



G. Waples

BI 121 Lecture 1

I. Announcements: Please check & sign attendance roster.

Not on list? See Pat during a break or after class. *Lab 1 Histology* tomorrow in 130 HUE: 12 n & 1 pm sections.

II. Introduction: Staff, office hr, required sources, course overview, grading, expectations & success. Q?

III. Human Physiology LS ch 1, DC Module 1

A. What? cf: Anatomy LS p 1

B. Where? Body Levels of Organization LS pp1-6, DC pp1-5

C. How? Different Study Approaches LS p 1

D. Why? Security+Decision-Making Power LS p xxi, DC p v

IV. Homeostasis LS ch 1, DC Module 1

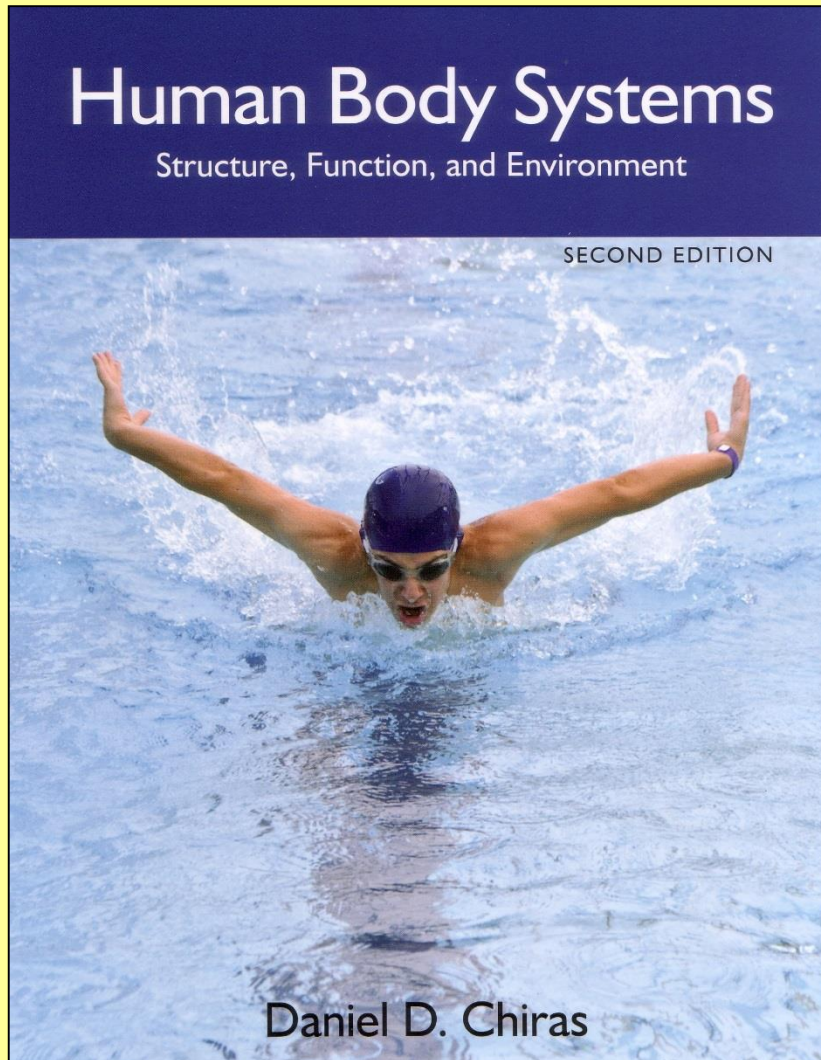
A. What? Maintenance of ECF LS p 8

B. Where? ECF = Plasma + Interstitium LS fig 1-4 p 8

C. How? Simplified Homeostatic Model cf: LS fig 1-7 p 14
Balances LS p 9, DC pp 5-6

D. Why? Cell survival! LS fig 1-5 p 9, DC p 5

BI 121 Required Texts
<http://uo.verbacompare.com/>



DC

New (2013 ed) \$30.75 Used \$23.25

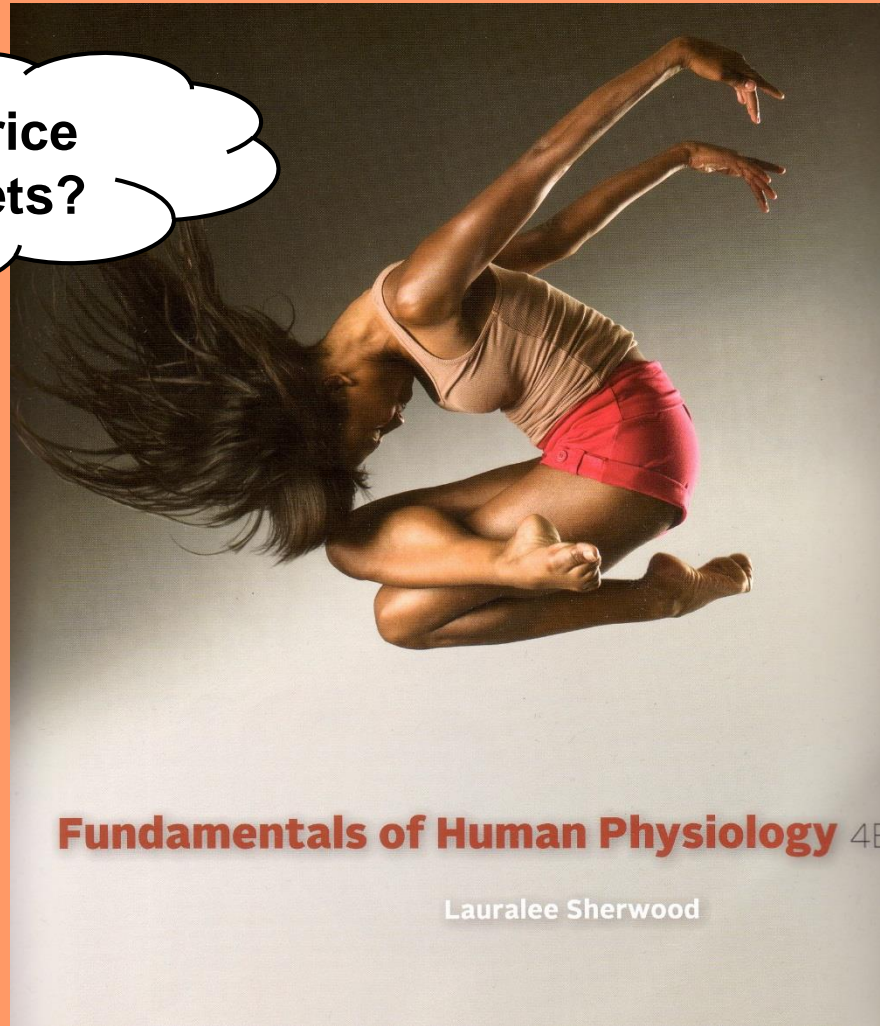
**Introduction to Human Physiology
Department of Biology, BI 121
Laboratory Manual
University of Oregon
Eugene, OR 97403
Summer 2016**

LM

Lab Notebook \$9.80

BI 121 Optional Source @ Amazon.com or Smith Family Bookstore?

**Publisher's Price
→ Gold Nuggets?**



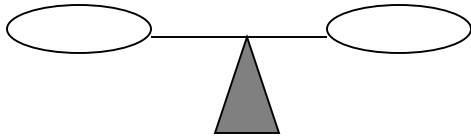
LS 2012

List price \$254.32! Used \$83.85 Int Ed 16.64 Rental \$16.62

Metabolic

ANA-

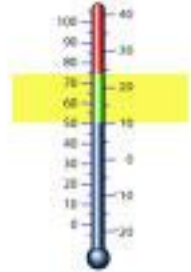
CATA-



H₂O



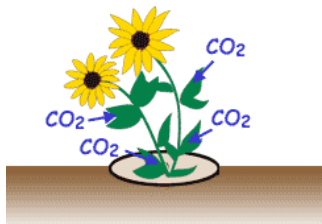
T_oC



Dr. Evonuk's 6 Balances

O₂/CO₂

Carbon Dioxide



Ion^{+/-}

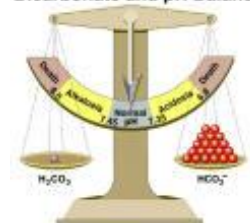


Captain Calcium

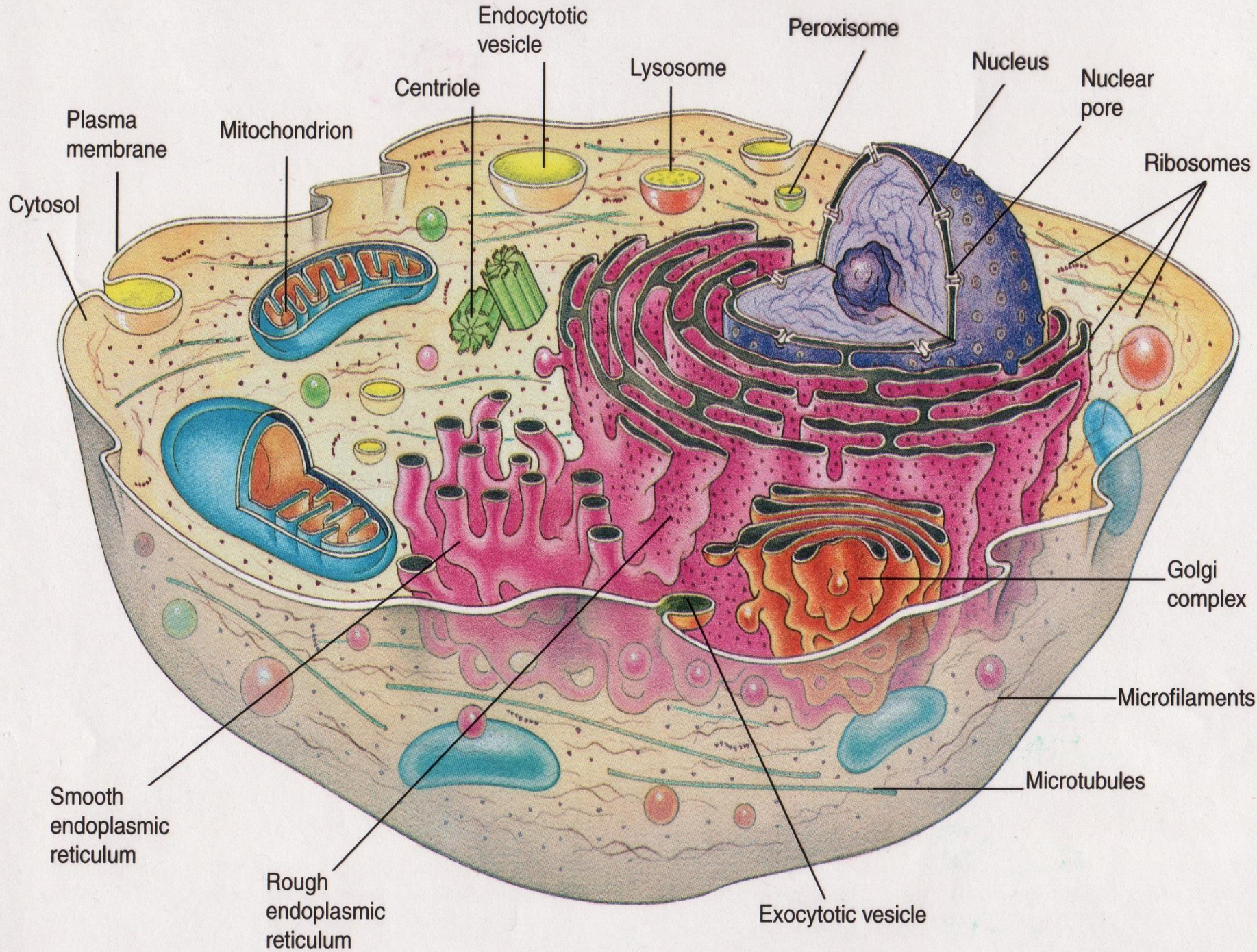


pH

Bicarbonate and pH Balance







Mitochondria: Energy Organelles

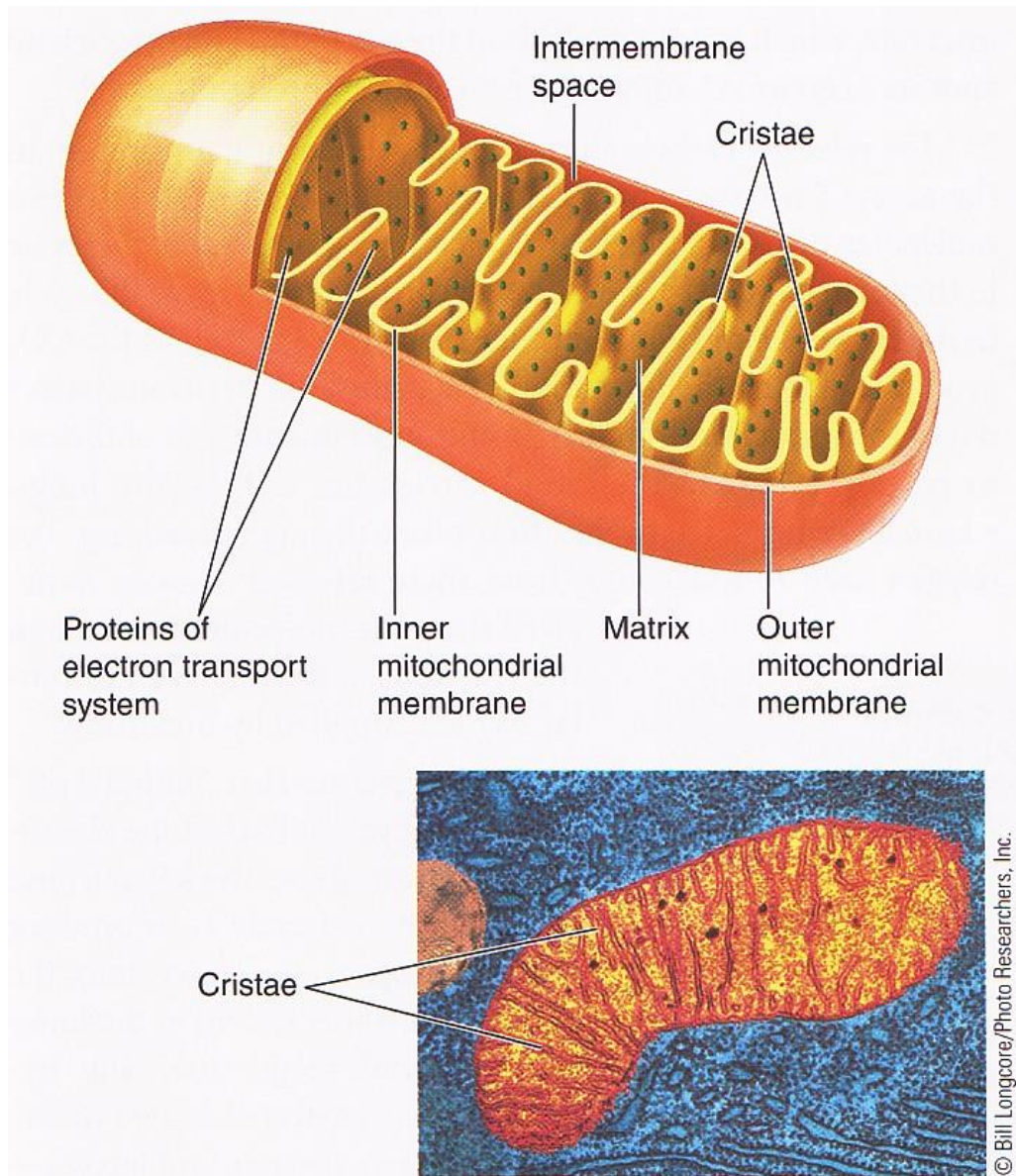


fig 2-8 LS 2012



AEROBIC

w/O₂

PRIMARY FUEL

FAT,
CARBOHYDRATE
& PROTEIN
(Small Amounts)

CARBOHYDRATE
(Glucose & Glycogen)

ATP, ADP &
Creatine
Phosphate (CP)

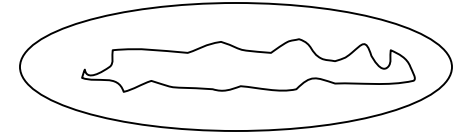
% AEROBIC
(Oxidative
Energy System)

% ANAEROBIC
(Immediate & Non-Oxidative
Energy Systems)

ACTIVITY

TIME (Min:Sec)

ACTIVITY	% AEROBIC (Oxidative Energy System)	% ANAEROBIC (Immediate & Non-Oxidative Energy Systems)	TIME (Min:Sec)
Marathon	100	0	135:00
Cross-Country Skiing	90	10	29:00
10-K Run	80	20	14:00
3-Mile Run	70	30	9:00
2-Mile Run	60	40	3:45
800-Meter Swim	50	50	3:45
1-Mile Run	40	60	1:30
Boxing	30	70	1:30
200-Meter Swim	20	80	0:50
Circuit Weight Training	10	90	0:20
Soccer	0	100	0:10
Lacrosse			
Tennis			
Basketball			
Volleyball			
200-Meter Dash			
Football			
Conventional Weight Training			



MITOCHONDRIA

CYTOSOL

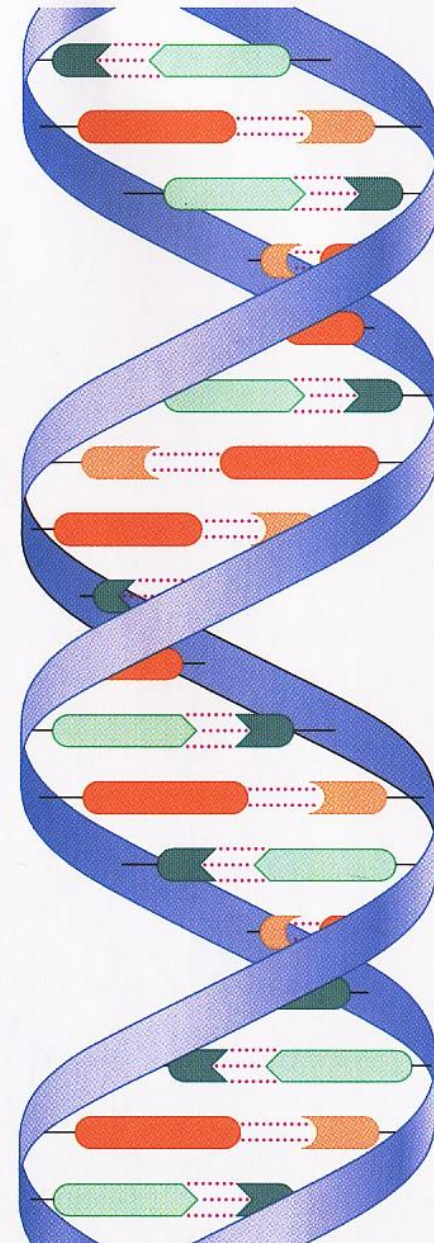
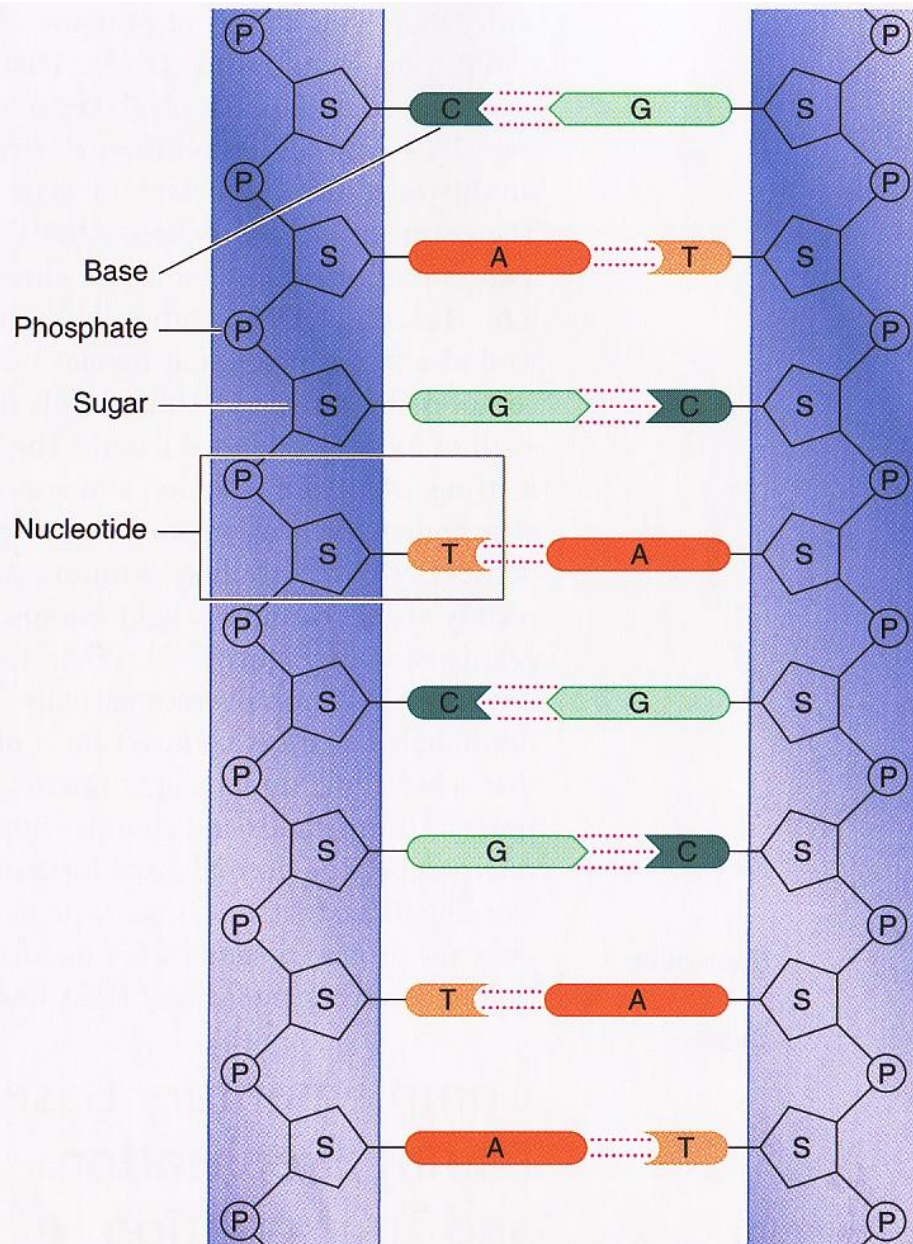
Glycolysis

Immediate/ATP-PC



ANAEROBIC

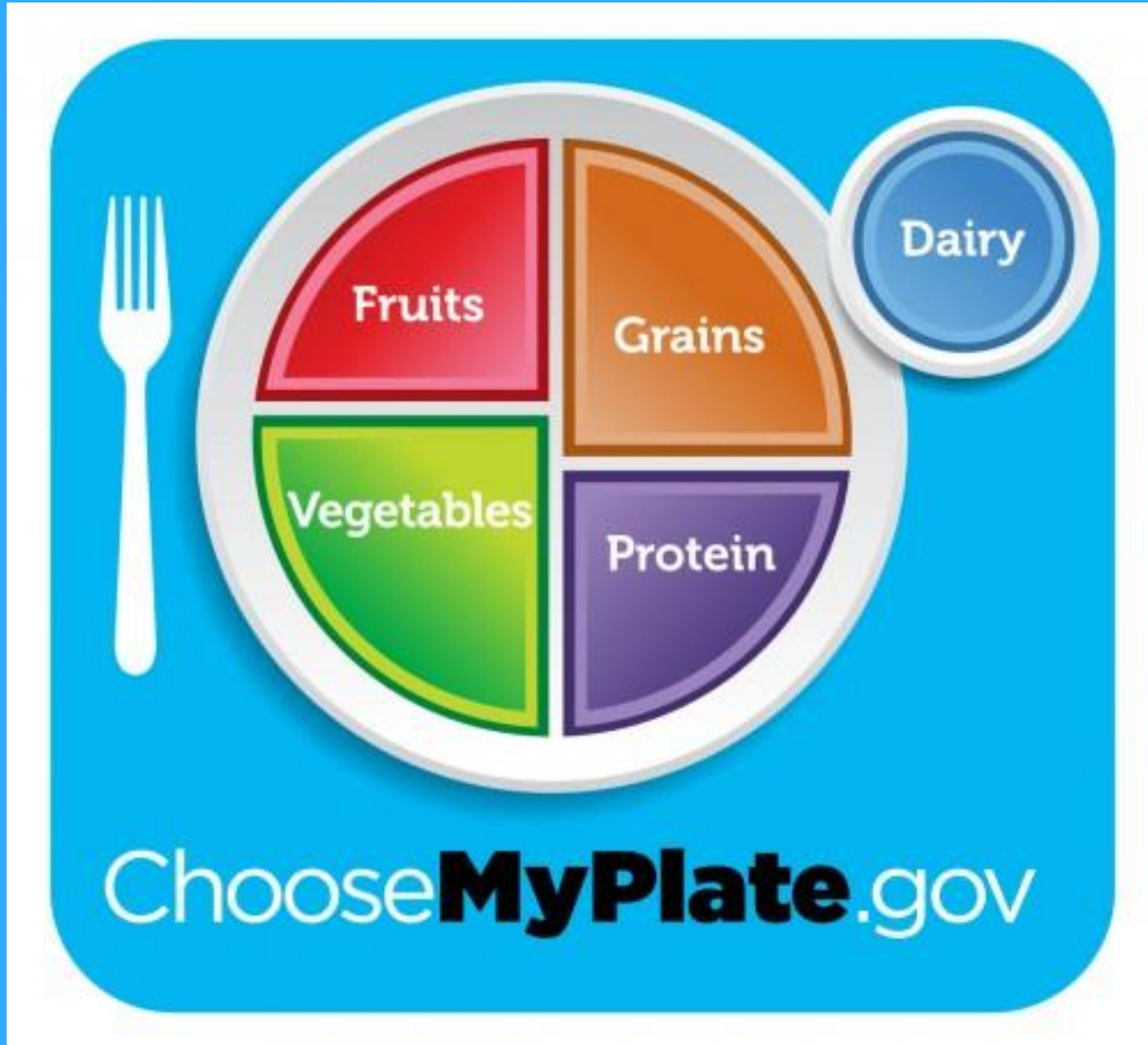
What does DNA look like? Double-helix!!



What are DNA's major functions? Heredity + Day-to-Day Cell Function



Dietary Analyses Thanks to Michelle Obama!



Dietary Composition & Physical Endurance

eg, Atkins!

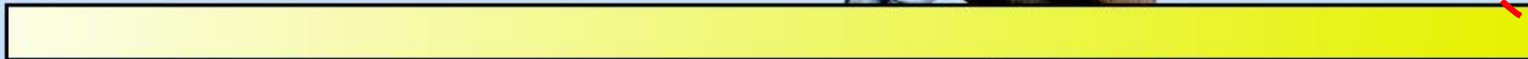
High-fat diet



Normal mixed diet



High-carbohydrate diet



~ 1/3 endurance!

Maximum endurance time:

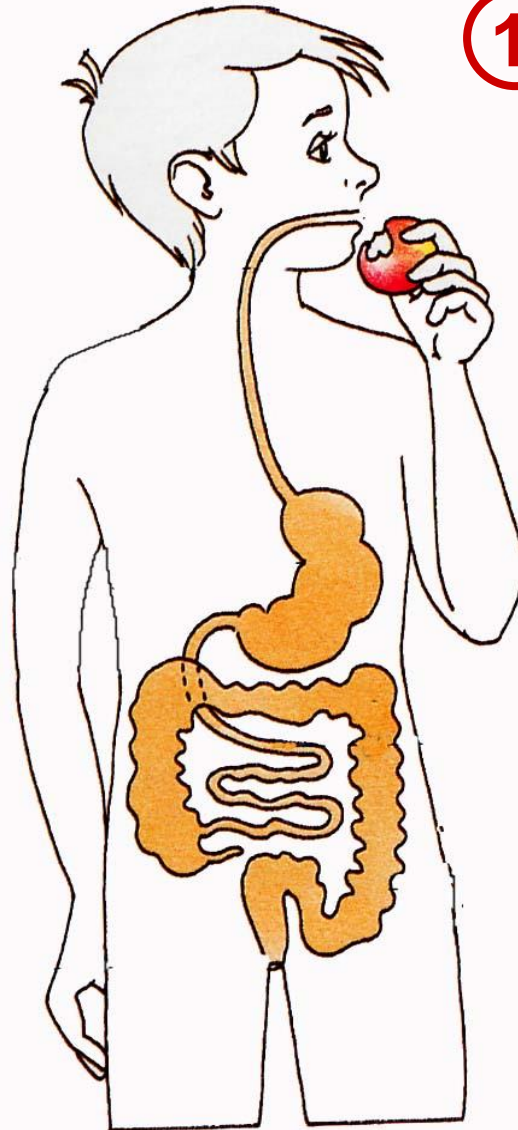
57 min

114 min

167 min



Digestion Steps



① Ingestion

② Mechanical Digestion

③ Chemical Digestion

④ Peristalsis

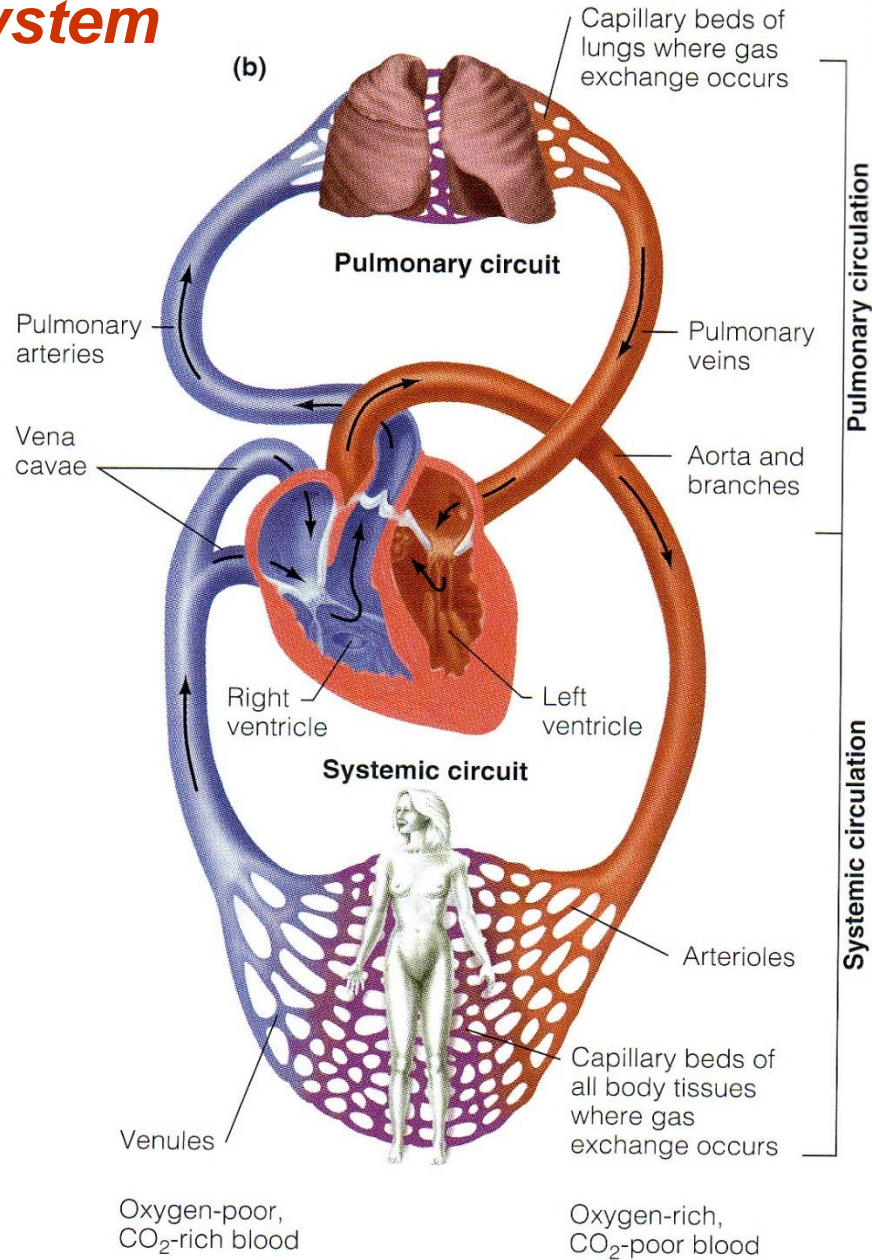
⑤ Absorption

⑥ Storage

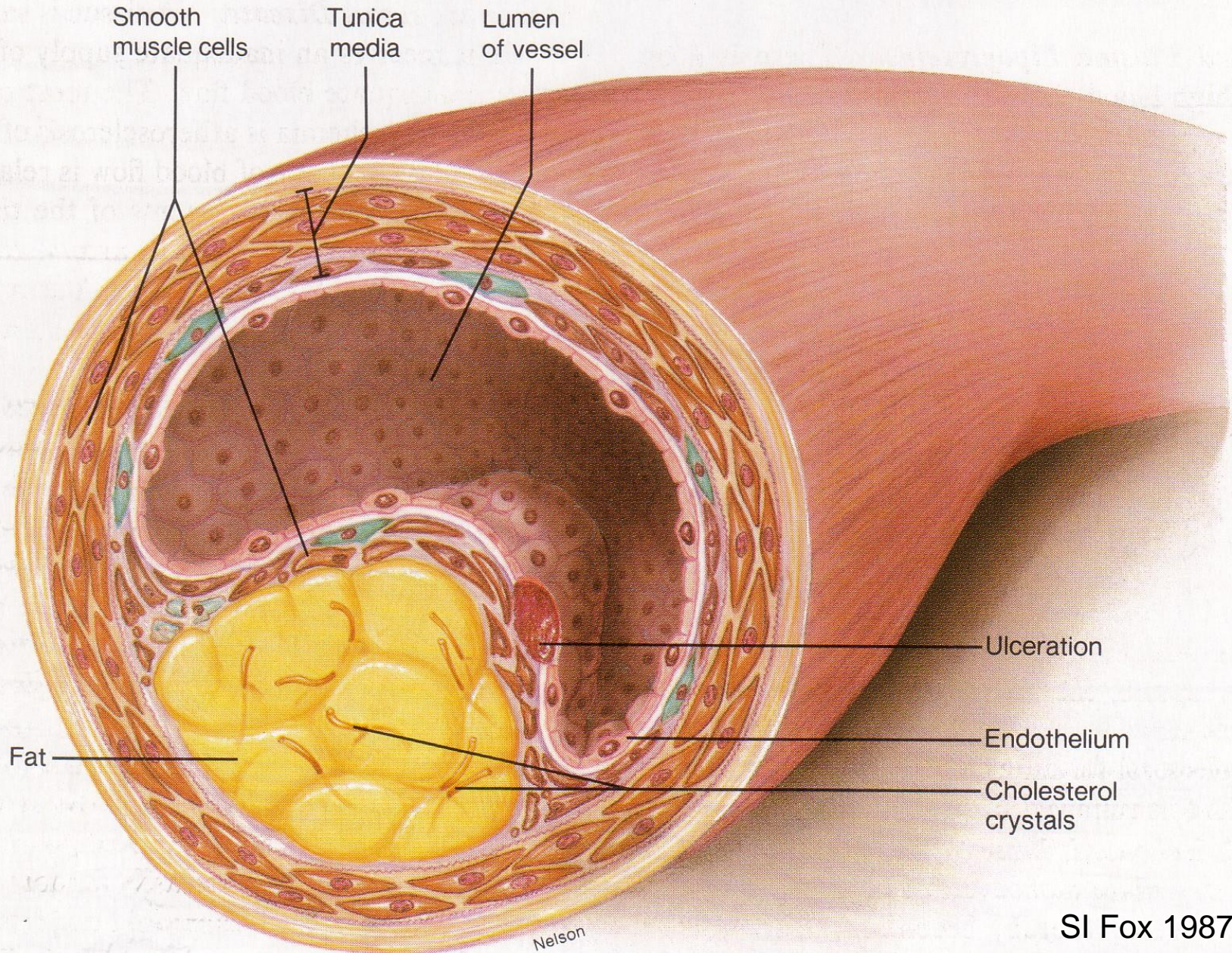
⑦ Defecation

Cardiovascular System

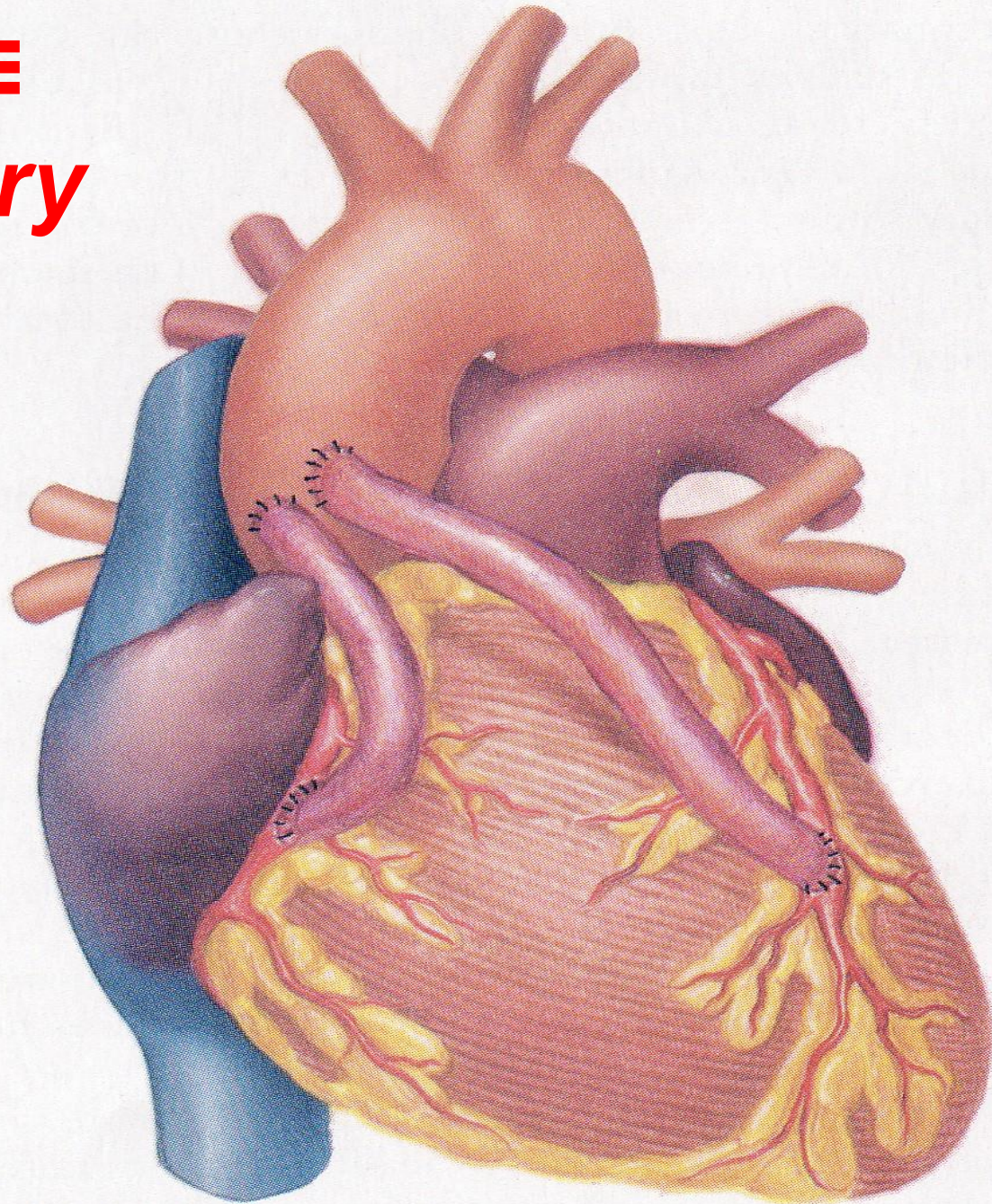
Figure-8 Loop



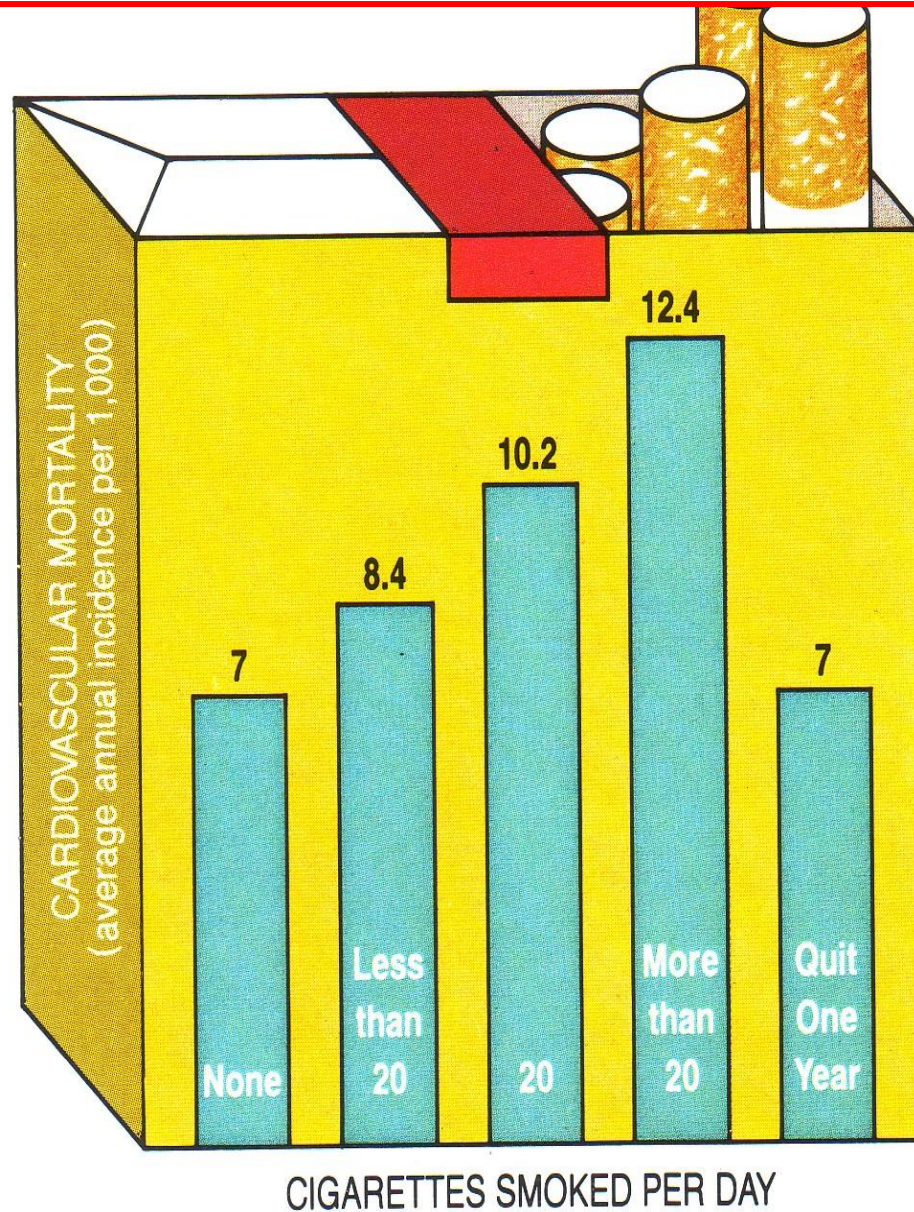
Atherosclerosis developing within vessel walls!



CABG ≡
Coronary
Artery
Bypass
Graft



Cigarette Smoking: #1 Preventable Cause of Premature Death in the US



How much aerobic?



Continuous exercise
≥ 50% muscle mass
≥ Conversational pace
20-60 min/session
3-5 days/wk







Healthy Oils to Minimize Atherosclerosis HAPOC?

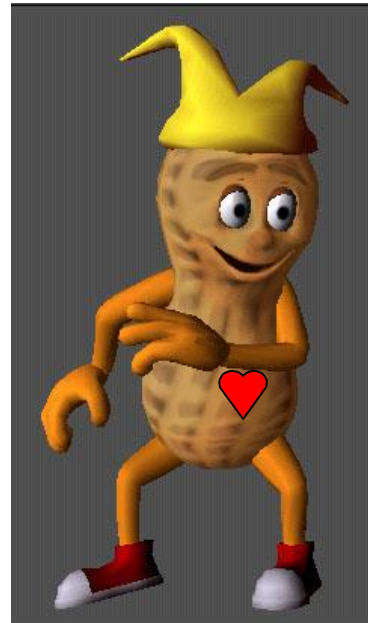
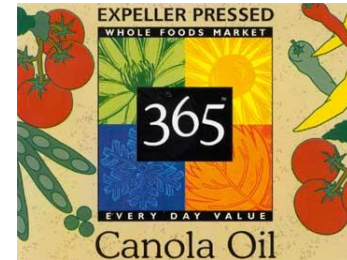
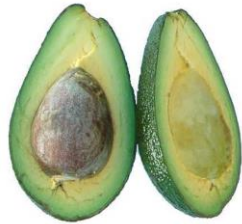
H

A

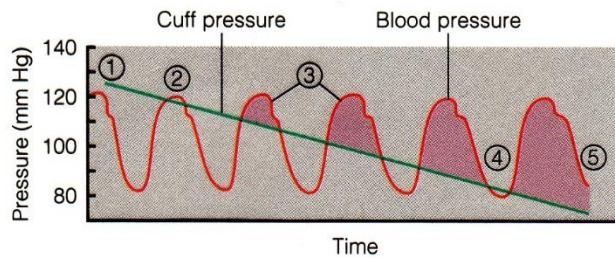
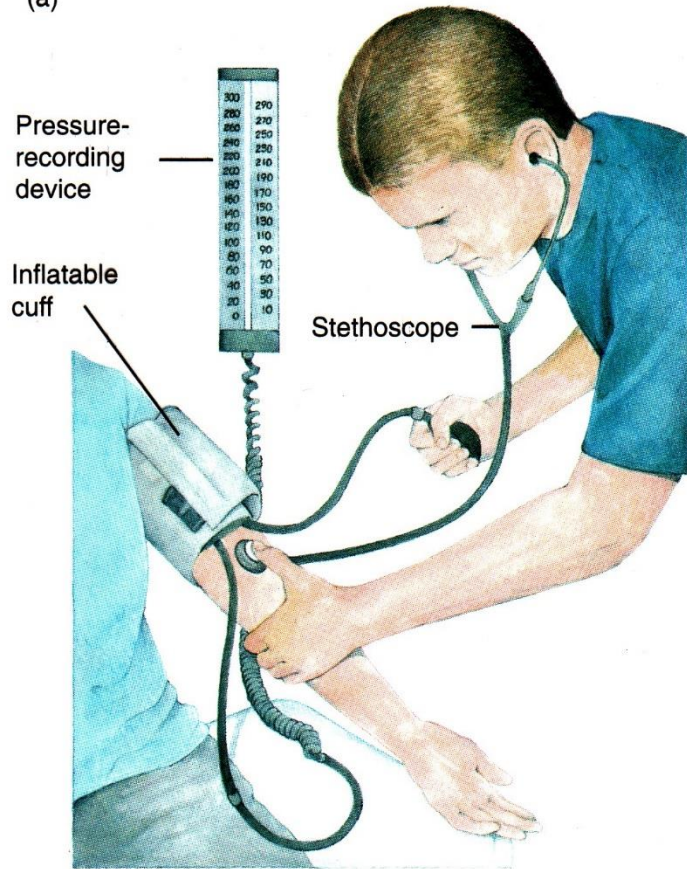
P

O

C

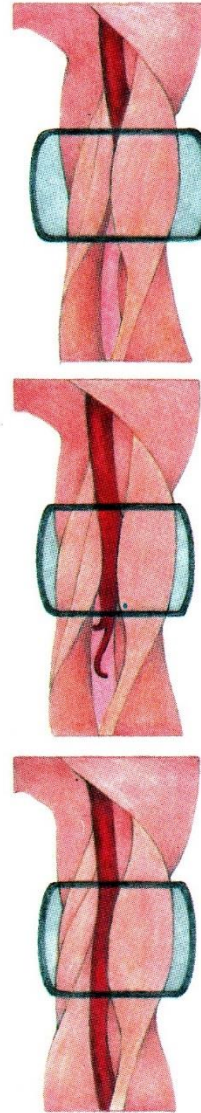


(a)



(b)

(c) When blood pressure is 120/80:

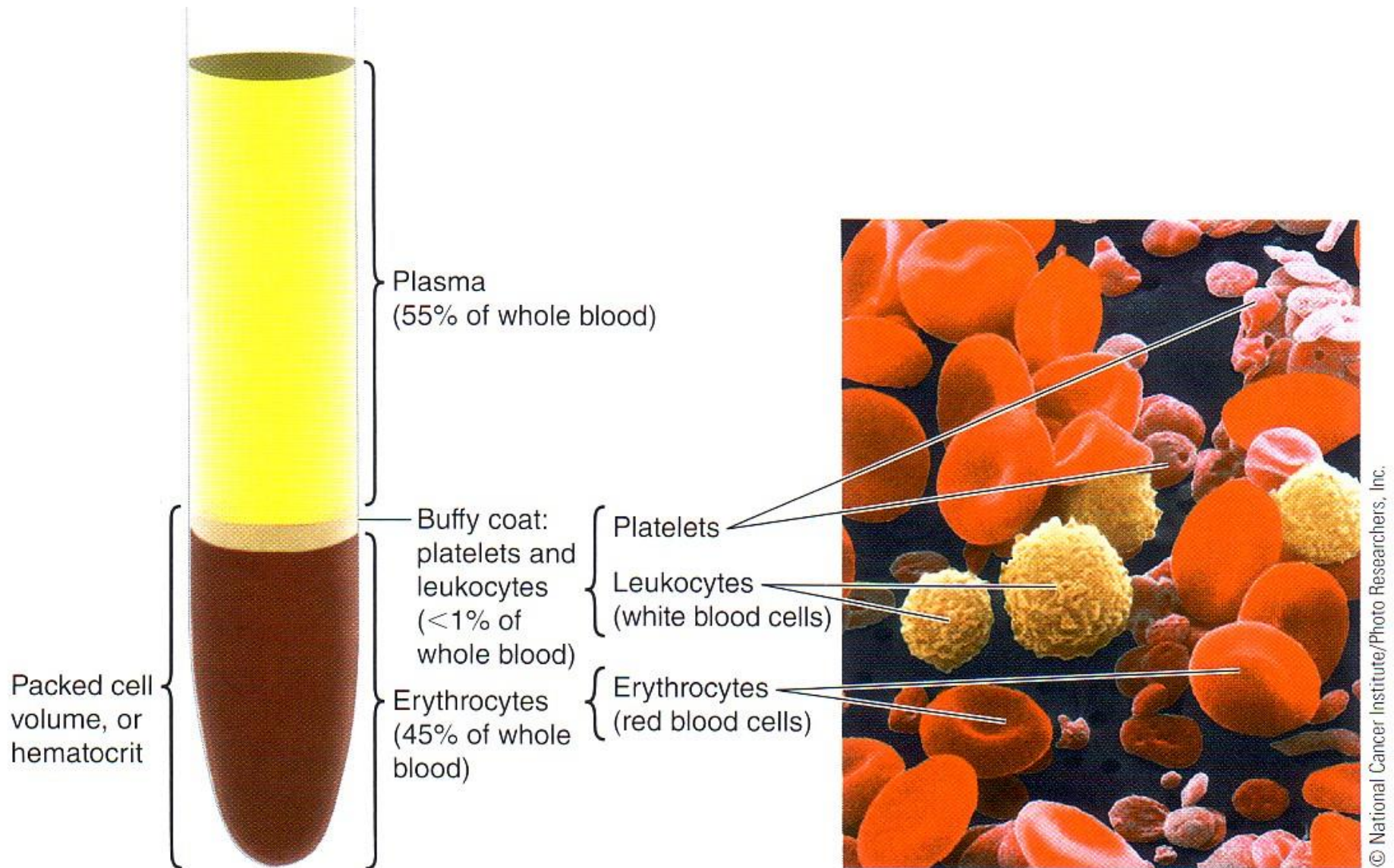


Cuff pressure is greater than 120 mm Hg.
No blood flows through vessel.
No sound is heard.

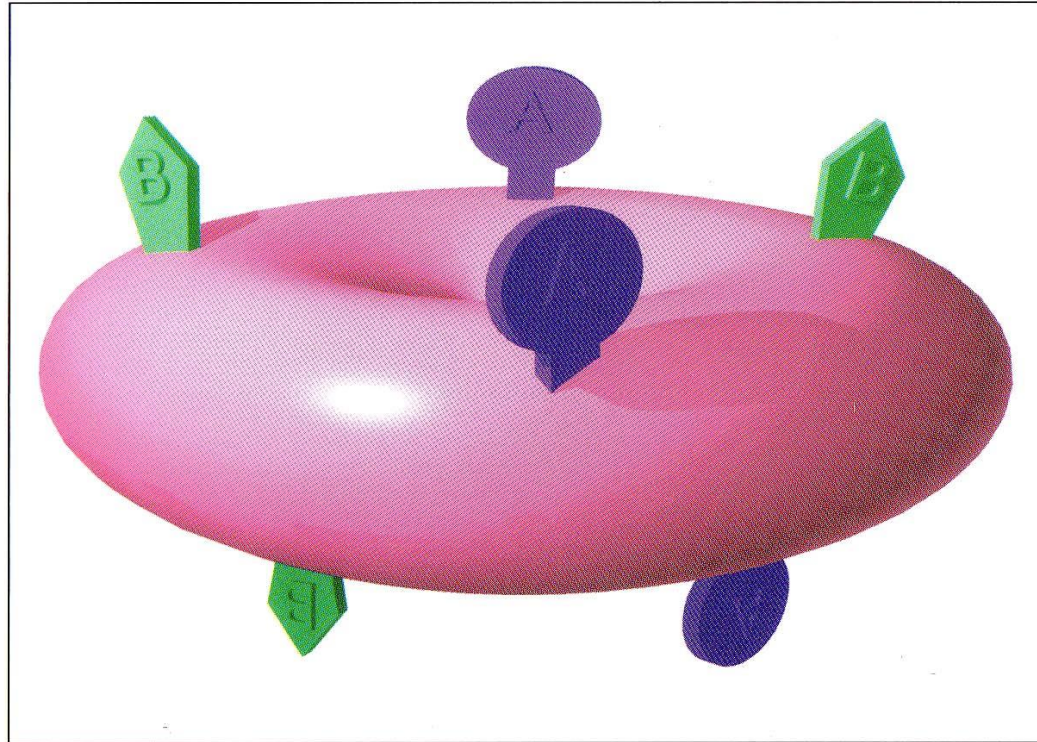
Cuff pressure is between 120 and 80 mm Hg.
Blood flow through vessel is turbulent whenever blood pressure exceeds cuff pressure.
Intermittent sounds are heard as blood pressure fluctuates throughout cardiac cycle.

Cuff pressure is less than 80 mm Hg.
Blood flows through vessel in smooth, laminar fashion.
No sound is heard.

What's in Blood? Plasma & Blood Cells



AB



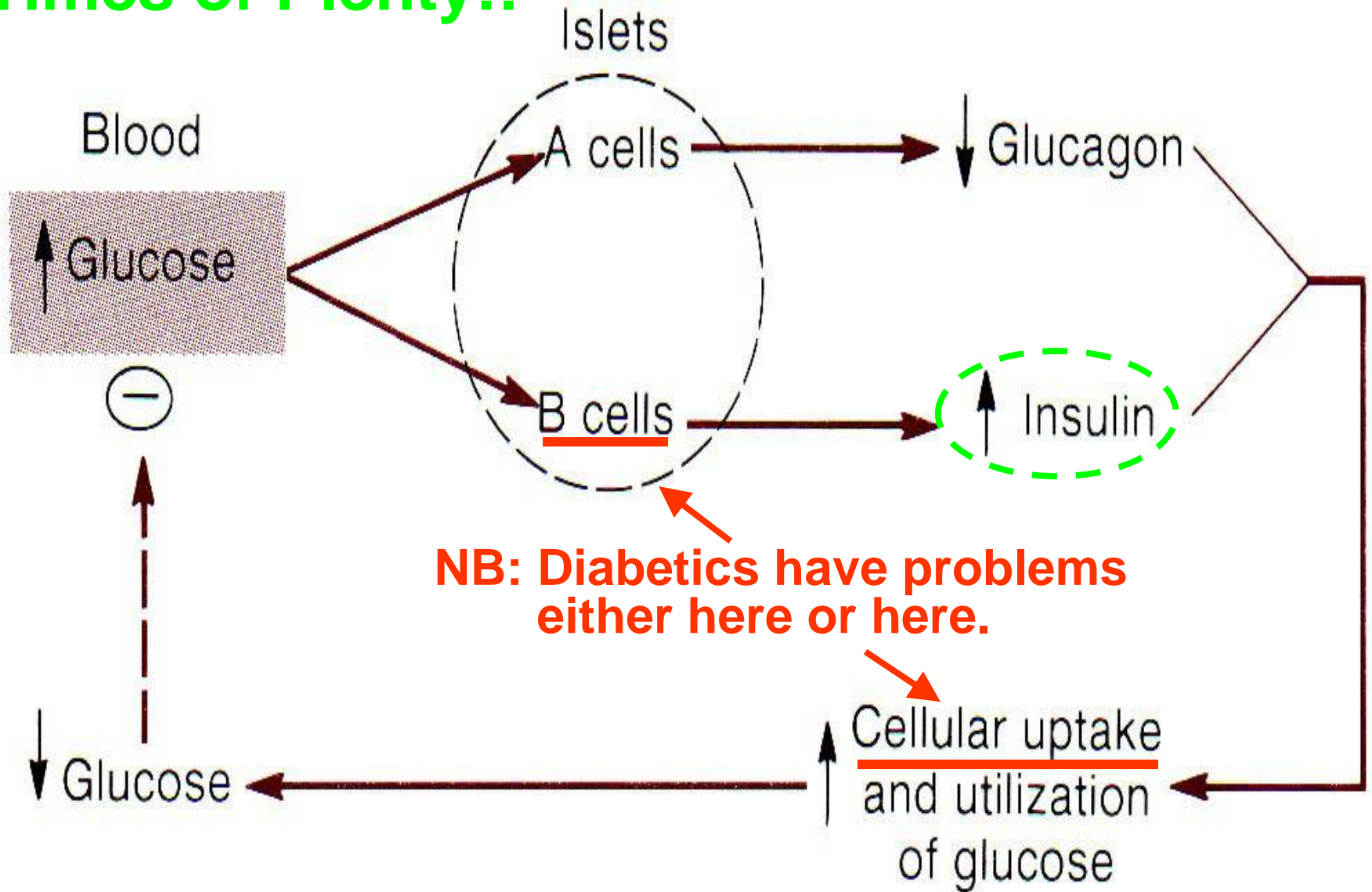
A & B Antigens
(Agglutinogens)

Glucose:
Sugar in Blood



Normal: 70-99
Pre-Diabetes: 100-125
Diabetes: ≥ 126 mg/dL

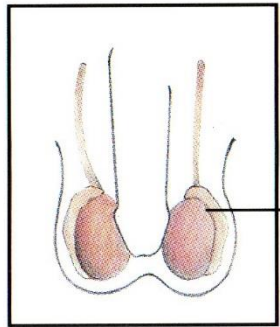
Times of Plenty!!



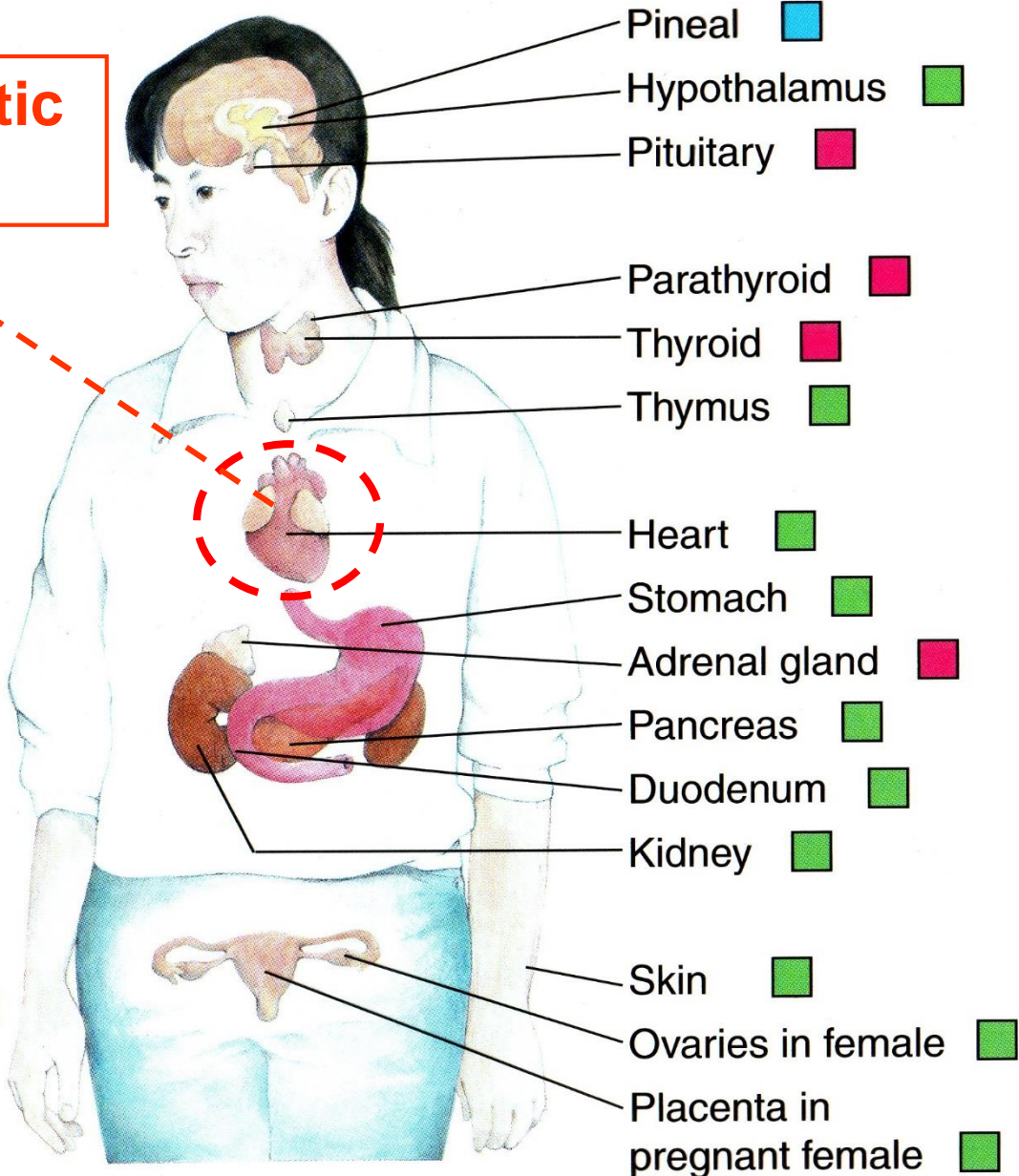
Endocrine System

ANP = Atrial Natriuretic Polypeptide

- Solely endocrine function
- Mixed function
- Complete function uncertain

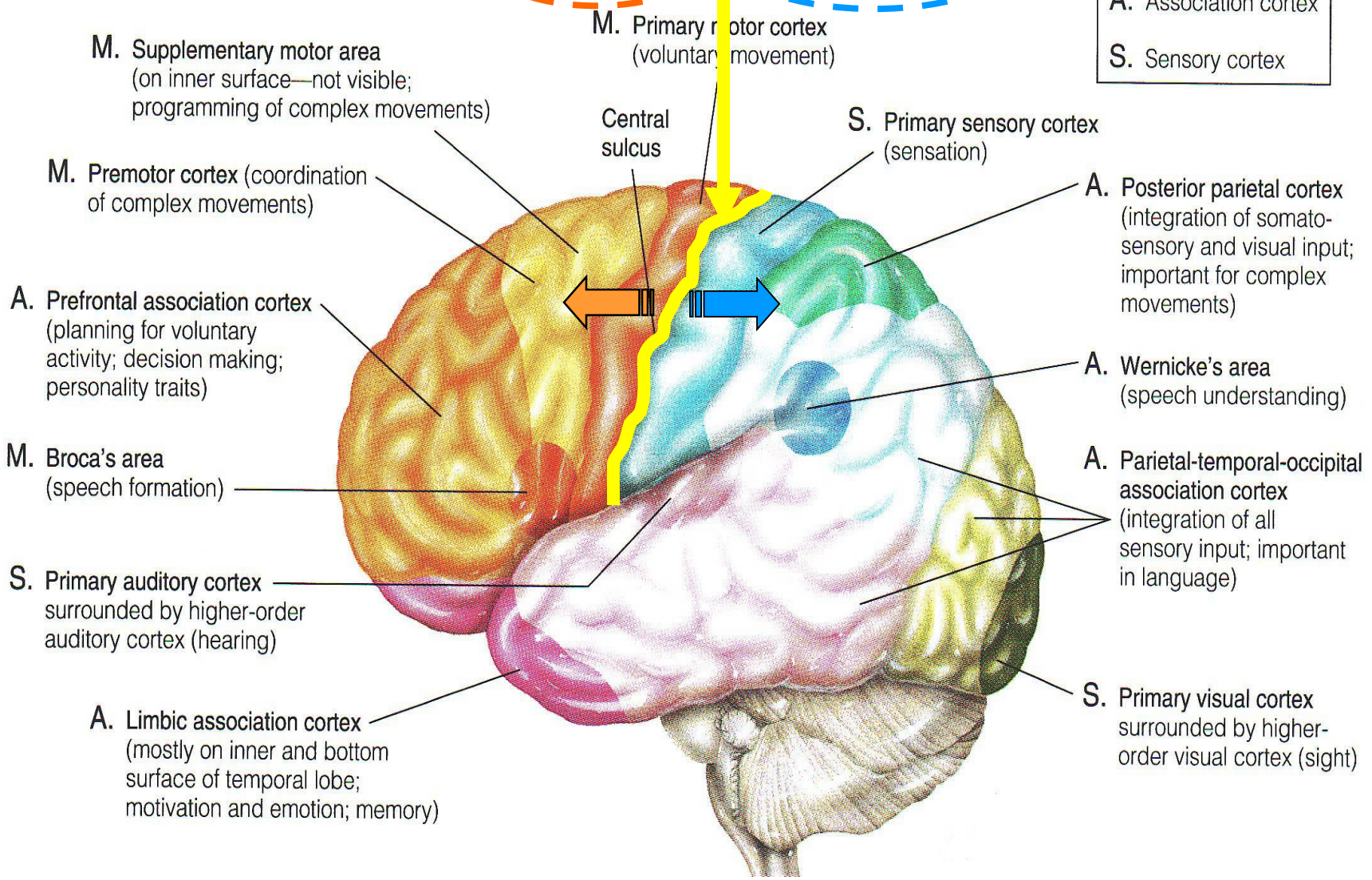


Testes in male ■

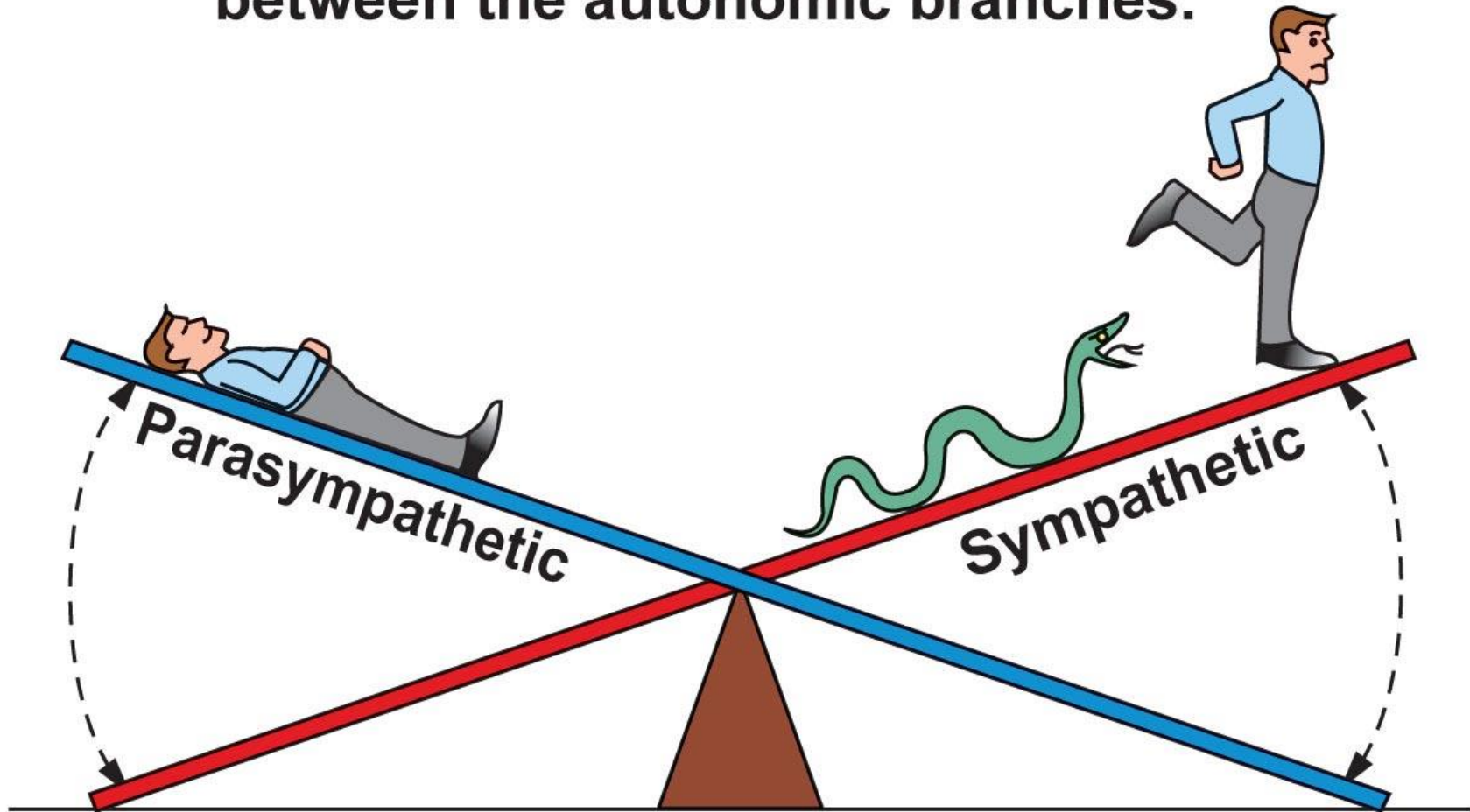




Key	
M.	Motor cortex
A.	Association cortex
S.	Sensory cortex



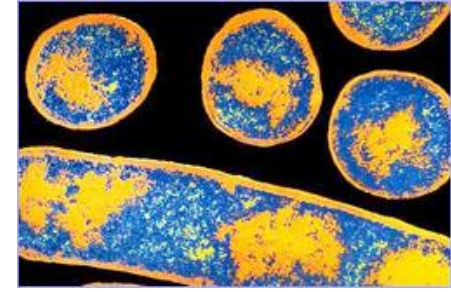
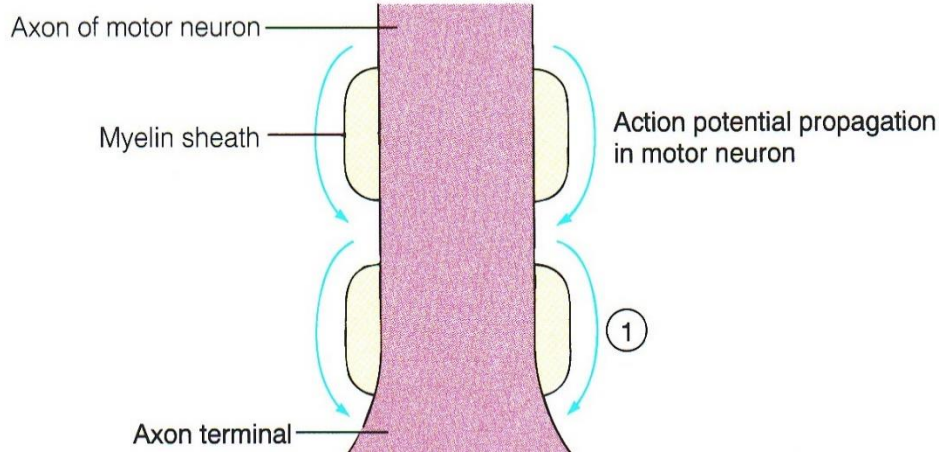
Homeostasis is a dynamic balance between the autonomic branches.



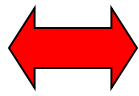
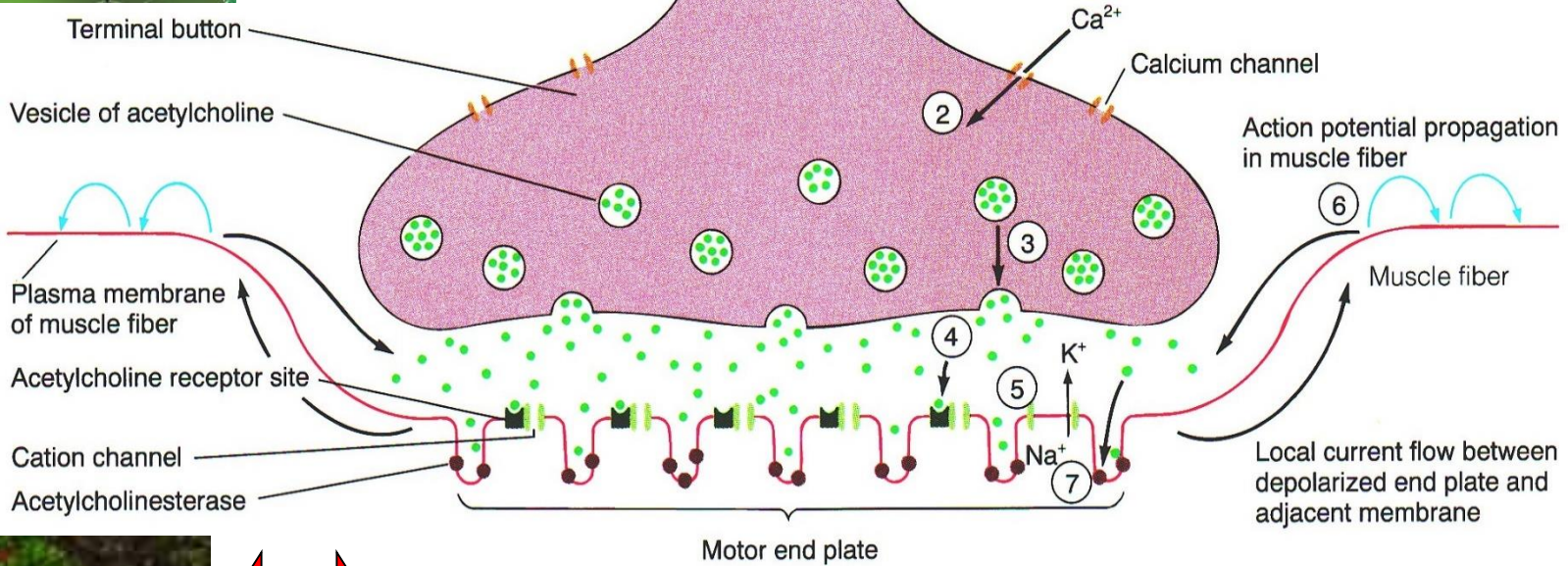
**Rest-and-digest:
Parasympathetic
activity dominates.**

**Fight-or-flight:
Sympathetic activity
dominates.**

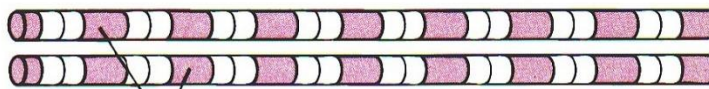
↑ 3



~~3~~



4

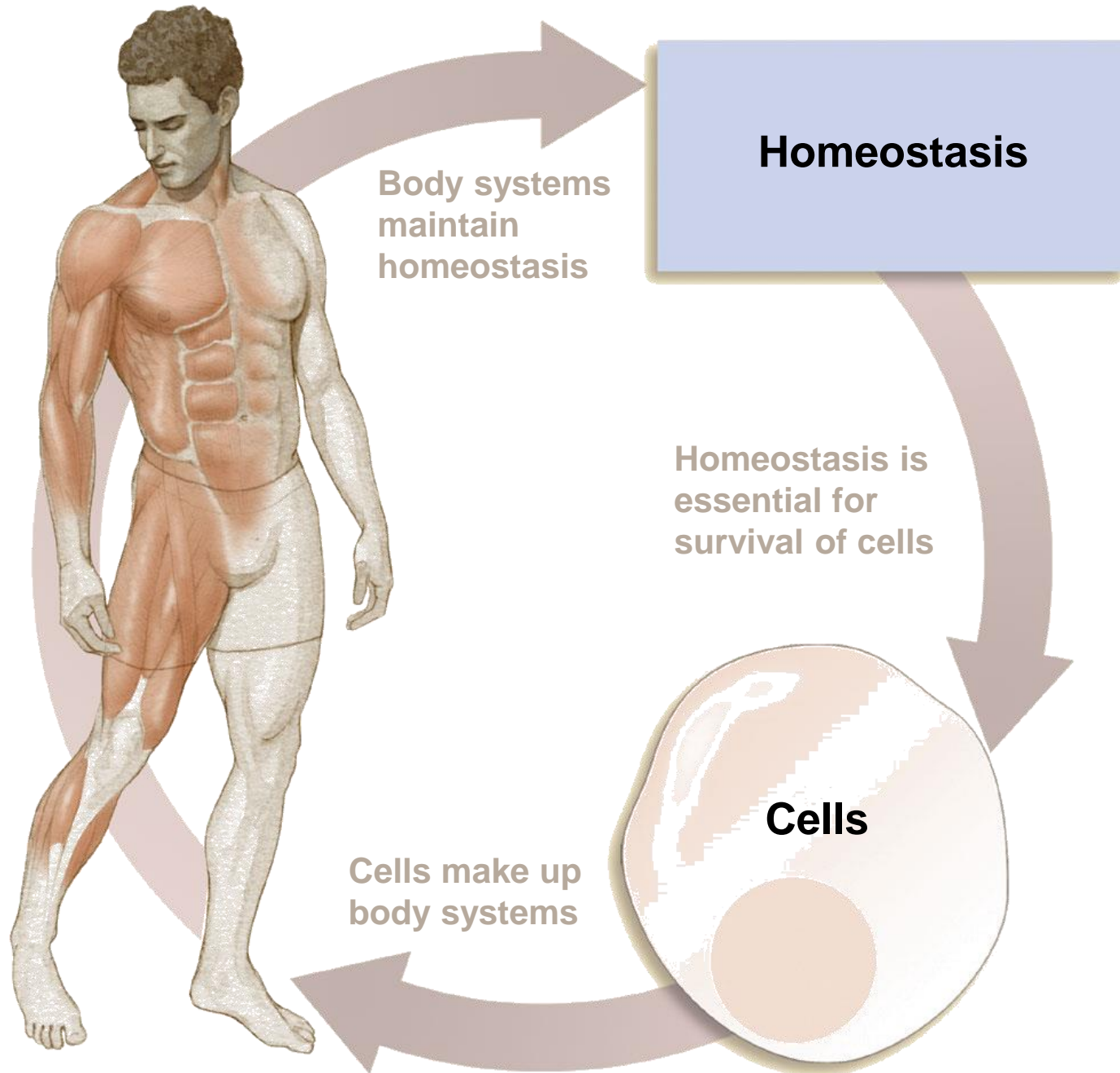


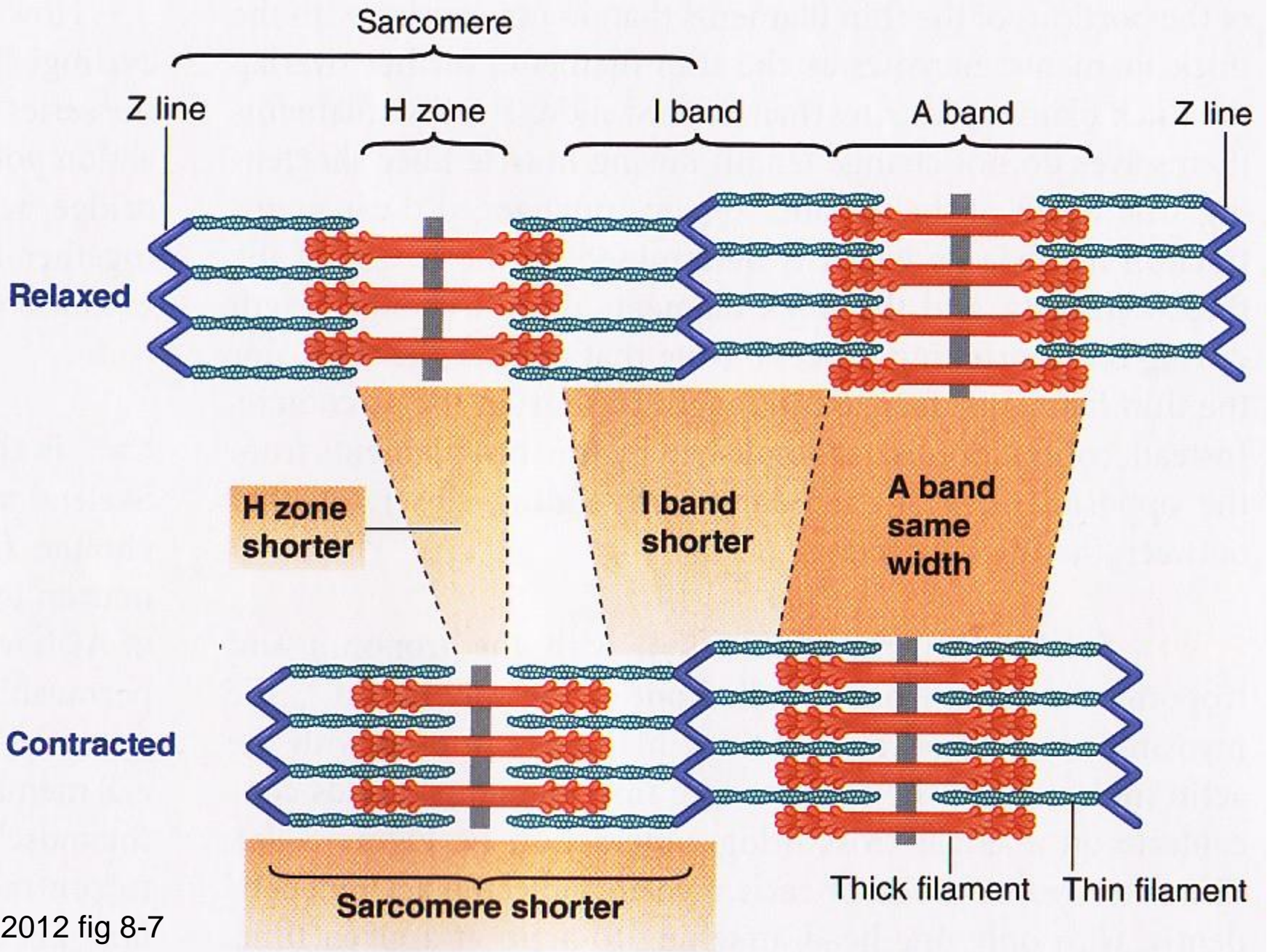
Contractile elements within muscle fiber



~~7~~

Muscular System





LS 2012 fig 8-7



Atrophy

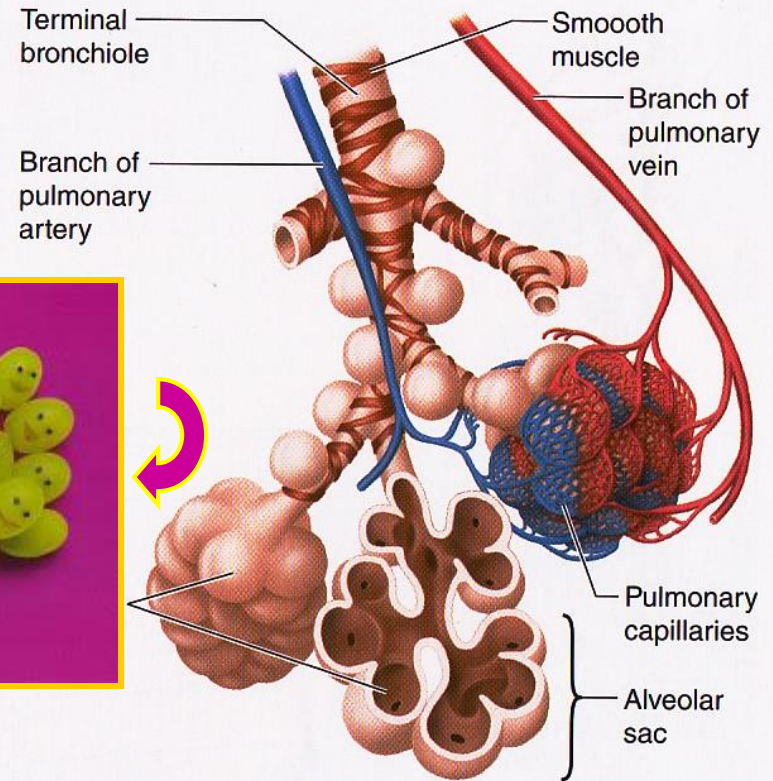
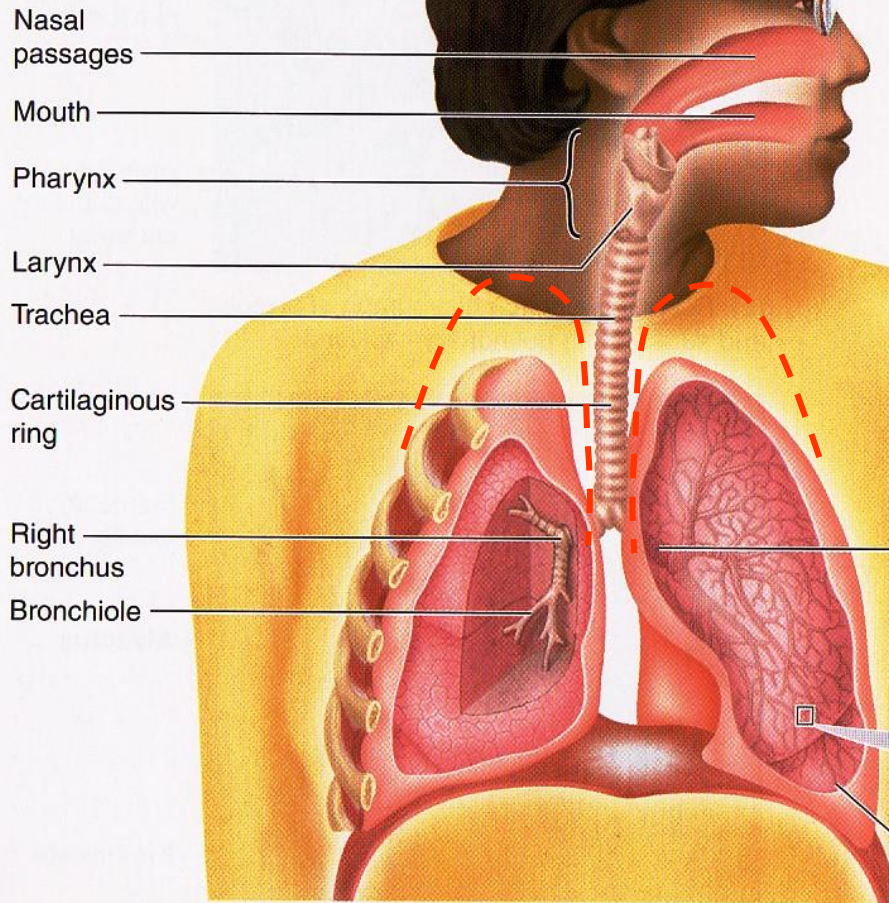
*decrease in size
& strength*

Hypertrophy

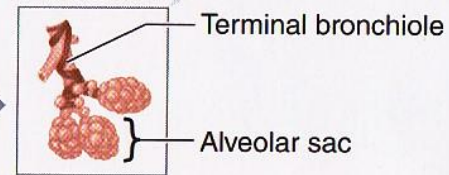
*increase in size
& strength*

Respiratory System Anatomy

NB: In vivo,
Cupola or peak
of each lung
goes into neck
> clavicle line!



(b) Enlargement of alveoli (air sacs) at terminal ends of airways



Terminal bronchiole

***Not only the Brain, but the Heart & 100s of Other
Tissues and Organs are Adversely Affected!***



👉😊...I ♥ U of O!

Students who succeed are usually those who:

- (1) **Attend** class regularly
- (2) **Ask** questions
- (3) **Come** to office hours & problem-solving sessions
- (4) **Study** outside class both alone & in study groups
- (5) **Seek** to understand methods & overarching principles/concepts rather than specific answers
- (6) **Teach** or tutor others &
- (7) **Discuss** concepts informally with fellow students.



Science Teaching Reconsidered, National Academy Press, 1997.

ANATOMY
STRUCTURE
WHAT?
WHERE?

VS

PHYSIOLOGY

VS

FUNCTION

VS

HOW?

VS

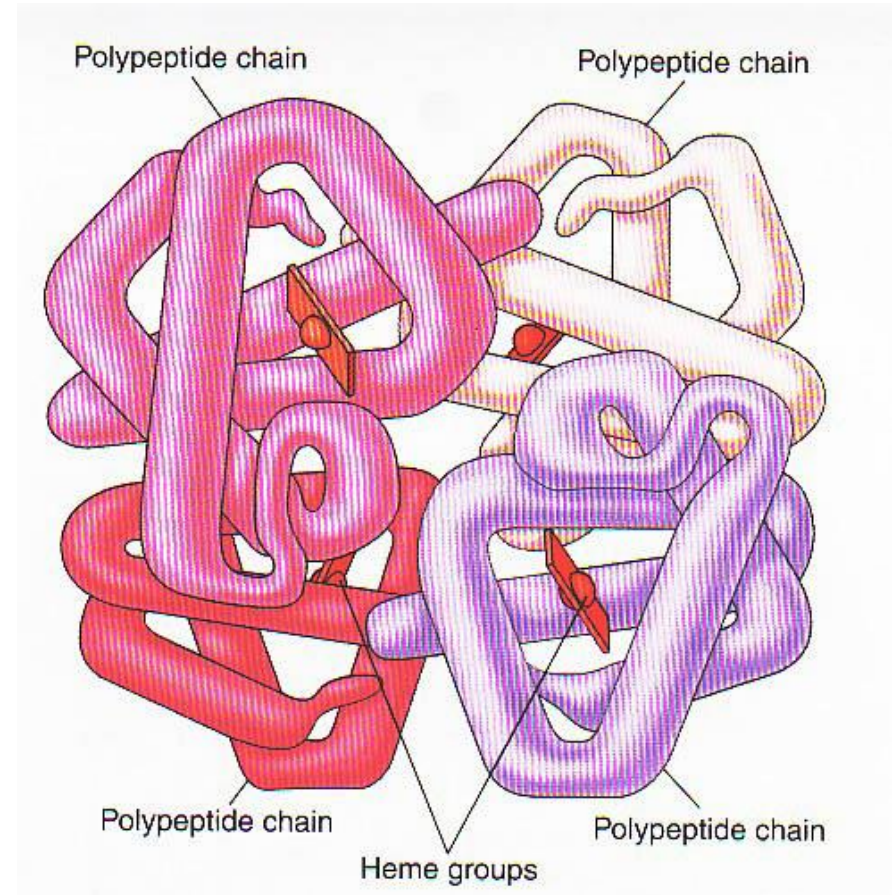
WHY?



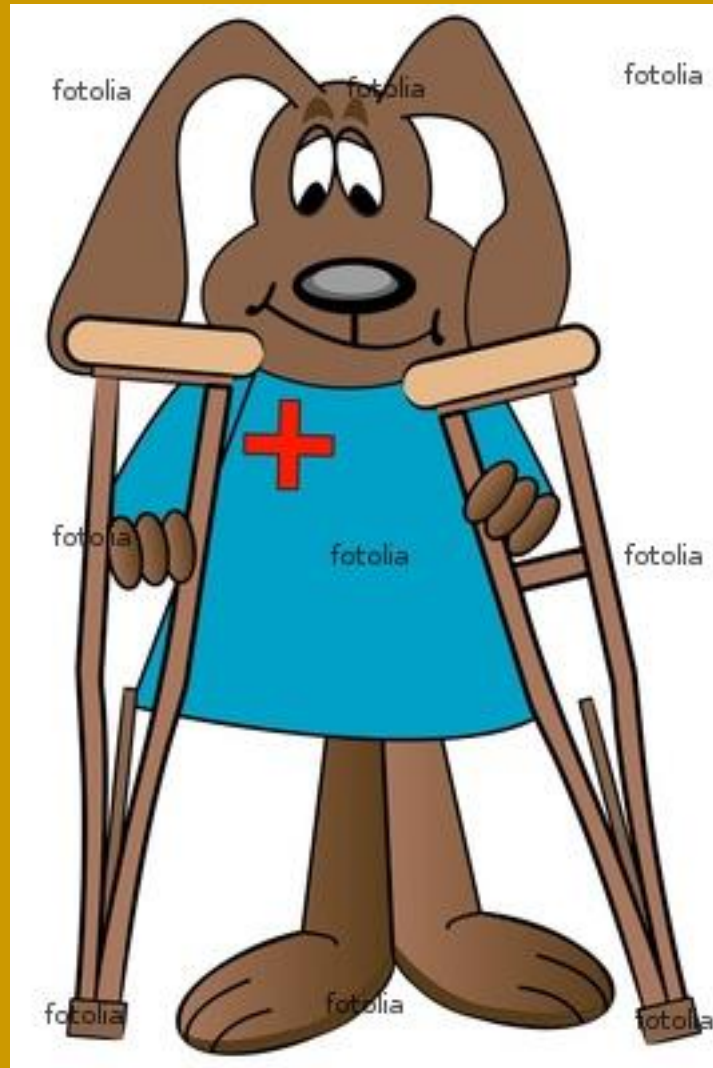
VS



Structure begets *function*!
Structure gives rise to *function*!
Structure & *function* are inseparable!



Knee Structure-Function?



Preoperative Diagnoses: R Knee

Degenerative Joint Disease (DJD) = arthritis

Varus malalignment = bow-leg



Procedures:

Arthroscopy & microfracture

High Tibial Osteotomy (HTO)

Packing bone graft substitute



Blocks/Medications:

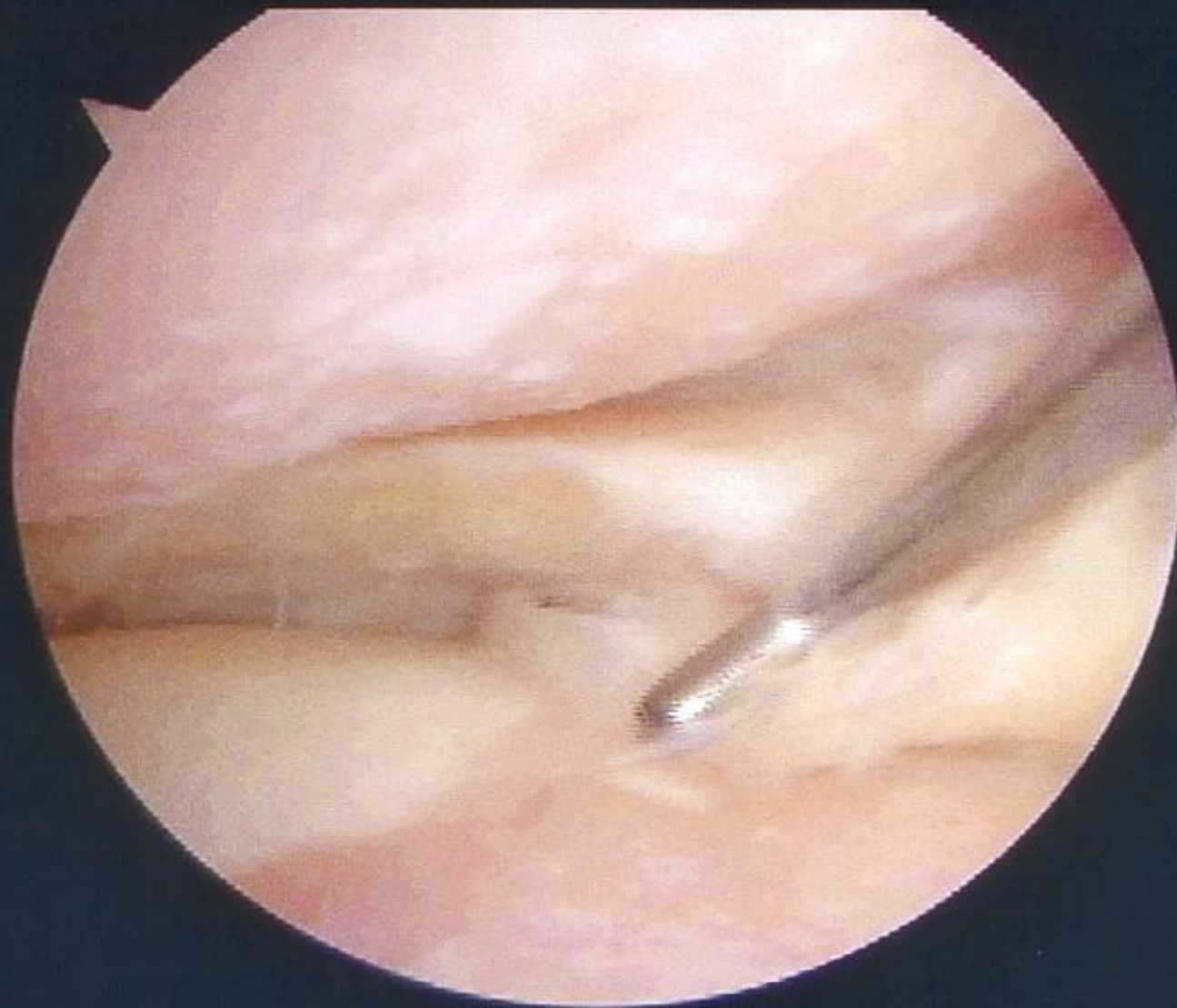
Femoral n. block

General anesthesia

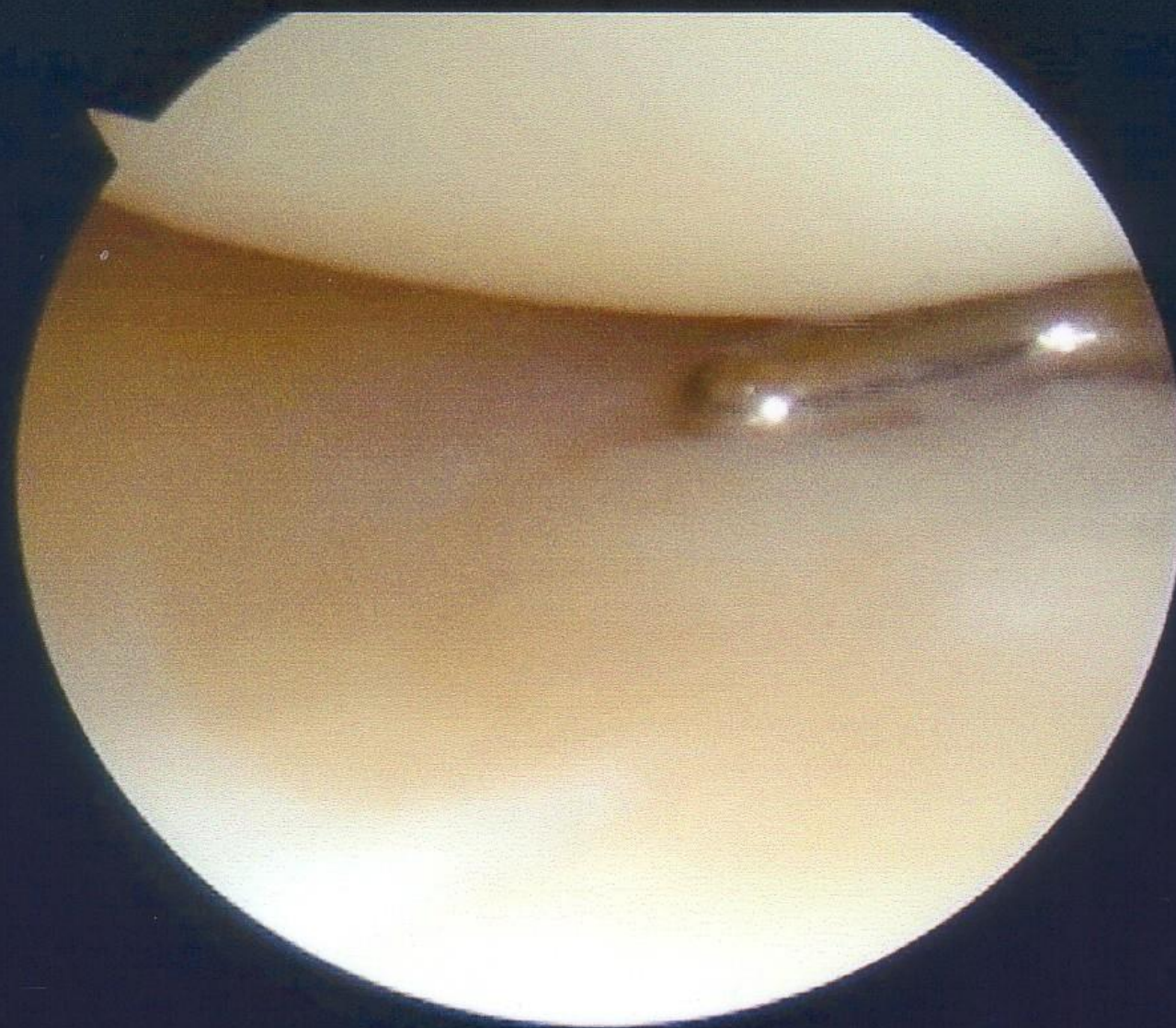
IV Morphine, Oral Oxycotin + Oxycodone,

Tylenol, Injectable Lovenox (enoxaparin Na)

William Sterett, MD
Ben Hogan, PAC
Vail Summit Orthopedics



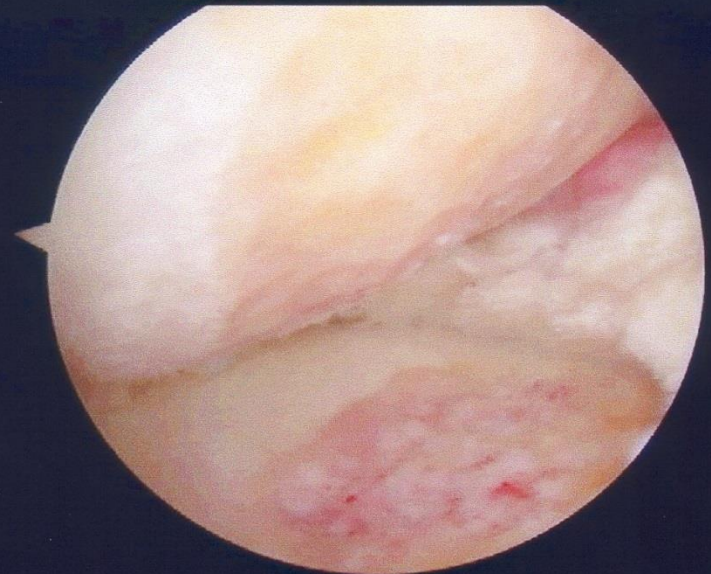
R knee medial meniscus cleavage & tear



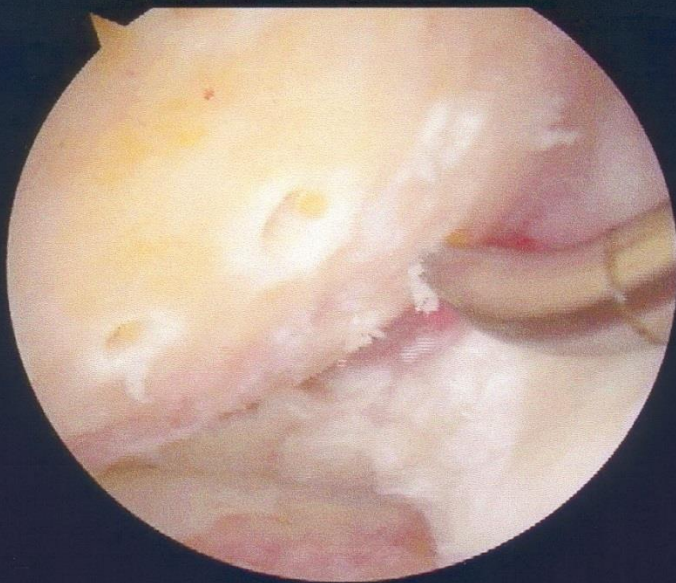
R knee lateral compartment in good shape!



1. Arthroscopy clean-up



2. Debridement complete



3. Microfracture with awl

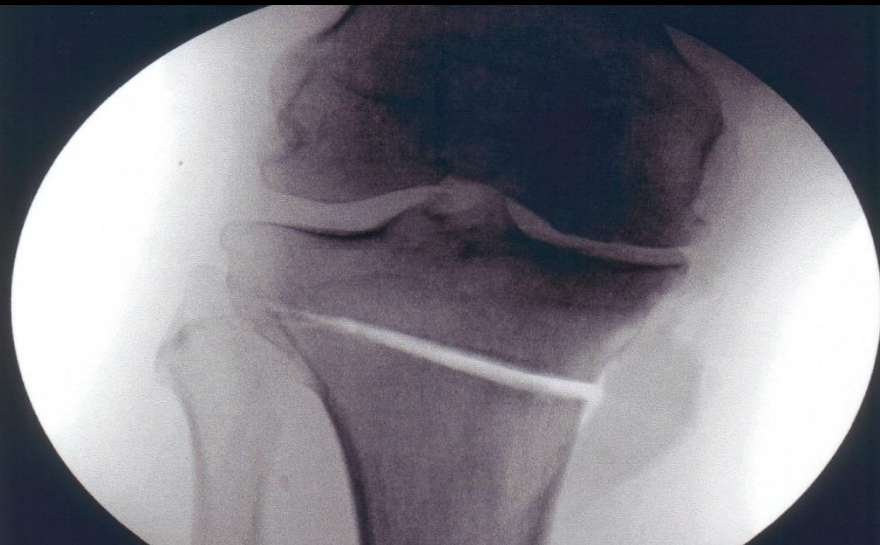


4. Punctuate bleeding

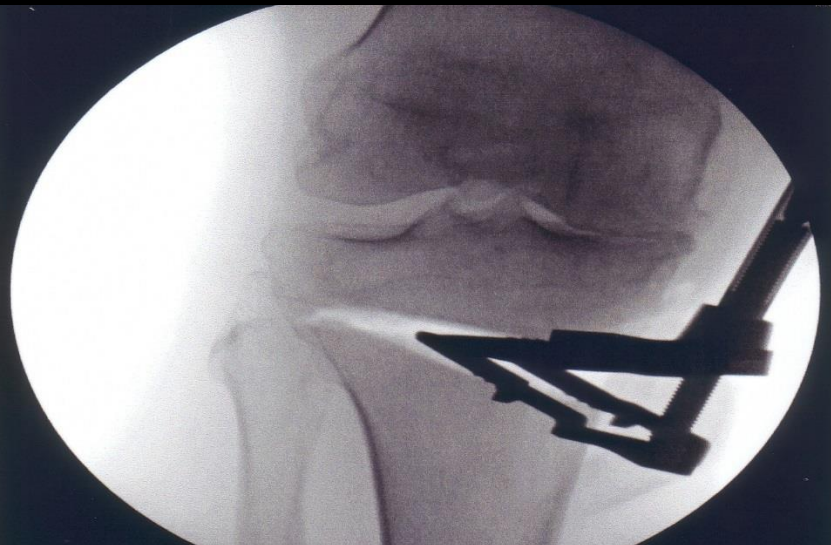


Further bleeding to create superclot!

High-Tibial Osteotomy (HTO) to Realign the Joint



1. Oscillating saw cut



2. R plate/scaffolding insert



3. Align, stabilize w/screws & pack defect

Post-Operative Reality: 10 d injectable anti-coagulant, 3 wk oral anti-coagulant, 4 wk CPM machine, non-wt bearing 8 wk, 12 wk PT, 3-5 d/wk,...



CPM ≡ Torture Device

Break for discussion/questions!



Body Levels of Organization

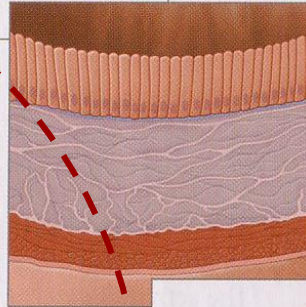
1. Molecular



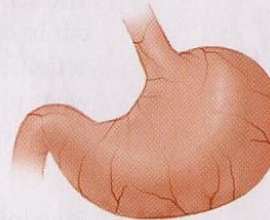
2. Cellular



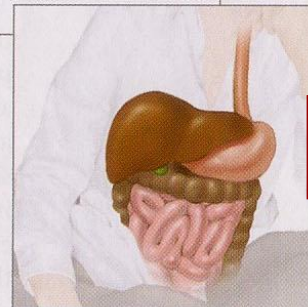
3. Tissue



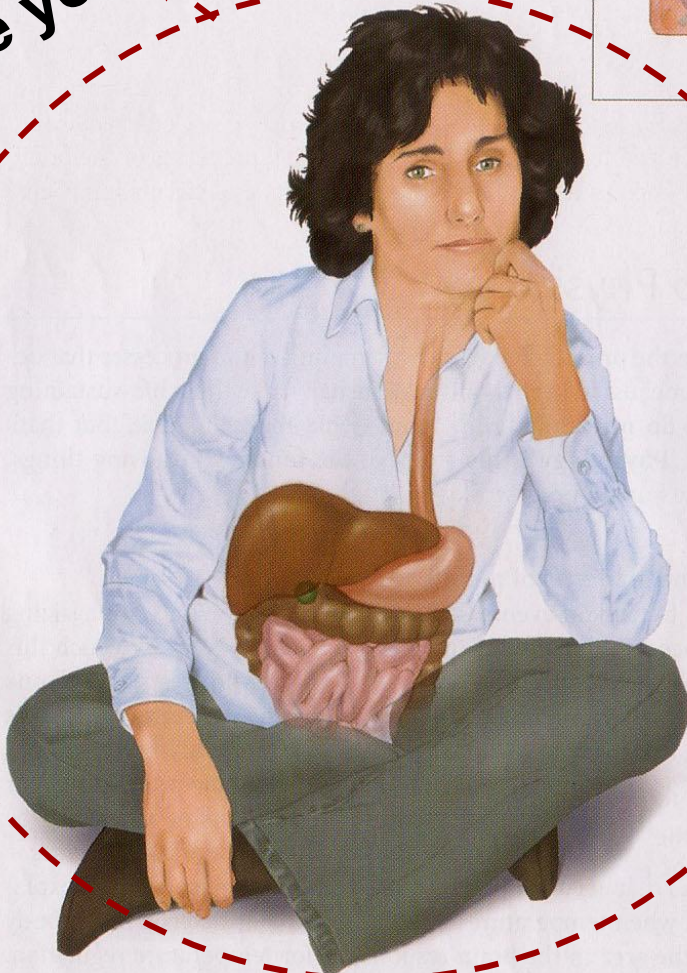
4. Organ

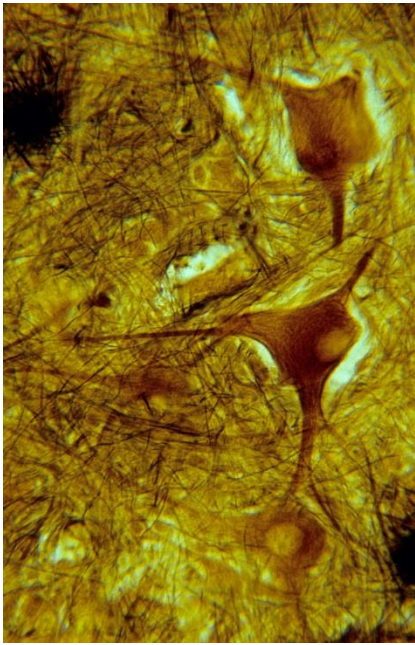


5. System

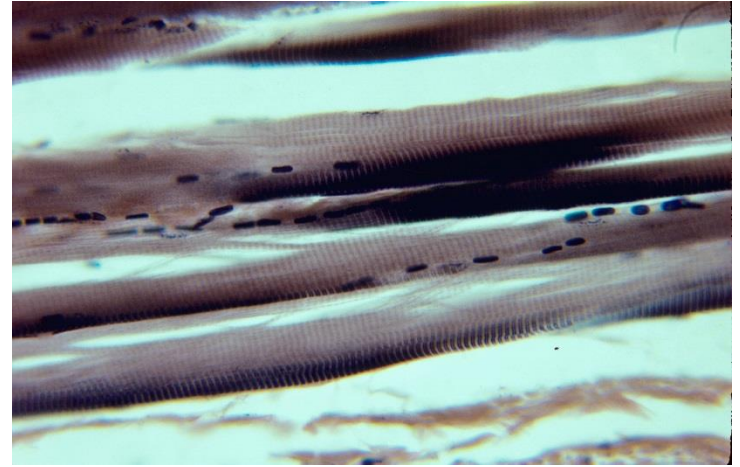


Entire Organism,
like you & me!

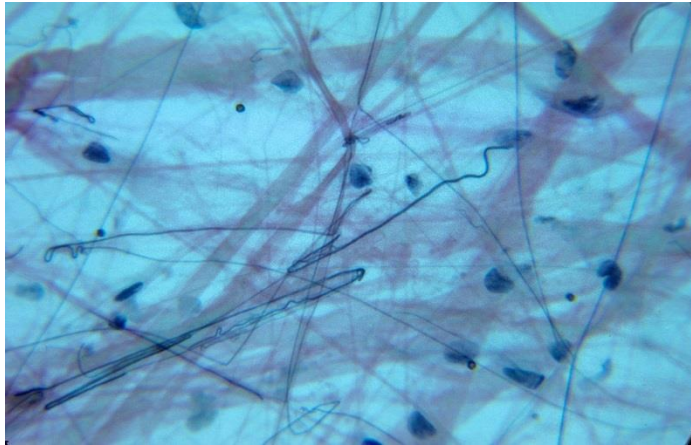




Nerve conducts



Muscle contracts

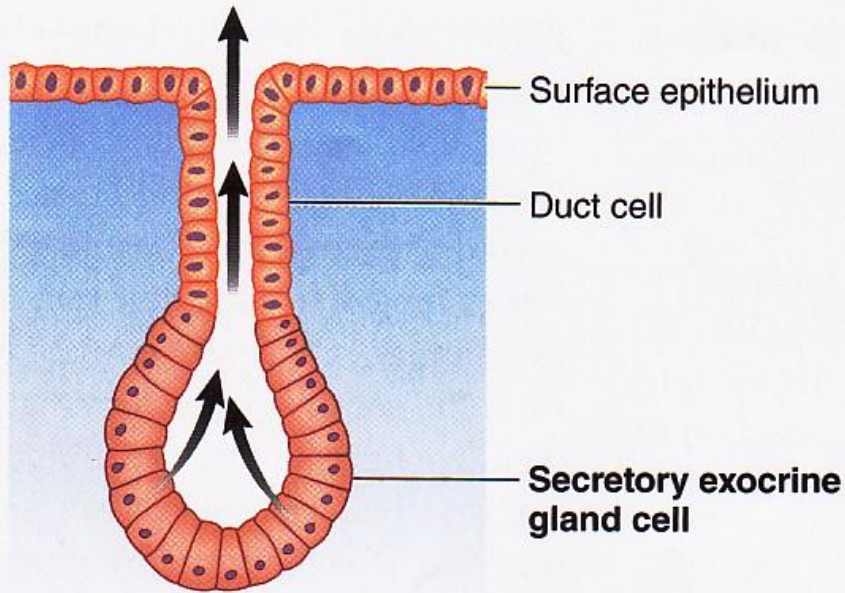


Connective connects!!

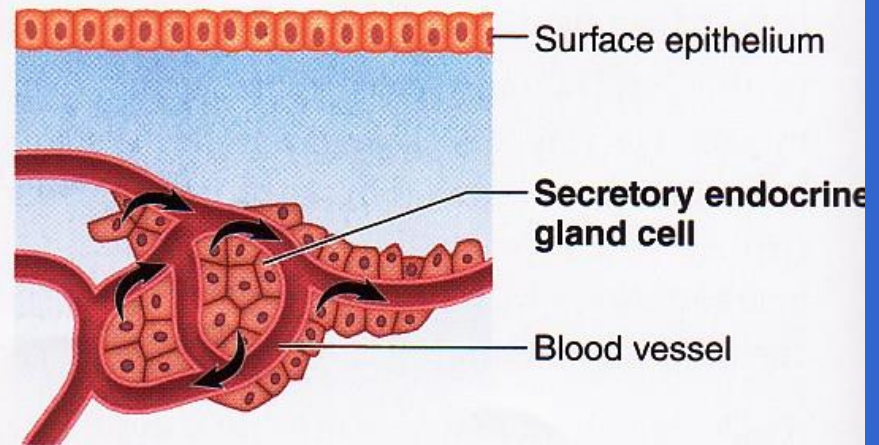


Epithelial covers

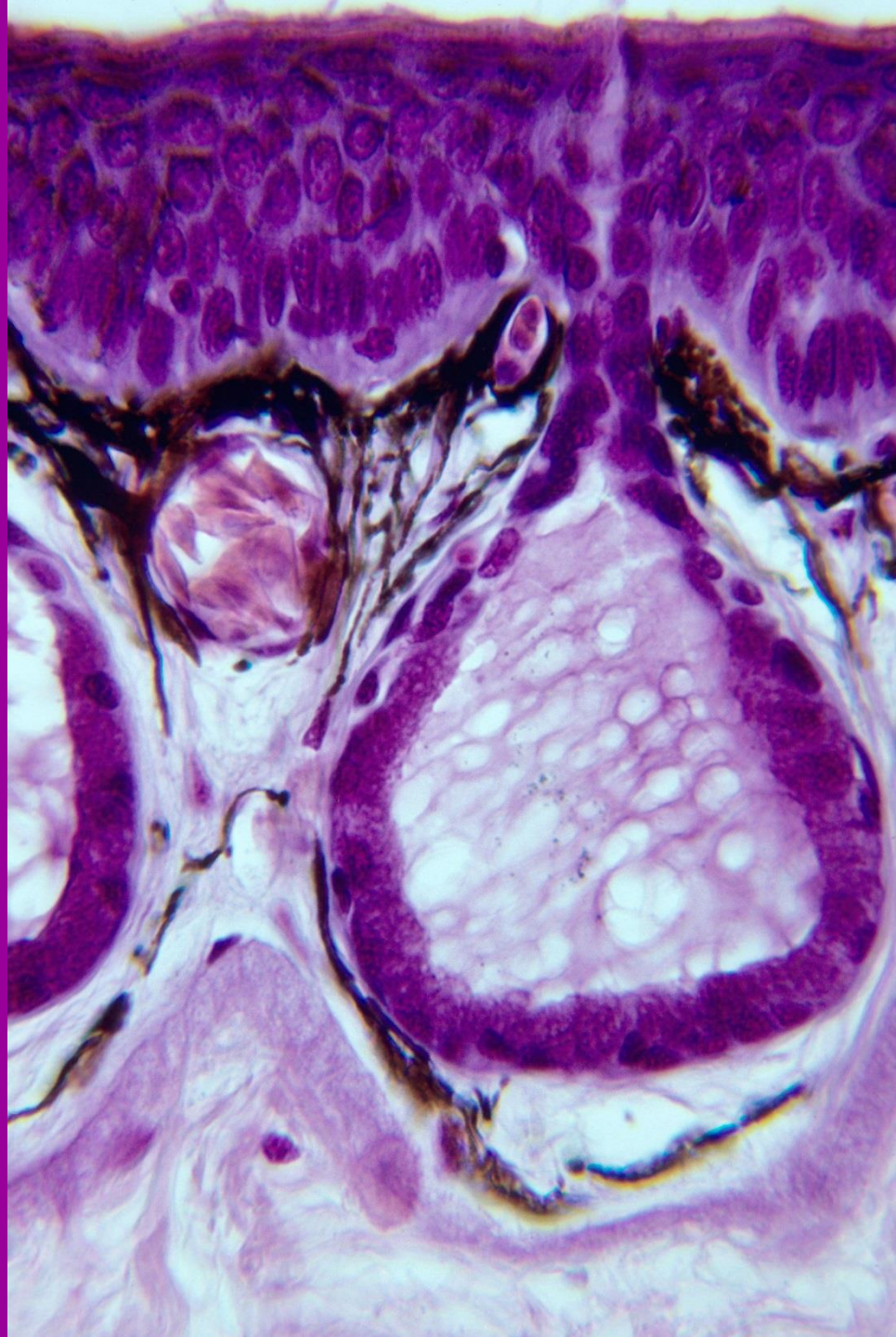
Epithelial tissue gives rise to glands: (a) exocrine & (b) endocrine



(a) Exocrine gland



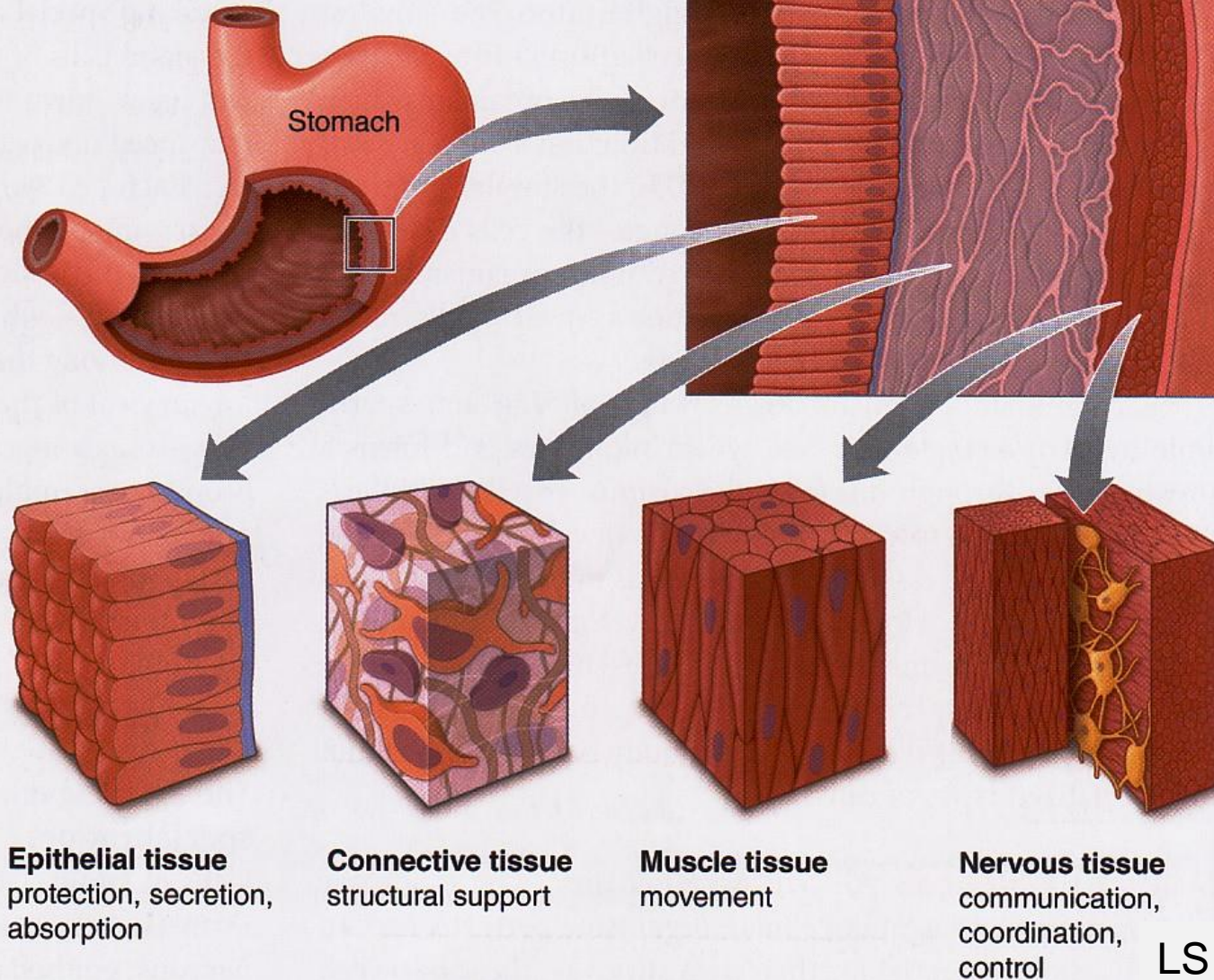
(b) Endocrine gland



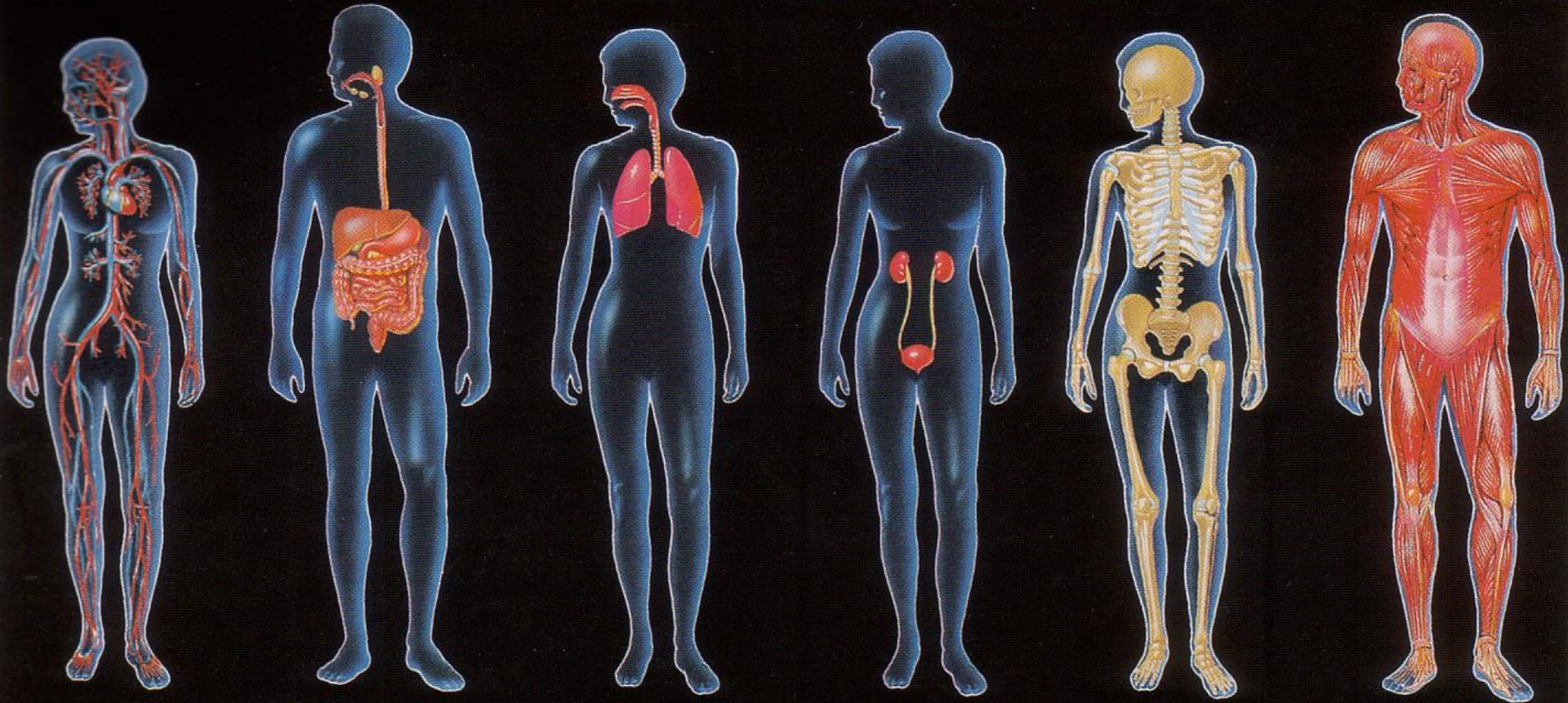
**Epithelial
tissue in
frog skin
developing
into an
exocrine
gland!**

Organs are made up ≥ 2 tissue types

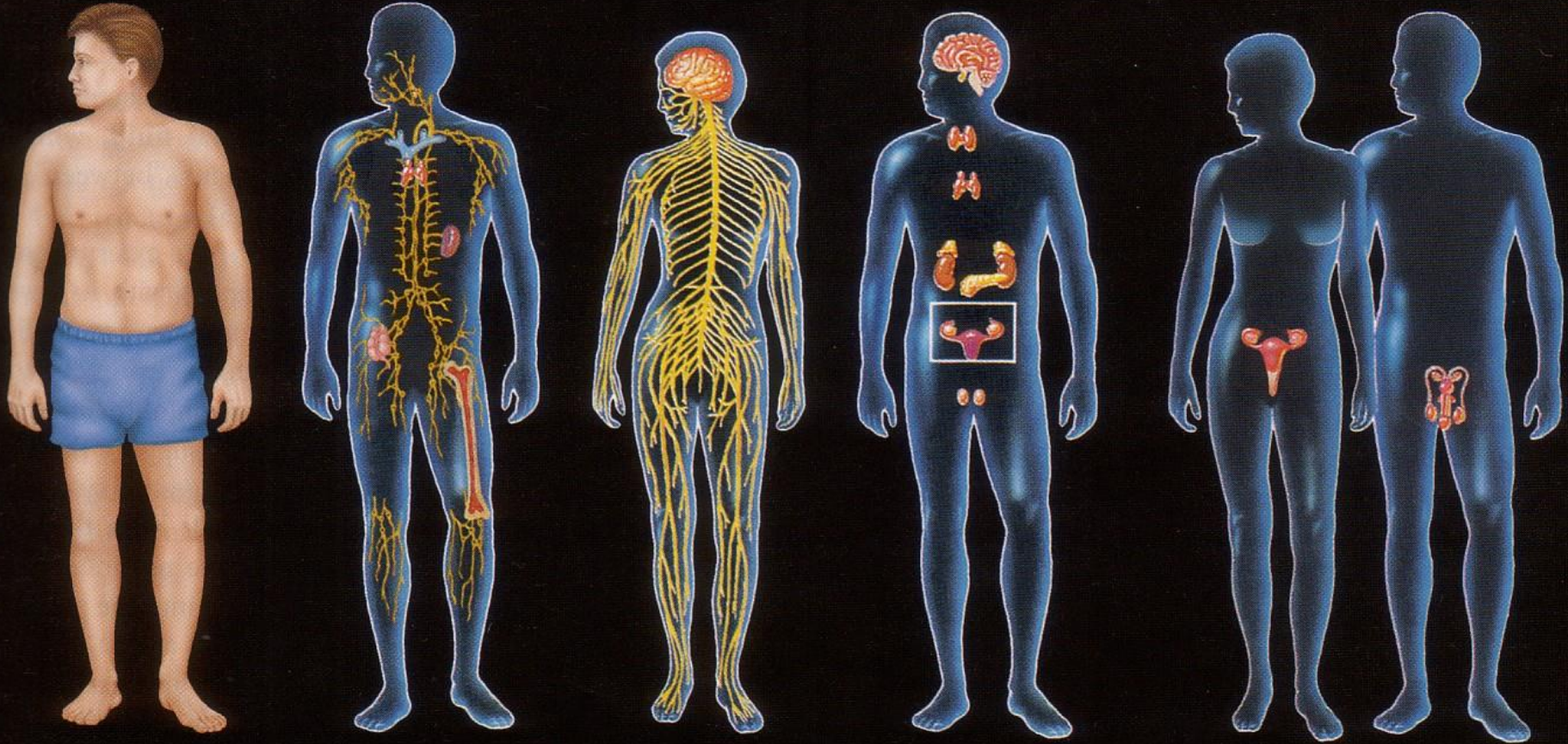
Organ:
Body structure that integrates different tissues and carries out a specific function



Which body systems?



Which body systems?



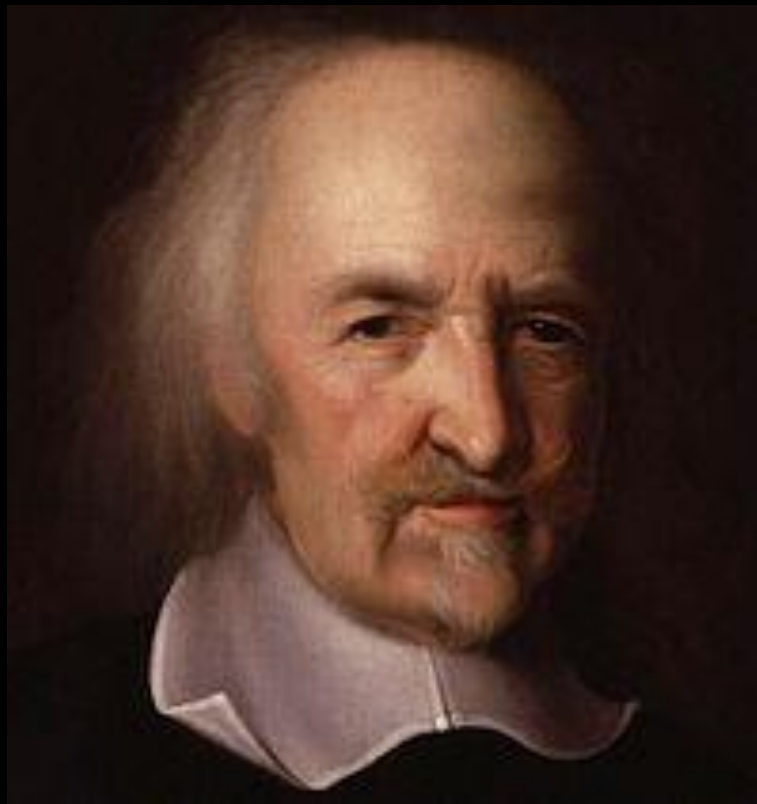
Why study human physiology?





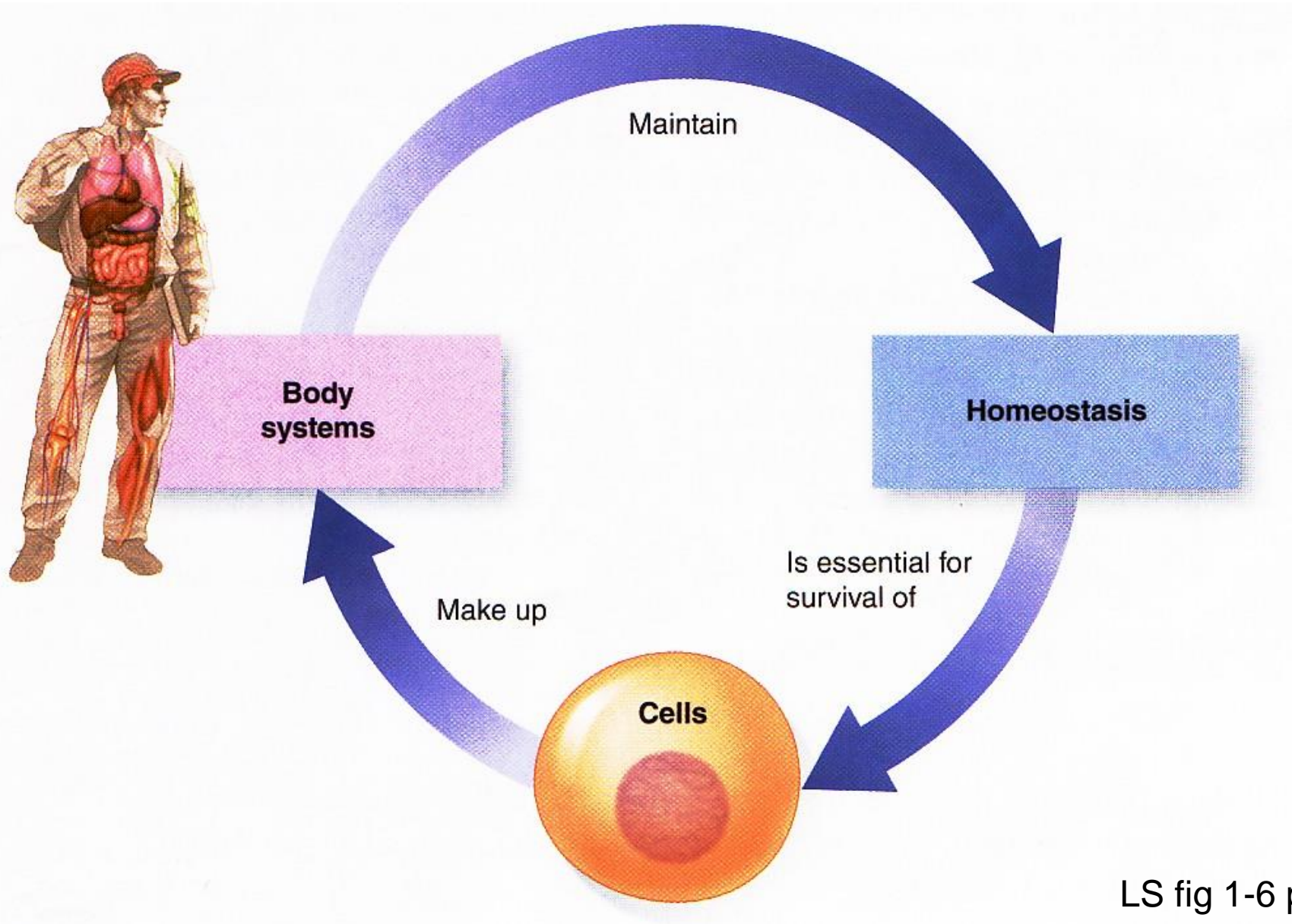


KNOWLEDGE IS POWER!!!



**Thomas Hobbes of Malmesbury
English Philosopher, 1658**

Homeostasis is essential for cell survival!

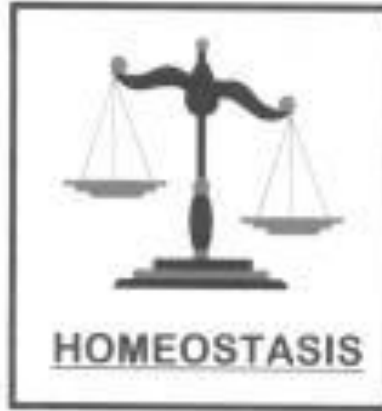


***Maintenance of a relative constancy in the
Internal environment = ECF = fluid outside of cells***

**milieu
interieur?**



Claude Bernard

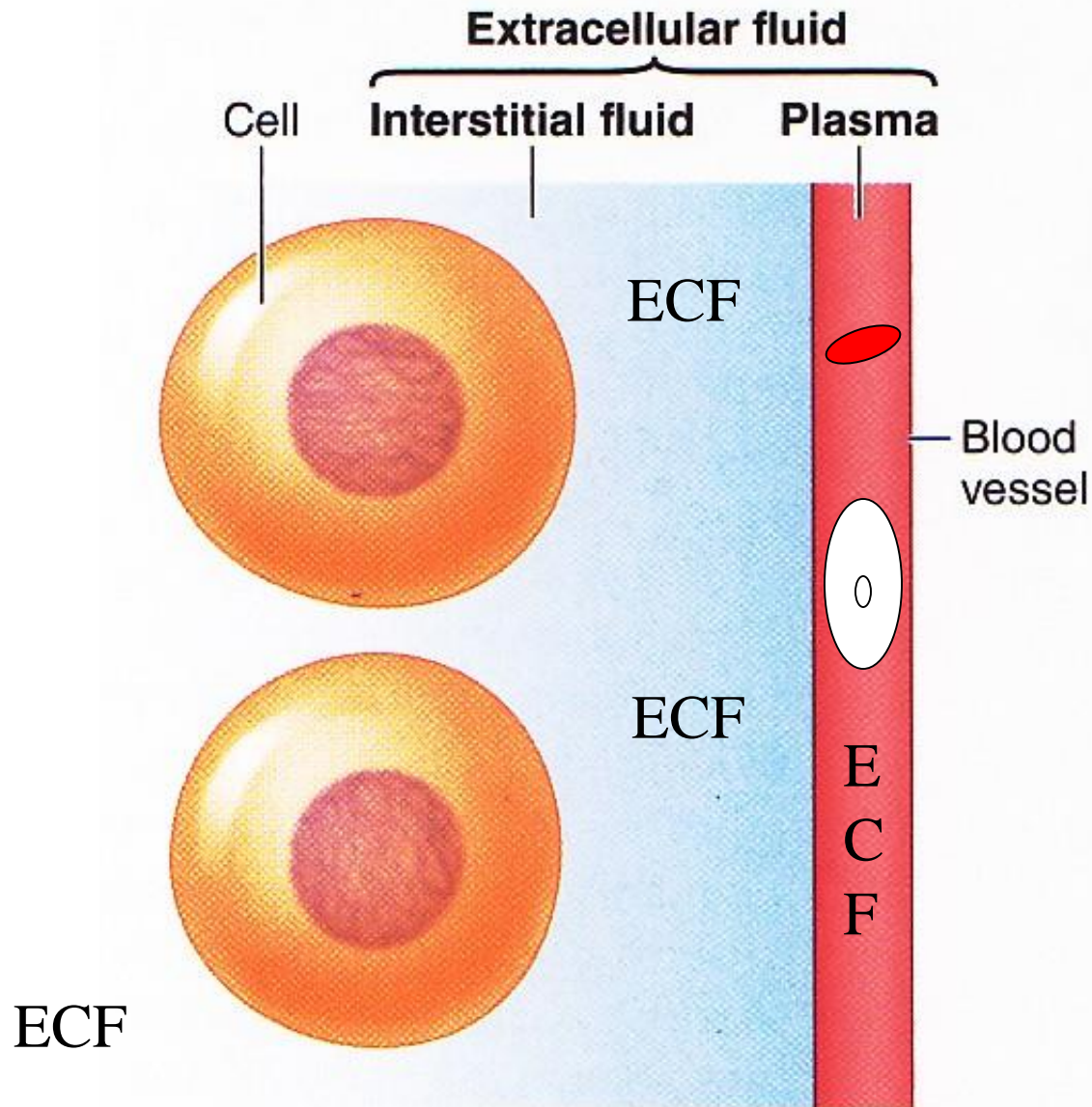


**100 trillion
cells working
intimately**

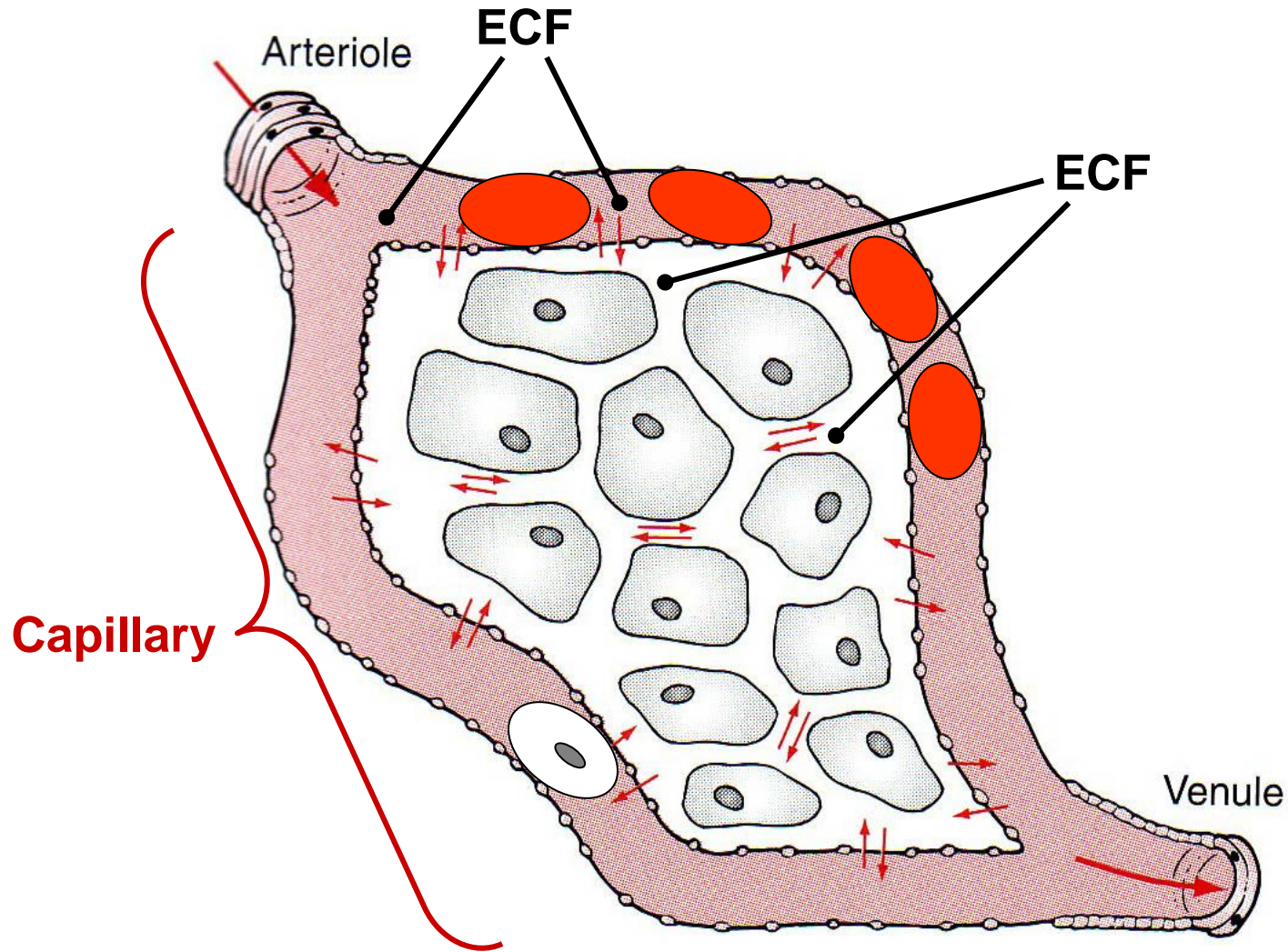


Walter B. Cannon

Where is extracellular fluid?

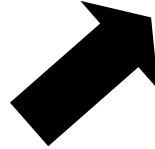


Where is extracellular fluid?

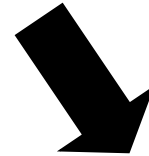


As long as between/outside cells, **ECF everywhere?**

ECF = Extracellular

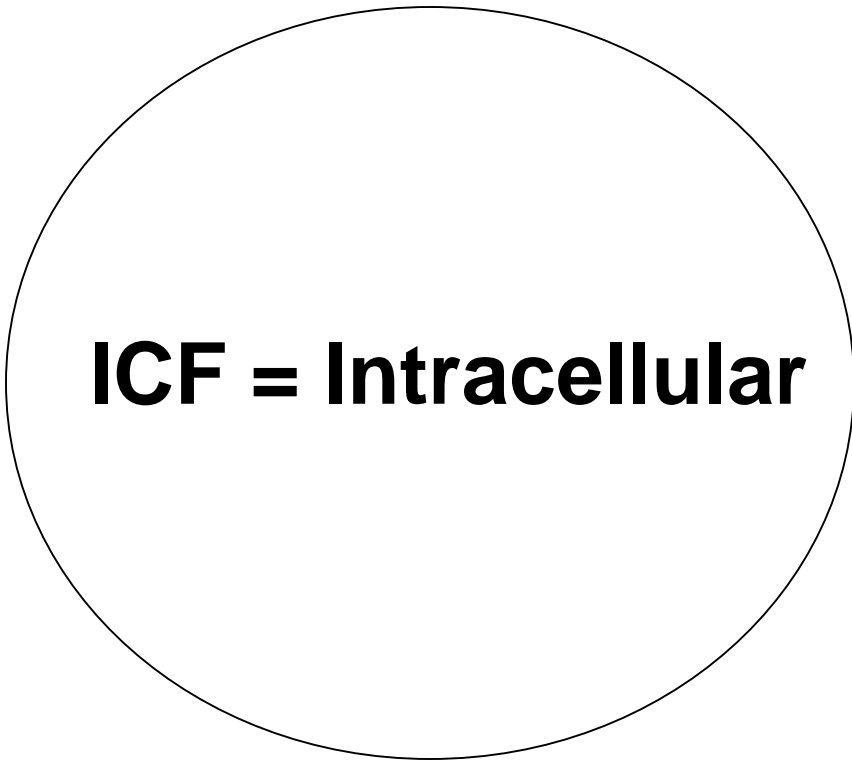


Plasma
(within CV System)



Interstitium
(eg, between
muscle cells)

ICF = Intracellular



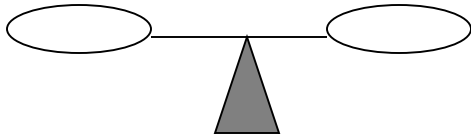
HOMEOKINESIS?



Metabolic

ANA-

CATA-



H₂O



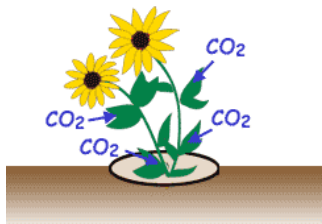
T_oC



Dr. Evonuk's 6 Balances

O₂/CO₂

Carbon Dioxide



Ion^{+/-}



Captain Calcium



pH

Bicarbonate and pH Balance

