

PATHOPHYSIOLOGY

UNIT 2 NOTES

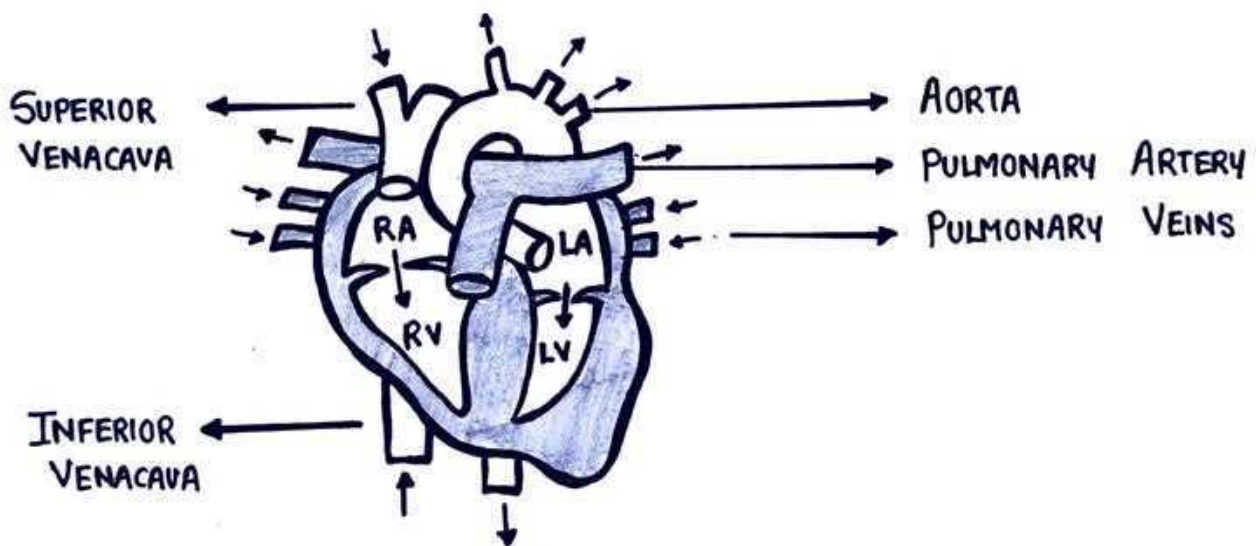
- **CARDIOVASCULAR DISORDERS**
- **RESPIRATORY DISORDERS**
- **RENAL DISORDERS**

CARDIOVASCULAR SYSTEM DISORDERS

- The human cardiovascular system is a system of organs that includes, heart, blood vessels & blood.
- Heart pumps the blood into blood vessels & blood vessels circulates the blood to whole body.

HEART

Heart is a hollow muscular & major organ of cardiovascular system that pumps the blood into blood vessels.



Layers Of Heart

The wall of heart consist of 3 layers :

- ① Pericardium
- ② Myocardium
- ③ Endocardium

Chambers OF Heart

The heart mainly consist of 4 chambers :

- ① Right Atrium : Upper right side
- ② Left Atrium : Upper Left side
- ③ Right Ventricle : below Right Ventricle atrium
- ④ Left Ventricle : below Left Atrium

CARDIOVASCULAR DISEASE

- The diseases or disorders related to heart & blood vessels are termed as cardiovascular diseases :
 - Some most common cardiovascular diseases are as follows :
- ① Hypertension
 - ② Congestive Heart Failure
 - ③ Ischemic Heart Disease
 - ④ Angina Pectoris
 - ⑤ Myocardial Infraction
 - ⑥ Atherosclerosis

HYPERTENSION

- Hypertension is most commonly known as High Blood Pressure (BP)
- It is a condition in which the blood pressure on systemic artery increased beyond the normal pressure.
- In this condition heart has to work harder to deliver blood to tissues.
- According to WHO , In india around 23% men and 22% women over 25 years old suffer from Hypertension.
- High BP also becomes the reason for other various heart diseases.

Stages Of Hypertension

	<u>STAGES</u>	<u>SYSTOLIC BP</u>	<u>DIASTOLIC BP</u>
•	Pre Hypertension	120 - 129 mm Hg	80 - 89
•	Stage - I	130 - 139 mm Hg	90 - 99
•	Stage - II	140 - 149 mm Hg	100 - 110
•	Stage - III (Severe)	More or equal to 180	More or equal to 110

Etiology / Causes Of Hypertension

Generally it is very difficult to find the actual cause of Hypertension but here are some following reasons that can be responsible for Hypertension.

- Genetics
- Inactive Life style
- Stress
- Obesity
- Unhealthy Diet
- Alcohol
- Smoking
- Kidney diseases
- Adrenal Gland disorders
- Thyroid Problems
- Damage In Blood vessels.
- Certain Medications : Birth Control Pills , Pain relievers , illegal drugs etc.

Pathogenesis Of Ess Hypertension

- The pathogenesis of Hypertension is multifactorial & very complex
- It mainly depends on 4 mechanism
- (i) Sympathetic Nervous System Activities
- (ii) Activities of Vascular endothelium
- (iii) Activities of Renal system
- (iv) Renin - Angiotensin System

SYMPATHETIC NERVOUS SYSTEM ACTIVITIES

- The increase in the activity of sympathetic nervous system leads to increase in heart rate & cardiac contraction.
- Now the increase in heart rate & cardiac contraction leads to vasoconstriction.
- The vasoconstriction ultimately leads to increase in blood pressure that is responsible for hypertension.

ACTIVITIES OF VASCULAR ENDOTHELIUM

- The vascular endothelium is a single cell layer that lines the blood vessels.
- Now production of vasoactive substances & growth factors like nitric acid, endothelin, etc. can leads to vasoconstriction.
- These substances are potent vasoconstrictors & can lead to increase in blood pressure level.

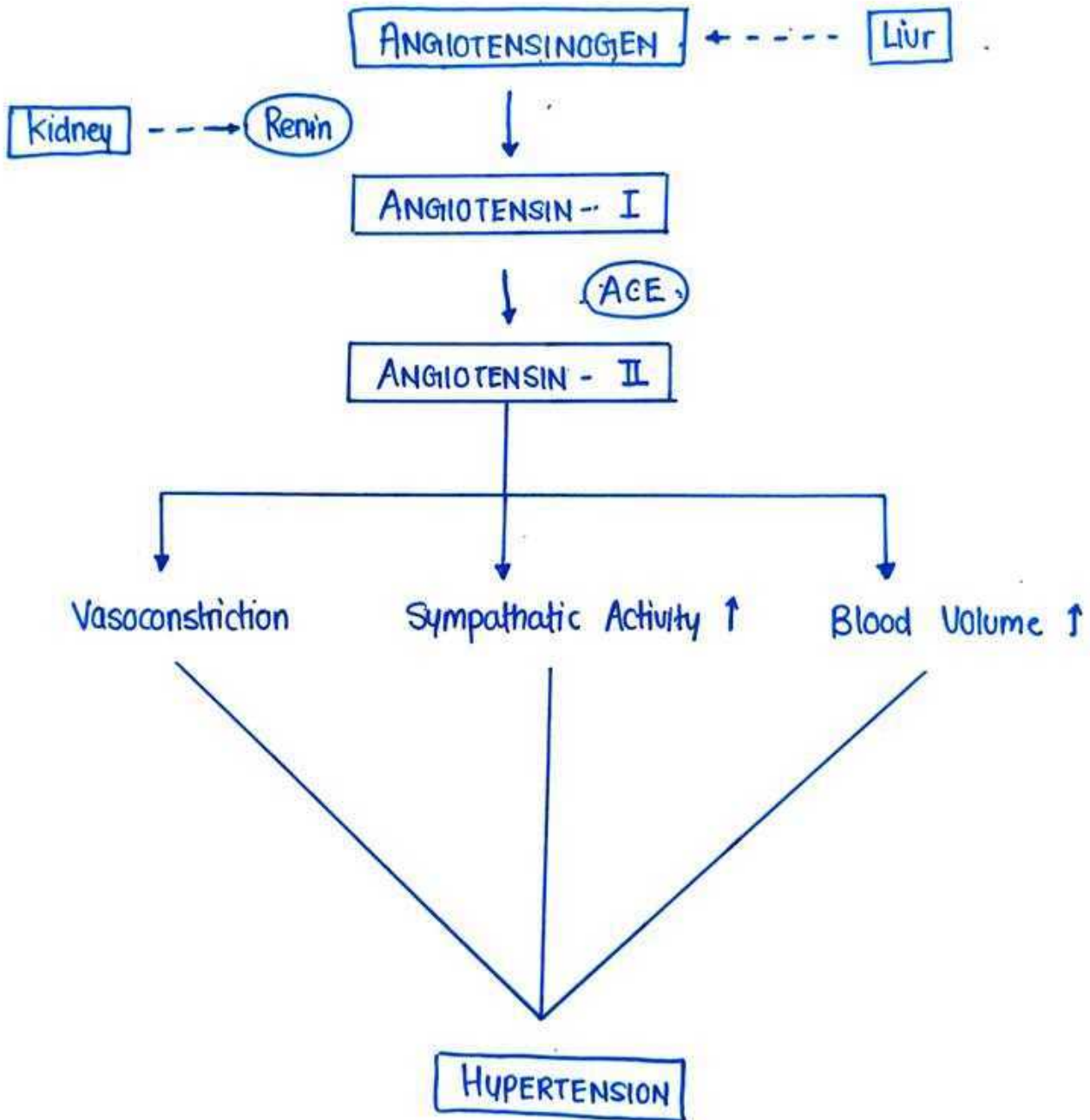
ACTIVITIES OF RENAL SYSTEM

- Any disorder or disease related to renal system can lead to disturbance in the functions of kidney.
- Now disturbance in kidney functions can lead to increased blood volume that ultimately can cause hypertension.



RENIN - ANGIOTENSIN SYSTEM

Renin is an hormone released by kidney while angiotensinogen is released by liver & when they both combined activates Angiotensin - I



SIGN & SYMPTOMS

- Headaches
- Bleeding
- Fatigue
- Chest Pain
- Breathing Difficulty
- Irregular Heartbeat
- Blood in Urine
- Blurred Vision

COMPLICATIONS

- Heart Attack
- Heart Failure
- Kidney Failure
- Eye problems
- Various Metabolic Disorders

TREATMENT

- ① Non Pharmacological :
 - Weight Loss
 - Exercise
 - Meditation
 - Healthy Diet
- ② Pharmacological :
 - Diuretics
 - Beta blocker
 - Alpha blocker
 - Vasodilators etc

CONGESTIVE HEART FAILURE

- CHF is a serious condition mainly characterized by reduction in heart's pumping capacity.
- When a heart fails to pump blood in a quantity sufficient to fulfil the body's requirement then the condition is known as Congestive Heart Failure (CHF).
- It can also be simply known as Heart failure.
- Narrowing in the artery or high blood pressure, generally makes the heart too weak to pump sufficiently.

Types

It can be of following types :

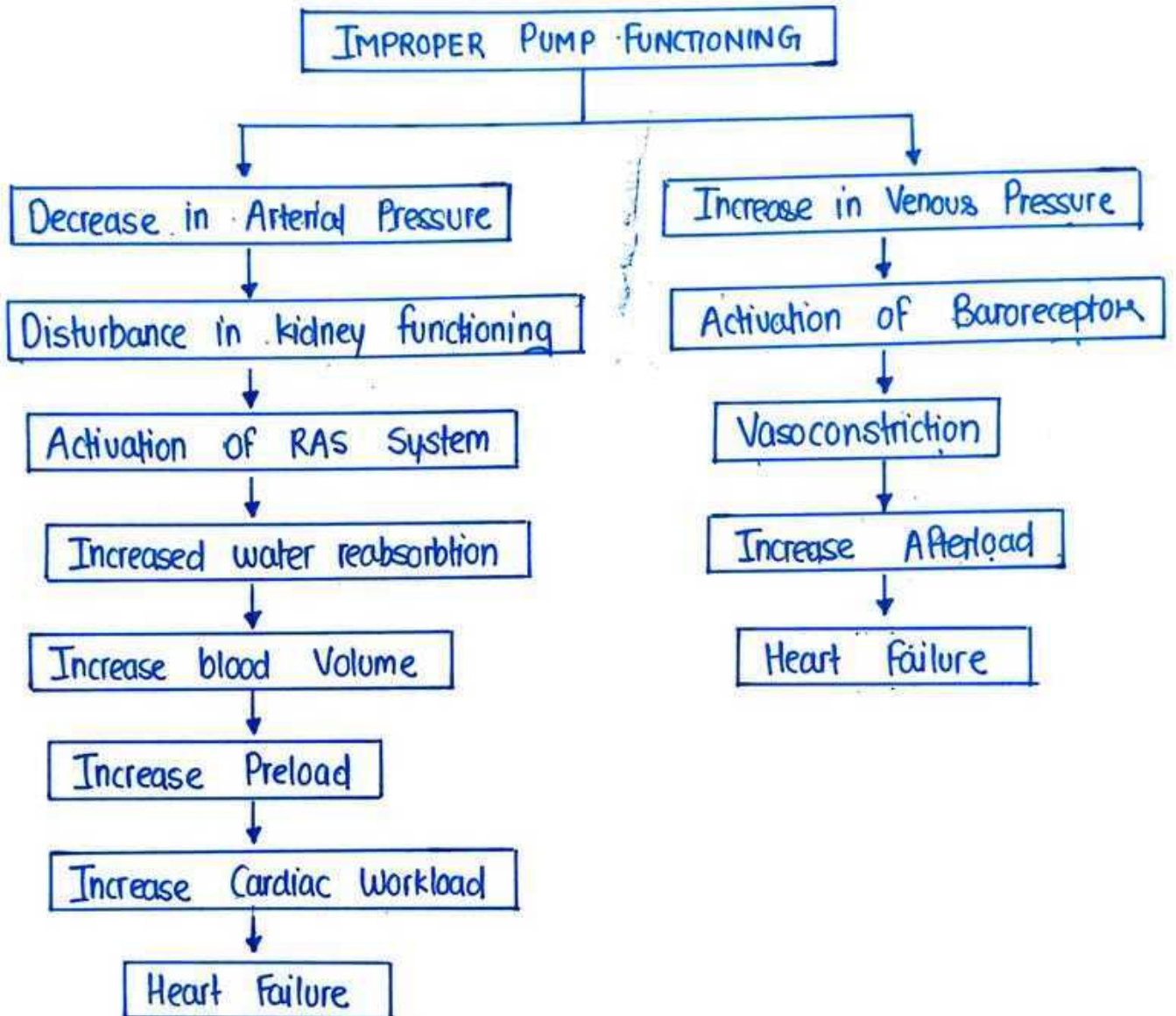
- Left - sided heart failure
- Right - sided heart failure
- Biventricular Heart failure

Causes / Etiology

- Narrowing of arteries that supply blood to heart muscle.
- Ischemic heart disease
- Hypertension
- Myocardial Infraction
- Smoking
- Obesity
- Improper Lungs functioning.
- Diabetes
- Stress
- Valvular Heart Disease.
- Alcohol

Pathogenesis / Mechanism of CHF

CHF can be occur through various mechanism as given below :



Sign & Symptoms

- Chest Pain
- Shortness of Breath
- Fatigue
- Irregular Heartbeat
- Blood in Urine
- Blurred Vision
- Headaches
- Dry Cough etc.

Complications

- Kidney Damage
- Liver Damage
- Heart Attack
- Heart Valve Problem
- Diarrhoea etc..

Treatment

① Non Pharmacological

- Exercise
- No smoking
- Healthy Diet
- Proper Lifestyle

② Pharmacological

- ACE Inhibitors
- Beta blockers
- Diuretics
- Vasodilators

ISCHEMIC HEART DISEASE

- It is condition in which supply of oxygen to the muscles of heart get reduced.
- In, Ischemic heart disease, the major blood vessels supplying blood, oxygen & nutrients to the heart becomes damaged.
- It is also known as Coronary Artery Disease.
- Building of plaque & inflammation in arteries are the major causes of ischemic heart disease
- Ischemic heart disease is further responsible for following heart diseases :
 - (i) Angina Pectoris.
 - (ii) Myocardial Infraction
 - (iii) Atherosclerosis

ANGINA PECTORIS

Types Of Angina Pectoris

Angina Pectoris can be further subdivided into three types

- ① Stable Angina
- ② Unstable Angina
- ③ Variant Angina

STABLE ANGINA

- In stable angina the pain usually occurs when the heart muscles work harder during physical exercise.
- Pain can be relieved by proper rest & medications.
- Chest pain may spread to arm, back & other areas.

UNSTABLE ANGINA

- It is also known as Crescendo Angina.
- The pain of unstable angina occurs during periods of rest, sleeping & suddenly.
- It generally not relieved by rest & medicine.
- Build up of plaque along the walls of arteries is one of the principle cause of unstable angina.

VARIANT ANGINA

- The pain of variant angina occurs at rest during night & early morning hours.
- It's rare type of angina caused by spasm in blood vessels.

MYOCARDIAL INFARCTION

Types Of Myocardial Infarction

Myocardial Infarction is of mainly two types

- ① Transmural MI
- ② Non- Transmural MI

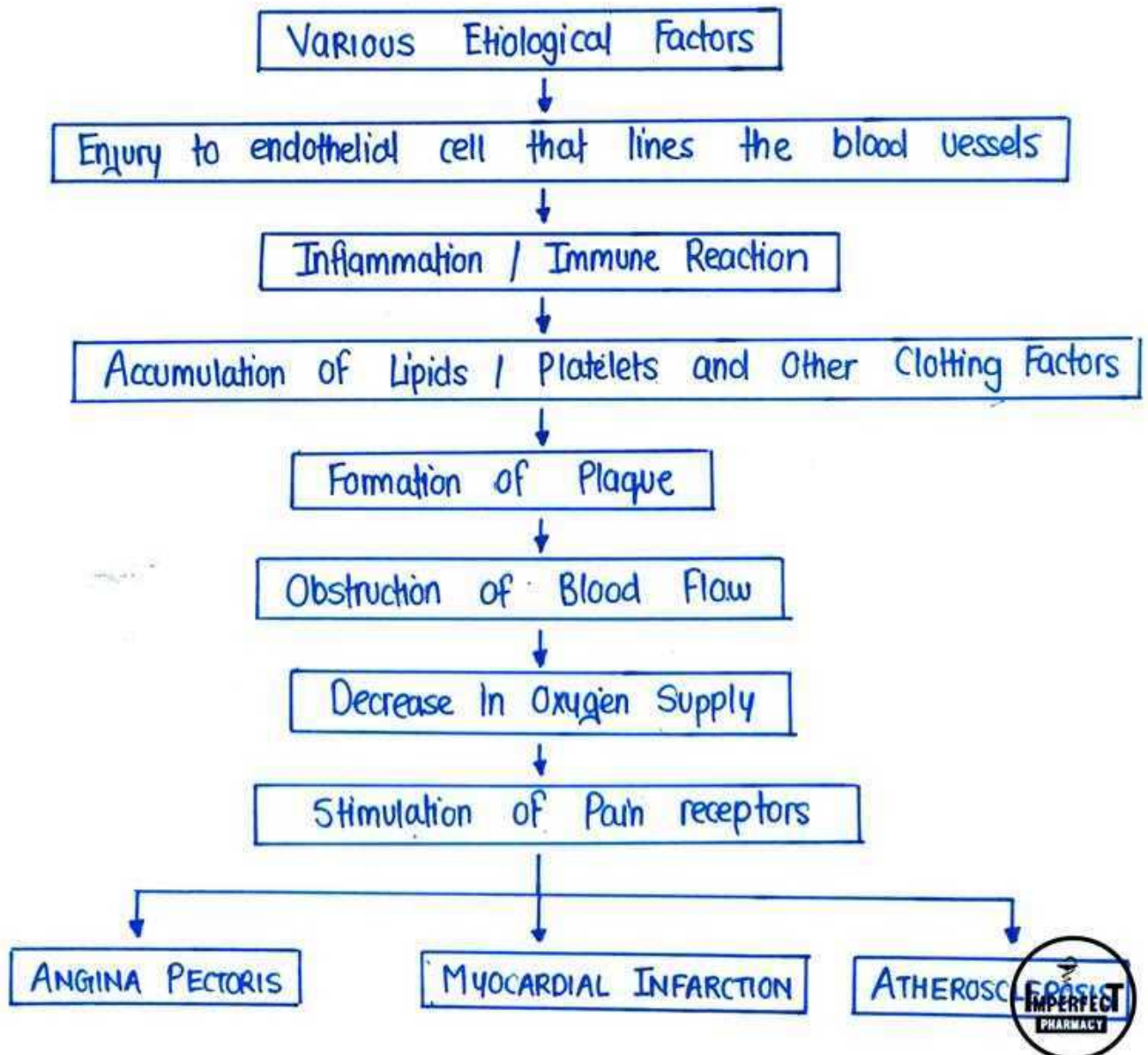
TRANSMURAL MI : In this the affected muscle segment undergoes necrosis that extends from endocardium to epicardium through myocardium

NON TRANSMURAL MI : In this type of MI the area of necrosis is limited to endocardium or max to myocardium.

Etiology / Causes

- Hypertension
- Low O₂ supply
- Smoking
- Alcohol
- Obesity
- Stress
- Diabetes
- Inflammation

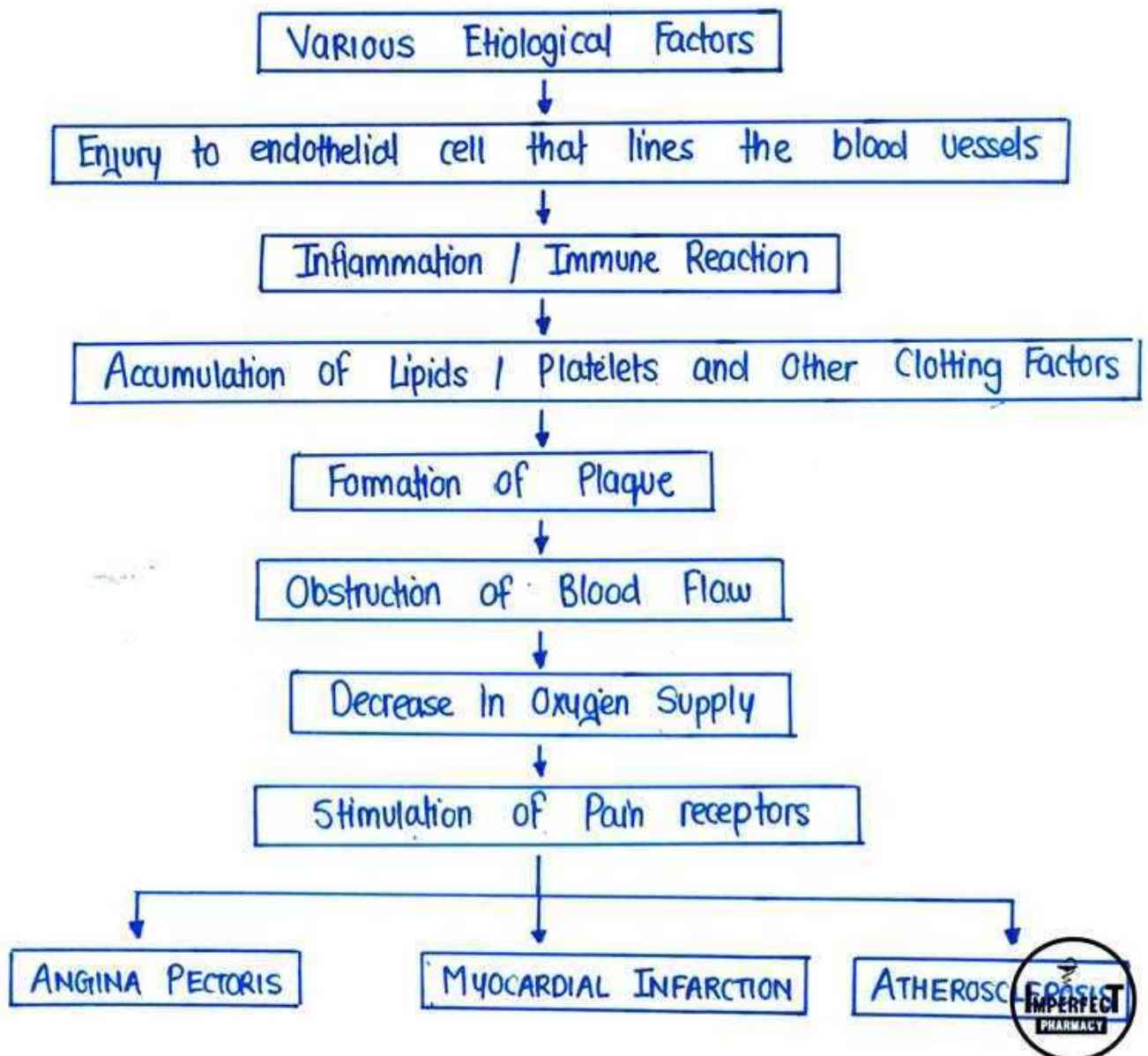
Pathogenesis / Mechanism



Etiology / Causes

- Hypertension
- Low O₂ supply
- Smoking
- Alcohol
- Obesity
- Stress
- Diabetes
- Inflammation

Pathogenesis / Mechanism



Symptoms

- Chest Pain
- Fatigue
- Anxiety
- Headaches
- Shortness of Breath
- Irregular Heartbeat
- Blurred Vision

Complications

- Heart Attack
- Heart Failure
- Kidney Failure
- Eye Problems
- Various Metabolic Disorders

Treatment

① Non Pharmacological

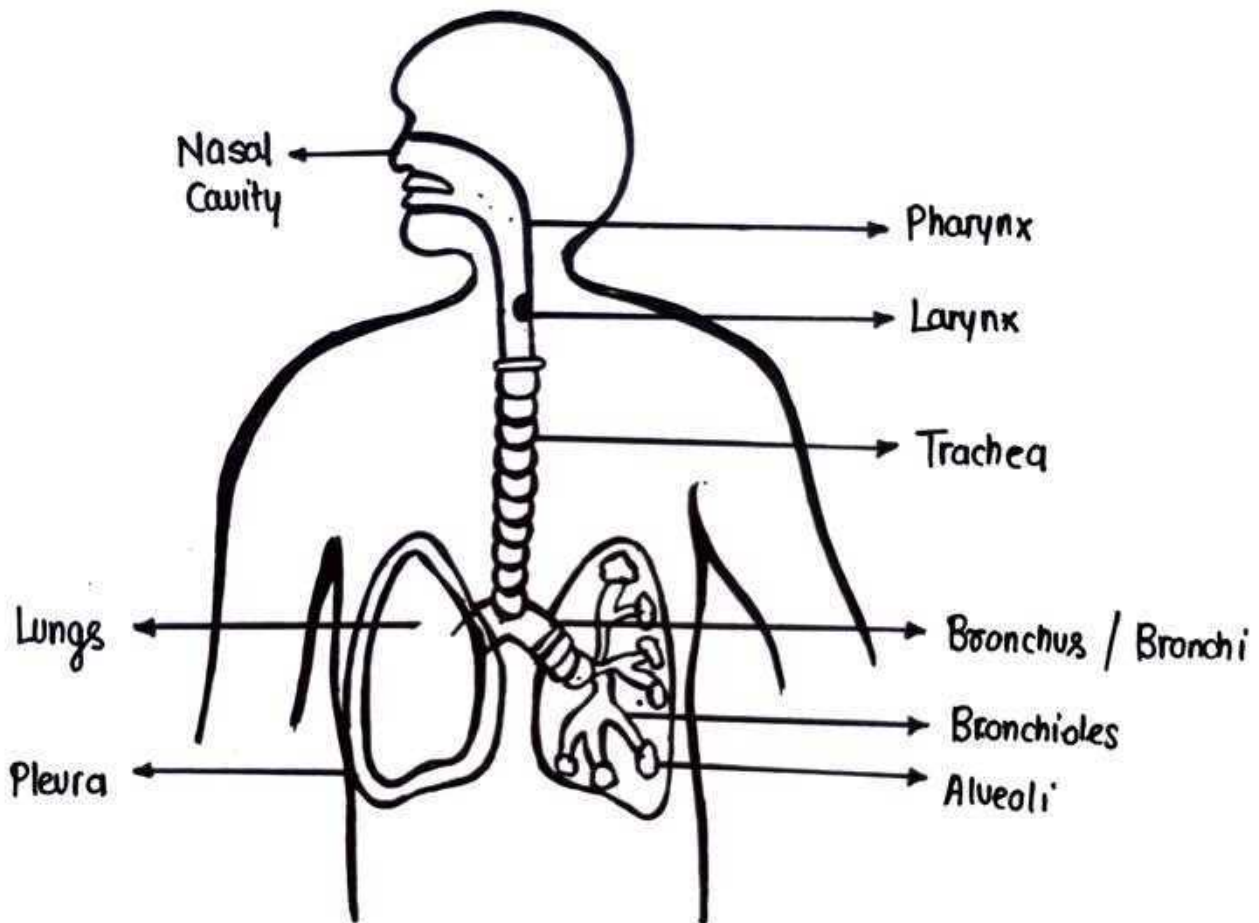
- Exercise
- Healthy Diet
- No tobacco / No Alcohol
- Healthy Lifestyle

② Pharmacological

- Anticoagulants
- Beta blockers
- ACE Inhibitors
- Vasodilators

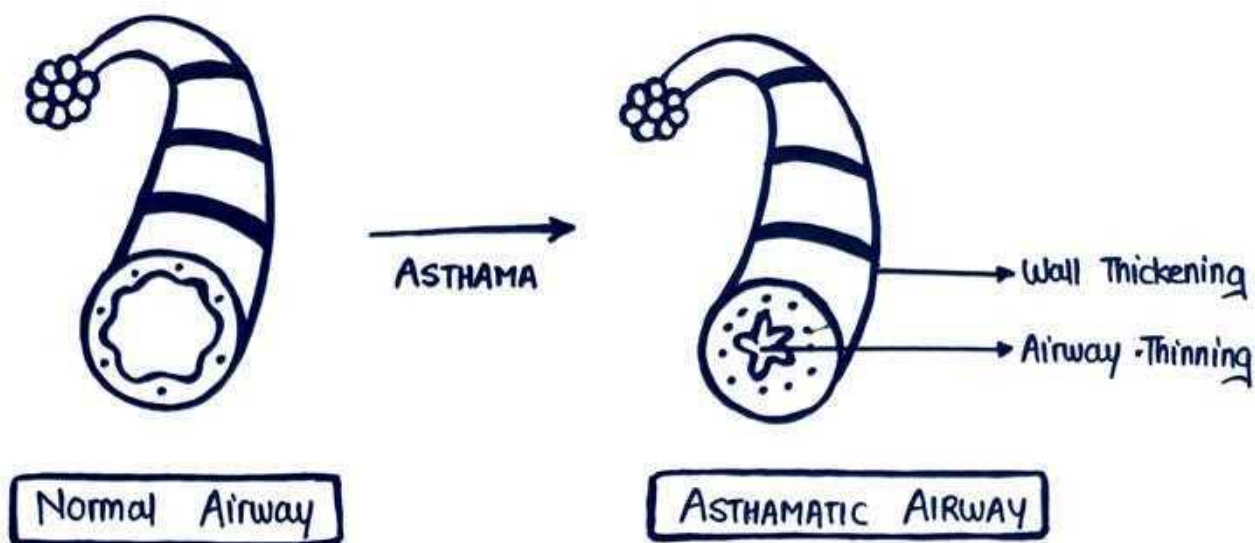
RESPIRATORY DISORDERS

The diseases or disorders related to respiratory tract are simply known as Respiratory system disorders.



ASTHAMA

Asthma is defined as a chronic inflammatory disease of airways that makes the airway narrow & swell & ultimately leads to shortness of breath, chest pain & cough.



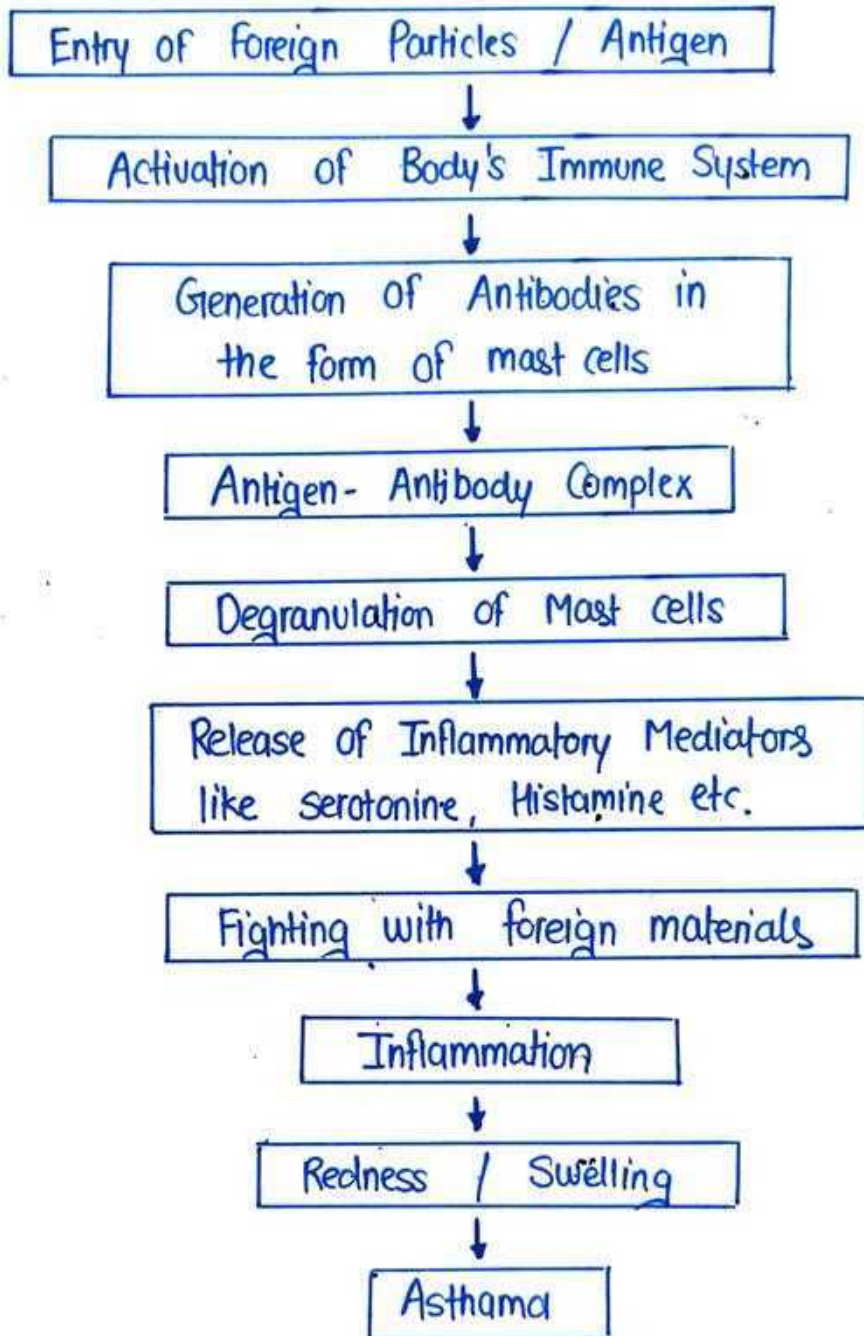
Causes

- Air Pollution
- Smoking
- Weather Change
- Exposure to cold air
- Infections like Colds, Flu etc.
- Medications such as Aspirin
- Anxiety
- Stress
- Dust etc.

Types

- ① **Extrinsic Asthama** :
 - Also known as Allergic Asthama.
 - Usually begins in childhood or early adulthood.
- ② **Intrinsic Asthama** :
 - Also known as Non-Allergic Asthama.
 - Usually develops in later adulthood

PATHOGENESIS OF ASTHAMA



SYMPTOMS

- Shortness of breath
- Chest tightness / pain
- Wheezing
- Sleeping Trouble.
- Coughing
- Tightened neck
- Anxiety
- Pale, Sweattness

TREATMENT

① Non- Pharmacological

- Intake of fresh air
- Avoid tobacco / smoking
- Avoid medications such as beta blockers, Aspirin etc.
- Avoid alcohol

② Pharmacological

- Bronchodilators
- Leukotrienes.
- Mast cell stabilizers
- Corticosteroids

RENAL FAILURE

- Renal failure is defined as a significant loss of renal function in both kidneys to the point where less than 10-20% of normal GFR remains.
- Renal failure may occur as an acute and rapidly progressing process or may present as a chronic form in which there is a progressive loss of renal function over a number of years.
- Acute renal failure has an abrupt onset and is potentially reversible.
- Chronic failure progresses slowly over at least three months and can lead to permanent renal failure.

ACUTE RENAL FAILURE

- Acute renal failure is defined as a condition of sudden & temporary loss of renal functions.
- It is also known as Acute kidney Injury
- It is a short time disease.
- Acute renal failure is reversible & can be prevented by proper precautions and medications.

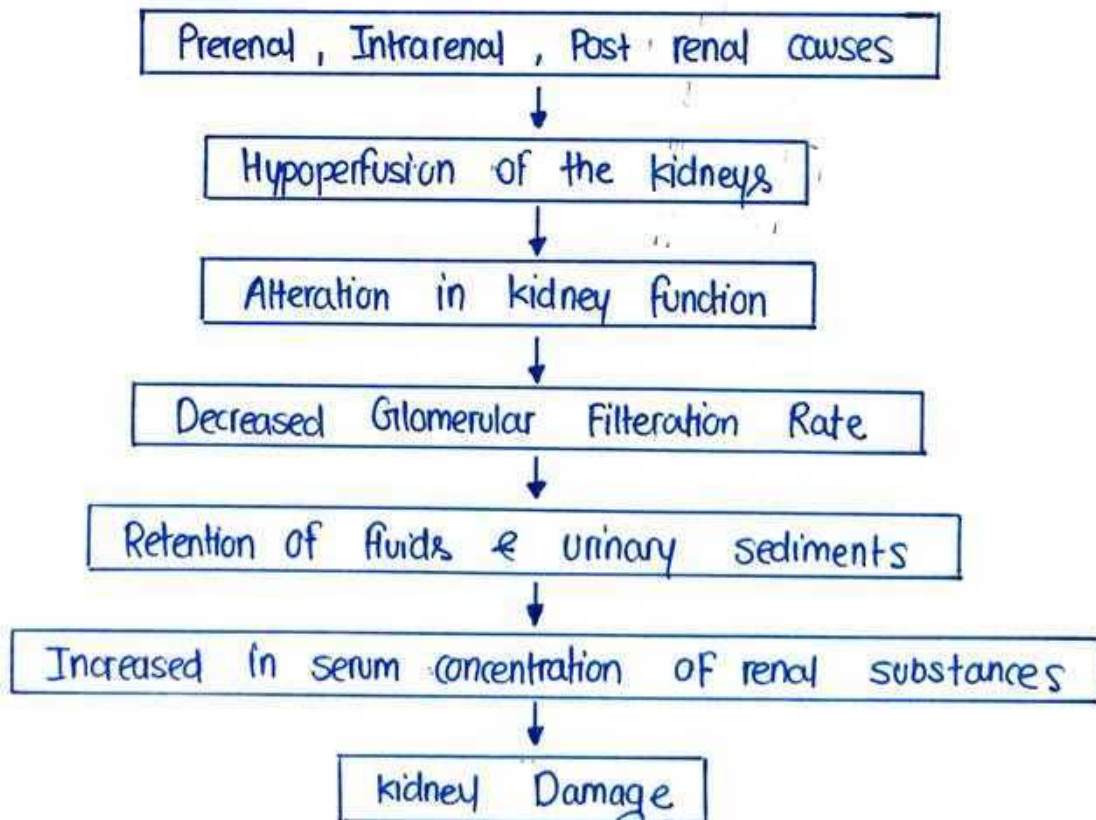
Etiology Of Acute Renal Failure

There are mainly 3 types of causes behind acute renal failure.

- ① **Pre- Renal Causes** :
- It results from impaired or reduced blood flow to kidney.
 - Possible causes behind this reduced blood flow is shock, hypotension, ischemia etc.

- ② **Intra-Renal Failure**
- It results from acute damage to renal structures
 - The possible causes behind intra renal failure are glomerulonephritis, acute tubular necrosis etc.
- ③ **Post-Renal Failure**
- It basically results from conditions block of urine outflow.
 - The possible causes behind post renal failure are obstruction of urine outflow by calculi, tumors, prostatic hypertrophy etc.

PATHOGENESIS OF ACUTE RENAL FAILURE



Sign & Symptoms

- Decreased kidney function
- Obstructions in Urinary Tract
- Reduced urine output
- Dehydration
- Abnormal weight loss
- Pale skin

Complications

- Hyperkalemia
- Metabolic Acidosis
- Hypercalcemia
- Hyperphosphatemia
- Infections
- Heart Failure.

Treatment

- ① Non Pharmacological
 - Oxygen Therapy
 - Ventilation
 - Water Restriction
 - Sodium Restriction
- ② Pharmacological
 - Furosemide
 - Metolazone
 - Sodium bicarbonate
 - Calcium Carbonate
 - Calcium Gluconate

Chronic Renal Failure

- Chronic renal failure is the end result of progressive kidney damage and loss of function.
- Generally it is an irreversible disease.
- It occurs gradually over the time & results in permanent loss of kidney function.
- It is also known as End Stage Renal Disease.

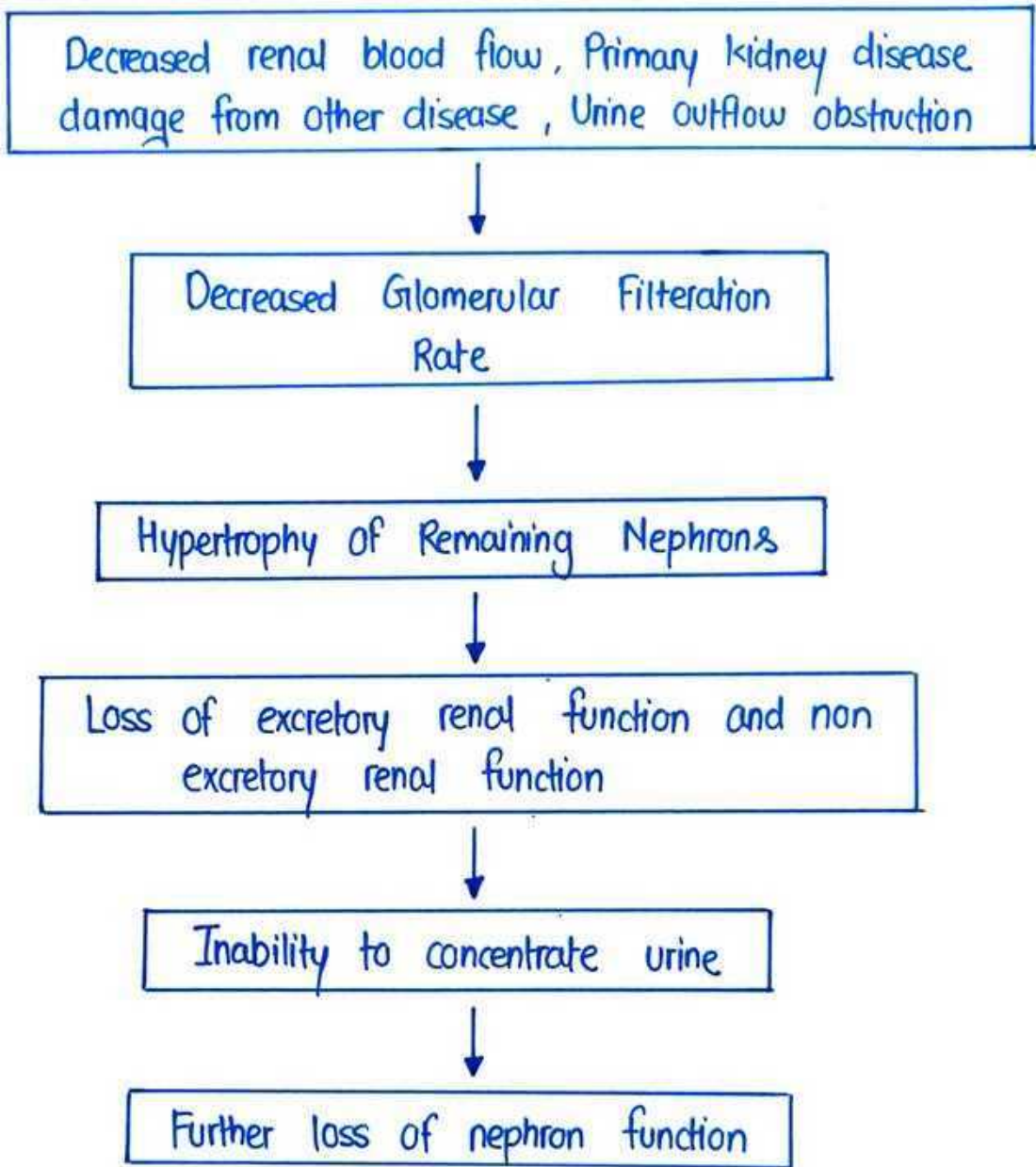
Stages Of Chronic Renal Failure

- Reduced Renal Reserve
- Renal Insufficiency
- Renal Failure
- End stage renal disease

Etiology / Causes

- Type 1 or Type 2 diabetes
- Polycystic kidney disease
- Interstitial nephritis
- High blood pressure
- Vesicoureteral Reflux
- Hypertension

Pathogenesis Of Chronic Renal Failure



Sign & Symptoms

- Anaemia
- Malaise
- Dry skin
- Poor appetite
- Vomiting
- Bone Pain
- Metallic taste in mouth

Complications

- Intrinsic renal azotemia
- Electrolyte Imbalance
- Metabolic Acidosis
- Pulmonary Edema
- Hypertensive Crisis
- Infections

Treatment

- Careful management of fluids & electrolytes.
- Prudent use of diuretics
- Careful dietary management
- Renal dialysis
- Renal transplantation