

PHYSIOLOGY

Q12 – Coronary Circulation

Ans : 12 – Answer

Introduction

Coronary circulation is the specialized circulation that supplies blood to the myocardium. The heart works continuously throughout life and has a very high metabolic rate. Therefore, it requires a constant and rich supply of oxygen and nutrients. Coronary circulation ensures adequate oxygen delivery and removal of metabolic waste products, failure of which can result in serious cardiac dysfunction.

Definition

Coronary circulation is defined as the circulation of blood through the coronary arteries, capillaries, and veins that supply oxygenated blood to the heart muscle and drain deoxygenated blood from it.

Coronary Arteries

The coronary arteries arise from the ascending aorta just above the aortic valve. The right coronary artery supplies the right atrium, right ventricle, and parts of the conduction system. The left coronary artery divides into the left anterior descending artery and left circumflex artery, supplying the left ventricle and interventricular septum.

Coronary Veins

The coronary veins collect deoxygenated blood from the myocardium. Most of the venous blood drains into the coronary sinus, which opens into the right atrium. A small amount of blood drains directly into cardiac chambers through Thebesian veins.

Special Features of Coronary Circulation

Coronary arteries function as end arteries with minimal collateral circulation. Coronary blood flow occurs mainly during diastole because vessels are compressed during systole. Myocardial oxygen extraction is very high even at rest.

Regulation of Coronary Blood Flow

Coronary blood flow is primarily regulated by metabolic factors. Increased cardiac activity leads to accumulation of metabolites such as adenosine, carbon dioxide, and hydrogen ions, causing vasodilation. Myogenic mechanisms and neural influences also contribute.

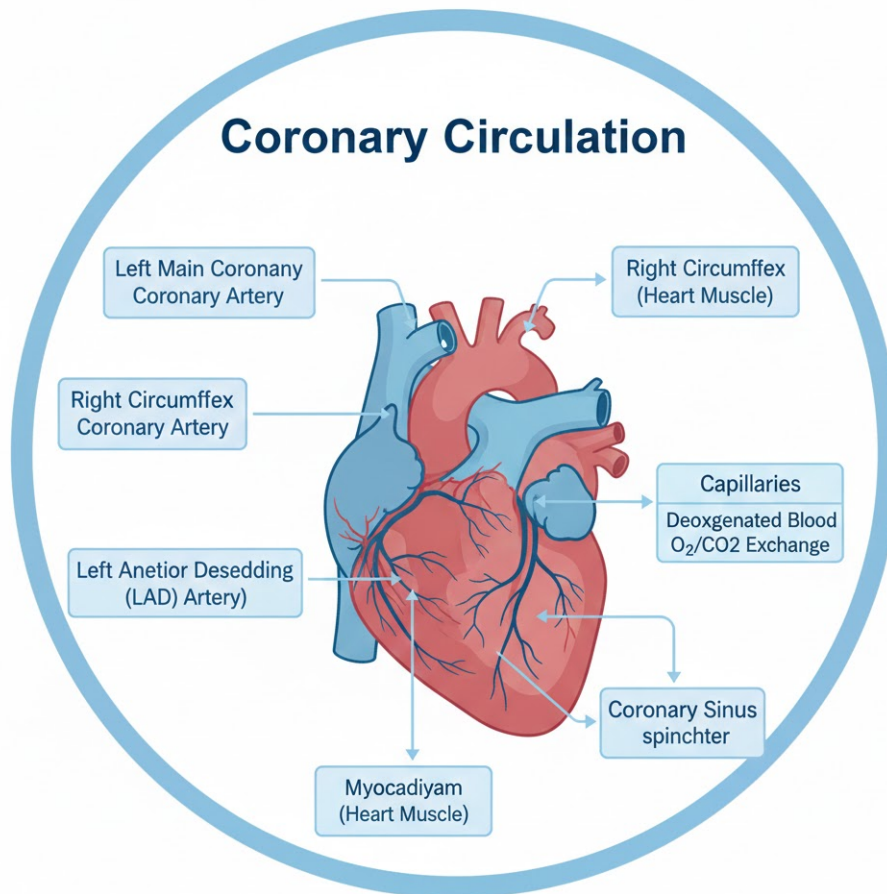
Coronary Blood Flow During Cardiac Cycle

During systole, contraction of myocardium compresses coronary vessels and reduces blood flow. During diastole, relaxation of myocardium allows maximum coronary perfusion, especially in the left coronary artery.

Clinical Importance

Impairment of coronary circulation results in ischemic heart disease. Reduced blood flow causes angina pectoris, while complete blockage leads to myocardial infarction. Understanding coronary circulation forms the basis for coronary angiography and bypass surgery.

Diagram – Coronary Circulation



Conclusion

Coronary circulation is a highly specialized and essential circulatory system that maintains the functional integrity of the heart. Adequate coronary blood flow is crucial for continuous cardiac activity, and any compromise can result in severe and life-threatening cardiac conditions.