

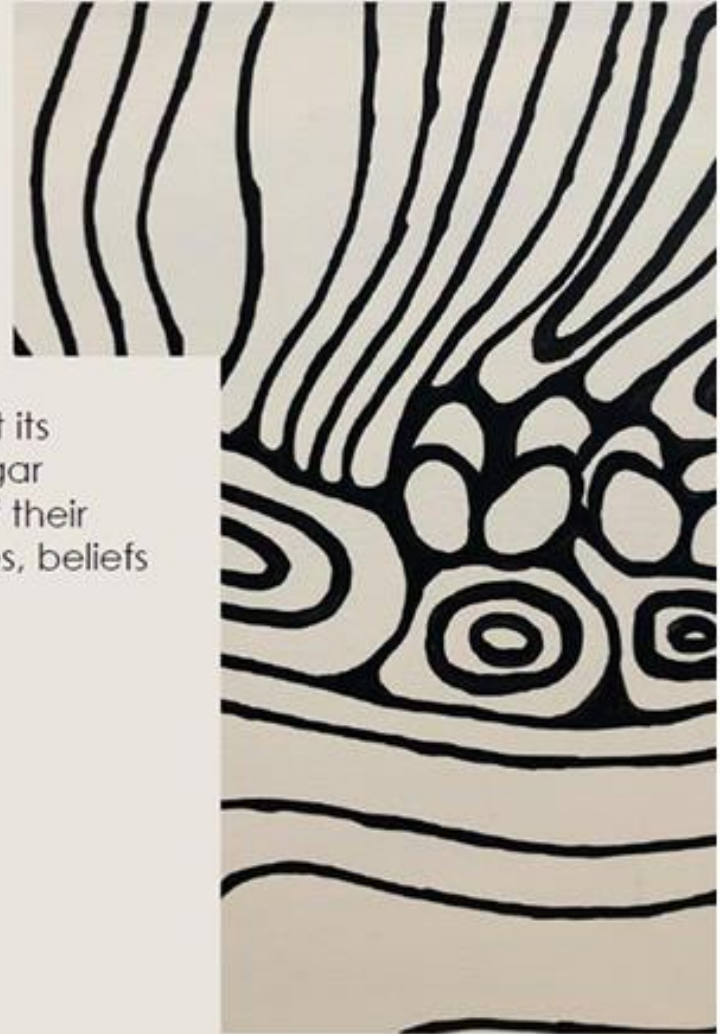
# DENT 3005: Introduction to Pharmacology

## **Cardiovascular systems**

Dr Thuy Linh Truong  
[thuy.truong@uwa.edu.au](mailto:thuy.truong@uwa.edu.au)

# Acknowledgement of country

The University of Western Australia acknowledges that its campus is situated on Noongar land, and that Noongar people remain the spiritual and cultural custodians of their land, and continue to practise their values, languages, beliefs and knowledge.



# Learning Outcomes



## Learning objectives

- 1) Understand the classes and mechanisms of major classes of cardiovascular drugs
- 2) Recognise oral and dental side effects of cardiovascular drugs
- 3) Management of emergencies related to cardiovascular conditions in the dental setting
- 4) Understand drugs interactions with dental medications
- 5) Applied knowledge to clinical scenarios

# Hypertension

- **Definition**

- The force of the blood pushing against the artery walls is consistently too high → heart works harder
- Grade 1, 2, 3

- **Two types**

- Primary HTN
- Secondary HTN

- **Complications:** many

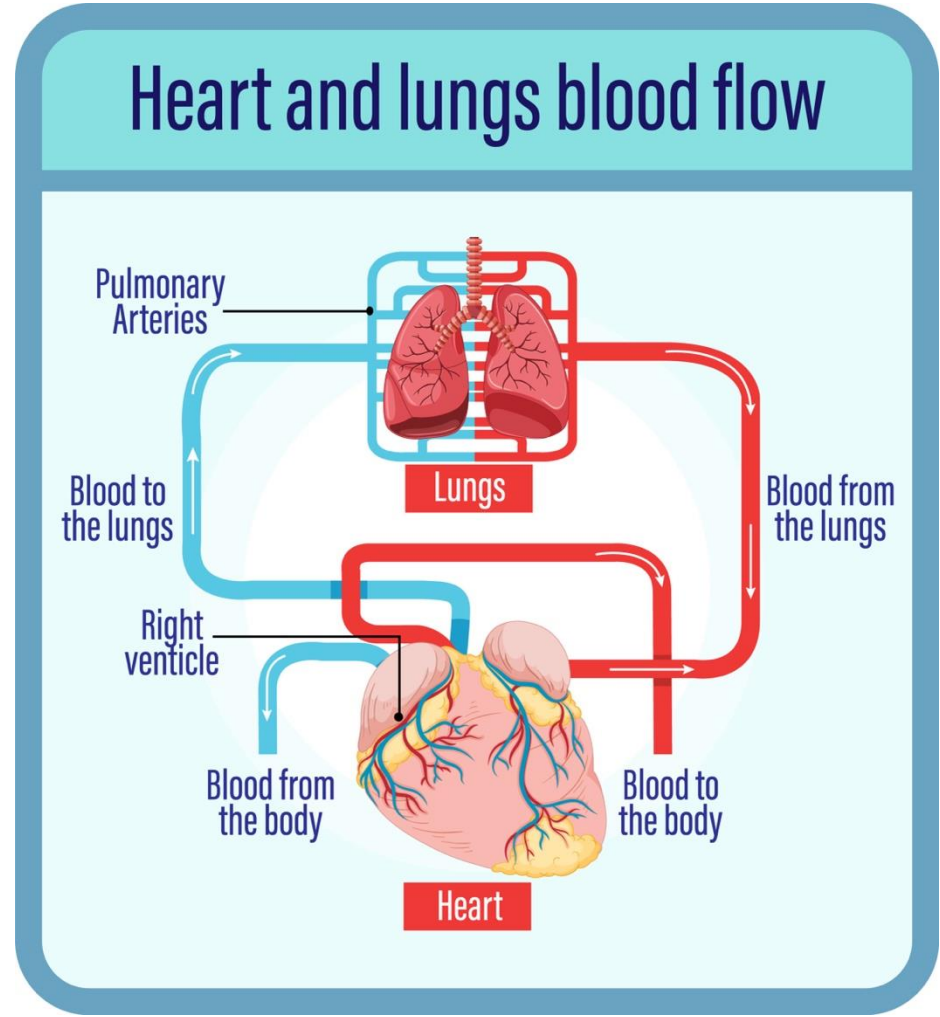
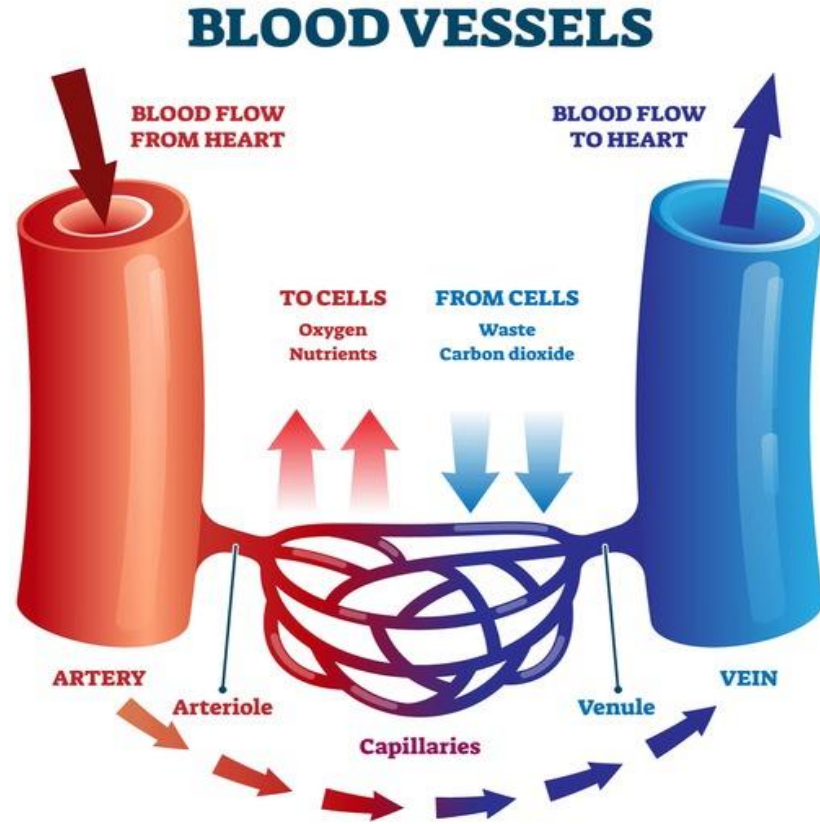
- **Treatment rationale**

- Reduce premature cardiovascular morbidity & mortality & microvascular disease affecting the brain, kidney & retina

Grade	Systolic/diastolic mmHg
1	140-159/90-99
2	160-179/100-109
3	>180/>110mmHg

Complications
Heart attack, stroke
Aneurysm
Heart failure
Microvascular damage : eye, brain
Metabolic syndrome

# Normal regulation of BP



# Normal regulation of BP

- **Factors determining BP**

- $CO = SV \times HR$
- Systemic vascular resistance
- Blood volume & viscosity
- Elasticity

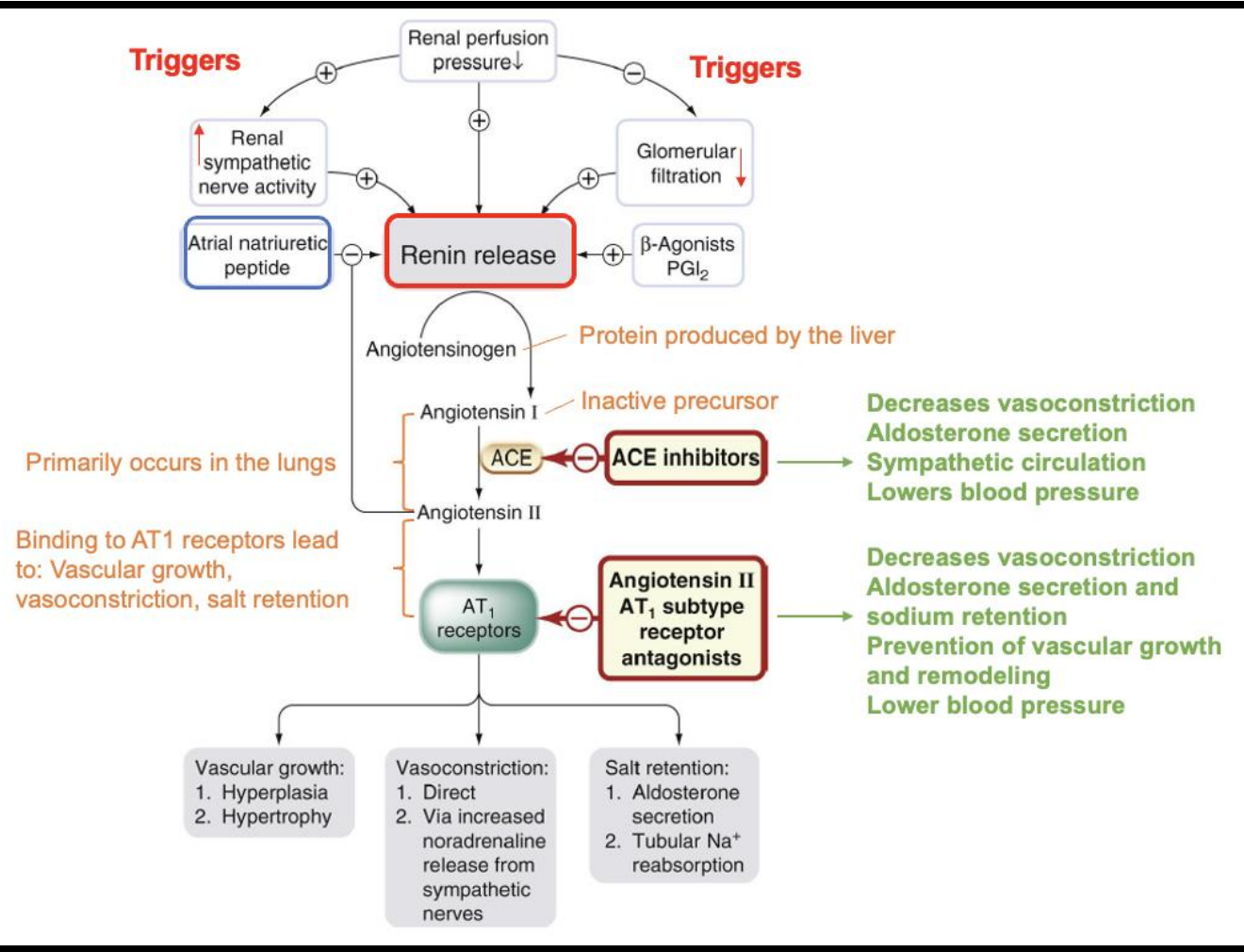
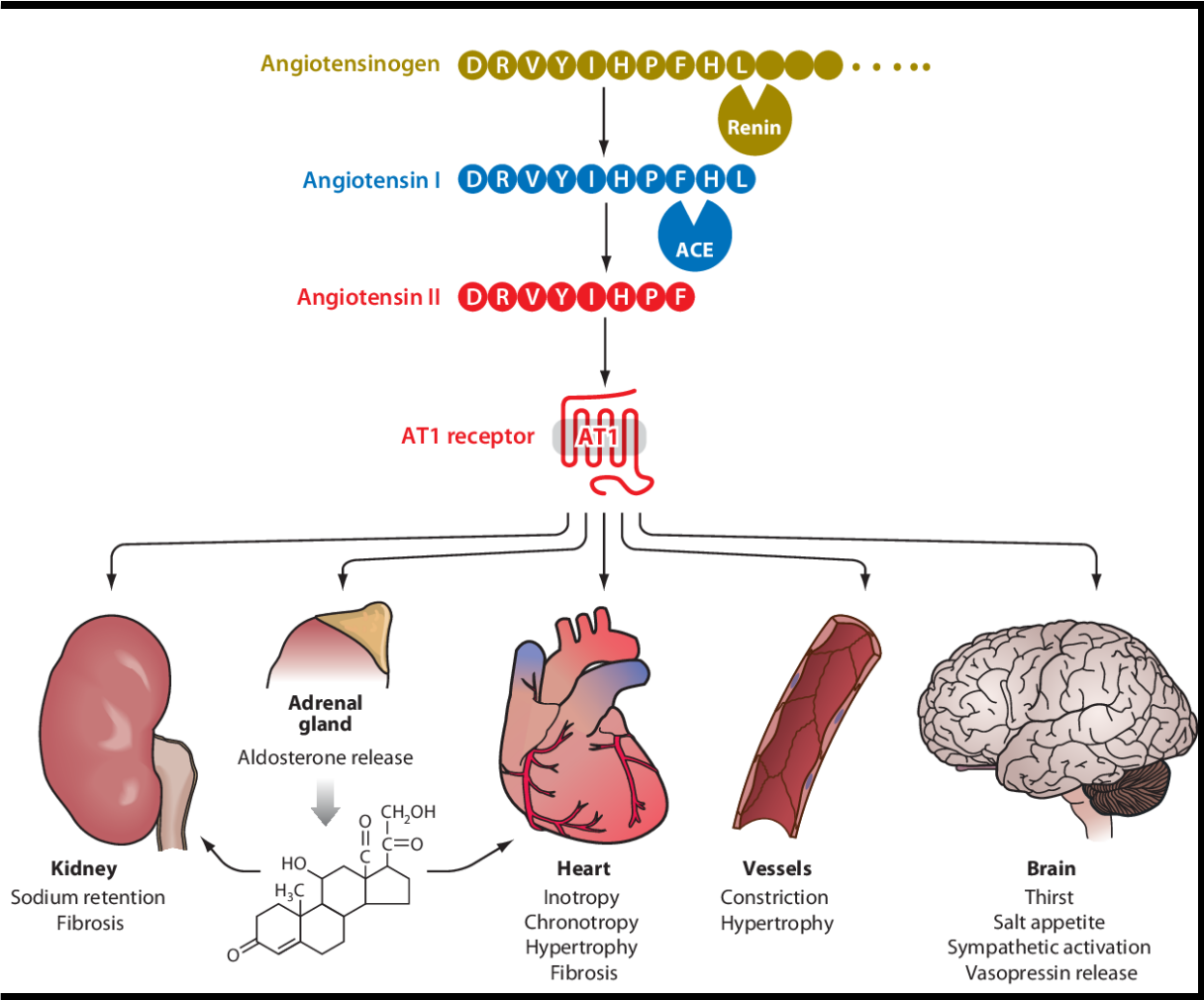
- **Nervous systems**

- Receptors in aortic arch & common carotid artery
- Relay information to vasomotor center
- Alpha adrenergic receptors

- **Humoral systems**

- Endocrine-renal interactions
- Endothelial vasoactive substances

# Renin-angiotensin system



## ACE inhibitor

- **MOA:** block conversion of angiotensin I to II, Inhibit breakdown of bradykinin
- **Dental implications**
  - Many 😊

Generic name	Brand Name
Captopril	Zedace, Capoten
Enalapril	Renitec, Auspril
Fosinopril	Monopril, Fosipril
Lisinopril	Zestril, Zinopril
Perindopril	Coversyl, Prexum
Quinapril	Acupril, Qpril
Ramipril	Tritace, Tryzan
Trandolapril	Gopten, Tranalpha

# ACE Inhibitors

- **Dental Relevance**

- **Hypotension Risk:** monitor BP during GA/sedation & postural changes
- **Angioedema:** swelling (lips, face, tongue) – refer to GP if suspected
- **Orthostatic Hypotension:** sit patient up slowly before standing
- **Neutropenia:** delay procedures if signs of infection – request WBC count

- **Oral Side Effects**

- **Dysgeusia:** advise avoiding bitter foods & metal utensils
- **Burning Mouth Syndrome:** avoid irritants; suggest cold fluids, sugar-free gum
- **Dry Mouth:** monitor for caries/infections; manage early
- **Oral Lichenoid Reactions:** minimise trauma; adjust prostheses

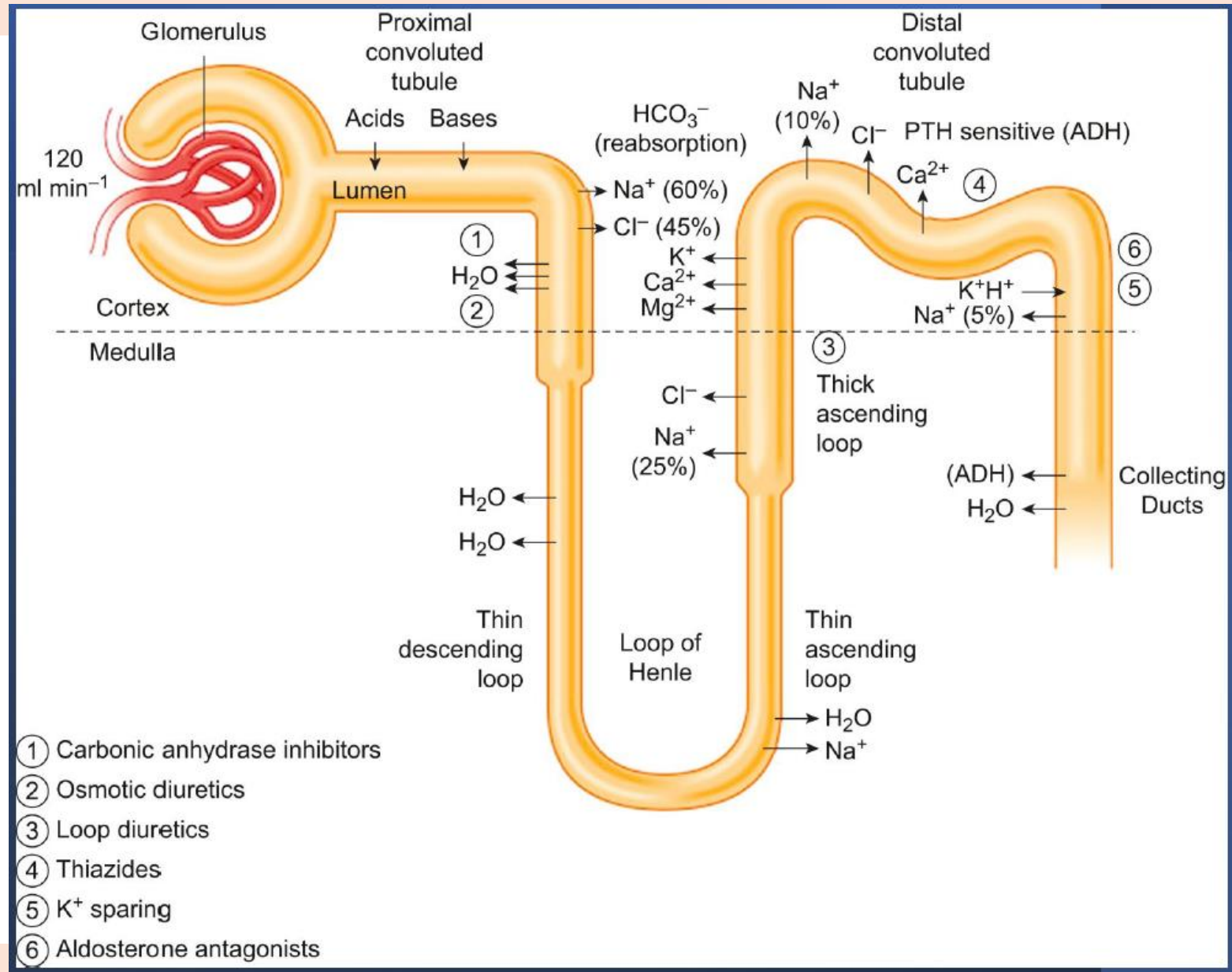
- **Drug Interactions**

- **Quinapril + Tetracyclines:** dose 2 hrs apart
- **Prolonged NSAIDs:** ↓ ACE efficacy, ↑ renal risk → prefer paracetamol

# Sartans

- **MOA**
  - Competitively block binding of angiotensin II to type 1 angiotensin receptors
- **Dental implications**
  - Hypotension but mainly implicated in GA
  - NSAIDs: may increase risk for hyperkalemia & reduce renal function

Generic name	Brand Name
Candesartan	Adesan, Atacand
Irbesartan	Avapro, Karvea
Losartan	Cozavan, Cozaar
Olmesartan	Olmetec
Telmisartan	Micardis
Valsartan	Diovan



- ① Carbonic anhydrase inhibitors
- ② Osmotic diuretics
- ③ Loop diuretics
- ④ Thiazides
- ⑤ K<sup>+</sup> sparing
- ⑥ Aldosterone antagonists

## Thiazide & related diuretics

- **MOA:** inhibit reabsorption of Na & Cl
- **Dental implications**
  - NSAIDs: may reduce renal function

## Potassium sparing diuretics

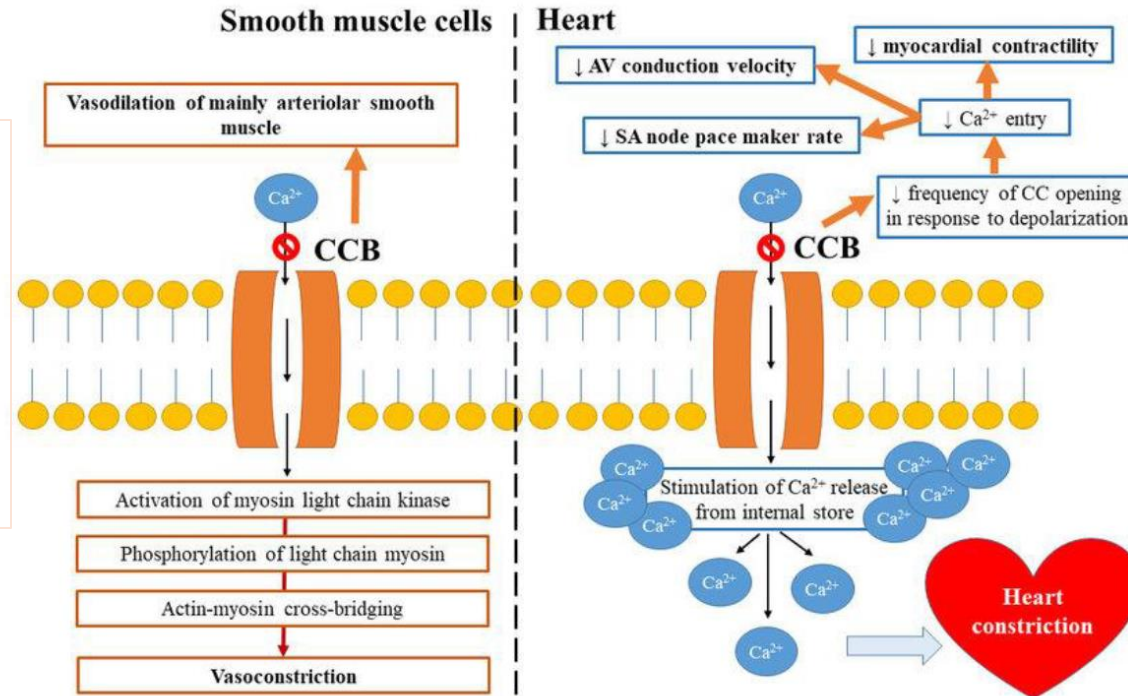
- **MOA:** inhibit reabsorption of Na in the distal tubule
- **Dental implications**
  - NSAIDs: may increase risk for hyperkalemia & reduce renal function
  - Dry mouth

Generic name	Brand Name
Hydrochlorothiazide	Dithiazide
Chlorthalidone	Hygroton
Indapamide	Natrilix

Generic name	Brand Name
Amiloride	Kaluril
Triamterene	Only available w/ hydrochlorothiazide

# Calcium channel blockers (CCBs)

**Calcium Channel Blockers (CCBs)** inhibit  $\text{Ca}^{2+}$  influx in arteriolar smooth muscle  
**Calcium** is essential for muscle contraction via MLCK activation  
**Blocking  $\text{Ca}^{2+}$  channels** prevents smooth muscle contraction  
Results in **vasodilation**, reduced peripheral resistance, and **lowered blood pressure**



- ↓ **AV Conduction Velocity:** Slows electrical signal transmission through AV node; useful in supraventricular tachycardia
- ↓ **SA Node Pacemaker Rate:** Reduces heart rate (negative chronotropy); helps manage atrial fibrillation
- ↓ **Myocardial Contractility:** Decreases calcium entry during depolarization; lowers force and rate of cardiac contractions

# Calcium Channel Blockers (CCBs)

- **Mechanism of Action**
  - Block **L-type calcium channels** in heart & blood vessels
  - ↓ Calcium entry → ↓ muscle contraction → **Vasodilation**
  - ↓ Heart rate (**negative chronotropy**), ↓ contractility (**negative inotropy**), ↓ AV conduction
- **Key Uses**
  - **Hypertension:** ↓ Vascular resistance (esp. dihydropyridines – e.g., amlodipine)
  - **Angina:** ↑ Coronary blood flow & ↓ cardiac oxygen demand
  - **Arrhythmias:** Stabilize heart rhythm (non-dihydropyridines – e.g., verapamil, diltiazem)
- **Types of CCBs**
  - **Dihydropyridines:** Amlodipine, Nifedipine – act on blood vessels
  - **Non-dihydropyridines:** Verapamil, Diltiazem – act on heart & rhythm
- **Clinical Highlights**
  - ↓ **Blood Pressure** via smooth muscle relaxation
  - **Relief of Chest Pain** via improved perfusion
  - **Rhythm Control** in AF, SVT via slowed conduction

# Calcium channel blockers (CCBs)

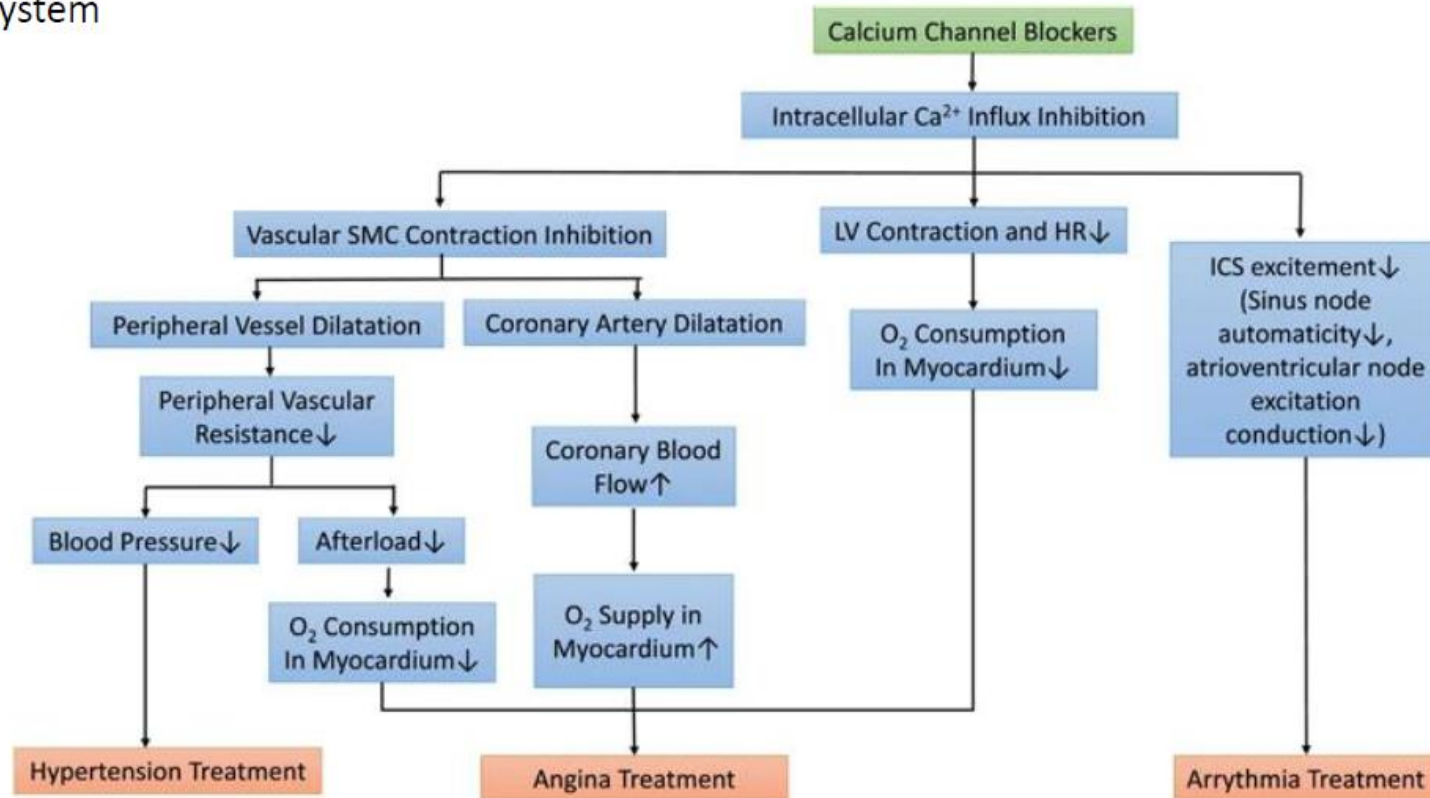
Ca - Calcium

SMC - Smooth muscle cell

LV - Left ventricle

HR - Heart rate

ICS - Impulse conduction system

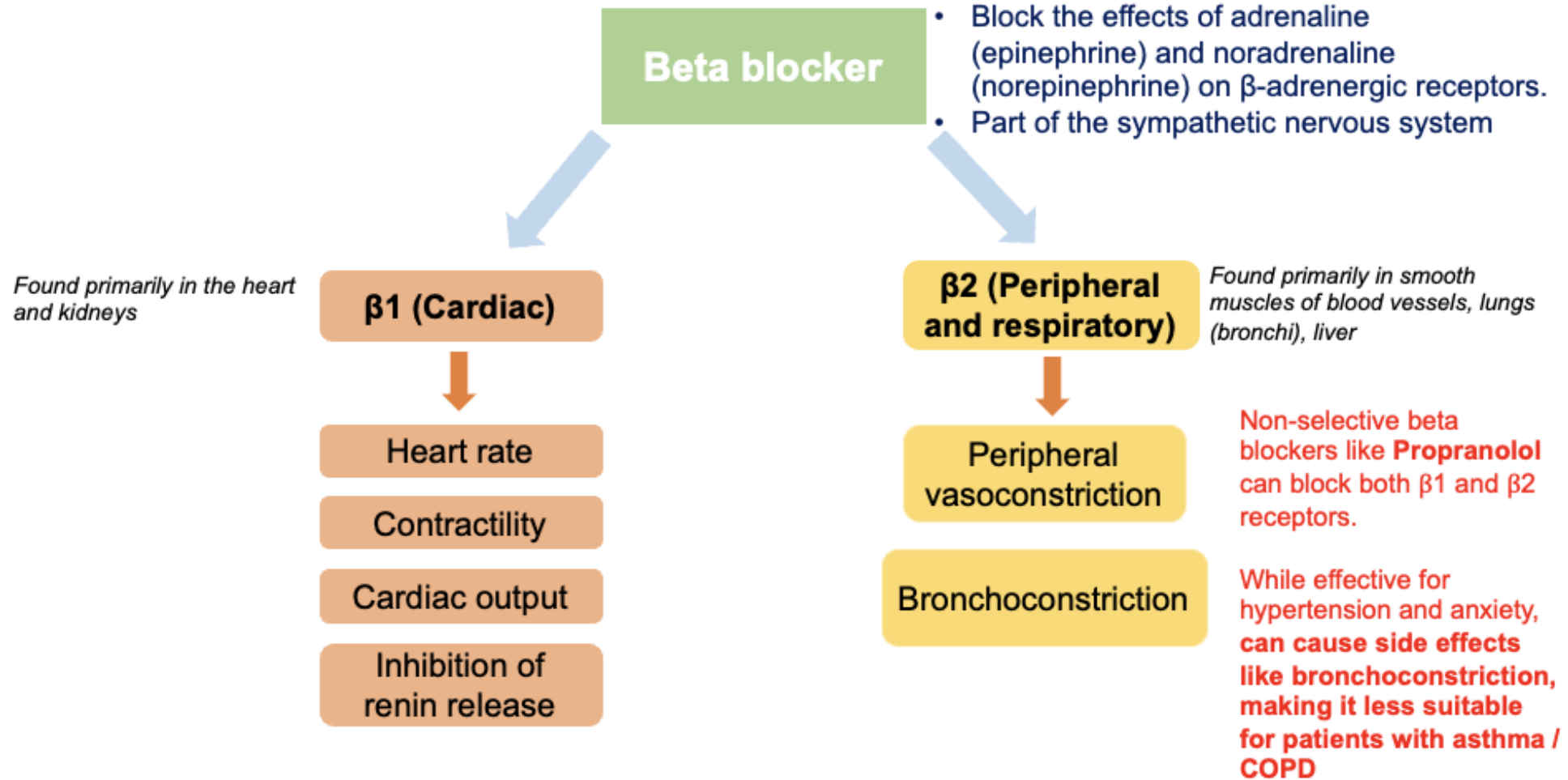


# Calcium Channel Blockers

- **MOA:**
  - Block inward current of Ca into cells
  - Reduce vascular resistance
- **Dental implications**
  - Gingival hyperplasia , taste disturbance, exfoliative dermatitis, angioedema
  - Except for clevidipine, CCBs & CYP3A4 inH
  - Diltiazem, Verapamil: +erythromycin → QT prolongation
  - LA technique: always aspirate

Generic name	Brand Name
Amlodipine	Nordip, Norvasc
Clevidipine	Cleviprex inj
Felodipine	Felodur
Lercanidipine	Zanidip, Lercan
Nifedipine	Adalat, Adefin
Nimodipine	Nimotop
Diltiazem*	Cardizem
Verapamil *	Cordilox, Veracaps

# Beta blockers



# Beta blockers

- **$\beta_1$  receptor blockade (cardio-selective effects)**
  - $\downarrow$  Heart rate  $\rightarrow$  *Negative chronotropic effect*
  - $\downarrow$  Contractility  $\rightarrow$  *Negative inotropic effect*
  - $\downarrow$  Cardiac output
  - $\downarrow$  Renin release  $\rightarrow$  *Suppresses RAAS, lowers BP*
  - *Examples: Metoprolol, Atenolol*
- **$\beta_2$  receptor blockade (non-cardio-selective effects)**
  - $\uparrow$  Peripheral vasoconstriction
  - $\uparrow$  Bronchoconstriction  $\rightarrow$  *Caution in asthma/COPD*
  - *Example: Propranolol (blocks both  $\beta_1$  &  $\beta_2$ )*
- **Mixed alpha & beta blockade**
  - *Labetalol, Carvedilol*
  - Block  $\beta_1$ ,  $\beta_2$ , and  $\alpha_1$  receptors
  - Enhanced BP lowering via vasodilation

Generic name	Brand Name
<b>Cardio-selective Beta 1 blockers</b> Atenolol Bisoprolol Metoprolol Nebivolol	Noten, Tenormin Bispro, Bicor Betaloc Nebilet
<b>Nonselective Beta1&amp;2 blockers</b> Propranolol	Deralin
<b>Nonselective Beta1&amp;2 blockers &amp; alpha1 blocker</b> Carvedilol Labetalol	Dilatren Presolol, Trandate
<b>Injection</b> Esmolol	Brebviloc inj
<b>Antiarrhythmic</b> Sotalol	Sotacor, Cardol

# Beta blockers

- **Dental implications**
  - **Orthostatic hypotension:** sit patient up slowly post-treatment
  - **Xerostomia (rare):** increases caries and infection risk
  - **Dysgeusia:** altered/bitter taste; avoid metallic utensils
  - **Oral lichenoid reactions:** white lacy lesions; may require referral
  - **Rare blood dyscrasia:** delay treatment if infection symptoms present
- **Drug interactions**
  - **NSAIDs:** may reduce antihypertensive effect — limit use to  $\leq 5$  days
  - **Adrenaline (LA):** use caution with non-selective  $\beta$ -blockers  $\rightarrow$  risk of  $\uparrow$  BP & reflex bradycardia
- **Surgical considerations**
  - Monitor vitals during sedation or general anaesthesia
  - Be aware of cardiac risks (bradyarrhythmia, hypotension)

## Selective alpha blockers

- **MOA:** block  $\alpha_1$  receptors → reduce vasoconstrictions
- **Dental implications**
  - Orthostatic hypotension

## Other antihypertensives

- **MOA:** predominantly arteriolar vasodilators
- **Dental implications**
  - Dry mouth: clonidine, methyldopa, moxonidine

Generic name	Brand Name
Prazosin	Minipress
Terazosin	Hytrin

Generic name	Brand Name
Clonidine	Catapres
Diazoxide	Diazoxide
Hydralazine	Alphapress
Methyldopa	Hydopa
Minoxidil	Loniten
Moxonidine	Physiotens
Sodium Nitroprusside	Sodium Nitroprusside

# Hypertension Dental implications

- **Patient factors**
  - Other comorbidities
  - Short appointments
  - LA delivery technique
  - Monitor patient & BP
- **Medication factors**
  - Orthostatic hypotension
  - Xerostomia
  - Gingival hyperplasia: CCBs
  - Gingival bleeding: vasodilators
  - Lichenoid drug rxn
  - Angioedema: ACE InHs

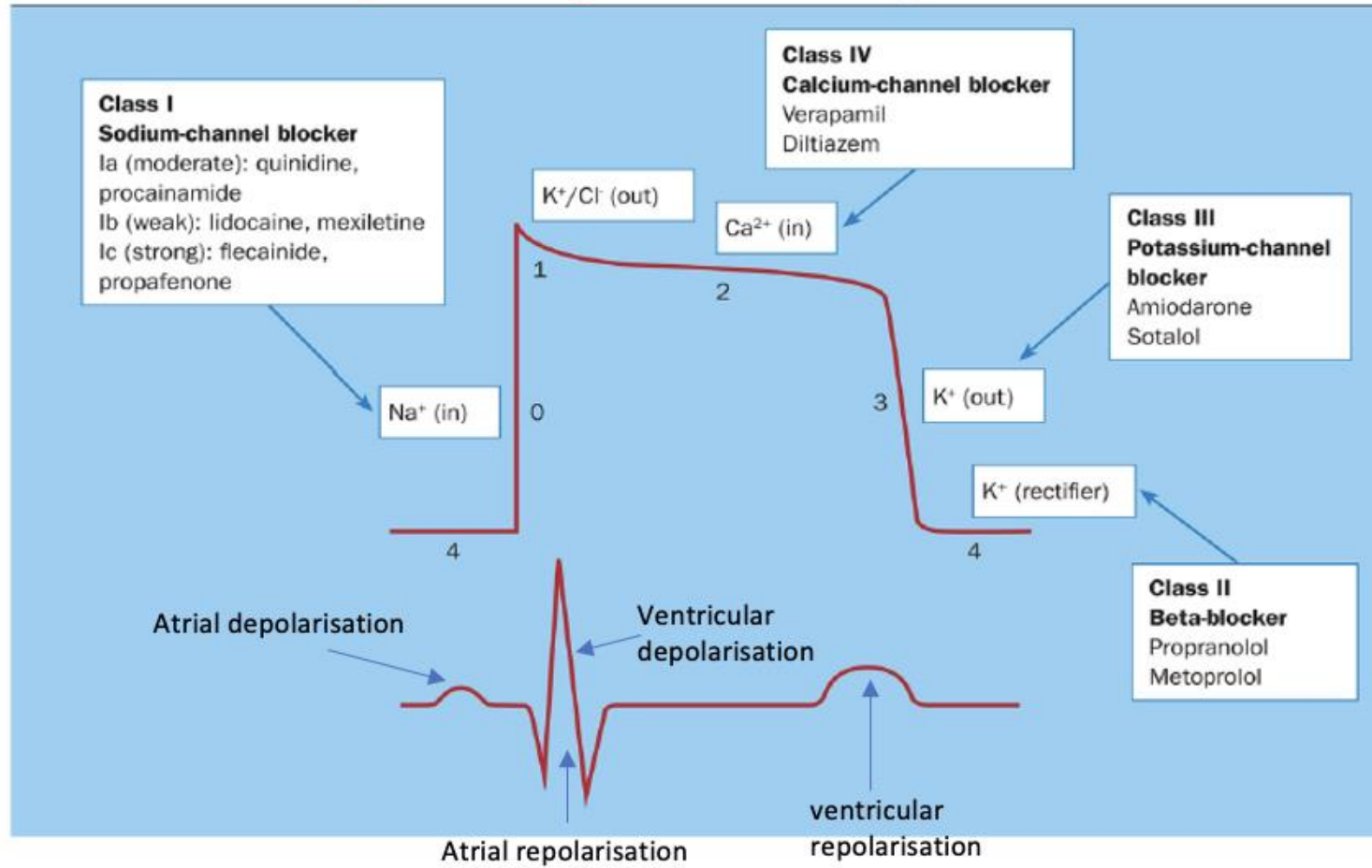
# Hypertension Dental implications

## Management of Syncope in Dental practice

Scenario	Actions
<b>If patient feels faint</b>	<ul style="list-style-type: none"><li>• Stop dental treatment</li><li>• Lay patient flat (tilt chair or lie down)</li><li>• Raise legs</li><li>• Check heart rate</li><li>• Talk to assess consciousness</li></ul>
<b>If patient loses consciousness</b>	<ul style="list-style-type: none"><li>• Stop dental treatment</li><li>• Raise legs, lower head (horizontal position)</li><li>• Check BP and heart rate</li><li>• Allow slow recovery under supervision</li></ul>
<b>If no recovery of consciousness</b>	<ul style="list-style-type: none"><li>• Call 000</li><li>• Start basic life support (refer to BLS chart)</li><li>• Place patient on side</li><li>• Continue until help arrives or patient wakes up</li></ul>

# Arrhythmia

- **Abnormal beating of the heart**
  - Too quick, too slow, irregularly
- **Symptoms**
  - Chest pain, dizziness, sweating, SOB, anxiety
- **Rationale of drug therapy**
  - Prevent sudden cardiac arrest
  - Restore sinus rhythm & hemodynamic stability
  - Control sx relief
  - Control ventricular rate in AF
- **Complications**
  - Stroke, HF, cardiac arrest, sudden death



# Cardiac action potential: Key Phases

- **Phase 0: Depolarization**
  - Rapid sodium ( $\text{Na}^+$ ) influx
  - Triggers action potential (electrical signal)
- **Phase 1: Initial Repolarization**
  - Sodium channels close
  - Brief potassium ( $\text{K}^+$ ) efflux
  - Slight drop in membrane potential
- **Phase 2: Plateau**
  - Calcium ( $\text{Ca}^{2+}$ ) enters via L-type channels
  - Potassium continues to exit
  - Maintains a steady voltage; supports muscle contraction
- **Phase 3: Repolarization**
  - Calcium channels close
  - Potassium efflux continues
  - Cell returns to negative resting potential
- **Phase 4: Resting State**
  - Stable resting potential maintained by  $\text{Na}^+/\text{K}^+$  pump
  - Cell is ready for the next beat

## Antiarrhythmic drugs (Vaughan Williams classification)

- Used to treat abnormal heart rhythms
- Vaughan Williams classification

*Table 1*

**Simplified Vaughan Williams classification of antiarrhythmic drugs**

Class	Action	Examples
I	Interfere with depolarisation	disopyramide quinidine mexiletine flecainide
II	Beta blockade	beta blockers other than sotalol
III	Prolong repolarisation	amiodarone sotalol
IV	Calcium channel blockade	verapamil

Generic name	Brand Name
Adenosine	Adenocor inj
Amiodarone	Aratac, Cordarone
Atropine	Atropine inj
Digoxin	Lanoxin, Sigmagin
Disopyramide	Rythmodan
Esmolol	Brevibloc inj
Flecainide	Flecatab, Tambocor
Isoprenaline	Isuprel inj
Lignocaine	Lignocaine inj
Sotalol	Cardol, Sotacor
Verapamil	Cordilox, Veracaps

## Amiodarone

- **MOA:** prolong refractory period in all cardiac tissue
- **Dental implications:** taste disturbance, skin pigmentation

## Disopyramide

- **MOA:** prolong refractory period of myocardial tissue
- **Dental implications:** dry mouth

## Isoprenaline

- **MOA:** beta agonist
- **Dental implications:** dry mouth



## Arrhythmia Dental implications

- **Well-controlled arrhythmias** do not contraindicate routine dental care
- **Stress reduction and proper anaesthesia technique** are central to safe treatment
- **Amiodarone** may reduce the effectiveness of certain opioids and cause oral pigmentation
- **Calcium channel blockers** can lead to gingival overgrowth, requiring careful monitoring and, occasionally, surgical management

# Heart Failure

- **Systolic HF**
  - Responds to conventional tx
- **Diastolic HF**
  - No drug tx shown to improve survival
- **Common cause is coronary heart disease**
  - Assoc w/ hx of myocardial infarction & HTN
- **Prognosis for chronic HF is poor: 60-70% mortality within 5yrs**
- **Impairment of pumping ability**
  - RHS: accumulation of blood in venous circulation → organ congestion & peripheral oedema
  - LHS: accumulation of blood in pulmonary circulation → pulmonary congestion & fluid in lungs

# Heart Failure

- **Rationale for drug therapy**
  - Provide sx relief & improve exercise tolerance
  - Prevent hospitalization & deterioration in left ventricular function
  - Reduce mortality
- **Identify cause & treat**
  - Eg, coronary artery disease, HTN, valvular heard disease
- **Identify & treat precipitants**
  - Eg. Acute myocardial ischemia, arrythmia, anemia, iron deficiency etc.
- **Drug tx for systolic HF**
  - Table next slide

# Drugs for systolic HF

- **1) Start ACE inhibitor**
  - Start low, increase slow
  - If cough/angioedema: switch to sartan
- **2) When stable, add beta blocker**
  - Start low, increase slow
- **3) If still symptomatic**
  - + aldosterone antagonist
- **4) If still symptomatic**
  - + digoxin or ivabradine
- **5) Fluid overload**
  - + loop diuretic
- **6) Acute pulmonary oedema**
  - Nitrates & diuretics
- **7) If acute severe HF**
  - + vasodilators, parenteral inotropes

## Aldosterone antagonists

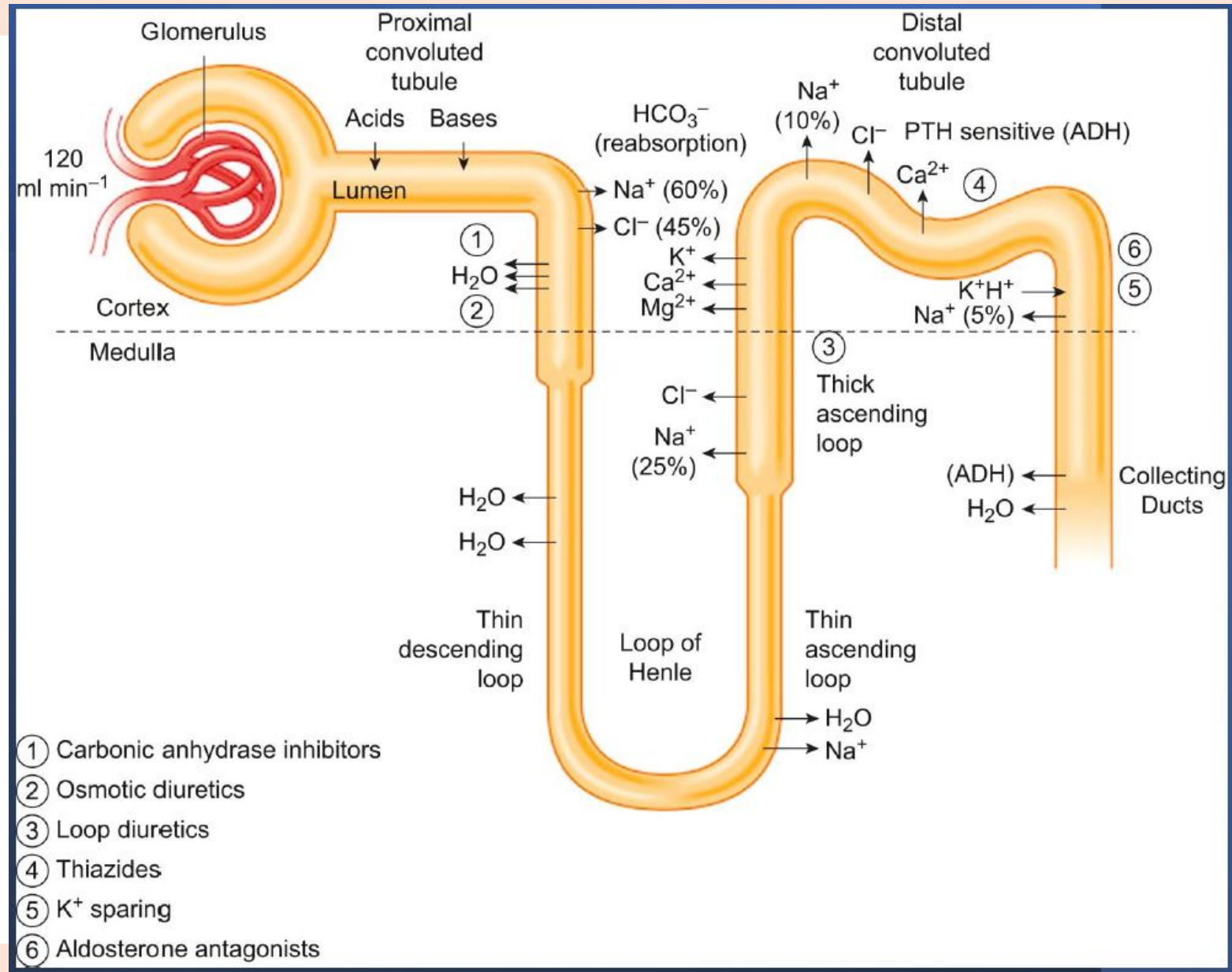
- **MOA:** antagonize aldosterone → inhibit Na absorption in distal tubule
- **Dental implications**
  - Orthostatic hypotension & drug interaction w/ NSAIDS

## Loop diuretics

- **MOA:** inhibit reabsorption of Na & Cl in ascending limb of loop of Henle
- **Dental implications**
  - Orthostatic hypotension & drug interaction w/ NSAIDS

Generic name	Brand Name
Eplerenone	Inspra
Spirolactone	Aldactone, Spiractin

Generic name	Brand Name
Bumetanide	Burinex
Ethacrynic acid	Edecrin
Frusemide	Lasix, Urex



# Sympathomimetics

- **MOA:** mimic agonistic action of adrenaline & noradrenaline on  $\alpha$  &/or  $\beta$ -adrenoceptors
- Pt need to be stabilized, tx in restricted setting under close monitoring

## Other drugs for HF – digoxin

- **MOA:** Inhibition of  $\text{Na}^+/\text{K}^+$ -ATPase pump in cardiac myocytes
- **Dental implications**
  - Low narrow therapeutic window! Monitor toxicity signs & defer tx
  - Macrolide ABs: inH metabolism of digoxin

Generic name	Brand Name
Adrenaline	Adrenaline inj
Dobutamine	Dobutrex inj
Dopamine	Dopamine inj
Isoprenaline	Isuprel inj
Noradrenaline	Levophed inj

Generic name	Brand Name
Digoxin	Lanoxin, Sigmagin
Milrinone	Primacor inj

# Heart Failure Dental implications

- **Unstable patients:** defer treatment and refer
- **Short, stress-free appointments:** minimize cardiovascular strain
- **Patient positioning:** keep head above heart to reduce pulmonary congestion
- **Avoid sedation in-clinic:** refer to hospital for GA or conscious sedation
- **Stress management:** effective LA, calm communication, possible mild sedation (with cardiologist's input)
- **Comprehensive medical history:** identify class of HF, medications, comorbidities
- **Monitor vitals:** BP and HR before and during treatment
- **Infective endocarditis risk:** check need for antibiotic prophylaxis with cardiologist
- **Patient education:** emphasize oral hygiene, diet, and lifestyle changes
- **Emergency readiness:** oxygen, nitro-glycerine, trained staff, clear protocols



## Drugs for HF Dental implications

- **Medication factors**
  - Drug interactions: macrolide Abs, NSAIDs
  - Safe delivery of LAs
  - Orthostatic hypotension
- **Monitor sign of digoxin drug toxicity**
  - GI effects: nausea, vomiting
  - Visual disturbances
  - Cardiac arrhythmia

# Heart Failure Dental implications

## **Figure 13.48 Management of cardiac arrest in dental practice**

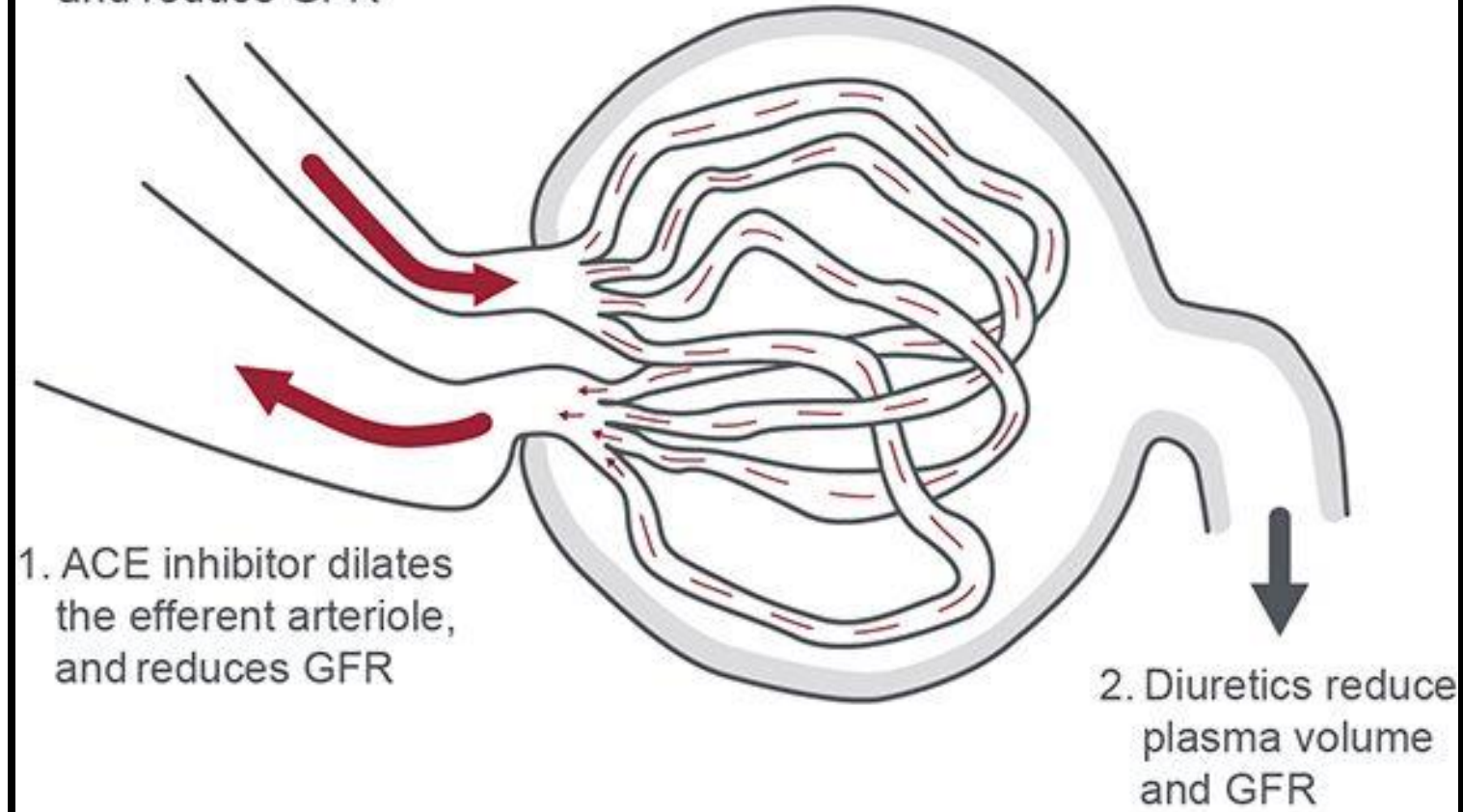
### **If cardiac arrest occurs:**

- Stop dental treatment.
- Call 000.
- Start basic life support, including CPR (for 'Basic life support flow chart', see [Figure 13.43](#)). Use an automated external defibrillator if available.
- Maintain treatment until the patient regains consciousness or assistance arrives.

CPR = cardiopulmonary resuscitation

# Tripple Whammy

3. NSAIDs constrict blood flow into the glomerulus via the afferent arteriole and reduce GFR



1. ACE inhibitor dilates the efferent arteriole, and reduces GFR

2. Diuretics reduce plasma volume and GFR

# Angina

- Type of chest pain or discomfort
- Common symptom of **coronary artery disease** (CAD)
- Typically caused by the narrowing or blockage of the coronary arteries
- **Rationale for drug therapy**
  - Provide symptom relief
  - Reduce risk of death or MI
- **Drug choice**
  - Beta blockers, CCBs, long-acting nitrates, other groups of drugs

# Nitrates

- **MOA:** provide exogenous source of nitric oxide  
→ vasodilatory effect

## Other anti-anginal drugs

- **Ivabradine**
  - **MOA:** Inh a current regulating the interval btw depolarization of the SA node
- **Nicorandil**
  - **MOA:** produces venous & arterial dilation & improve myocardial oxygen balance and decrease angina
- **Perhexiline**
  - **MOA:** unclear, but having anti-ischaemic effects

Generic name	Brand Name
Glyceryl trinitrate	Nitrolingual
Isosorbide dinitrate	Isordil
Isosorbide mononitrate	Duride, Imdur

Generic name	Brand Name
Ivabradine	Coralan
Nicorandil	Ikorel
Perhexiline	Pexig

# Angina Dental implications

- **Angina attacks**
  - Know first aid for angina & acute coronary syndrome
- **Ensure pt have their meds on hand**
  - Not all clinic will have nitroglycerin
- **Caution:** adrenaline-soaked retraction cord
- **CCBs:** gingival hyperplasia
  - OH education
  - Surgical removal: will come back
  - Referral to medical GP

## Management of angina or ACS in the dental setting

# Angina Dental implications

Scenario	Actions
<b>If chest pain occurs in a patient with a history of angina:</b>	<ul style="list-style-type: none"><li>- Stop dental treatment</li><li>- Measure blood pressure, heart rate, and pulse oximetry</li><li>- Assess consciousness by talking to the patient</li><li>- Ask the patient to sit down (due to risk of hypotension)</li><li>- Administer glyceryl trinitrate:</li></ul>
	<ul style="list-style-type: none"><li>• <b>Spray:</b> 400 micrograms sublingually, repeat every 5 min if needed, up to 3 doses (if tolerated)</li></ul> <b>OR</b> <ul style="list-style-type: none"><li>• <b>Tablet:</b> 300–600 micrograms sublingually, repeat every 5 min if needed, up to 3 doses (if tolerated)</li></ul>
<b>If pain persists for more than 10 minutes (after 2 doses):</b>	<ul style="list-style-type: none"><li>- Administer third dose</li><li>- Manage as for severe/new chest pain</li></ul>
<b>If the patient recovers:</b>	<ul style="list-style-type: none"><li>- Do not proceed with dental treatment</li><li>- Refer for medical evaluation even if patient appears well</li></ul>
<b>If chest pain is severe or new:</b>	<ul style="list-style-type: none"><li>- Call <b>000</b></li><li>- If patient has angina history, give glyceryl trinitrate as above</li><li>- For <b>all patients</b>, give: aspirin (not detailed in image but implied standard protocol)</li></ul>

# Angina Dental implications

## Management of severe or new chest pain

Action	Details
<b>Call Emergency Services</b>	Call 000 immediately.
<b>Administer Glycerol Trinitrate</b>	For patients with a history of angina, give glycerol trinitrate as per protocol.
<b>Give Aspirin</b>	300 mg orally, chewed or dissolved before swallowing.
<b>Monitor Vital Signs</b>	Measure blood pressure, heart rate, and use pulse oximetry.
<b>Oxygen Therapy</b>	If $\text{SaO}_2 < 90\%$ , start supplemental oxygen. Titrate $\text{SaO}_2$ to 90–96% if possible.
<b>Provide Reassurance</b>	Calm and reassure the patient until help arrives.
<b>If Unconscious</b>	Start basic life support. Use an AED if available. Follow the Basic Life Support flow chart

# Dyslipidemia

- Abnormal levels of lipids in the bloodstream
- Risk factor for cardiovascular (CV) diseases
- Dysregulation in lipid levels → atherosclerosis and other CV complications
- **Rationale for drug therapy**
  - Reduce progression of atherosclerosis
  - Improve survival
  - reduce risk of MI & stroke in patients w/ CVD
  - Prevent pancreatitis
- **Hypercholesterolemia**
  - Statins, bile acid binding resins, nicotinic acid, ezetimibe, fibrates
- **Hypertriglyceridemia**
  - Fibrates, nicotinic acid, fish oils

# Atherosclerosis

- Chronic disease
- Buildup of plaques within the arterial walls
- Leading to narrowing and hardening of the arteries → restrict blood flow.

Modifiable	Non-modifiable	Uncertain
Diabetes mellitus and impaired glucose tolerance	Age	Obesity
Dyslipidaemia	Male	Hypercoagulability
Cigarette	Family history of CVD	High carbohydrate intake
Raised serum C-reactive protein <sup>1</sup>	Familial hypercholesterolaemia	Elevated serum triglyceride
Vitamin B6 deficiency	Increased levels of homocysteine <sup>2</sup>	Elevated serum uric acid
Hypothyroidism		Elevated serum fibrinogen
		Elevated serum lipoprotein
		Chronic systemic inflammation
		Hyperthyroidism
		Continuous pattern of short sleep duration
		Some bacterial infection
<p>1. C-reactive protein (CRP) is a protein made by the liver. Its level increases when there's inflammation in the body.</p> <p>2. Increased levels of homocysteine can damage the inside of arteries and raise the risk of blood clot formation</p>		

## Statins

- **MOA:** competitively inH HMG-CoA reductase enzyme → increase hepatic uptake of cholesterol
- **Drug interaction:** other CYP3A4 inH
  - Clarithromycin, erythromycin, azoles

## Bile acid binding resins

- **MOA:** binds bile acid in intestinal lumen → prevent reabsorption → increase excretion in feces

Generic name	Brand Name
Atorvastatin	Lipitor
Fluvastatin	Vastin
Pravastatin	Pravachol
Rosuvastatin	Crestor
Simvastatin	Zocor

Generic name	Brand Name
Cholestyramine	Questran lite
Colestipol	Colestid

# Fibrates

- **MOA:** peroxisome proliferator-activated receptors (PPARs)

## Other drugs for dyslipidemia

- **Ezetimibe**
  - **MOA:** reduce absorption of dietary & biliary cholesterol
- **Nicotinic acid**
  - **MOA:** unclear, possibly suppress fatty acid release

Generic name	Brand Name
Fenofibrate	Lipidil
Gemfibrozil	Lipigem

Generic name	Brand Name
Ezetimibe	Ezetrol
Nicotinic acid	Nicotinic acid



## Dyslipidemia Dental implications

- **Drug factors**
  - Interactions: Macrolide Abs, Itraconazole, ketoconazole, fluconazole antifungals
  - Check individual drug monograph for CYP enzymes
  - Myopathy
- **Patient factors**
  - Other comorbidities: HTN, diabetes...
- **Oral manifestations**
  - Increase calcification in pulp chambers

## References

- Ritter JM, Flower RJ, Henderson G, Loke YK, MacEwan D, Robinson E, editors. *Rang & Dale's pharmacology*. 10th ed. Edinburgh: Elsevier; 2023
- Australian Medicines Handbook Online [Internet]. Adelaide (AU): Australian Medicines Handbook Pty Ltd;2000. Cardiovascular; [updated 2025; cited 2025]. Available from: UWA Onesearch
- Pharmaceutical Society of Australia. *Australian Pharmaceutical Formulary and Handbook: A Guide to Best Practice*. 25th ed. Canberra: Pharmaceutical Society of Australia; 2021
- Ali K. *Clinical dental pharmacology*. 1st ed. Oxford: Wiley-Blackwell; 2023
- Bullock S, Manias E. *Fundamentals of pharmacology*. 8th ed. Frenchs Forest, NSW: Pearson Australia; 2017
- MIMS Australia. *eMIMSelite: Consumer medicine information, specific clinical monograph* [Internet]. Sydney: MIMS Australia; [updated 2025; cited 2025 Apr 17]. Available from: UWA Onesearch
- Cardiovascular Expert Group. *Therapeutic Guidelines Cardiovascular (Version 7)*. Therapeutic Guidelines Ltd:2023
- [Heart Foundation \(What is an arrhythmia?\)](#), [Victor Chang Cardiac Research Institute\(Arrhythmia\)](#), [Canberra Health Services \(Holter Monitor\)](#), [Heart Foundation \(What is atrial fibrillation?\)](#), [SA Health \(Palpitations – Adult CPC\)](#), [ANZCOR Guidelines \(Guideline 11.9 – Managing Acute Dysrhythmias\)](#)
- Tahamtan S et al. The effect of statins on dental and oral health: a review of preclinical and clinical studies. *Journal of Translational Medicine*. 2020; 18(155)
- Terence J et al. Amiodarone. *Aust Prescr* 2005;28:150-4

