Cardiac Muscle Cheat Sheet C.Forsythe Cheat Sheet

by CooperF04 via cheatography.com/212853/cs/46339/

Heart Overview

Human Blood Circulation

Double pump action

Two circuits

Pulmonary arteries

Carry oxygen-poor blood from hearts right half to capillary beds in lungs

Pulmonary veins

Return oxygenated blood to heart's left half

Systemic circuit

Oxygenated blood is pumped from the heart's left half into body's main arteries

Aorta

Blood flows to smaller arteries then capillary beds

The Human Heart

Lies in thoracic cavity between sternum anteriorly and the vertebrae posteriorly

Apex lies to the left of the sternum and base lies to the right

Atria

Receive blood returning to heart and transfer to lower chambers

Ventricles

Pump blood from the heart

Veins

Return blood from tissues to the atria

Arteries

Carry blood away from the ventricles to the tissues

Septum

Continuous muscular partition that prevents blood mixing from the two sides of the heart

Right Half

Right atrium

-Receives deoxygenated blood from head and arms and trunk and legs

The Human Heart (cont)

Right ventricle

-Receives deoxygenated from right atrium from AV valve

-Pumps into pulmonary artery

-Carries to lungs

Left Half

Left atrium

-Receives blood from right and left pulmonary veins

-Well oxygenated

Left ventricle

-Receives oxygenated blood from atrium through left AV valve

-When contracted blood moves into aorta and is then pushed throughout major arteries of body

-Conduction of electrical signals

-Causes heart to contract

-Begins at SA node (sinoatrial node)

-Found near Right atrium

Pacemaker

Spreads through both atria and causes it to contract

Spreads then to AV node

Relays impulse to bundle of HIS

Charge is distributed

Cardiac myocytes

Mechanical pumping

Autorhythmic cells

Initiate and conduct electrical impulses

Pacemaker activity

Fire action potential

Complete Circuit of Blood Flow

Blood returning from systemic circulation enters right atrium via two large veins:

Venae cavae

-Returning blood from above and the other returning blood from below heart level

-Deoxygenated blood flows from right atrium into right ventricle

-Pumps out through pulmonary artery

Pulmonary veins

-Blood returning to left atrium from both lungs

Atrioventricular and Semilunar Valves

Atrioventricular Valves between the Atria and Ventricles

AV valves are positioned between atrium and ventricle on the right and left sides

Let blood flow from atria into the ventricles during ventricular filling

Prevent backflow of blood

Right AV valve

Tricuspid valve

3 cusps or leaflets

Left AV valve

Bicuspid valve

2 cusps

Semilunar Valves between the Ventricles and Major arteries

Aortic and pulmonary valve

-Forced open when left and right ventricular pressures exceed the pressure in the aorta and pulmonary artery during ventricular contraction and emptying

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Components of the Heart

Heart walls

Endothelium

-Thin, inner layer

-Unique type of epithelial tissues that lines entire circulatory system

Myocardium

-Middle layer

-Composed of cardiac muscle and constitutes bulk of heart wall

Epicardium

-Thin, external layer

-Covers the heart

Intercalated discs

Desmosomes

-Adhering junction that mechanically holds cells together

Gap junctions

-Areas of low electrical resistance that allow action potentials to spread from one cardiac cell to adjacent cells

Pericardial sac

Membranous sac that encloses heart

Double-walled

Two layers

Tough, fibrous covering

Attaches to the connective tissue partition that separates the lungs

Secretory lining

Thin pericardial fluid

-Provides lubrication to prevent friction between the layers as they glide with heart beats

Pacemaker Potentials

Sinoatrial node (SA node)

Small, specialized region in the right atrial wall near the opening of the superior (upper) vena cava

Controls pacemaker potential

Atrioventricular node (AV node)

Small bundle of specialized cardiac muscle cells located at the base of the right atrium near the septum, just above the junction of the atria and ventricles

Bundle of His/Atrioventricular bundle

Tract of specialized cells that originates at the AV node and enters the septum between the ventricles

Divides to form the right and left bundle branches that travel down the septum, curve around the tip of the ventricular chambers, and travel back toward the atria along the outer walls

Purkinje fibers

Small terminal fibers that extend from the bundle of His and spread throughout the ventricular myocardium, much like small twigs of a tree branch

Cardiac Muscle Excitation

The spread of cardiac excitation is coordinated to ensure efficient pumping

Atrial excitation and contraction should be complete before the onset of ventricular contraction

Excitation of cardiac muscle fibers should be coordinated to ensure that each heart chamber contracts as a unit to pump efficiently

Fibrillation

Random, uncoordinated excitation and contraction of cardiac cells

The pair of atria and pair of ventricles should be functionally coordinated so that both members of the pair contract simultaneously

Cardiac Muscle Excitation (cont)

Atrial Excitation

The interatrial pathway extends from the SA node within the right atrium to the left atrium

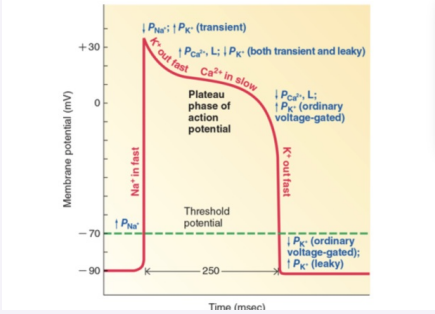
The internodal pathway extends from the SA node to the AV node

Ventricular Excitation

Impulse travels rapidly down the septum via the right and left branches of the bundle of His and throughout the ventricular myocardium via the Purkinje fibers

Action Potential in Cardiac Contractile Cells

Figure 9-10 Action potential in cardiac contractile cells.



Cardiac Muscle Excitation

The action potential of cardiac contractile cells shows a characteristic plateau

A long refractory period prevents tetanus of cardiac muscle

Rapidly repetitive stimulation that does not let the muscle fiber relax between simulations results in a sustained, maximal contraction known as tetanus

In contrast, cardiac muscle has a long refractory period because of the prolonged plateau phase of the action potential

Cardiac muscle cannot be restimulated until contraction is almost over, precluding summation of contractions and tetanus of cardiac muscle