

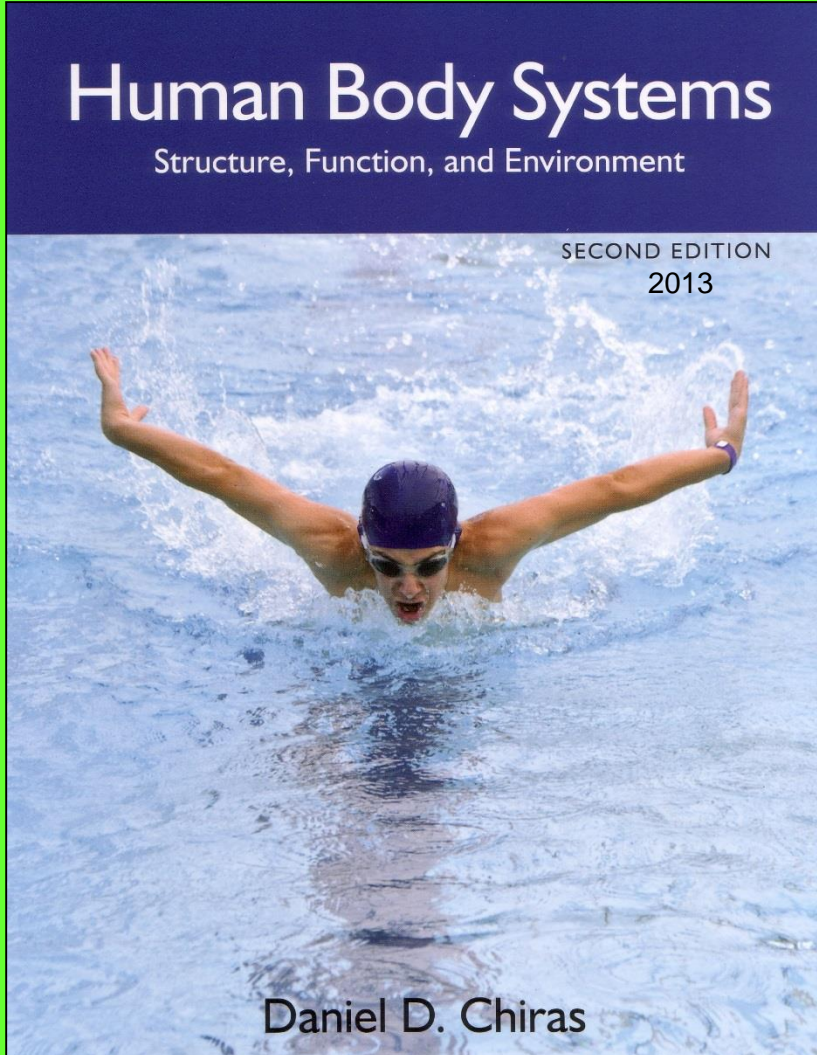


G. Waples

BI 121 Lecture 1

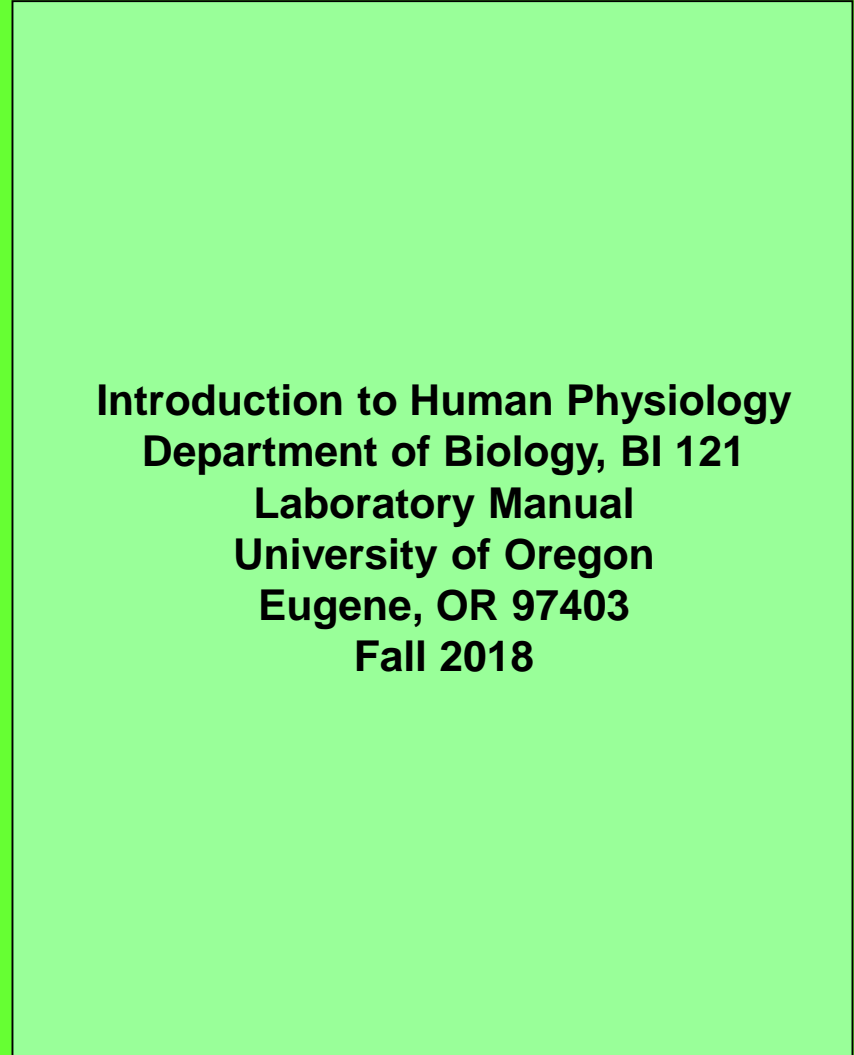
- I. Announcements**: Please check & sign attendance roster. Not on list? See Pat during break/> class. *Lab 1 Histology* Thursday in 130 HUE: 10 am - 5 pm sections. Much fun!!
- II. Introduction**: Staff, office hr, required sources, course overview, grading, expectations & success. Q?
- III. Human 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://uoduckstore.com/>



DC

New \$38.50 Used \$19.98

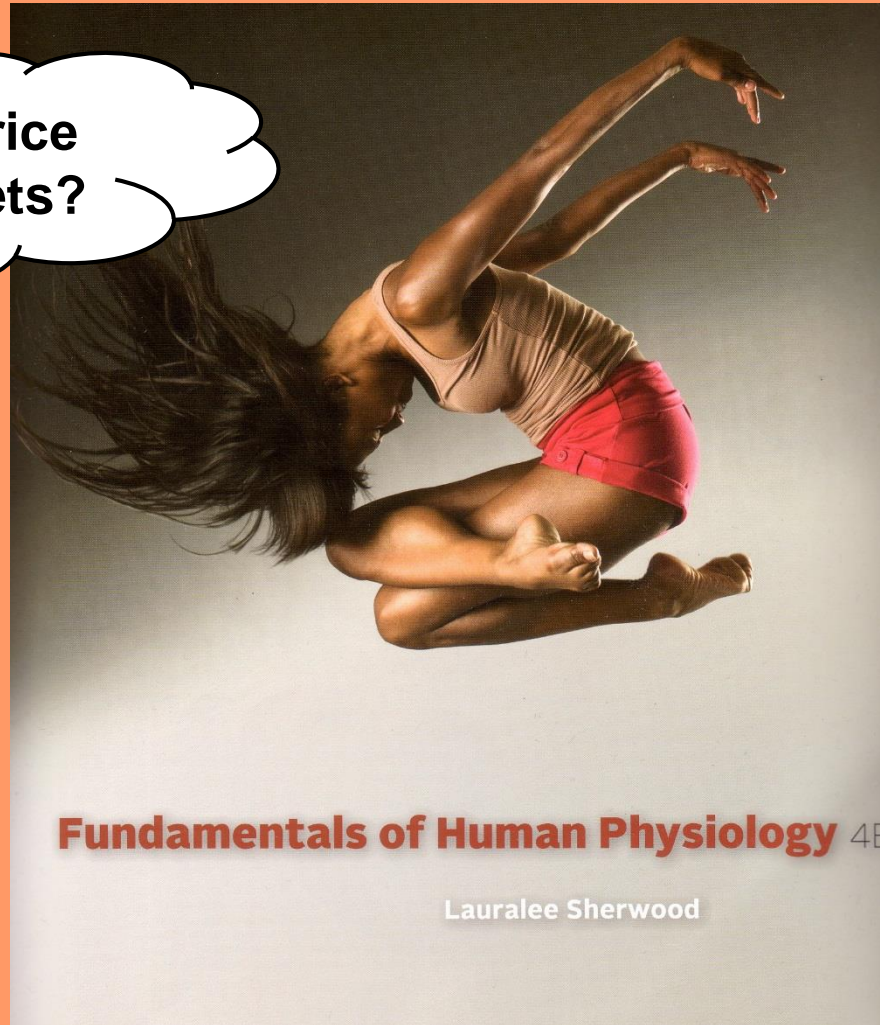
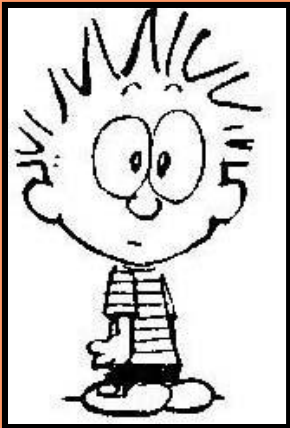


LM

Lab Notebook \$ 9.95

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

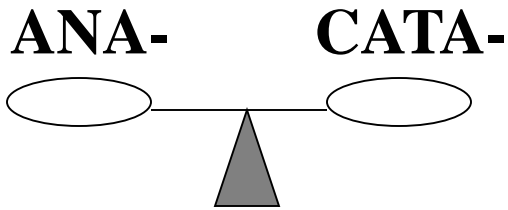
**Publisher's Price
→ Gold Nuggets?**



LS 2012

New \$119.99! Used \$14.96 - \$56.82 Rental \$7.99 E-Book \$23.49

Metabolic



H₂O

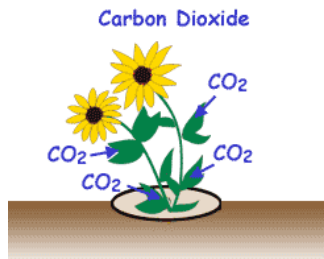


T_oC



Dr. Evonuk's 6 Balances

O₂/CO₂



Ion^{+/-}

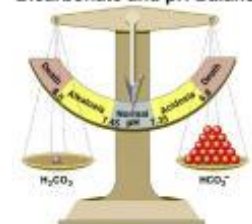


Captain Calcium

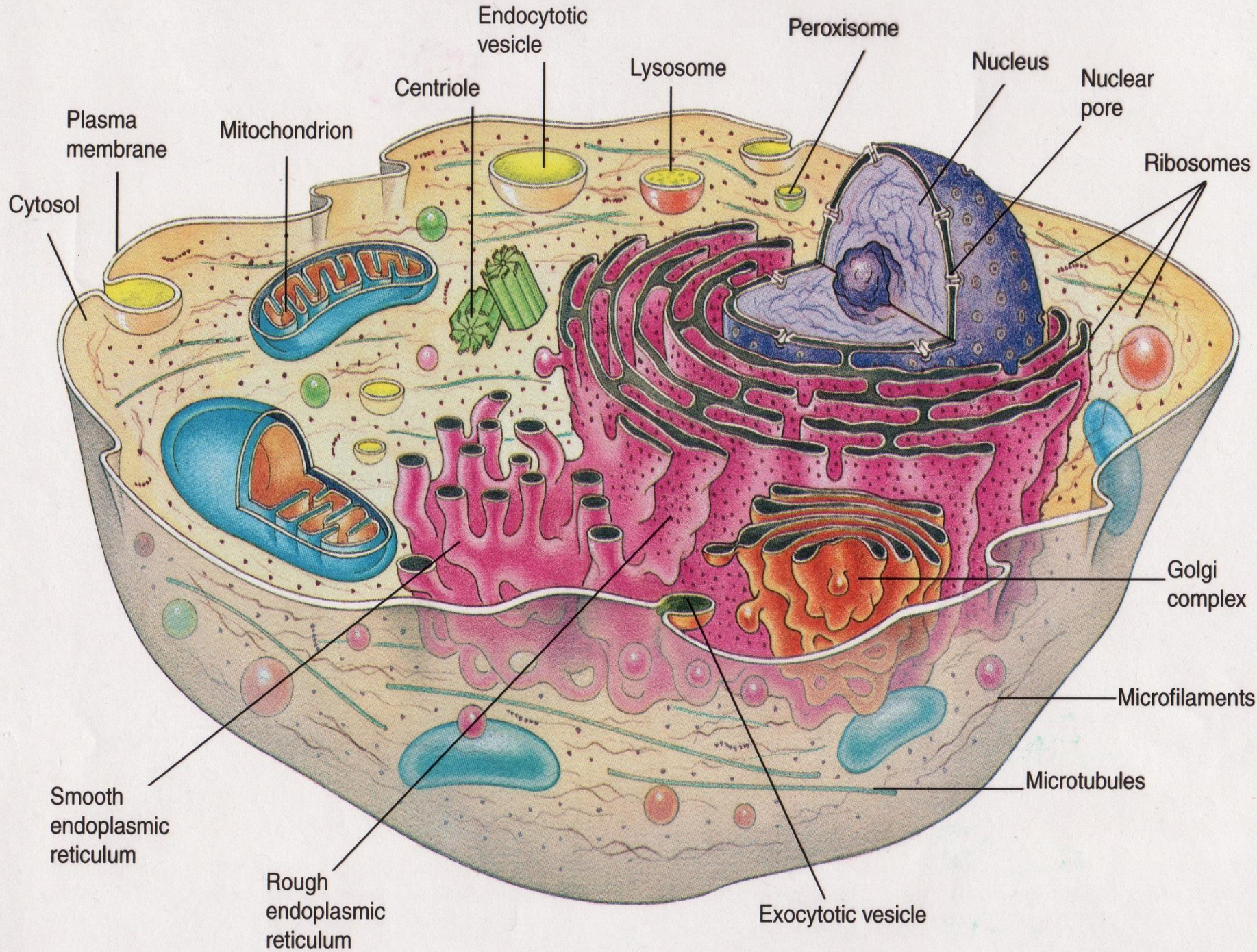


pH

Bicarbonate and pH Balance







Plasma membrane
Cytosol

Mitochondrion

Endocytotic vesicle
Centriole

Lysosome

Peroxisome

Nucleus

Nuclear pore

Ribosomes

Golgi complex

Microfilaments

Microtubules

Smooth endoplasmic reticulum

Rough endoplasmic reticulum

Exocytotic vesicle

Mitochondria: Energy Organelles

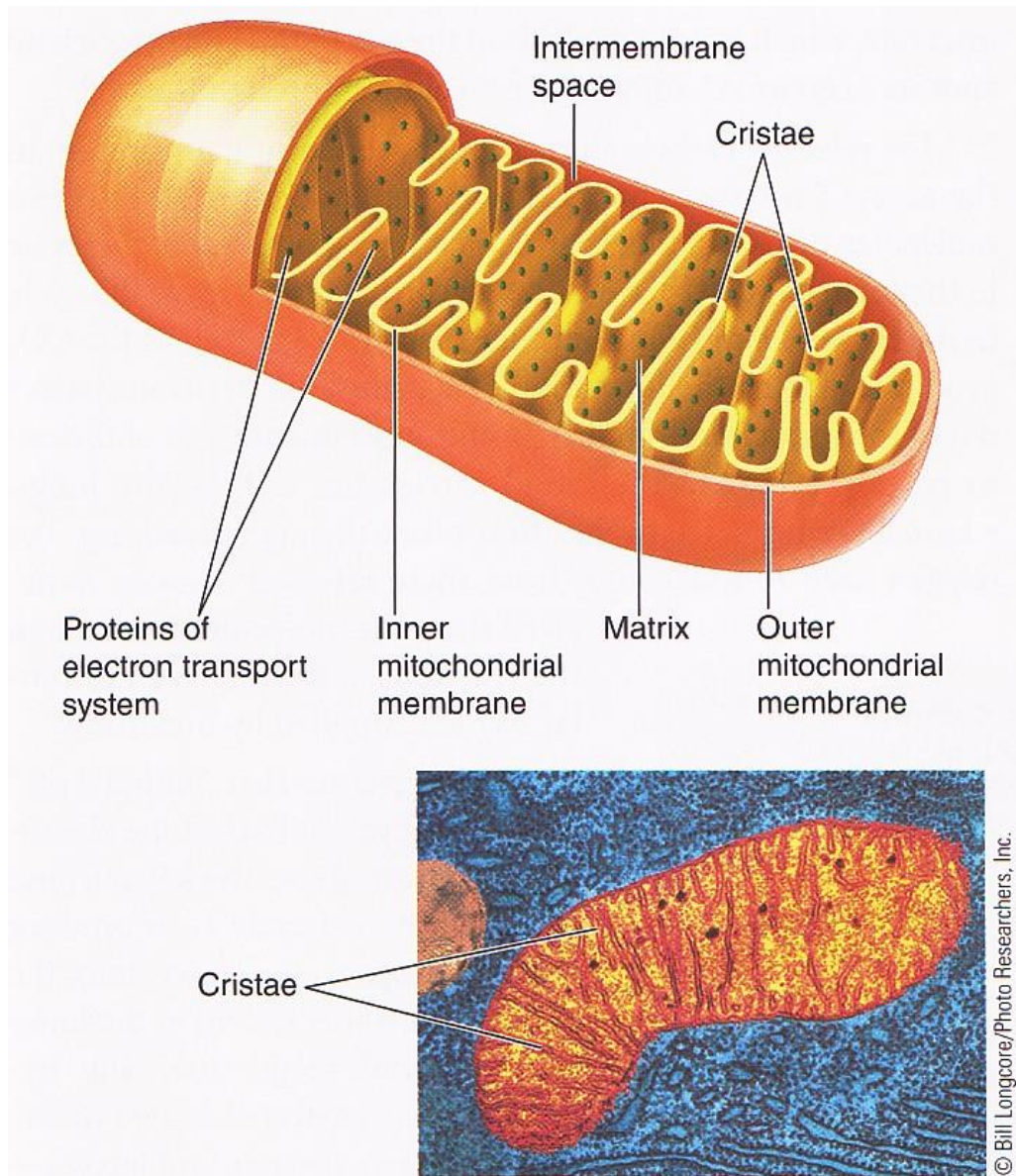
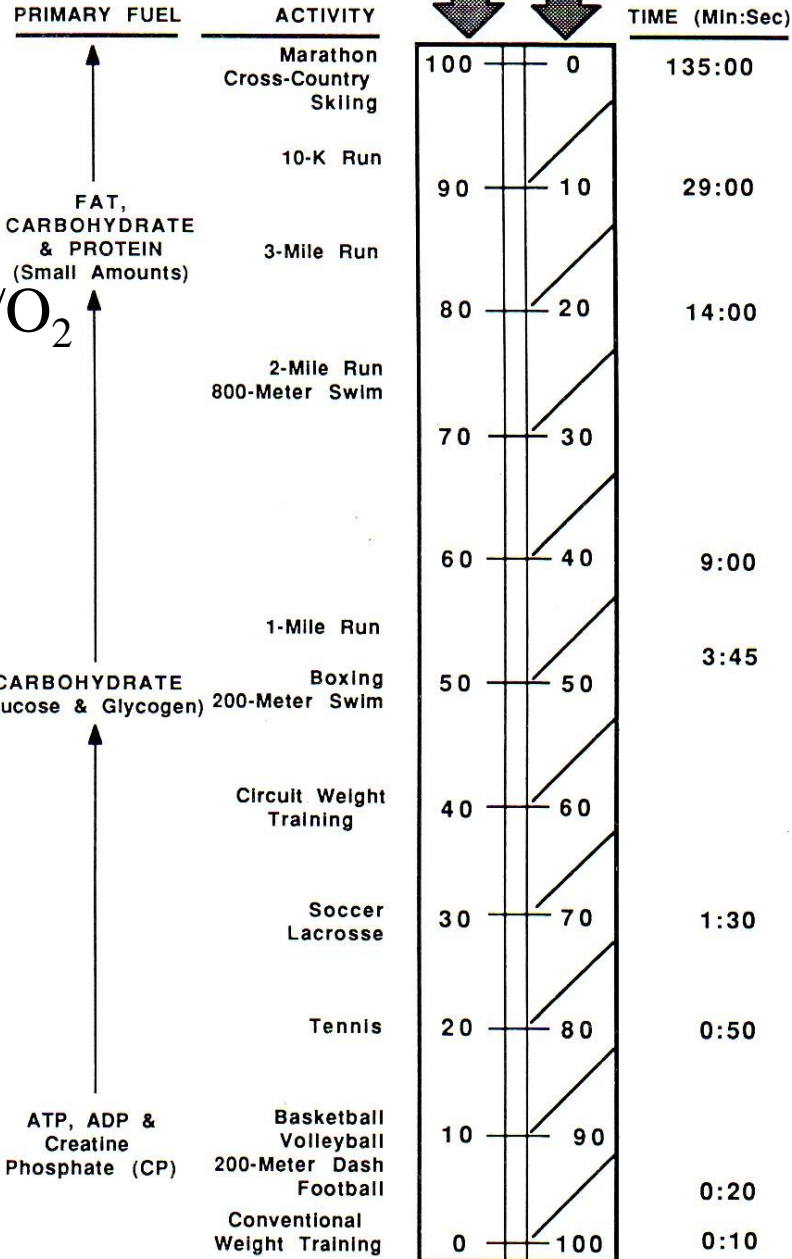


fig 2-8 LS 2012



AEROBIC

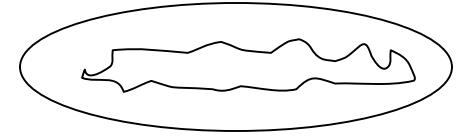
w/O₂



FAT,
CARBOHYDRATE
& PROTEIN
(Small Amounts)

CARBOHYDRATE
(Glucose & Glycogen)

ATP, ADP &
Creatine
Phosphate (CP)



MITOCHONDRIA

CYTOSOL

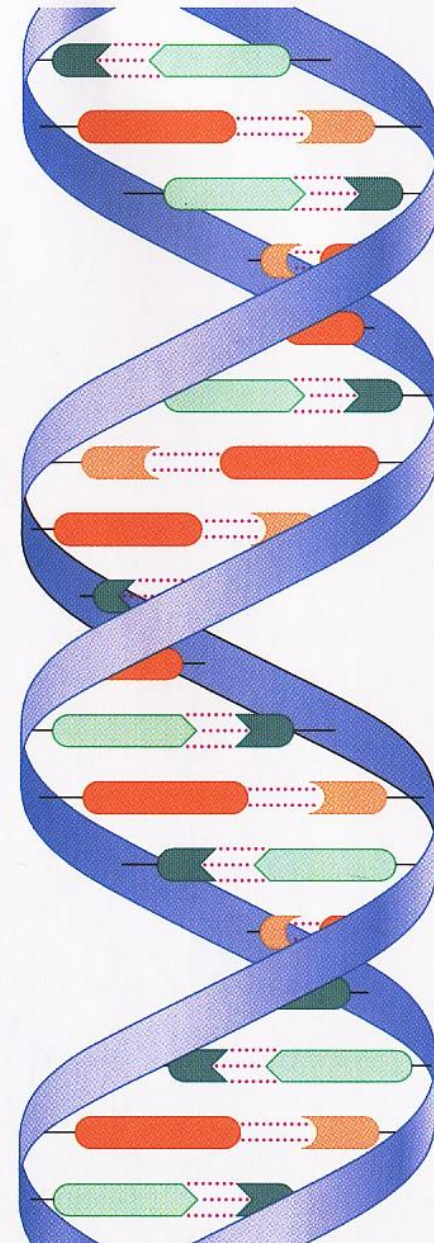
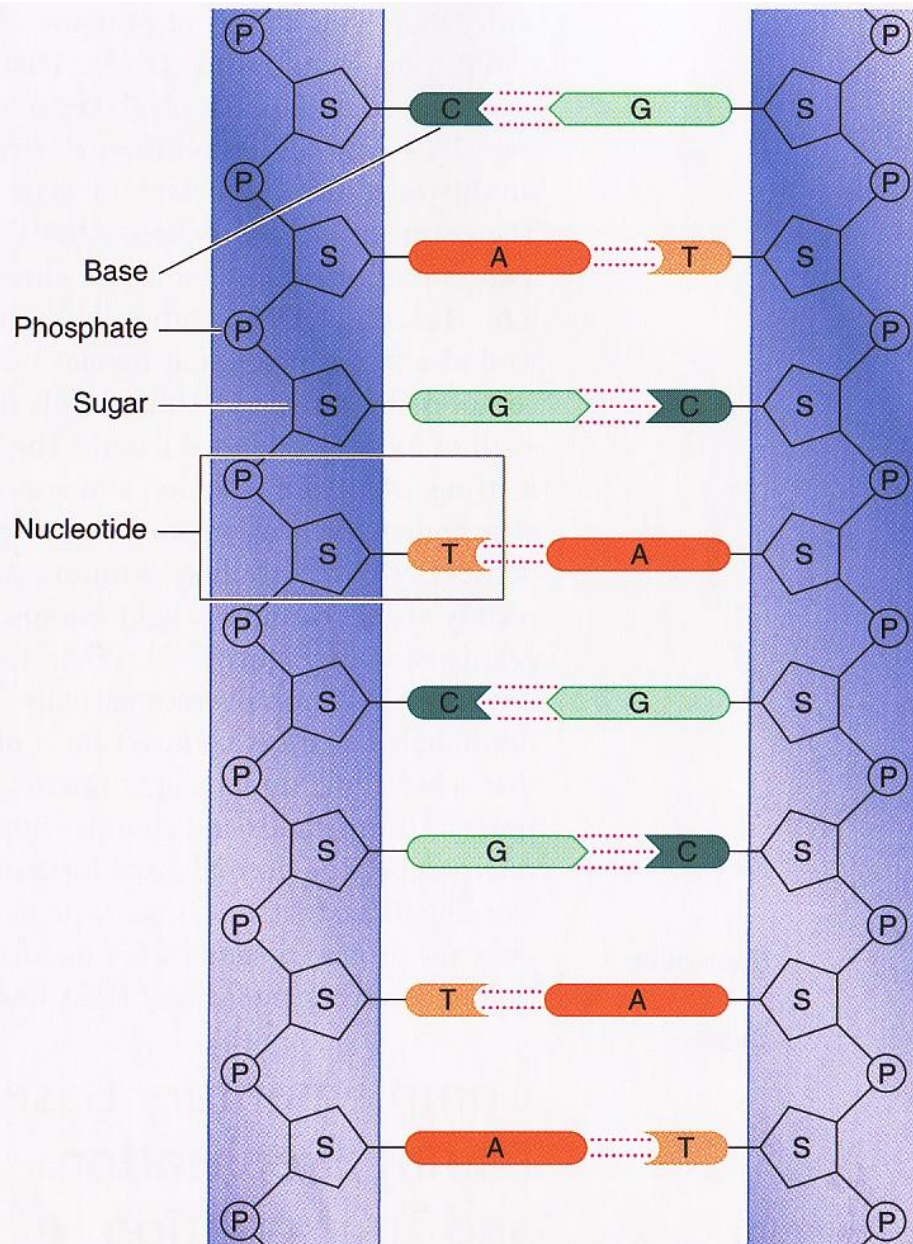
Glycolysis

Immediate/ATP-PC



ANAEROBIC

What does DNA look like? Double-helix!!



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



DietController Software for Personal Nutrition Analyses!



***No purchase necessary!
On computers in lab!***

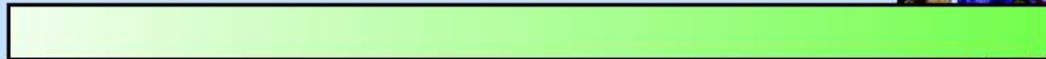
Dietary Composition & Physical Endurance

eg, Atkins!

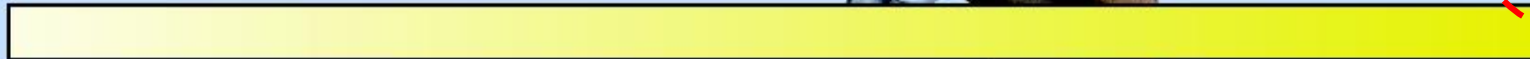
High-fat diet



Normal mixed diet



High-carbohydrate diet



~ 1/3 endurance!

Maximum endurance time:

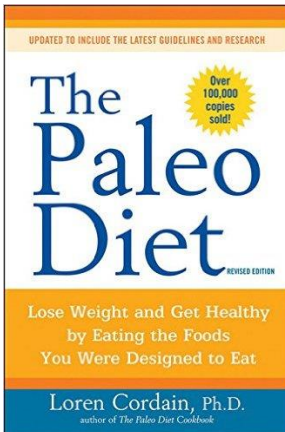
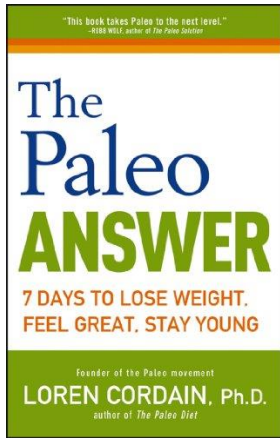
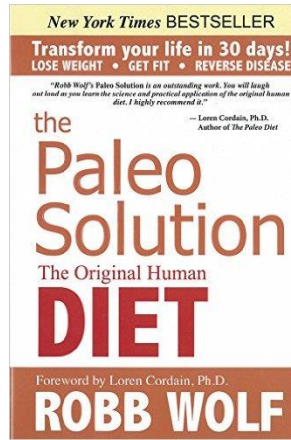
57 min

114 min

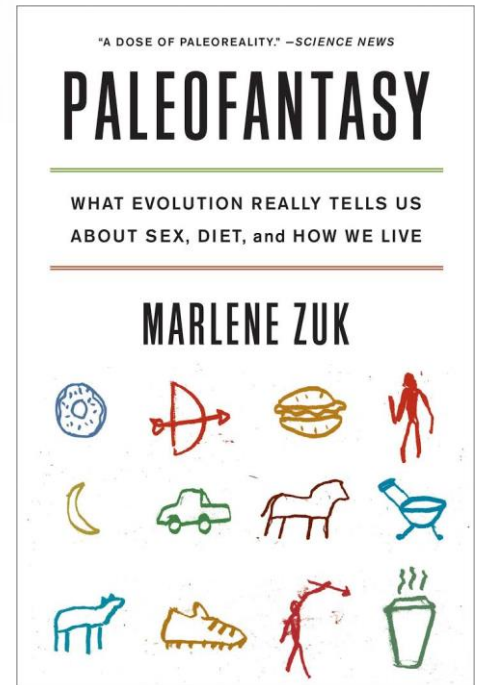
167 min



Pondering Paleo?



**Evolutionary Biologist
Behavioral Ecologist
U Minnesota**



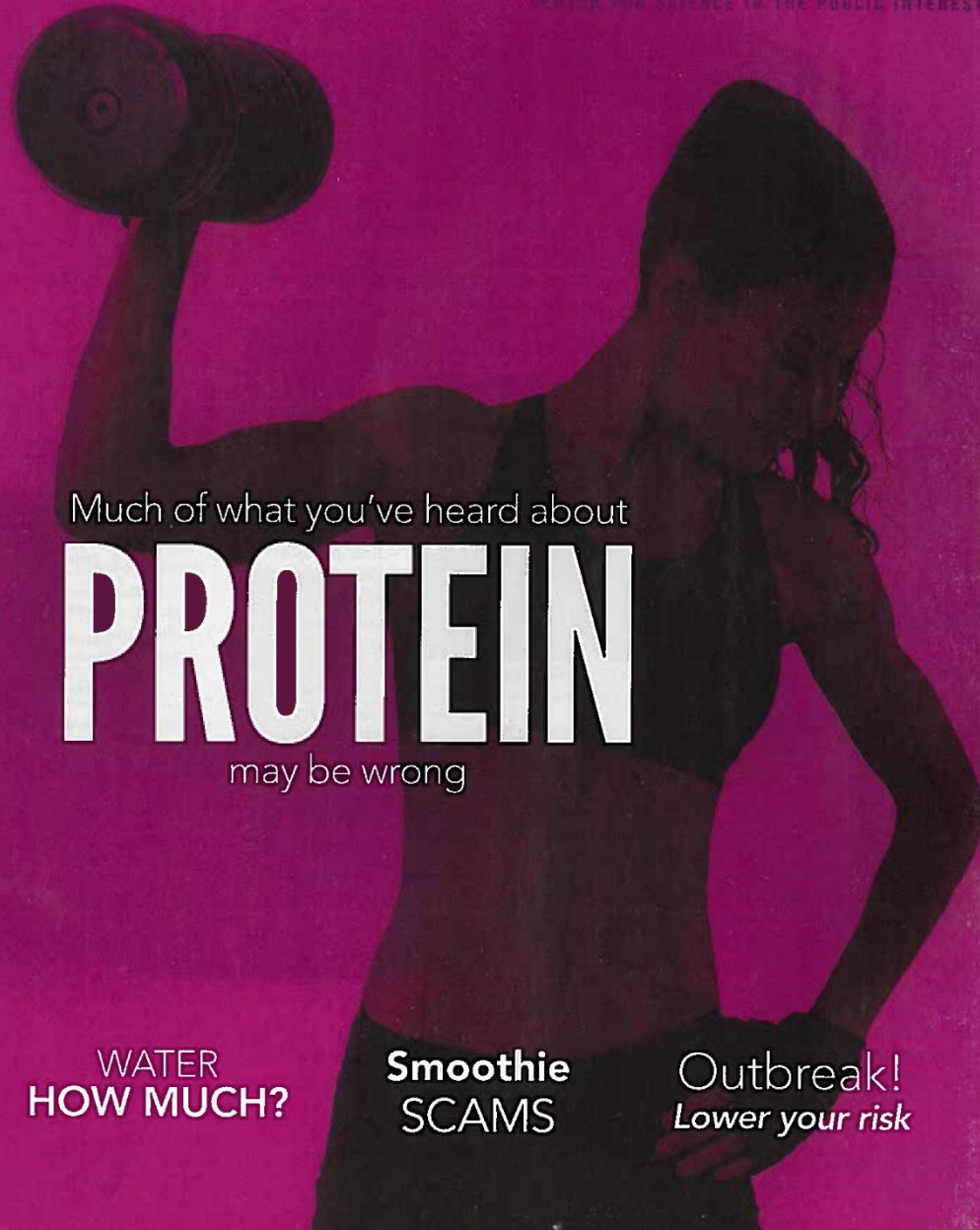
<http://www.nutritionaction.com/daily/how-to-diet/pondering-paleo/>

Nutrition Action

SEPTEMBER 2018 \$2.99

HEALTH LETTER®

VENTURE FOR SCIENCE IN THE PUBLIC INTEREST



Much of what you've heard about

PROTEIN

may be wrong

Photo: Jacob Lund/Photo: iStock.com

WATER
HOW MUCH?

**Smoothie
SCAMS**

Outbreak!
Lower your risk

The World's Longest-Lived People!

○ Blue Zones! ○



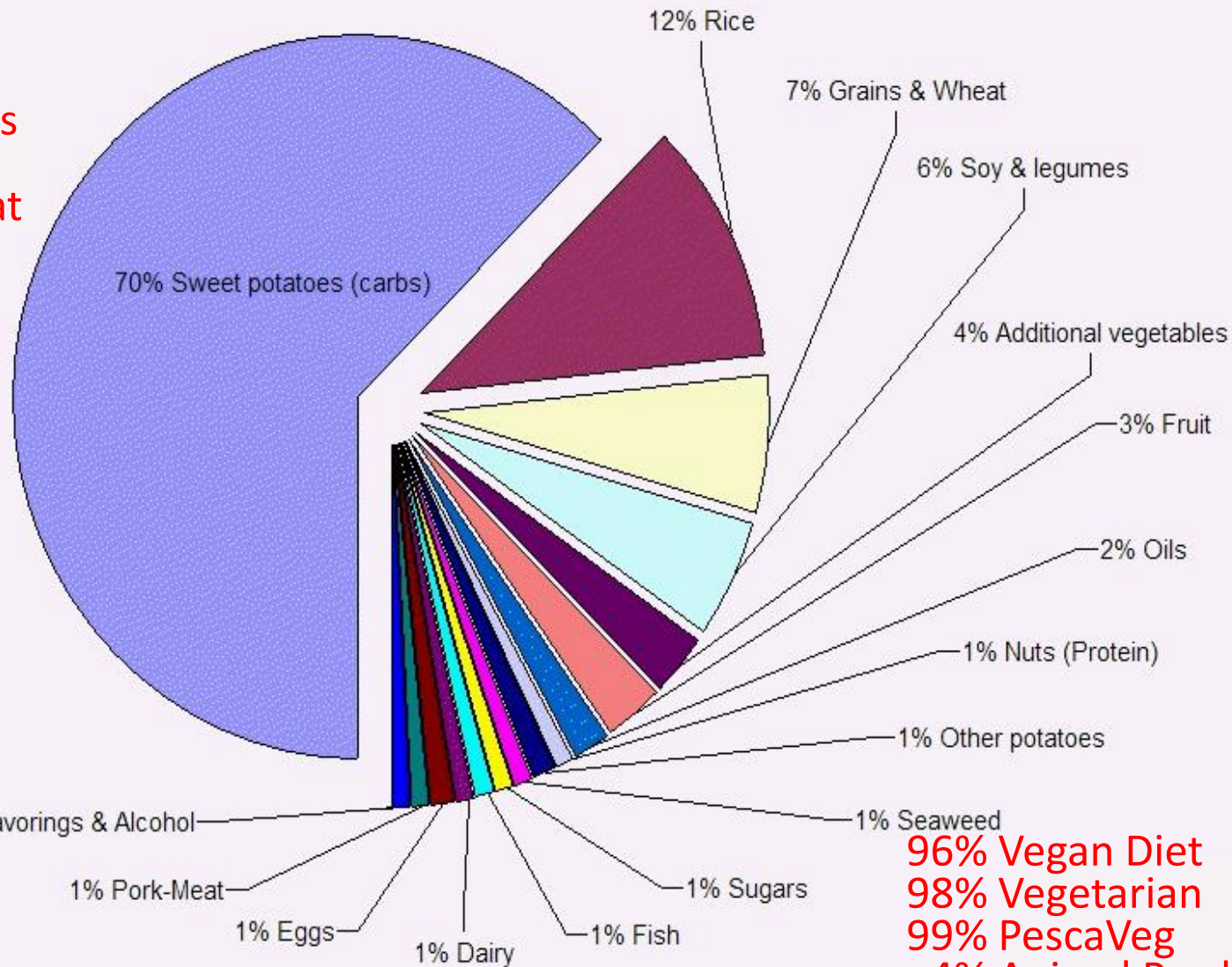
<https://www.cbsnews.com/news/blue-zones-do-people-who-live-in-certain-areas-live-longer/>, Aug 2013.

Buettner, D. *National Geographic*, Nov 2005.

M Poulain & Coworkers. *Experimental Gerontology*, Sep 2004

OKINAWA LONGEVITY DIET

- 70% Sweet Potatoes
- 12% Rice
- 7% Grains & Wheat
- 6% Soy & legumes
- 4% Additional vegetables
- 3% Fruit
- 2% Oils
- 1% Nuts (Protein)
- 1% Other potatoes
- 1% Seaweed
- 1% Sugars
- 1% Fish
- 1% Dairy
- 1% Eggs
- 1% Pork-Meat
- 1% Flavorings & Alcohol



85% Carbohydrates
 9% Protein
 6% Fat
 85-10-5
 1785 Calories

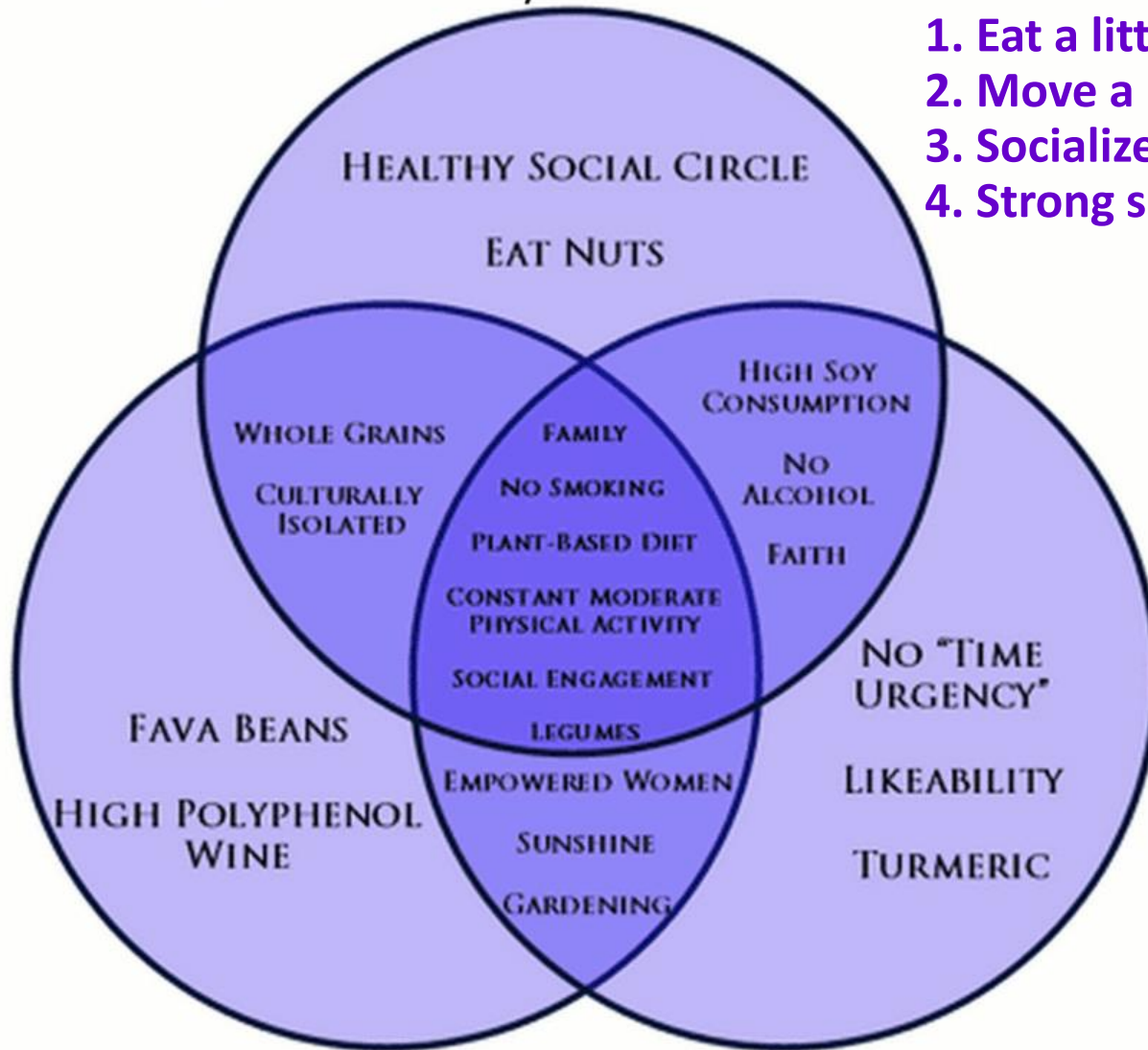
96% Vegan Diet
 98% Vegetarian
 99% PescaVeg
 <4% Animal Prod
 <1% Fish
 <1% Meat-Pork

SCIENTIFIC STUDY: "The Diet of the World's Longest-Lived People and Its Potential Impact on Morbidity and Life Span"
 JOURNAL: Annals of the Academy of Sciences - Volume 1114: 434-455 (2007).

Note: These are the Actual Food Measurements of the Centenarians, not the diet of All island Okinawans or the ones who died, but the ones who lived.

Loma Linda, United States

1. Eat a little bit better!
2. Move a little bit more!
3. Socialize more!
4. Strong sense of purpose!



Sardinia,
Italy

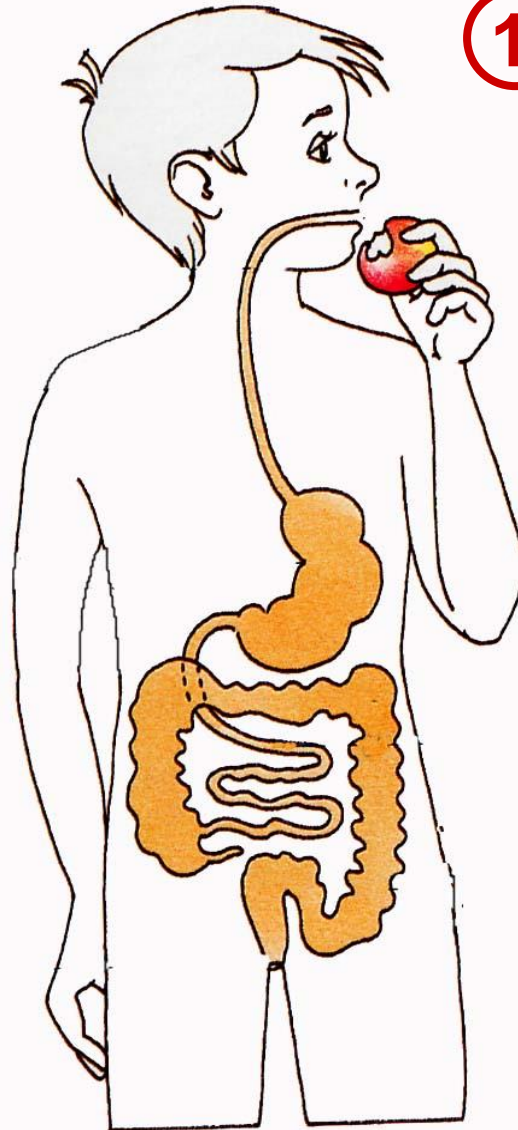
Okinawa,
Japan

https://en.wikipedia.org/wiki/Blue_Zone

<https://www.bluezonesproject.com/>

<http://www.sciencedirect.com/science/article/pii/S0531556504002141>

Digestion Steps



① Ingestion

② Mechanical Digestion

③ Chemical Digestion

④ Peristalsis

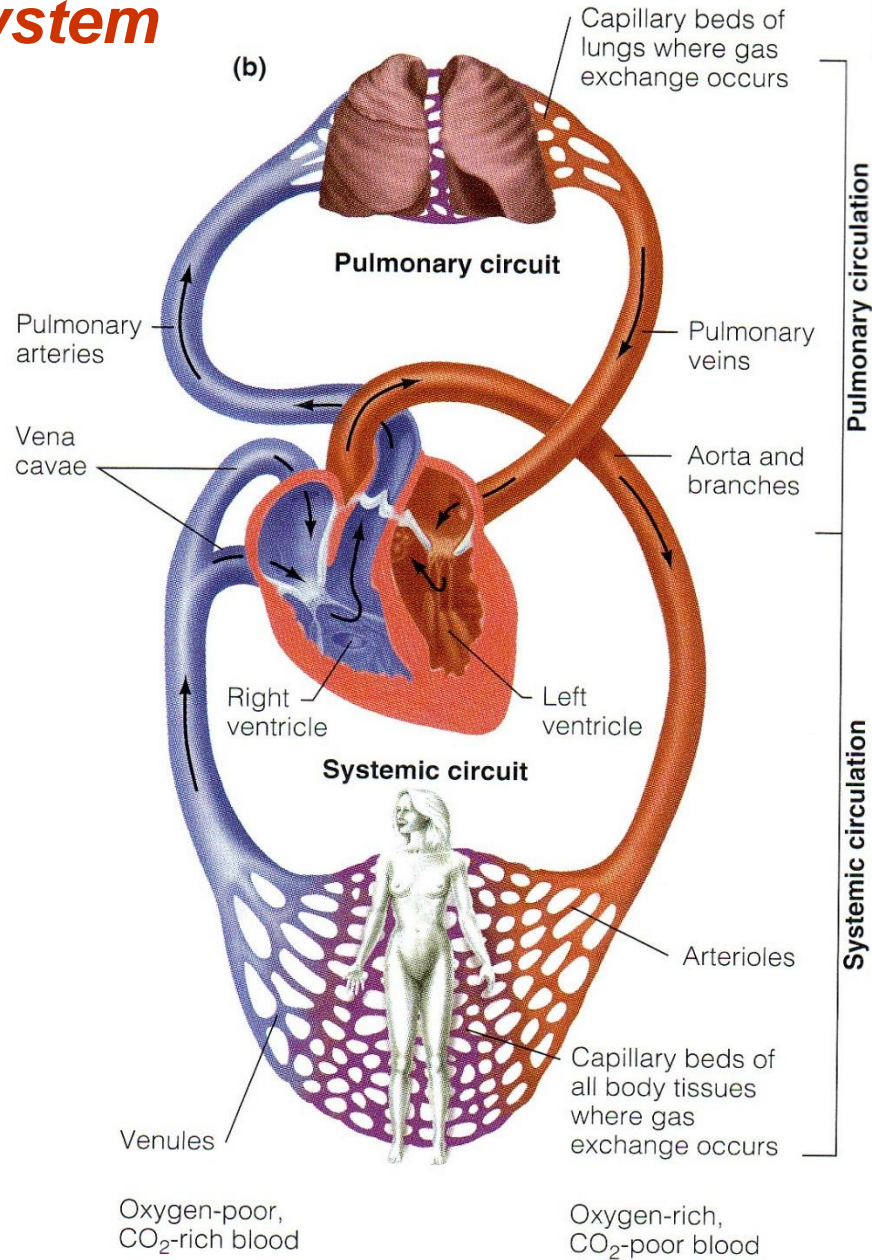
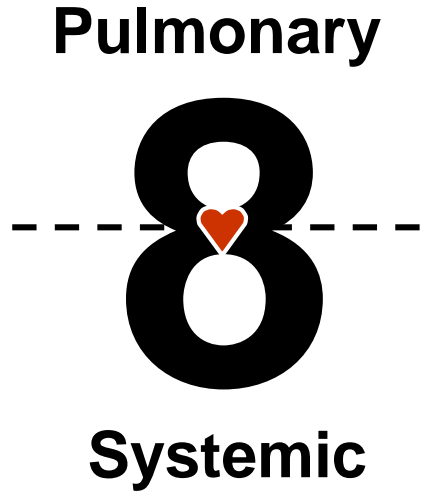
⑤ Absorption

⑥ Storage

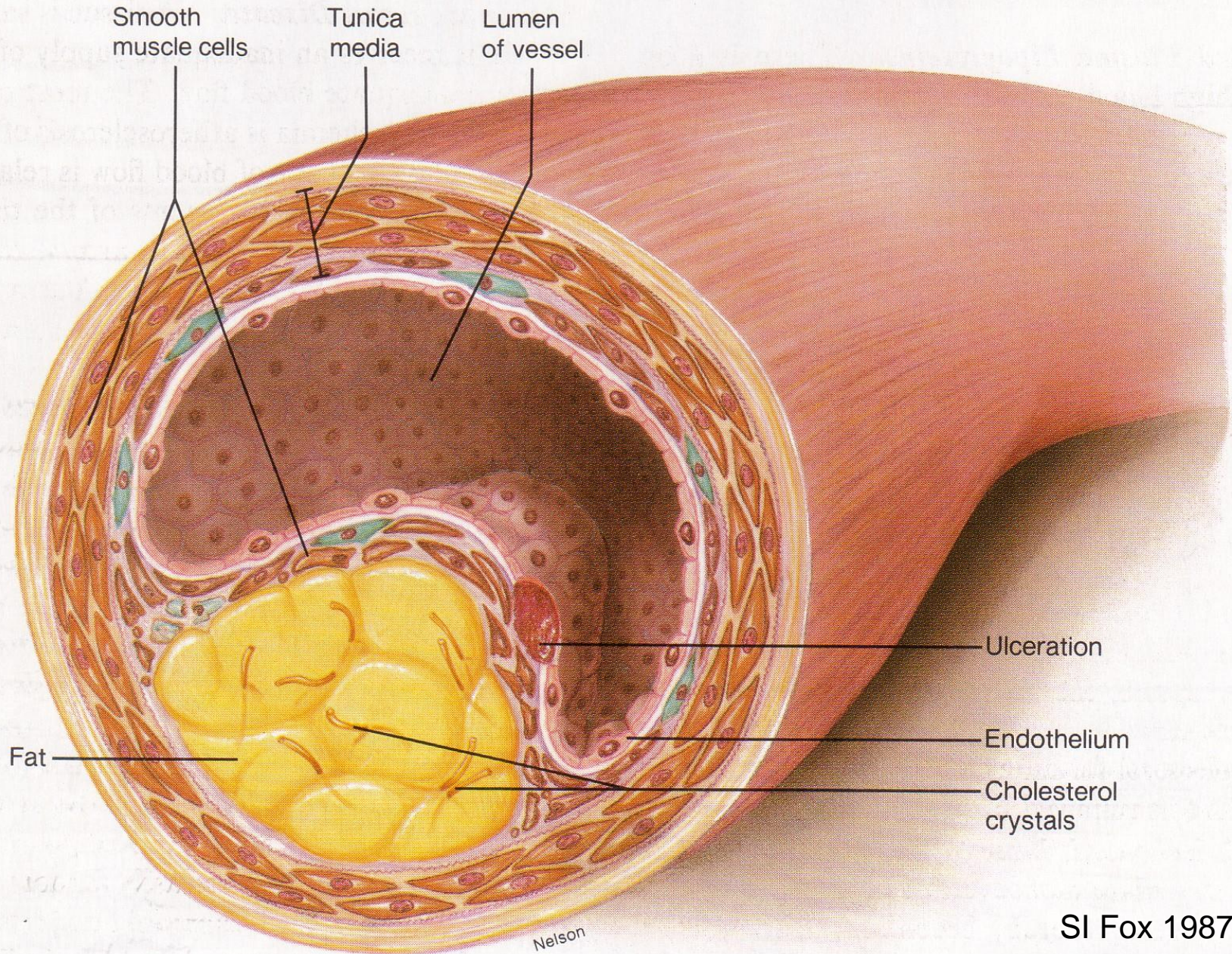
⑦ Defecation

Cardiovascular System

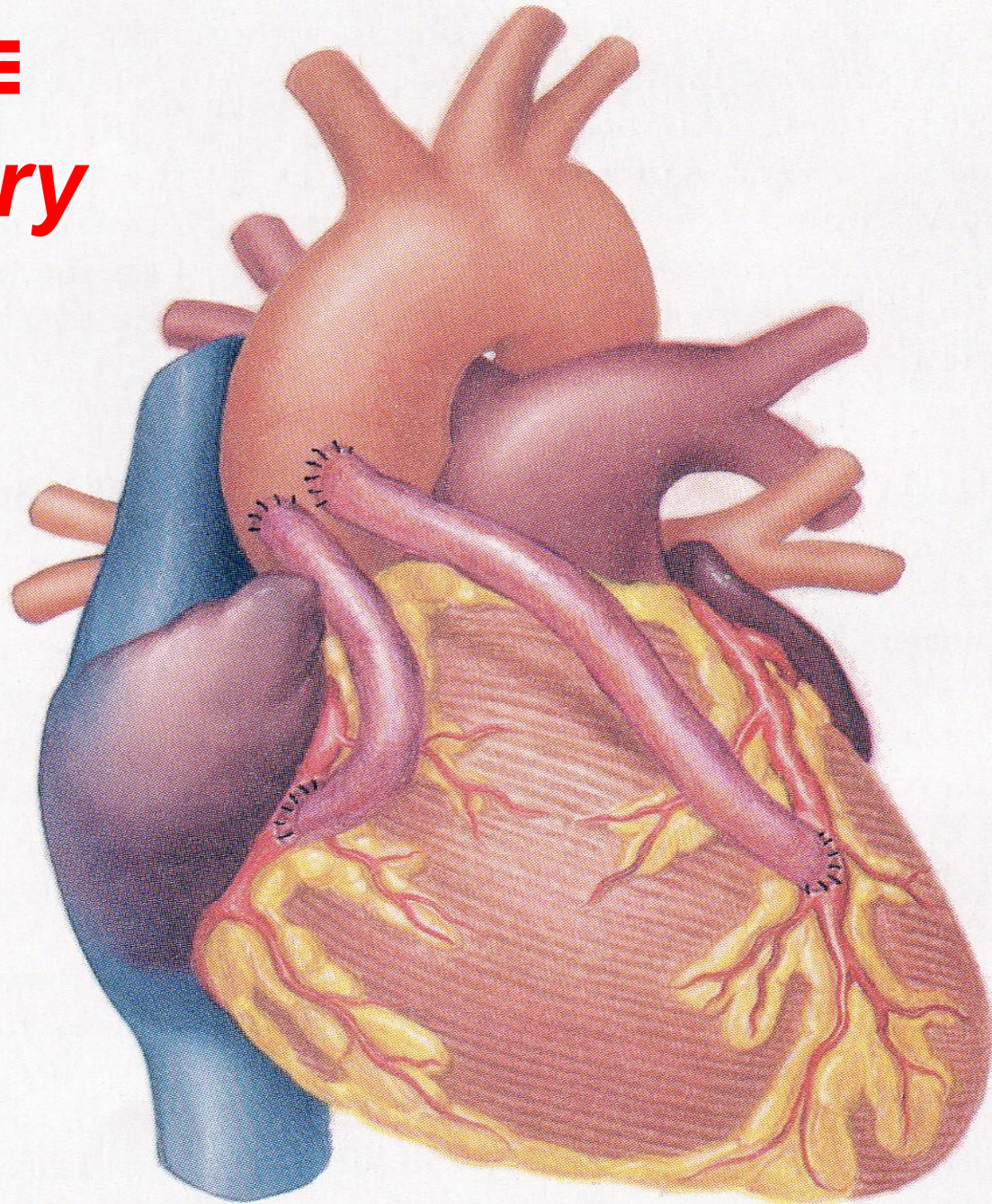
Figure-8 Loop



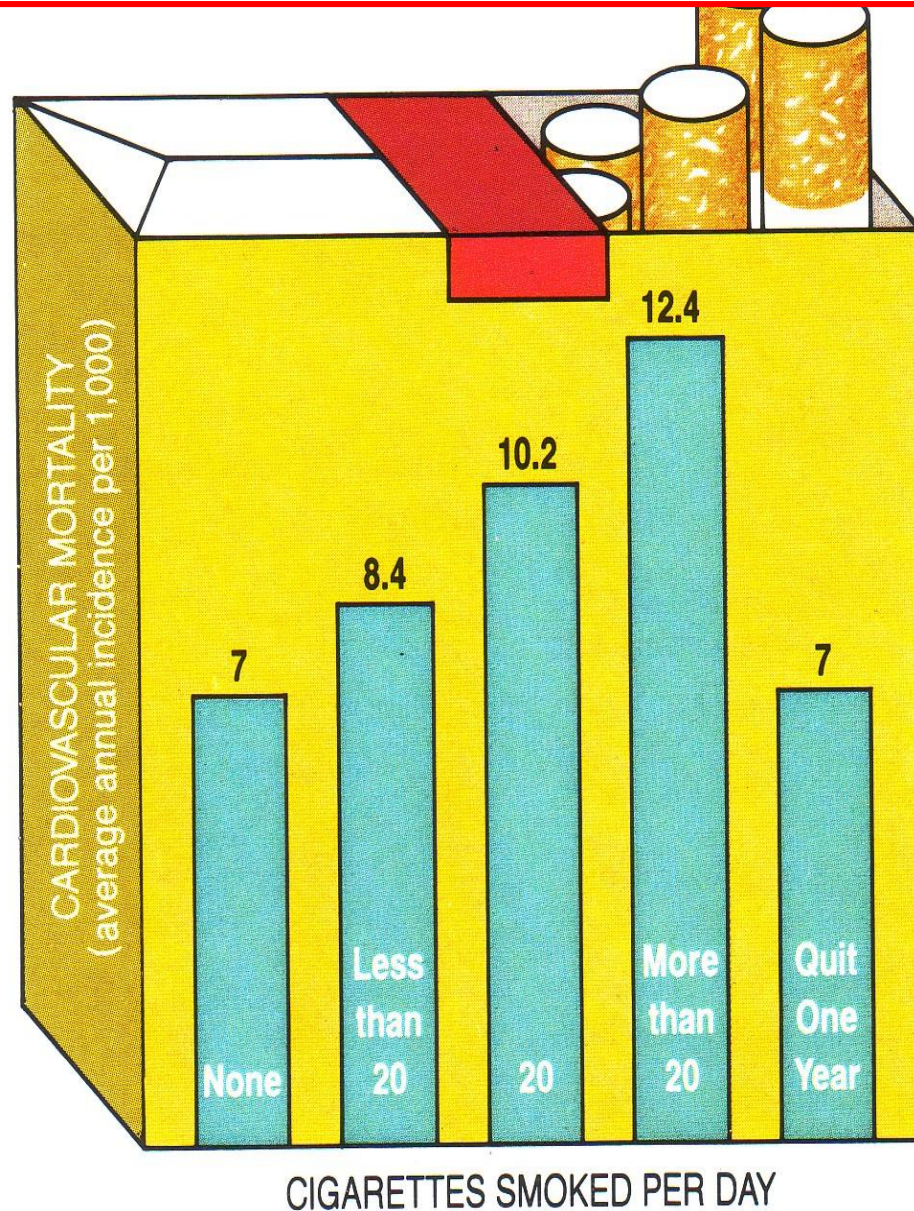
Atherosclerosis developing within vessel walls!



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?

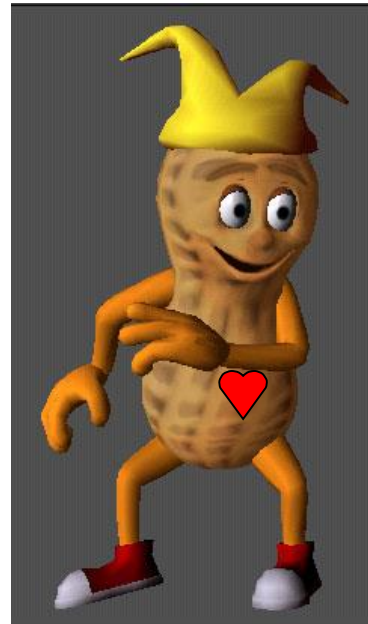
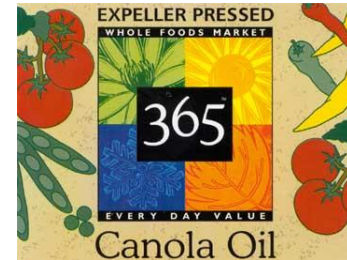
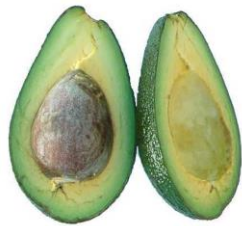
H

A

P

O

C



Nutrition Action

OCTOBER 2011 \$2.50

HEALTH LETTER®
CENTER FOR SCIENCE IN THE PUBLIC INTEREST

Eat Real, America!

"With the right food choices, physical activity, and not smoking, we could prevent about 80 percent of heart disease, about 90 percent of diabetes, and 70 percent of stroke," says Walter Willett, chair of the nutrition department at the Harvard School of Public Health in Boston. "Those are the three pillars. They really do make a difference."

The right food choices are simple: Eat less red meat, sweets, refined grains, and salt, and drink fewer sugary beverages. Replace unhealthy foods with vegetables, fruit, beans, and whole grains, and with smaller amounts of fish, poultry, and low-fat dairy. Those foods aren't just good for our health. They can also help protect the Earth.

Here's why—and how—to eat real.

Continued on page 3.

With the right food choices, physical activity, and not smoking, we could prevent about ~90% of diabetes, 80% of heart disease & 70% of stroke!

Photo: © Marisa at Beaudinmau/110

FOOD DAY
OCTOBER 24, 2011
JOIN US AT FOODDAY.ORG

40
CSPI • 1971-2011

Nutrition *Action*

JULY/AUGUST 2018 \$2.50

HEALTH LETTER®

CENTER FOR SCIENCE IN THE PUBLIC INTEREST

How Did We Get Here?



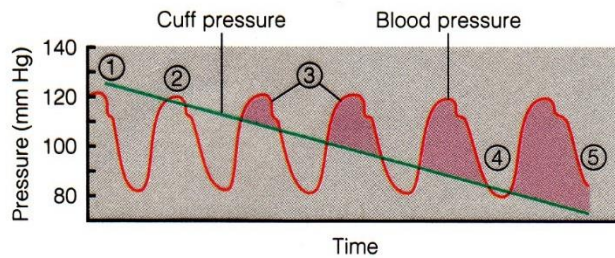
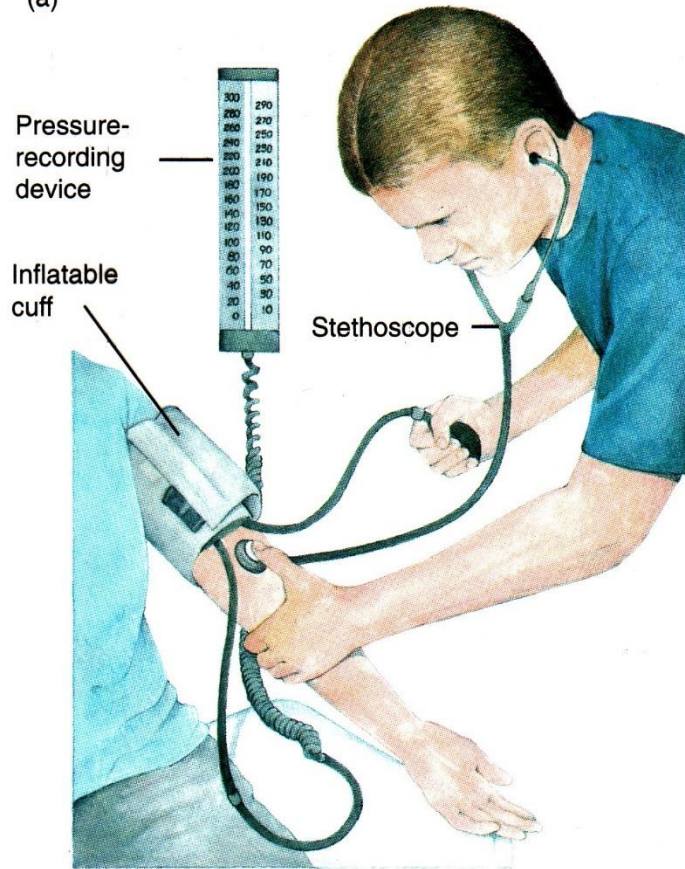
Explaining the obesity epidemic

HOW TO
EAT LESS

2018
*Xtreme Eating
Awards*

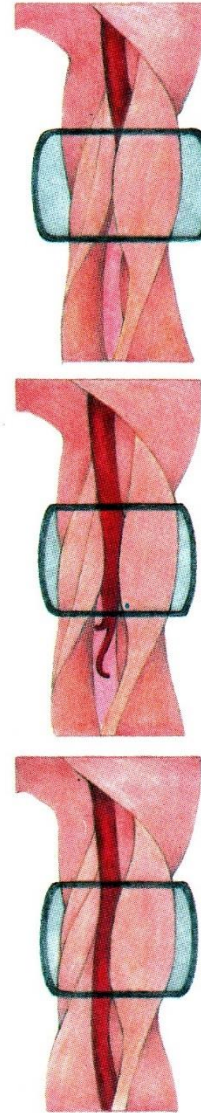
**Trans Fat
R.I.P.**

(a)



(b)

(c) When blood pressure is 120/80:

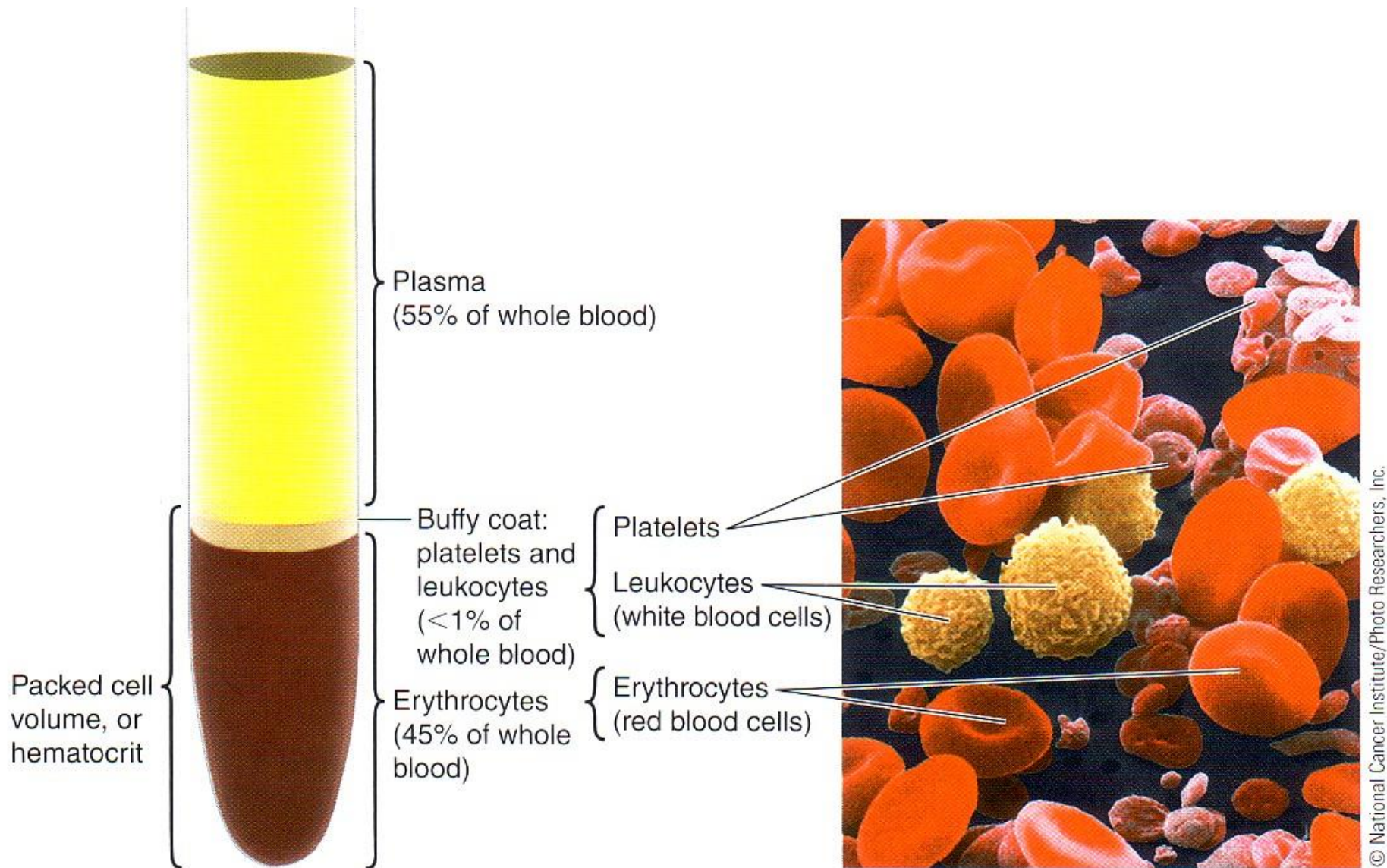


Cuff pressure is greater than 120 mm Hg.
No blood flows through vessel.
No sound is heard.

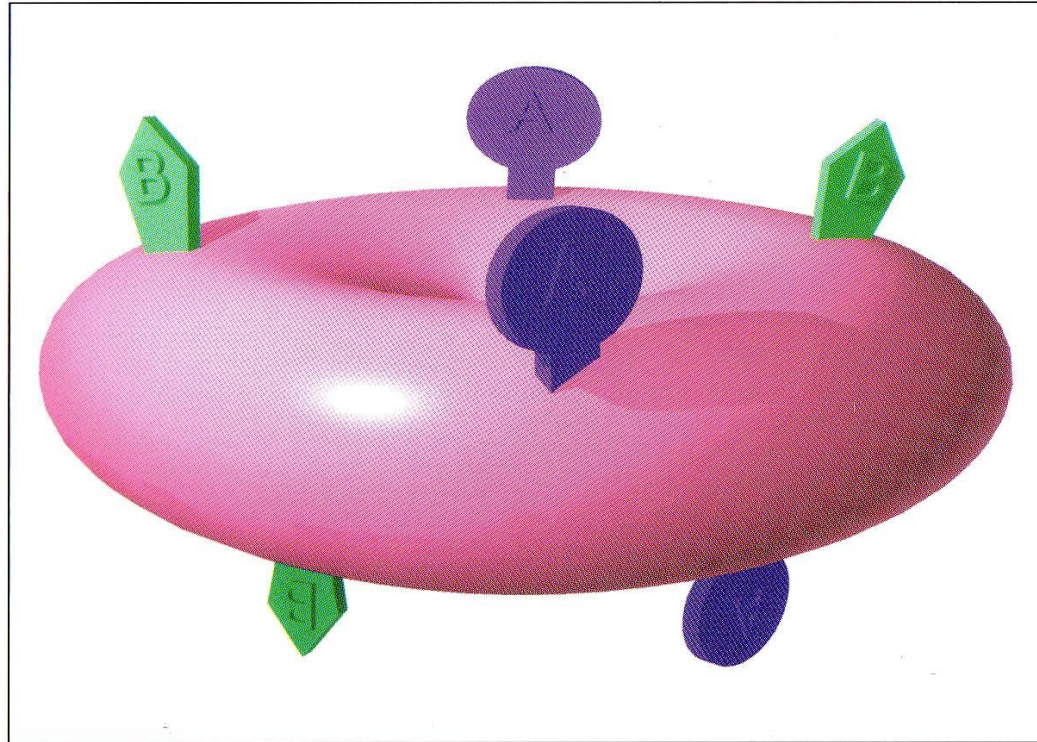
Cuff pressure is between 120 and 80 mm Hg.
Blood flow through vessel is turbulent whenever blood pressure exceeds cuff pressure.
Intermittent sounds are heard as blood pressure fluctuates throughout cardiac cycle.

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



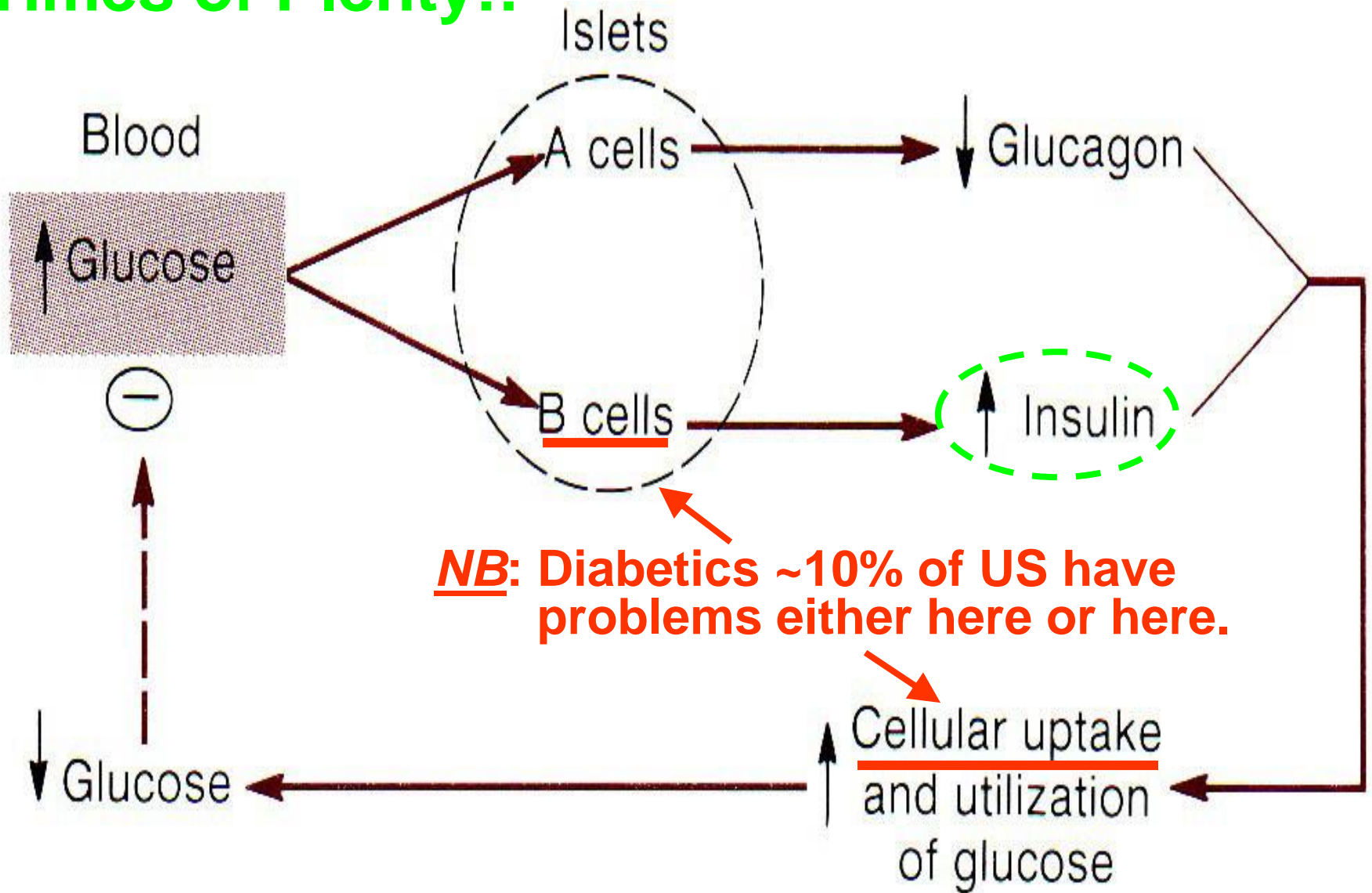
A & B Antigens
(Agglutinogens)

Glucose:
Sugar in Blood



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

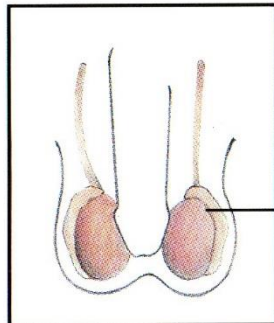
Times of Plenty!!



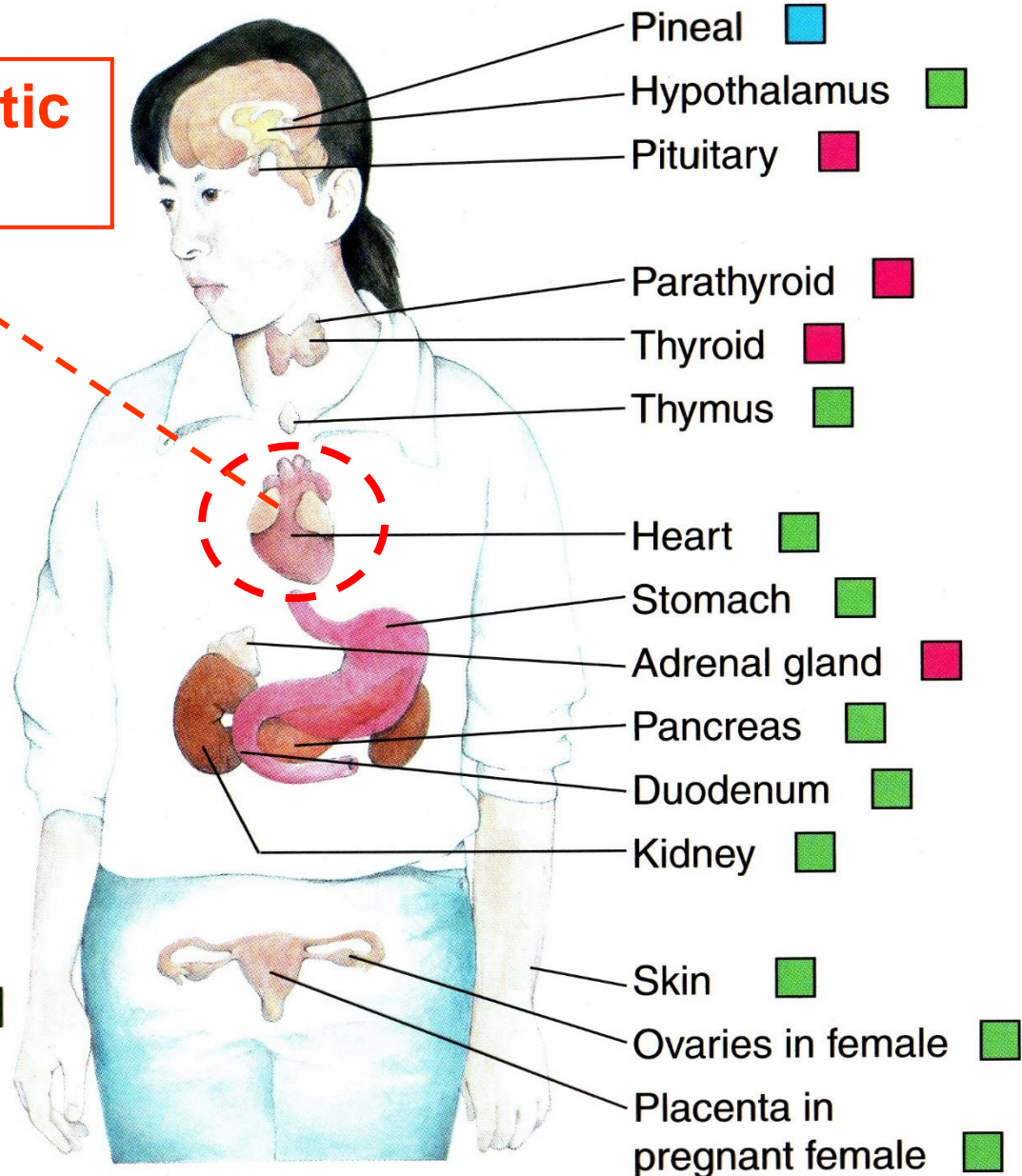
Endocrine System

ANP = Atrial Natriuretic Polypeptide

- Solely endocrine function
- Mixed function
- Complete function uncertain

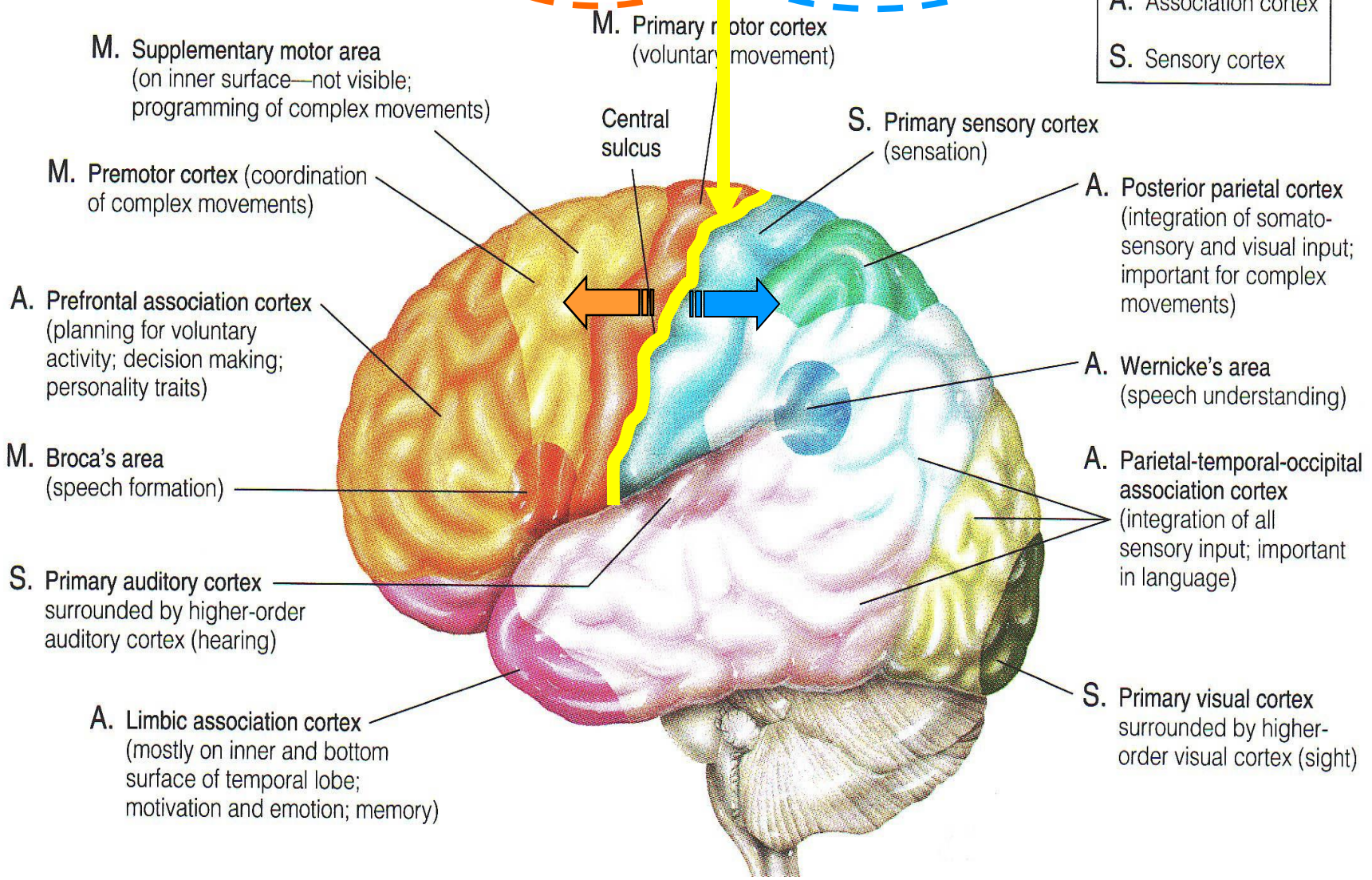


Testes in male ■

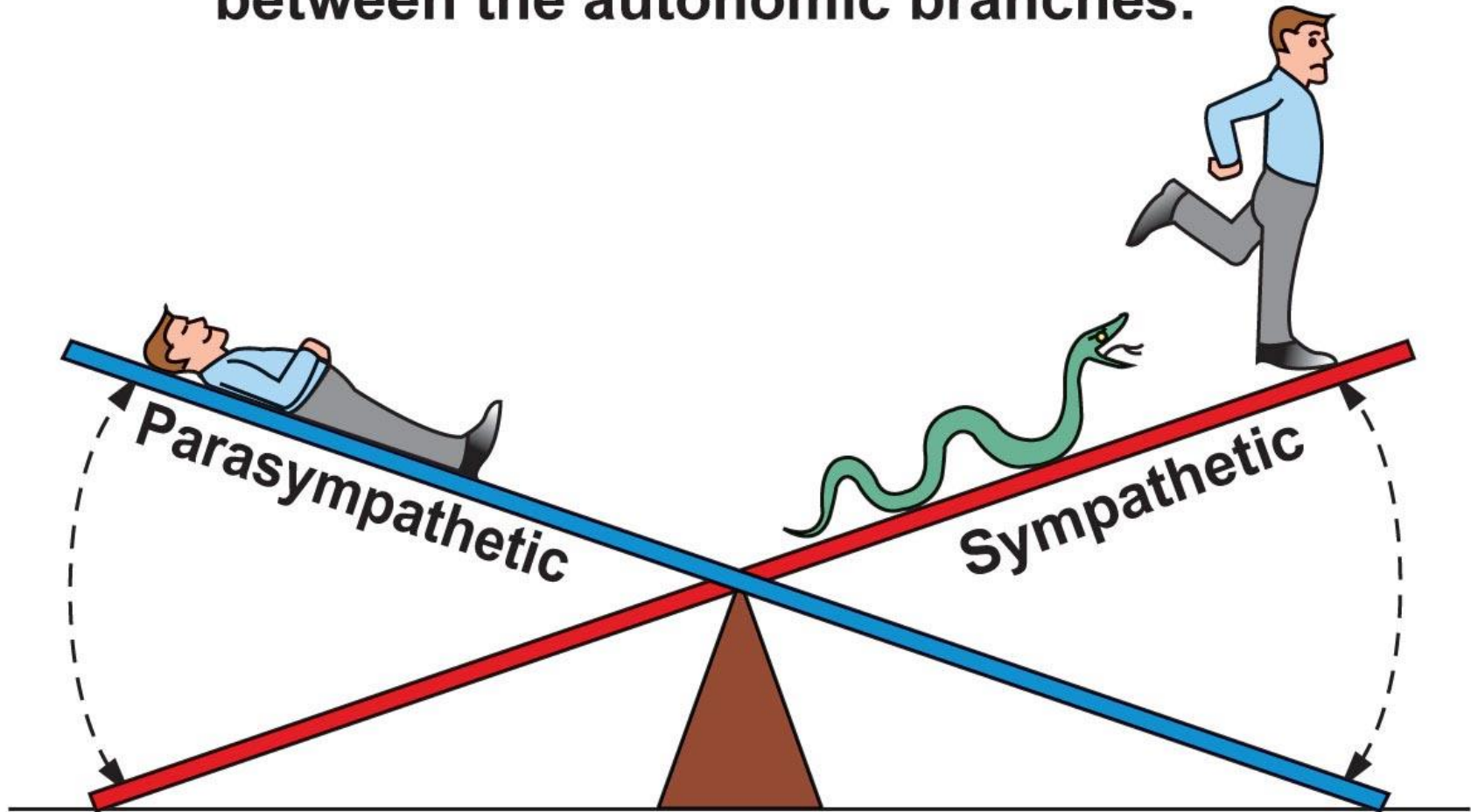




Key	
M.	Motor cortex
A.	Association cortex
S.	Sensory cortex



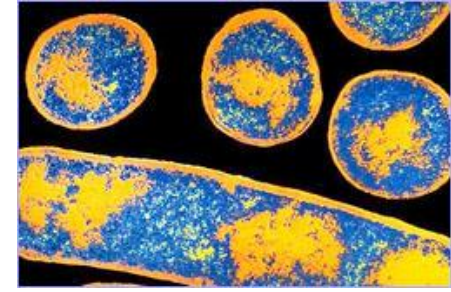
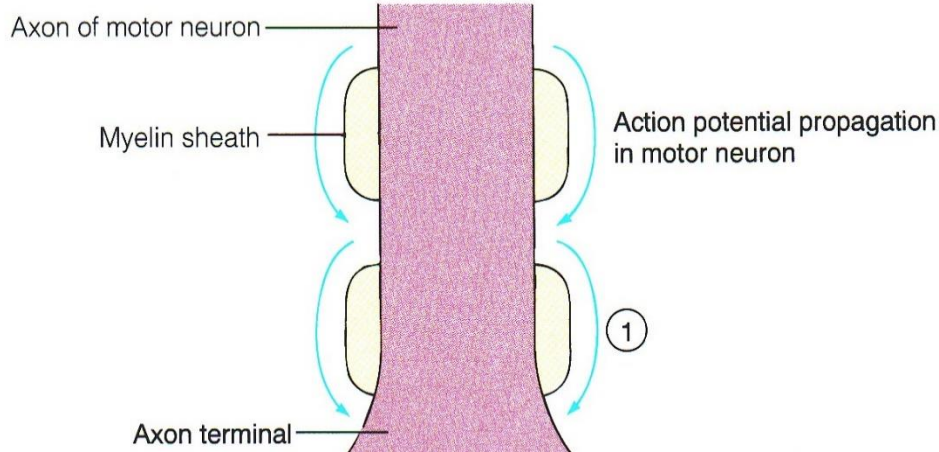
Homeostasis is a dynamic balance between the autonomic branches.



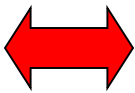
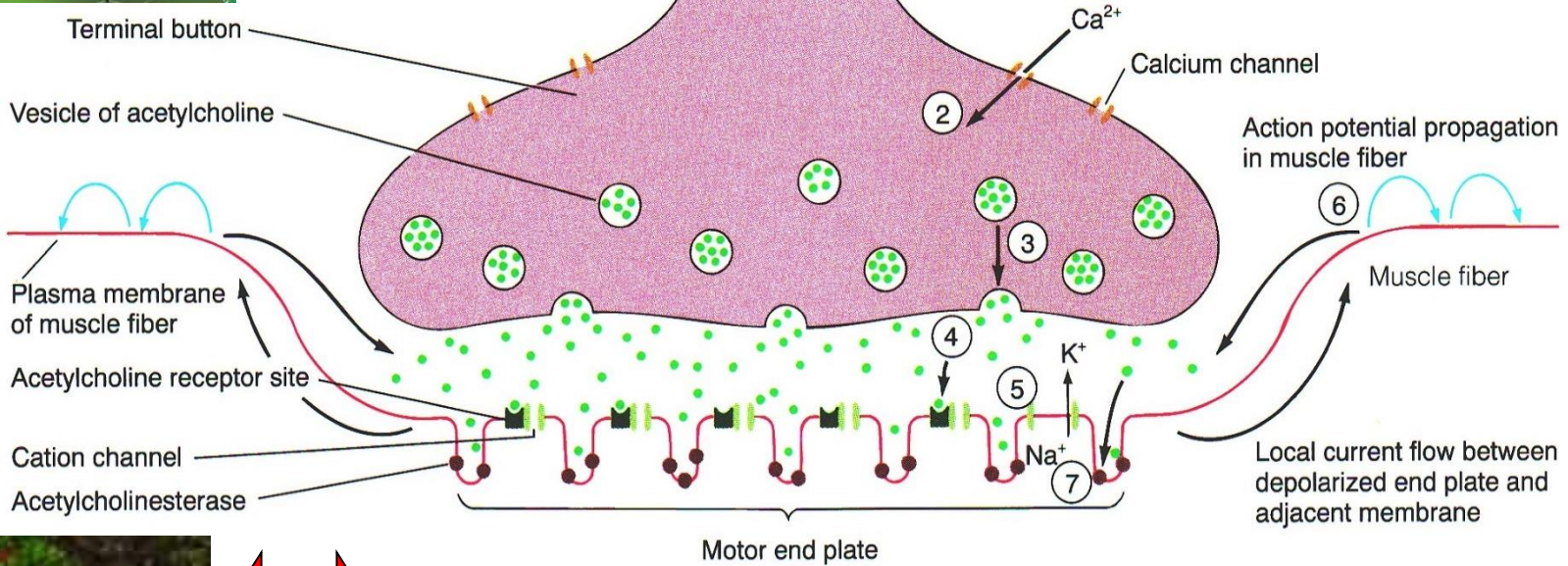
**Rest-and-digest:
Parasympathetic
activity dominates.**

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

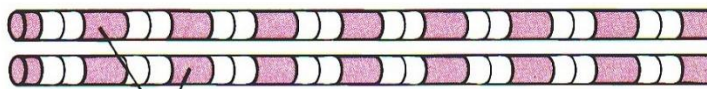
↑ 3



~~3~~



4

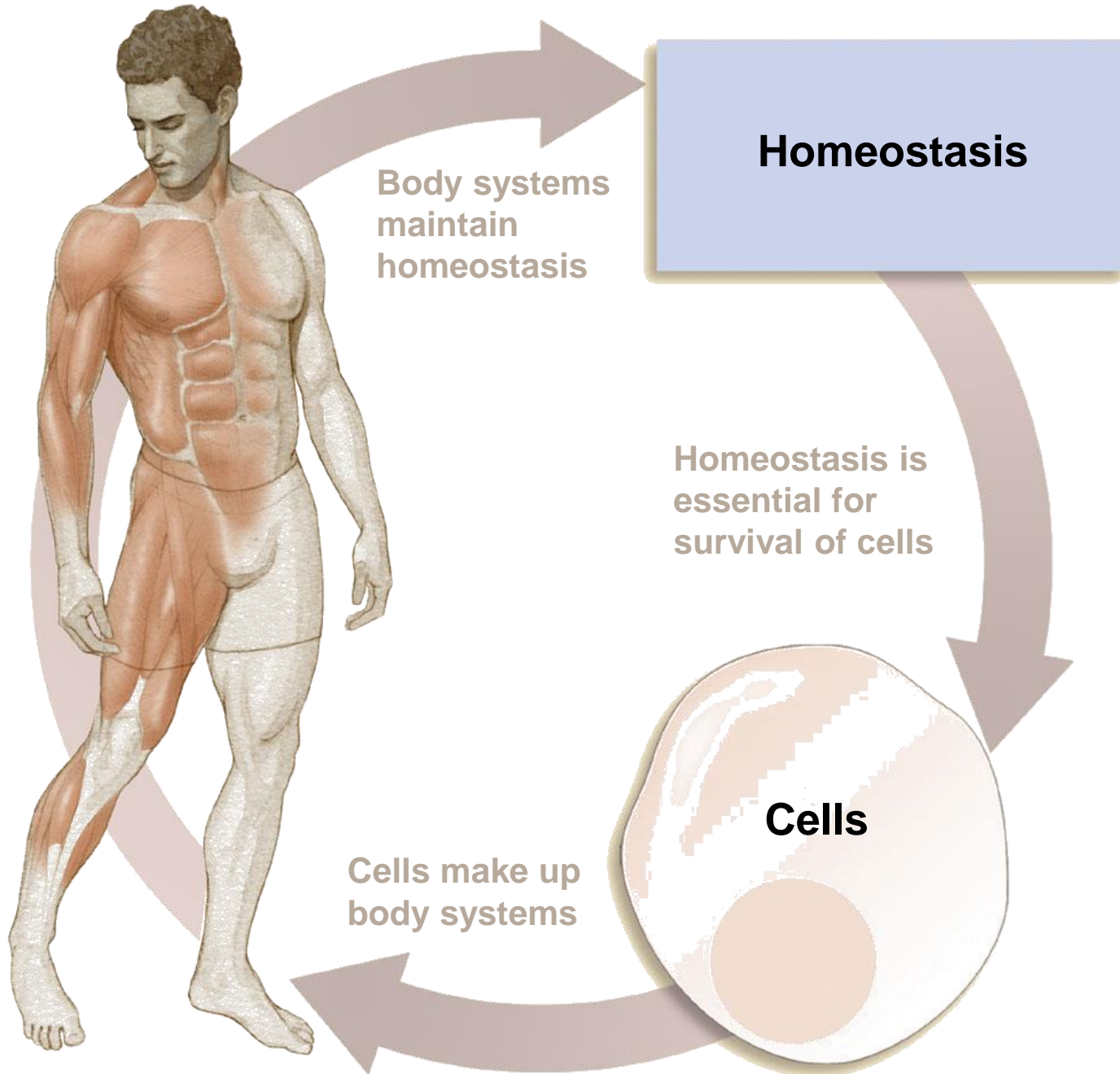


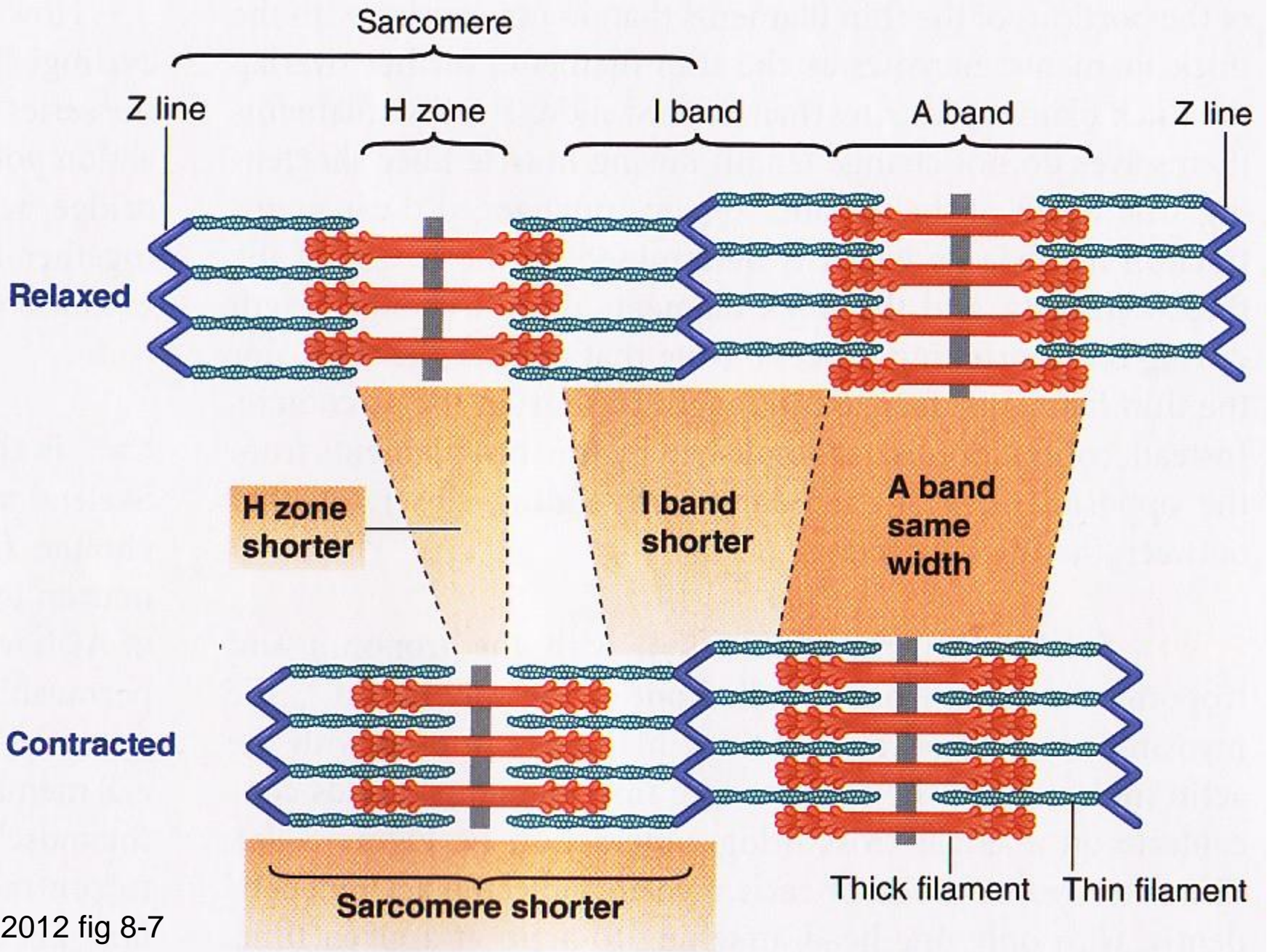
Contractile elements within muscle fiber



~~7~~

Muscular System





LS 2012 fig 8-7



Atrophy

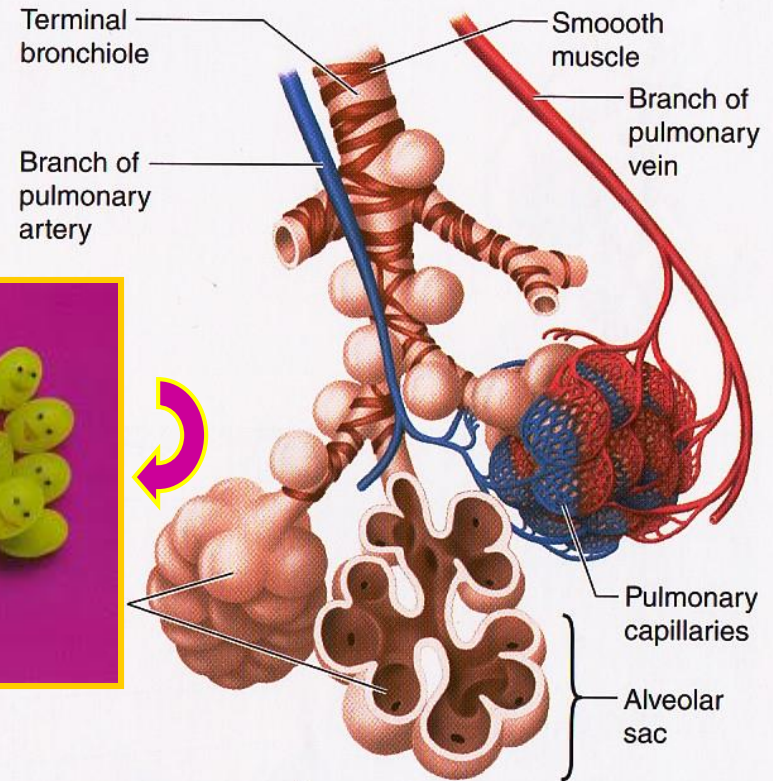
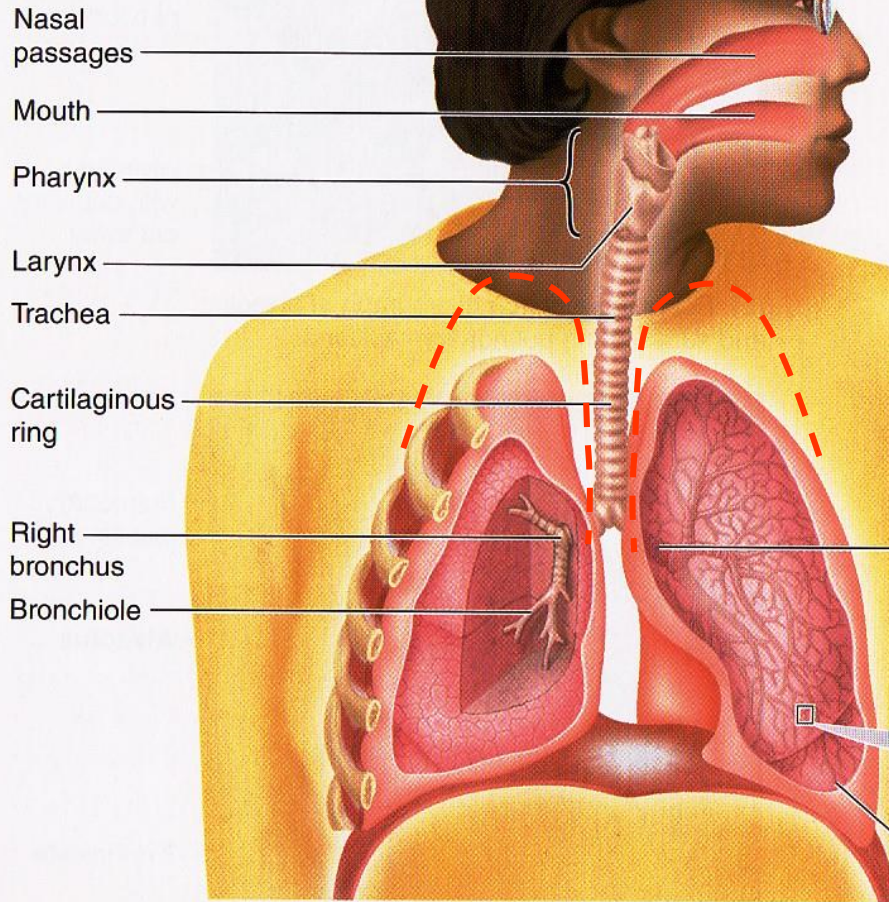
*decrease in size
& strength*

Hypertrophy

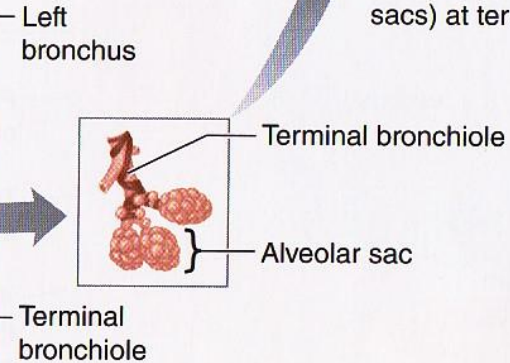
*increase in size
& strength*

Respiratory System Anatomy

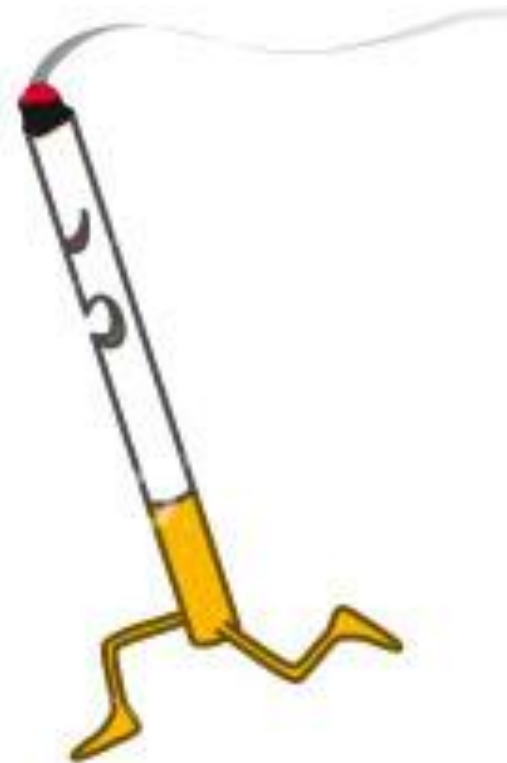
NB: In vivo,
Cupola or peak
of each lung
goes into neck
> clavicle line!



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



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



News: Health, Toxicology, Pollution

Health risks of e-cigarettes emerge

Vaping pollutes lungs with toxic chemicals and may even make antibiotic-resistant bacteria harder to kill

By JANET RALOFF 4:31PM, JUNE 3, 2014



<https://www.sciencenews.org/article/health-risks-e-cigarettes-emerge>

👉😊...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.

Break for discussion/questions!



ANATOMY
STRUCTURE
WHAT?
WHERE?

VS

PHYSIOLOGY

VS

FUNCTION

VS

HOW?

VS

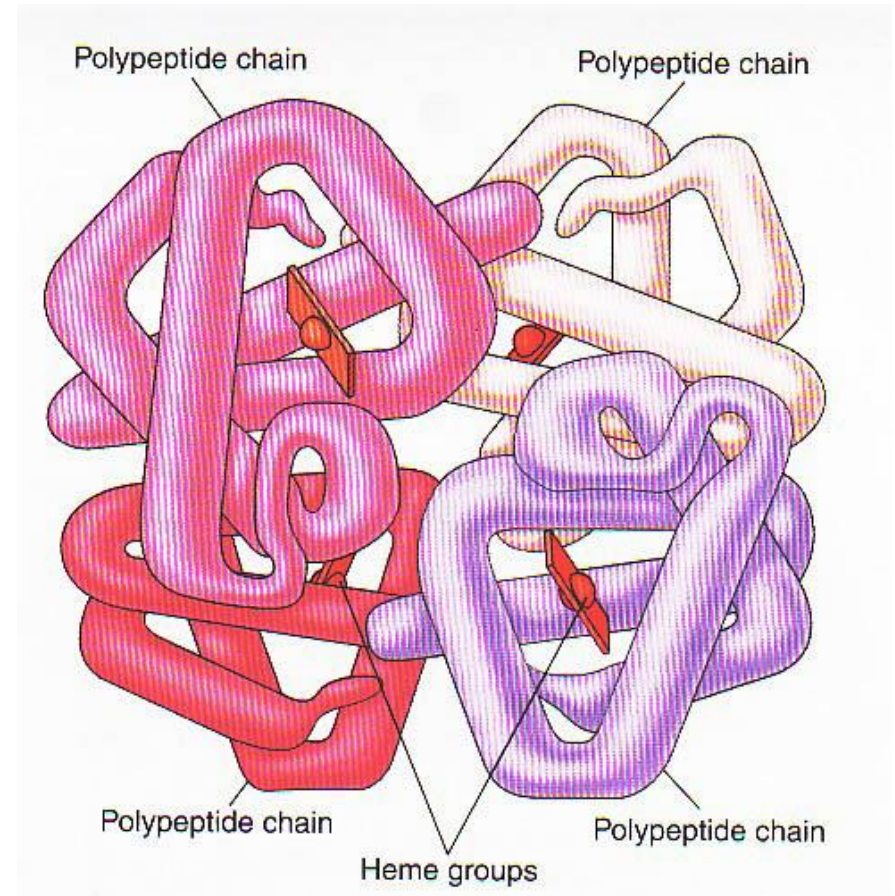
WHY?



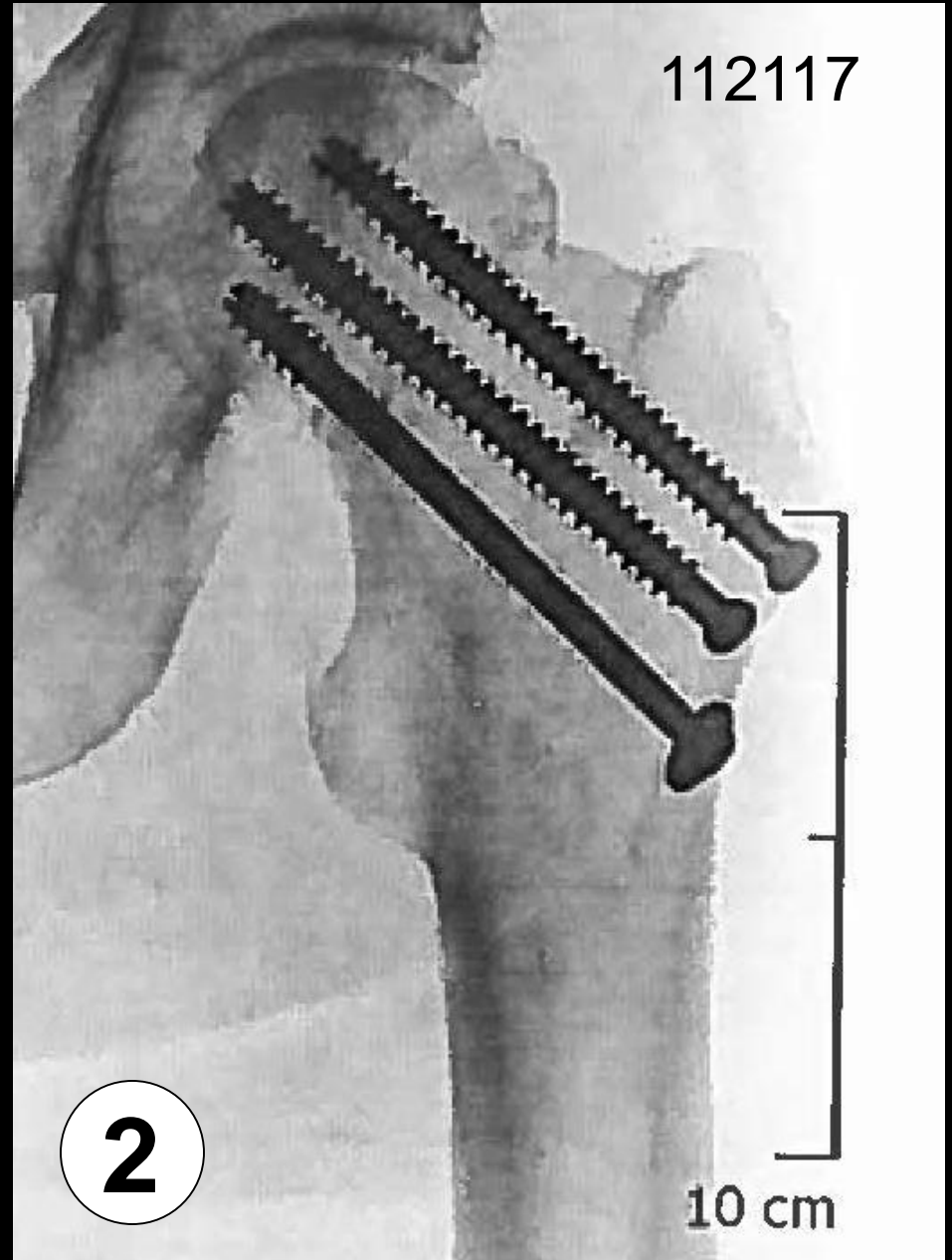
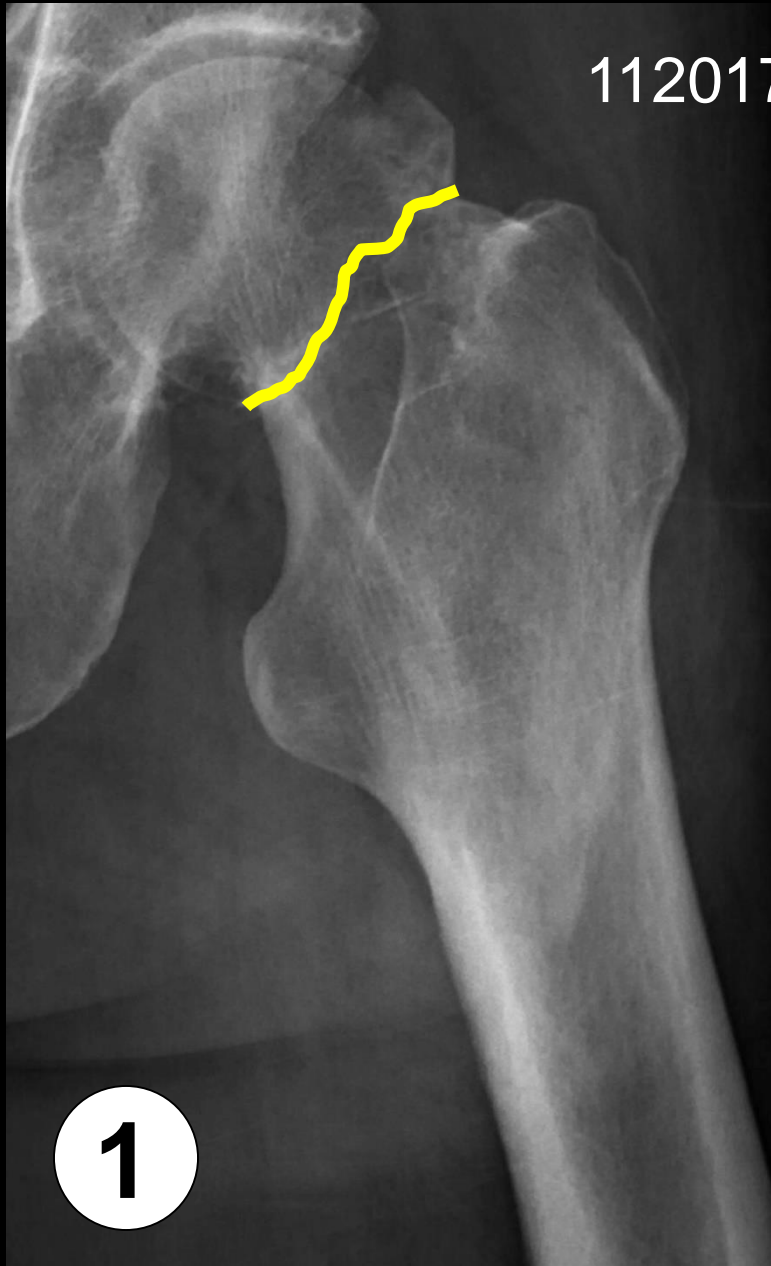
VS



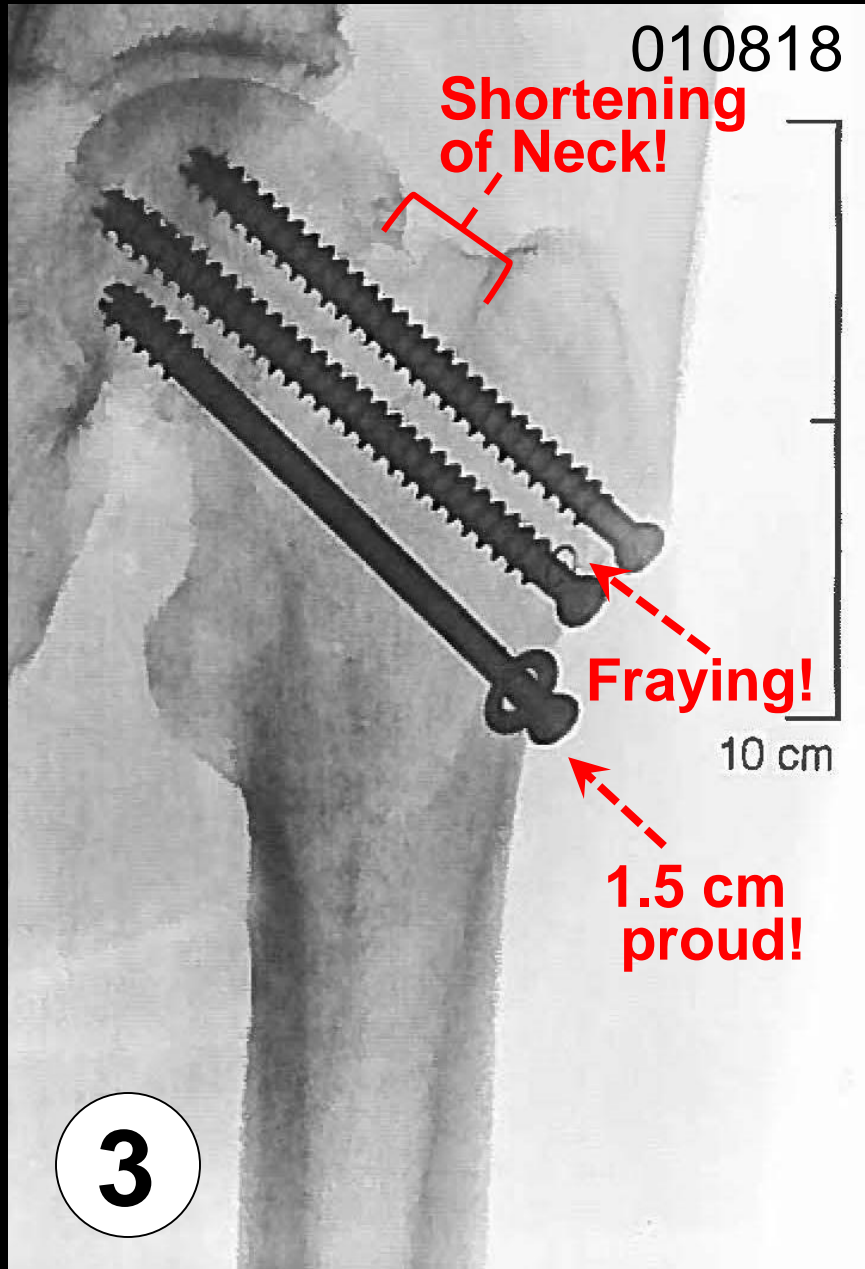
Structure begets *function*!
Structure gives rise to *function*!
Structure & *function* are inseparable!



Structure-Function: L Hip Fracture & Fixation w/Screws



L Hip Osteonecrosis & L Hip Replacement



Body Levels of Organization

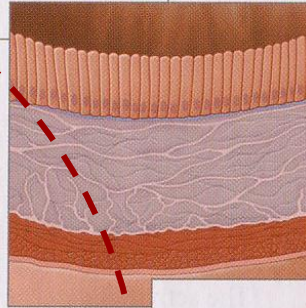
1. Molecular



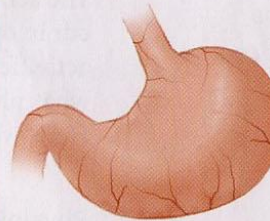
2. Cellular



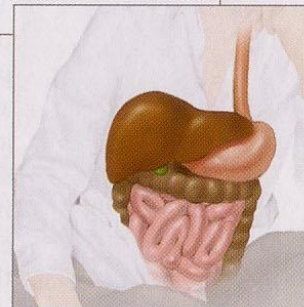
3. Tissue



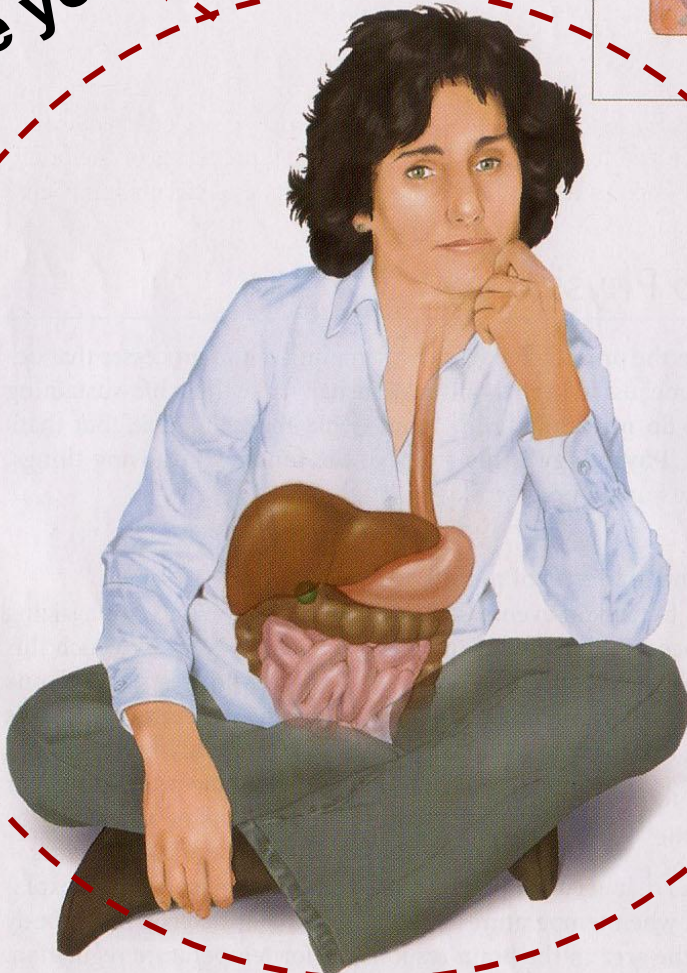
4. Organ

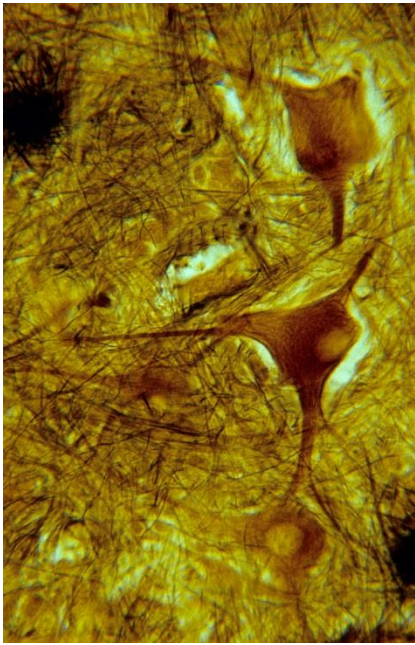


5. System

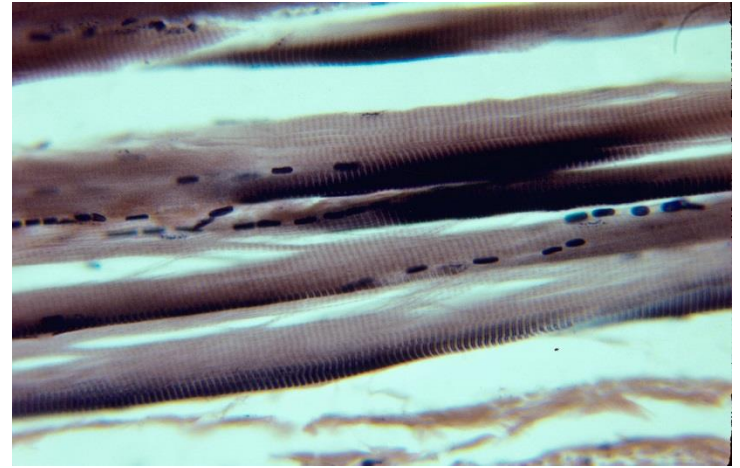


Entire Organism,
like you & me!

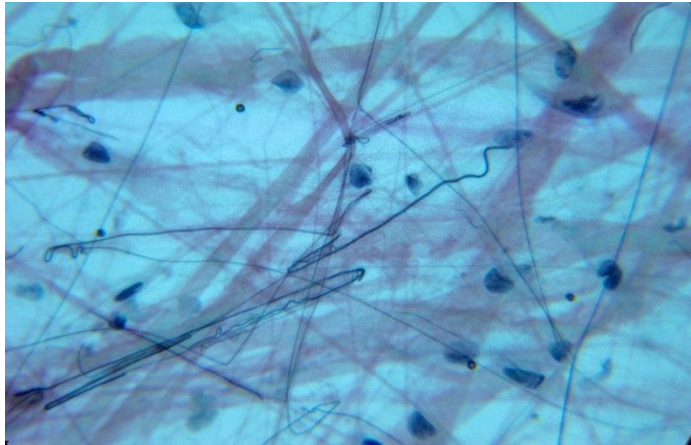




Nerve conducts



Muscle contracts

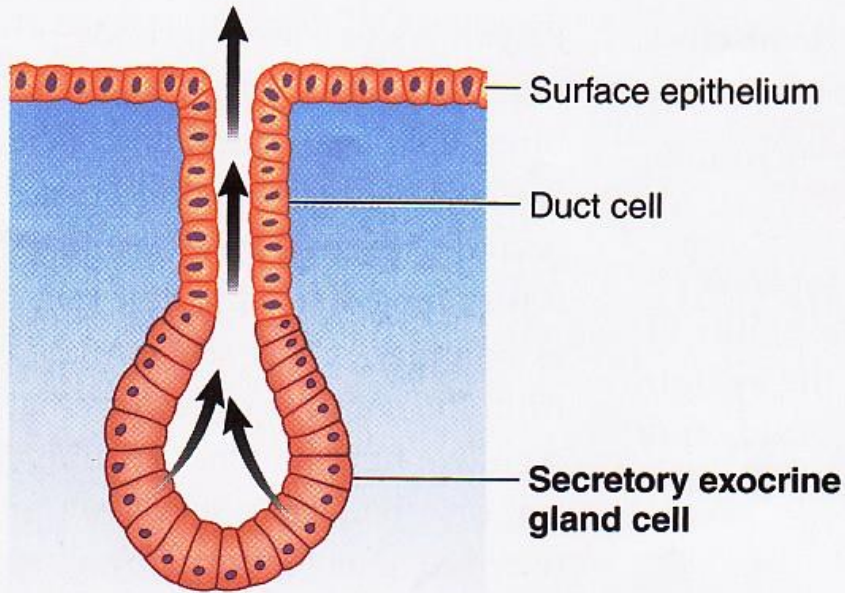


Connective connects!!

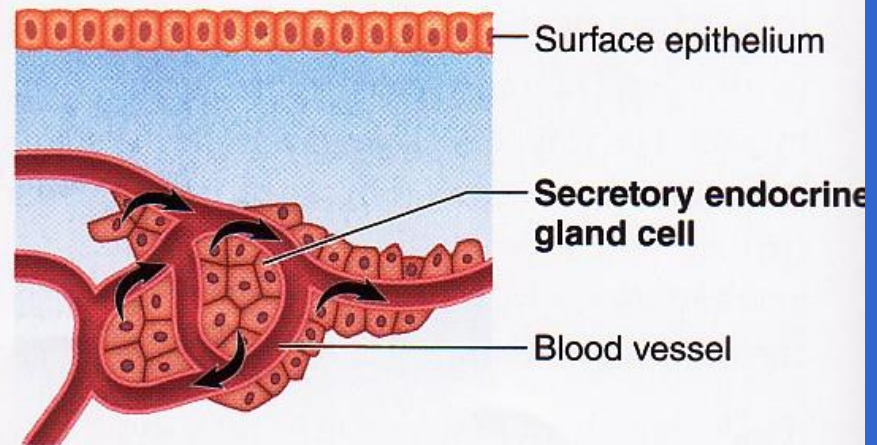


Epithelial covers

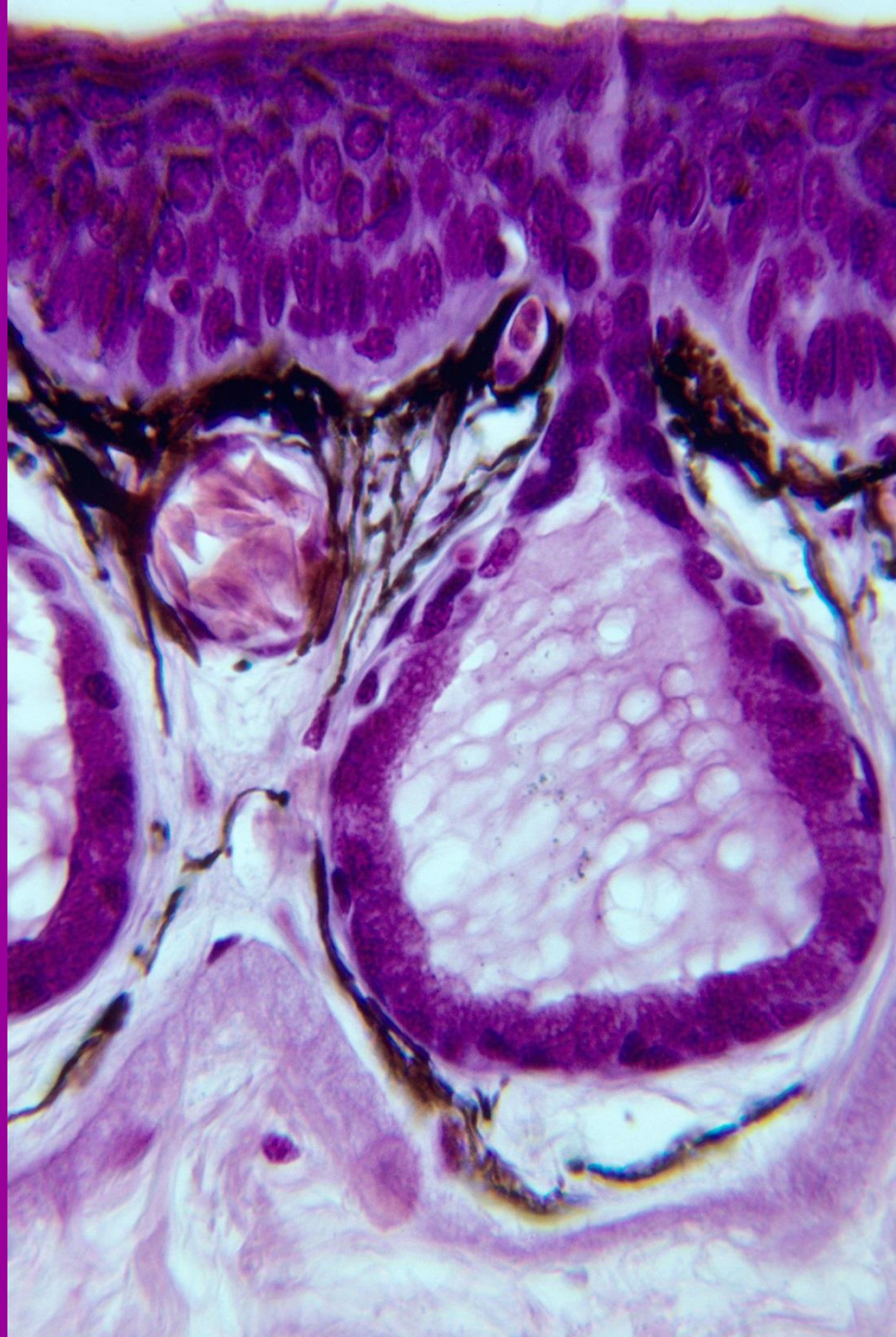
Epithelial tissue gives rise to glands: (a) exocrine & (b) endocrine



(a) Exocrine gland



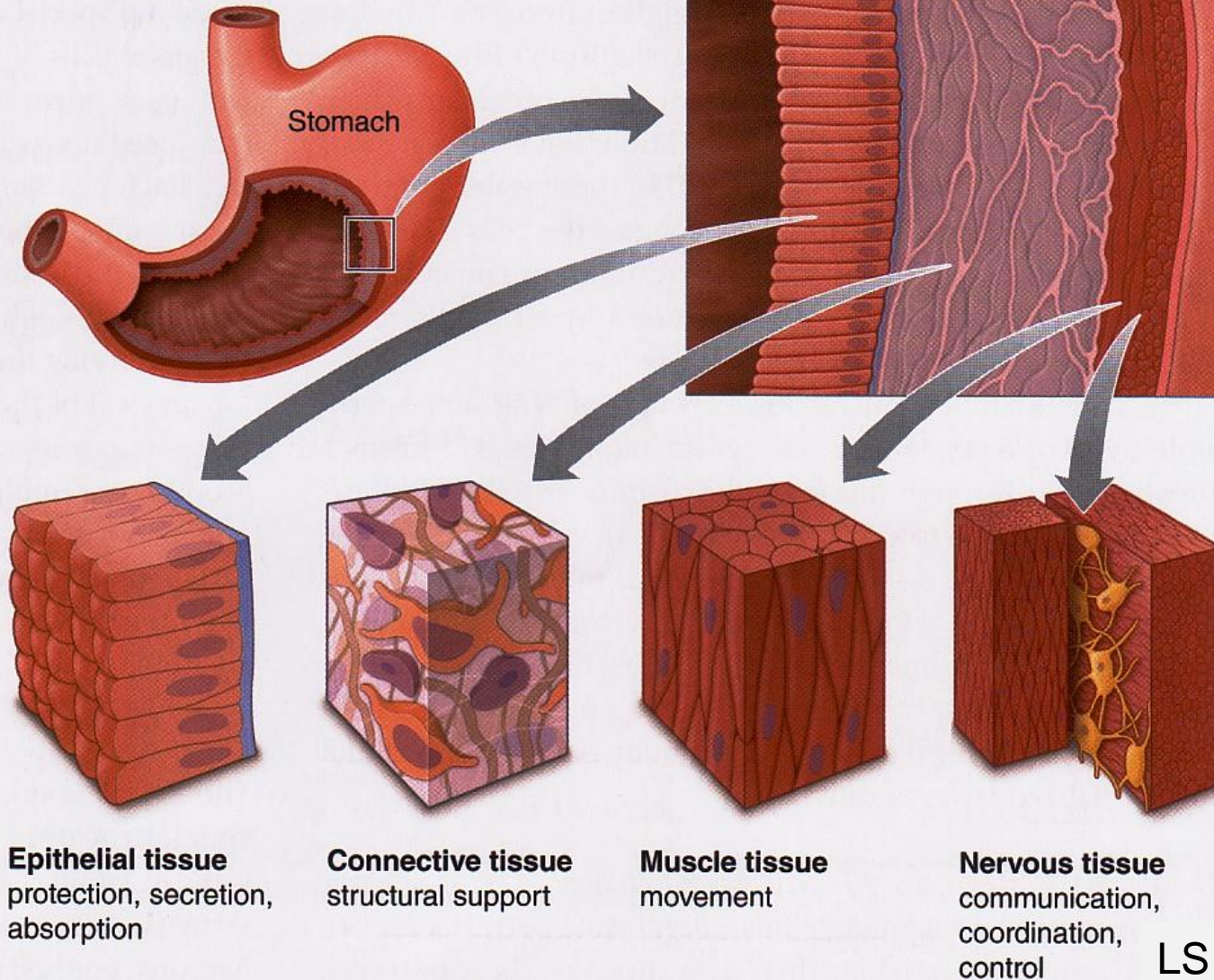
(b) Endocrine gland



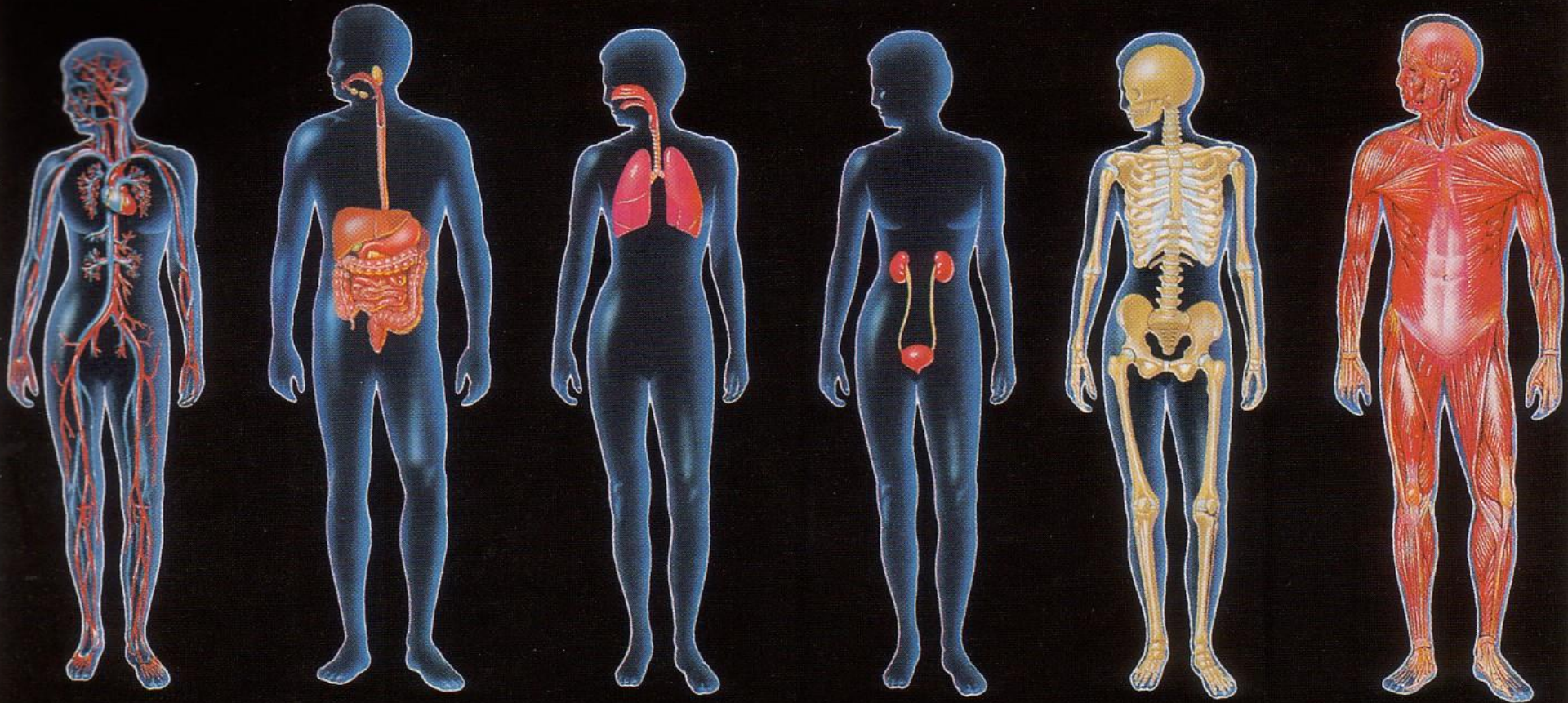
**Epithelial
tissue in
frog skin
developing
into an
exocrine
gland!**

Organs are made up ≥ 2 tissue types

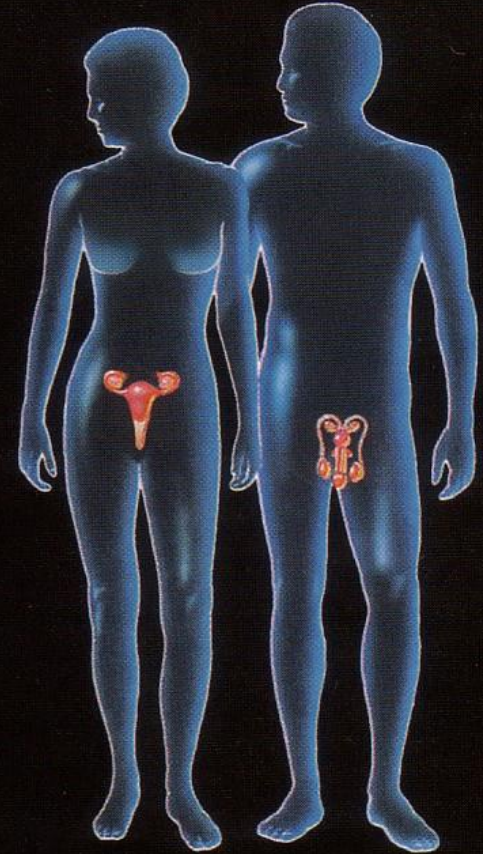
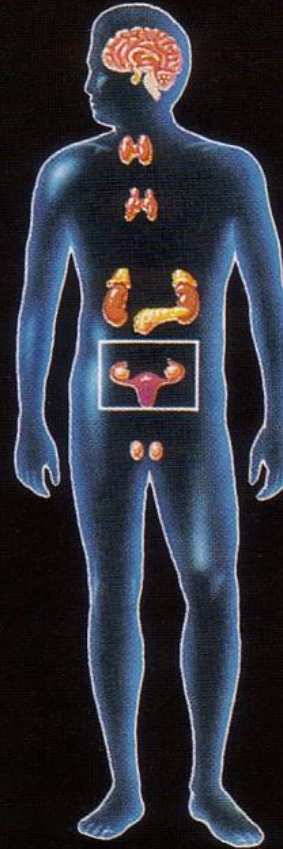
Organ:
Body structure that integrates different tissues and carries out a specific function



Which body systems?



Which body systems?



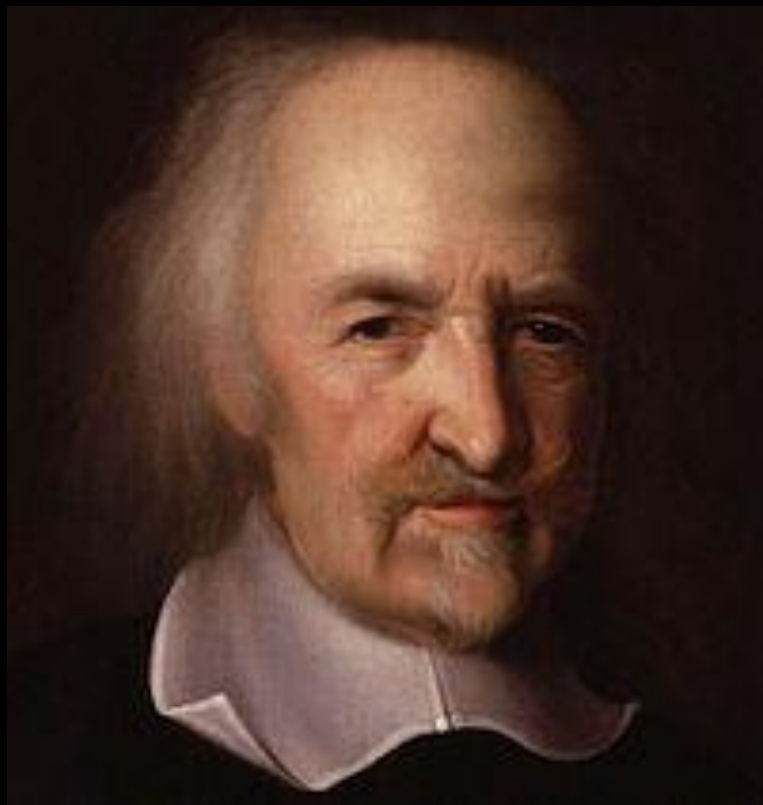
Why study human physiology?





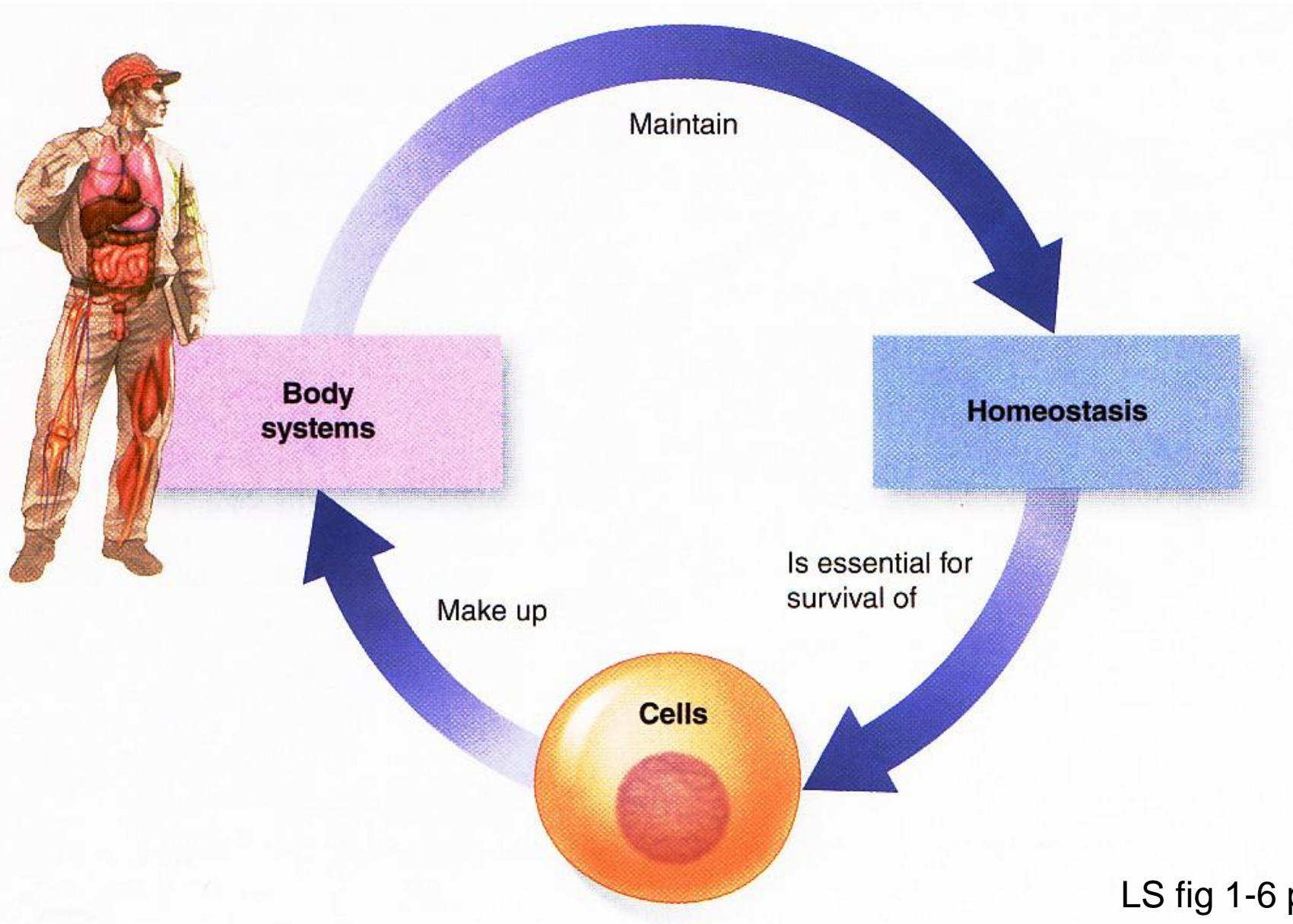


KNOWLEDGE IS POWER!!!



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

Homeostasis is essential for cell survival!

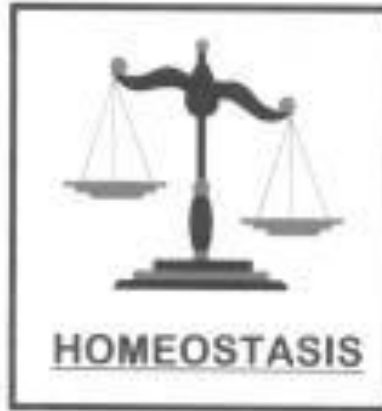


***Maintenance of a relative constancy in the
Internal environment = ECF = fluid outside of cells***

**milieu
interieur?**



Claude Bernard

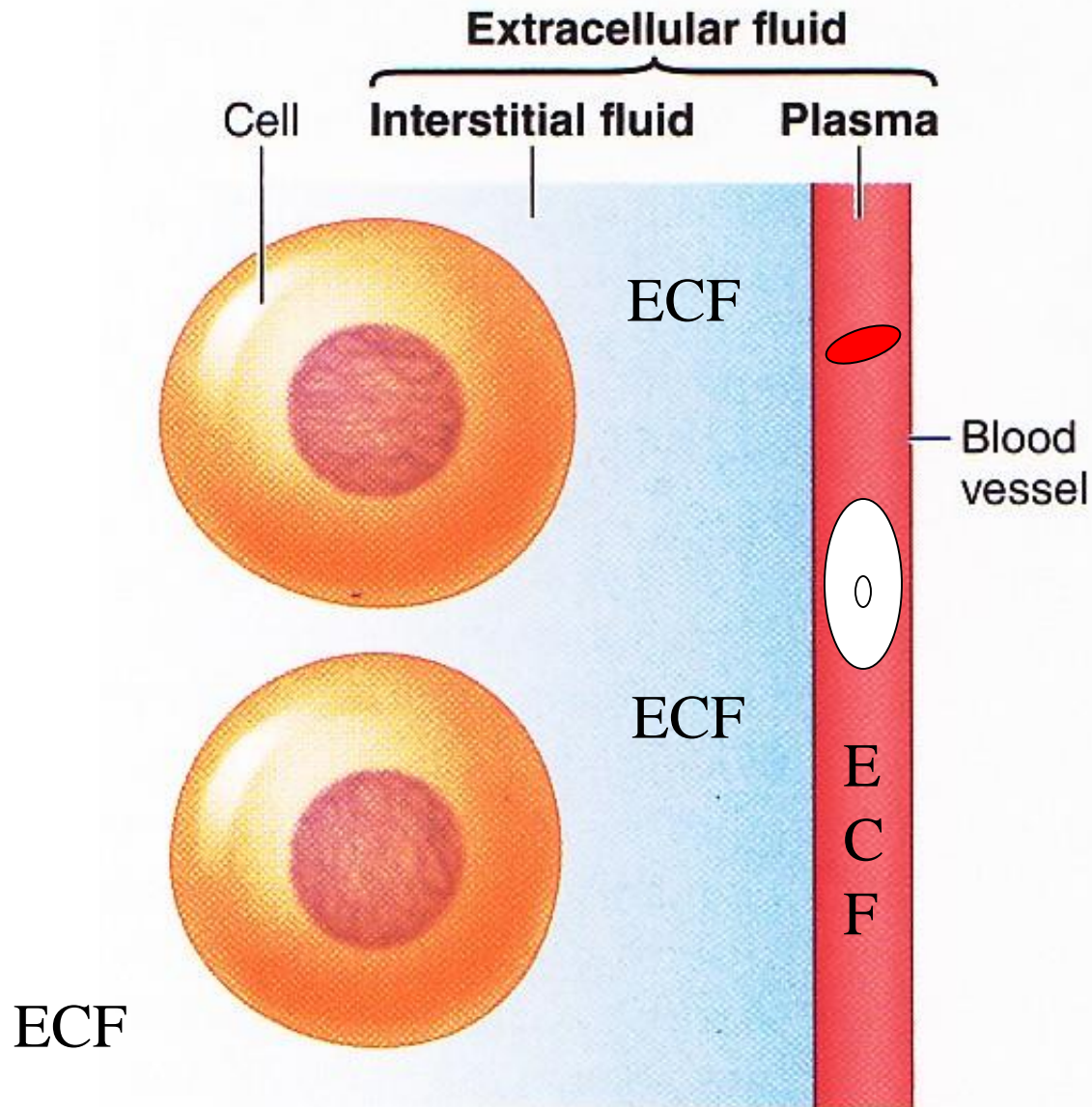


**100 trillion
cells working
intimately**

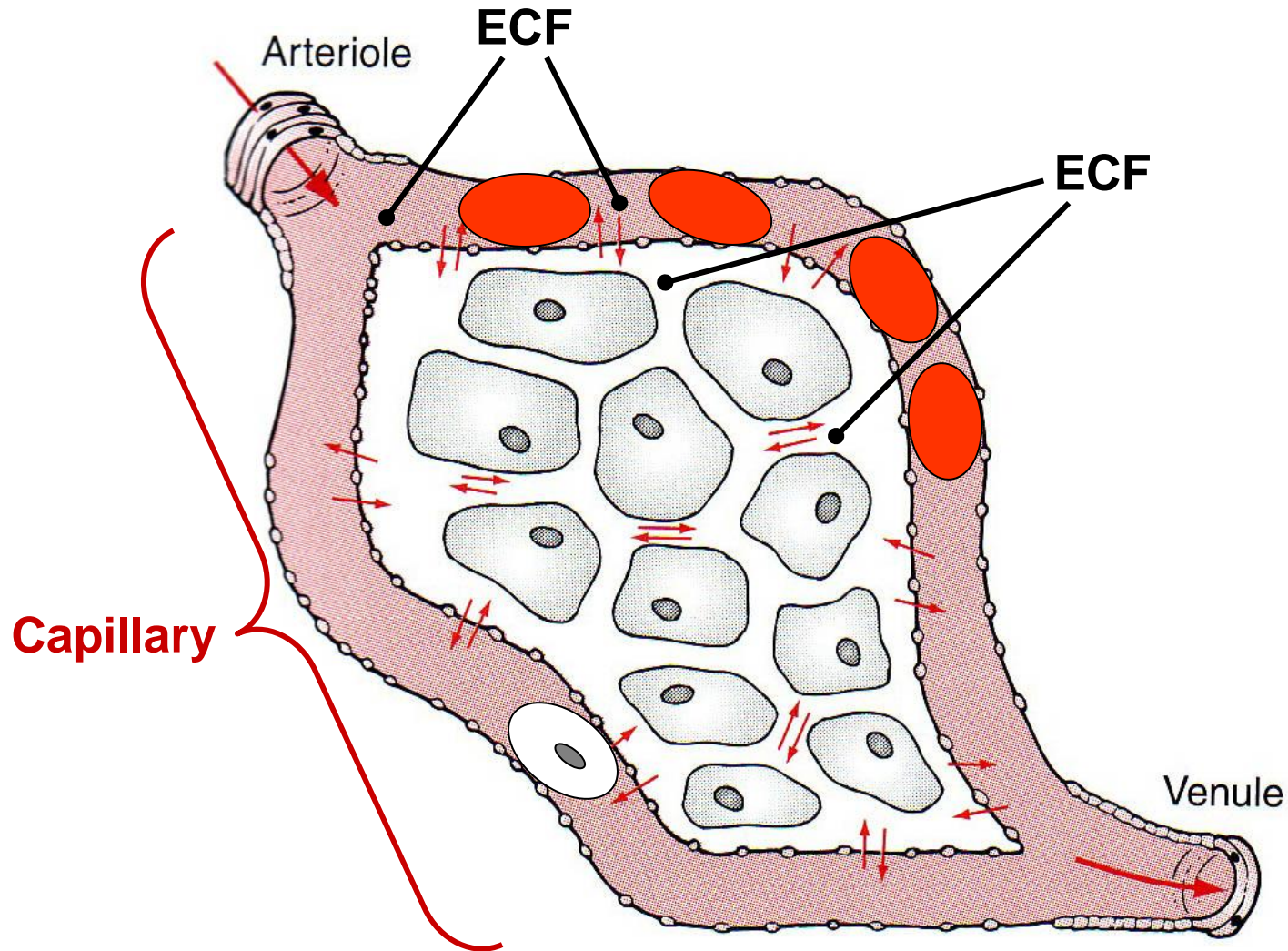


Walter B. Cannon

Where is extracellular fluid?

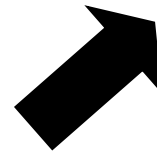


Where is extracellular fluid?



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

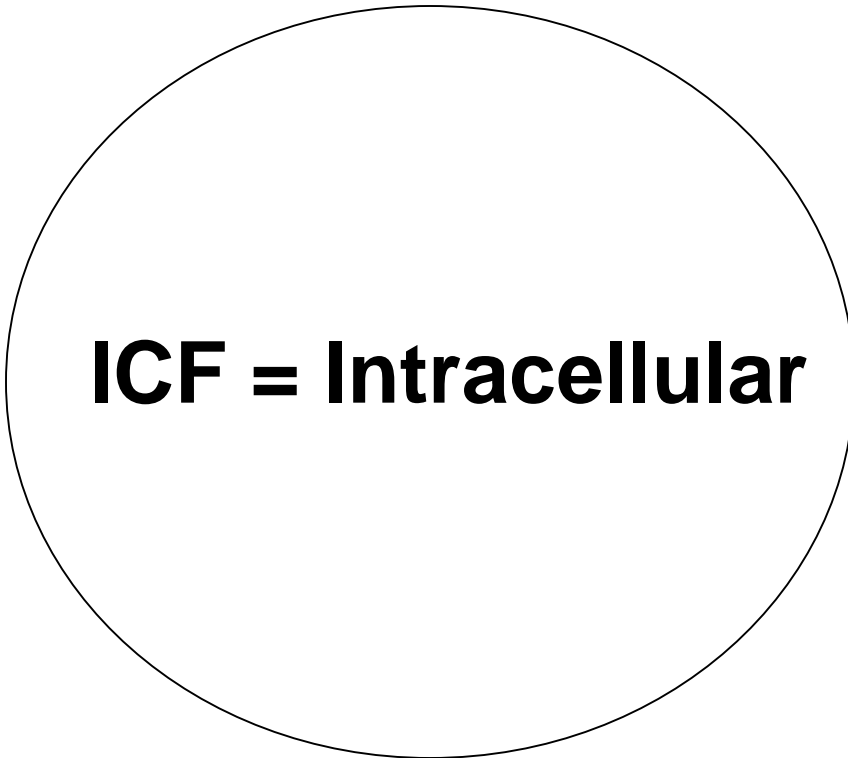
ECF = Extracellular



Plasma 
(within CV System)



Interstitium
(eg, between
muscle cells)



ICF = Intracellular

*Homeostasis
or
Homeokinesis?*

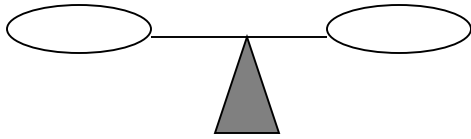


<https://www.khanacademy.org/partner-content/mit-k12/chem-and-bio/v/homeostasis>

Metabolic

ANA-

CATA-



H₂O



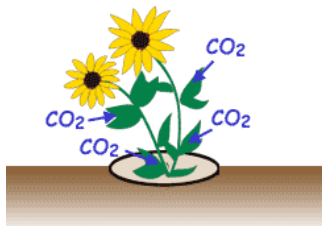
T_oC



Dr. Evonuk's 6 Balances

O₂/CO₂

Carbon Dioxide



Ion^{+/-}



Captain Calcium



pH

Bicarbonate and pH Balance

