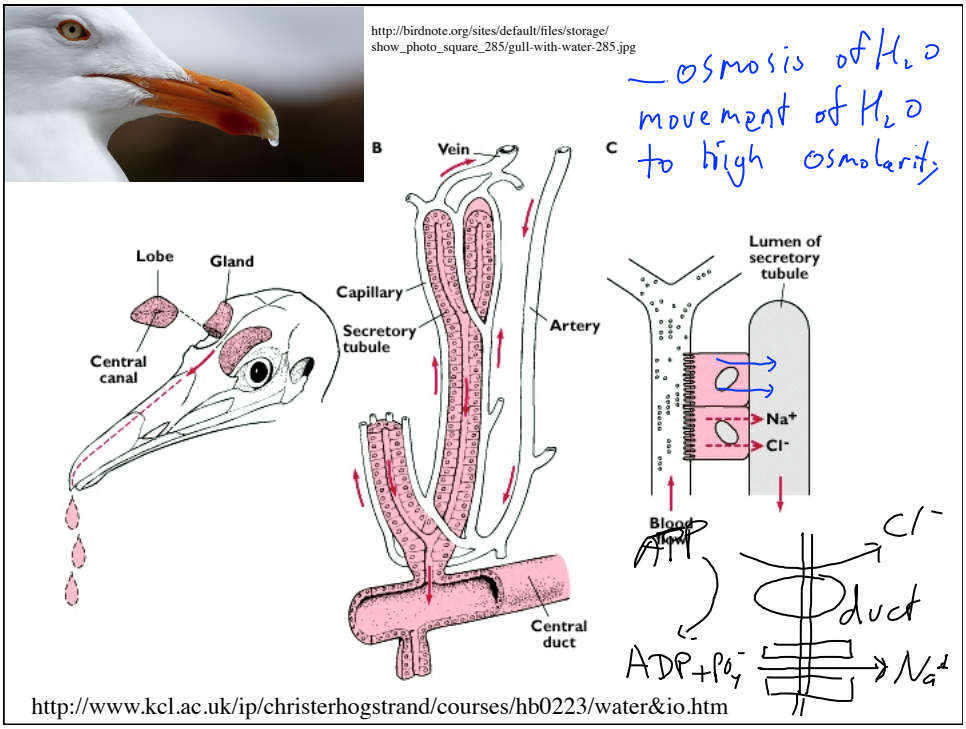
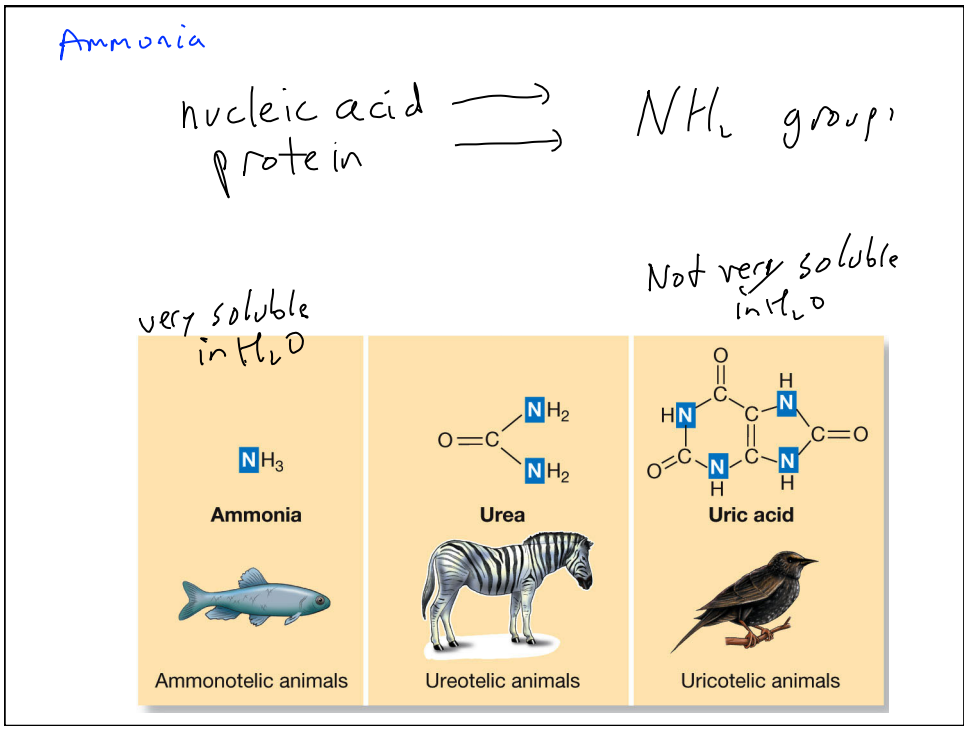
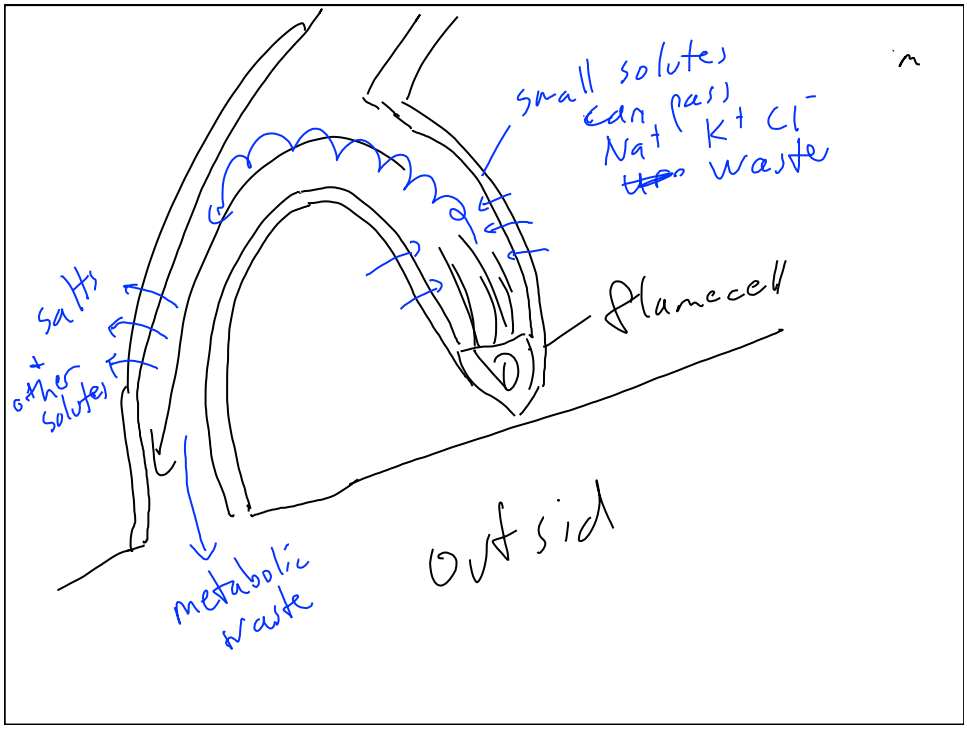
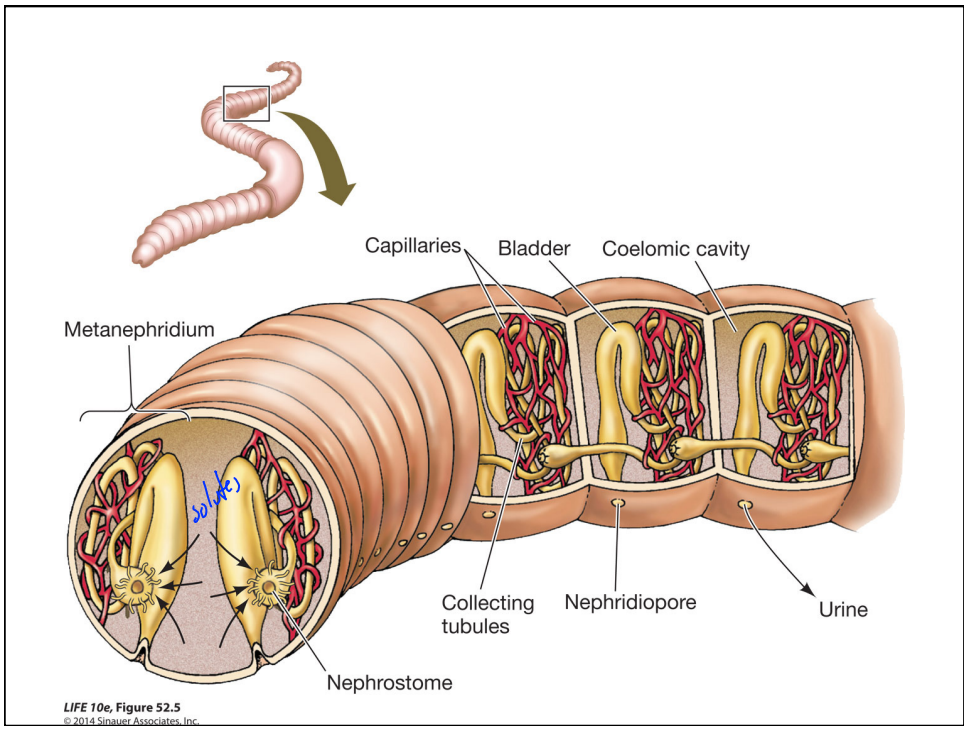

http://birdnote.org/sites/default/files/storage/show_photo_square_285/gull-with-water-285.jpg
osmosis of H_2O
movement of H_2O to high osmolarity
B
Vein
Lobe
Gland
Capillary
Secretory tubule
Artery
Central canal
Central duct
C
Lumen of secretory tubule
Na^+
Cl^-
Blood flow
ATP
ADP + PO_4^-
Cl^-
duct
Na^+
http://www.kcl.ac.uk/ip/christerhogstrand/courses/hb0223/water&io.htm


Ammonia
nucleic acid
protein
NH_2 group
very soluble in H_2O
Not very soluble in H_2O
NH_3
Ammonia
Urea
Uric acid
Ammonotelic animals
Ureotelic animals
Uricotelic animals


small solutes
can pass
Na+ K+ Cl-
waste
salts
other solutes
flame cell
outsid
metabolic waste


Capillaries
Bladder
Coelomic cavity
Metanephridium
solute
Collecting tubules
Nephridiopore
Urine
Nephrostome
LIFE 10e, Figure 52.5
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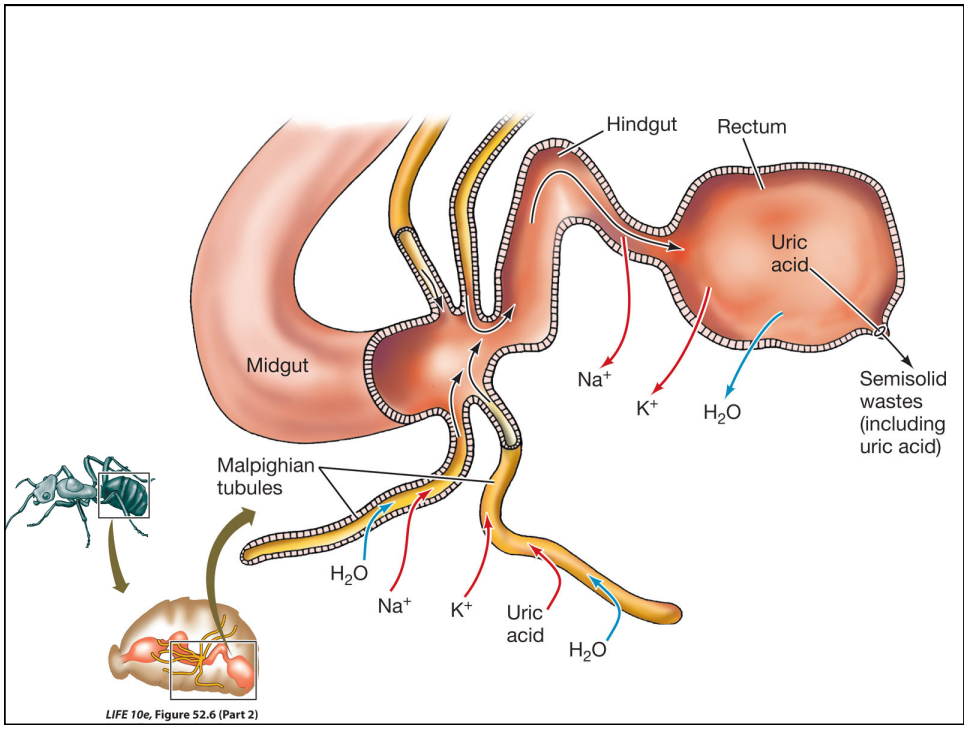
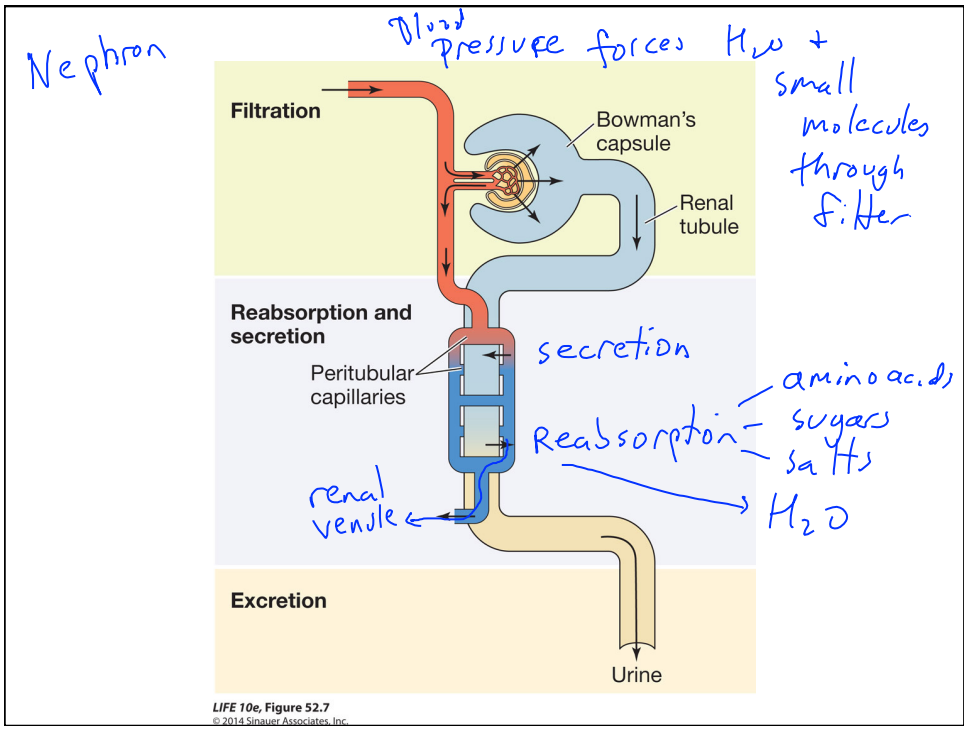

Hindgut
Rectum
Uric acid
Midgut
Na+
K+
H2O
Semisolid wastes (including uric acid)
Malpighian tubules
H2O
Na+
K+
Uric acid
H2O
LIFE 10e, Figure 52.6 (Part 2)


Nephron
Blood pressure forces H2O + small molecules through filter
Filtration
Bowman's capsule
Renal tubule
Reabsorption and secretion
Peritubular capillaries
secretion
Reabsorption – amino acids, sugars, salts
H2O
renal venule
Excretion
Urine
LIFE 10e, Figure 52.7
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osmolarity
[urea + salt]
↓

Animal	Kidney size (mm)[a]	Relative medullary thickness, RMT[b]	Percent long loops of Henle	Freezing point depression, FPD (°C)[c]
Human	64.0	3.0	14	2.6
Pig	66.0	1.6	3	2.0
Domestic cat	24.0	4.8	100	5.80
Beaver	36.0	1.3	0	0.96
Lab rat	14.0	5.8	28	4.85
Sand rat	13.0	10.7	100	9.2
Kangaroo rat	5.9	8.5	27	10.4
Jerboa	4.5	9.3	33	12.0

urine

[a] Kidney size = cube root of overall length × width × thickness
[b] RMT = thickness of medulla in mm × 10 divided by kidney size.
[c] FPD = the number of degrees below 0°C at which urine freezes. FPD is a measure of solute concentration: the more concentrated the urine, the higher the FPD.

LIFE 10e, Working with Data 52.1, Table 1
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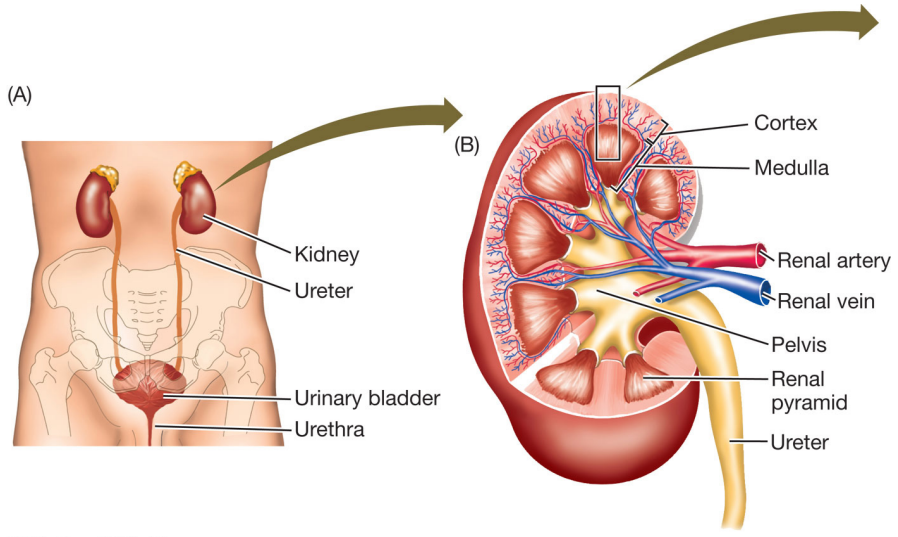

LIFE 10e, Figure 52.9 (Part 1)
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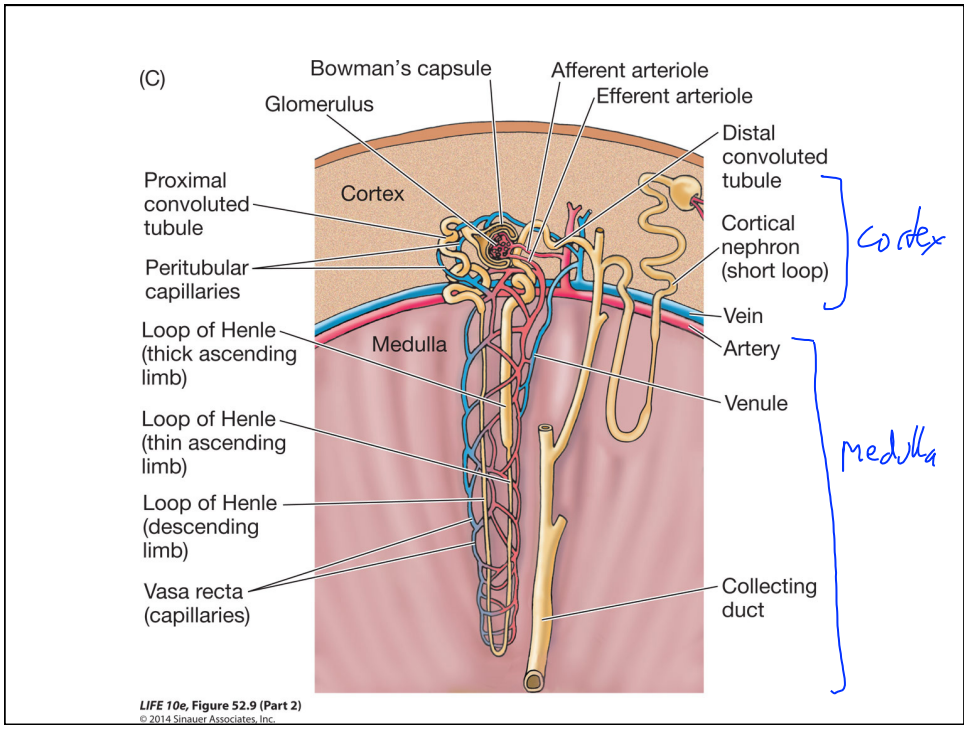
(C)
Bowman's capsule
Afferent arteriole
Efferent arteriole
Glomerulus
Distal convoluted tubule
Proximal convoluted tubule
Cortex
Cortical nephron (short loop)
Peritubular capillaries
Vein
Loop of Henle (thick ascending limb)
Medulla
Artery
Venule
Loop of Henle (thin ascending limb)
Loop of Henle (descending limb)
Vasa recta (capillaries)
Collecting duct
Cortex
Medulla
LIFE 10e, Figure 52.9 (Part 2)
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