PHARM.D • YEAR 2

Pharmacology

CHAPTER 3

Pharmacology of Drugs Acting on the Cardiovascular System

PPT CHAPTER COVER

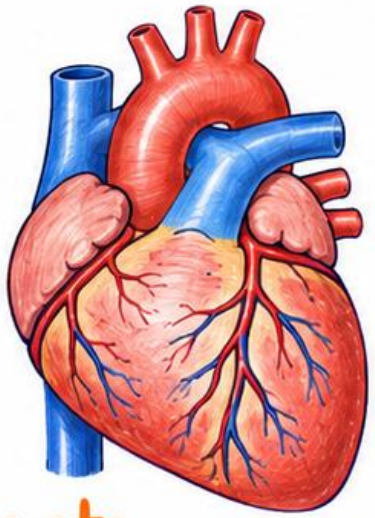


DOCTOR OF PHARMACY

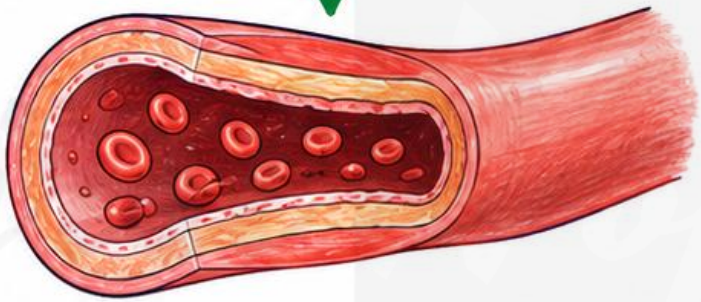
How antihypertensives lower blood pressure

Blood pressure depends on cardiac output and peripheral vascular resistance.

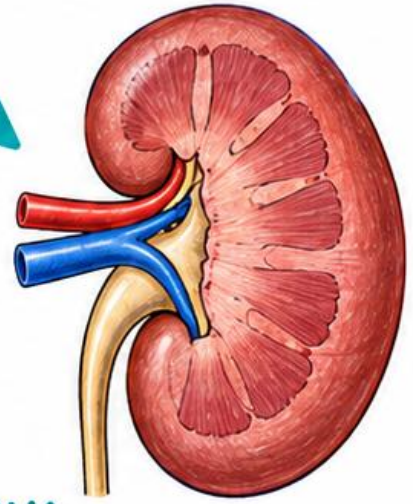
$$BP \approx CO \times PVR$$



Heart:
beta-blockers reduce rate and contractility.



Vessels:
calcium-channel blockers and vasodilators reduce resistance.

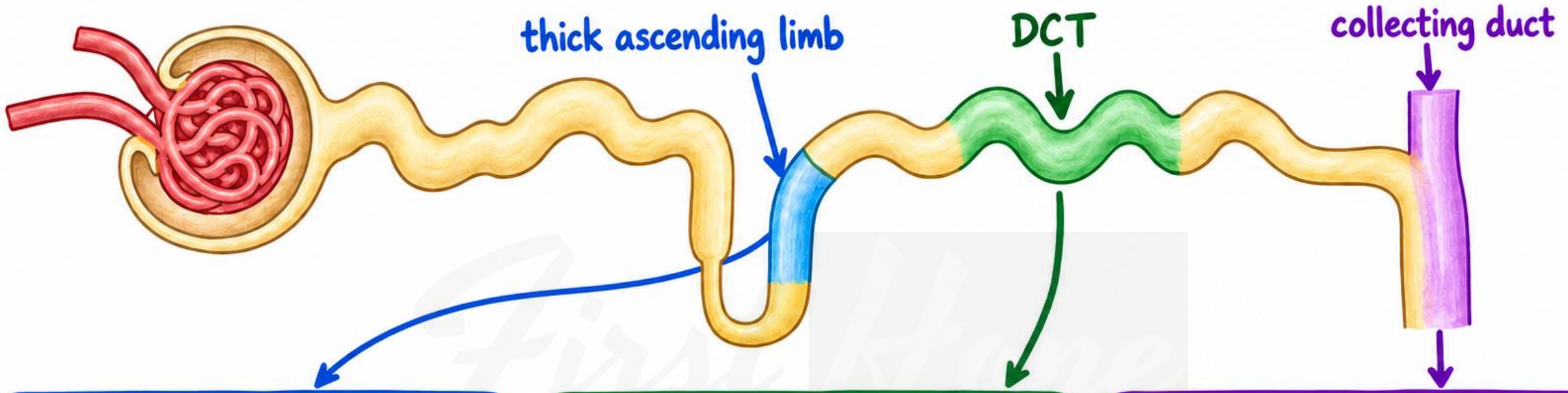


Kidney:
diuretics reduce sodium and water retention; RAAS inhibitors reduce angiotensin–aldosterone effects.

Treatment aims to reduce cardiovascular and kidney complications, not merely change a number.

Drug choice depends on comorbidities, tolerability and the clinical setting.

Diuretics in hypertension



Loop:
furosemide acts in the thick ascending limb; useful when congestion requires stronger diuresis.

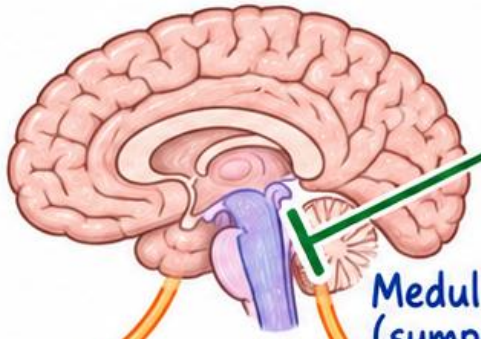
Thiazide-type:
hydrochlorothiazide and chlorthalidone act in the distal convoluted tubule.

Potassium-sparing:
spironolactone and eplerenone block aldosterone; amiloride blocks epithelial sodium channels.

Early effect: sodium and water loss lowers circulating volume.

Monitor electrolytes and renal function.
Thiazides and loops may lower potassium; potassium-sparing drugs may raise it.

Sympathetic pathways and blood pressure

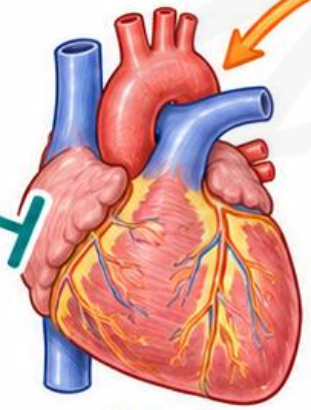


Central alpha-2 agonists: clonidine and methyldopa reduce sympathetic outflow.

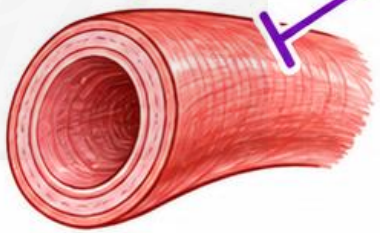
Medulla (sympathetic outflow)

Sympathetic nerves

Beta-blockers: metoprolol, atenolol and propranolol reduce cardiac stimulation and renin release.







Alpha-1 blockers: prazosin and terazosin relax vascular smooth muscle.

Heart (↑ heart rate and contractility)

Kidney (renin release)

Arteriole (vascular smooth muscle tone)

↑ Blood pressure

Combined blockade: labetalol and carvedilol block beta receptors and alpha-1 receptors.

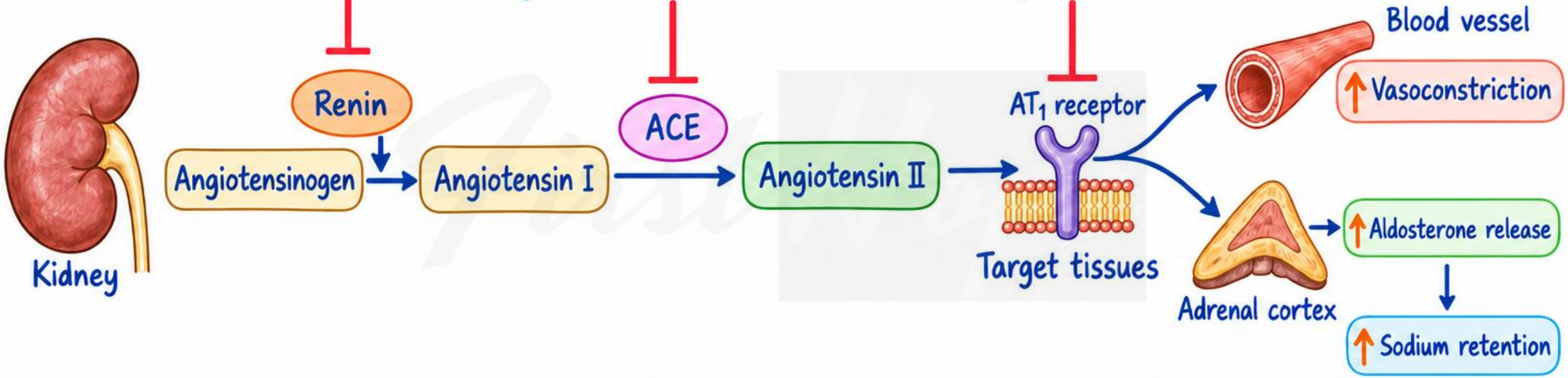
Watch for bradycardia, fatigue and postural hypotension. Abrupt clonidine withdrawal can cause rebound hypertension.

RAAS inhibitors: three targets

Aliskiren: inhibits renin.

ACE inhibitors: enalapril, lisinopril and ramipril reduce angiotensin II formation.

ARBs: losartan and valsartan block angiotensin II at AT_1 receptors.



Renin starts a cascade that produces angiotensin II and stimulates aldosterone release.

Result: less vasoconstriction and sodium retention.

ACE inhibitors can cause cough or angioedema. All these groups require potassium and renal monitoring and must be avoided in pregnancy.

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