PHYSIOLOGY

Q5 – Cardiovascular & Respiratory Changes During Exercise

Ans : 1 – Answer

Introduction

Exercise produces marked changes in the cardiovascular and respiratory systems to meet the increased metabolic demands of working muscles. These adjustments ensure adequate oxygen delivery, removal of carbon dioxide, and maintenance of blood pressure during physical activity. Both systems function in close coordination to support sustained exercise.

Cardiovascular Changes During Exercise

During exercise, heart rate increases due to enhanced sympathetic activity and reduced vagal tone. Stroke volume increases because of increased venous return and enhanced myocardial contractility. As a result, cardiac output rises significantly to supply more blood to active muscles. Systolic blood pressure increases due to increased cardiac output, while diastolic pressure remains unchanged or slightly decreases due to vasodilation in skeletal muscles. Blood flow is redistributed, with increased supply to muscles, heart, and skin, and reduced flow to kidneys and gastrointestinal tract.

Respiratory Changes During Exercise

Exercise leads to an increase in respiratory rate and tidal volume, resulting in a marked increase in minute ventilation. Pulmonary diffusion capacity increases due to recruitment of pulmonary capillaries and improved ventilation–perfusion matching. Oxygen uptake rises to meet metabolic demands, while enhanced ventilation facilitates removal of excess carbon dioxide, helping to maintain acid–base balance.

Neural and Chemical Regulation

Neural control during exercise involves central command from the motor cortex, which simultaneously activates cardiovascular and respiratory centers. Peripheral chemoreceptors and mechanoreceptors in muscles and joints provide feedback to regulate heart rate and ventilation according to exercise intensity.

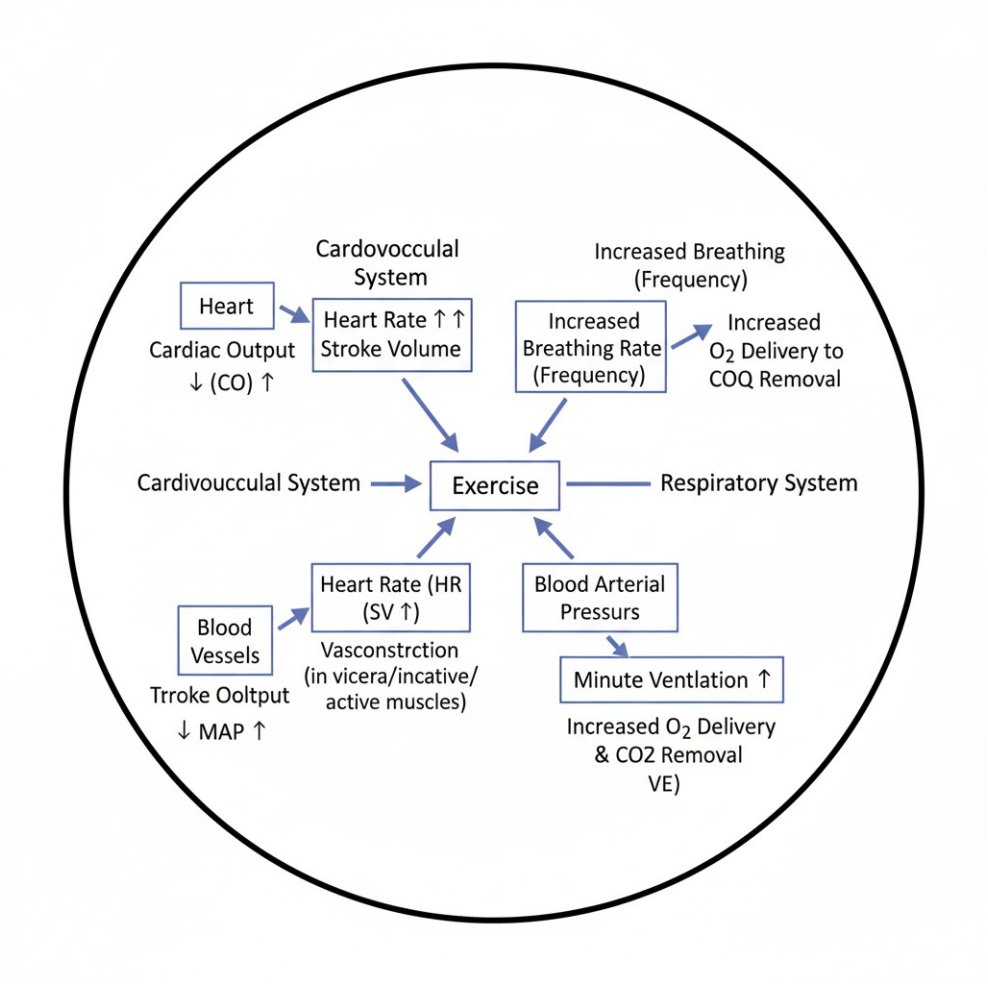
Effects of Training

Regular physical training results in adaptive changes such as lower resting heart rate, increased stroke volume, improved cardiac efficiency, enhanced respiratory capacity, and better oxygen utilization by tissues.

Clinical Importance

Understanding cardiovascular and respiratory changes during exercise forms the basis of exercise testing and evaluation of cardiac and pulmonary reserve. It is important in sports medicine, rehabilitation, and assessment of fitness levels.

Diagram – Cardiovascular & Respiratory Changes During Exercise



Conclusion

During exercise, the cardiovascular and respiratory systems undergo coordinated physiological adjustments to meet increased metabolic demands. These changes ensure efficient oxygen delivery, effective removal of carbon dioxide, and maintenance of internal homeostasis, enabling sustained physical activity.