Fig. 23.1

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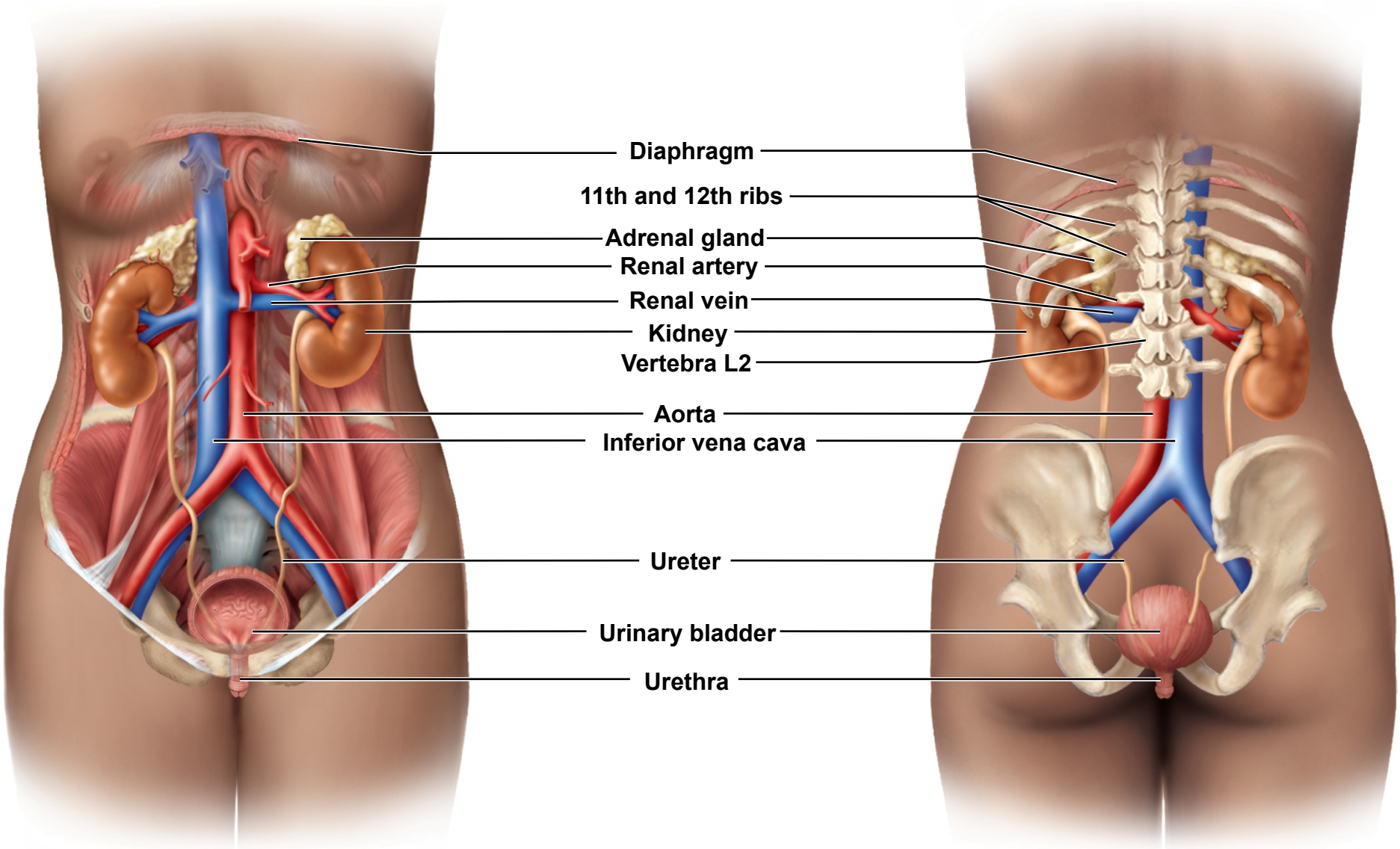

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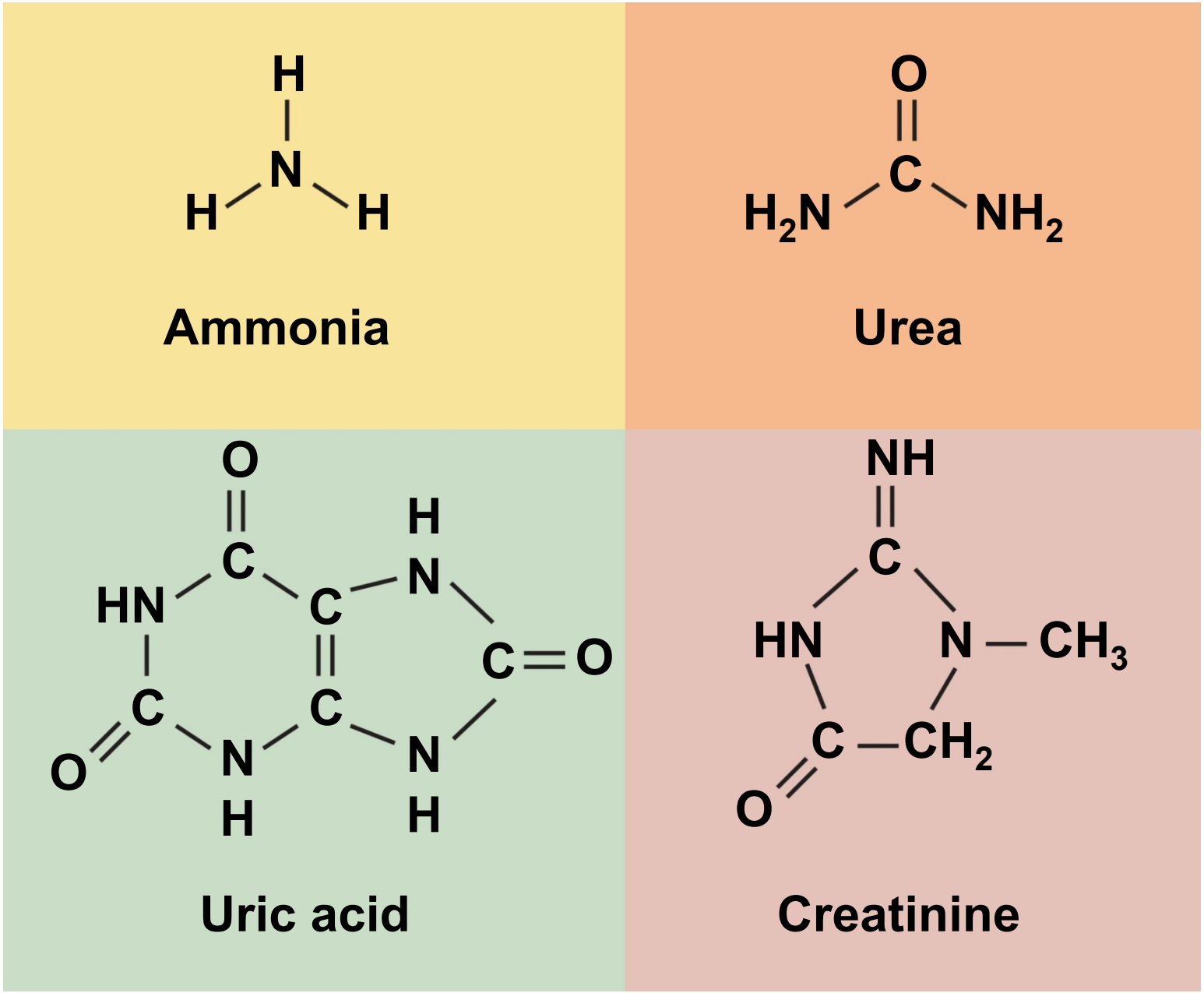

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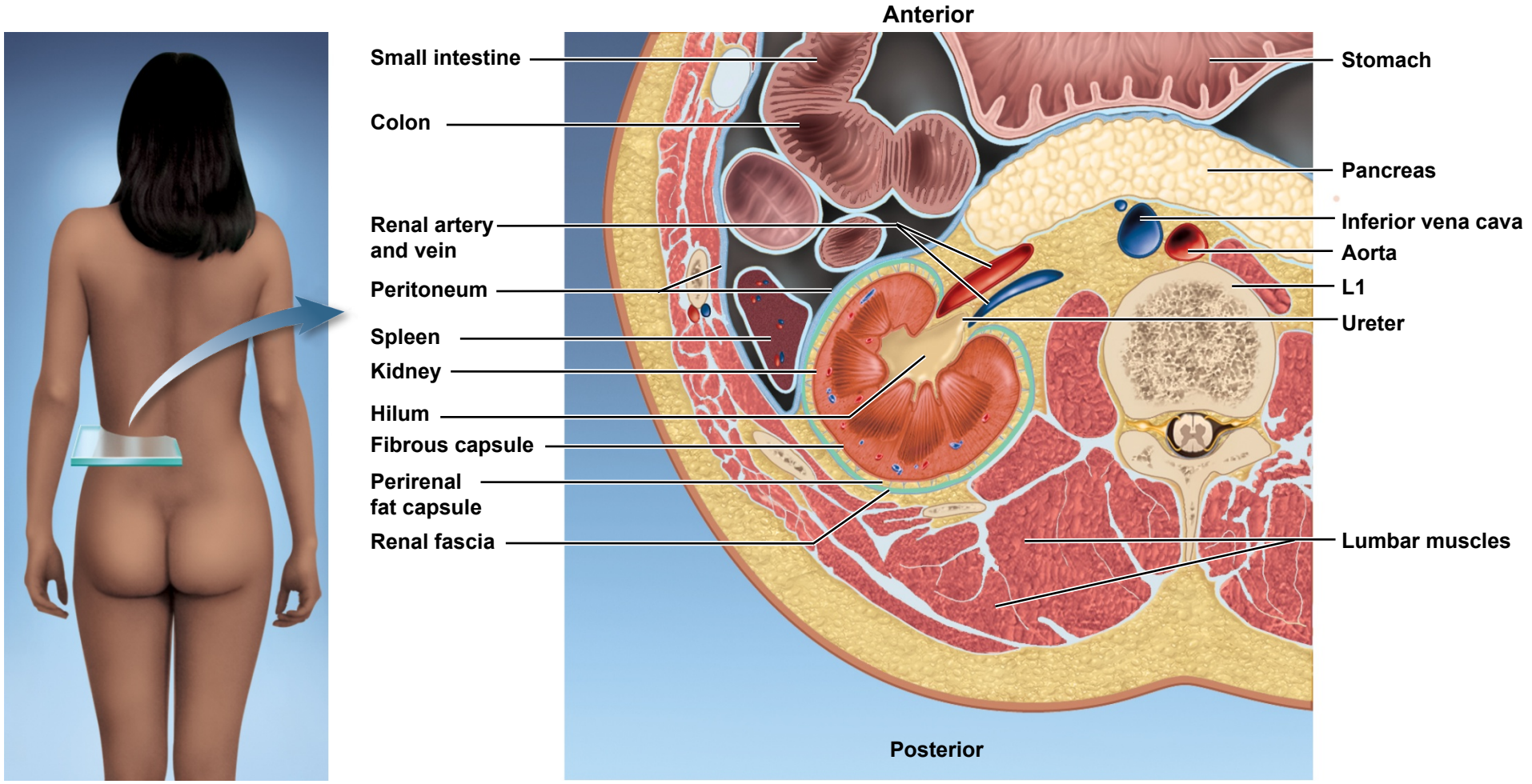

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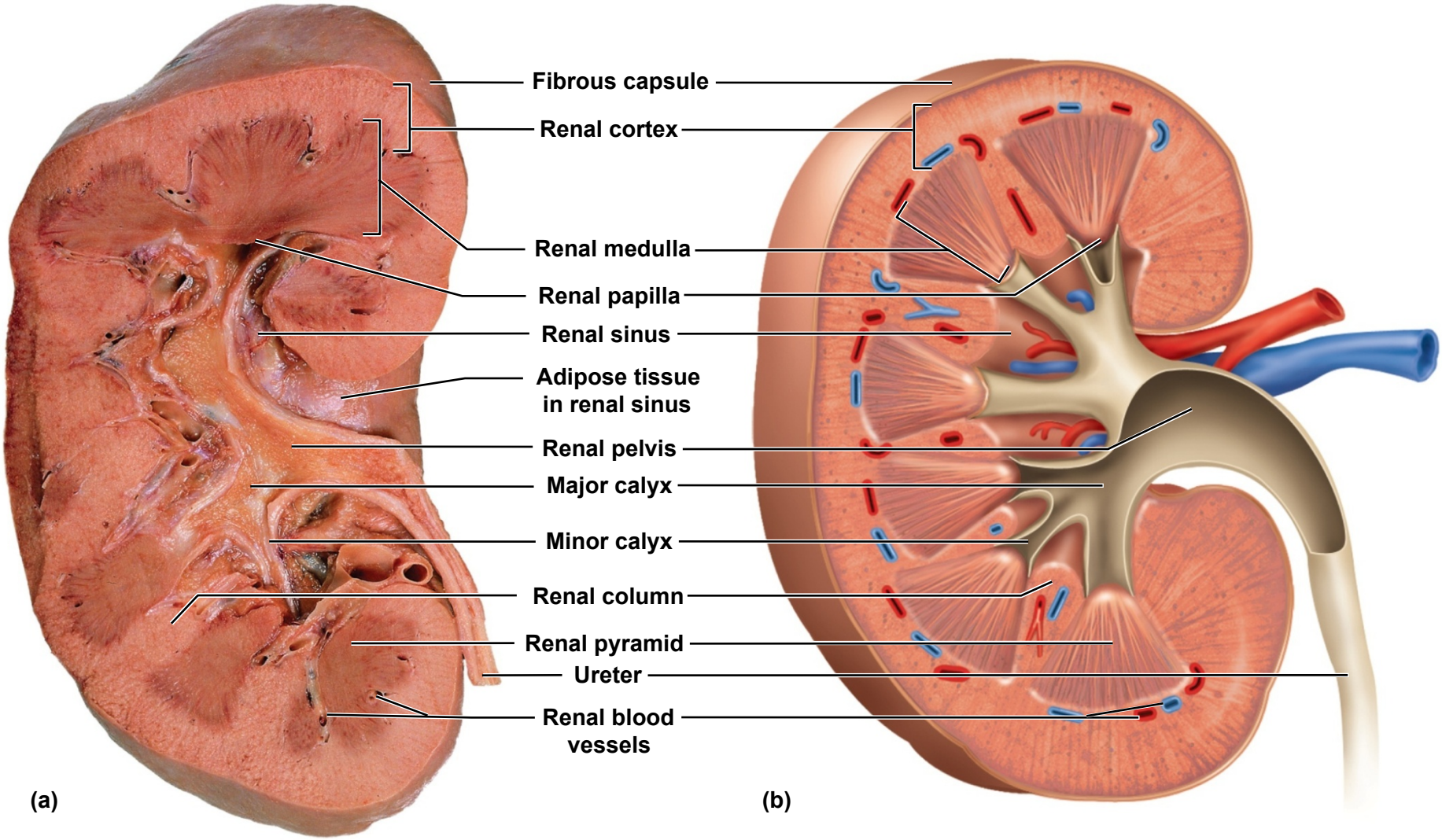

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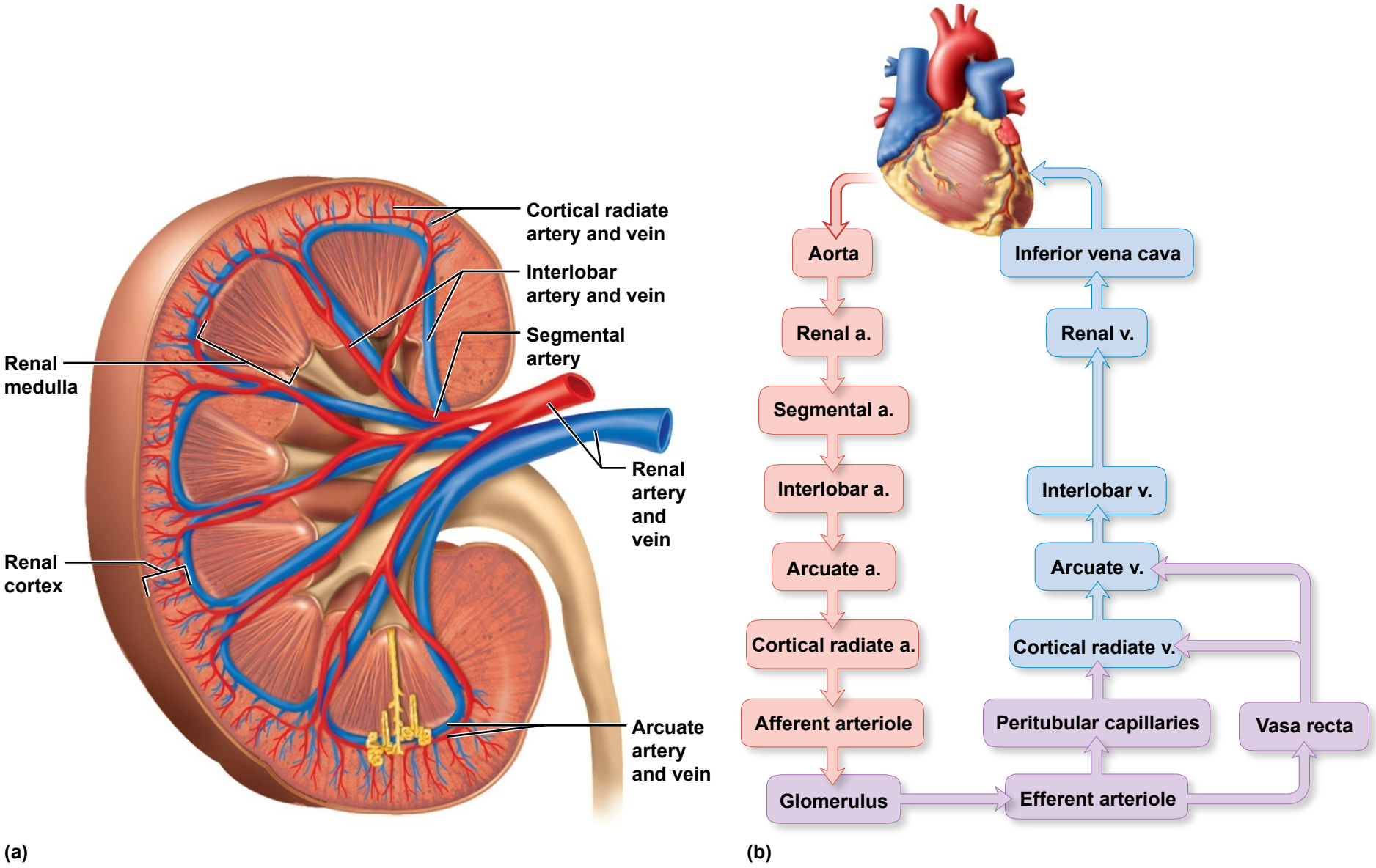

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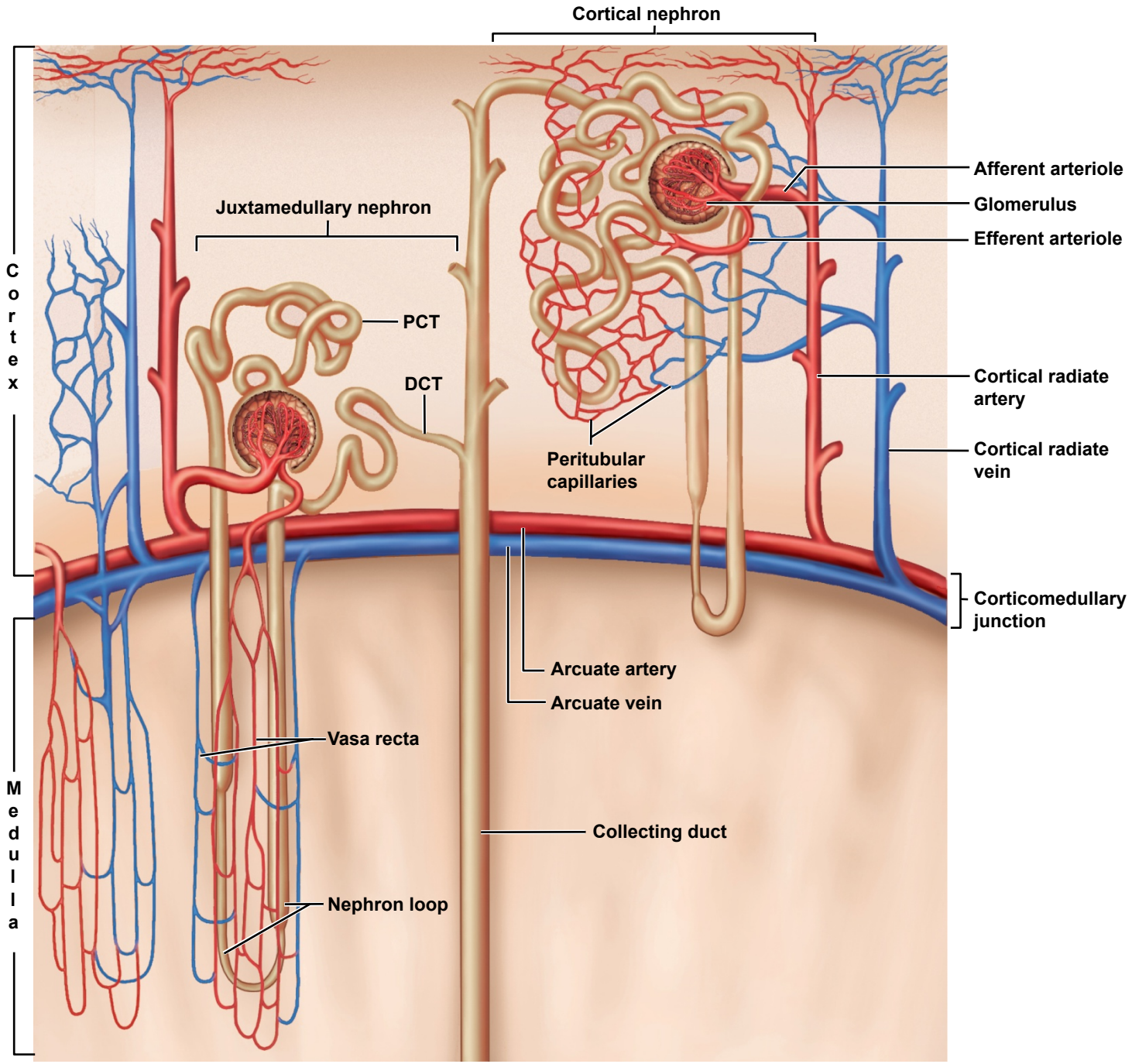

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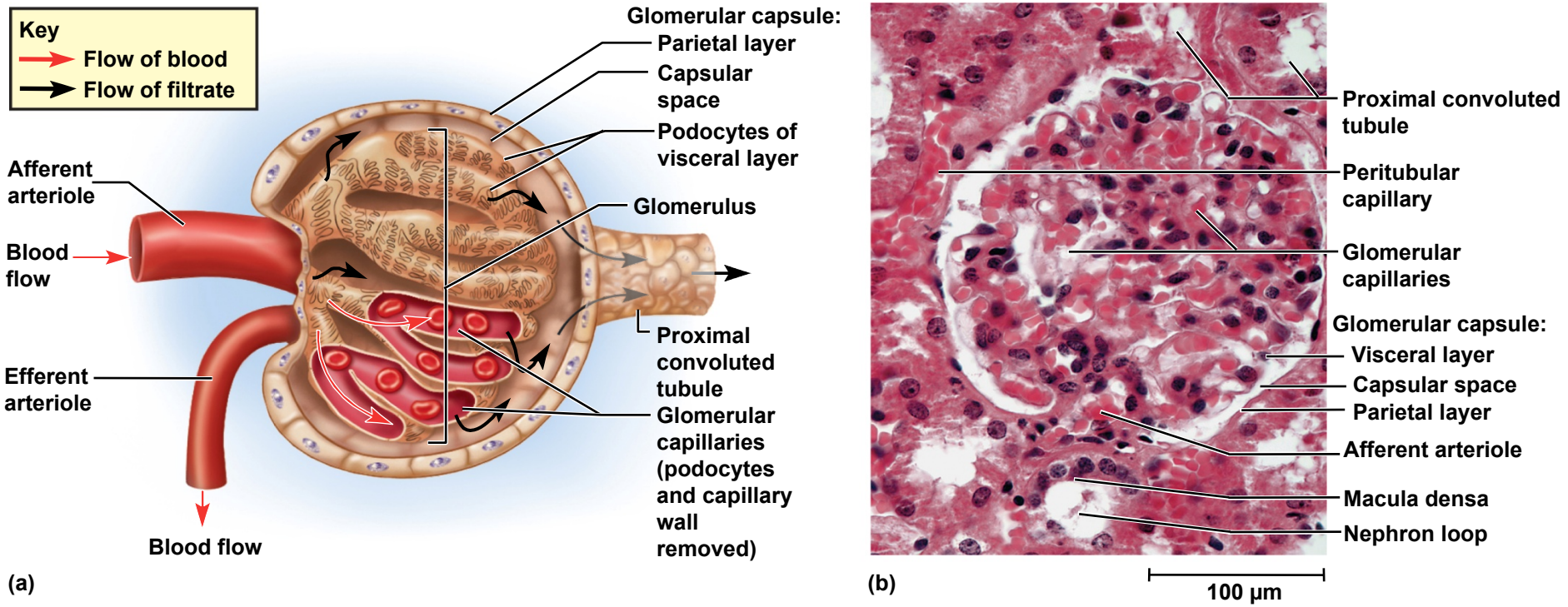

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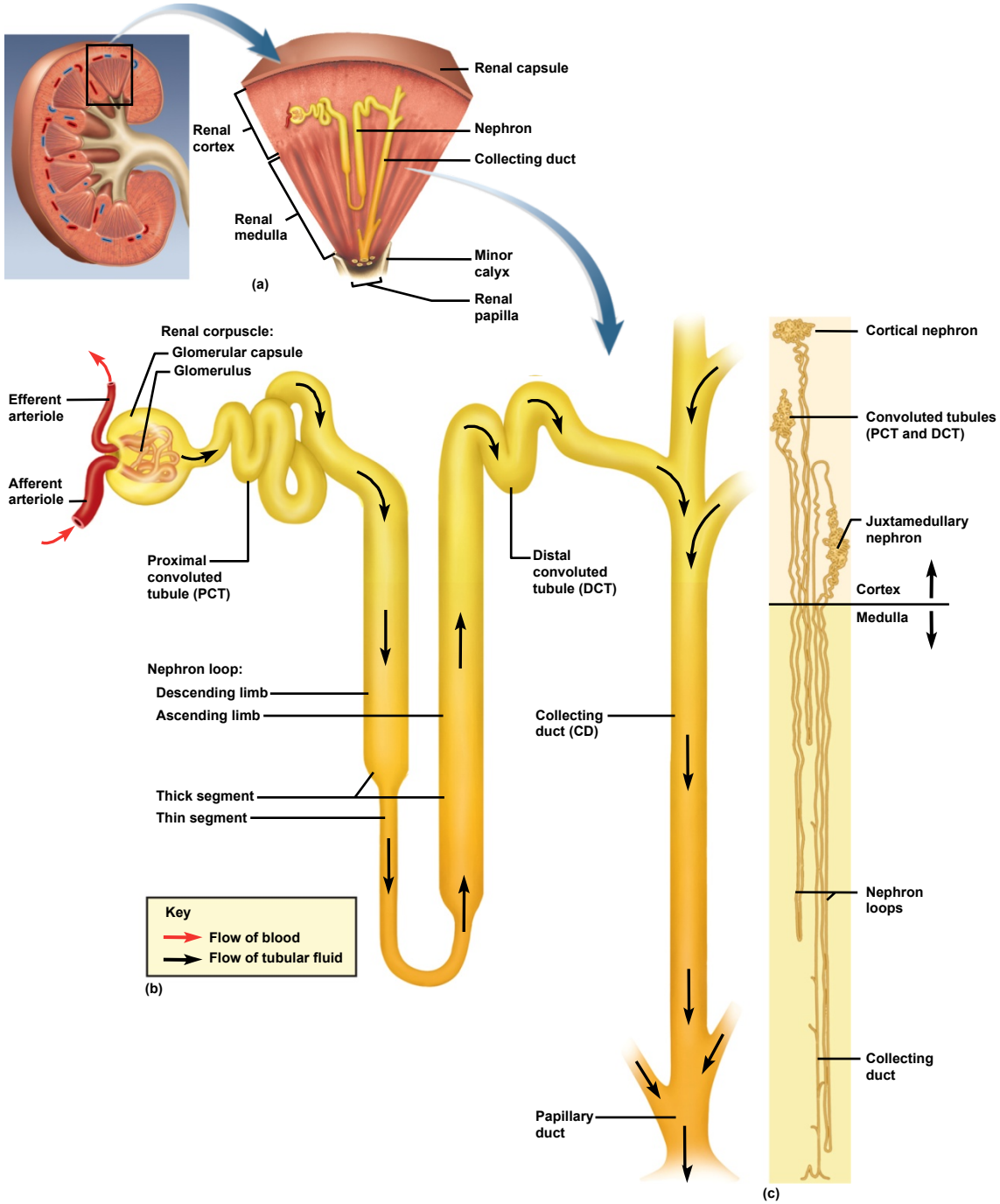

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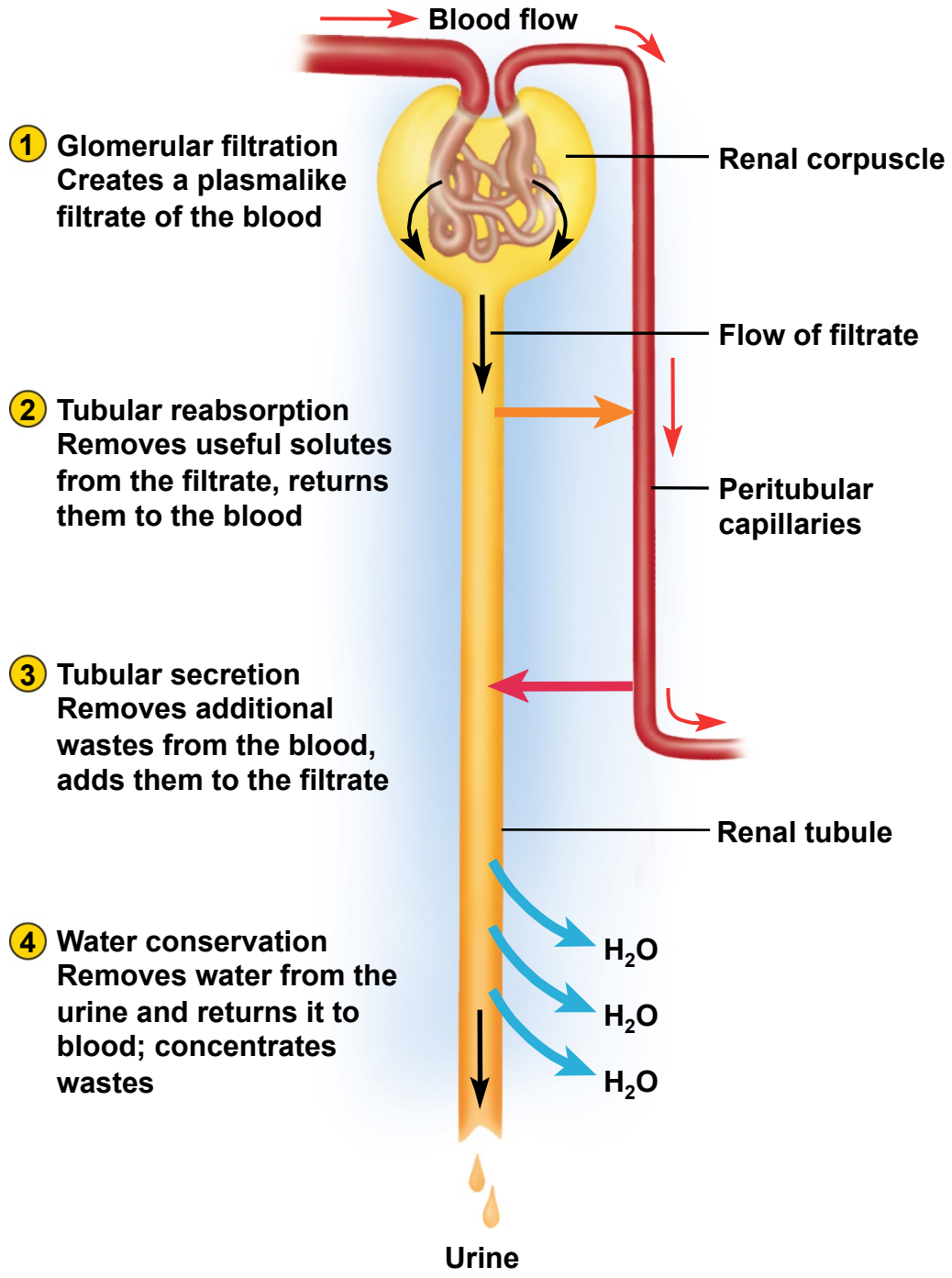

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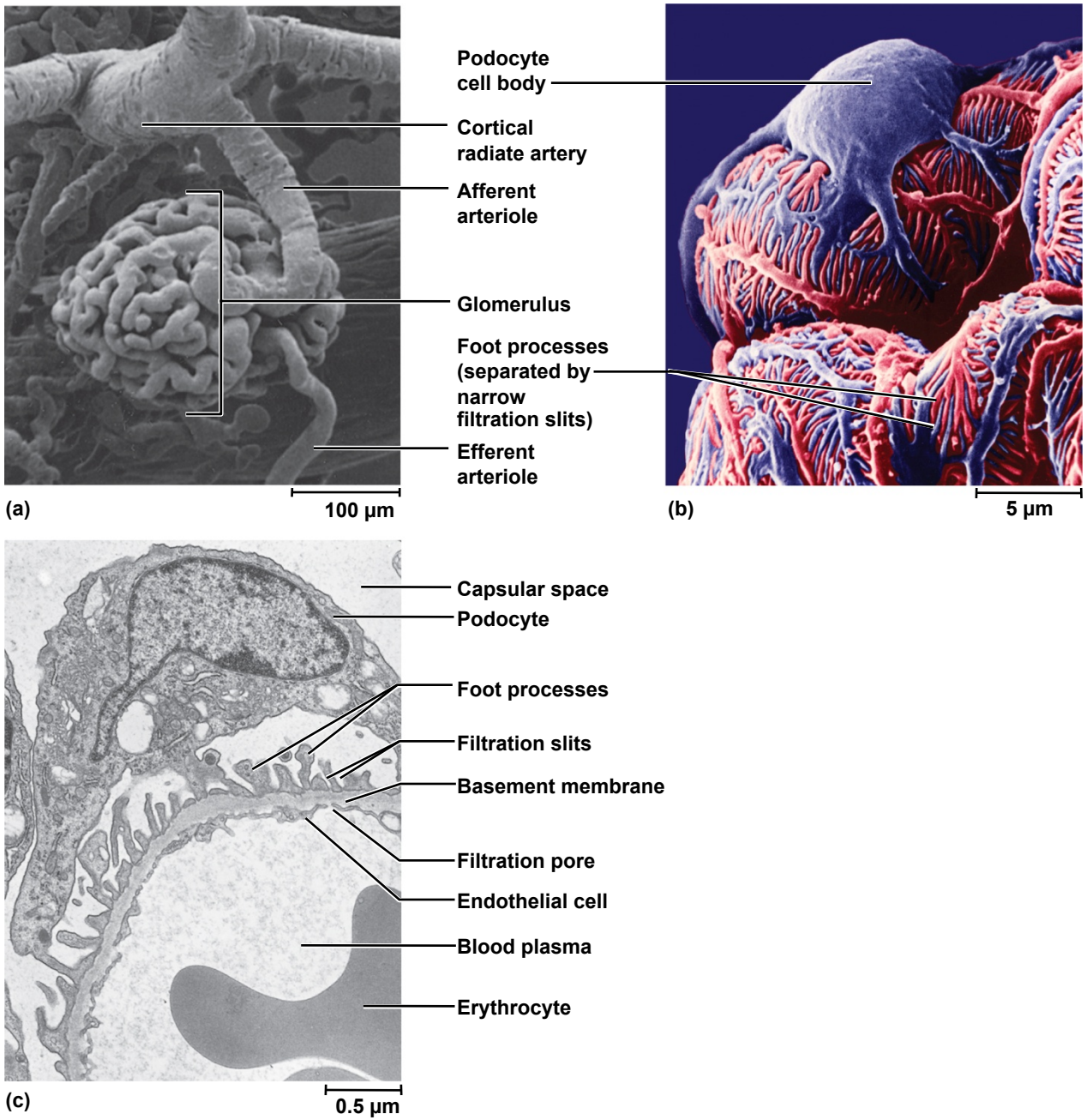

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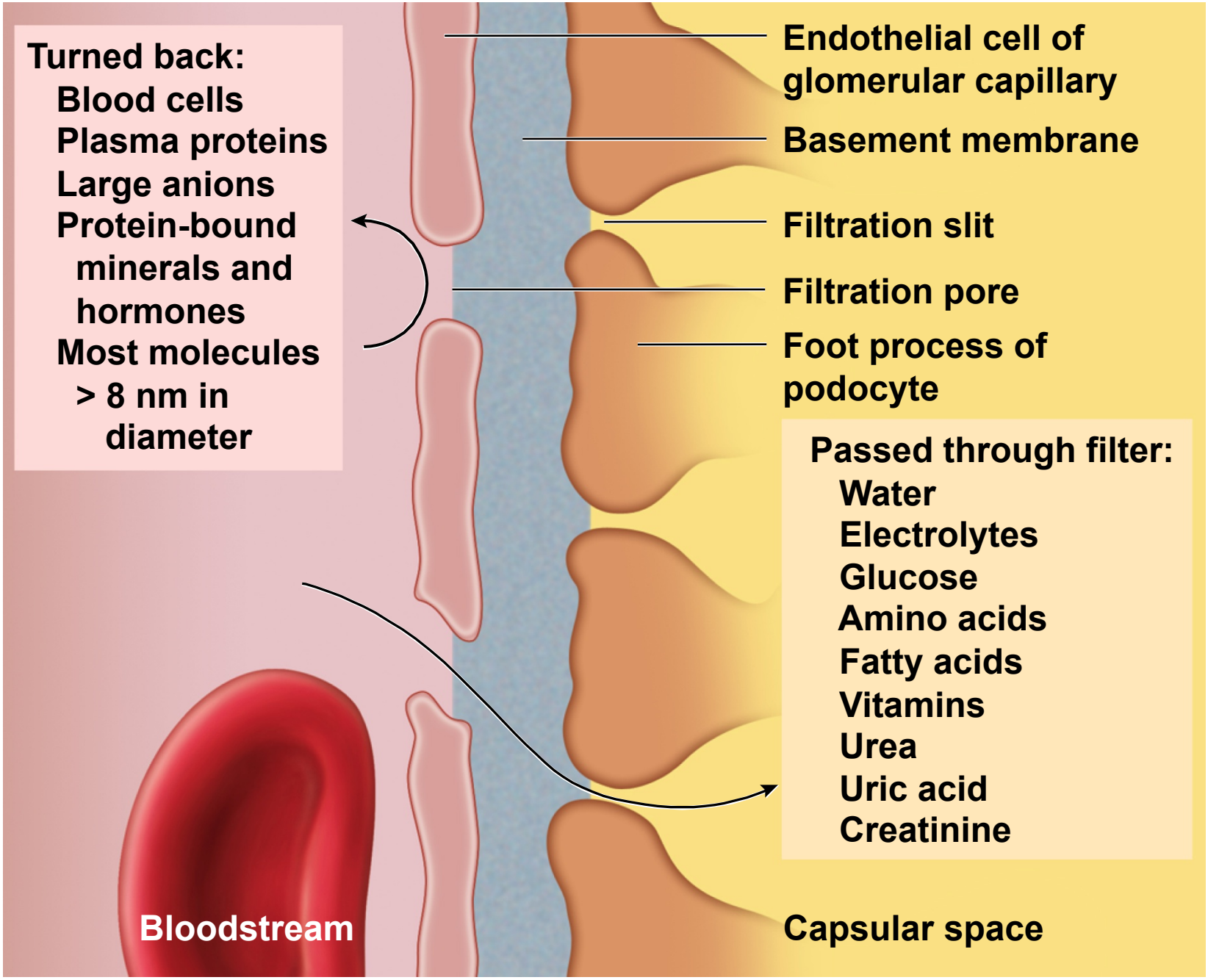

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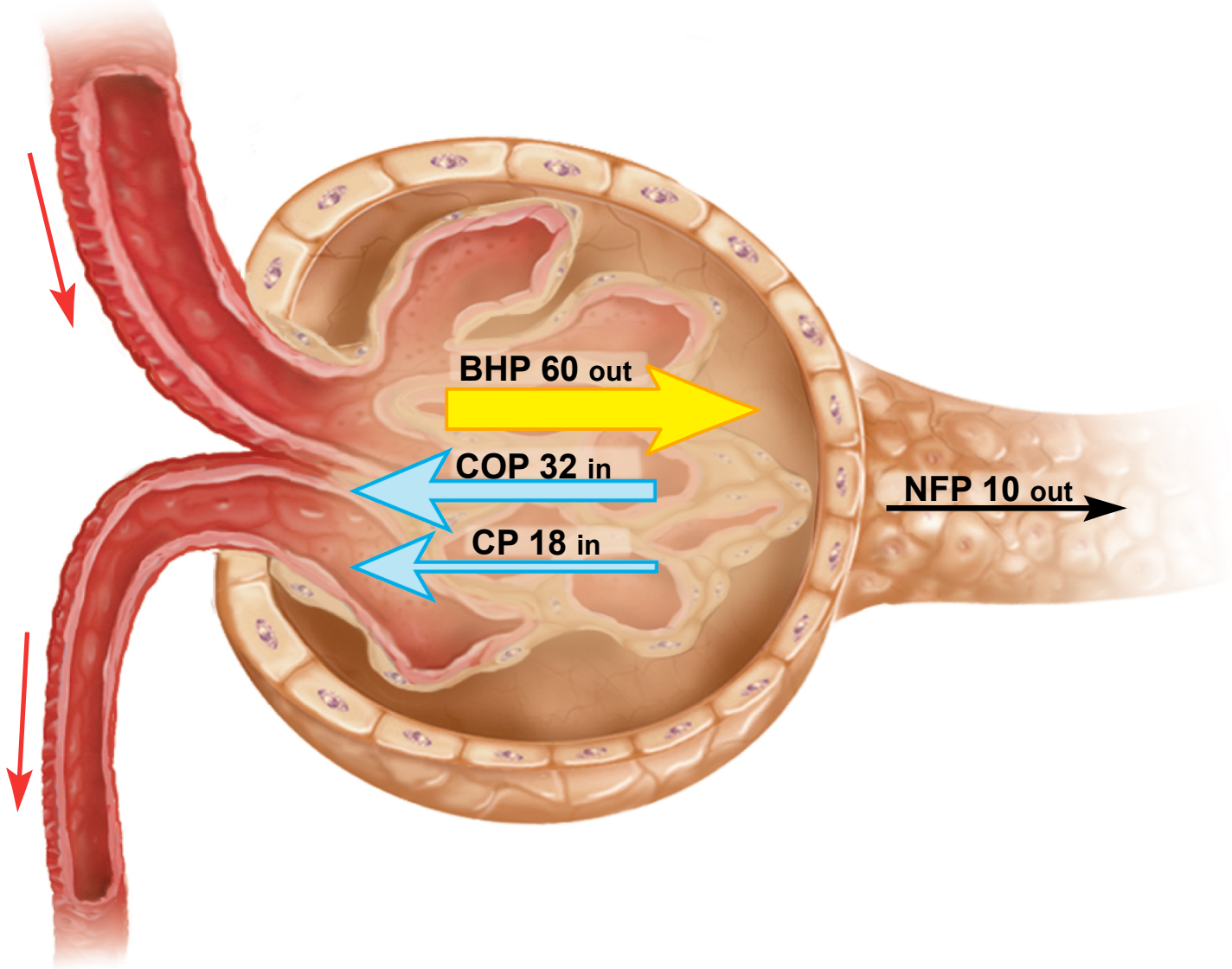

Blood hydrostatic pressure (BHP)	**60 mm Hg_{out}**
Colloid osmotic pressure (COP)	**–32 mm Hg_{in}**
Capsular pressure (CP)	**–18 mm Hg_{in}**
Net filtration pressure (NFP)	**10 mm Hg_{out}**

Fig. 23.13

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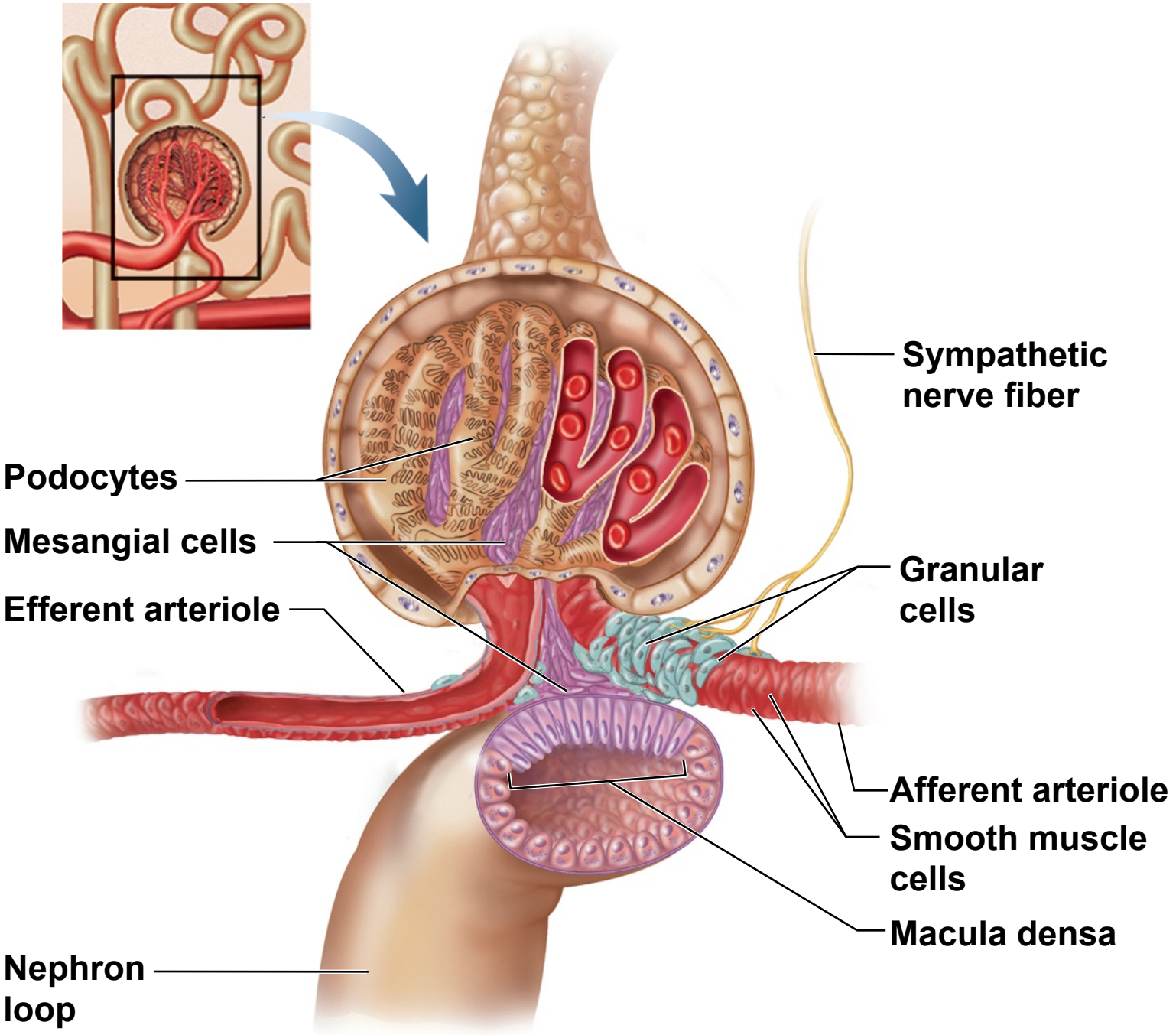

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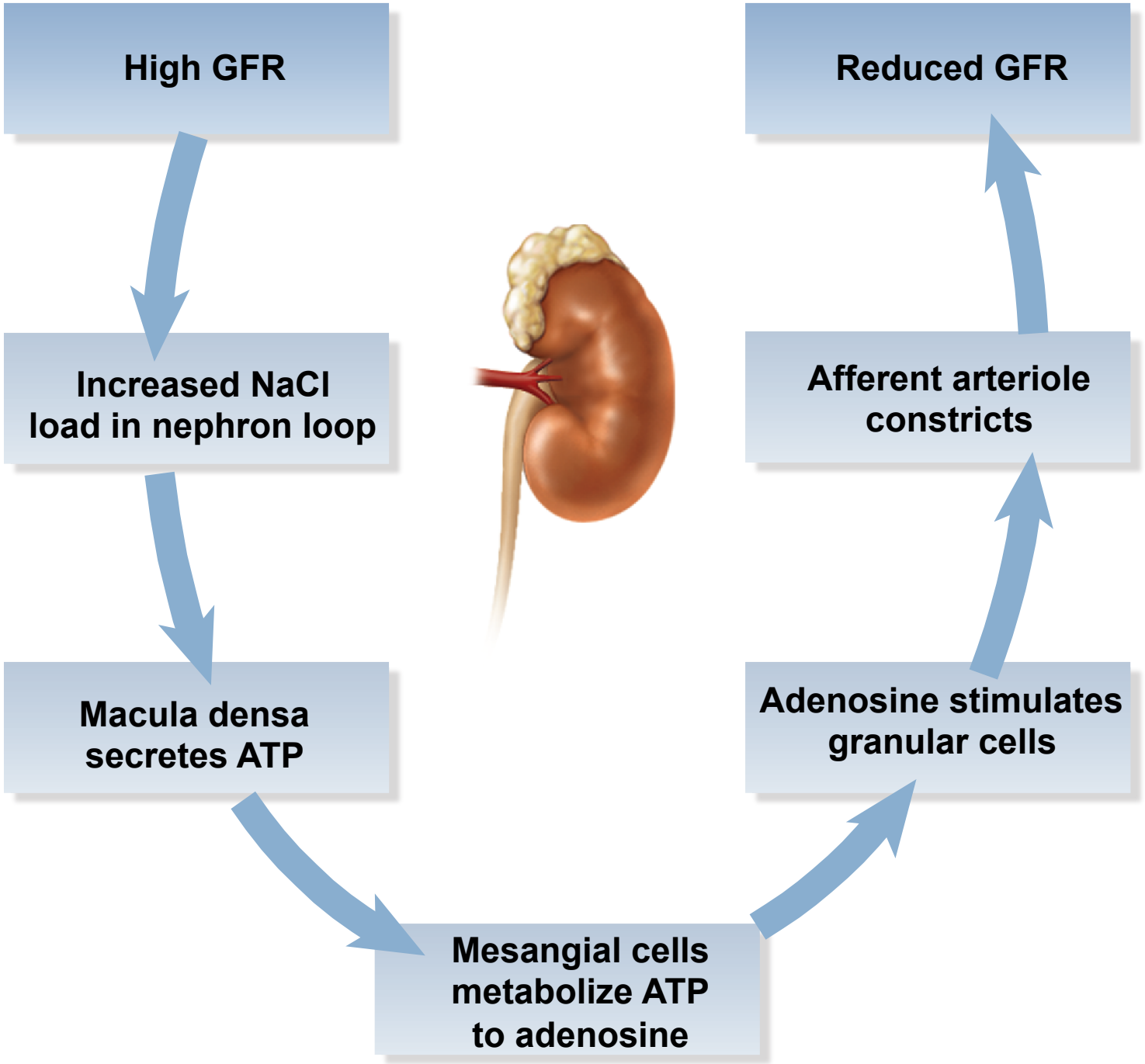

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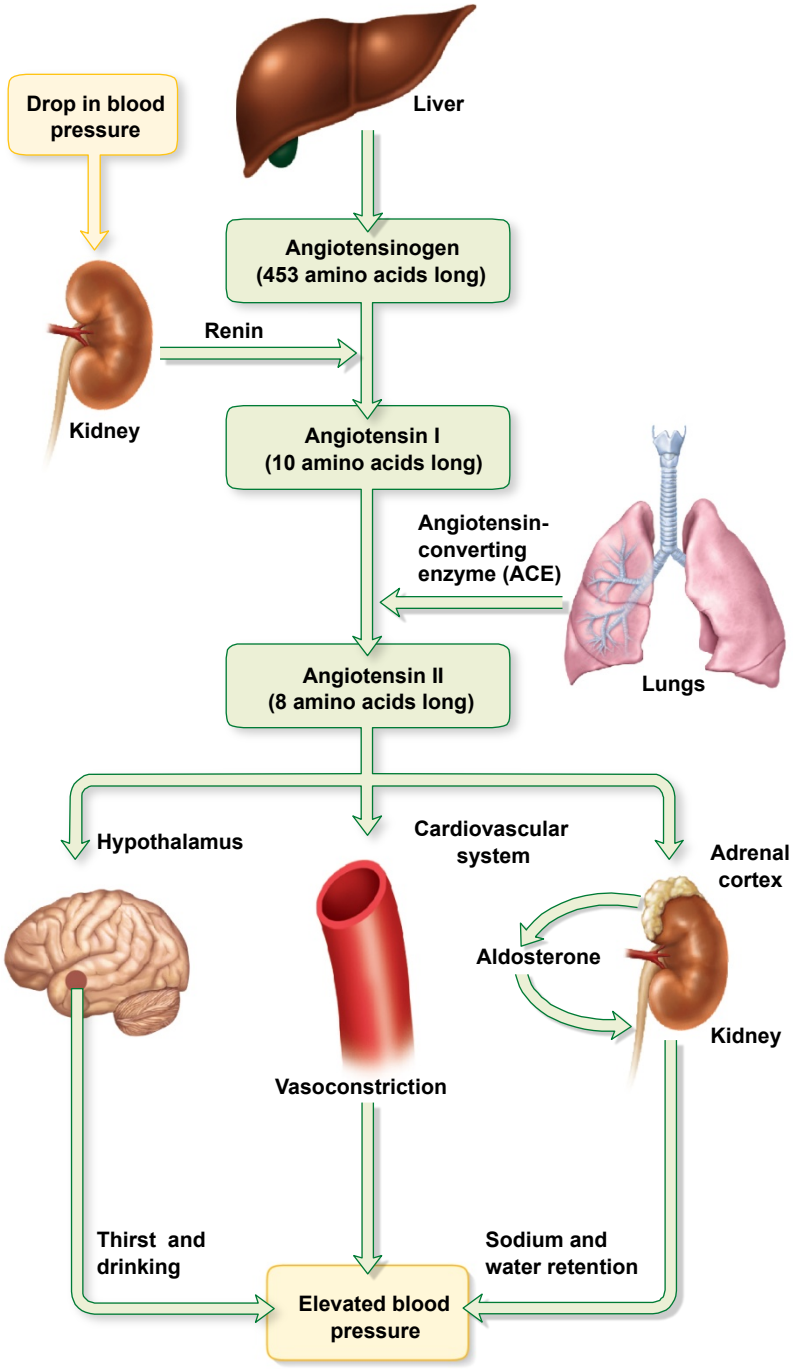

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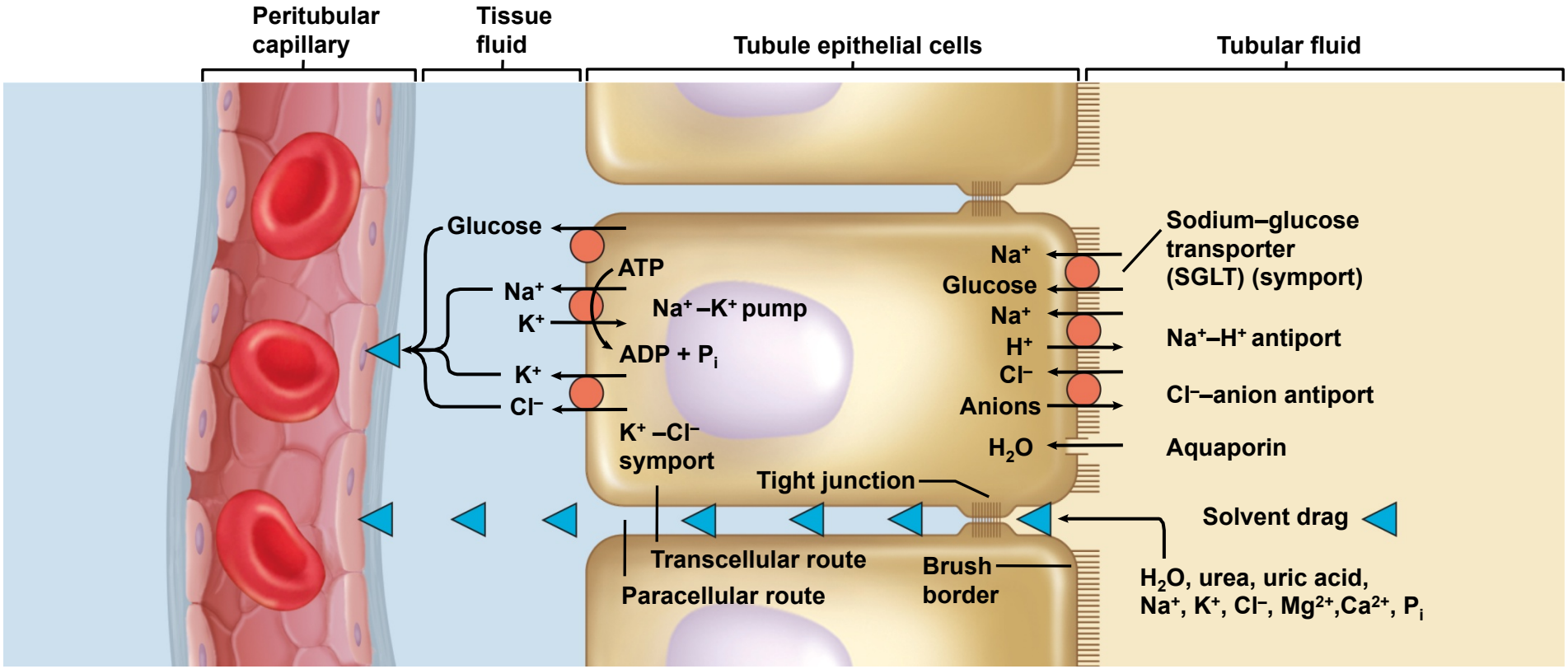

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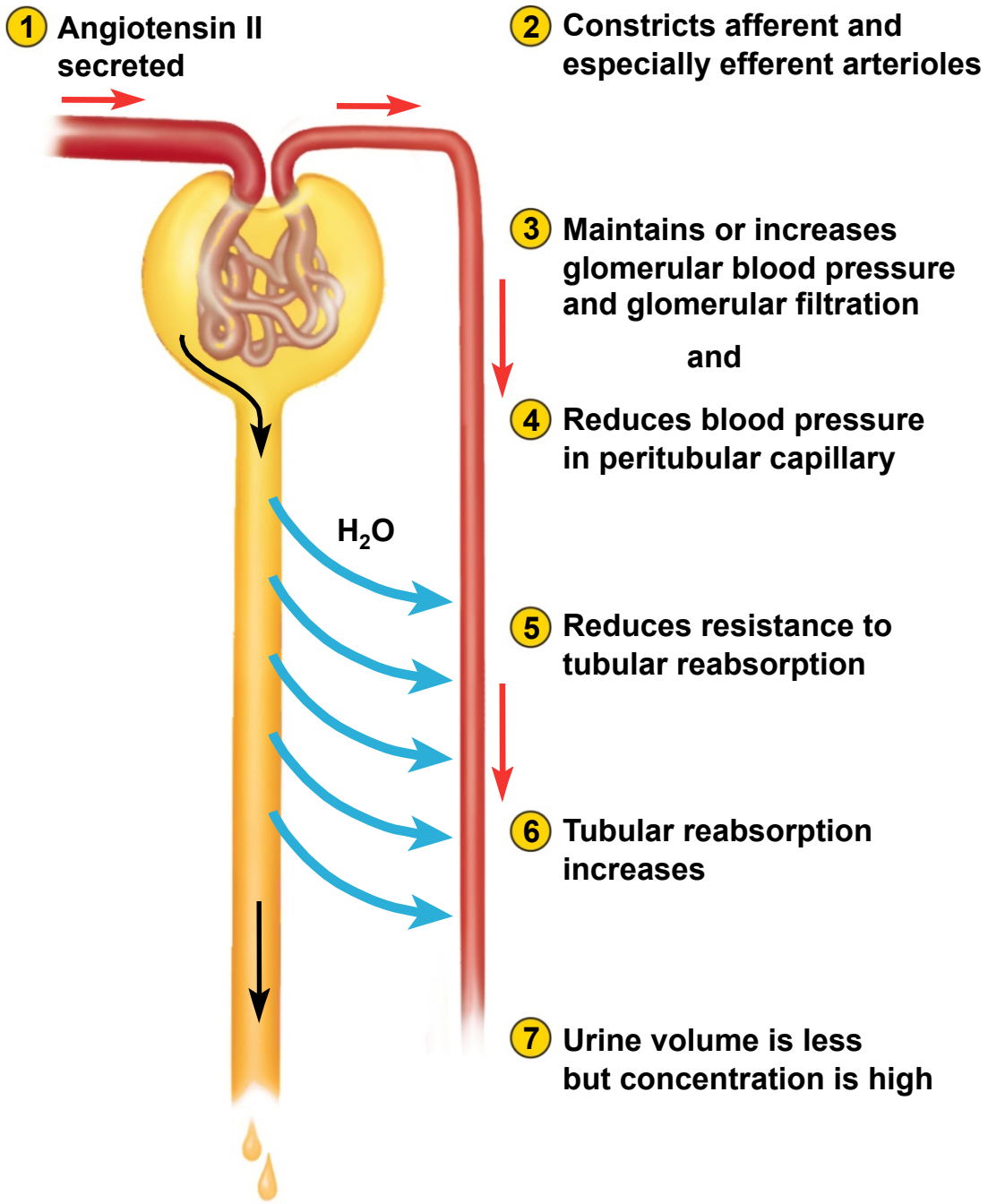

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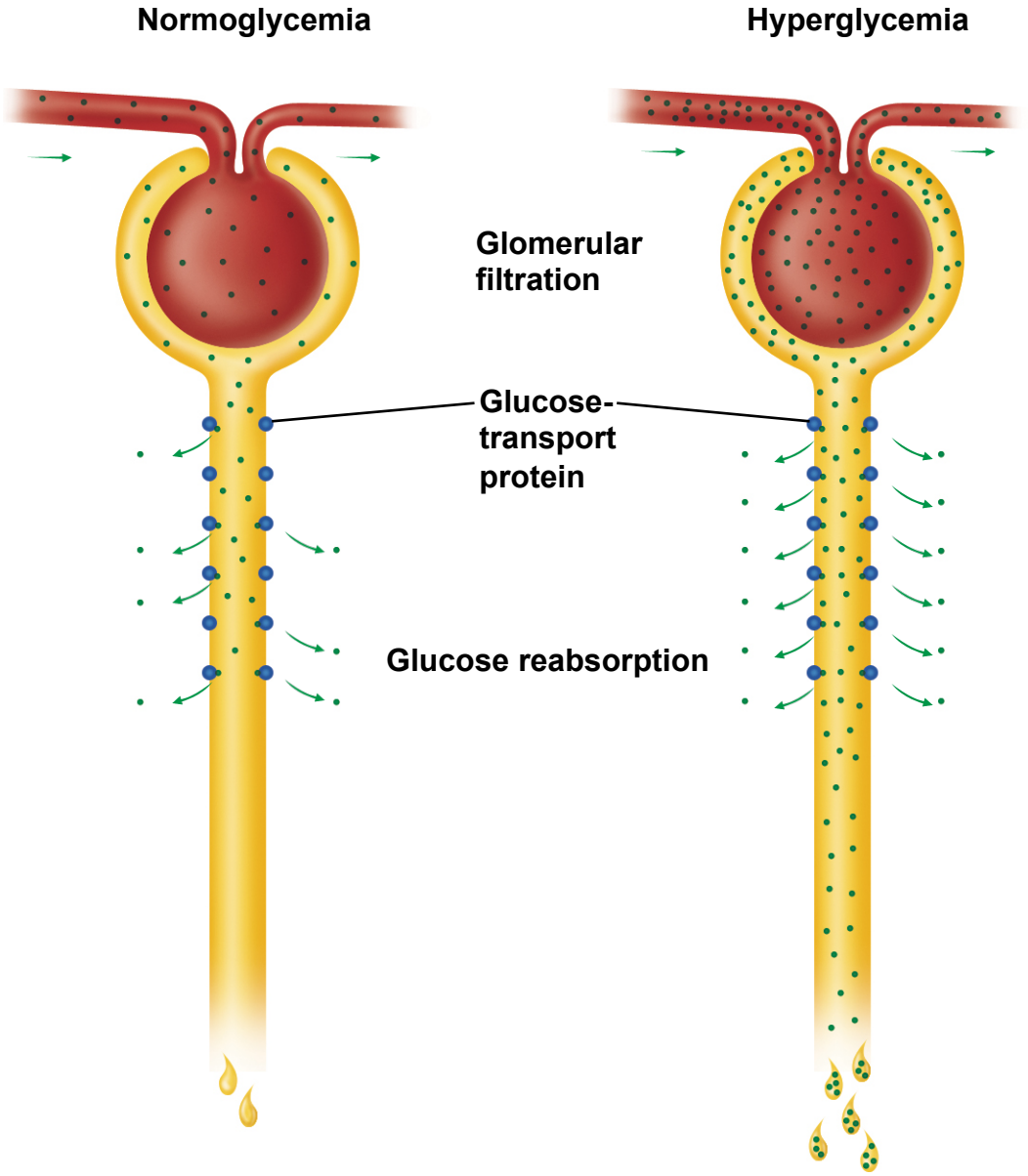

Fig. 23.19

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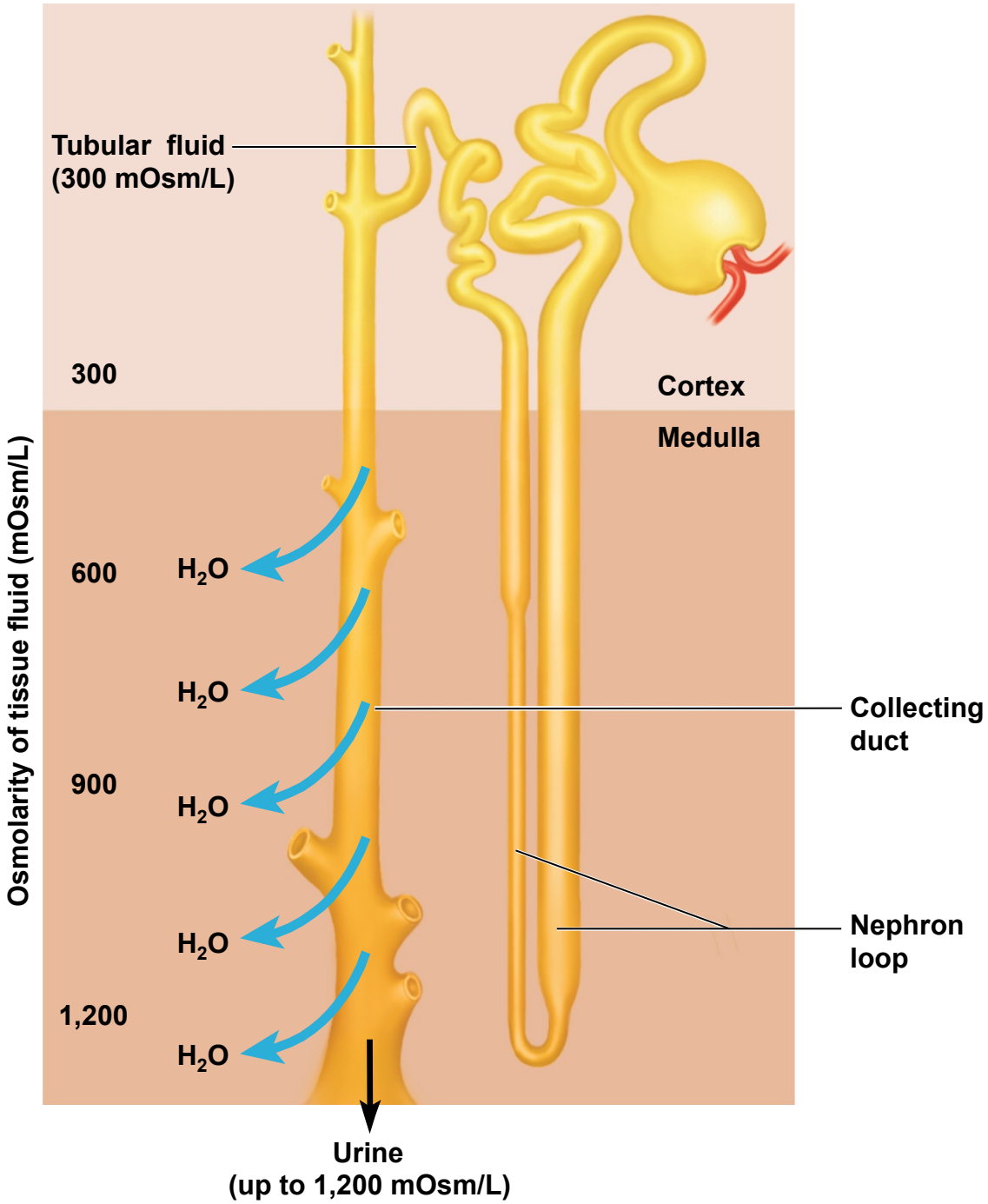

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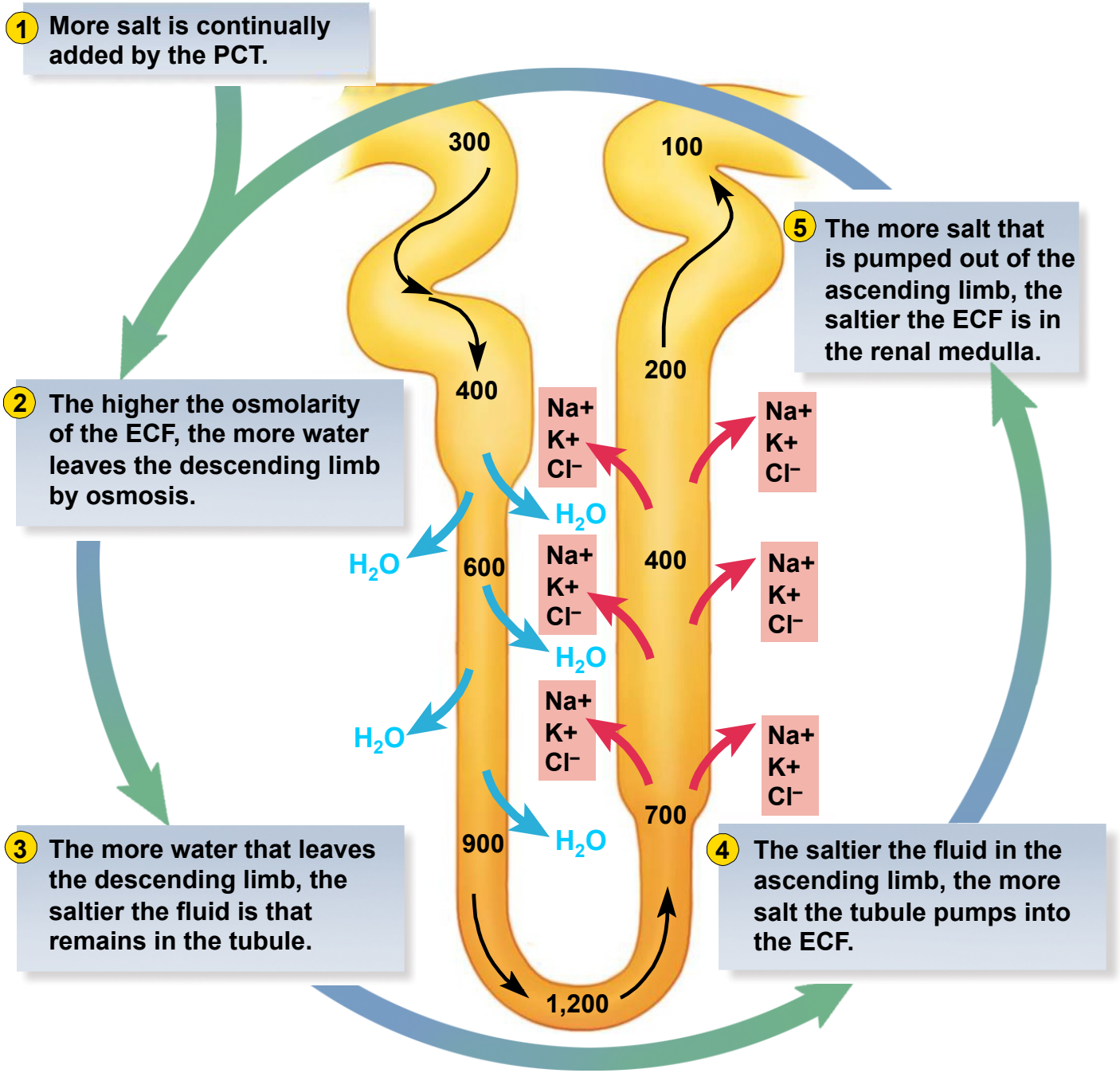

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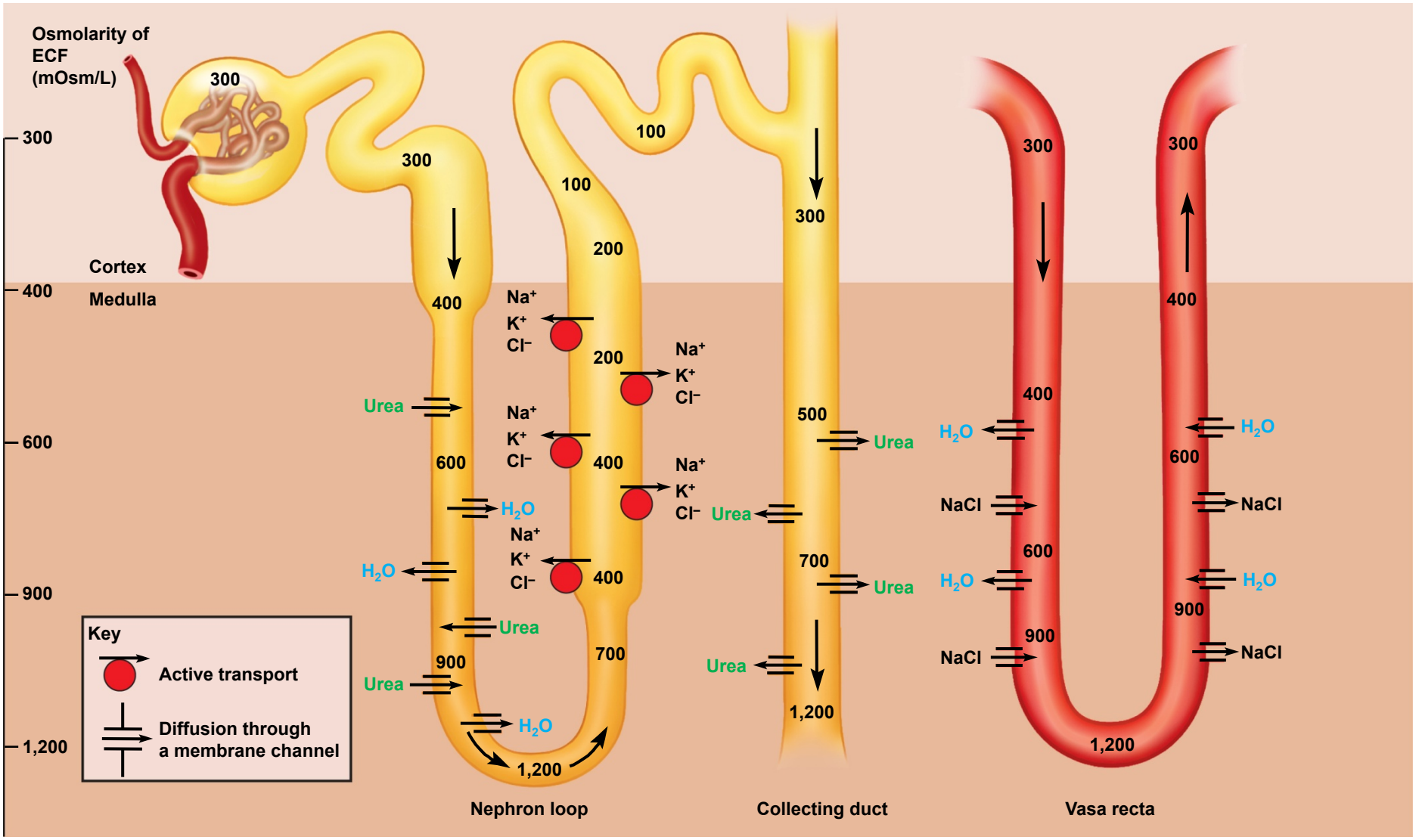

Table 23.1

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TABLE 23.1 Hormones Affecting Renal Function

Hormone	Renal Targets	Effects
Aldosterone	Nephron loop, DCT, CD	Promotes Na^+ reabsorption and K^+ secretion; indirectly promotes Cl^- and H_2O reabsorption; maintains blood volume and reduces urine volume
Angiotensin II	Afferent and efferent arterioles, PCT	Reduces water loss, stimulates thirst and encourages water intake, and constricts blood vessels, thus raising blood pressure. Reduces GFR; stimulates PCT to reabsorb NaCl and H_2O; stimulates aldosterone and ADH secretion
Antidiuretic hormone	Collecting duct	Promotes H_2O reabsorption; reduces urine volume, increases concentration
Natriuretic peptides	Afferent and efferent arterioles, collecting duct	Dilate afferent arteriole, constrict efferent arteriole, increase GFR; inhibit secretion of renin, ADH, and aldosterone; inhibit NaCl reabsorption by collecting duct; increase urine volume and lower blood pressure
Calcitonin	DCT	Weak effects similar to those of parathyroid hormone
Calcitriol	DCT	Weak effects similar to those of parathyroid hormone
Epinephrine and norepinephrine	Juxtaglomerular apparatus, afferent arteriole	Induce renin secretion; constrict afferent arteriole; reduce GFR and urine volume
Parathyroid hormone	PCT, DCT, nephron loop	Promotes Ca^{2+} reabsorption by loop and DCT; increases phosphate excretion by PCT; promotes calcitriol synthesis

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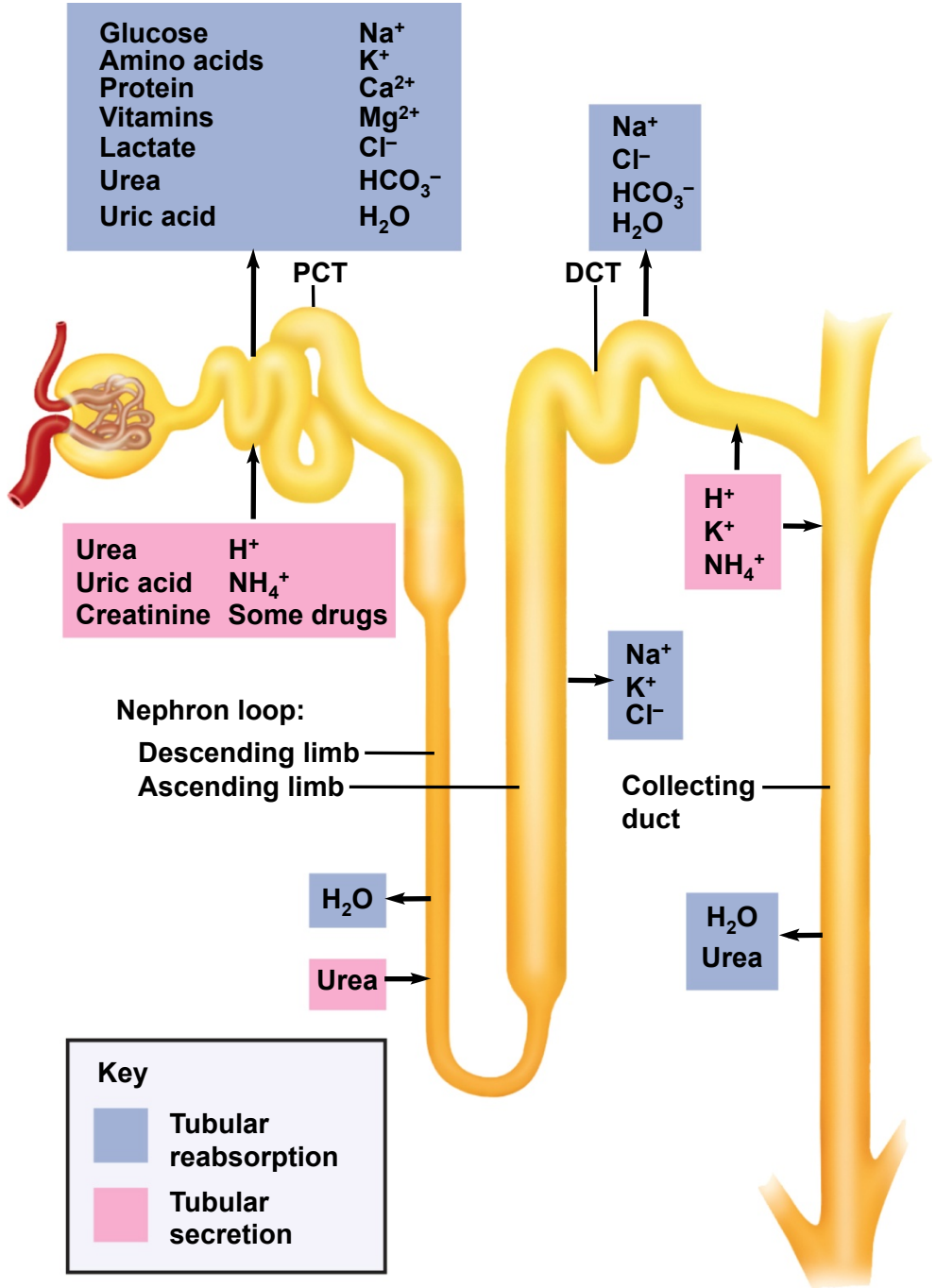

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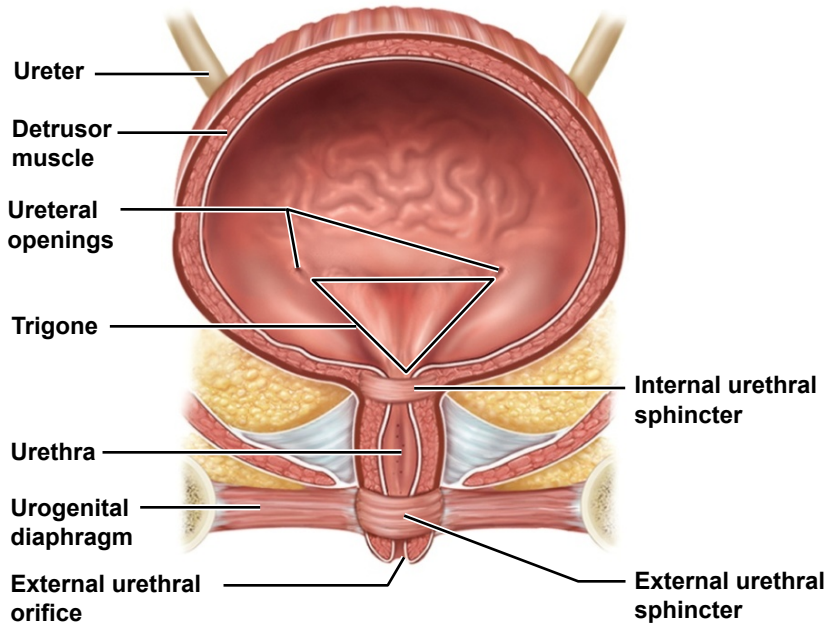
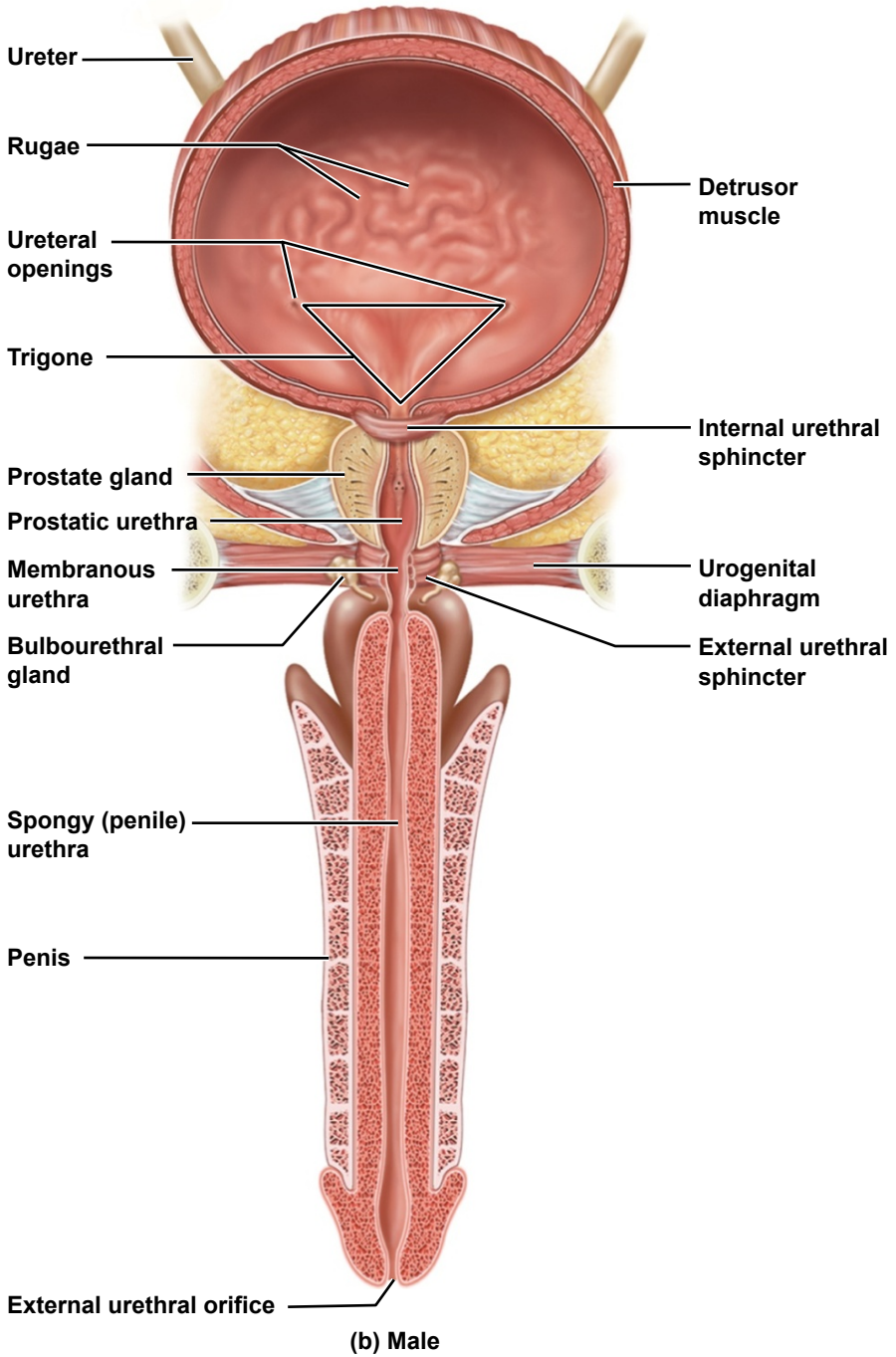


(a) Female



(b) Male

Fig. 23.24

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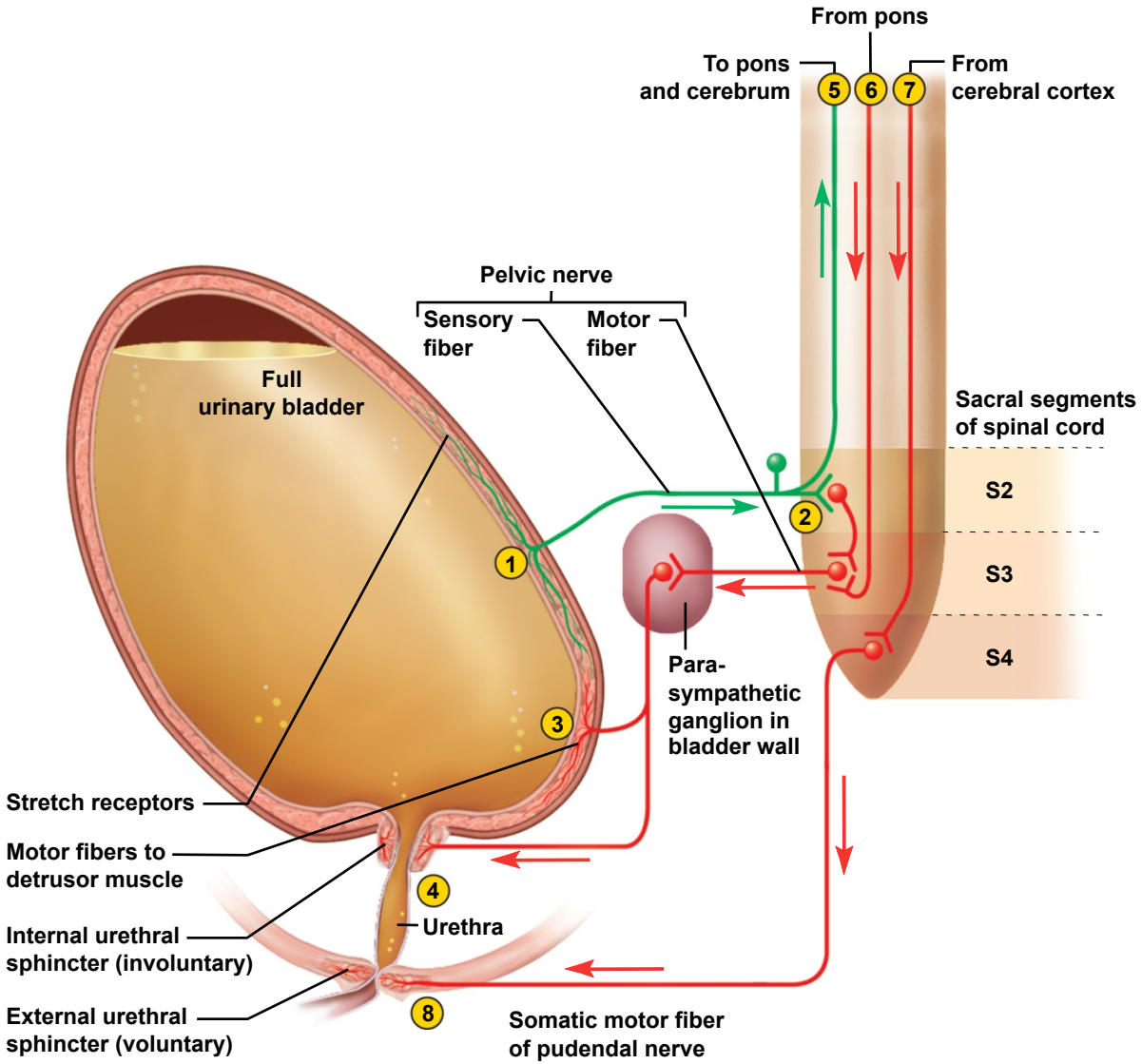

Involuntary micturition reflex

1. Stretch receptors detect filling of bladder, transmit afferent signals to spinal cord.
2. Signals return to bladder from spinal cord segments S2 and S3 via parasympathetic fibers in pelvic nerve.
3. Efferent signals excite detrusor muscle.
4. Efferent signals relax internal urethral sphincter. Urine is involuntarily voided if not inhibited by brain.

Voluntary control

5. For voluntary control, micturition center in pons receives signals from stretch receptors.
6. If it is timely to urinate, pons returns signals to spinal interneurons that excite detrusor and relax internal urethral sphincter. Urine is voided.
7. If it is untimely to urinate, signals from cerebrum excite spinal interneurons that keep external urethral sphincter contracted. Urine is retained in bladder.
8. If it is timely to urinate, signals from cerebrum inhibit sacral neurons that keep external sphincter closed. External urethral sphincter relaxes and urine is voided.