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PART A

The Cardiovascular System Day Two!

PowerPoint® Lecture Slide Presentation by Jerry L. Cook, Sam Houston University



ESSENTIALS OF HUMAN ANATOMY & PHYSIOLOGY

EIGHTH EDITION

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The Heart: Conduction System

- Intrinsic conduction system (nodal system)
 - Heart muscle cells contract, without nerve impulses, in a regular, continuous way
- Contraction is initiated by the sinoatrial (SA) node (pacemaker)
- Sequential stimulation occurs at other autorhythmic cells

- Heart Conduction Pathway

Sinoatrial (SA) node → Atrioventricular (AV) node → Atrioventricular bundle → Bundle branches → Purkinje fibers

- Purkinje fibers cause myocardium to contract

Heart Contractions

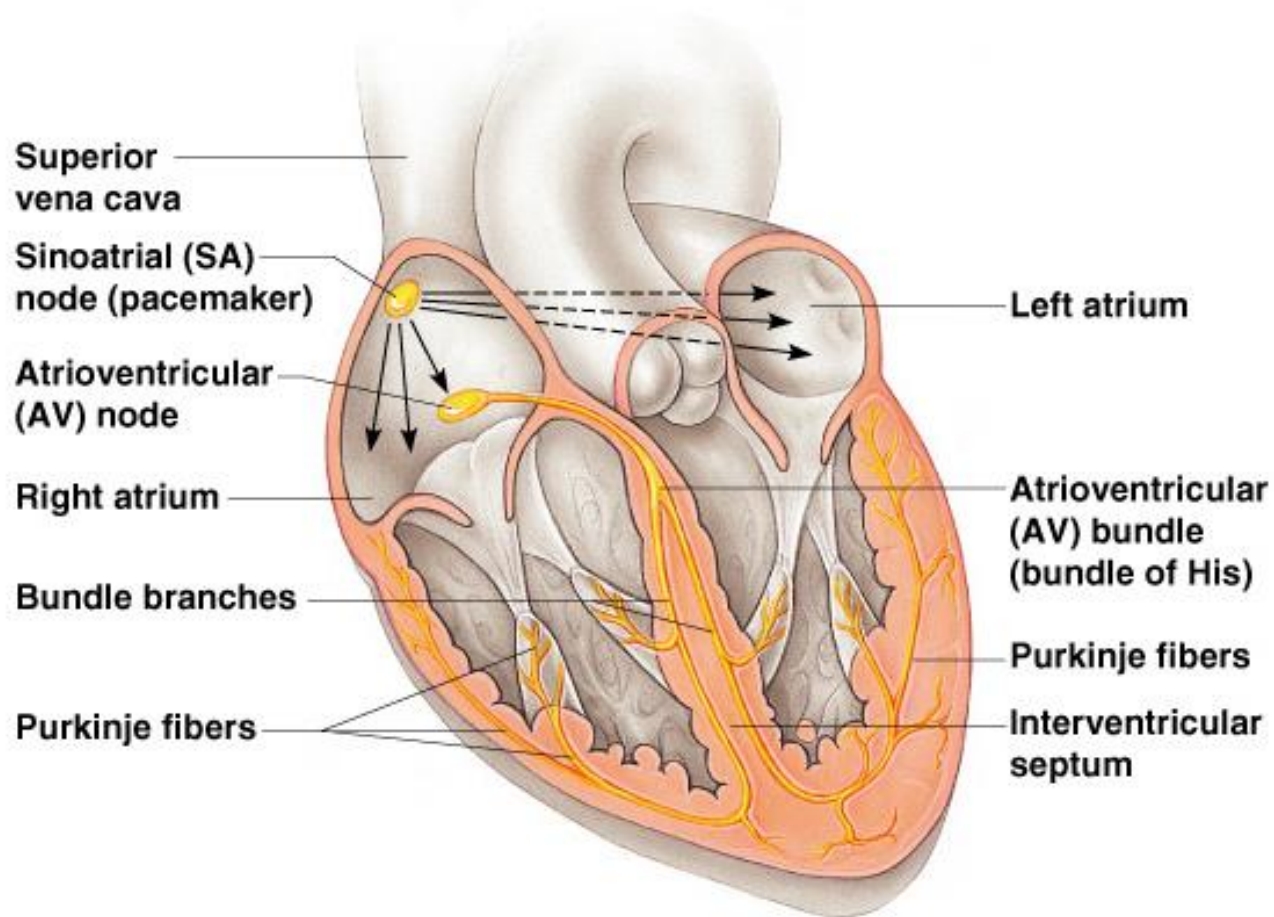


Figure 11.5

The Heart: Cardiac Cycle

- Cardiac Cycle—Events of one heartbeat
 - Atria contract simultaneously
 - Atria relax, then ventricles contract
 - Systole = ventricular contraction
 - Diastole = ventricular relaxation

Filling of Heart Chambers – the Cardiac Cycle

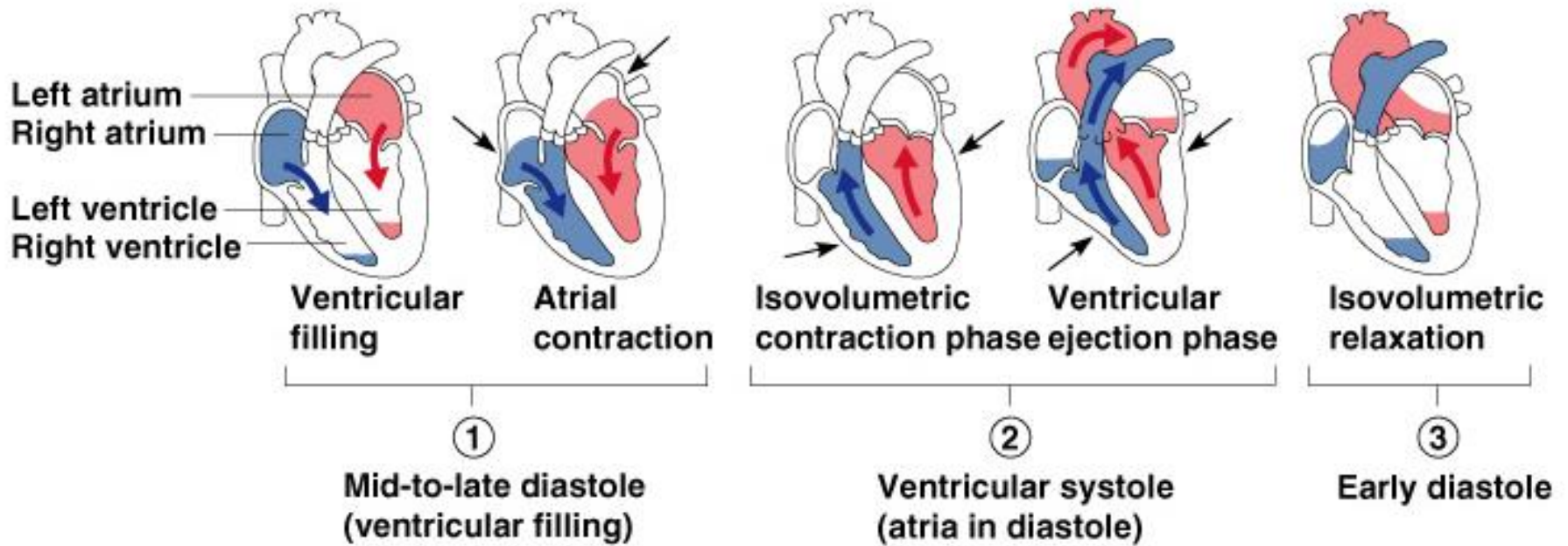


Figure 11.6



The Heart: Cardiac Output

- Cardiac output (CO)
 - Amount of blood pumped by each side of the heart in one minute
 - $CO = (\text{heart rate [HR]}) \times (\text{stroke volume [SV]})$
- Stroke volume (SV)
 - Volume of blood pumped by each ventricle in one contraction

Cardiac Output Regulation

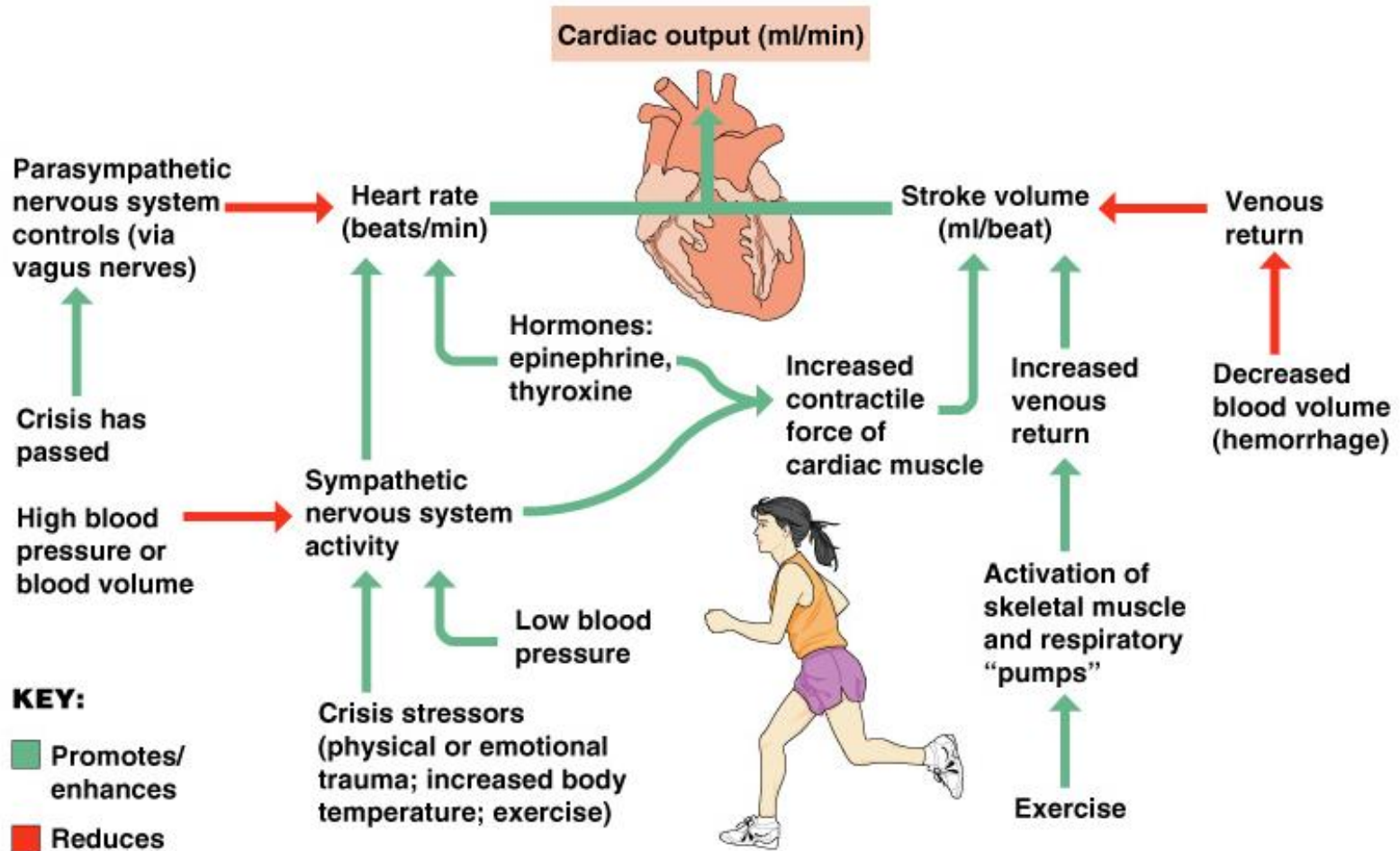


Figure 11.7

The Heart: Regulation of Heart Rate

- Stroke volume usually remains relatively constant
 - Starling's law of the heart – the more that the cardiac muscle is stretched, the stronger the contraction
- Changing heart rate is the most common way to change cardiac output

The Heart: Regulation of Heart Rate

- Increased heart rate
 - Sympathetic nervous system
 - Crisis
 - Low blood pressure
 - Hormones
 - Epinephrine
 - Thyroxine
 - Exercise
 - Decreased blood volume

The Heart: Regulation of Heart Rate

- Decreased heart rate
 - Parasympathetic nervous system
 - High blood pressure or blood volume
 - Decreased venous return