



มหาวิทยาลัยราชภัฏนครปฐม



Mechanism and Illness of Human Body 2

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Disorders of the Cardiovascular System (part 1)

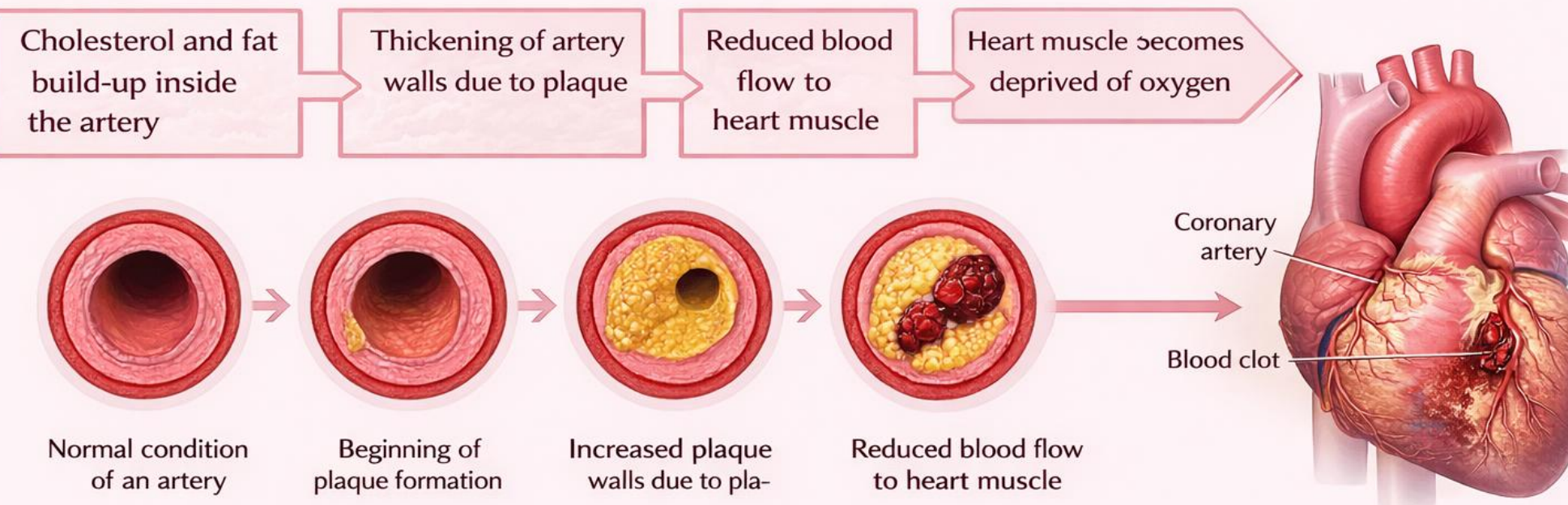


Ischemic Heart Disease

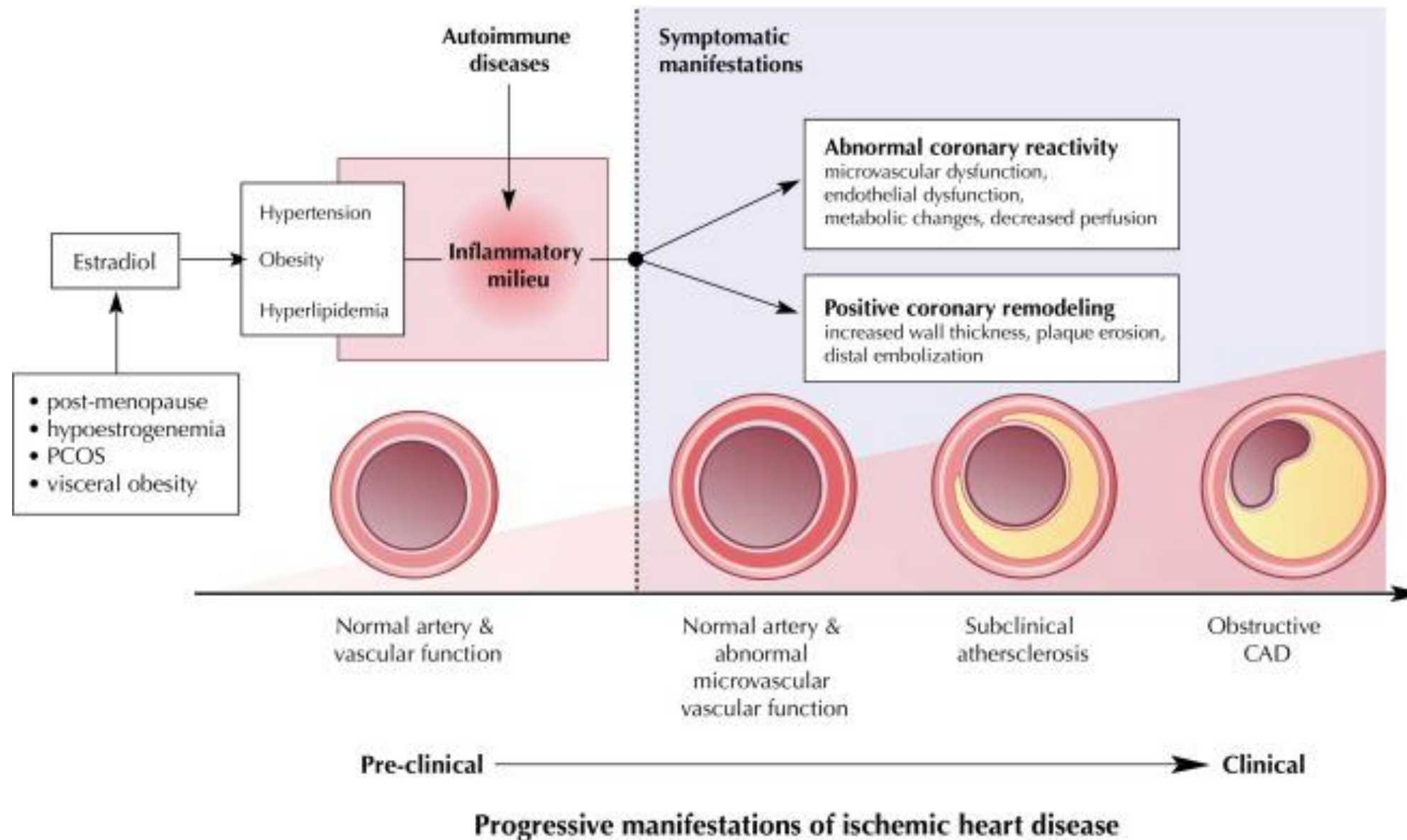


- Ischemic Heart Disease (IHD)
- Coronary Artery Disease (CAD)

Cause: Narrowing of coronary arteries leading to reduced blood supply to the heart muscle



Ischemic Heart Disease



Pathogenesis of Coronary Artery Disease (CAD)

1. Injury or damage to the inner lining of coronary arteries

– Endothelial injury of coronary vessels

2. Deposition of blood lipids, especially LDL cholesterol, on the damaged arterial wall

– Especially at sites of injury caused by hypertension

3. Platelet aggregation

– Leads to:

1. Hardening of the arteries (atherosclerosis)

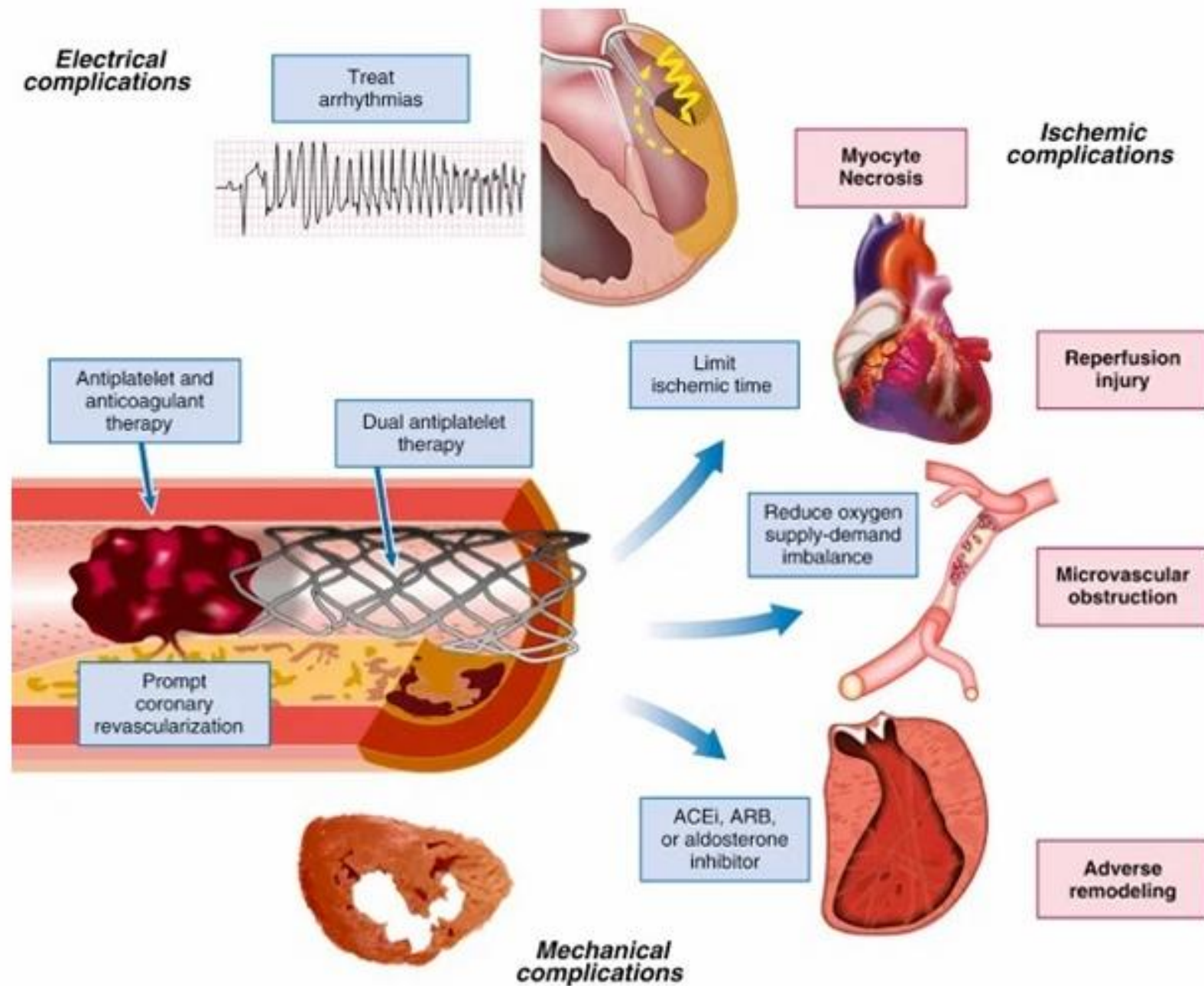
2. Slower blood flow

3. Platelet adhesion to the vessel wall

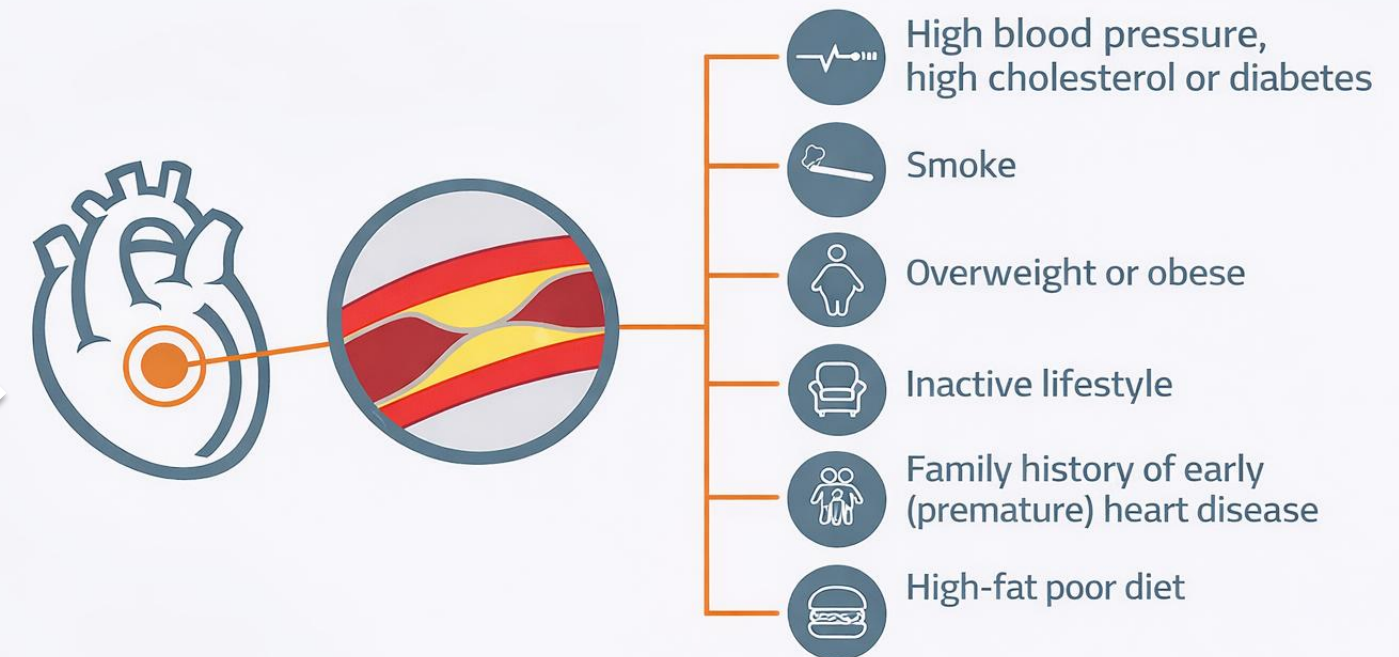
4. Progressive lipid accumulation

5. Narrowing and obstruction of coronary arteries

Ischemic Heart Disease



Risk Factors for Ischemic Heart Disease

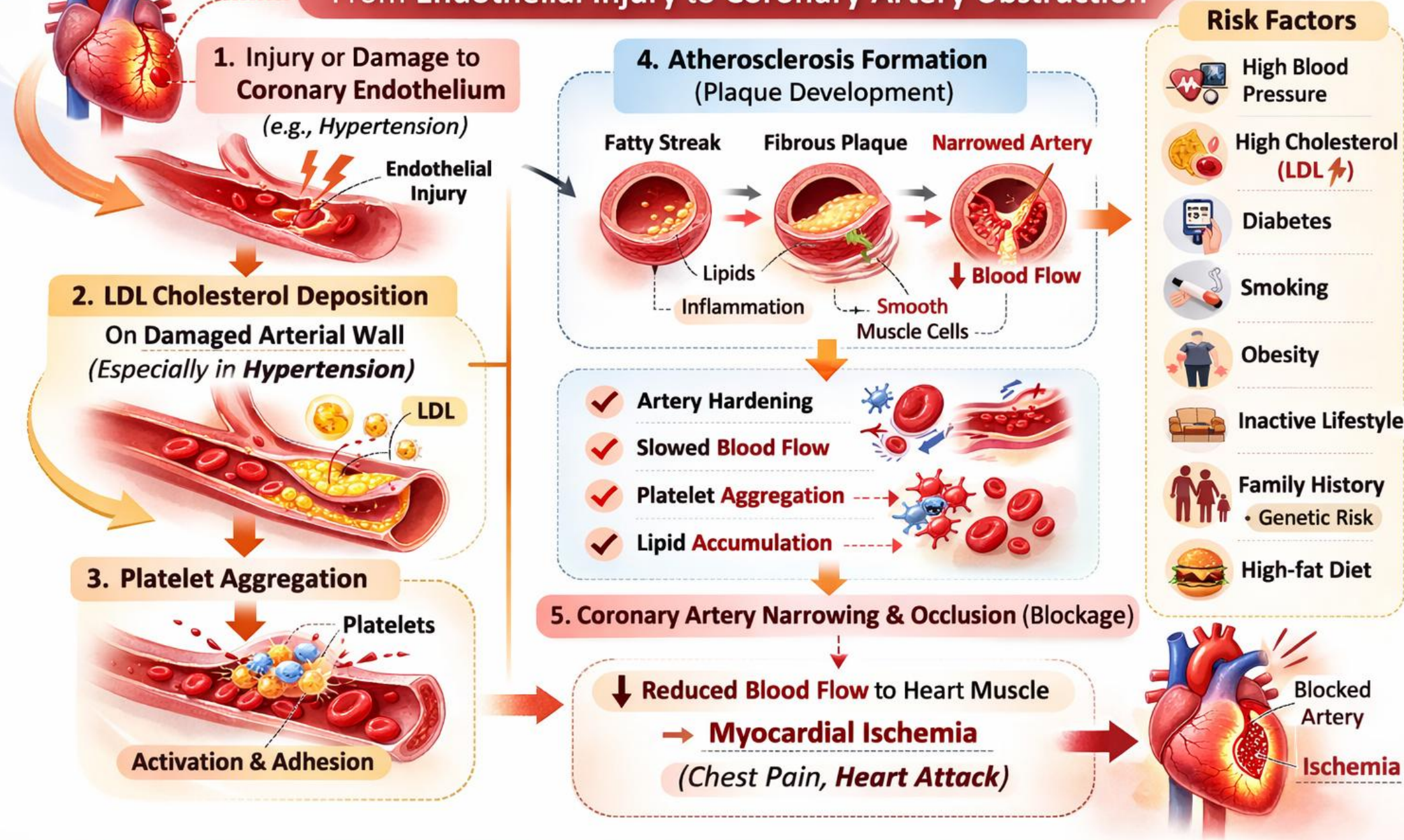


Ischemic Heart Disease



Pathophysiology of Coronary Artery Disease (CAD)

From Endothelial Injury to Coronary Artery Obstruction



congenital heart disease

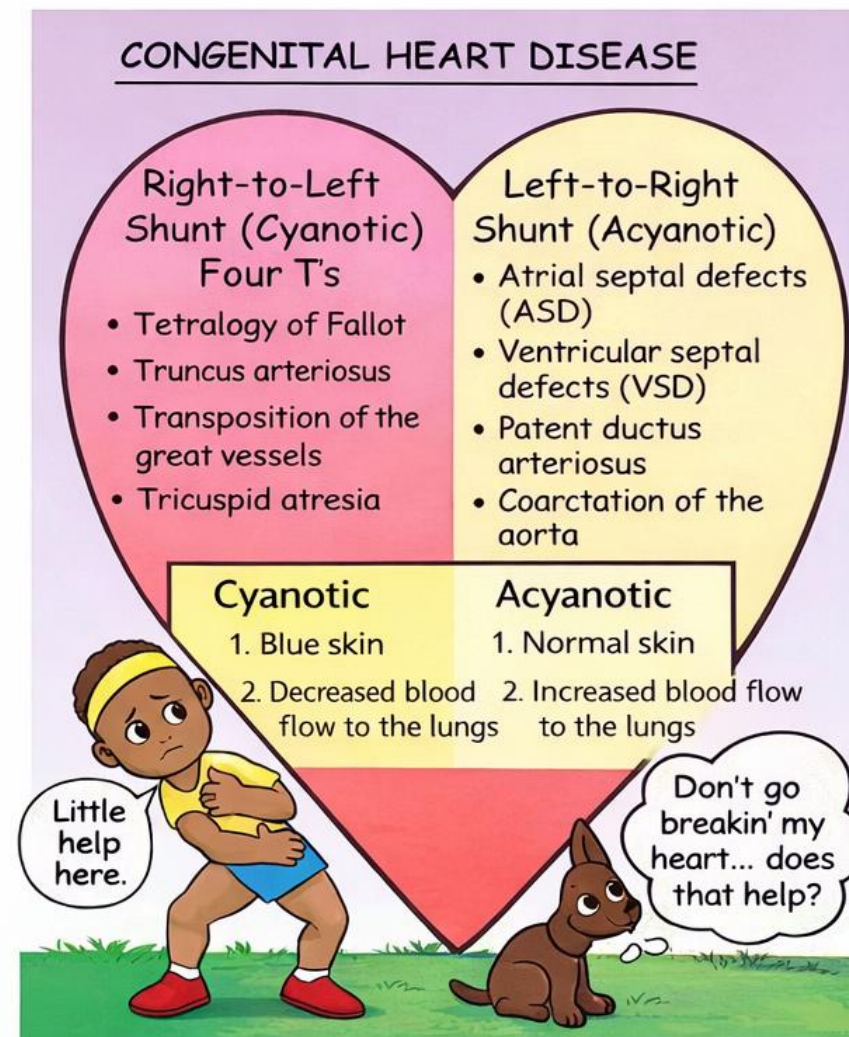


Congenital Heart Disease



Congenital heart disease (CHD)

- A defect in the structure of the heart that is present at birth or develops as the baby is growing in the womb.
- Can cause abnormal blood flow through the heart and the major blood vessels coming from the heart.



Risk Factors for Congenital Heart Disease (CHD)

- **Genetic factors** (chromosomal or genetic abnormalities)
- **Certain medications** taken by the mother during pregnancy
- **Alcohol consumption and drug abuse** during pregnancy
- **Viral infections** during pregnancy (e.g., rubella)
- **Maternal diabetes mellitus**
- **Exposure to pesticides or toxic chemicals** during pregnancy

congenital heart disease



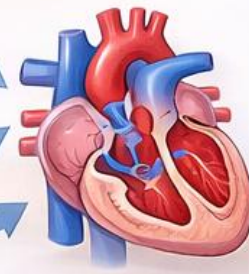
Types of Congenital Heart Disease (CHD)

1. Acyanotic Congenital Heart Disease

- Main mechanism: **Left-to-right shunt** or obstructive lesions
- Characteristic: **No cyanosis**

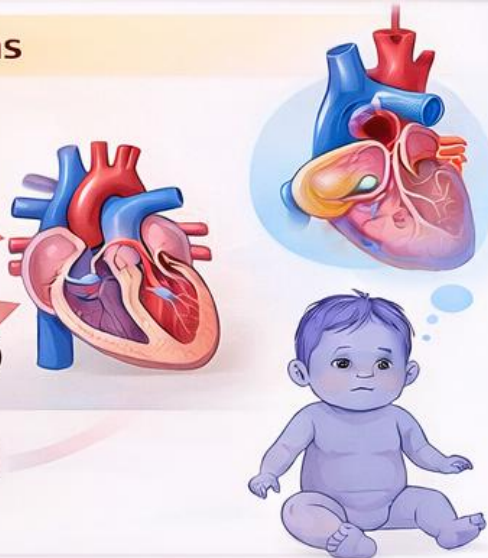
1.1 Left-to-Right Shunt Lesions

- **ASD** (Atrial Septal Defect)
- **VSD** (Ventricular Septal Defect)
- **PDA** (Patent Ductus Arteriosus)



1.2 Obstructive Lesions

- **Pulmonary Stenosis (PS)**
- **Aortic Stenosis (AS)**
- **Coarctation of Aorta (CoA)**
- **Coarctation of Aorta (CoA)**

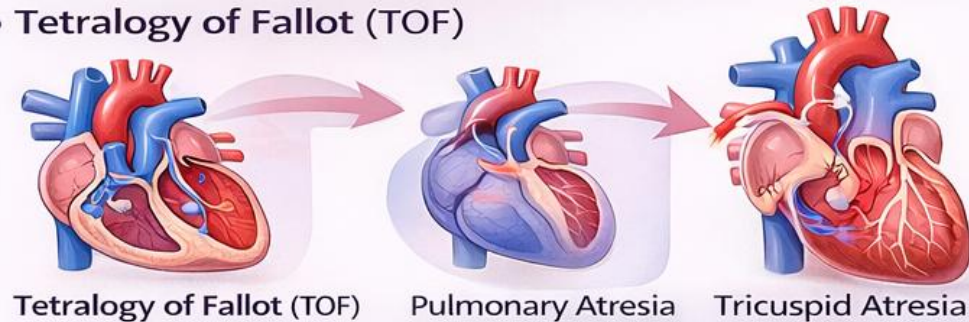


2. Cyanotic Congenital Heart Disease

- Main mechanism: **Right-to-left shunt**
- Characteristic: **Cyanosis present**

2.1 Decreased Pulmonary Blood Flow

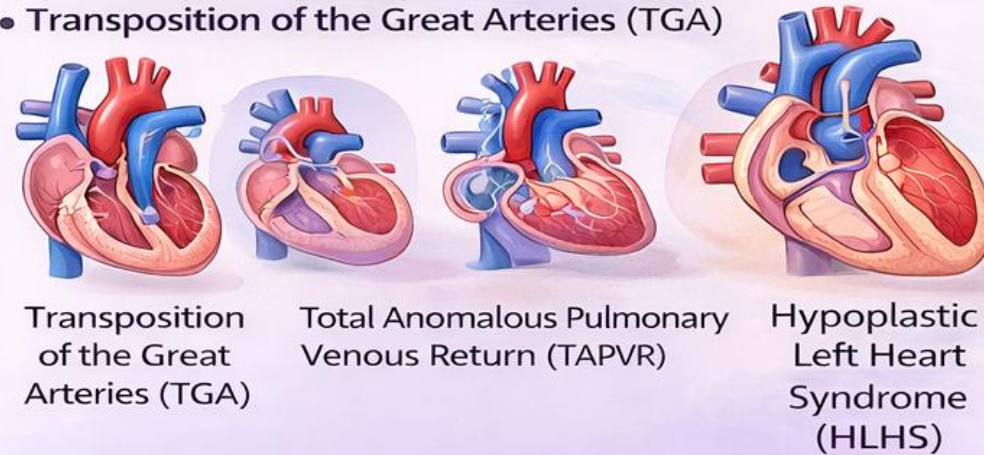
- **Tetralogy of Fallot (TOF)**



Tetralogy of Fallot (TOF) Pulmonary Atresia Tricuspid Atresia

2.2 Increased Pulmonary Blood Flow / Mixing Lesions

- **Transposition of the Great Arteries (TGA)**

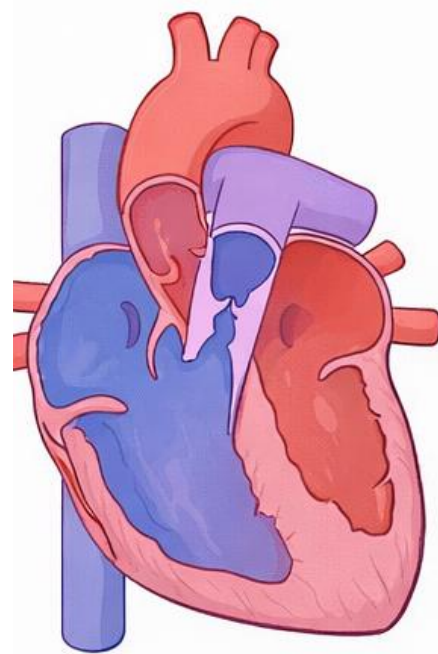


Transposition of the Great Arteries (TGA) Total Anomalous Pulmonary Venous Return (TAPVR) Hypoplastic Left Heart Syndrome (HLHS)

congenital heart disease



Key Features of Obstructive Lesions in Congenital Heart Disease Patients



MILD
NO SYMPTOMS



MODERATE



DYSPNEA



FATIGUE &
SYNCOPE

SEVERE



CYANOSIS



WORSEN with
EXERTION

Pulmonary stenosis

1. Obstructive lesions:

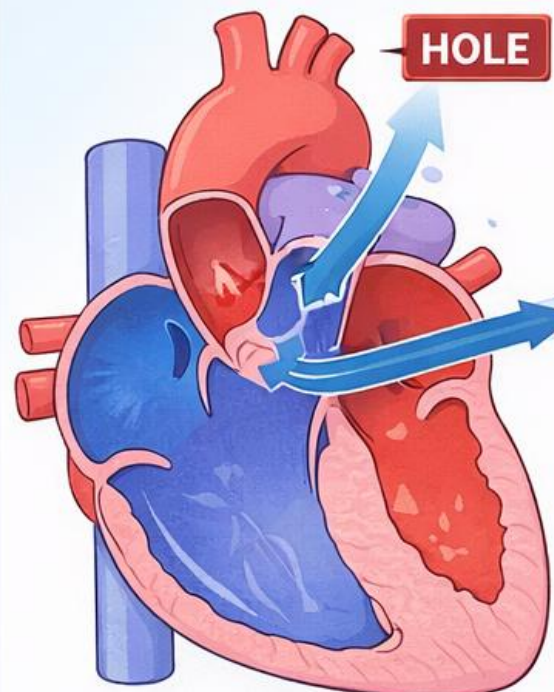
- Narrowing or obstruction of the cardiac valve or blood vessel
- Results in pressure overload of proximal portion
- Right ventricle enlargement (dilatation) and thickening (hypertrophy)

congenital heart disease



Key Features of Left-to-Right Shunt Lesions in Patients with Congenital Heart Disease

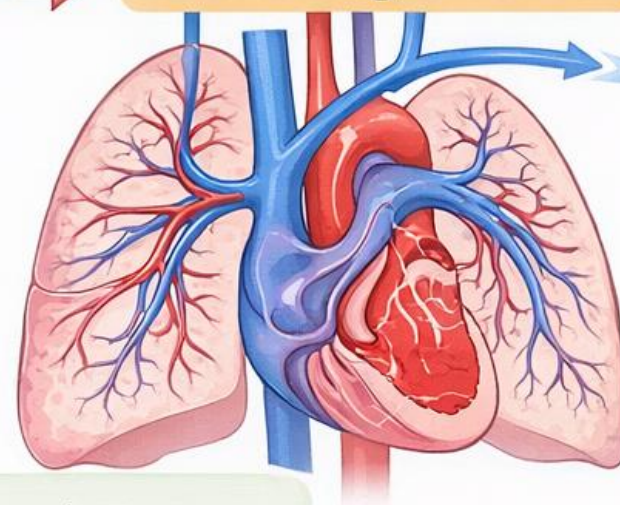
Atrial Septal Defect (ASD)



Mechanism of Left-to-Right Shunt Lesions

- Passage of blood between atria or from the left ventricle to right ventricle or major blood vessels
- Increases volume load to the pulmonary vasculature

Left-to-Right Shunt



LUNGS

- ✓ Pulmonary vascular overcirculation
- ✓ Increased pulmonary vascularity
- ✓ Pulmonary hypertension

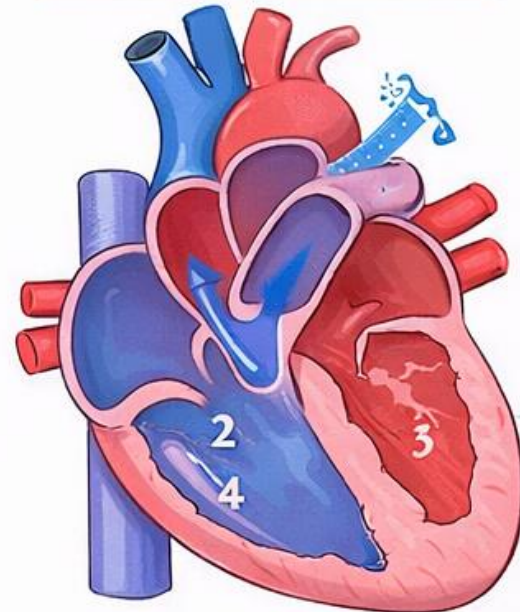
- ✓ Pulmonary **vascular** overcirculation
- ✓ Increased pulmonary vascularity
- ✓ Pulmonary hypertension

congenital heart disease



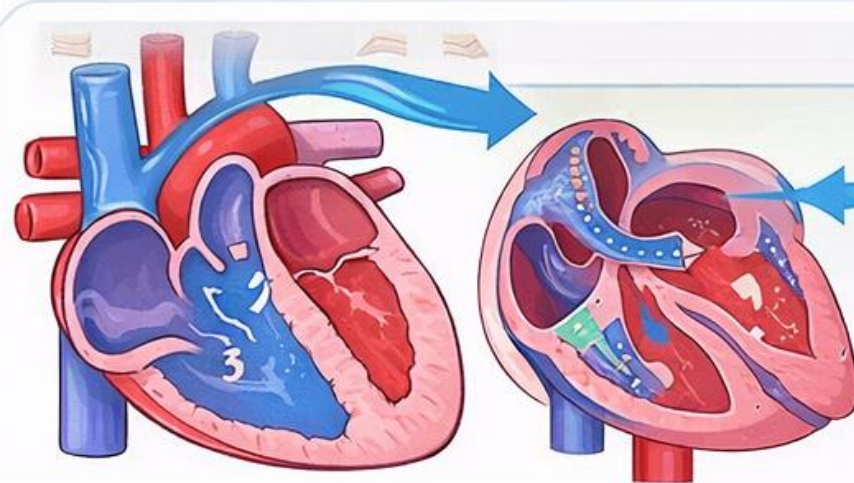
Key Features of Right-to-Left Shunt Lesions in Patients with Congenital Heart Disease

Tetralogy of Fallot



Tetralogy of Fallot
“knee-to-chest”
position”

- 1 Pulmonary Stenosis
- 2 Right Ventricular Hypertrophy
- 3 Overriding Aorta
- 4 Ventricular Septal Defect



3. Right-to-left shunt lesions:

- Blood flows from systemic veins mixing with blood from pulmonary veins
- Decreases oxygen saturation in the blood delivered to the body

Deoxygenated Blood Bypasses Lungs



Deoxygenated Blood
Bypasses Lungs



Bluish coloration
of lips, mouth, and

Fainting Spells

Inability to Play or
Exercise

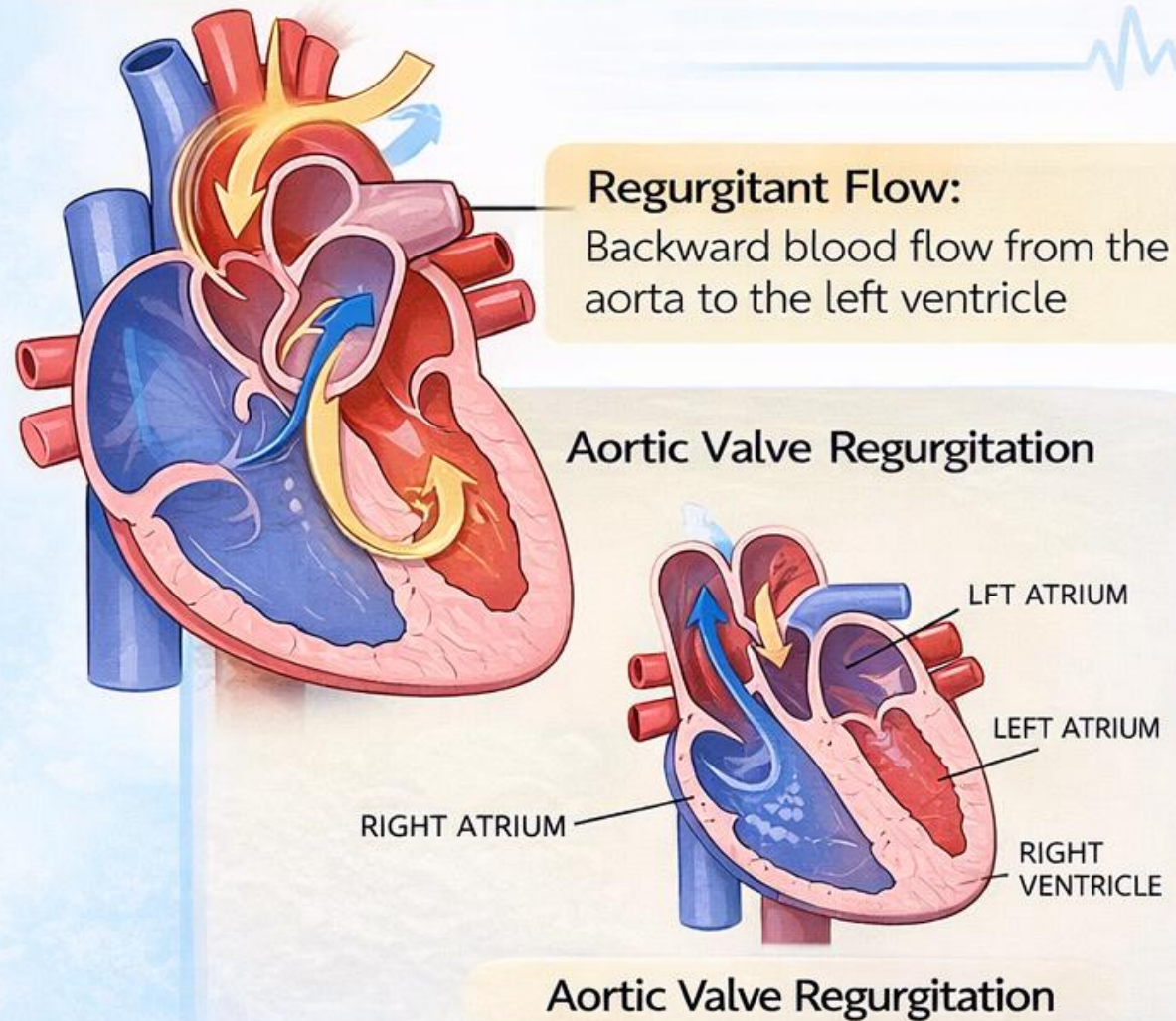
Heart Murmur

congenital heart disease



Key Features of Regurgitant Lesions in Patients with Congenital Heart Disease

Aortic Regurgitation



4. Regurgitant lesions:

- Blood leaks back from the aorta, mitral, or tricuspid valve
- Increases volume load to the affected ventricle
- Ventricular enlargement and increased pulmonary vascularity due to elevated tricuspid or pulmonic regurgitation which causes normal pulmonary vascularity
- Eventual congestion in pulmonary veins with mitral or aortic regurgitation
- Pulmonary venous (lung) congestion



Comparison of Cyanotic and Acyanotic Congenital Heart Disease



Feature	Cyanotic CHD	Acyanotic CHD
Key characteristic	Presence of cyanosis (bluish discoloration)	No cyanosis
Main mechanism	Right-to-left shunt	Left-to-right shunt
Oxygen level in blood	Decreased	Normal or near normal
Pulmonary blood flow	Decreased	Increased
Effect on tissues	Chronic hypoxia	Pulmonary congestion → heart failure
Common symptoms	Cyanosis, dyspnea, fatigue, clubbing	Dyspnea, tachypnea, poor feeding, failure to thrive
Long-term complications	Polycythemia, stroke, brain abscess	Pulmonary hypertension, Eisenmenger syndrome
Typical examples	Tetralogy of Fallot (TOF), Transposition of the Great Arteries (TGA), Tricuspid atresia	Ventricular septal defect (VSD), Atrial septal defect (ASD), Patent ductus arteriosus (PDA)



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