

Dr. Kraig is... I g GGGGREAT!!



BI 358 Lecture 8

Dedicated to Donald Zadoff & Family

I. Announcements Kraig Jacobson MD, Allergy & Asthma Research Associates, Oak Street Medical on Tuesday!

Quiz 3 on Blood & Immunology in Discussion. Questions?

Last update on outlines and paper drafts. Questions?

II. Cardiovascular Physiology Torstar Books, G&H, Katz, LS,...

A. Cardiovascular system? Figure-8 loop D Chiras (DC), LS

B. Fetal development & circulation Torstar..., G&H fig 83- 4

C. Layers: peri-, epi-, myo- & endocardium Torstar Books

D. ♥ structure & function G&H fig 9-7, LS1...

E. Blood flow through ♥ & periphery G&H fig 9-1, LS, DC

F. Coronary circulation & the cardiac cycle, composite events

G&H fig 21-3, Katz, G&H fig 21-5, 21-6, 21-4; ch 9 fig 9-6

G. Autorhythmic cells & ♥'s electrical highway G&H fig 10-1

III. Lymphatic System Torstar Books, DC, LS +...



Dedication to True Friend, Beloved Husband,
Father, Grandfather, Artist & Dog-Lover
Donald Jerome Zadoff, 022426-012913



**Wear Red next Friday (Feb 7th)
Help raise awareness about
Women & ♥ disease**

<http://www.goredforwomen.org/>

<https://www.goredforwomen.org/about-heart-disease/facts-about-heart-disease-in-women-sub-category/statistics-at-a-glance/>

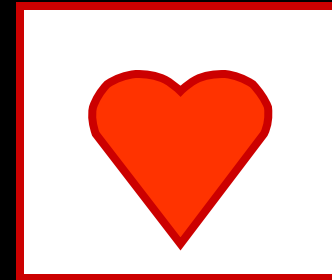
7 Resolutions *to Improve* ♥ *Health in 2014*

- **Quit smoking**
- **Avoid 2nd –hand smoke**
- **Know your numbers**
- **Process out processed foods**
- **Get moving**
- **Get your friends & family on board**
- **Spread awareness**

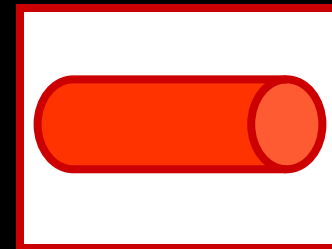


http://www.goredforwomen.org/about-heart-disease/symptoms_of_heart_disease_in_women/just-a-little-heart-attack/

Cardiovascular (CV) = Heart + Vessels + Blood!



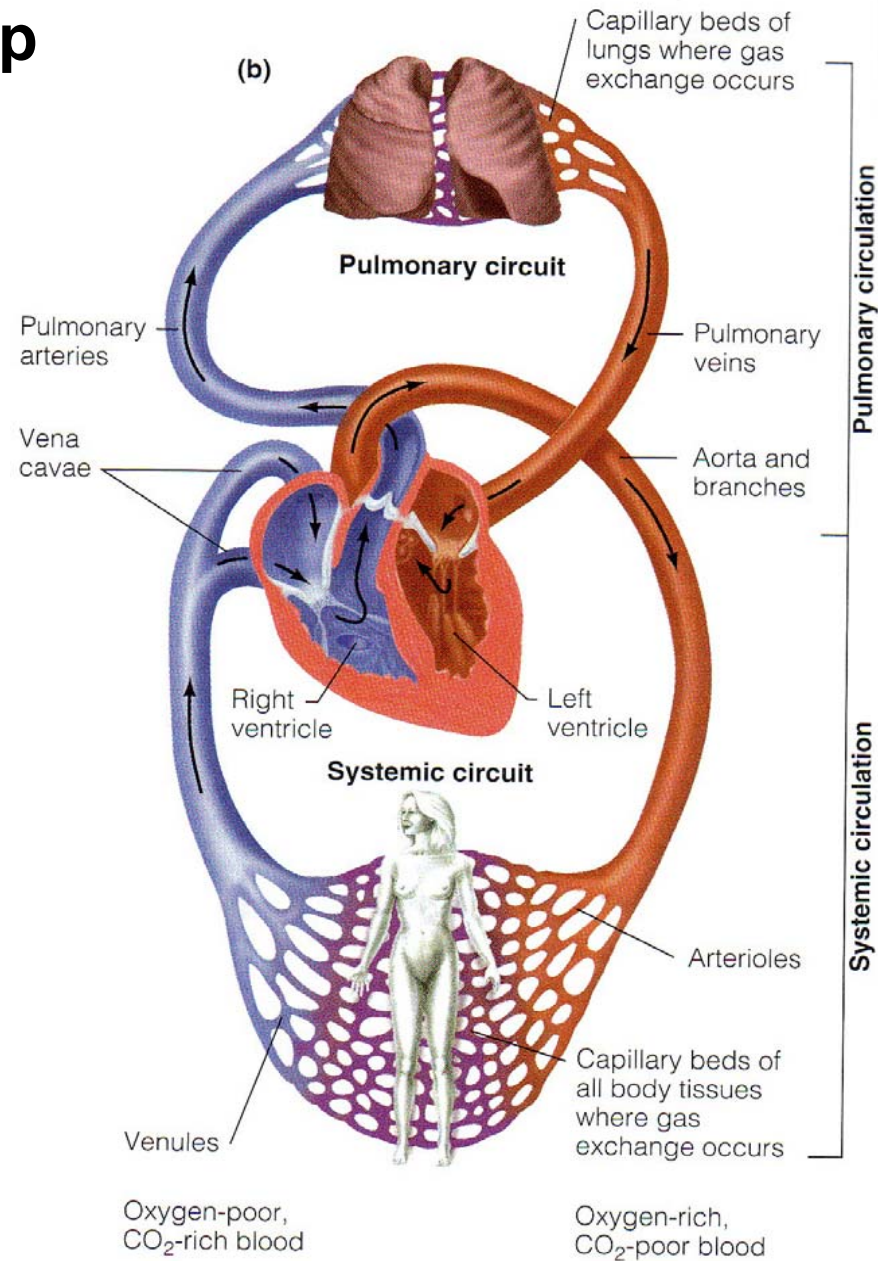
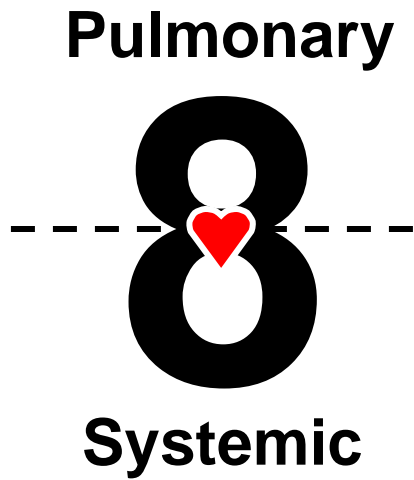
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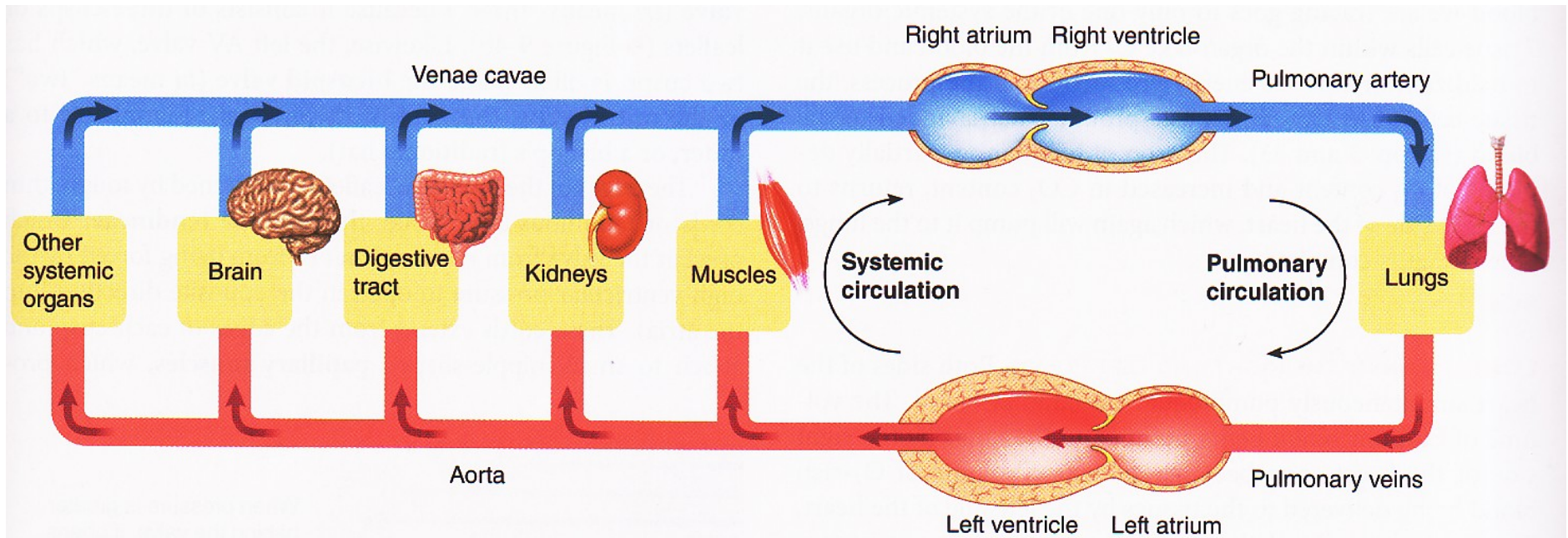
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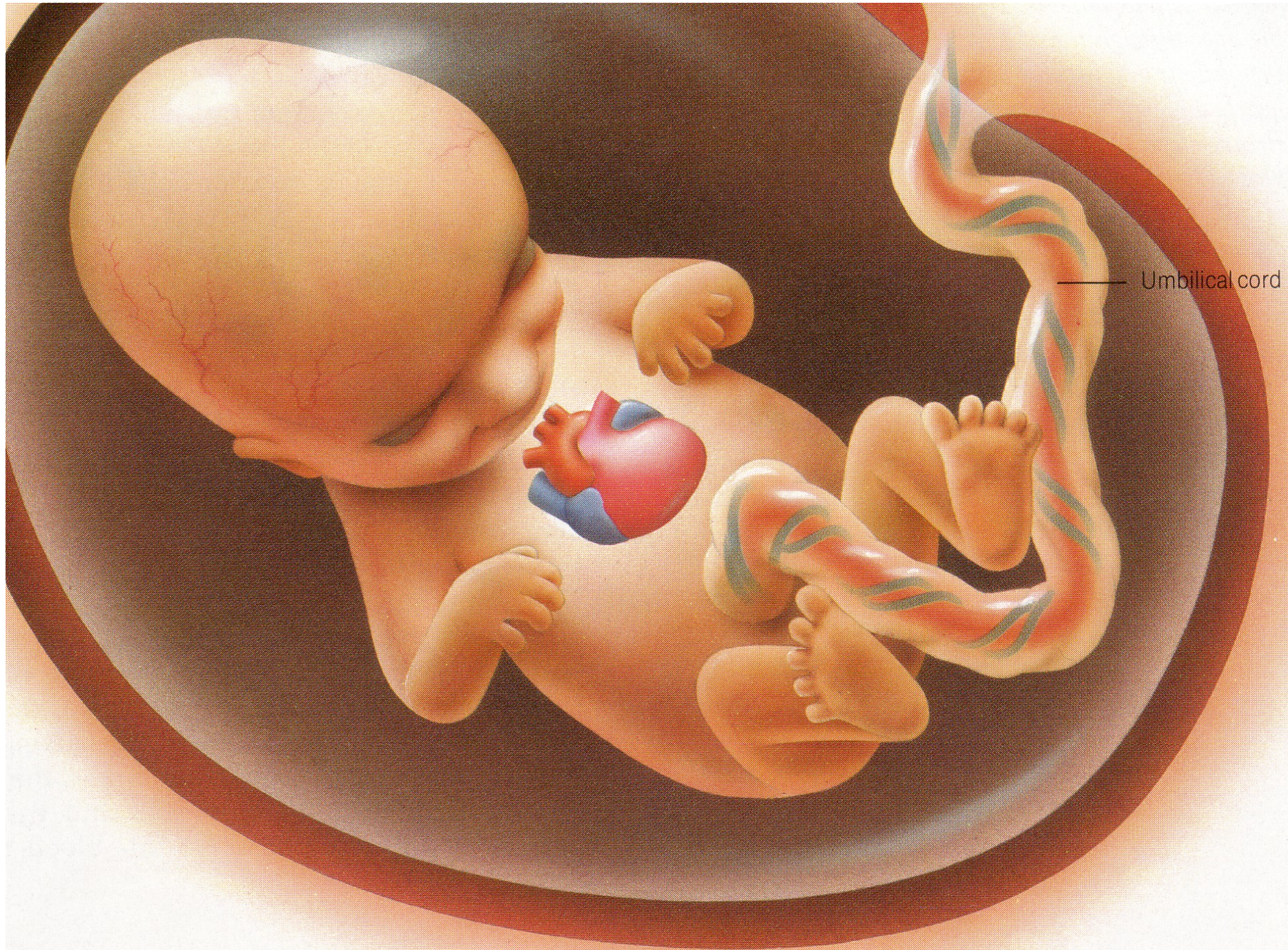


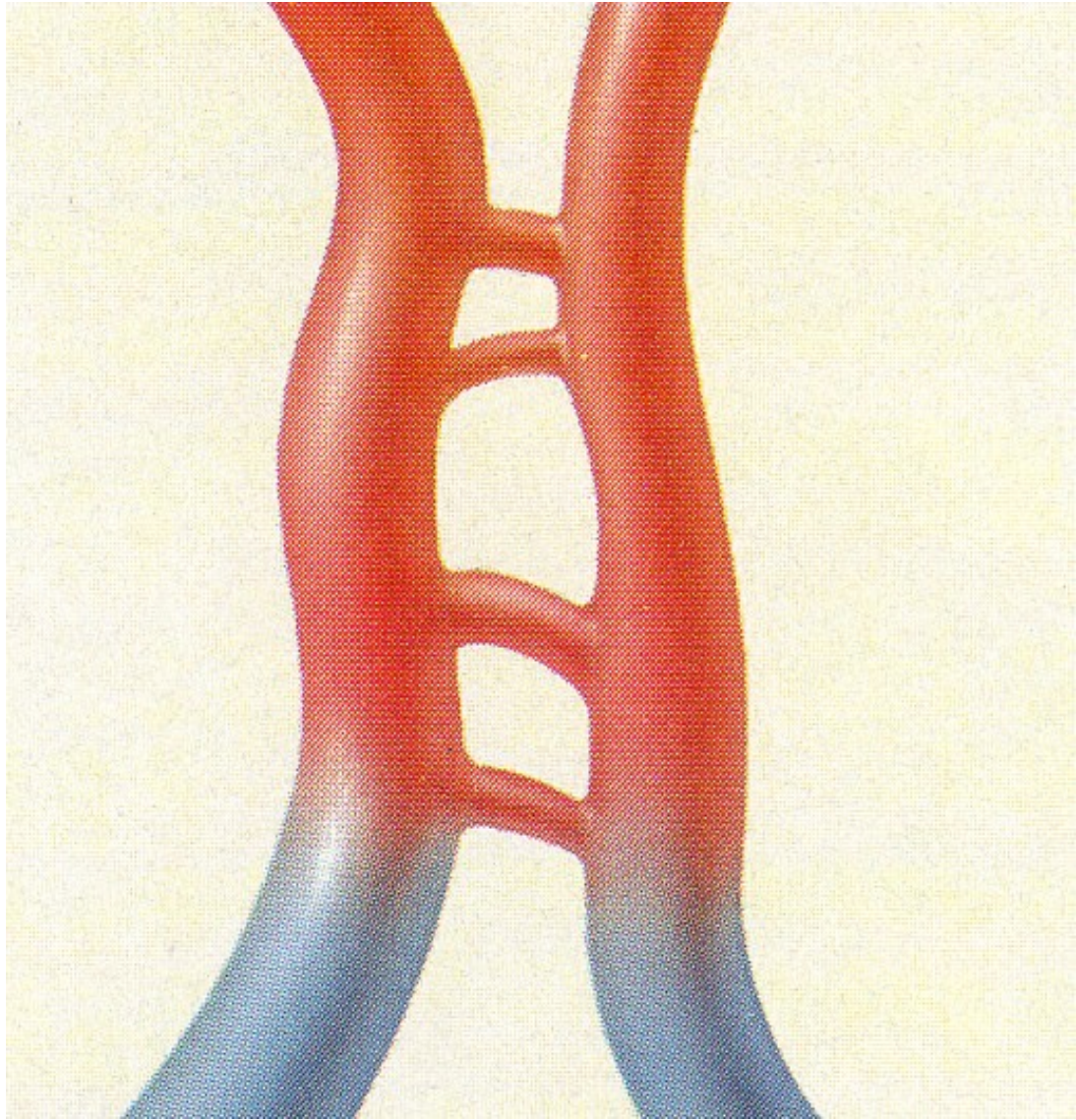
NB: Figure-8 loop

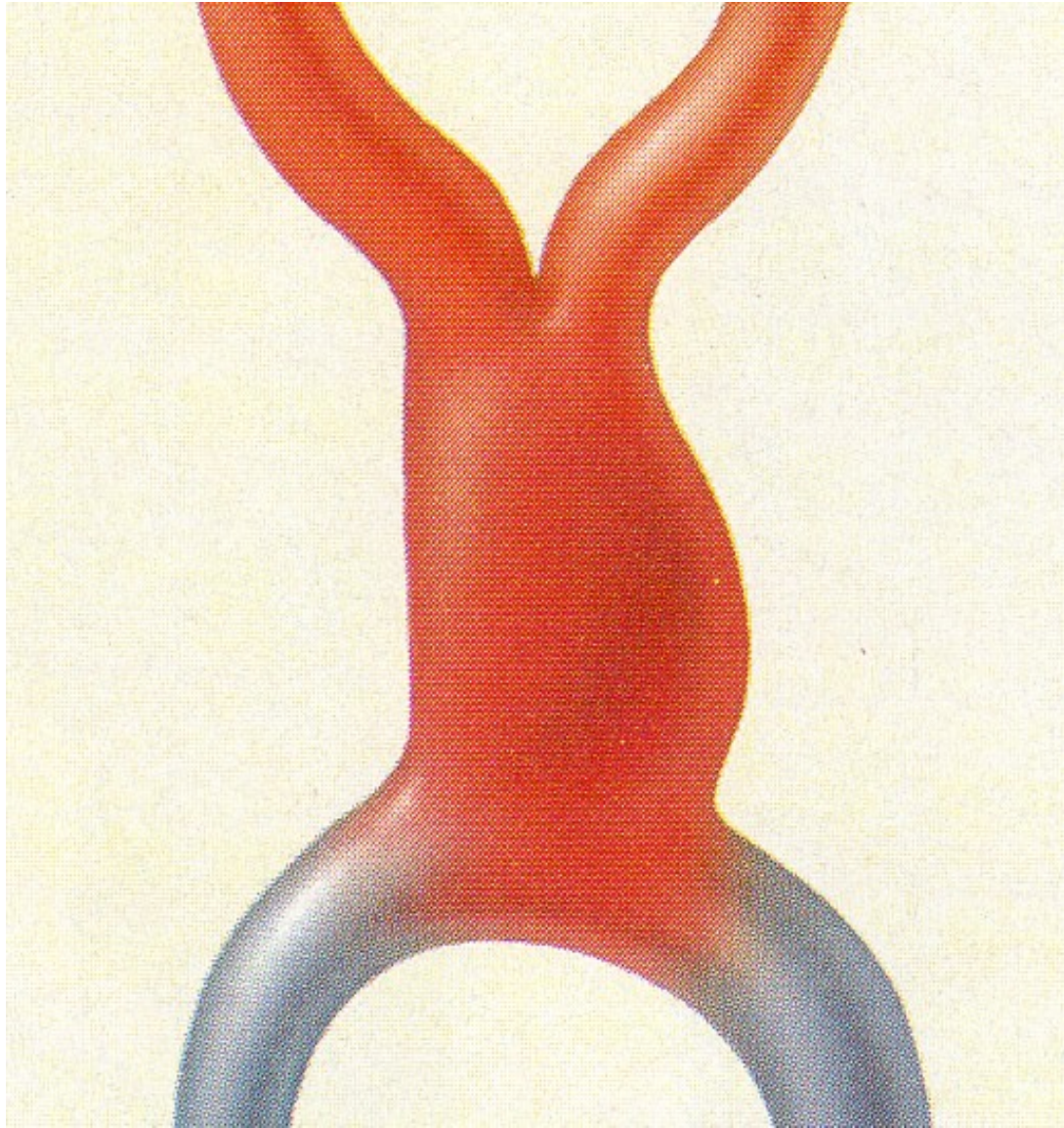


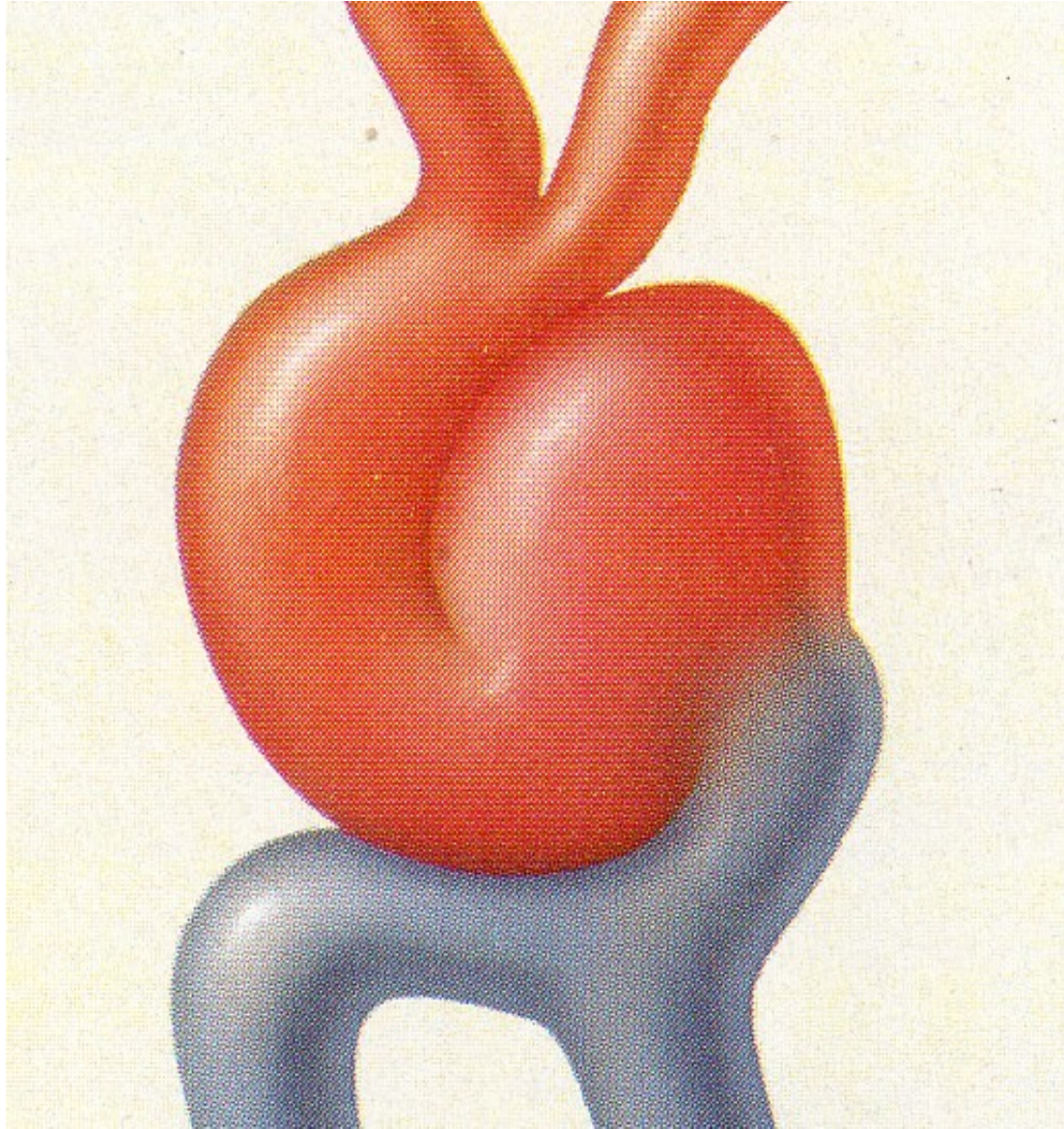
Dual Pump Action & Parallel Circulation



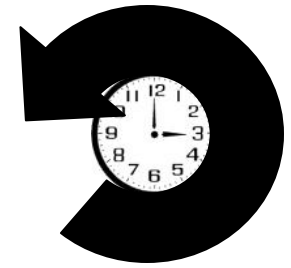


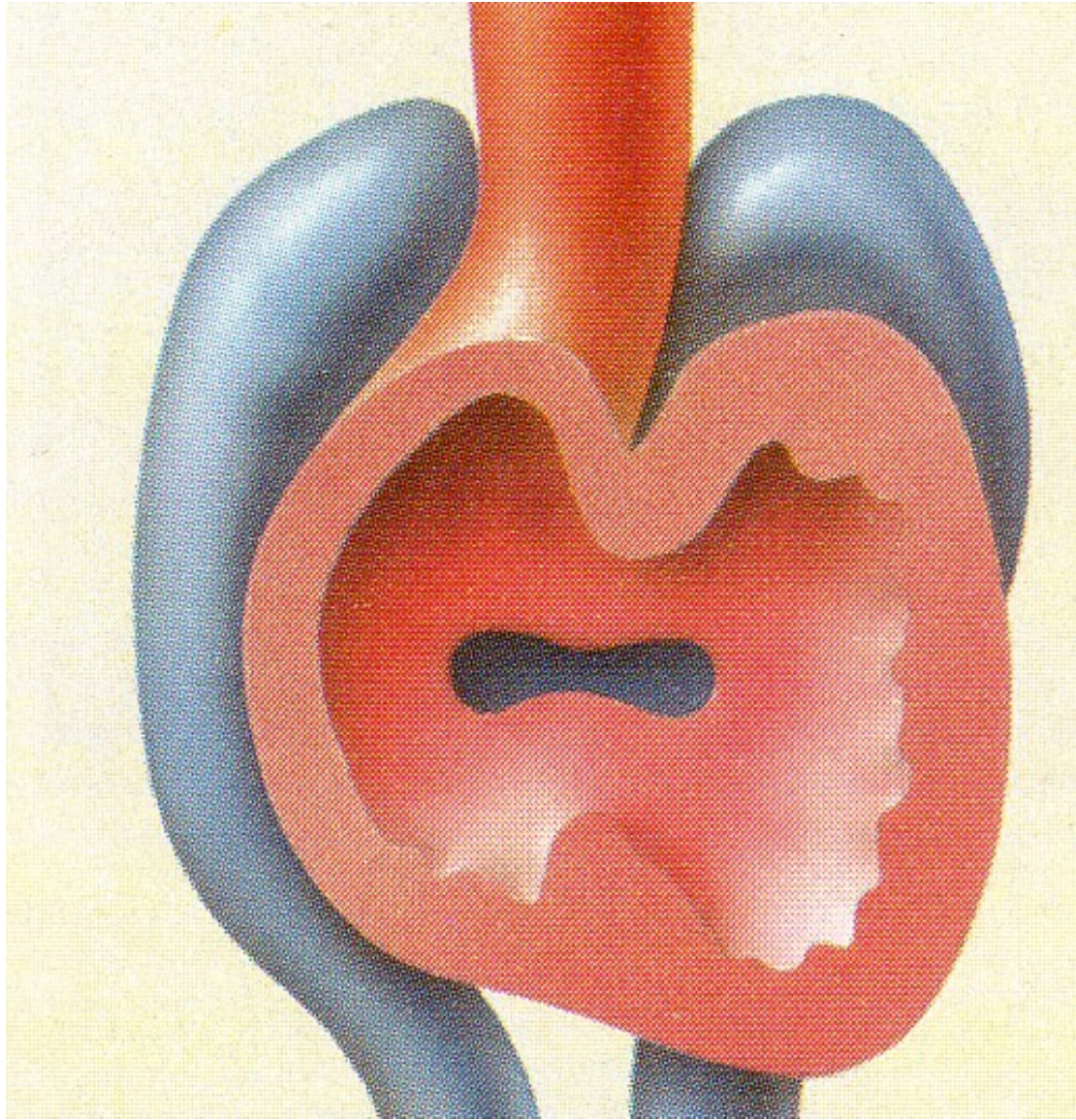


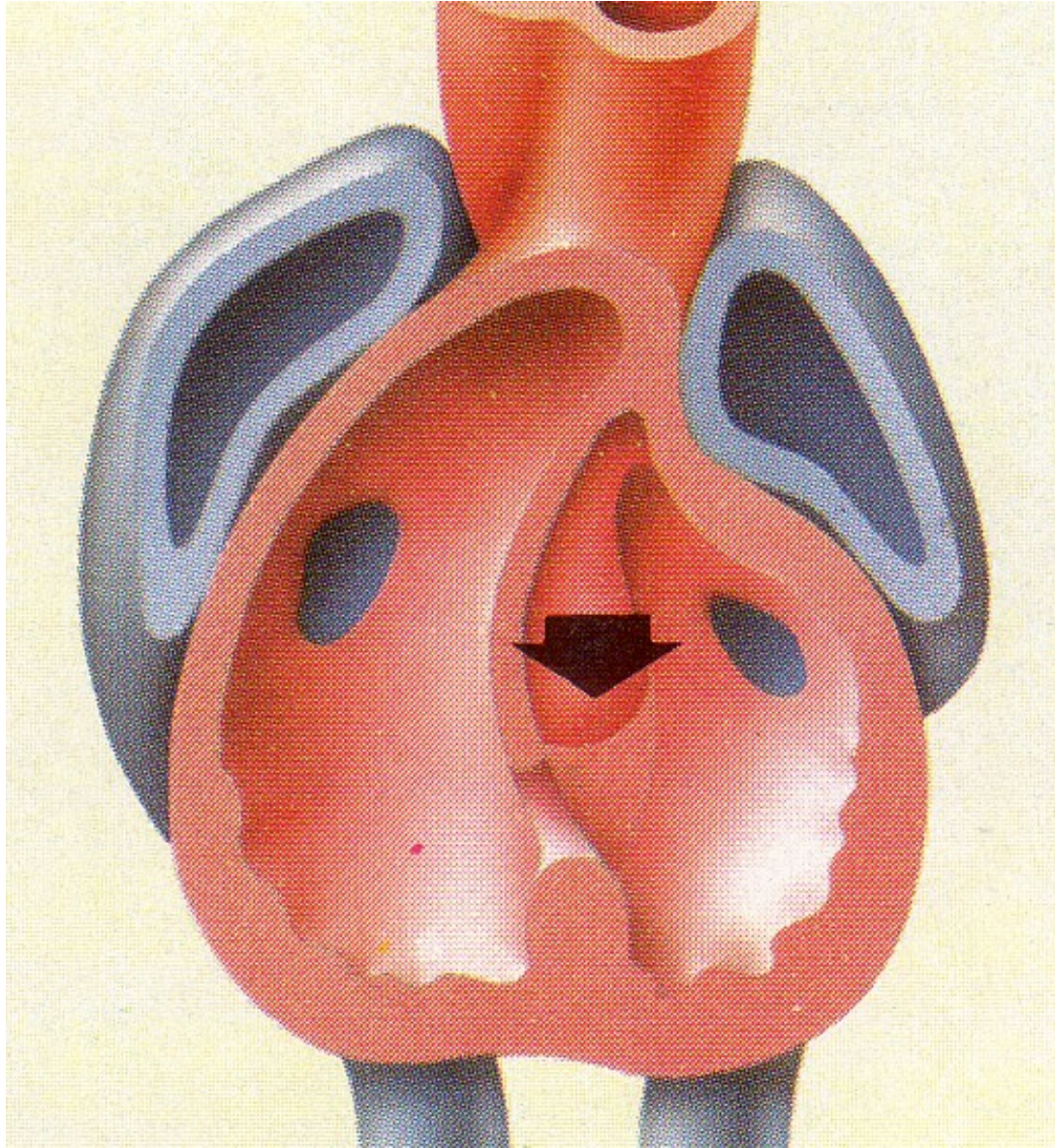




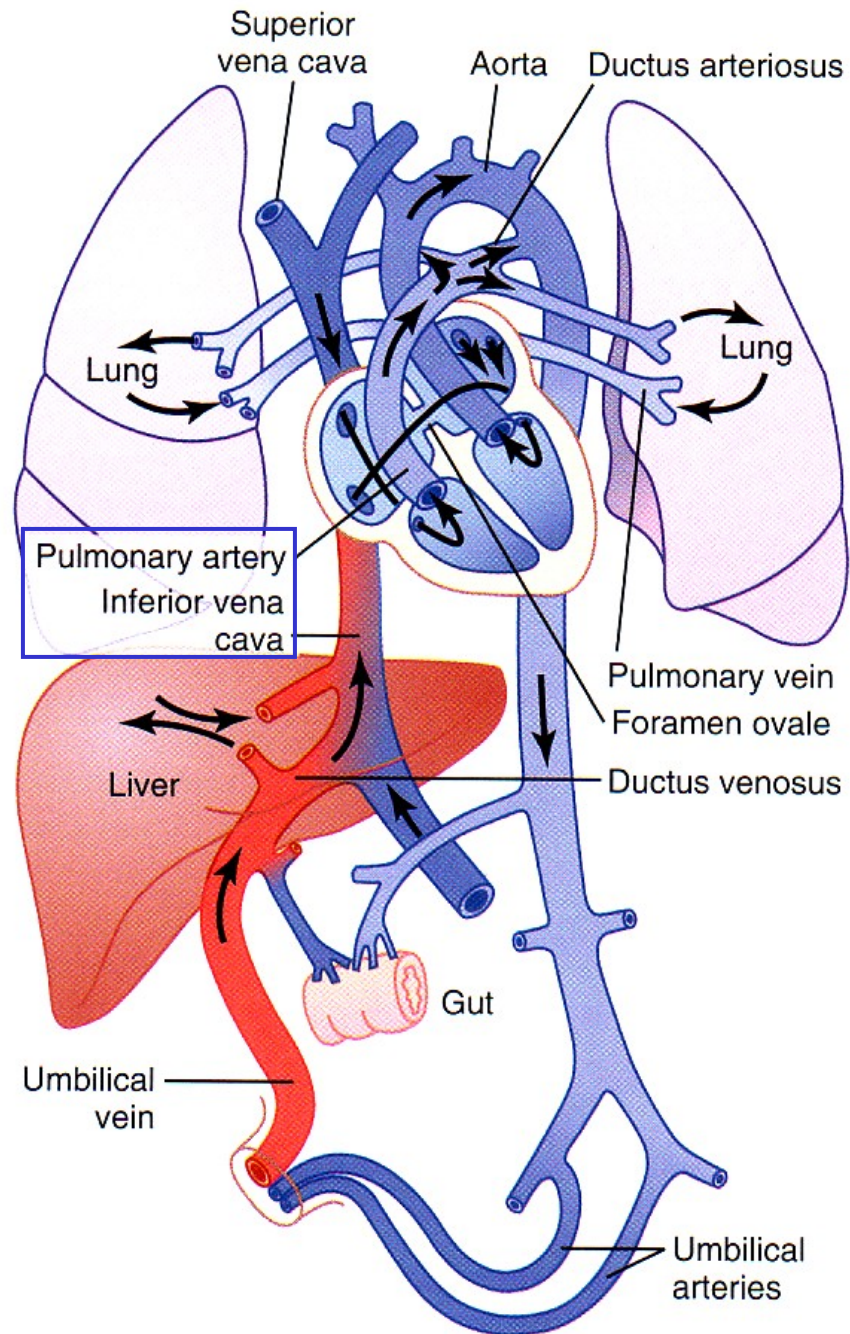
Counter-clockwise

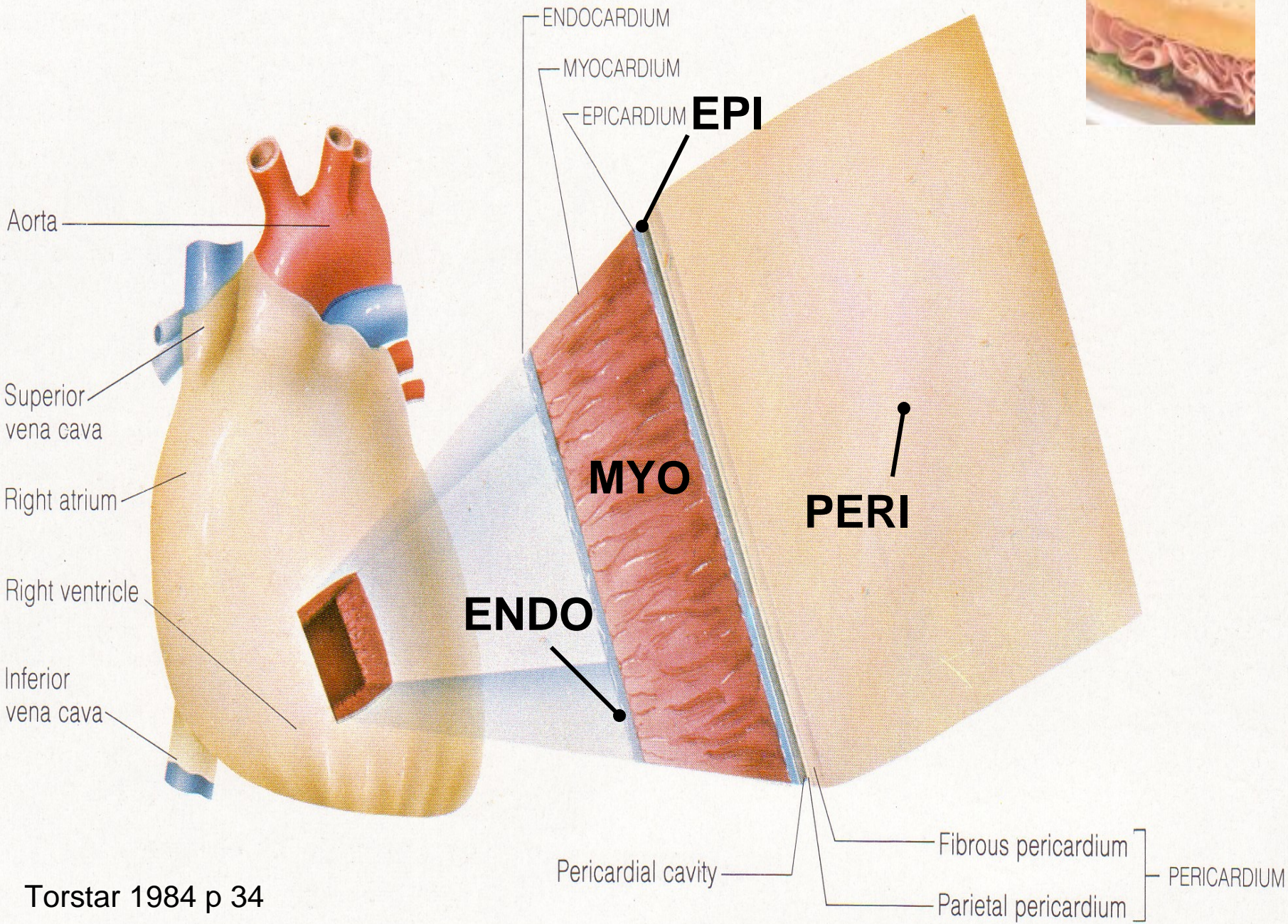






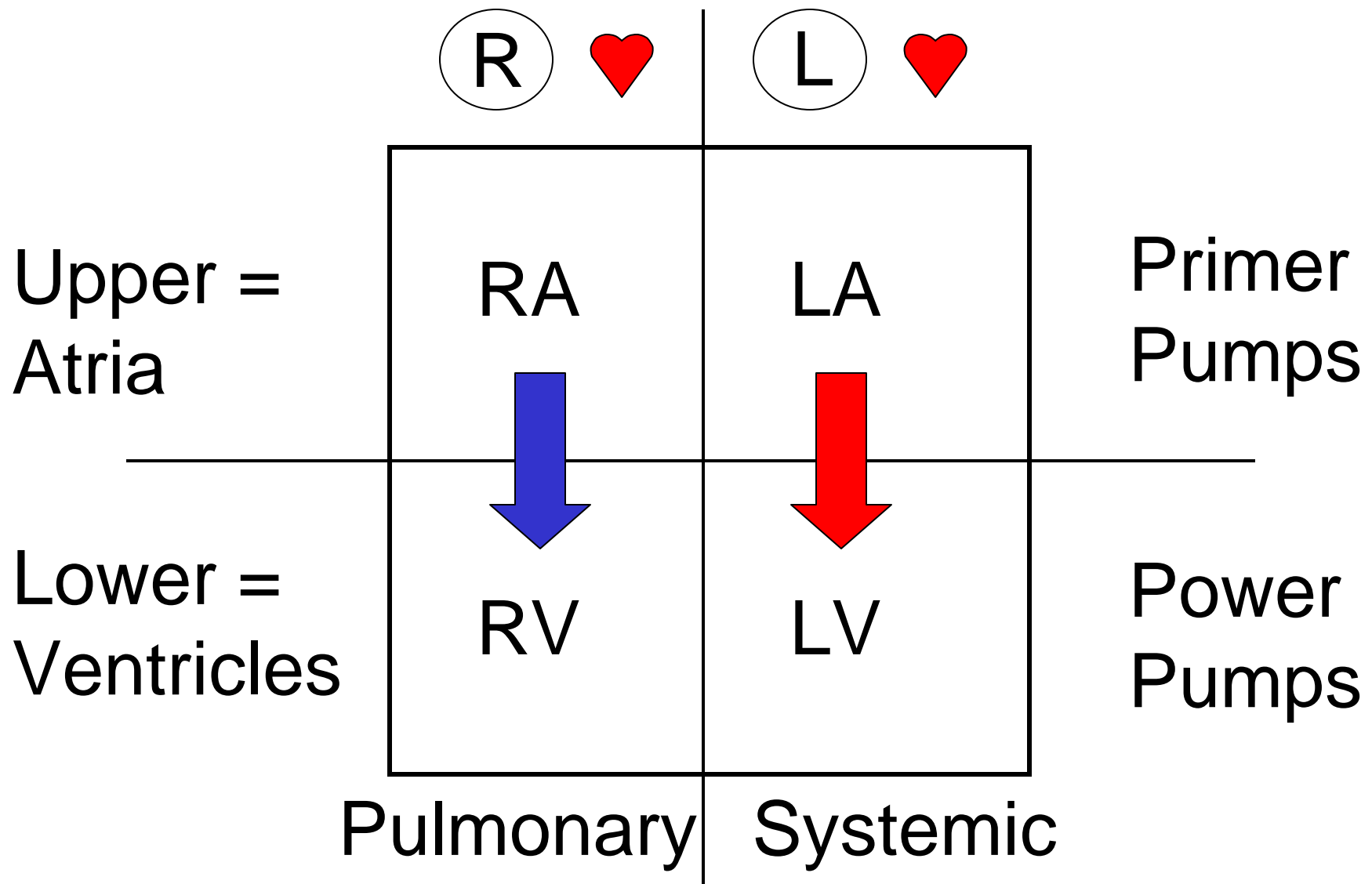
Fetal Circulation
 \equiv *Aqua Animal*
Bypass Lungs
 $R \rightarrow L$ ♥ *Shunt*

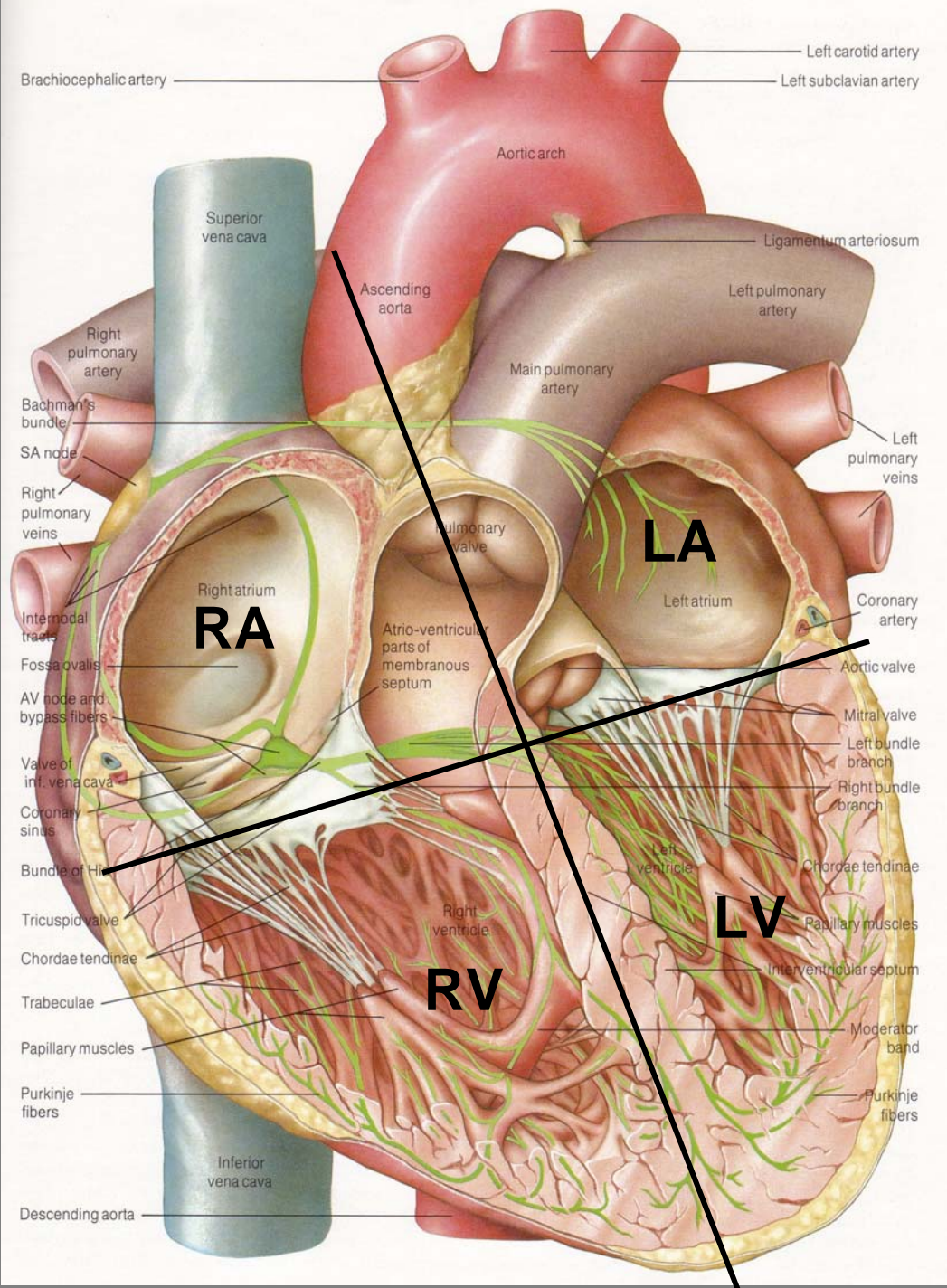




Torstar 1984 p 34

Human ♥ = 4-chambered box?
2 separate pumps?





Human ♥ = 4 unique valves?
2 valve sets?

Semilunar = Half-moon shaped

More rigid

1. Pulmonic/Pulmonary
2. Aortic



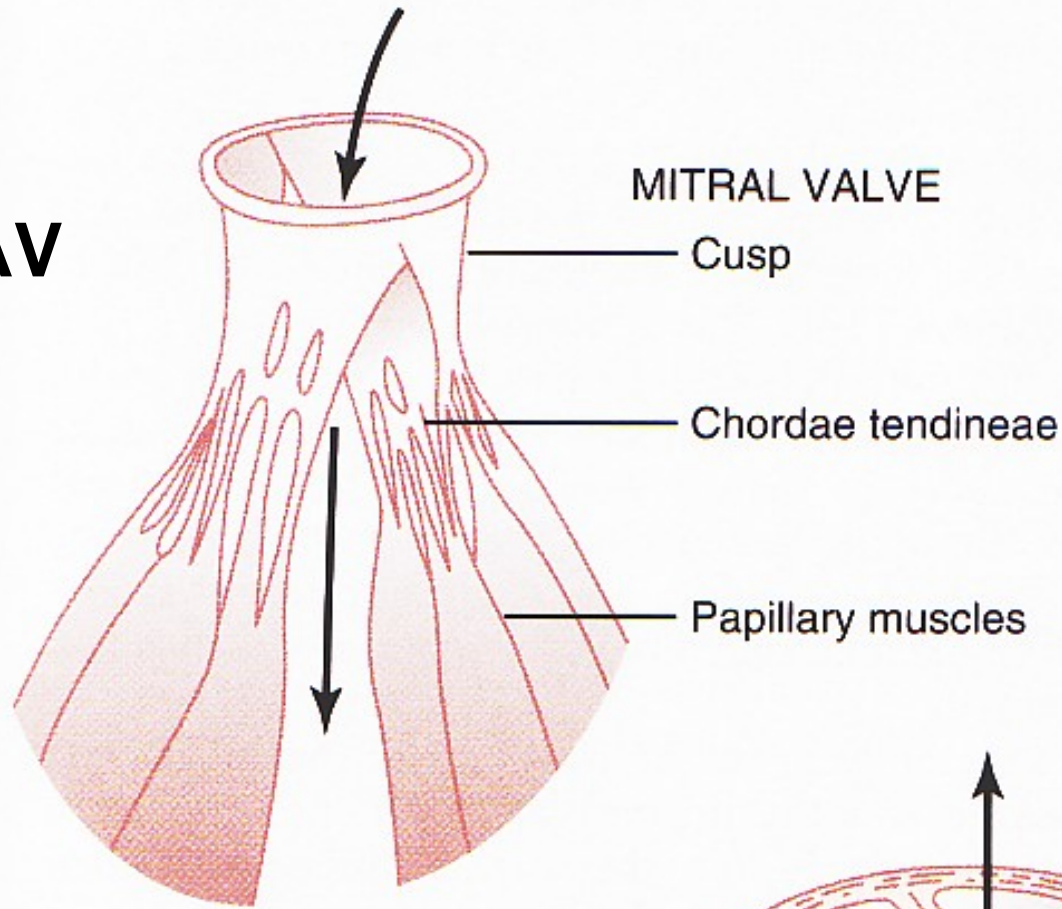
AV = Atrioventricular

More flimsy

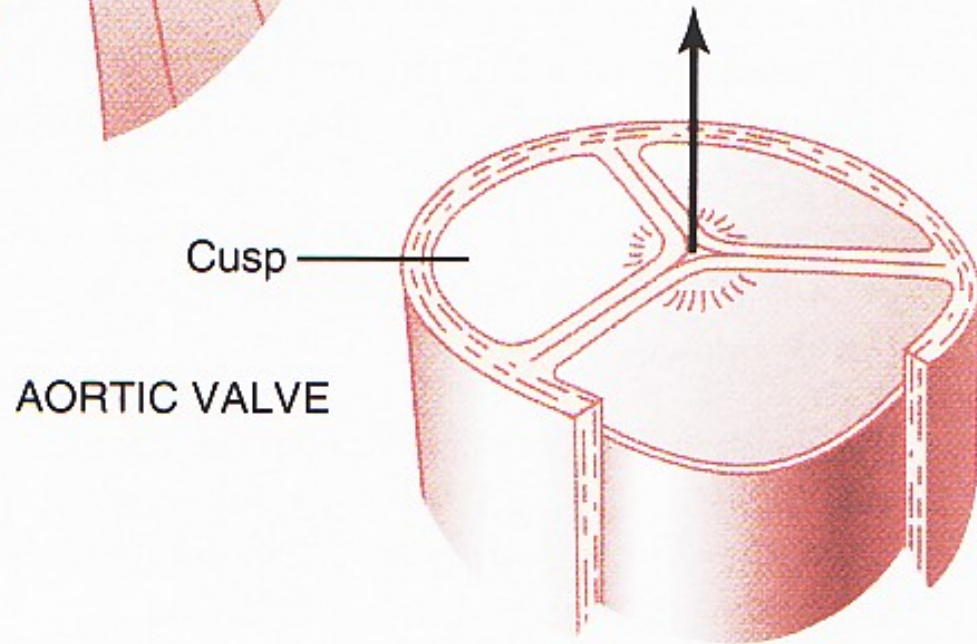
3. (R) AV = Tricuspid
4. (L) AV = Mitral/Bicuspid



L AV

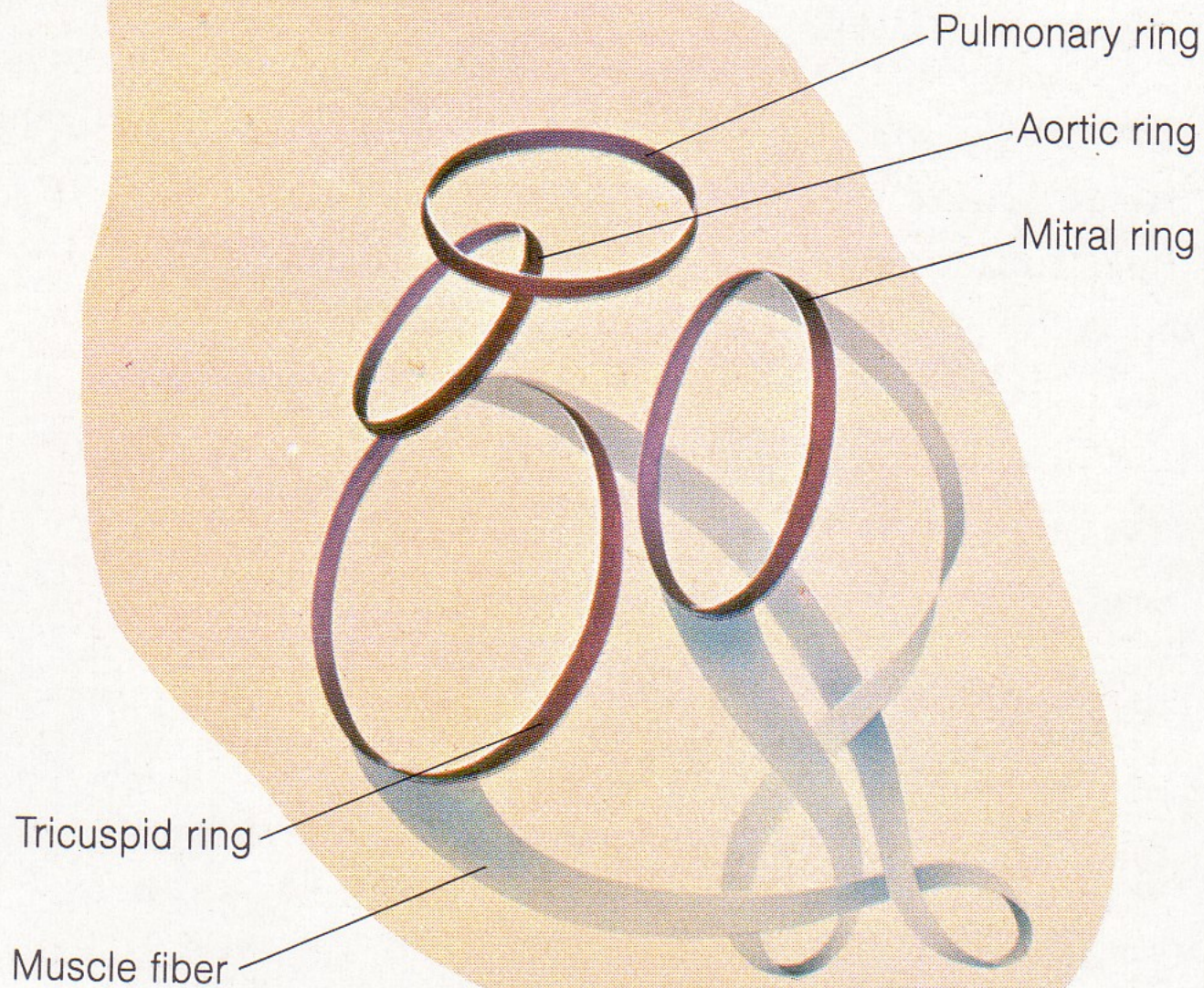


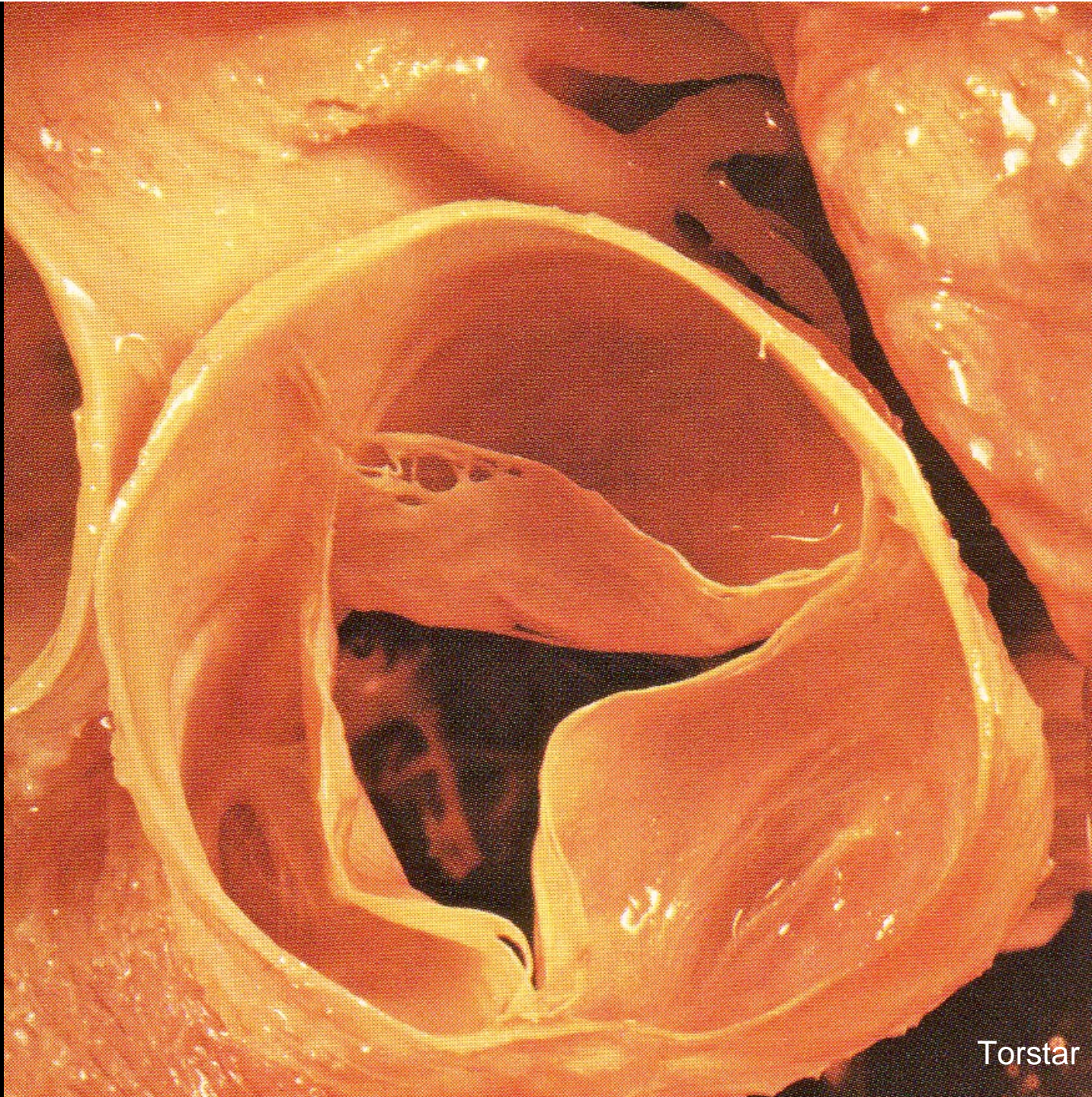
SL

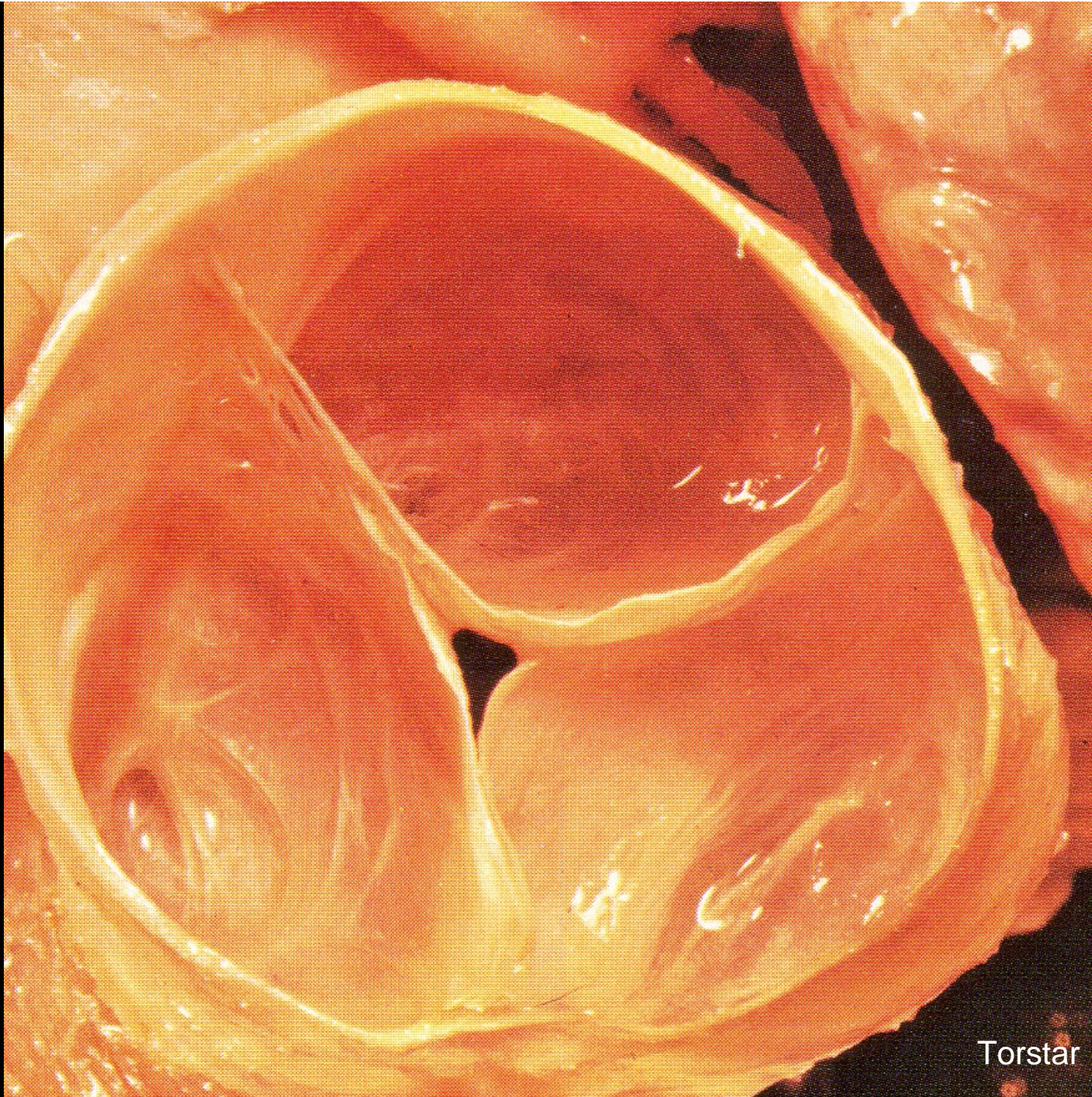


G&H 2006 fig 9-6;
cf: G&H 2011 fig 9-7

Heart Valve Orientation & Scaffolding









What the heck's a *bruit*?
(brwe, brōot) [Fr.] sound \geq
25 subclassifications!

Aneurysmal b. a blowing sound over an aneurysm.

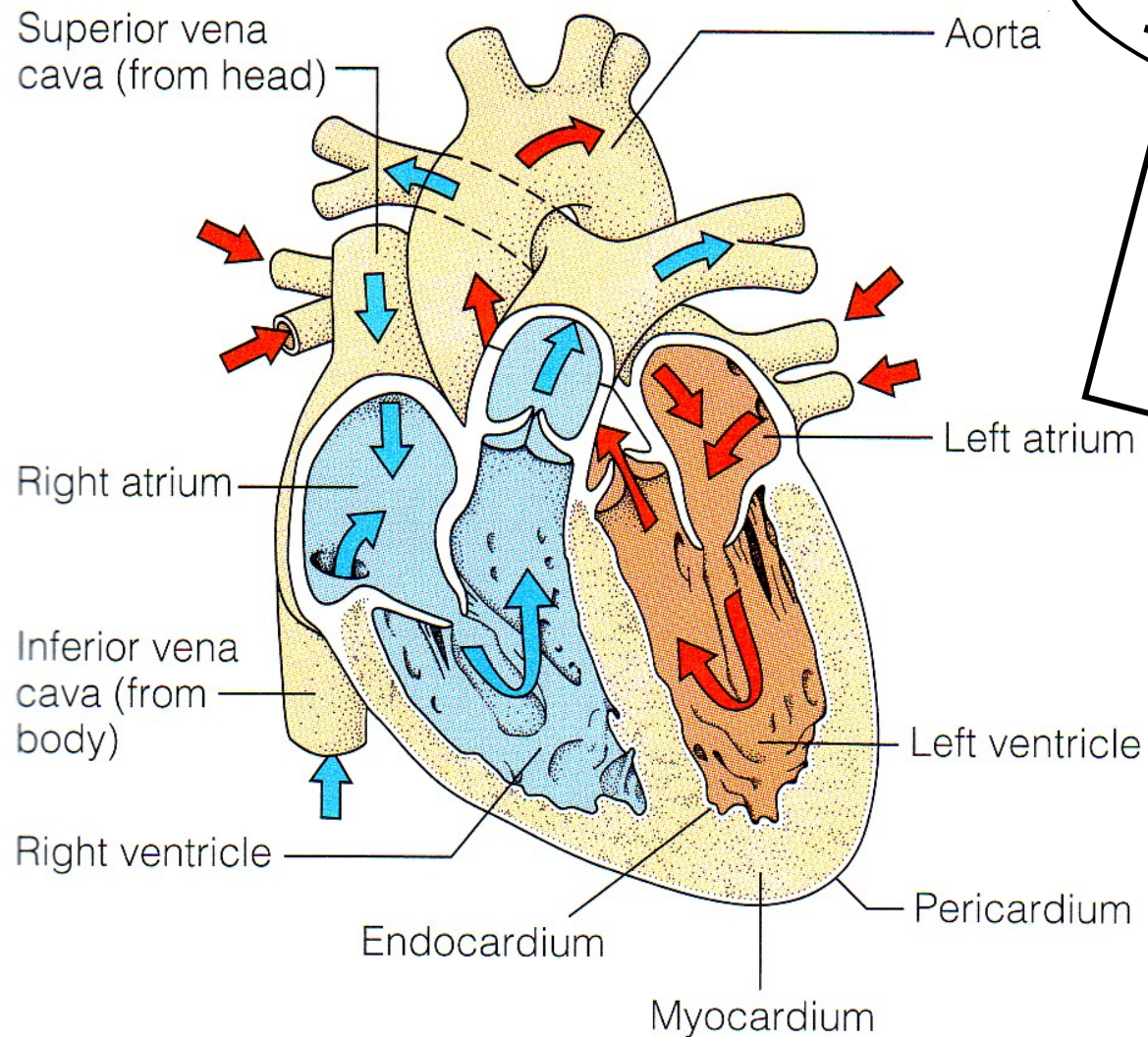
b. de canon [Fr. sound of cannon] abnormally loud 1st heart sound heard in complete heart block.

b. de craquement [Fr. sound of crackling] a crackling pericardial or pleural bruit.

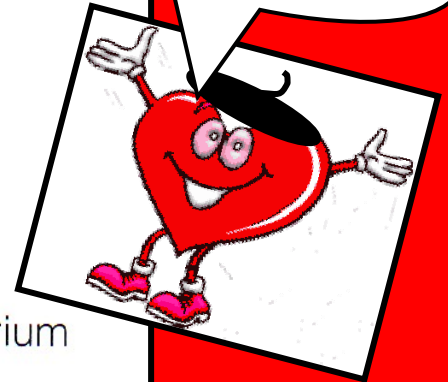
False b. artifact caused by pressure of the stethoscope or derived from circulation of the ear.

b. de lime [Fr. sound of a file] cardiac sound resembling filing.

Veins → Atria → Ventricles → Arteries

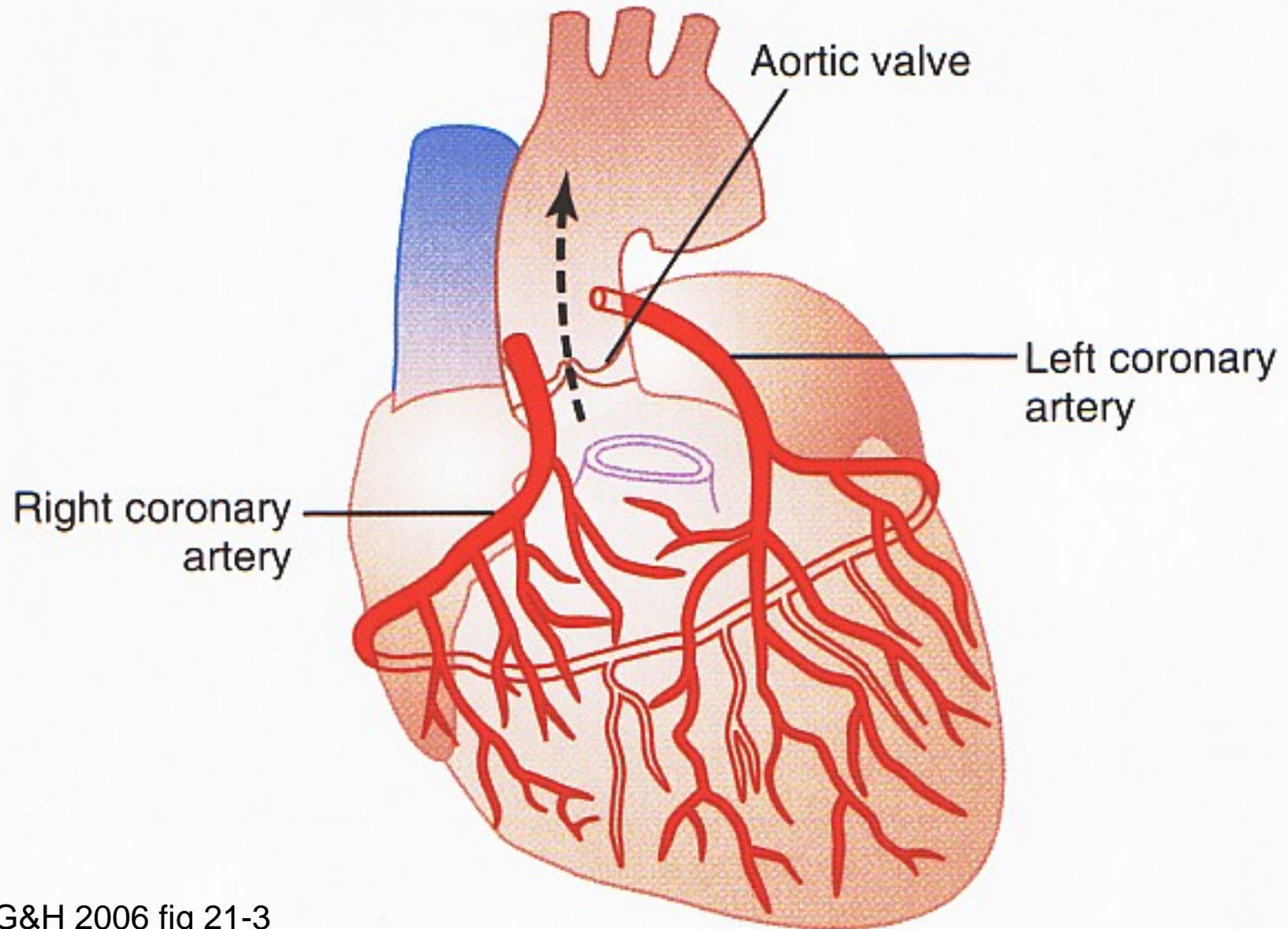


V A V A!



<http://www.nhlbi.nih.gov/health/health-topics/topics/hhw/contraction.html>

Coronary Circulation ≡ Crowns the Heart!





Heart Dominance May Influence Survival

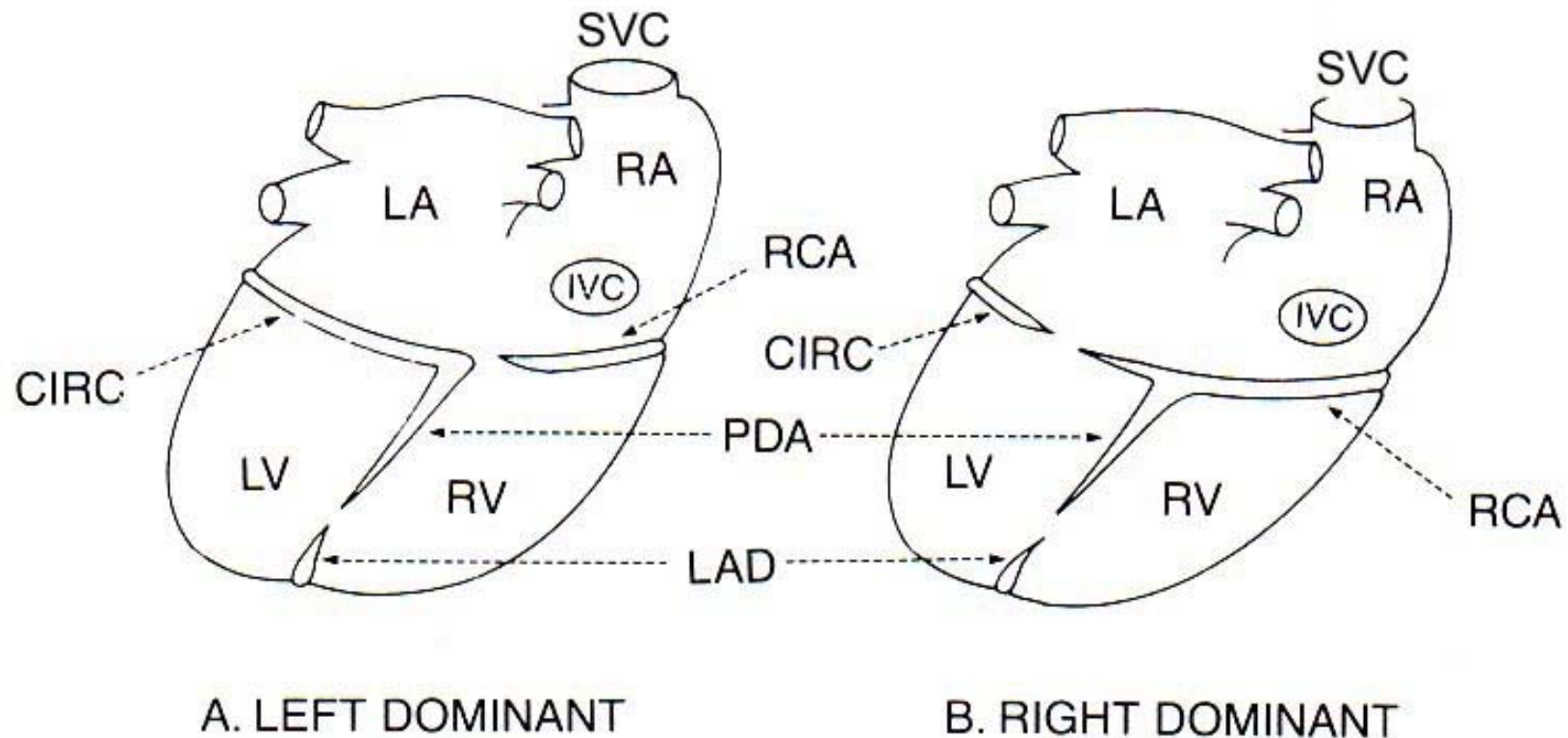
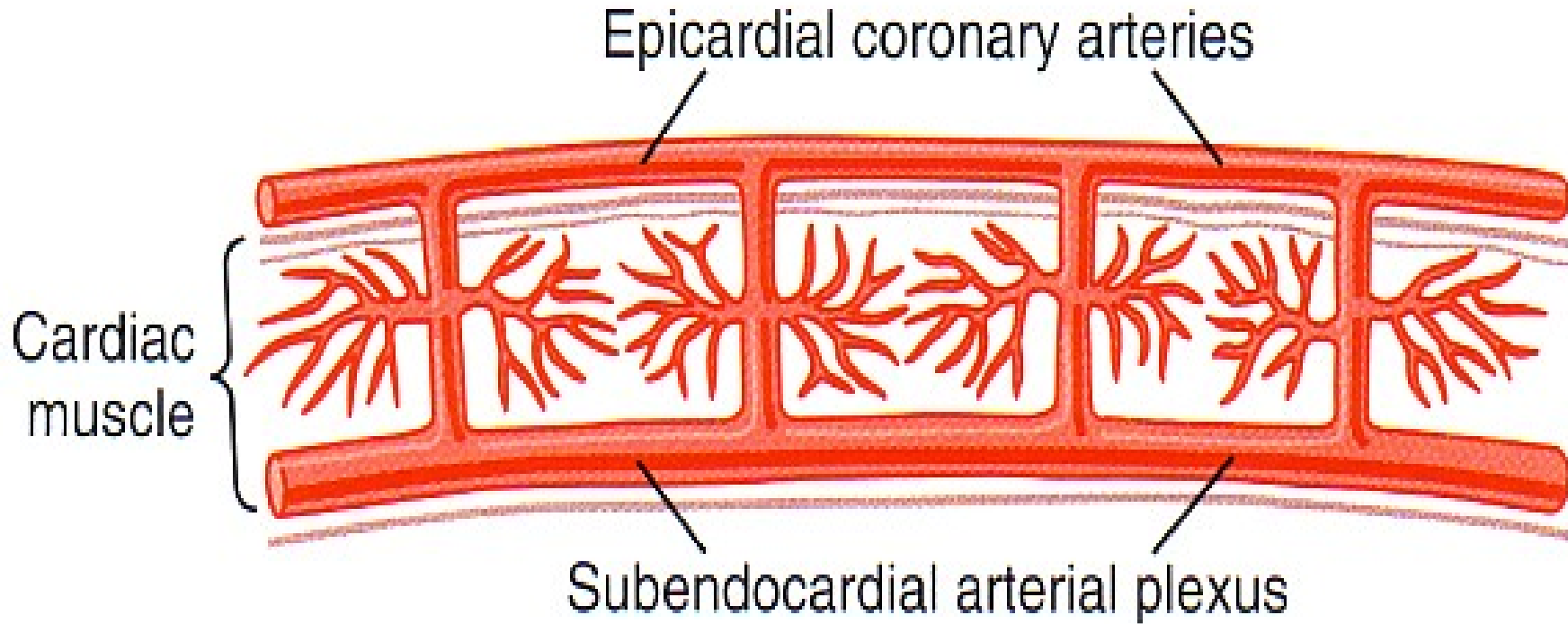
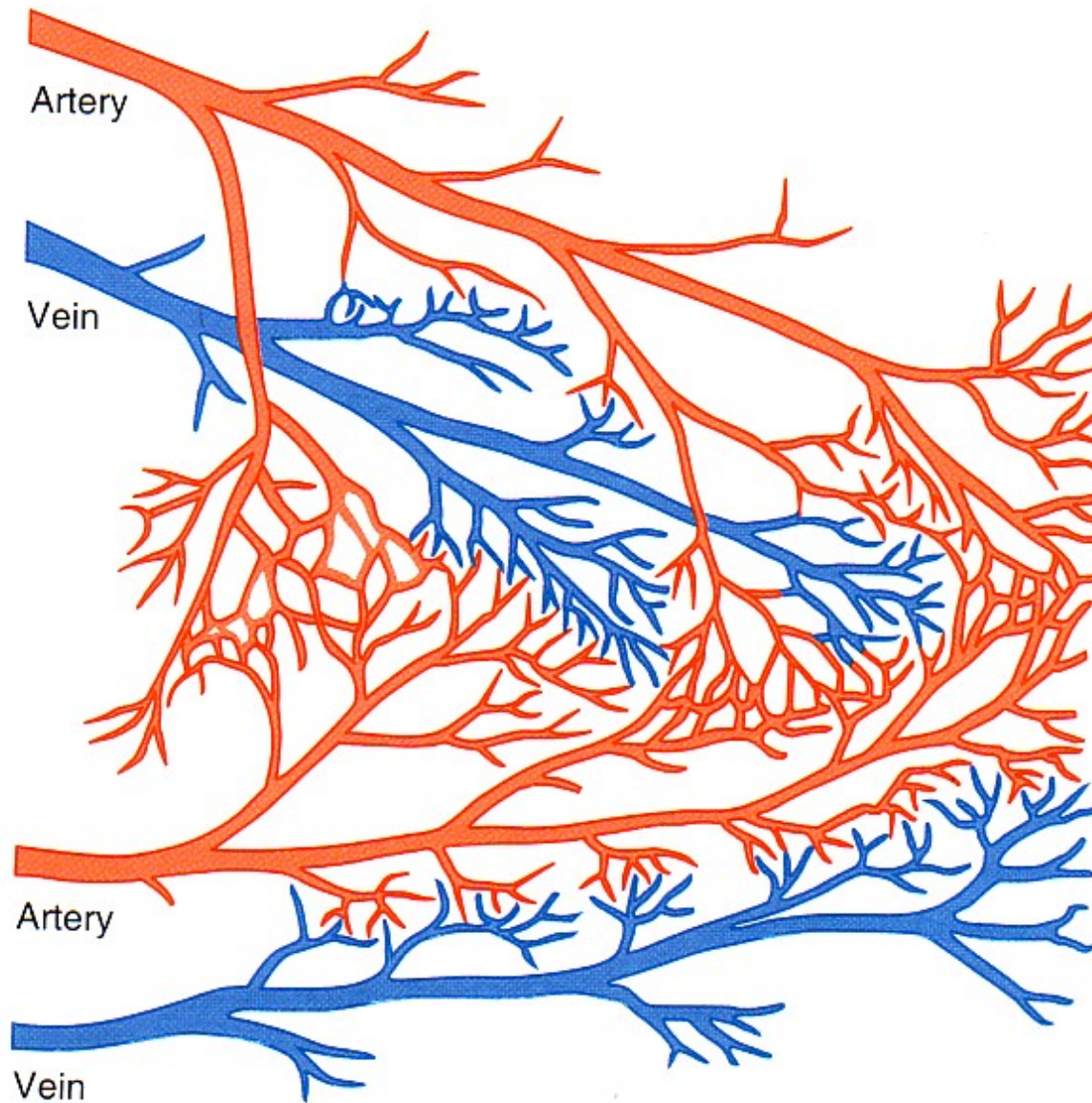


FIG. 1.9. Diagrammatic views of the posterior surfaces of the human heart showing left (A) and right dominant (B) patterns of coronary artery supply. In the left dominant pattern, the posterior descending artery (PDA) is supplied by the circumflex branch of the left coronary artery (CIRC). In the right dominant pattern, the posterior descending artery is supplied by the right coronary artery (RCA). Other abbreviations: LAD, left anterior descending coronary artery; LA, left atrium; RA, right atrium; LV, left ventricle; RV, right ventricle; SVC, superior vena cava; IVC, inferior vena cava.

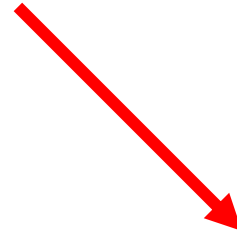
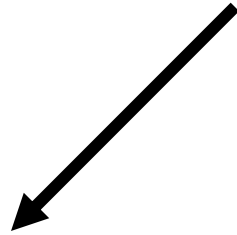
Coronary Arteries Pierce the Heart from Epi to Endo



Anastomoses May Provide Lifesaving Collateral Circulation!!



Cardiac Cycle

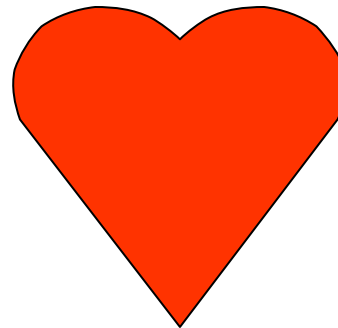
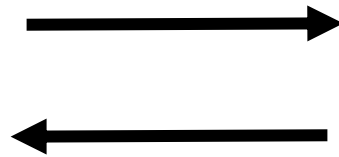
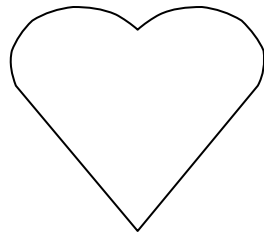


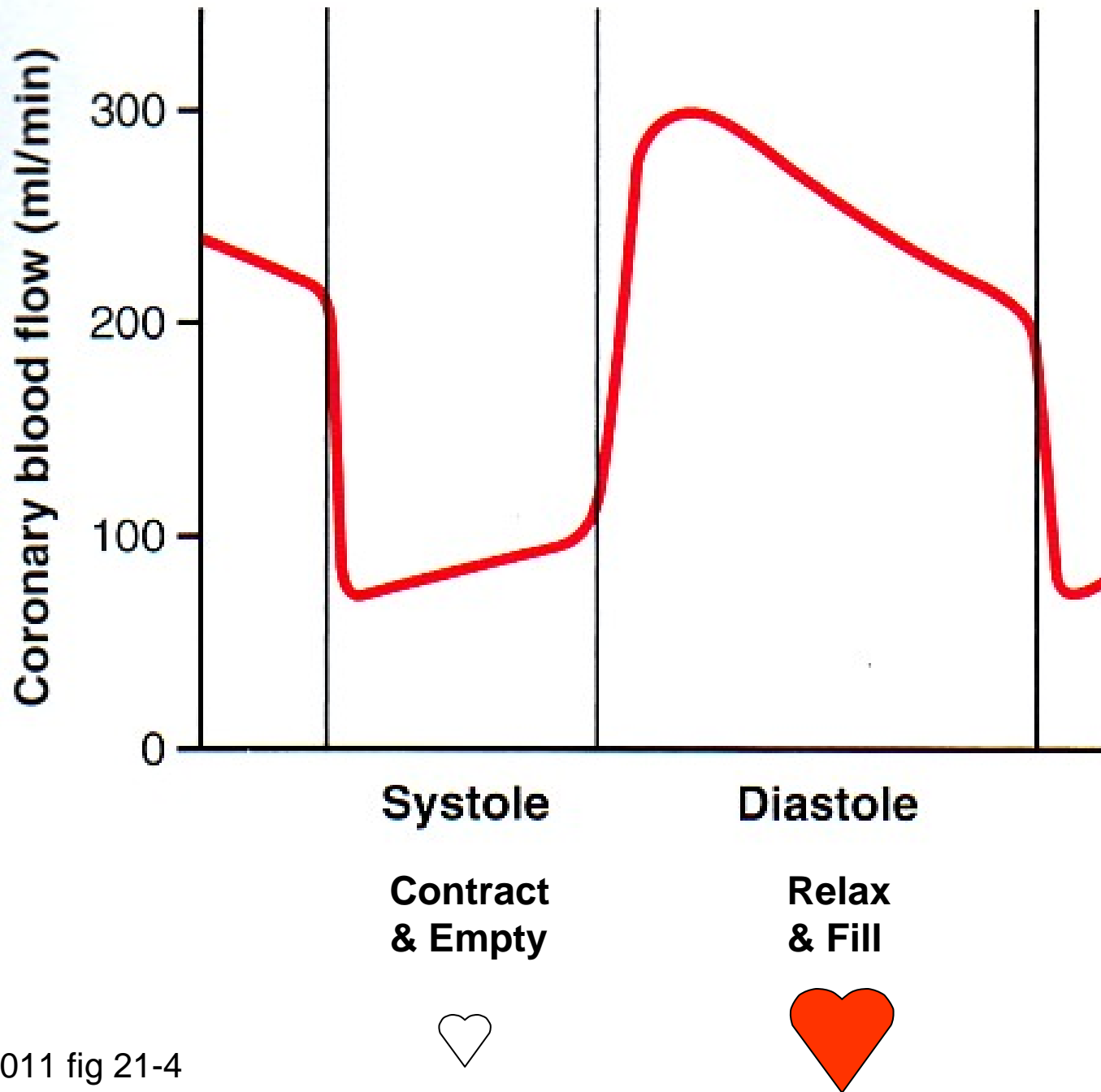
Systole

Contract
& Empty

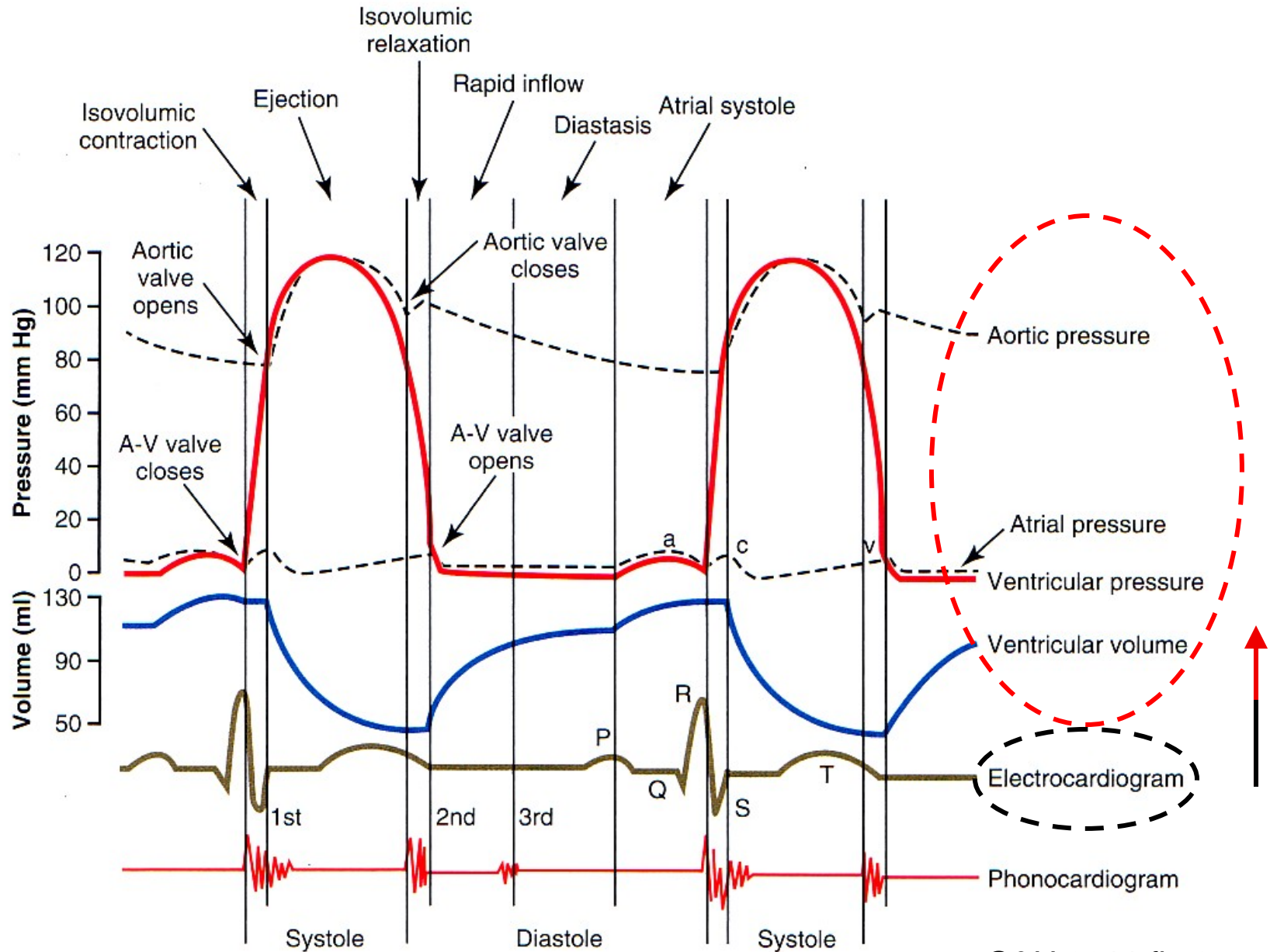
Diastole

Relax
& Fill



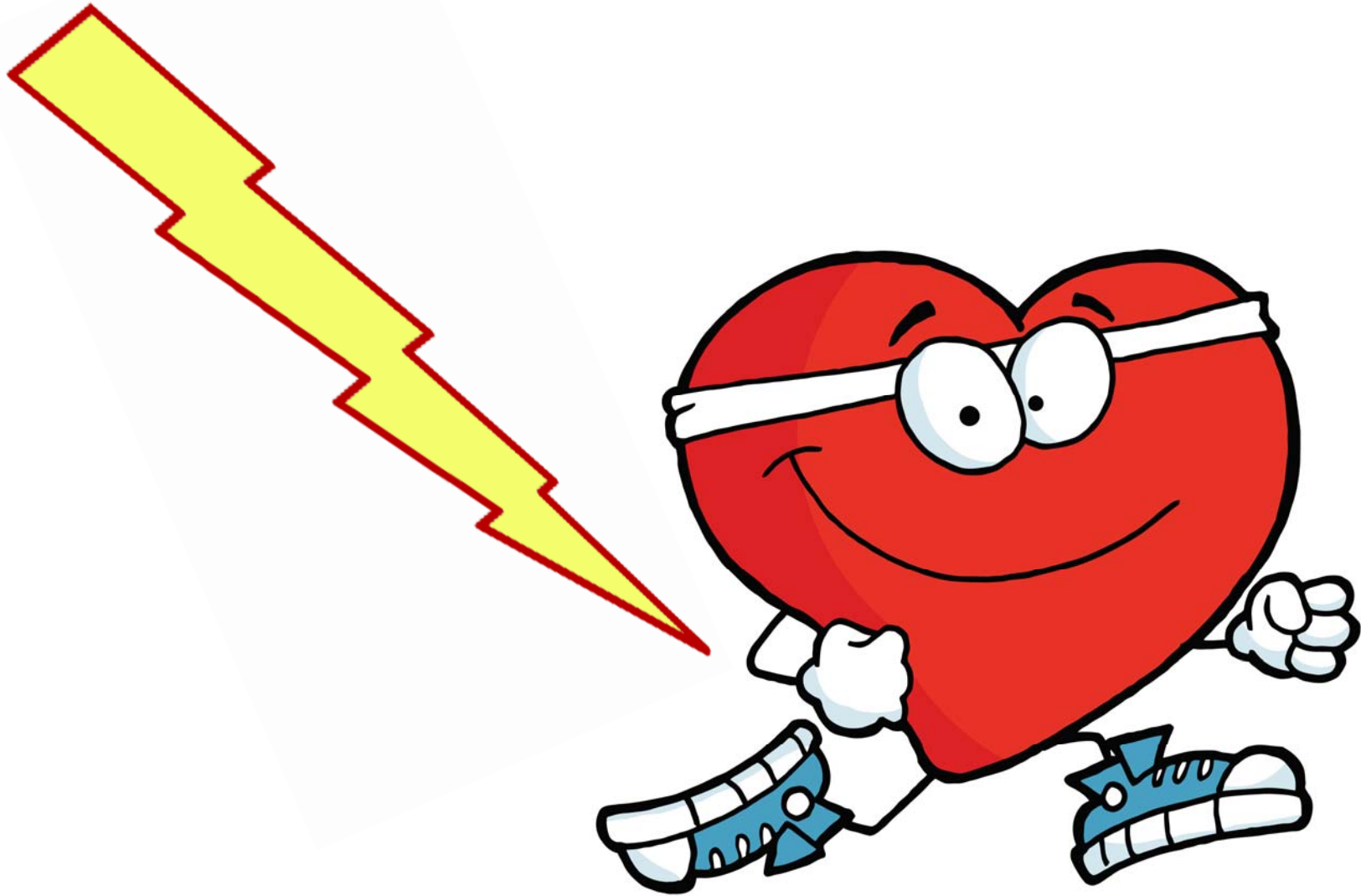


Electrical Events Precede *Mechanical Events!*

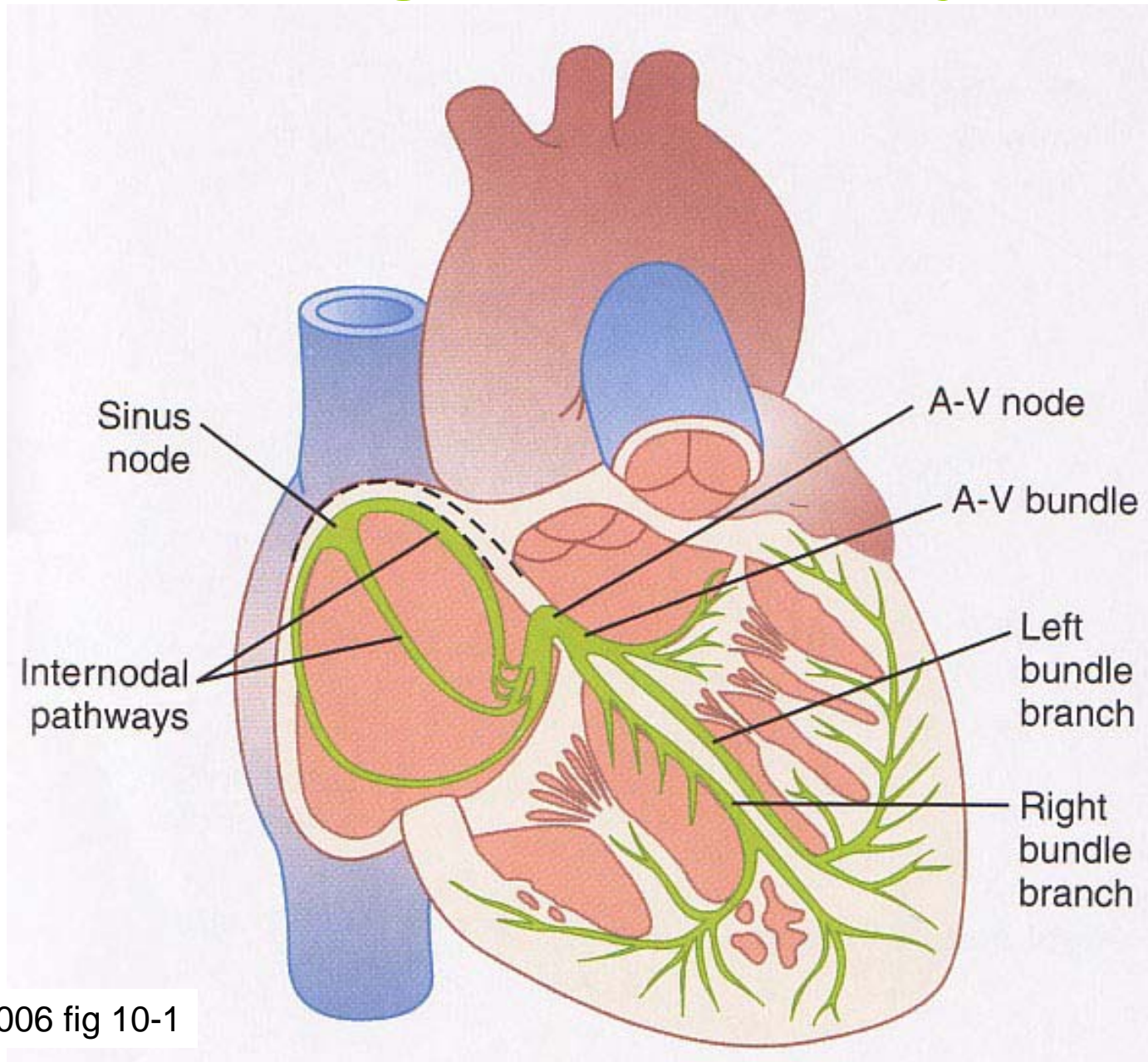


G&H 2011 fig 9-6

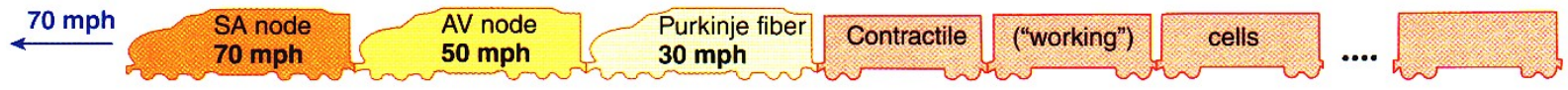
(Automatically) Shock the Heart then it Contracts!



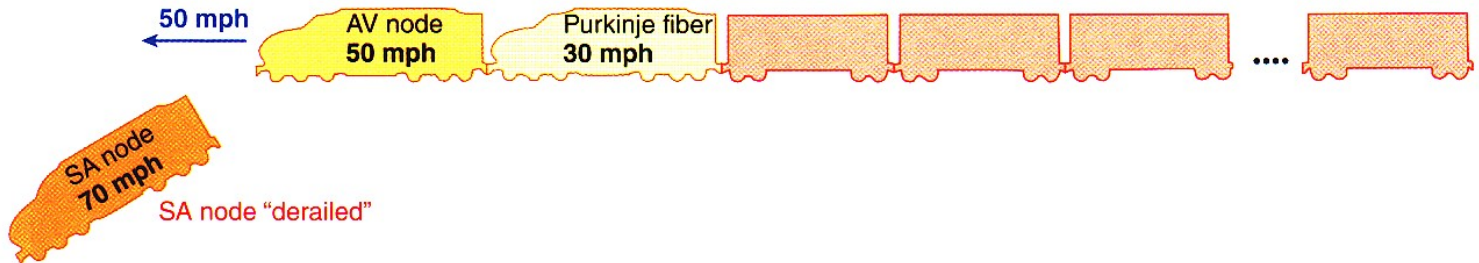
Intrinsic Regulation: Autorhythmic



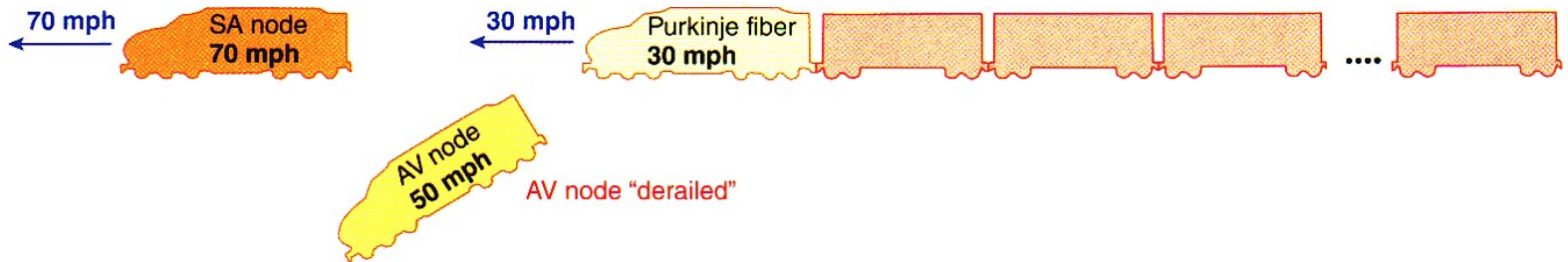
G&H 2006 fig 10-1



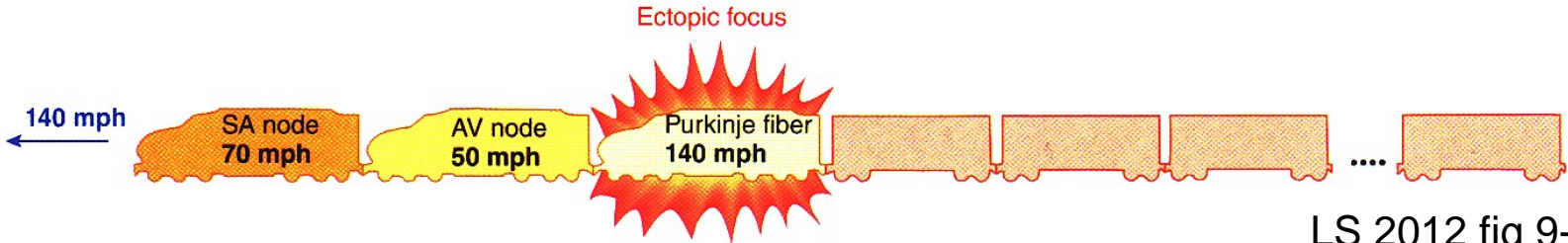
(a) Normal pacemaker activity: Whole train will go **70 mph** (heart rate set by SA node, the fastest autorhythmic tissue).



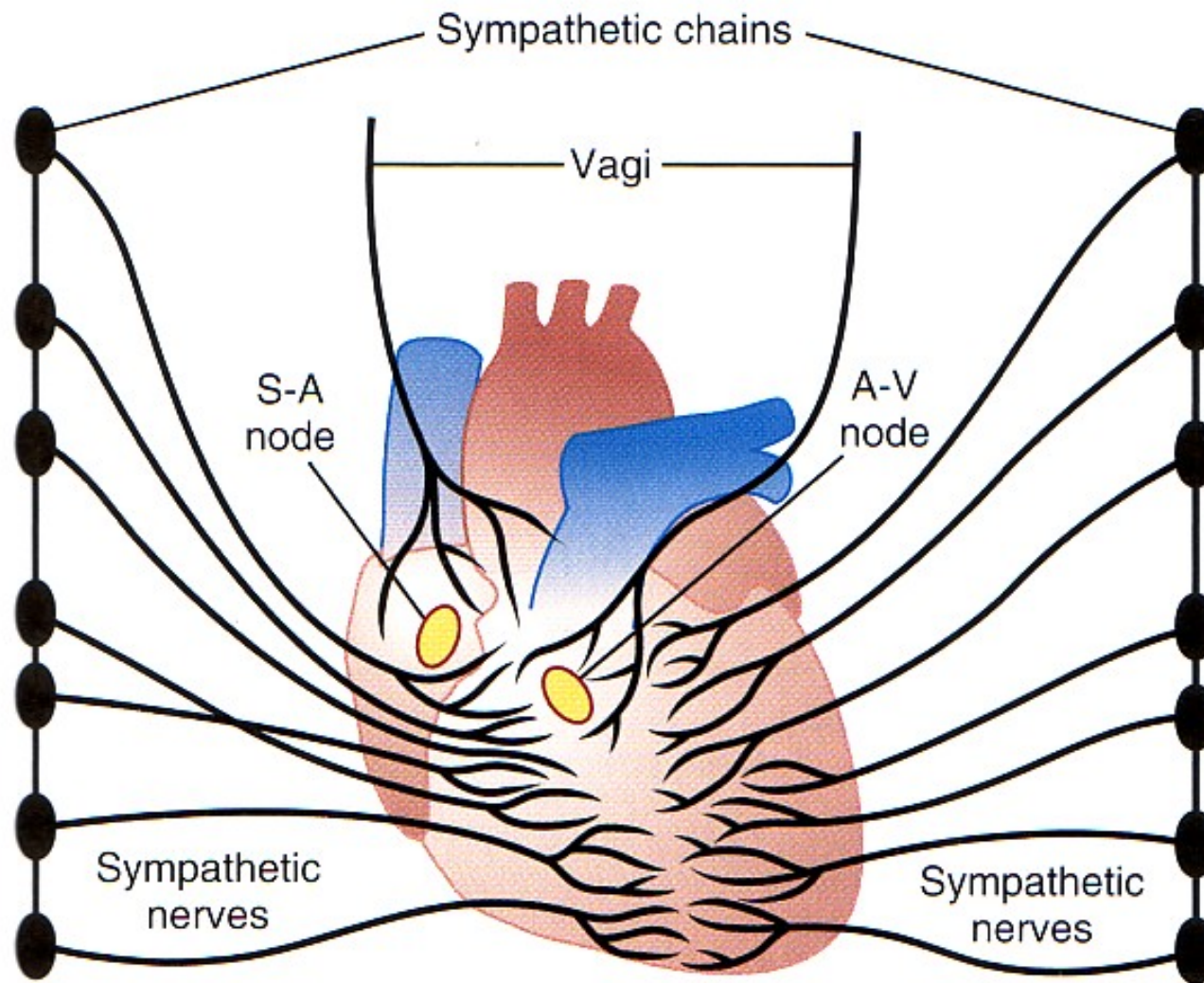
(b) Takeover of pacemaker activity by AV node when the SA node is nonfunctional: Train will go **50 mph** (the next fastest autorhythmic tissue, the AV node, will set the heart rate).



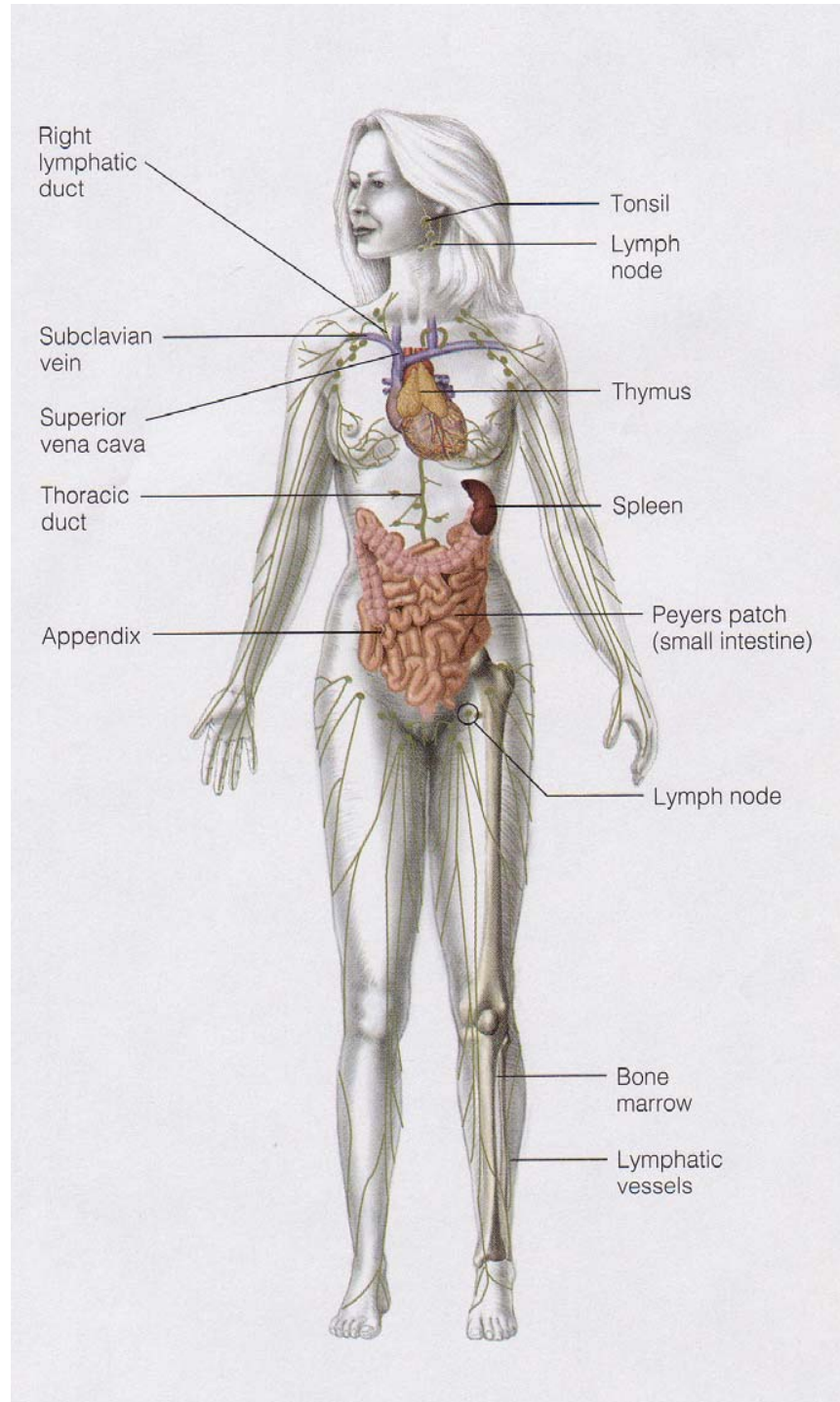
(c) Takeover of ventricular rate by the slower ventricular autorhythmic tissue in complete heart block: First part of train will go **70 mph**; last part will go **30 mph** (atria will be driven by SA node; ventricles will assume own, much slower rhythm).



Extrinsic Regulation: Nervous



**NB: + Extrinsic Hormonal
e.g. Adrenal Epi + NE**

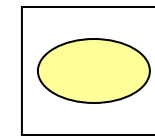


Lymphatic System

1. Lymph Nodes

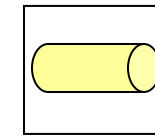
2. Vessels

3. Lymph

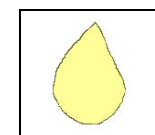


No pump!

+



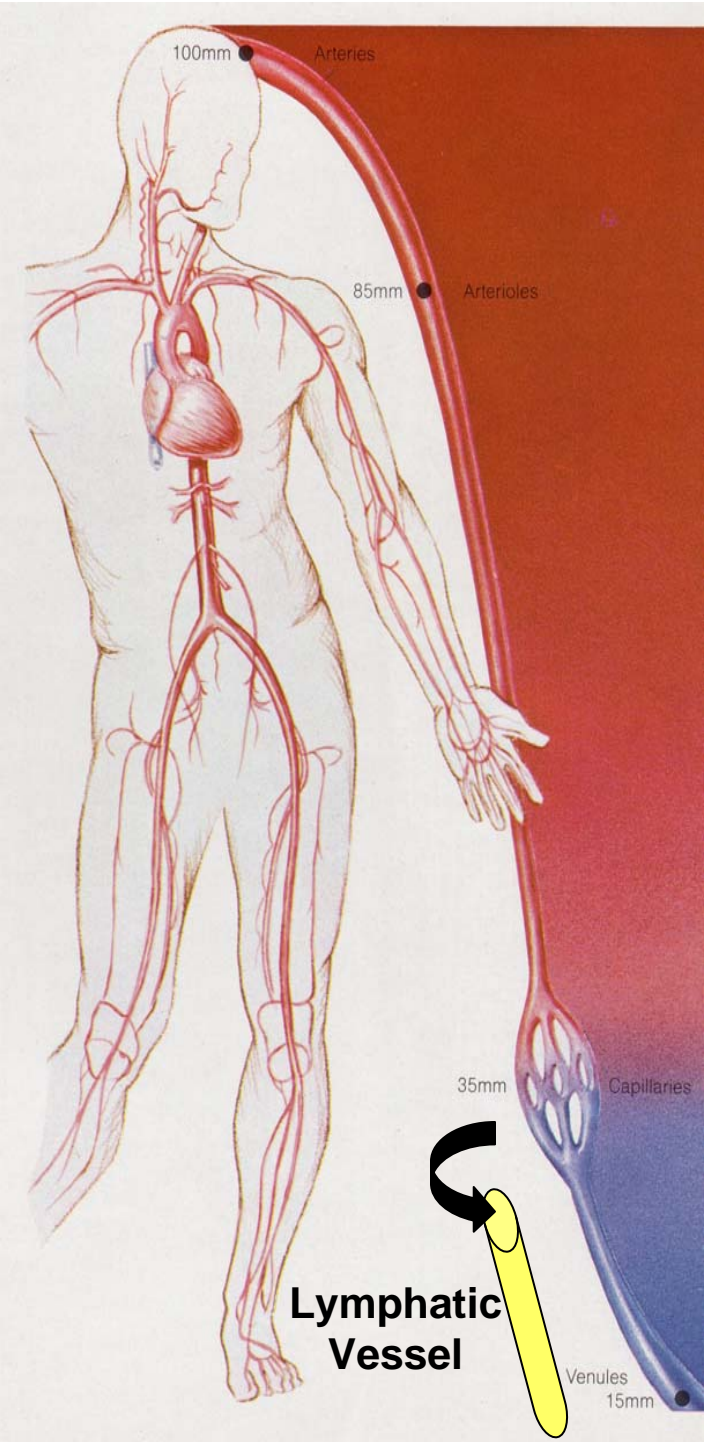
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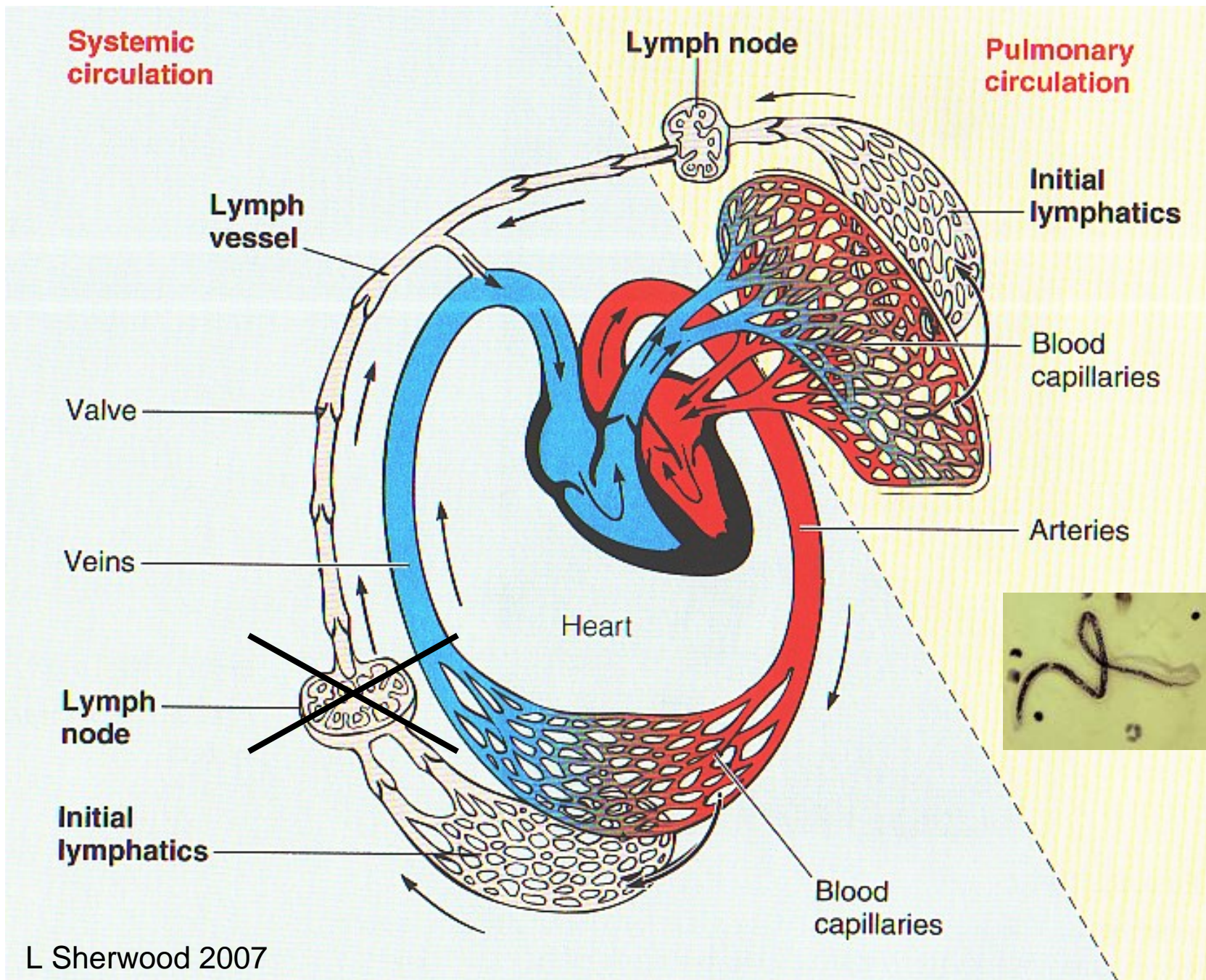
Lymphatic System

**Alternative System of
Circulation
or
Drainage System**

Lymph Vessels || Veins



Torstar Books 1984



L Sherwood 2007

Elephantiasis: Lymphatic Blockage Due to Mosquito-Borne Parasitic Worm

