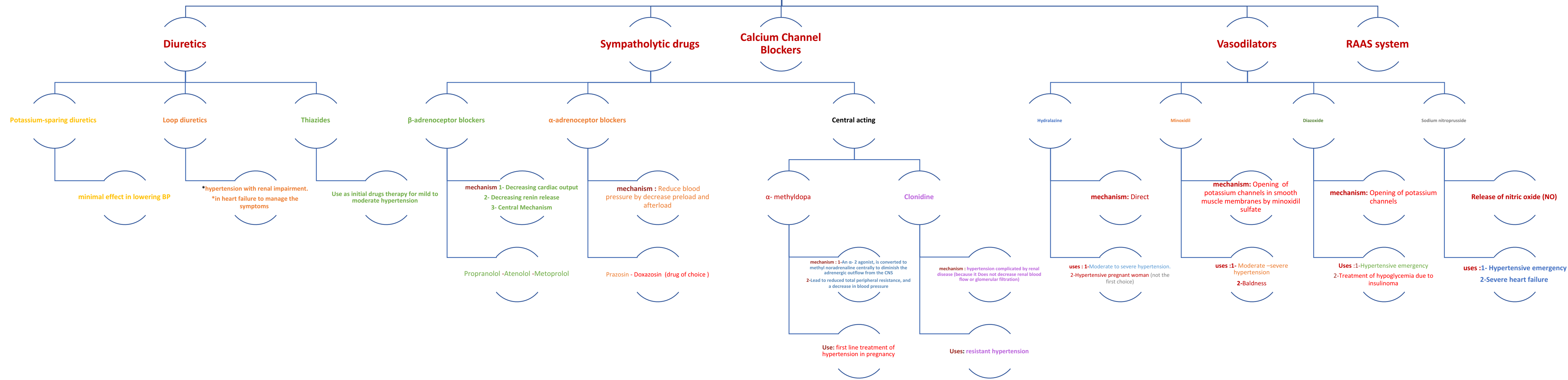


Antihypertensive drugs

- **Summary.** (Slide 2,3 and 4)
- **MCQs.** (Slide 5,6 and 7)
- **SAQ.** (Slide 8 and 9)

لم تخلق لتكون رقيبا على الناس، فدعهم لخالقهم.
و لم تخلق لترضيهم، فرضاهم غاية لن تدرك.

Summary



	Drugs acting on the renin- angiotensin - aldosterone (RAAS) system			Calcium Channel Blockers (CCBs)
	Angiotensin-converting enzyme inhibitors (ACEIs)		Angiotensin receptors blockers (ARBs)	
Examples	Enalapril	Lisinopril , Ramipril , Captopril	Losartan, Valsartan, Candesatran, Telmisartan	Verpamil, Nifedipine, Diltiazem.
pharmacokinetics	Enalaprilat is the active metabolite of enalapril	<ul style="list-style-type: none"> -Polar - excreted in urine -Do not cross BBB -Have a long half-life -Food reduces their bioavailability -Enalapril & ramipril are prodrugs. 	<ul style="list-style-type: none"> -Valsartan; No active metabolites. -Losartan; Has a potent active metabolite -Long half-life -Do not cross BBB 	<ul style="list-style-type: none"> -Verapamil and nifedipine are highly bound to plasma protiens while diltiazem is less . -Verapamil & diltiazem have active metabolites, nifedipine has not.
Mechanism of action	<ul style="list-style-type: none"> - The antihypertensive effect of ACE inhibitors results primarily from vasodilatation with little change in cardiac output. - a fall in aldosterone production. - effective when hypertension results from excess renin production 		<ul style="list-style-type: none"> -Cause selective block of AT1 receptors. -Produce more complete inhibition of angiotensin as there are other enzymes that can generate angiotensin. 	<ul style="list-style-type: none"> Block the influx of calcium through calcium channels resulting in:- 1- Peripheral vasodilatation . 2- Decrease cardiac contractility .
Clinical uses	<ul style="list-style-type: none"> 1- Treatment of essential hypertension. 2- Hypertension in patients with <u>chronic renal disease, ischemic heart disease, diabetes</u> 3-Treatment of heart failure. 		—	<ul style="list-style-type: none"> 1- Treatment of chronic hypertension. 2- Nicardipine can be given by I.V. route in hypertensive emergency. 3- Sustained- release formulations are preferred for the treatment of hypertension due to the short half- life of CCBs
ADRS	<ul style="list-style-type: none"> Dry cough. Angioneurotic edema. swelling of the nose, throat, tongue, larynx. First dose effect (severe hypotension). adrs specific to captopril Dysgeusia = reversible loss or altered taste. Proteinuria and neutropenia. 		<u>Same ADRs, except for dry cough & angioneurotic edema</u>	<ul style="list-style-type: none"> (Headache, flushing, hypotension) -Nifedipine: Tachycardia -Verapamil & Diltiazem: peripheral edema (ankle edema) -Verapamil: constipation
contraindications	<ul style="list-style-type: none"> -Renal artery stenosis. -Potassium-sparing diuretics. -During the second and third trimesters of pregnancy due to the risk of: fetal hypotension, anuria ,renal failure & malformations. 		<u>Same contraindications as ACEI.</u>	—

sympatholytic drugs			
β-adrenoceptor blockers			
drugs	Propranolol	Atenolol	Metoprolol
Uses	<ul style="list-style-type: none"> Mild to Moderate hypertension in severe cases in combination with other drugs may take 2 weeks to optimal therapeutic response evidence support using it with patient has concomitant coronary artery disease 		
Mechanism of action	Decrease blood pressure by: <ol style="list-style-type: none"> Decreasing cardiac output (blocking β₁ which is in cardiac muscles) Decreasing renin release (blocking β₁ which is in kidney) Central Mechanism (blocking β-receptors in CNS 'presynaptic receptors) 		
Adverse effects	<ul style="list-style-type: none"> Hypoglycemia Fatigue Mask the symptoms of hypoglycemia in diabetes (contraindicate in diabetes patients) Increase triglycerides Aggravate peripheral arterial disease (as Reynaud's disease) Erectile dysfunction 		
Note	<ul style="list-style-type: none"> When discontinued, β- blockers should be withdrawn gradually (to avoid rebound hypertension) Beta blockers cause retention of sodium and water. Diuretics can cause mild volume reduction that leads to an increase in renin secretion by the kidney. The rationale for combining beta blockers with diuretics is twofold: beta blockers blunt the increase in the plasma renin level that is induced by diuretics, and diuretics decrease the sodium and water retention that is caused by beta blockers. 		
α-adrenoceptor blockers			
Drugs	Prazosin	Doxazosin	
Site of effect	α- receptors in arterioles and venules		
Mechanism of action	Reduce blood pressure by decrease preload and afterload		
Duration of action	Short duration of action	Long duration of action, so it preferred	
Side effect	causes first dose hypotension & postural hypotension انخفاض الضغط لمن يوقف الشخص فجأة		-
Central acting			
Drugs	Clonidine	α- methyl dopa	
Mechanism of action	α ₂ -agonist, diminishes central adrenergic outflow & ↑ parasympathetic outflow	<ul style="list-style-type: none"> An α- 2 agonist, is converted to methyl noradrenaline centrally to diminish the adrenergic outflow from the CNS Lead to reduced total peripheral resistance, and a decrease in blood pressure 	
Uses	<ul style="list-style-type: none"> hypertension complicated by renal disease (because it Does not decrease renal blood flow or glomerular filtration) resistant hypertension 	first line treatment of hypertension in pregnancy	
Adverse effect	Abrupt withdrawal may lead to rebound hypertension (more sever than in beta-blockers)		-

MCQs

Online Quiz ..

- ✓ <https://www.onlineexambuilder.com/pharmacology-anti-hypertension-drugs/exam-141175>
- ✓ <https://www.onlineexambuilder.com/pharmacology-anti-hypertension-drugs-2/exam-141205>

Q1: A 45-year-old man was just started on therapy for hypertension and developed a persistent, dry cough. Which drug is most likely responsible for this side effect?

- A) Enalapril. B) Losartan. C) Nifedipine. D) Prazosin.

Q2: Which may cause reflex tachycardia and/or postural hypotension on initial administration?

- A) Atenolol. B) Hydrochlorothiazide. C) Metoprolol. D) Prazosin.

Q3: A 48-year-old hypertensive patient has been successfully treated with a thiazide diuretic for the last 5 years. Over the last 3 months, his diastolic pressure has steadily increased, and he was started on an additional antihypertensive agent. later, he complains of being unable to achieve an erection, Which is the likely second antihypertensive medication?

- A) Captopril. B) Losartan. C) Metoprolol. D) Minoxidil.

Q4: A 40-year-old male has recently been diagnosed with hypertension due to pressure readings of 165/100 mm Hg. He also has diabetes that is well controlled with oral hypoglycemic medications. Which is the best initial treatment regimen for treatment of hypertension in this patient?

- A) Metoprolol. B) Furosemide. C) Lisinopril. D) Lisinopril and hydrochlorothiazide.

Q5: A patient returns to her health care provider for routine monitoring 3 months after her hypertension regimen was modified. Labs reveal elevated serum potassium. Which is likely responsible for this hyperkalemia?

- A) Chlorthalidone. B) Losartan. C) Furosemide. D) Nifedipine.

Q6: A 58-year-old female reports that she recently stopped taking her blood pressure medications because of swelling in her feet that began shortly after she started treatment. Which is most likely to cause peripheral edema?

- A) Atenolol. B) Clonidine. C) Felodipine. D) Hydralazine.

Cont.... MCQs

Q7: A hypertensive patient with a renal disease was prescribed clonidine, but stopped it abruptly. Which side effect will he experience?

- A) Increased renal blood flow. B) decrease glomerular filtration. C) Rebound hypertension. D) Severe hypotension.

Q8: A 50-year-old male with newly diagnosed hypertension. His comorbidities include diabetes and chronic hepatitis C infection with moderate liver impairment. He requires two drugs for initial treatment of his hypertension. Which should be prescribed in combination with a thiazide diuretic?

- A) Furosemide. B) Lisinopril. C) Hydralazine. D) Diazoxide.

Q9: A 35 year old male was suffering from hypertension, after taking this drug he experienced cyanide poisoning. Which vasodilator did he take?

- A) Hydralazine. B) Minoxidil. C) Sodium nitropusside. D) Diazoxide.

Q10: A 24 year old pregnant lady came to the emergency room with hypertension, which is the first line anti-hypertensive drug in her case?

- A) Prazosin B) Clonidine. C) Propanolol. D) Alpha methyl dopa.

Q11: A 30 year old female took this anti-hypertensive vasodilator then experienced extra hair growth over her body especially her chest and face . Which of the following drugs that most likely this patient used?

- A) Hydralazine. B) Sodium nitropusside. C) Minoxidil. D) Diazoxide.

Q12: Pregnant women develop hypertension during her first pregnancy visited a doctor asking for a treatment for the hypertension and she was scared of the effect of hypertension on her child, Which one of the following is safe and can be used in her case ?

- A)Hydralazine. B) Alpha-methyl dopa. C) Labetalol. D) All of them.

Q13: When we decided to treat a hypertensive patient with Clonidine, beside giving him this drug what do we have to.....

- A) Give potassium syrup. B)Give Beta blocker drug to inhibit the reflex tachycardia. C) lower the dose gradually to avoid some adverse effect. D) all of them.

Q14: In the ER there is a patient with hypertensive crisis, What is the mechanism of action of the drug that should be given immediately in this situation?

- A) Cause sodium and water loss. B) Opening of potassium channels. C) Inhibit angiotensin II at its AT1 receptor site. D) Release of nitric oxide.

Answers
7:C
8:B
9:C
10:D
11:C
12:D
13:C
14:D

Cont.... MCQs

Q15: A 23 years old male who is diabetic has hypertension. which one of the following vasodilator we will exclude it as anti-hypertensive drug in this case ?

- A) Hydralazine. B) Diazoxide. C) Minoxidil. D) Sodium nitropruside

Q16: In the ER there is a patient with hypertensive crisis, Which anti-hypertensive drug that can be given in this situation?

- A) Enalapril. B) Nicardipine. C) Sodium nitropruside. D) All of them.

Q17: A 49 years old male who has hypertension and edema due to renal insufficiency , His doctor prescribed a combination of anti-hypertensive drug which are ACE inhibitor and diuretics, Which one of the following Diuretics was prescribed in his case ?

- A) Hydrochlorothiazide. B) Chlorthalidone. C) Furosemide. D) spironolactone.

Q18: Which group of antihypertensive drugs should not be given to a diabetic patient if we want to avoid masking hypoglycemia symptoms?

- A) Angiotensin receptor Blockers. B) Calcium channel blockers. C) β - Adrenoceptor Blockers. D) α - Adrenoceptor Blockers.

Q19: A 40-year-old female was just started on therapy for hypertension and developed a Dysgeusia which is a loss or altered taste. Which drug is most likely responsible for this side effect?

- A) Captopril. B) Lisonopril. C) Enalapril. D) Ramipril.

Q20: Which one of the following drug can't used for management of hypertension in pregnancy?

- A) Hydralazine. B) Ramipril. C) Chlorthiazide. D) Alpha methyl dopa.

Q21: A patient with sever hypertension was treated with the combination of anti-hypertensive drugs which are Hydralazine + hydrochlorothiazide + metoprolol. Which one of following may happen as side effect?

- A) Constipation. B) Cyanide toxicity. C) Hyperglycemia. D) lupus erythematosus like syndrome.

Q22: A patient with renal artery stenosis had hypertension and he had been treated with antihypertensive drugs, Which of the following drugs could be used ?

- A) Captopril. B) Losartan. C) Both of them. D) Non of them.

SAQ

A 45-year-old man who is diabetic was just started on therapy for hypertension and developed a persistent, dry cough and swelling of his nose & tongue.

Q1: Which group of anti-hypertensive drugs is most likely responsible for this side effect?

ACE inhibitor. Such as Captopril ,Lisinopril , Ramipril and Enalapril.

Q2: What is the mechanism of action these drugs ?

ACE inhibitors decrease angiotensin II which is a potent vasoconstrictor and increase bradykinin levels which is a vasodilator and decrease Aldosterone level by inhibiting Angiotensin Converting Enzyme (ACE).

Q3:If we know later that he has Dysgeusia which is a loss or altered taste, Name one drugs is responsible for that ?

Captopril.

Q4: What other anti-hypertensive drug should be prescribed for the patient instead of these drugs?

Angiotensin receptors blockers (ARBs) such as Valsartan , Losartan ,Candesartan and Telmisartan.

Q5: Name two contraindication of both drugs.

- Pregnant women.
- Patient with Renal artery stenosis

SAQ

A 30 year old female took this anti-hypertensive drug, after a while suddenly she notice a hair growth in her chest and face .

Q1: Which group of anti hypertensive drugs did she take?

Vasodilators

Q2: Which drug of them is most likely used in her case ?

Minoxidil

Q3: What is the mechanism of action of this drug ?

Arteriodilator by Opening of potassium channels in smooth muscle membranes which will lead to fall in BP which will activate the sympathetic system & the RAAS.

Q4:What are the most common adverse effects for this group of drugs ?

- Hypotension
- reflex tachycardia, palpitation
- salt and water retention (edema)

Q5: To avoid these adverse effects we can use these drug In combination with

In combination with diuretics & β -blockers to block the compensatory mechanism .

- reflex tachycardia, palpitation \rightarrow β -blockers
- salt and water retention (edema) \rightarrow diuretics



Done by:

Rawan ALqahtani
Allulu Alsulayhim
Rana Barasain
Reem Alshathri
Sama Alharbi

Revised by:

Abdulrahman Thekry
Ghadah Almuhana

Contact us :

 @Pharma436

 Pharma436@outlook.com

