

Hypertension

A Seminar as a part of curricular requirement
for I year M. Pharm I semester

Presented by

A.Geetanjali

(Reg. No. 20L81S0106)

Dept. Of Pharmacology

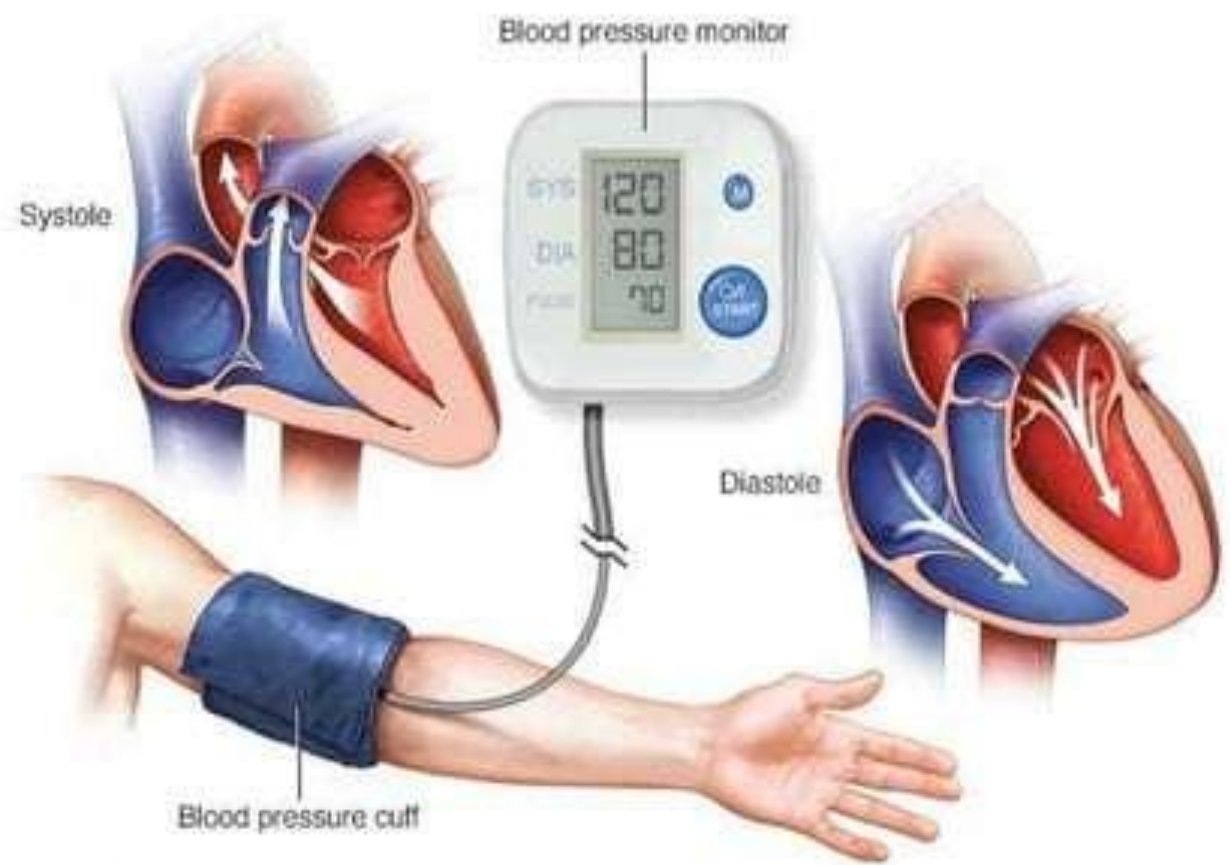
Under the guidance/Mentorship of

Mr.A.Sudheer ,M.Pharm

Associate Professor

Dept. of Pharmacology





© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED.



Contents

- Definition
- Types
- Risk factors
- Clinical manifestations
- Management
- References



Defination

- Blood pressure is the force exerted by circulating blood against the walls of the body's arteries, the major blood vessels in the body. Hypertension is when blood pressure is too high.

(or)

- Hypertension (HTN), also known as high blood pressure (HBP), is a longterm medical condition in which the blood pressure in the arteries is persistently elevated.



| Category | Systolic(mmHg) | | Diastolic(mmHg) |
|-----------------|----------------|-----|-----------------|
| Normal | <120 | and | <80 |
| Prehypertension | 120-139 | or | 80-89 |
| Hypertension | | | |
| Stage 1 | 140-159 | or | 90-99 |
| Stage 2 | ≥160 | or | >100 |



Types

- **Primary hypertension** is also known as essential hypertension. Most adults with hypertension are in this category.
- It's thought to be a combination of genetics, diet, lifestyle, and physical changes.
 - Lifestyle factors include smoking, drinking too much alcohol, stress, being overweight, eating too much salt, and not getting enough exercise.



- **Secondary hypertension** is when there's an identifiable— and potentially reversible— cause of hypertension.
- Only about 5-10 percent of hypertension is the secondary type.

The underlying causes of secondary hypertension include:

- Narrowing of the arteries that supply blood to the kidneys
- adrenal gland disease.
- side effects of some medications, including , diet aids, stimulants, antidepressants, and some over-the-counter medications, Obstructive sleep apnea, hormonal abnormalities, thyroid abnormalities.



Risk factors

- Unhealthy diet
- Physical inactivity
- Obesity ($BMI \geq 30$)
- Too much alcohol
- Genetic and family history
- Using Tobacco & Smoking
- Age
- Stress
- Certain Chronic conditions.



Clinical features

- Sometimes the high blood pressure does not cause any symptoms ,so that it is known as silent killer. In some patients the symptoms will develop like...,
- Severe headache
- Blurred vision
- Dizziness
- Nausea
- Vomiting
- Fatigue
- Shortness of breath
- Irregular breath



Management

- Non pharmacological management
- Pharmacological management



Non-pharmacological management

- Means life style modification...mainly it includes
 - Maintaining a healthy weight
 - Reduce salt/sodium intake
 - Increase physical activity
 - Tobacco &Smoking cessation
 - Limit alcohol consumption
 - Limit fat intake
 - Control diabetes



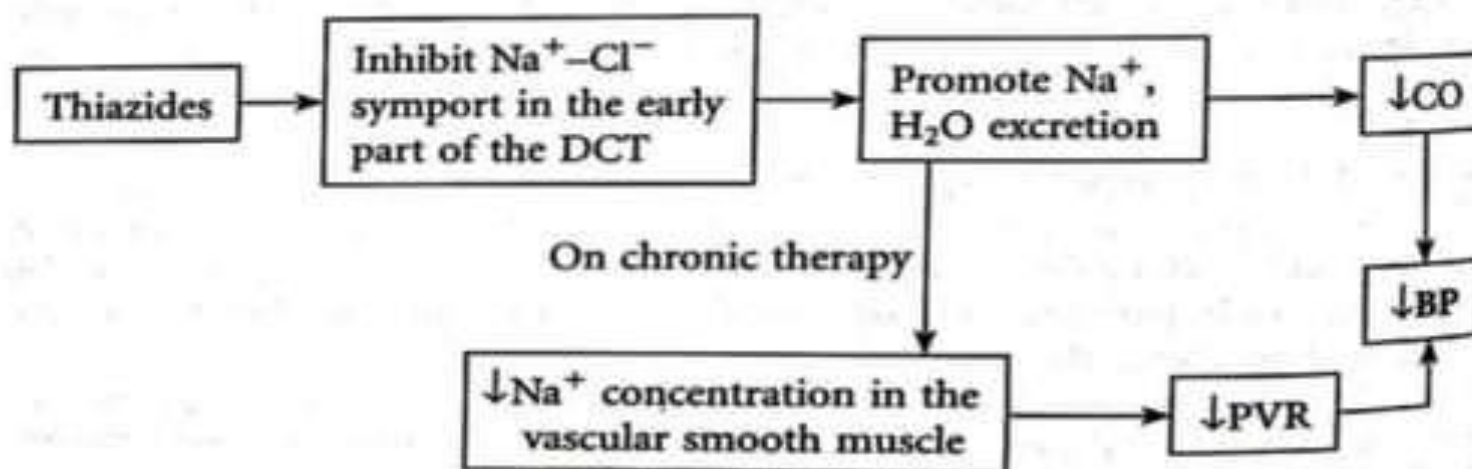
Pharmacological management

- **Diuretics:** High sodium levels and excess fluid in your body can increase blood pressure.
- **Diuretics**, also called water pills, help your kidneys remove excess sodium from your body.
- As the sodium leaves, extra fluid in your blood stream moves into your urine, which helps lower your blood pressure.



- **Thiazides** are used in uncomplicated mild to moderate HTN and have a long duration of action.
- The drug given is 12.5-25mg/day
- Eg: chlorthiazide , hydrochlorthiazide, chlorthalidone

Mechanism of Action of Thiazides



Advantages of Thiazides:

- Have long duration of action
- Are cheap
- Have synergetic effect when used in combination with other anti-hypertensive drug.

Adverse effects:

- Hypokalemia
- Hyper uricemia
- Hyper calcaemia



- **Potassium sparing diuretics** : are usually given with thiazides to counteract K^+ loss and increase antihypertensive efficacy. Use of ACE inhibitors with thiazides decreases K^+ loss by thiazides and enhances antihypertensive effect.

Eg : triamterene, spironolactone.

Pharmacokinetics:

- Oral route of absorption
- Low volume of distribution

Uses:

- Hypertension , Hypokalemia



- **Loop diuretics:**


These drug have short duration of action, so a sustained Na^+ deficit is not maintained, therefore, they are not used routinely in hypertension except in the presence of renal or cardiac failure.

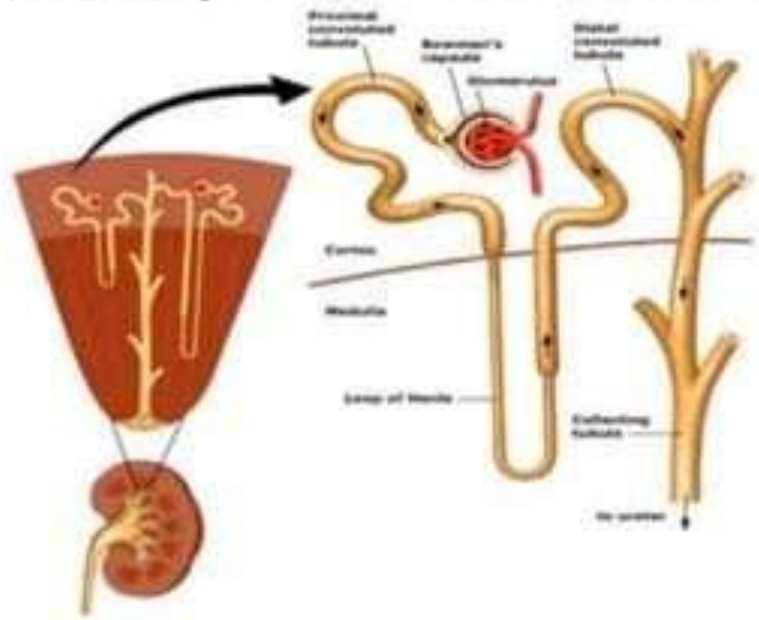
Eg :furosemide, torsemide.

ADRs:

- low sodium levels,
- too much potassium levels in blood(for PSD)
- Hyperuricemia



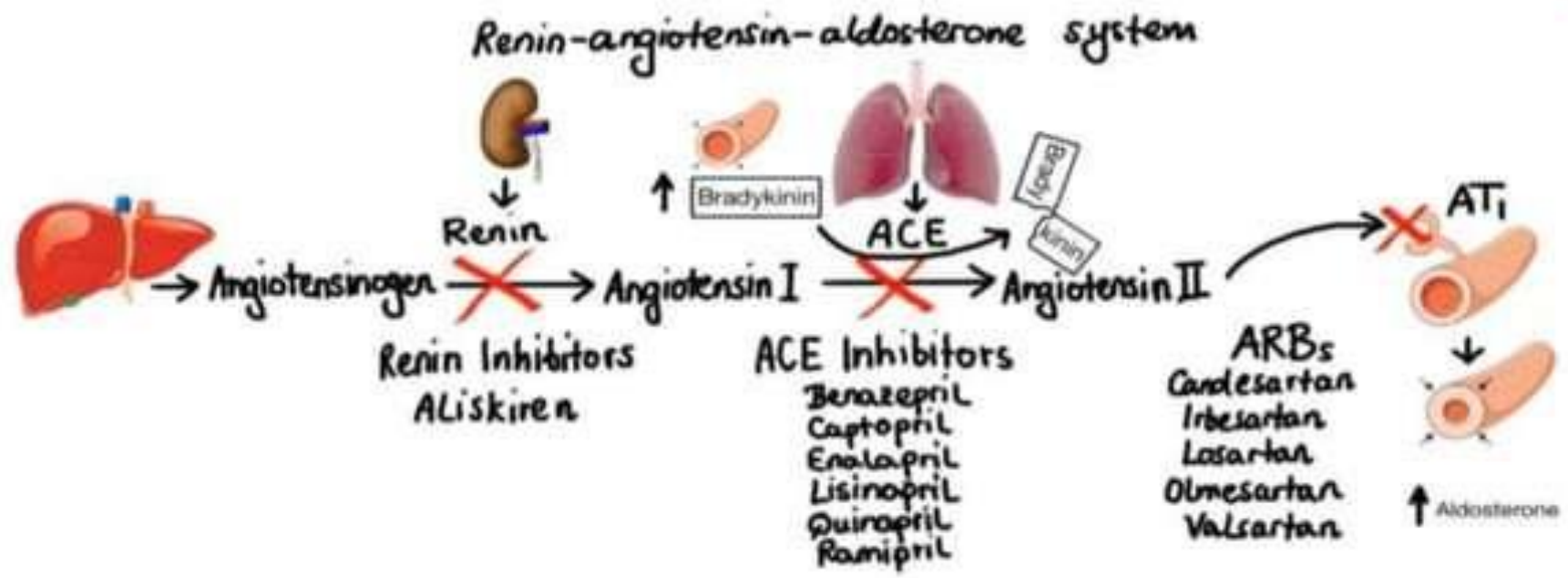
Diuretics
↓
Thiazide (Hydrochlorothiazide) 
Loop (Furosemide) Potassium-sparing (Triamterene & Spironolactone)



- **ACE inhibitors:**

- Angiotensin is a chemical that causes tightening and narrowing of blood vessels in artery walls .
- ACE (angiotensin converting enzyme) inhibitors prevent the body from producing as much of this chemical.
- This helps blood vessels relax and reduces blood pressure.





Pharmacokinetics: ACEI are usually given orally. In emergency, enalapril can be given intravenously. Food reduces absorption of captopril, hence ,it should given 1hr before meals.

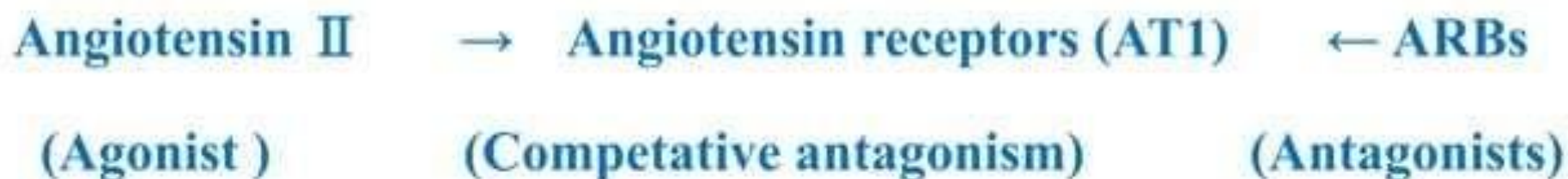
- ACE inhibitors poorly cross the blood brain barrier(BBB),are metabolized in the liver and excreted in urine.

ADRs & contraindications:

- Cough (dry cough) is due to increased bradykinin levels in the liver.
- Angioedema-swelling of nose, lips, mouth, throat, larynx, glottis. there can be airway obstruction in patient.
- Teratogenic effect



- **Angiotensin II receptor blockers (ARBs)**: While ACE inhibitors aim to stop the creation of angiotensin, ARBs block angiotensin from binding with receptors. Without the chemical, blood vessels won't tighten. That helps relax vessels and lower blood pressure.
- The two types of angiotensin II receptors are AT1 and AT2. Most of the effects of angiotensin II are mediated by AT1 receptors. they are vasoconstriction etc.



- ARBs competitively inhibit the binding of angiotensin II to AT1 – receptor subtype and block its effects. ARB produce effects similar to those of ACE inhibitors. ARBs do not affect bradykinin production.

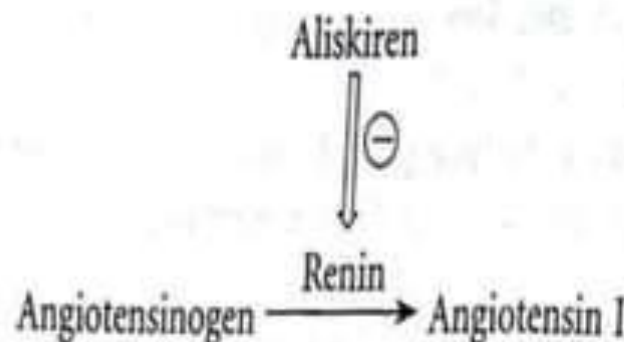
Eg: losartan, valsartan, candesartan

- ADRs: hyperkalemia, hypotension, angioedema (swelling of skin due to a build up of fluid) nausea, vomiting and teratogenic effect.
- **Uses:** hypertension, congestive cardiac failure, MI, diabetic nephropathy.



➤ **Direct renin inhibitor:** Aliskiren

- Aliskiren, by inhibiting renin, decrease levels of Angiotensin I and angiotensin II.
- It is useful in hypertension in combination with Diuretics
- It is administered orally.
- ADRs: diarrhoea, abdominal pain and angioedema.



➤ **Vasodilators:**

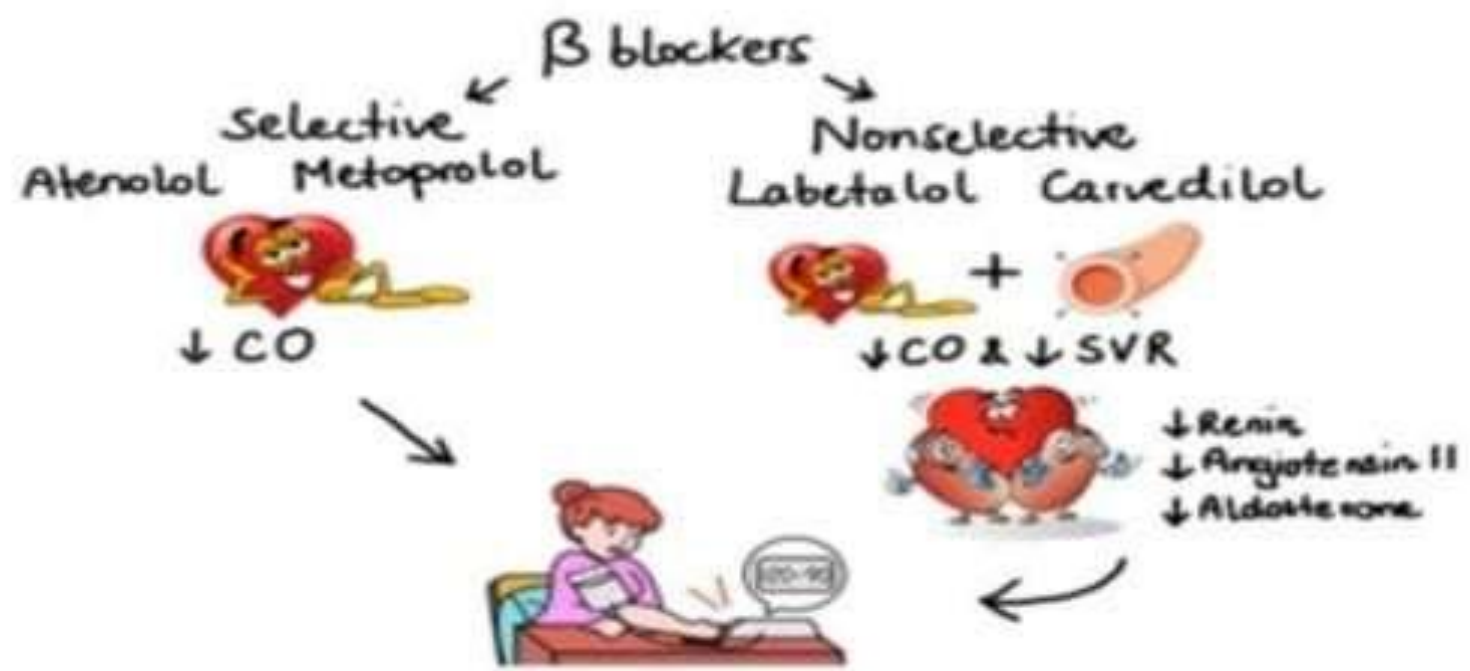
These medication acting directly on the muscles in the wall of arteries and preventing the muscles from tightening and arteries from narrowing.

Eg: nitro glucerine and sodium nitro prusside

- ADRs: rapid heartbeat(tachycardia), heart palpitations etc.



➤ **Beta-Blockers:**

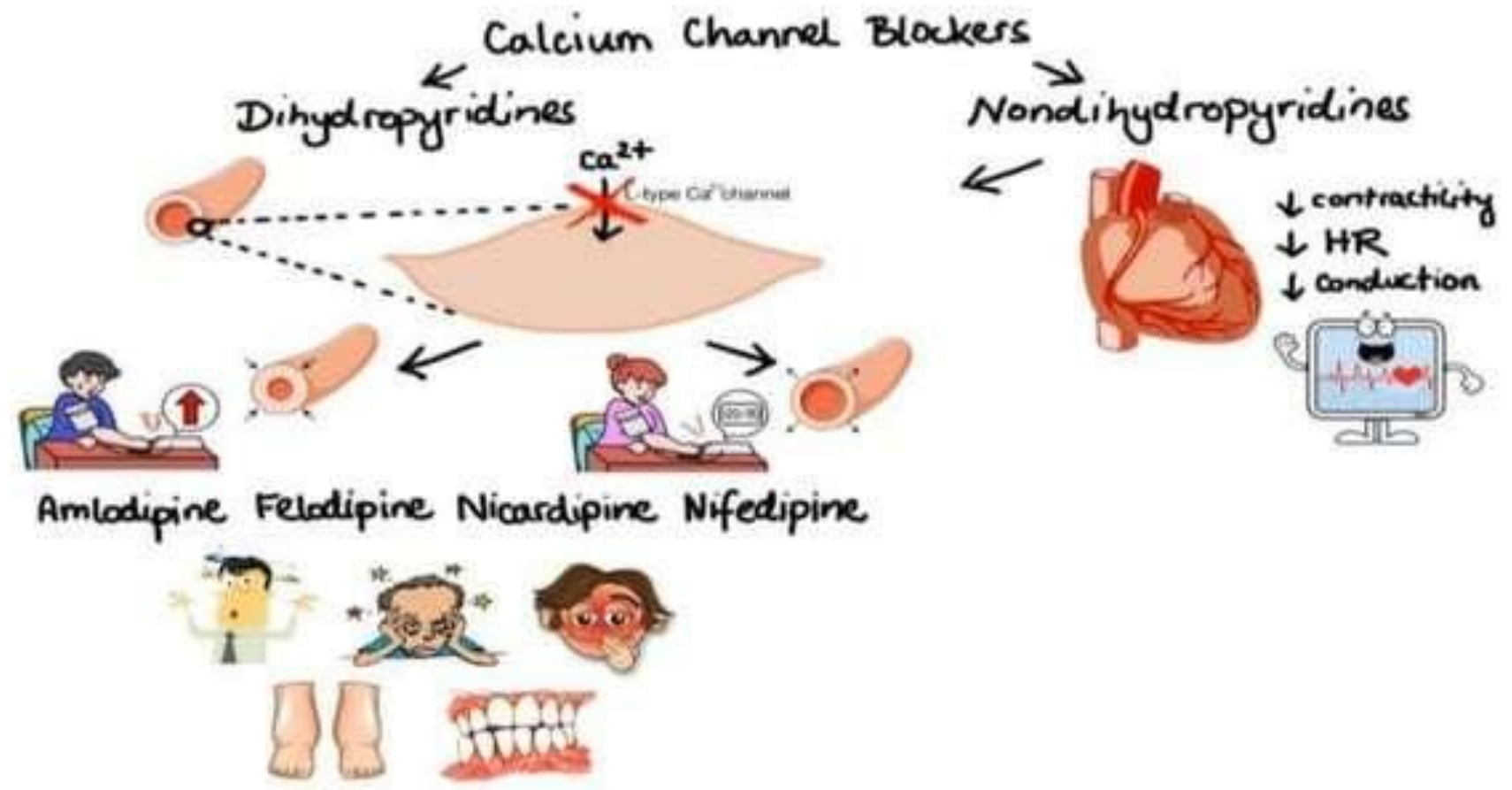


- **Calcium channel blockers:** These medication block some of the calcium from entering the cardiac muscles of your heart. This leads to less forceful heartbeats and a lower blood pressure.
- These medicines also work in the blood vessels, causing them to relax and further lowering blood pressure.

Eg: amlodipine, verapamil, Diltiazem.

- Uses: hypertension, angina pectoris, supraventricular arrhythmias.





References

- Essential Medical Pharmacology-K.D.Tripathi ,Sixth Edition
- Phrmacology For Medical Graduates-Tara V Shanbhag & Smitha Shenoy.
- High Blood Pressure (Hypertension) Mayo Clinic.org diseases
- 2020 International Society of Hypertension
Global hypertension practice guidelines,Journal of Hypertension
- world Health Organization ,International Society Of Hypertension Writing Group.



