

Superior vena cava
(blood from the body)

Aorta
(blood to the body)

Pulmonary artery
(to right lung)

Pulmonary artery
(to left lung)

Pulmonary veins
(from right lung)

Pulmonary veins
(from left lung)

Right atrium

Left atrium

EXPLORE THE HEART:

LECTURE

BEULAH DADALA- UNIVERSITY PREPARATORY ACADEMY

MARTHA DADALA

SPLASH FALL 2014

Aortic valve

Pulmonary valve

Tricuspid valve

Mitral valve

Right ventricle

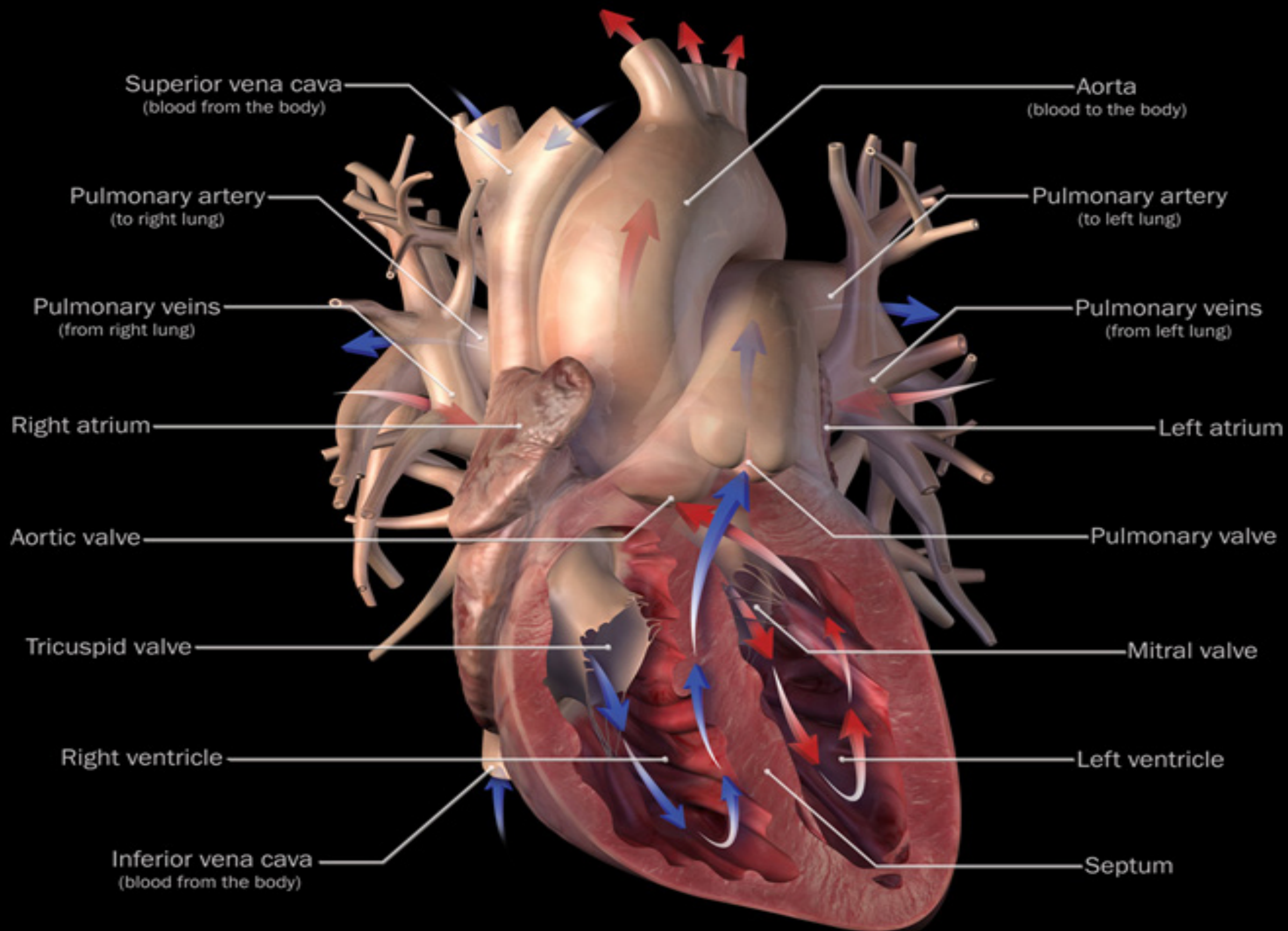
Left ventricle

Inferior vena cava
(blood from the body)

Septum

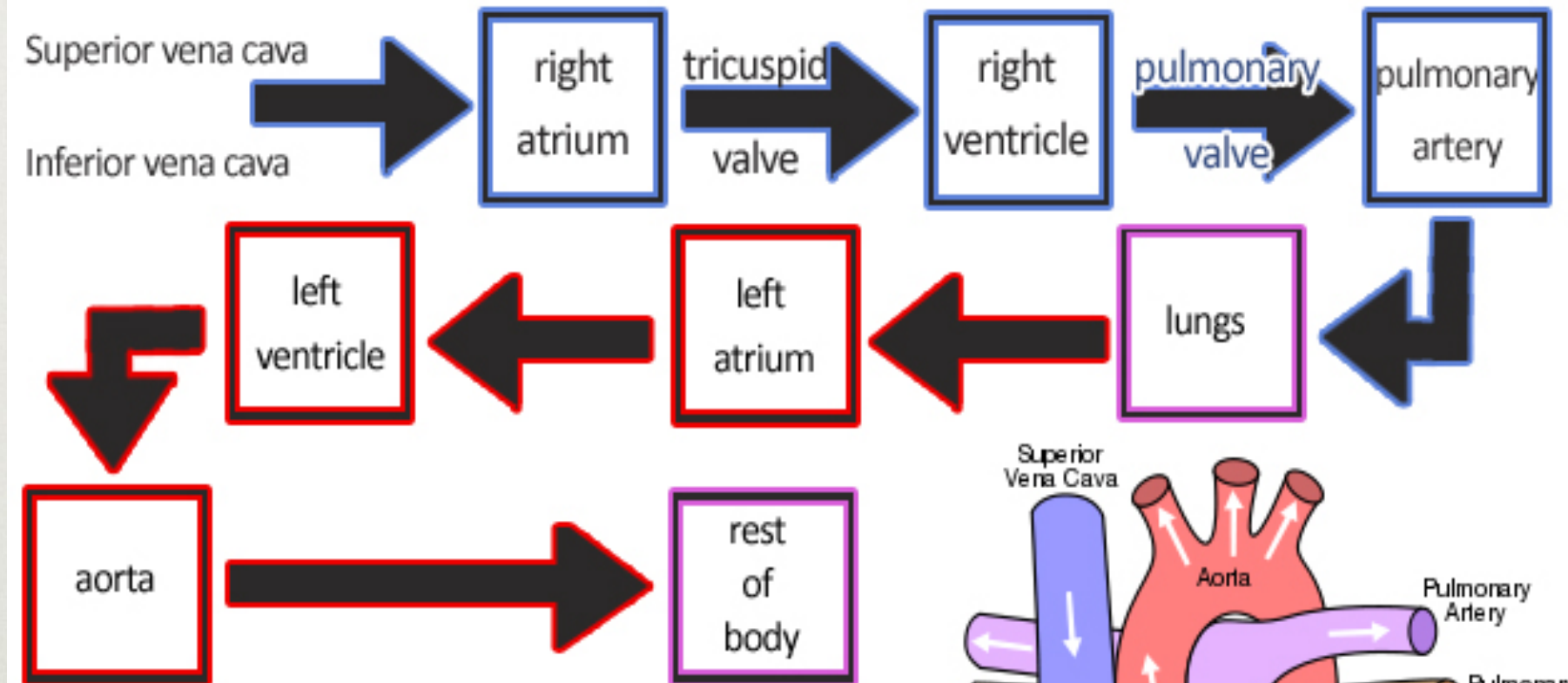
AGENDA

- Vocabulary
- Basics of the Heart
- New Technology and Engineering for the operations and treatments

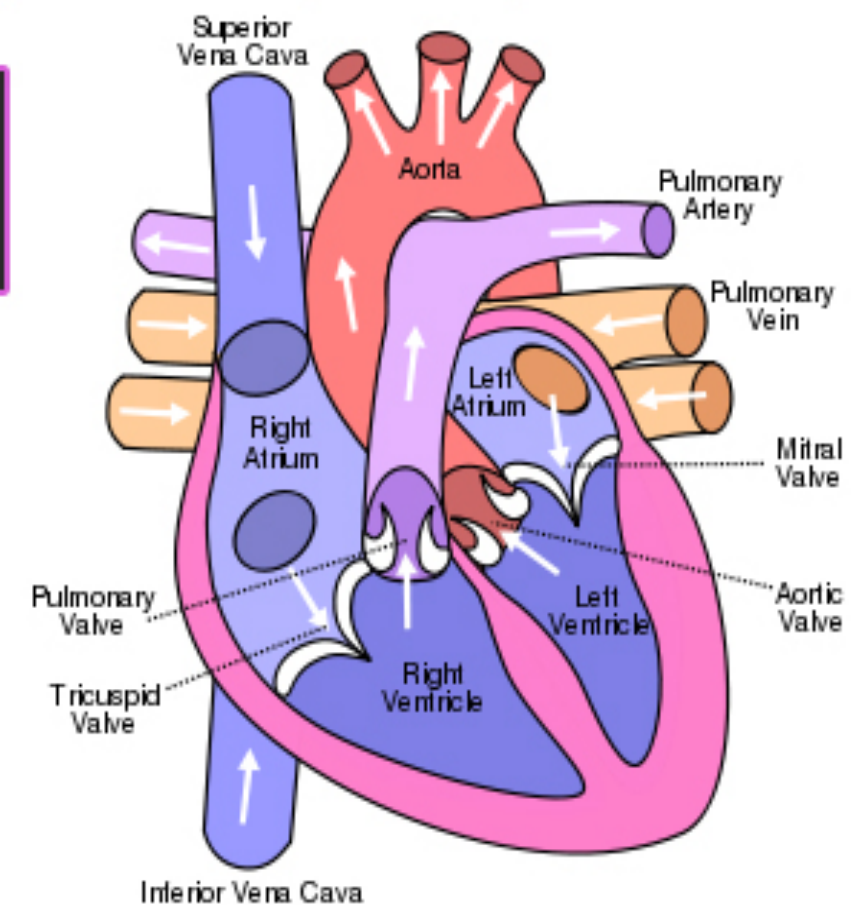


HEART AND BODY BLOOD FLOW

- Explain intra heart flow
 - Valves
 - Chambers
 - Pulmonary
 - Aorta
 - Vena cava



Circulation of Blood Through the Heart:

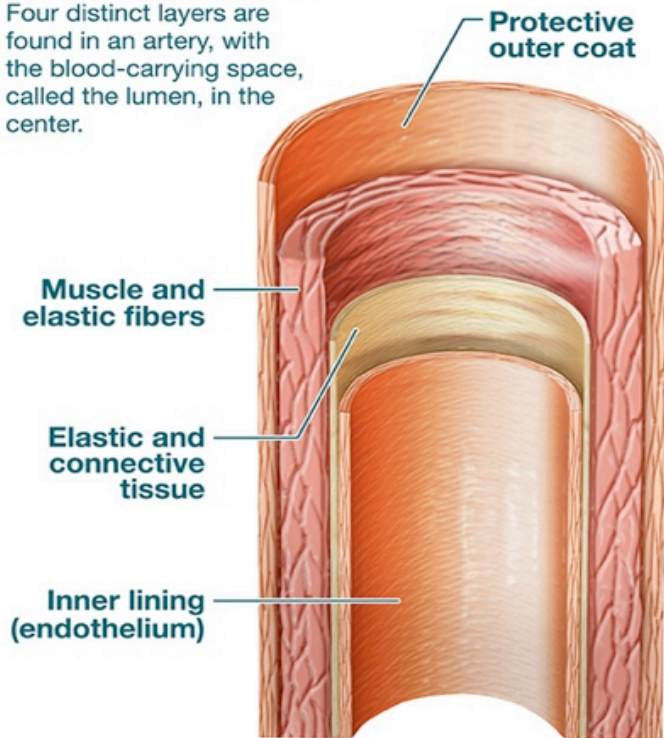


ARTERIES & VEINS & CAPILLARIES

- Structural Differences
- Arteries: Elastic
- Varicose Veins

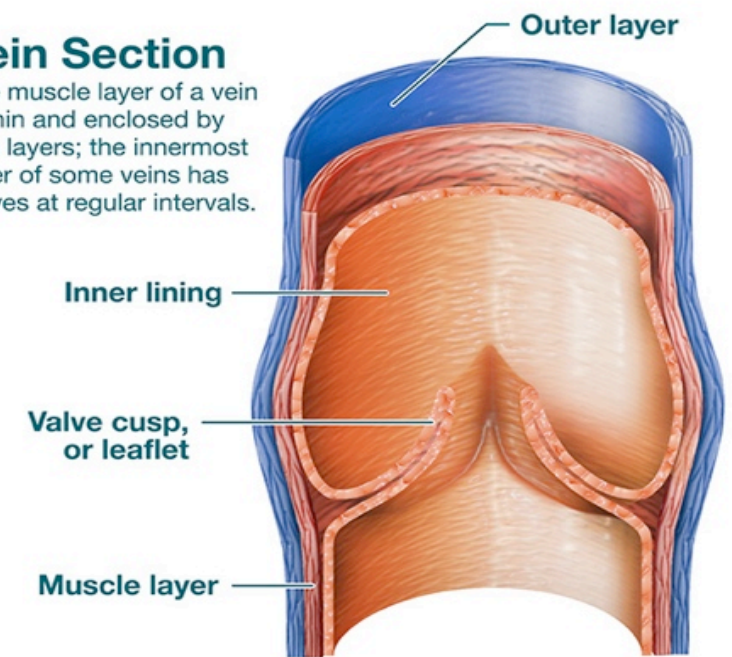
Artery Section

Four distinct layers are found in an artery, with the blood-carrying space, called the lumen, in the center.



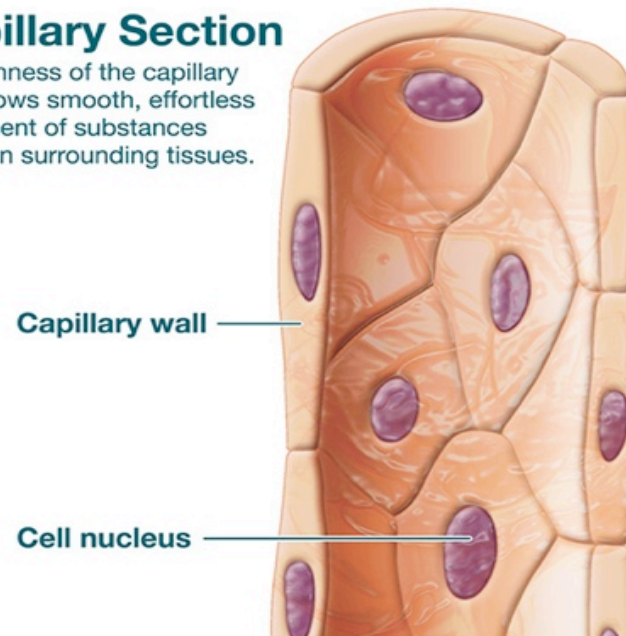
Vein Section

The muscle layer of a vein is thin and enclosed by two layers; the innermost layer of some veins has valves at regular intervals.



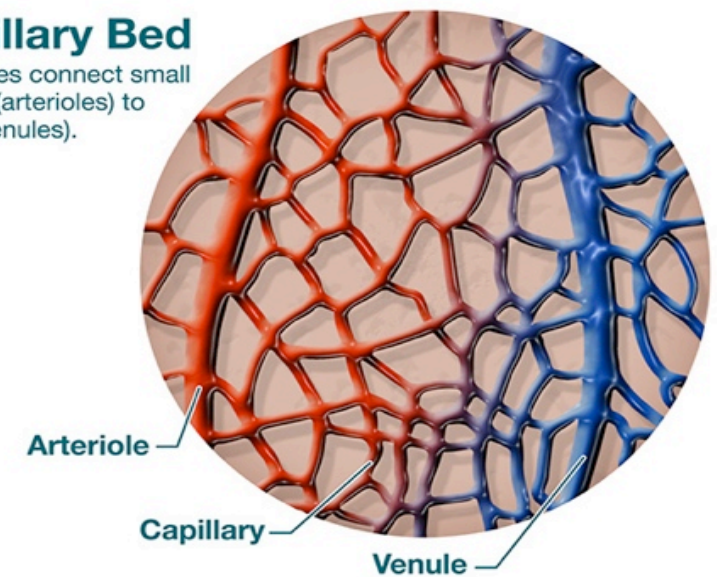
Capillary Section

The thinness of the capillary wall allows smooth, effortless movement of substances between surrounding tissues.



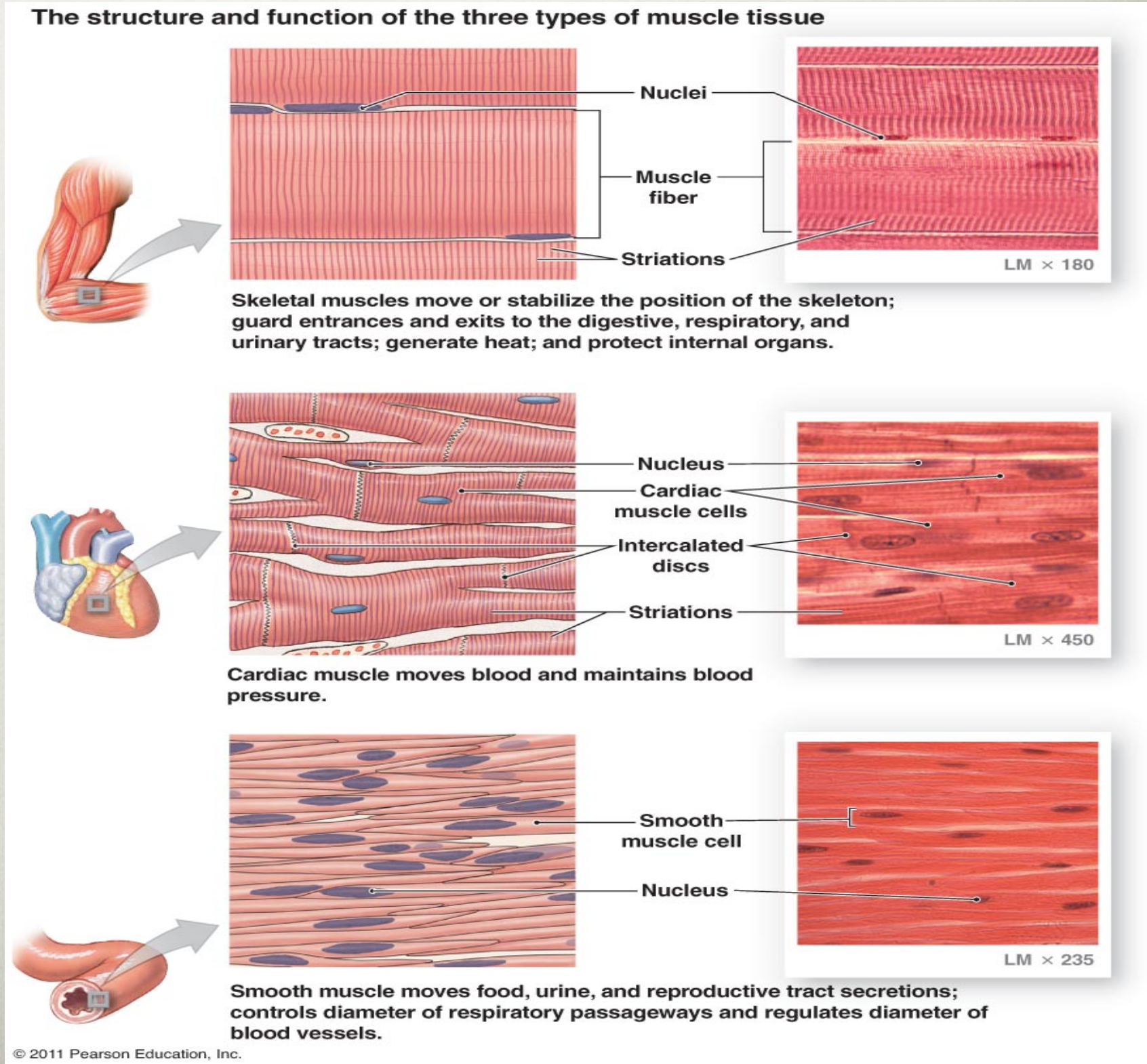
Capillary Bed

Capillaries connect small arteries (arterioles) to veins (venules).



WHAT'S SO SPECIAL ABOUT CARDIAC MUSCLE?

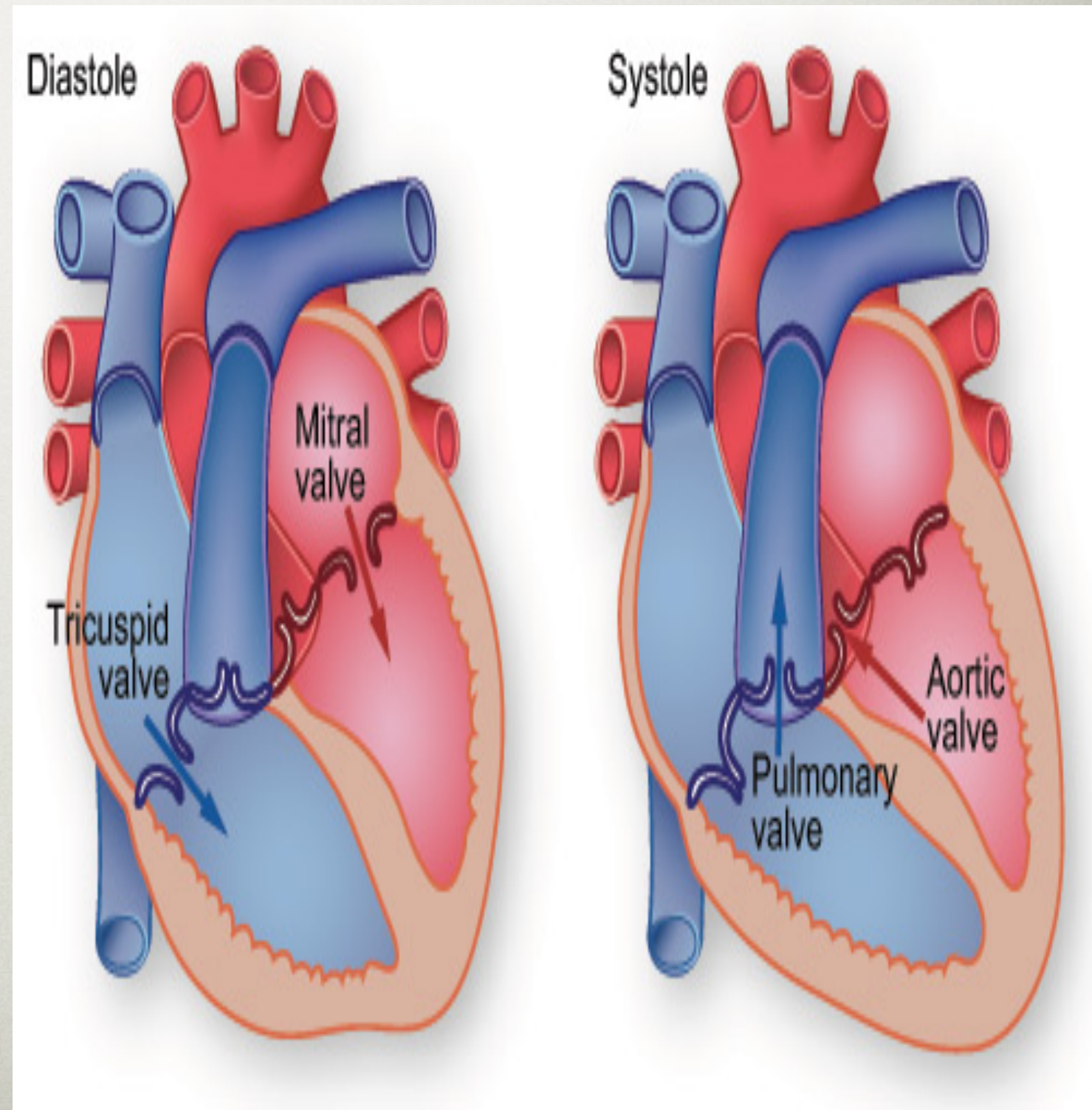
- Does not fatigue like other muscles
- Electric signals from the AV & SA Node cause it to contract and relax in sync



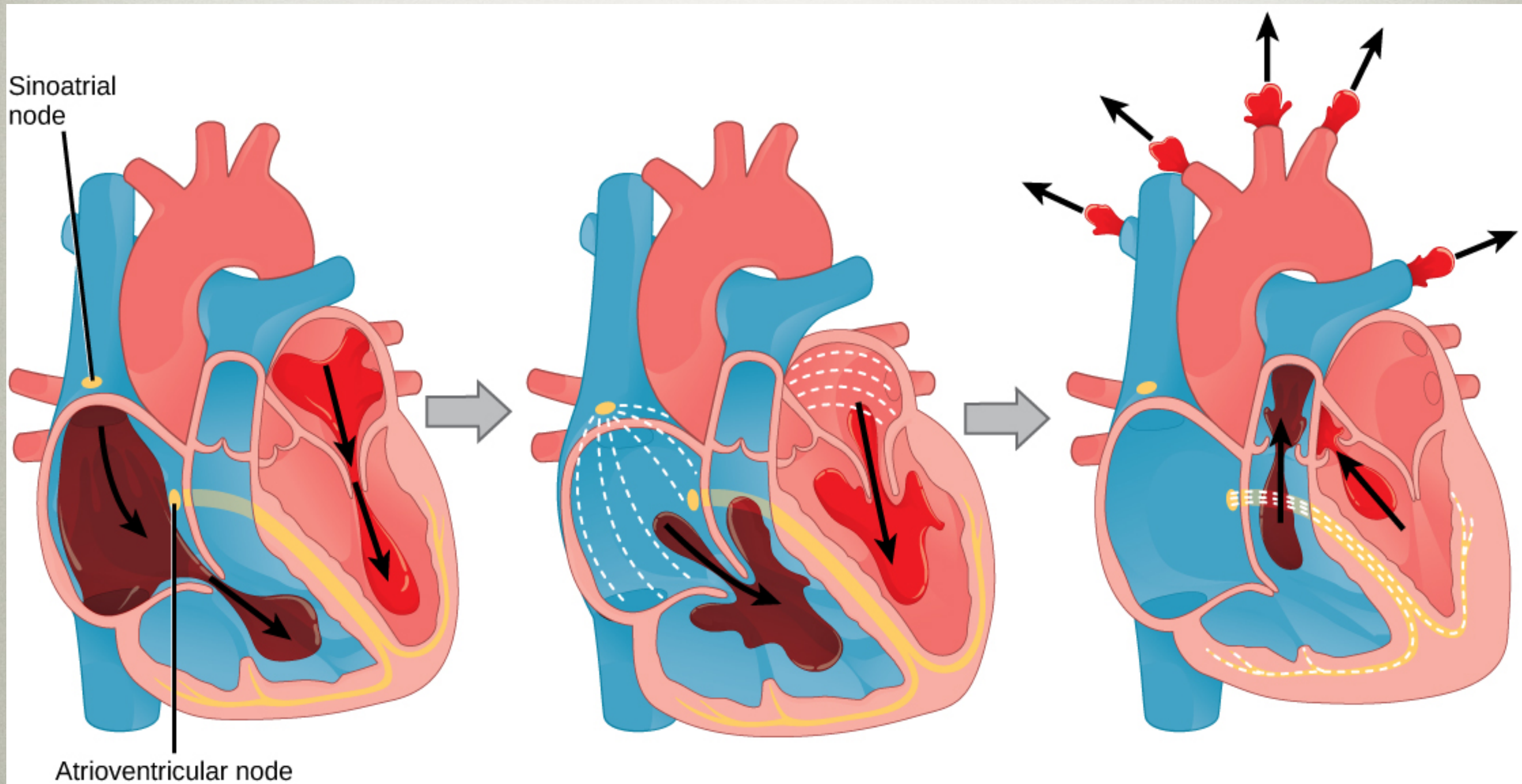
PUMP YOUR BLOOD

Video #1

- Cardiac Cycle
 - **Diastole:** Chambers relax, and the heart fills with blood
 - **Systole:** Chambers contract and eject the blood into the pulmonary arteries, leading to the lungs



DIASTOLE VS. SYSTOLE



(a) Cardiac diastole: all chambers are relaxed, and blood flows into the heart.

(b) Atrial systole, ventricular diastole: atria contract, pushing blood into the ventricles.

(c) Atrial diastole, ventricular systole: after the atria relax, the ventricles contract, pushing blood out of the heart.

CONTROLLING THE HEART

- Endocrine

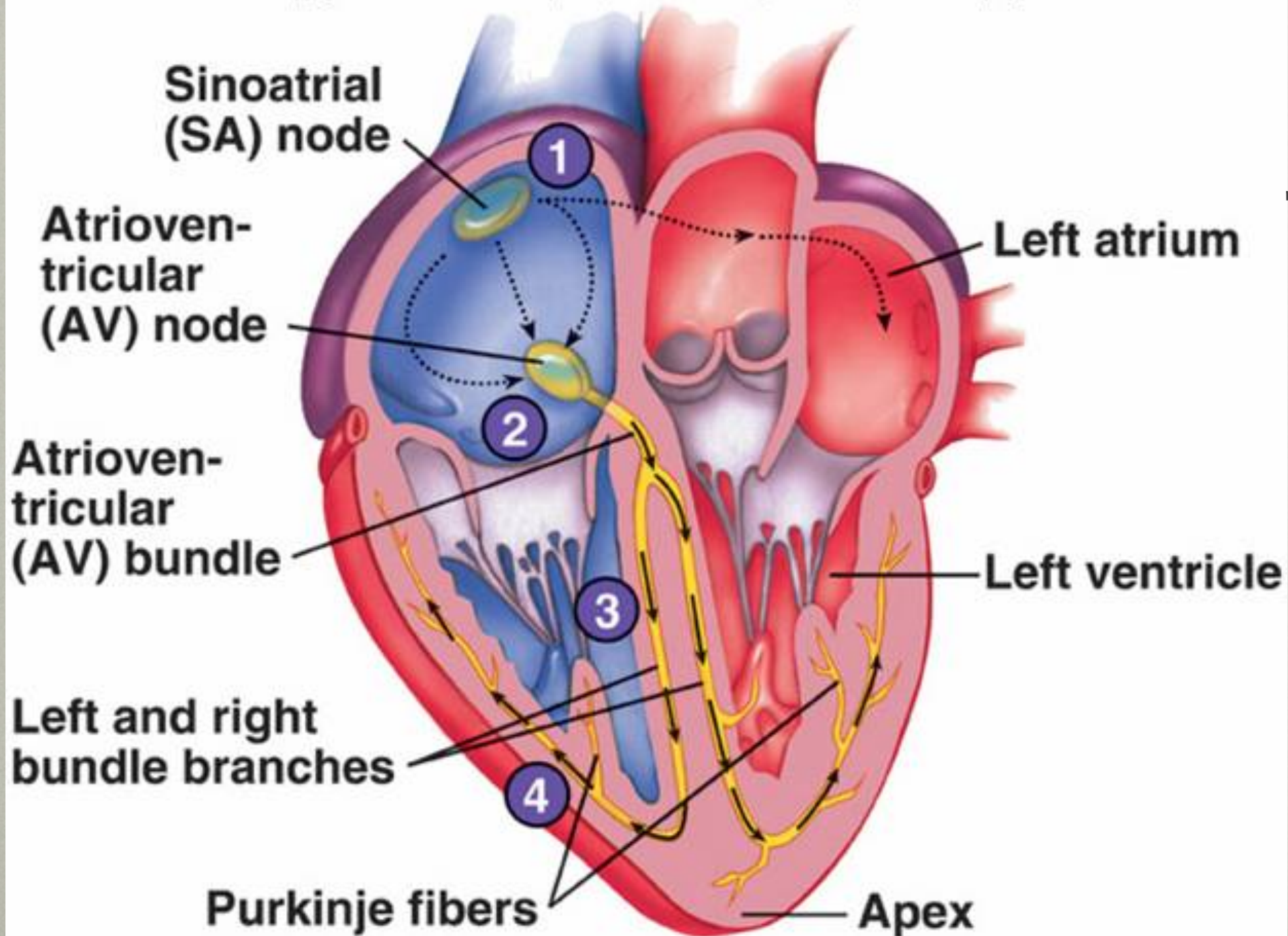
- Atrial Natriuretic Peptide (ANP)
 - Counteracts High BP via vasodilation (enlargement of blood vessels to allow more blood to flow thus lowering BP)
- Epinephrine and Norepinephrine
 - Blood Pressure and Heart Rate
 - Works to divert blood supplies to essential organs during emergencies
 - Epinephrine Increases Blood rate while Norepinephrine reduces it *after* the emergency

- Nervous

- Sinoatrial Node and Atrioventricular Node
 - Purkinje Fibers (Inside AV Node)

CONTROLLING THE HEART

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



The Nervous System aids in the synchronizing of the heart cells to beat in time.

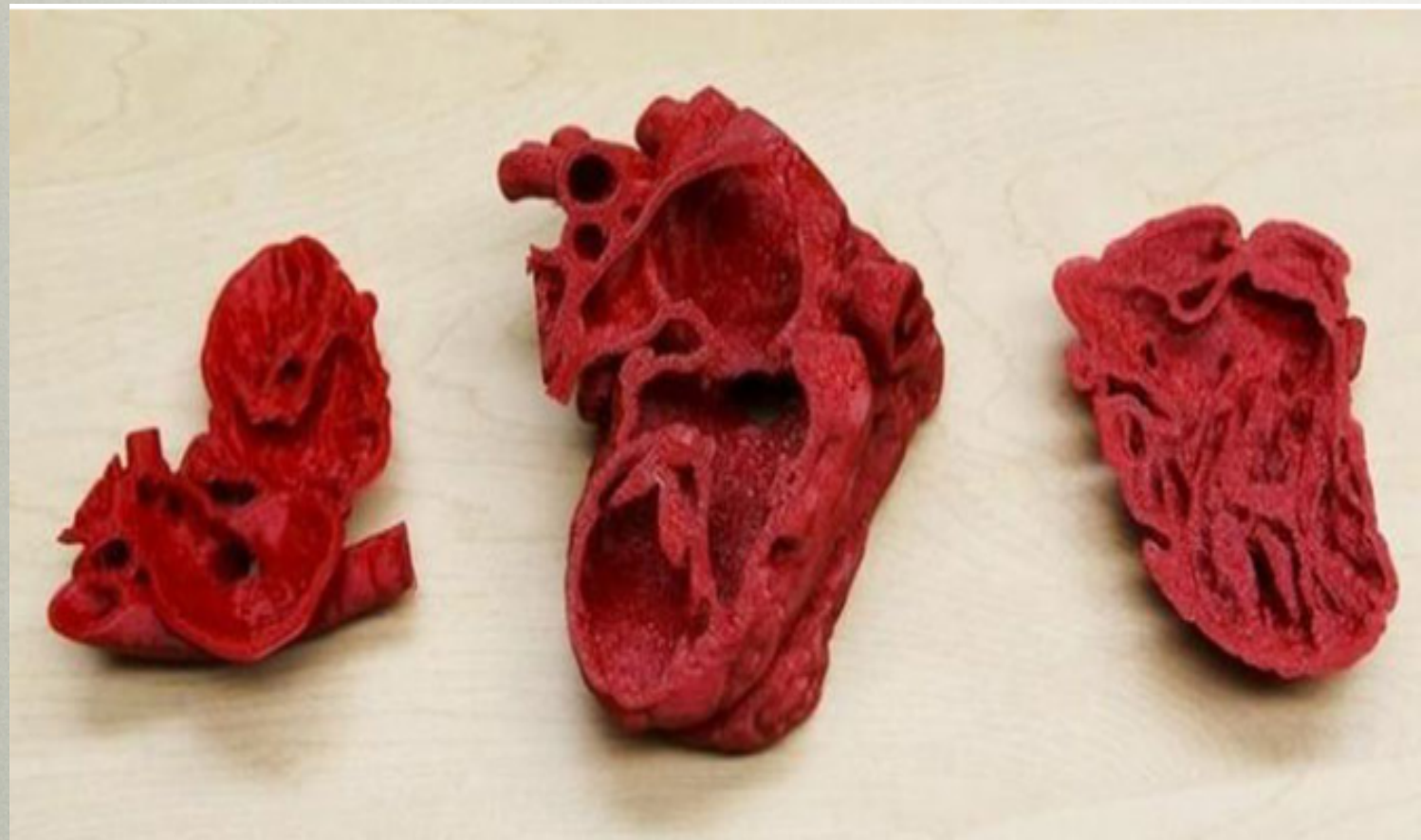
THE ADVANCES IN MEDICINE



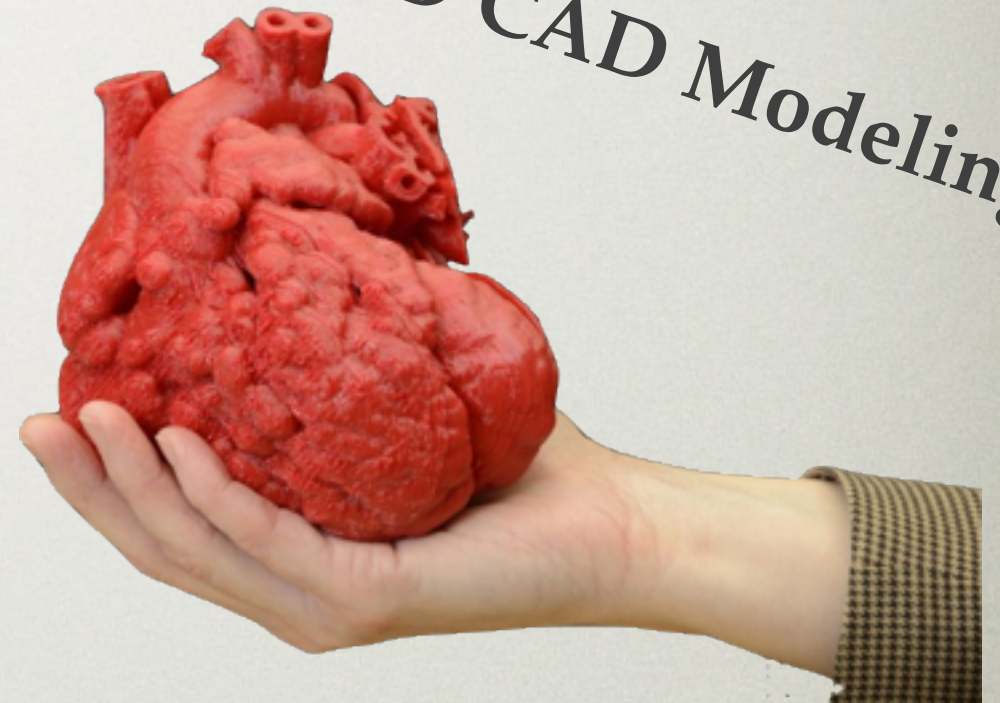
SYNERGY OF ENGINEERING AND MEDICINE

Video #3

This is the 3D heart of
an operative patient



MRI -----> 3D CAD Modeling



- the 3D printing of organs and tissues are the future of this field
- Cross sections of the heart can be made with CAD programming
- Rapid Prototyping of Organs (made of a plastic polymer)

VIDEO GAME OR REAL? WHY NOT BOTH!



NO HEARTBEAT? BUT STILL KICKING?

Video #5

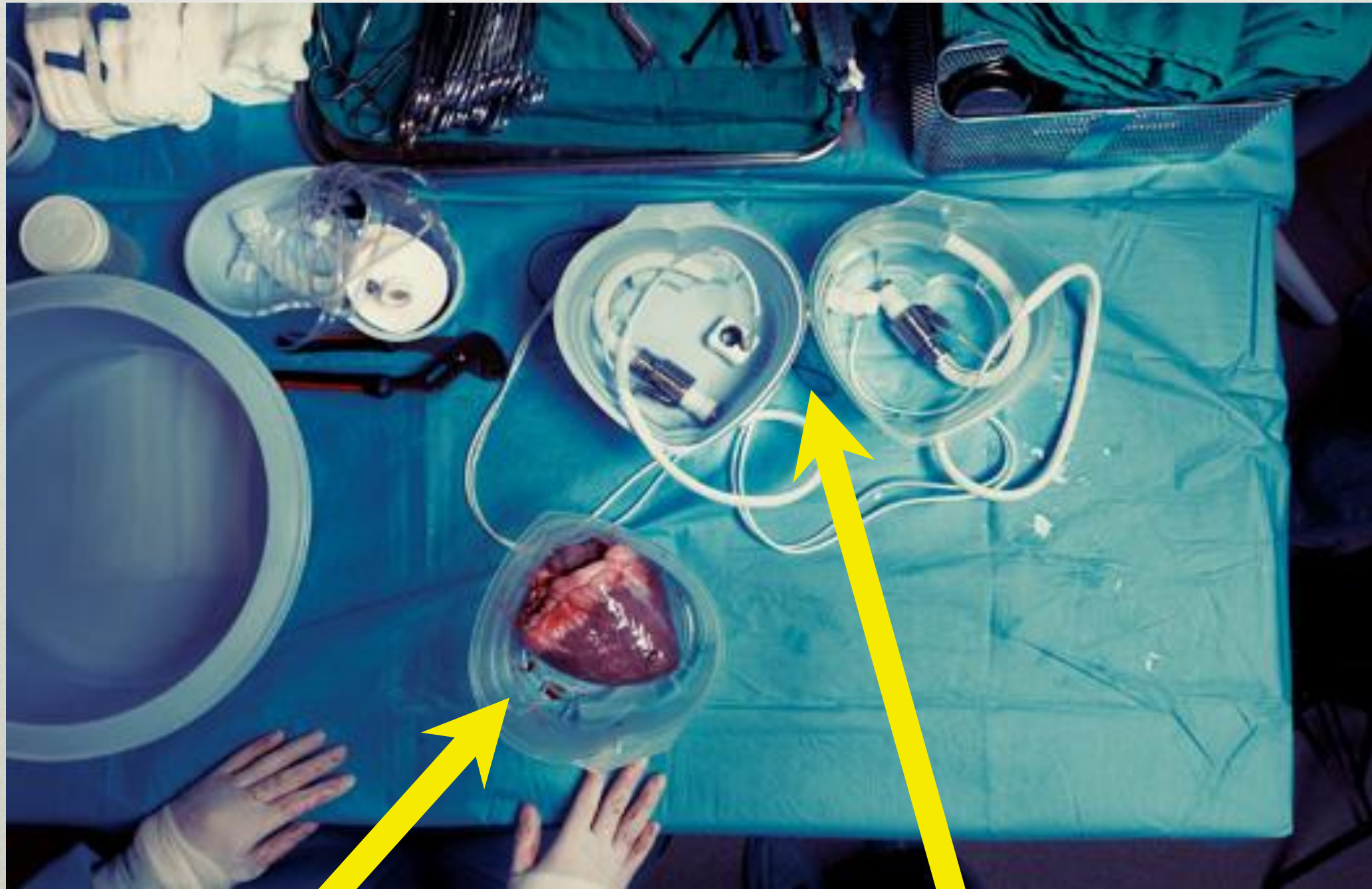


Cardiology's
new toy!

An artificial heart
that doesn't hook
the patient up to a
machine

THEY'RE TWINS!

(OKAY MAYBE FRATERNAL)



Nature-made

From Toys R' Us

SOURCES

- <http://www.innerbody.com/image/endoov.html#full-description>
- <http://humandiagrams.com/human-gross-anatomy-study/cardiac-muscle-diagram-labeled/#main>
- <http://www.popsci.com/science/article/2012-02/no-pulse-how-doctors-reinvented-human-heart?nopaging=1>
- <http://www.sciencedaily.com/releases/2014/02/140224123756.htm>
- Images galore

THANK

YOU!!!