

## BI 121 Lecture 10



...Fun lab week with much personal data!

- I. **Announcements** Remember to read Lab 5 before Thursday. Thanks for helping us be well-prepared. Q from last time? Calculating grade from estimated final. Keys to success? Q? Notebooks returned at the end of lecture today.
- II. **CVDs Risk Reduction Connections** LS ch 9-10, DC Module 4  
Minimizing risk of CVDs: U of O Smoke-Free! Exercise!!  
Can food choices make a difference? What's HAPOC?
- III. **Blood Form & Function** LS ch 11 pp 296-304, 309-12  
DC Module 5 + SI Fox + *National Geographic* Lennart Nilsson
  - A. Formed vs. nonformed/cells vs. plasma fig+tab 11-1
  - B. Red blood cells/erythrocytes: O<sub>2</sub>-carrying  
sickle cells, ABO blood typing, Rh factor pp 299-304.
  - C. White blood cells/leukocytes: Defense/immunity  
differential + general functions pp 309-12
  - D. Platelets/thrombocytes: Initial clotting p 304
- IV. **Blood Glucose & Diabetes Mellitus** LS ch 17, DC Module 13

**Q? What do I need on the final, if I want to get...?**

**A? You can actually calculate given assumptions...**

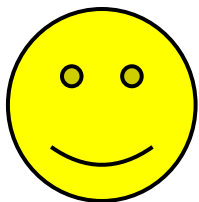
**e.g., 62 for midterm & desire  $\geq B^-$  (assume  $\geq 80$ )**

**Assume 100% for lecture (20% of grade)  
+ lab attendance & participation (20% of grade!)**

$$X = [\text{Hope for? } 80 - ((0.3 \times \text{MT } 62) + (0.2 \times \text{Lecture } 100) + (0.2 \times \text{Lab } 100))]/0.3$$

$$X = [80 - [(18.6) + (20) + (20)]]/0.3$$


$$X = [21.4]/0.3 = 71.3 \text{ Need this on final for } B^- \text{ for course!}$$



**...Fortunately, lecture & lab attendance buffer the grade!**

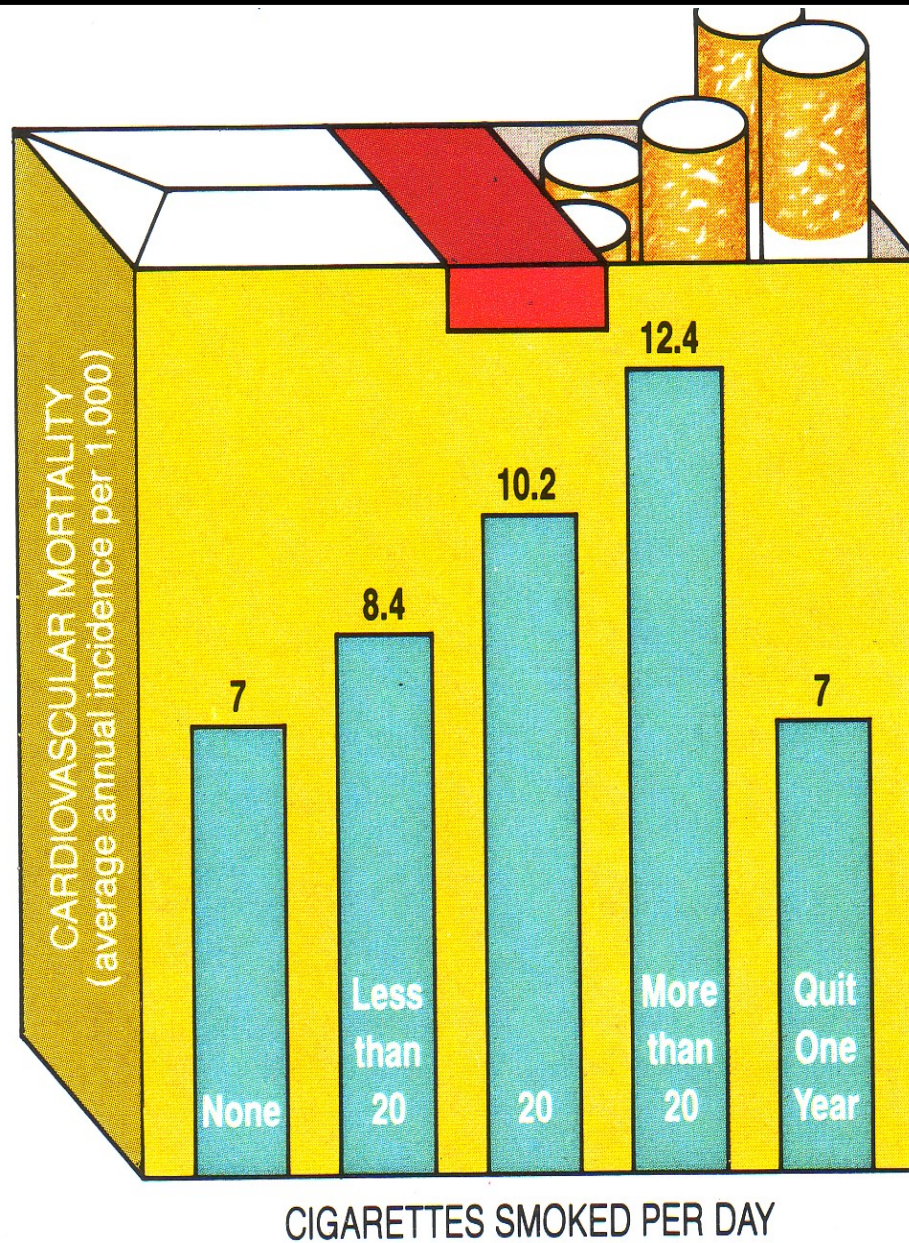
  ...I ♥ U of O!

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.

# Cigarettes smoked/day & cardiovascular mortality!



# Tobacco-free Campus

For better health,  
smoking and use of  
tobacco products are  
prohibited everywhere  
on our property.



UO's Josh Buehler

U.S. Surgeon General  
Regina Benjamin

## SMOKE AND TOBACCO-FREE UNIVERSITY



**September 1, 2012**

For a healthier community and cleaner  
environment, the University of Oregon  
will be smoke and tobacco free



**Ready to Quit Tobacco?**

Visit [tobaccofree.uoregon.edu](http://tobaccofree.uoregon.edu) for free and low cost resources



UNIVERSITY OF OREGON

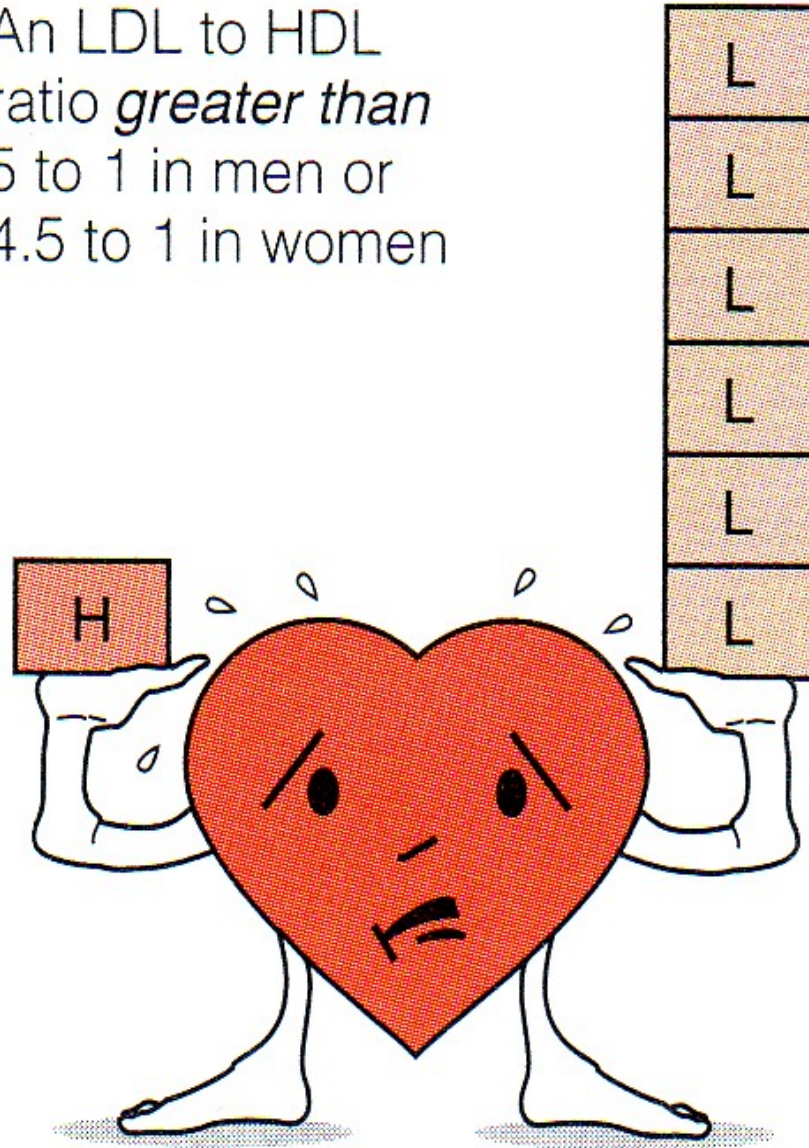
[tobaccofree.uoregon.edu](http://tobaccofree.uoregon.edu)



For a healthier community and cleaner  
environment, the University of Oregon  
is smoke and tobacco-free.



An LDL to HDL  
ratio *greater than*  
5 to 1 in men or  
4.5 to 1 in women



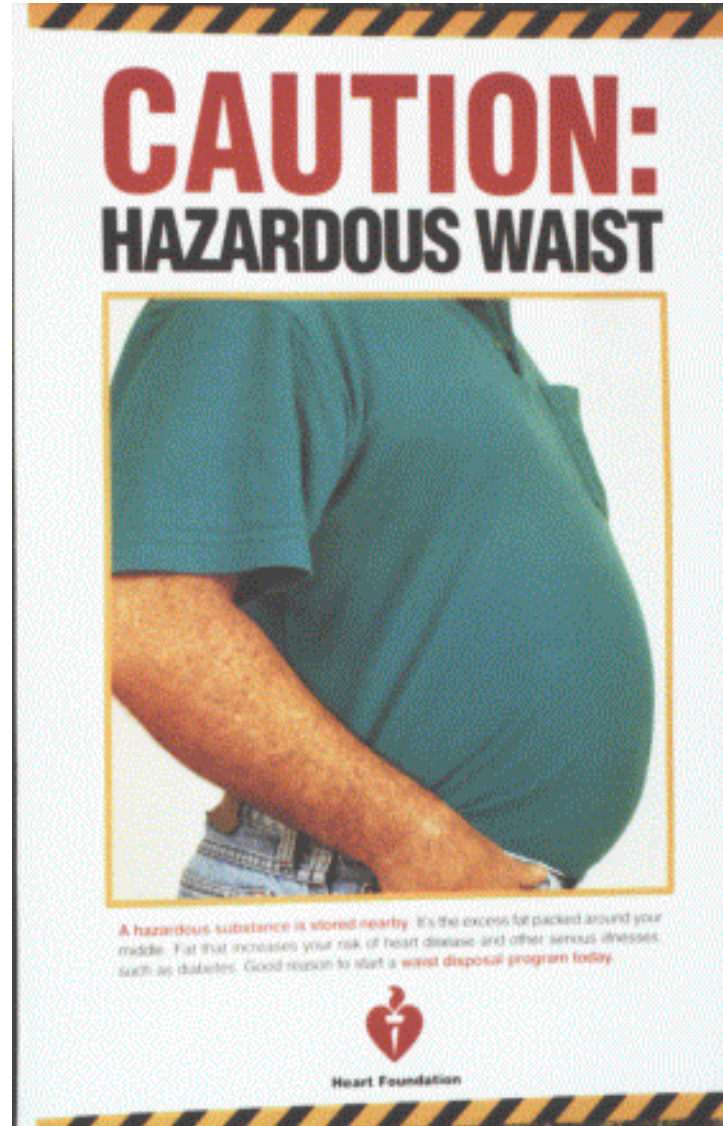
Increased risk of  
heart disease

# Apple type of obesity predisposed to CVD!

Pear type of fat pattern...



implies lower disease risk!

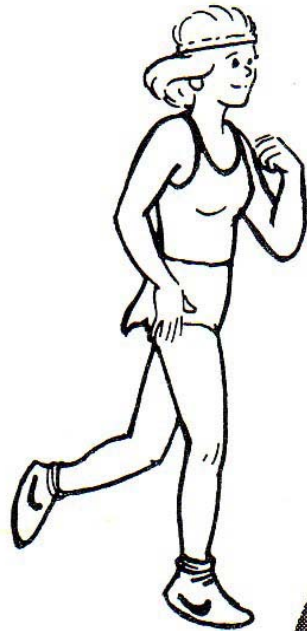


Eat more apples...



to help prevent the apple type of obesity!





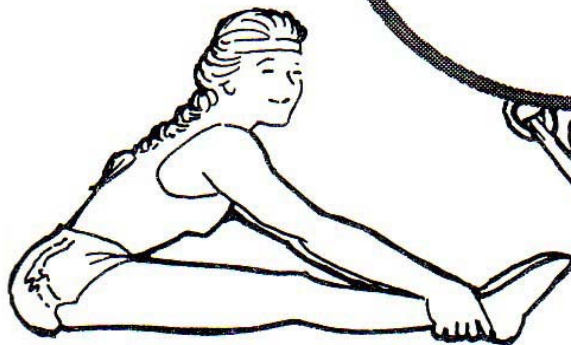
**Cardiorespiratory  
Endurance**



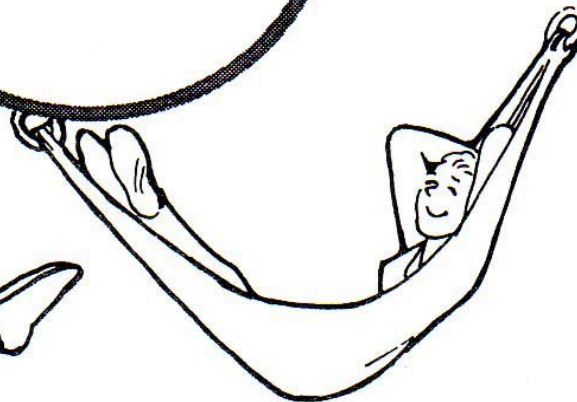
**Muscular  
Strength/Endurance**



**HEALTH-RELATED  
FITNESS**

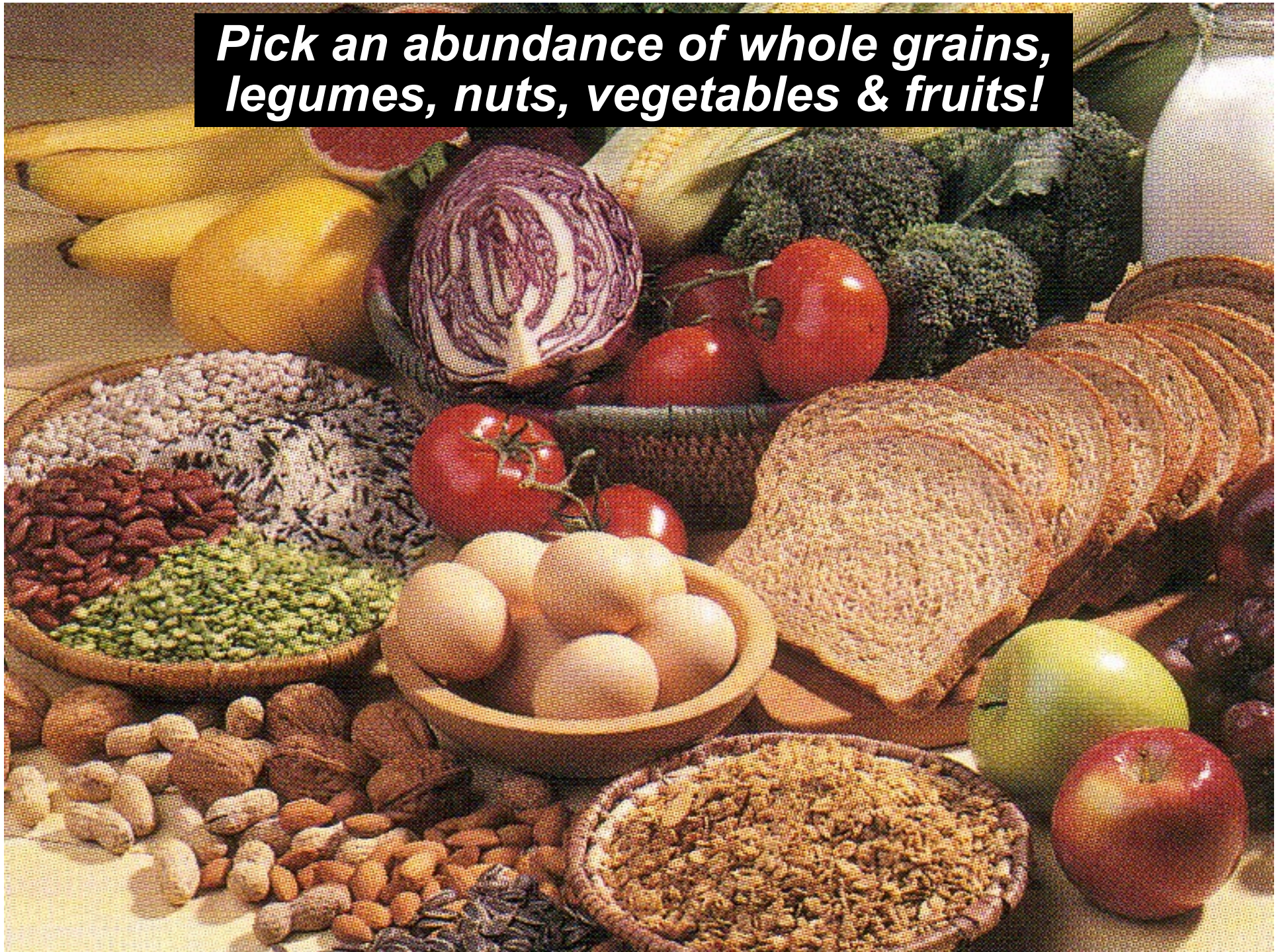


**Flexibility**



**Neuromuscular Relaxation**

***Pick an abundance of whole grains,  
legumes, nuts, vegetables & fruits!***



# Essential Fatty Acids: $\Omega$ -6 Linoleic & $\Omega$ -3 Linolenic Acids

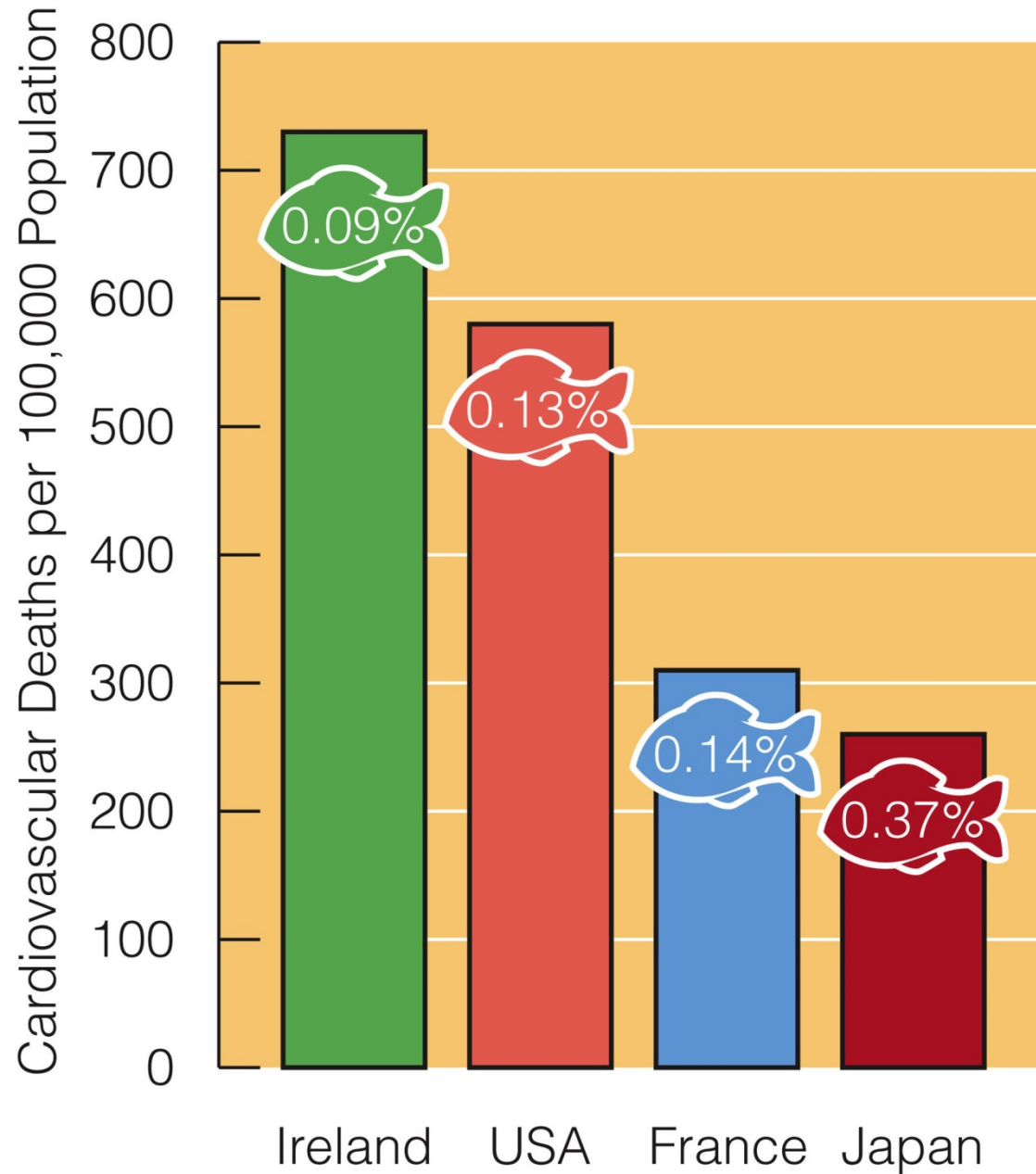


Linoleic  $\rightarrow$  Arachadonic Acid  $\rightarrow$  Inflammatory Cascade

Linolenic  $\rightarrow$  EPA, DHA  $\rightarrow$  Anti-inflammatory



## *Fish Oil Intakes & Cardiovascular Death Rates*



S&W 2011  
fig 5-12 p 167

***Deep cold  
water fish  
are fabulous  
sources of  
 $\Omega$ -3 fatty  
acids!***



♥ *Healthy Oils to Minimize Atherosclerosis*  
*HAPOC?*

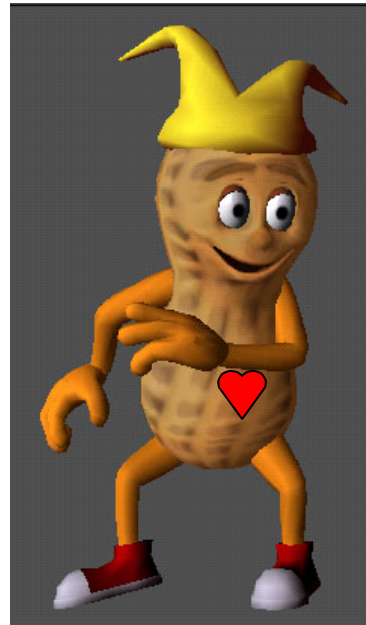
**H**



**A**



**P**



**O**



**C**



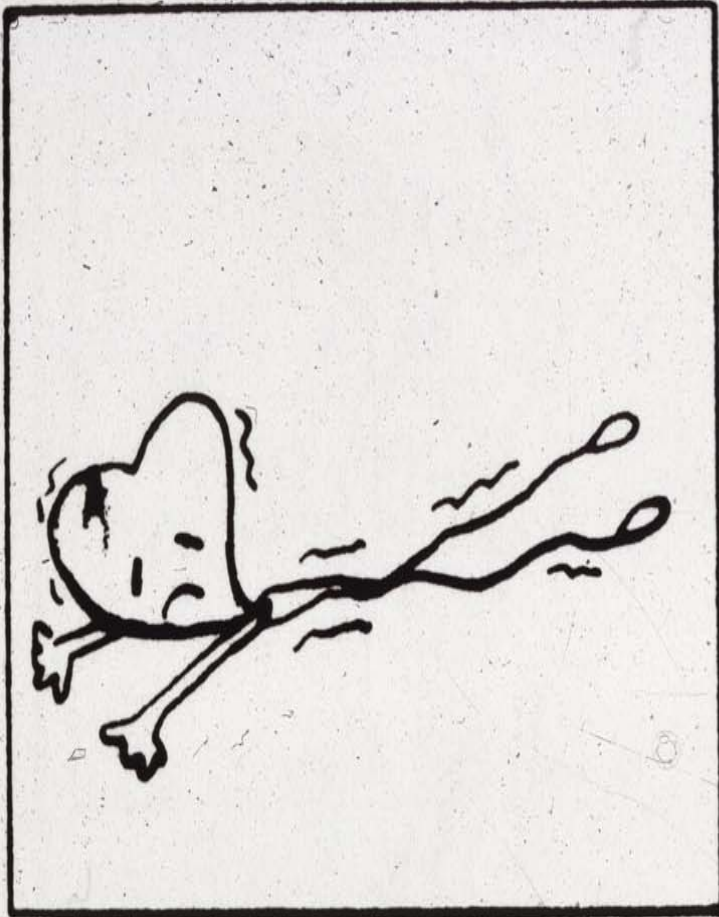
***Olive Oil Loves Olive Oil & has  
some heartfelt advise for Popeye!!***



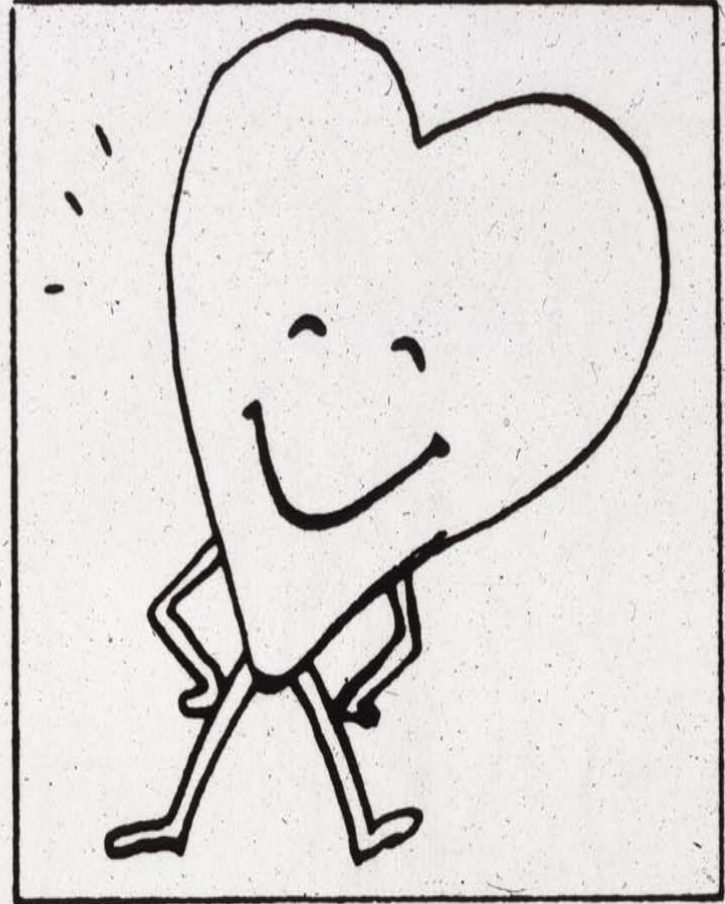
Yes for the  
spinach! — but get  
rid of the pipe!!





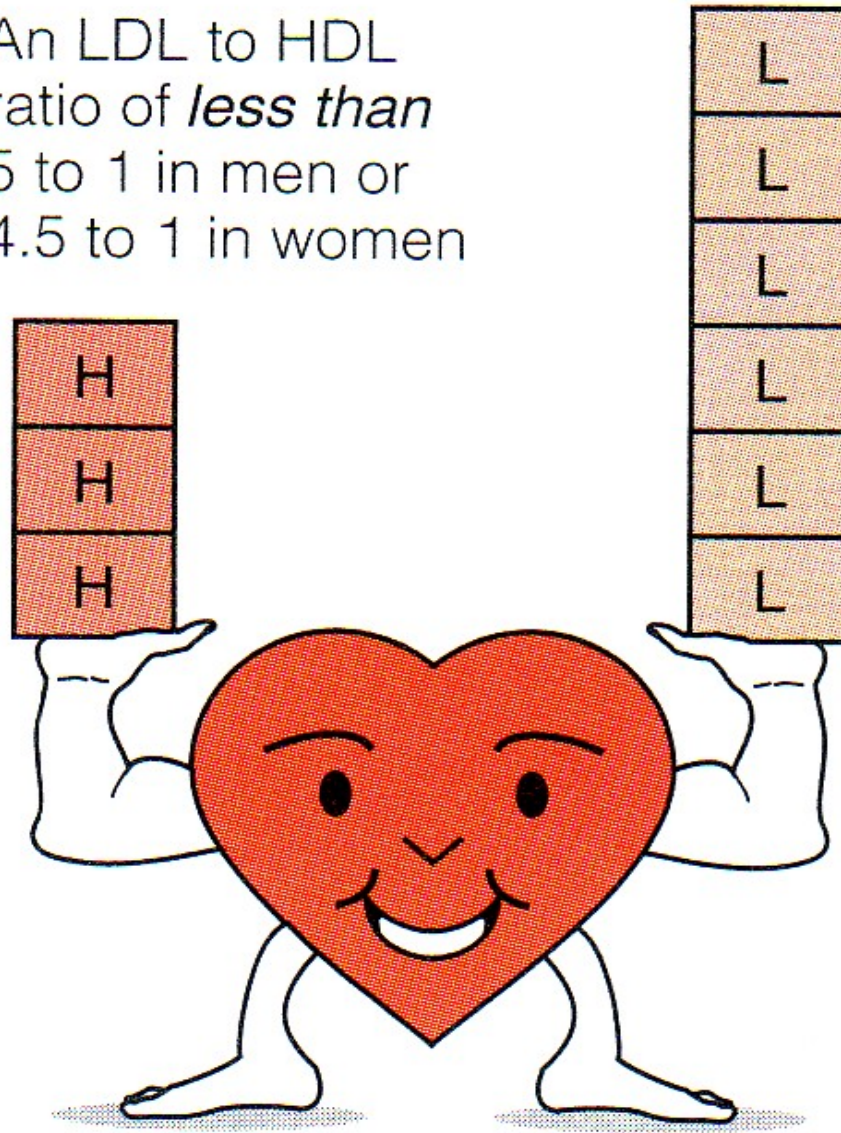


**Before**



**After**

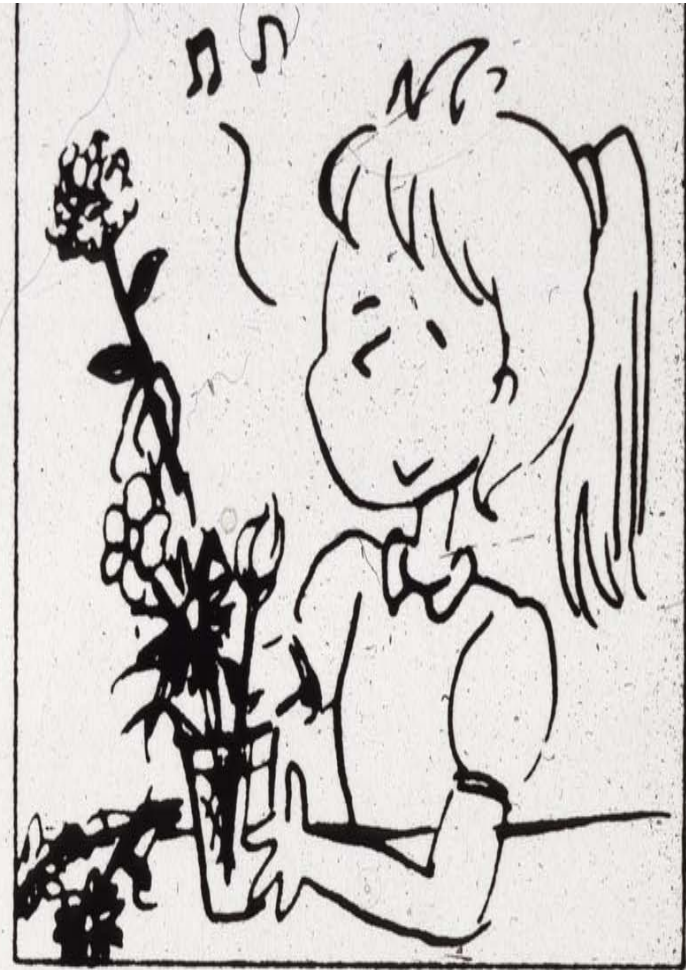
An LDL to HDL  
ratio of *less than*  
5 to 1 in men or  
4.5 to 1 in women



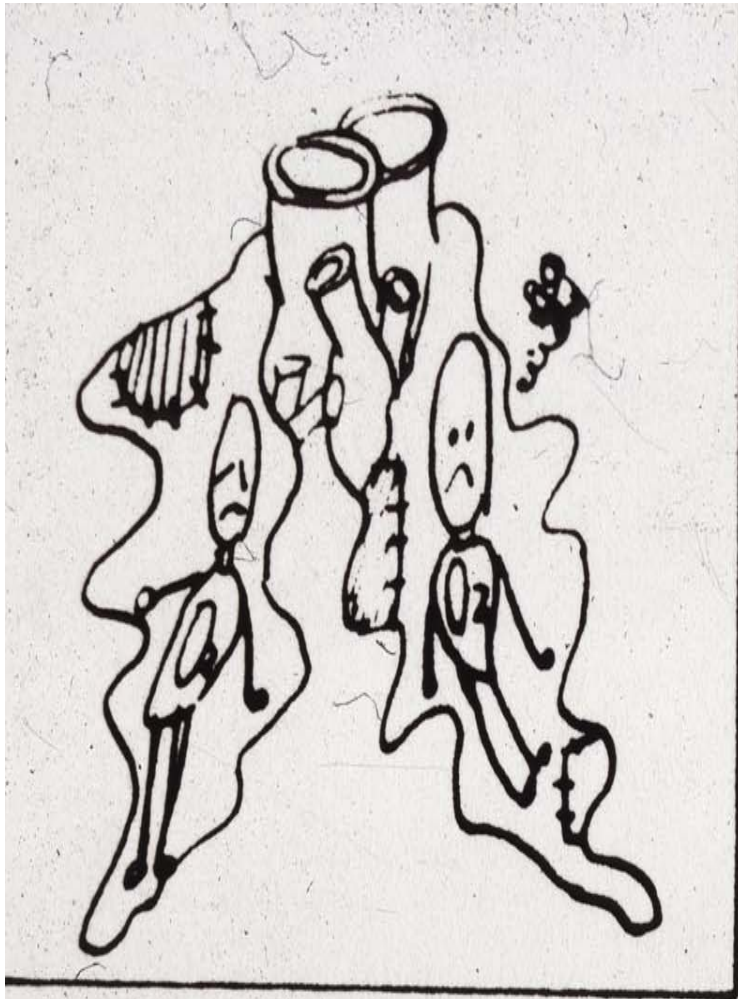
Reduced risk of  
heart disease



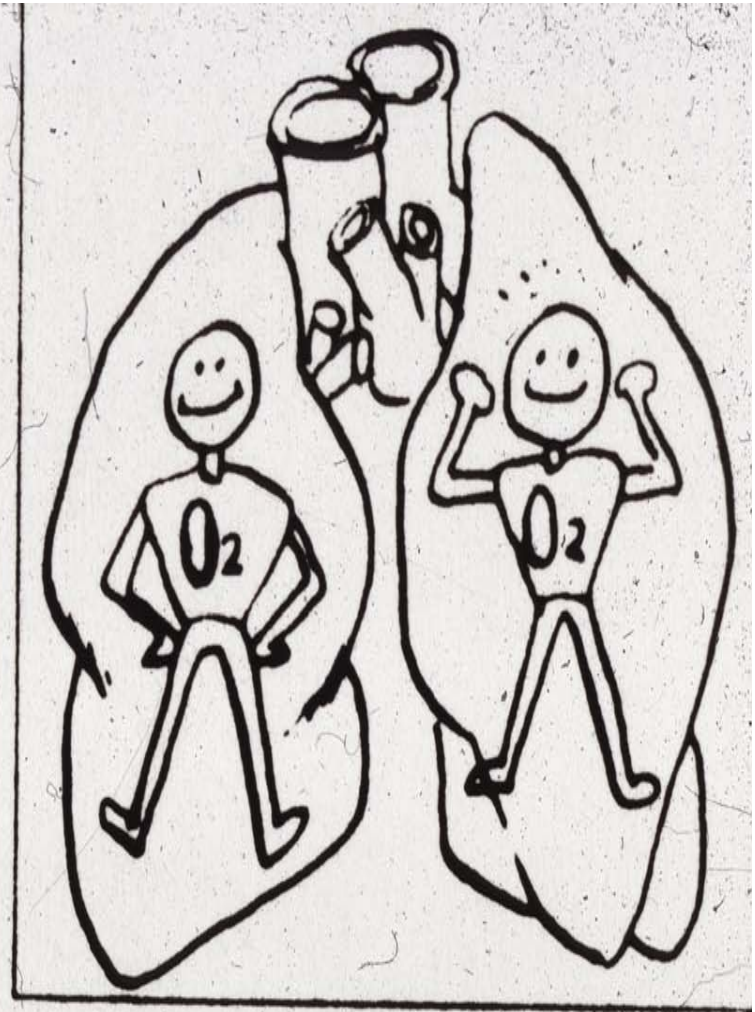
Before



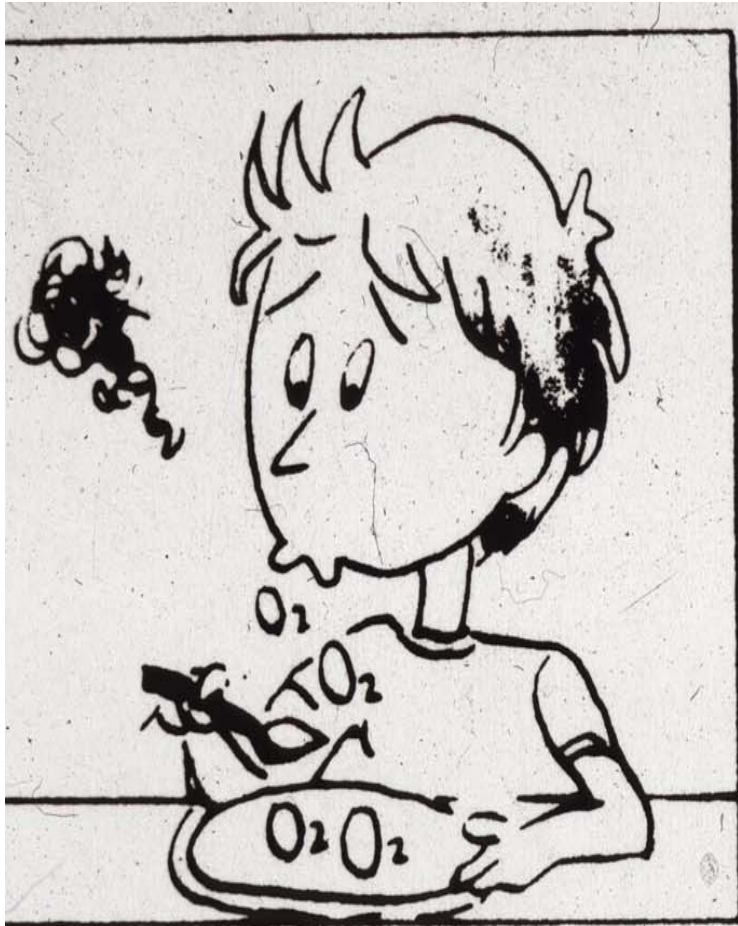
After



**Before**



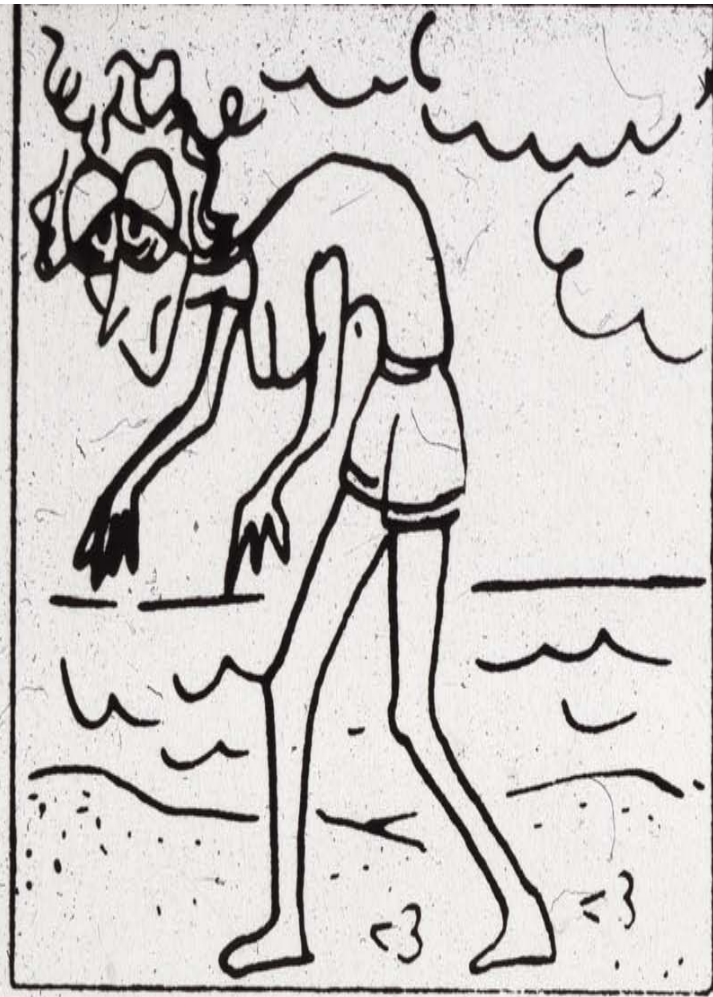
**After**



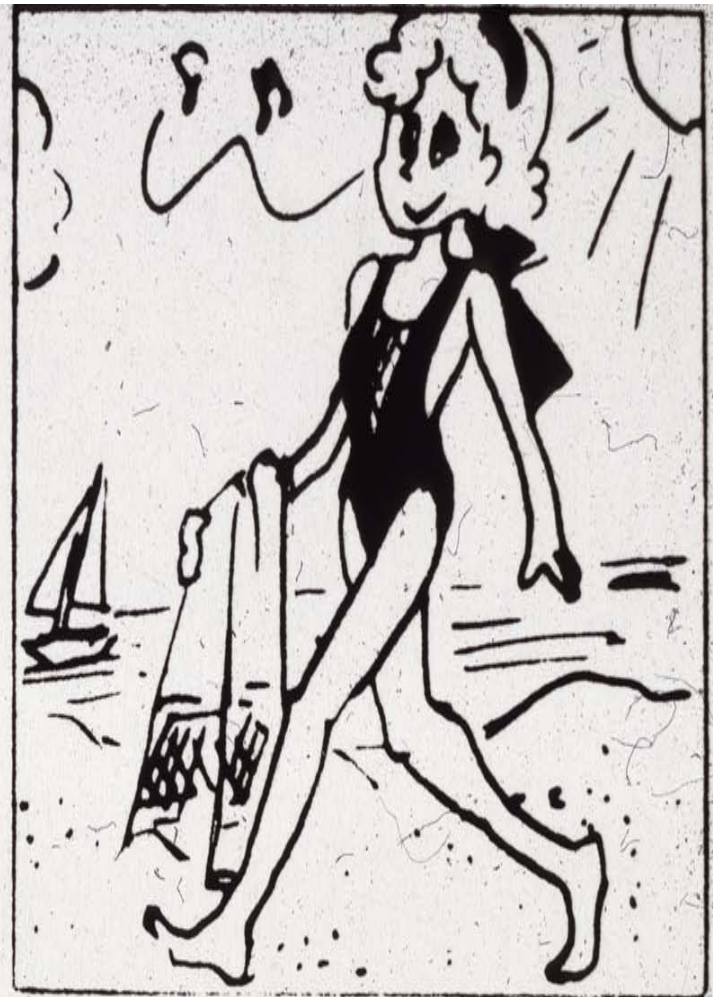
Before



After



**Before**

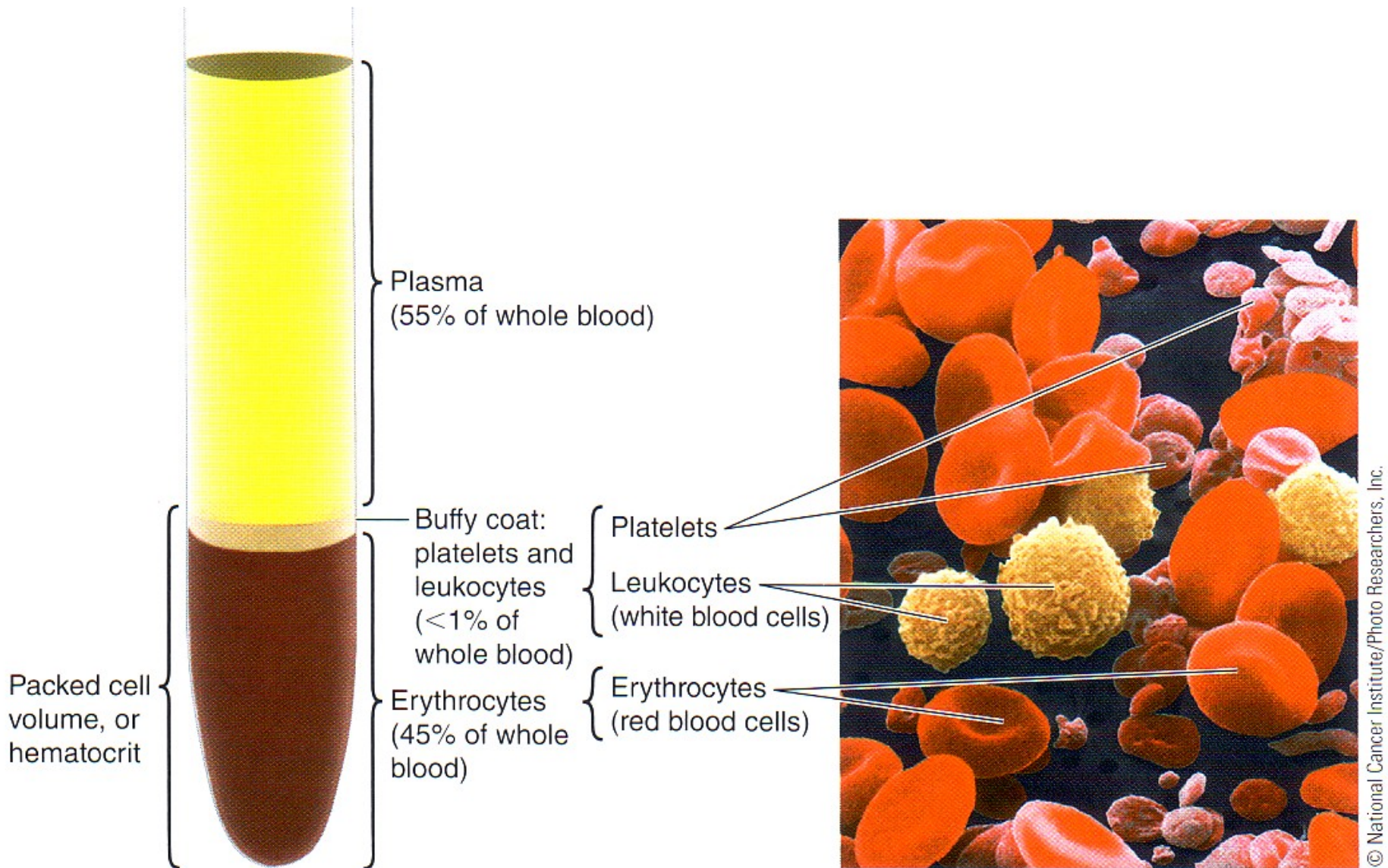


**After**

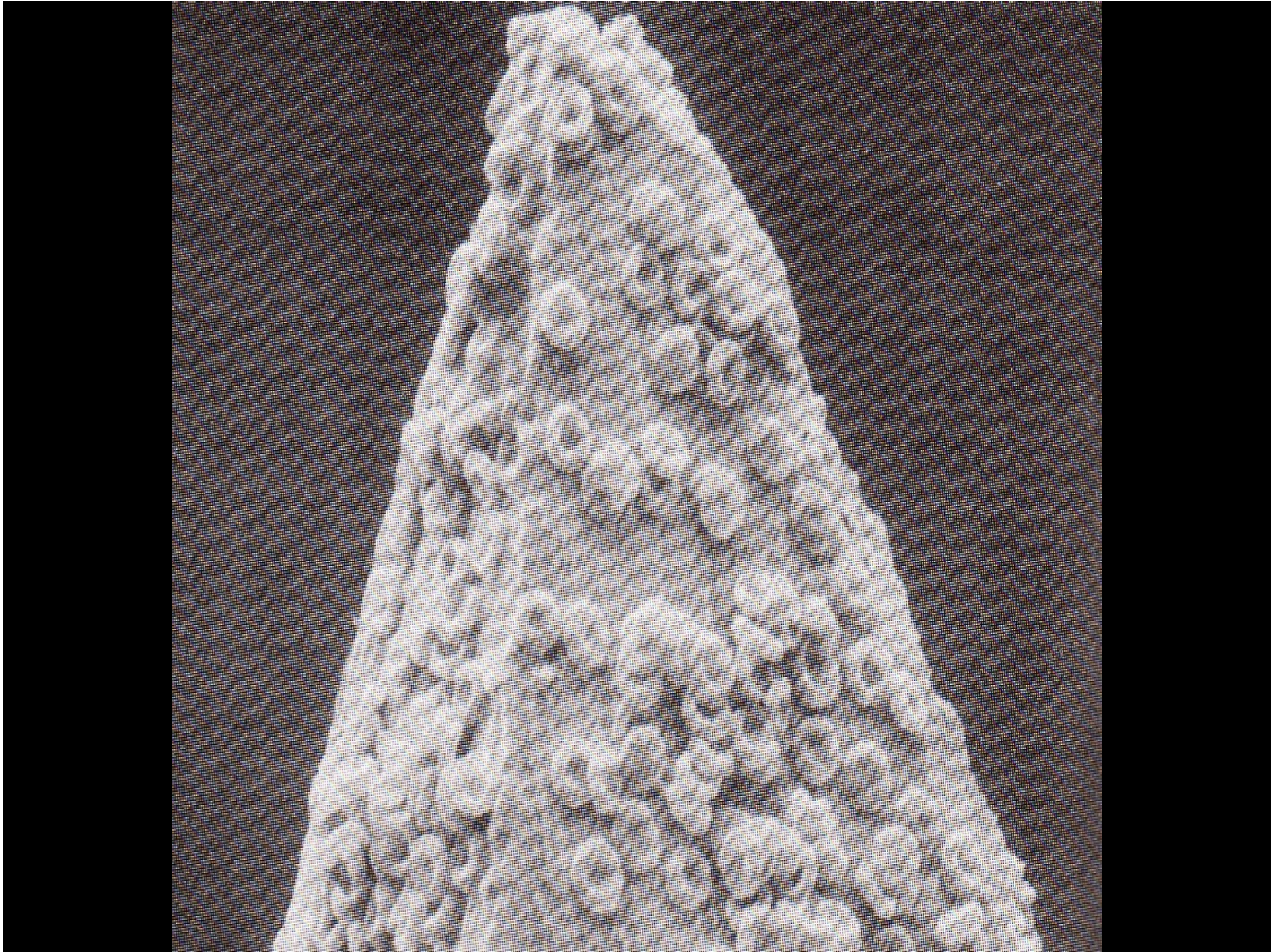
***Break for discussion/questions!***



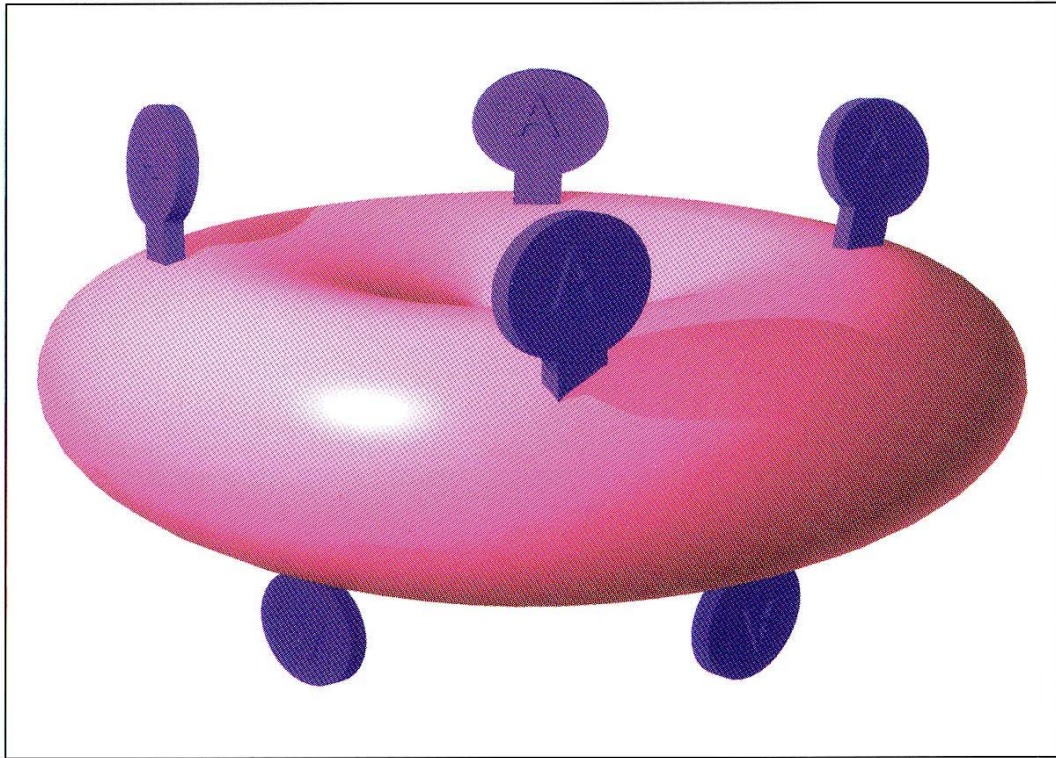
# What's in Blood? Plasma & Blood Cells





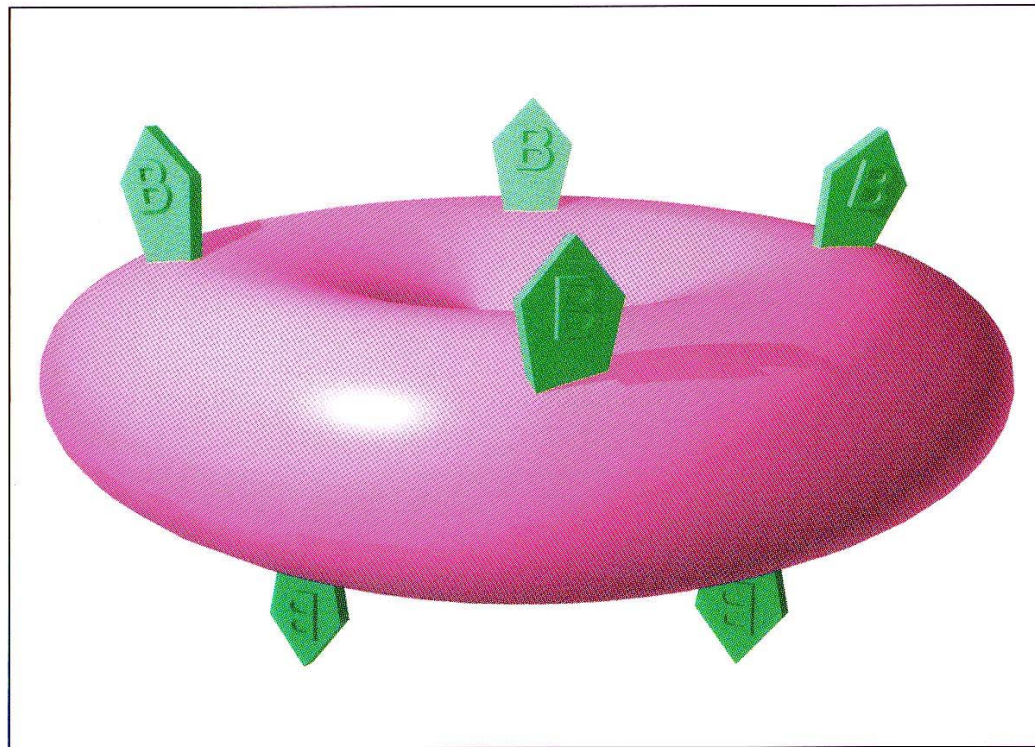


A



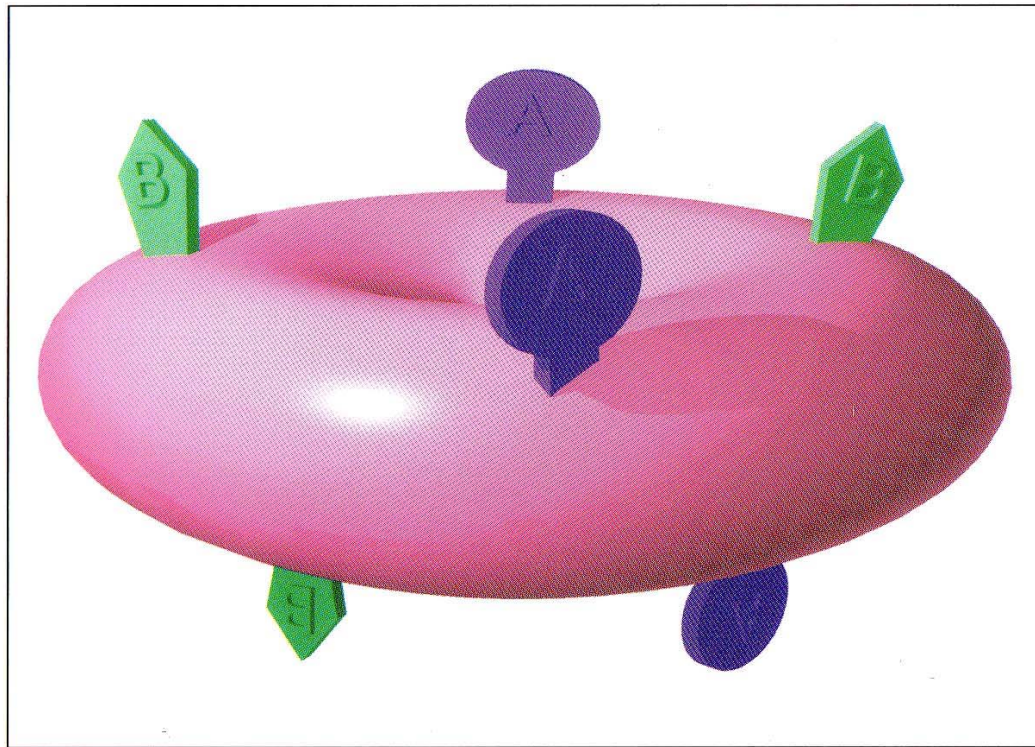
A Antigens  
(Agglutinogens)

# B

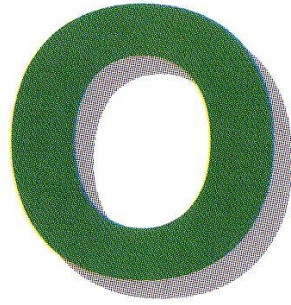


**B Antigens**  
(Agglutinogens)

# AB



A & B Antigens  
(Agglutinogens)

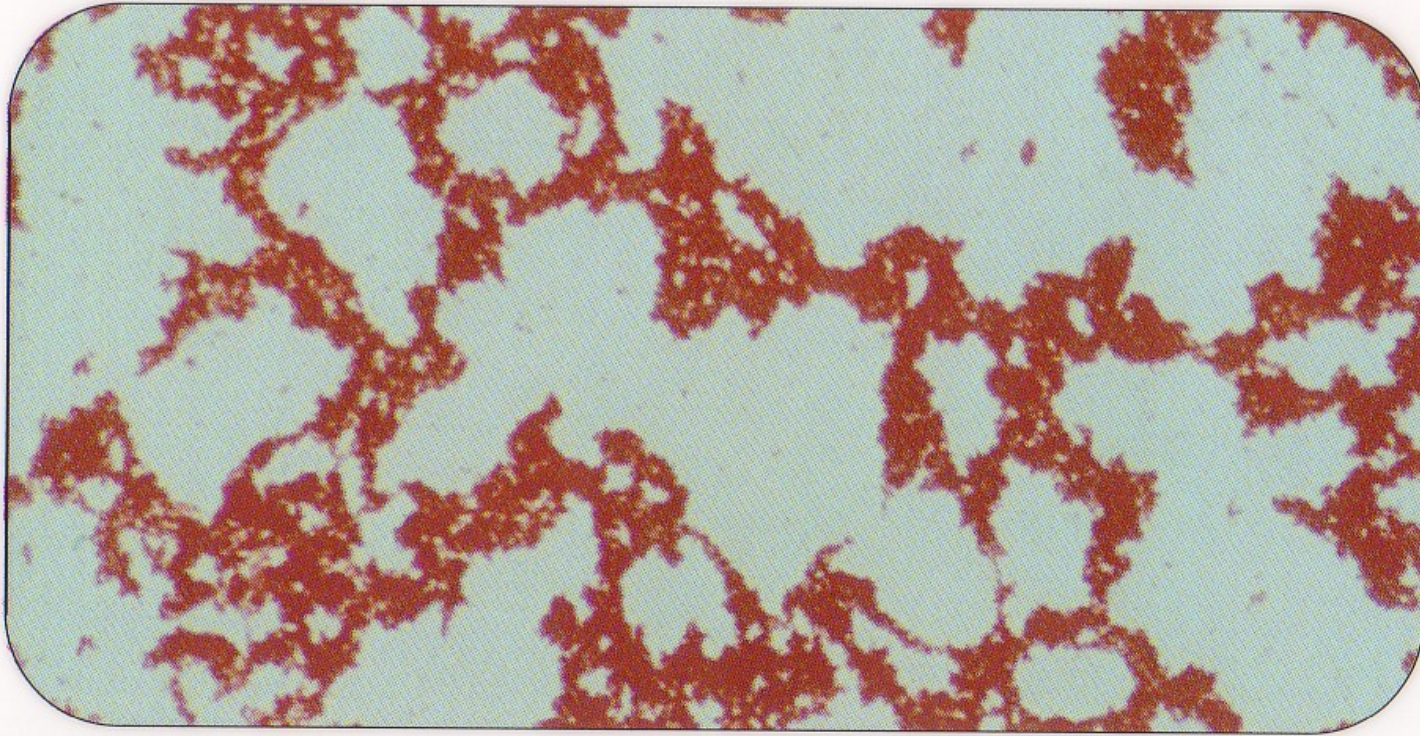


No Antigens  
(Agglutinogens)

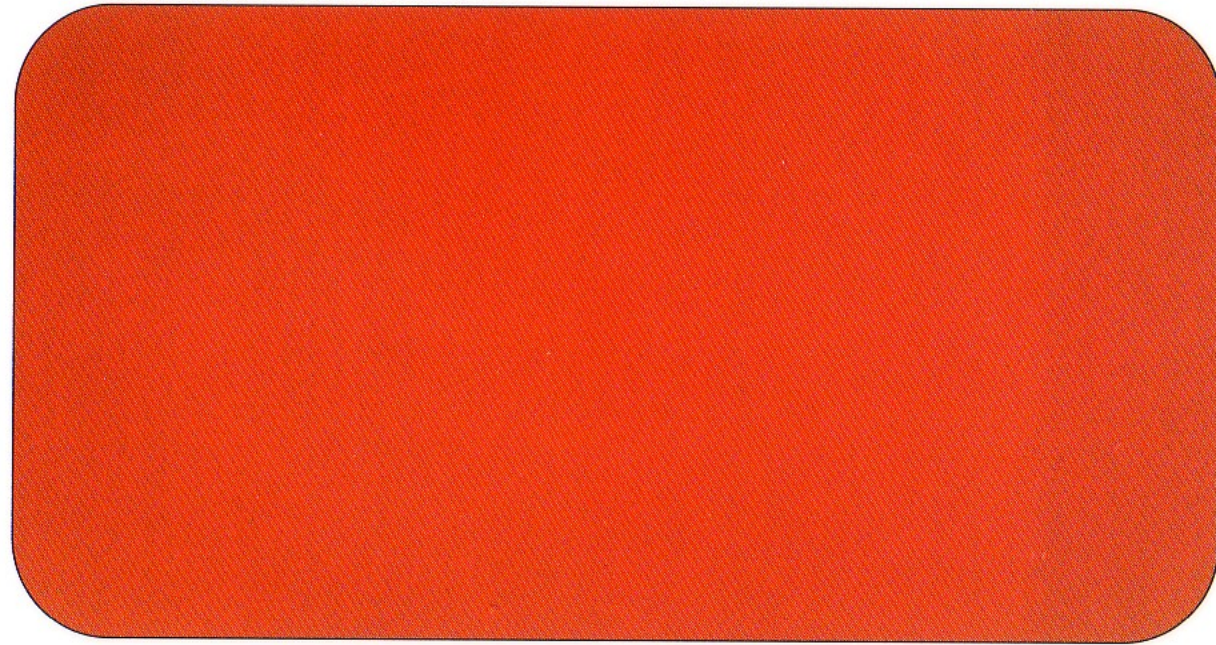


# A Antibodies

(Agglutinins)



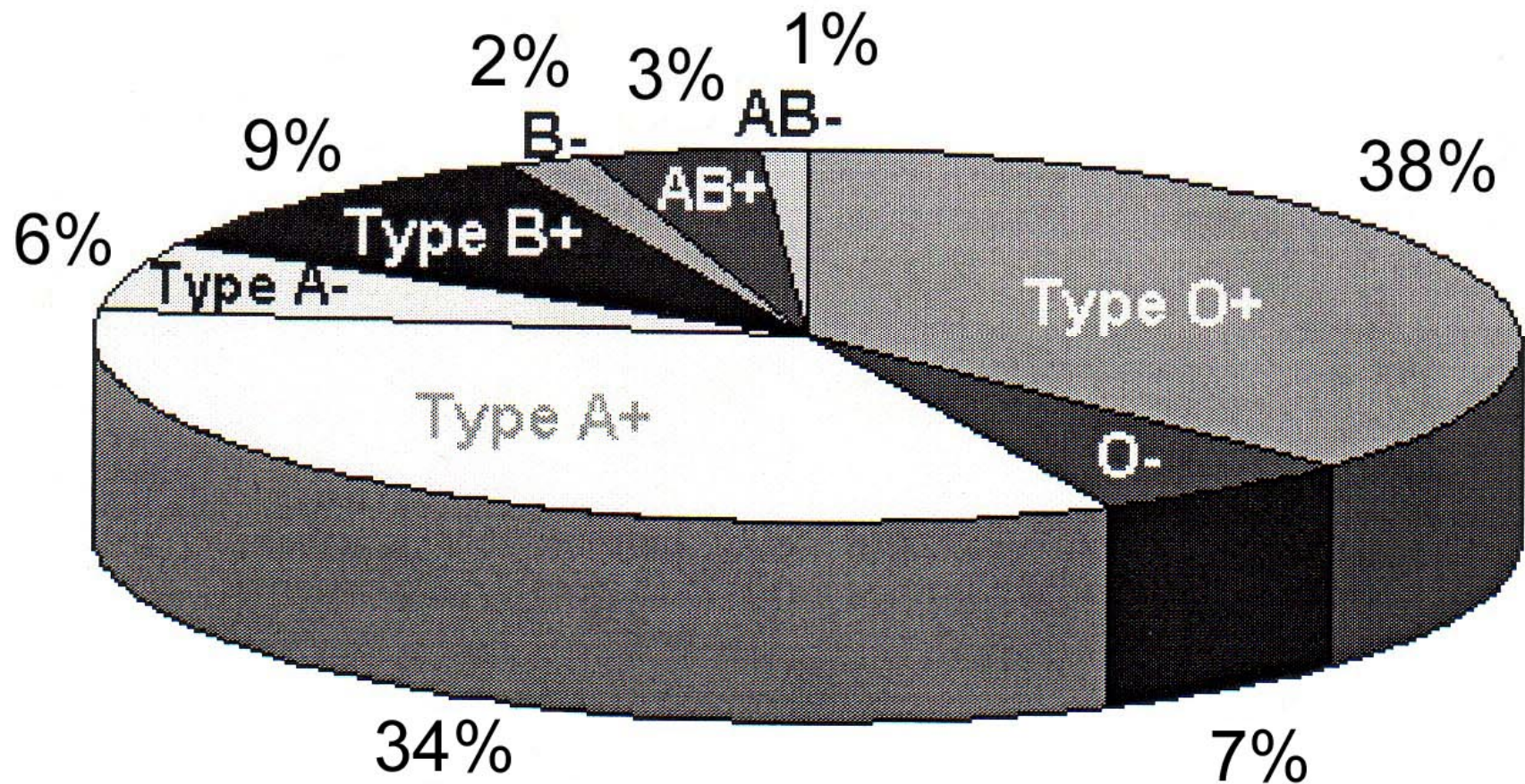
Clumping with  
anti-A serum



No Clumping with  
anti-A serum



# Blood Type Distribution, General Population



# ***Erythroblastosis Fetalis?***

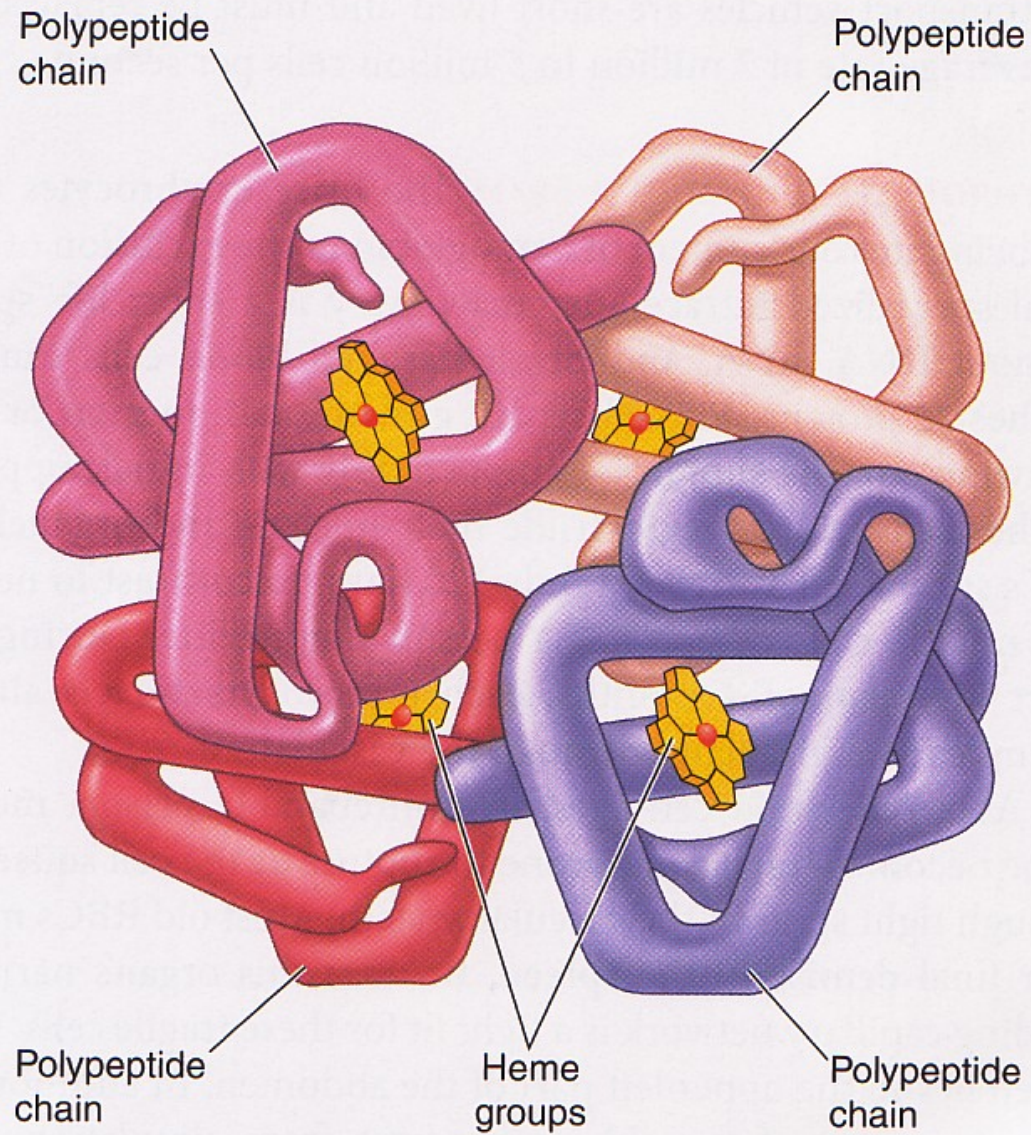
**eg, Rh- mom  
Rh+ baby**

***<http://www.nlm.nih.gov/MEDLINEPLUS/ency/article/001298.htm#Alternative%20Names>***



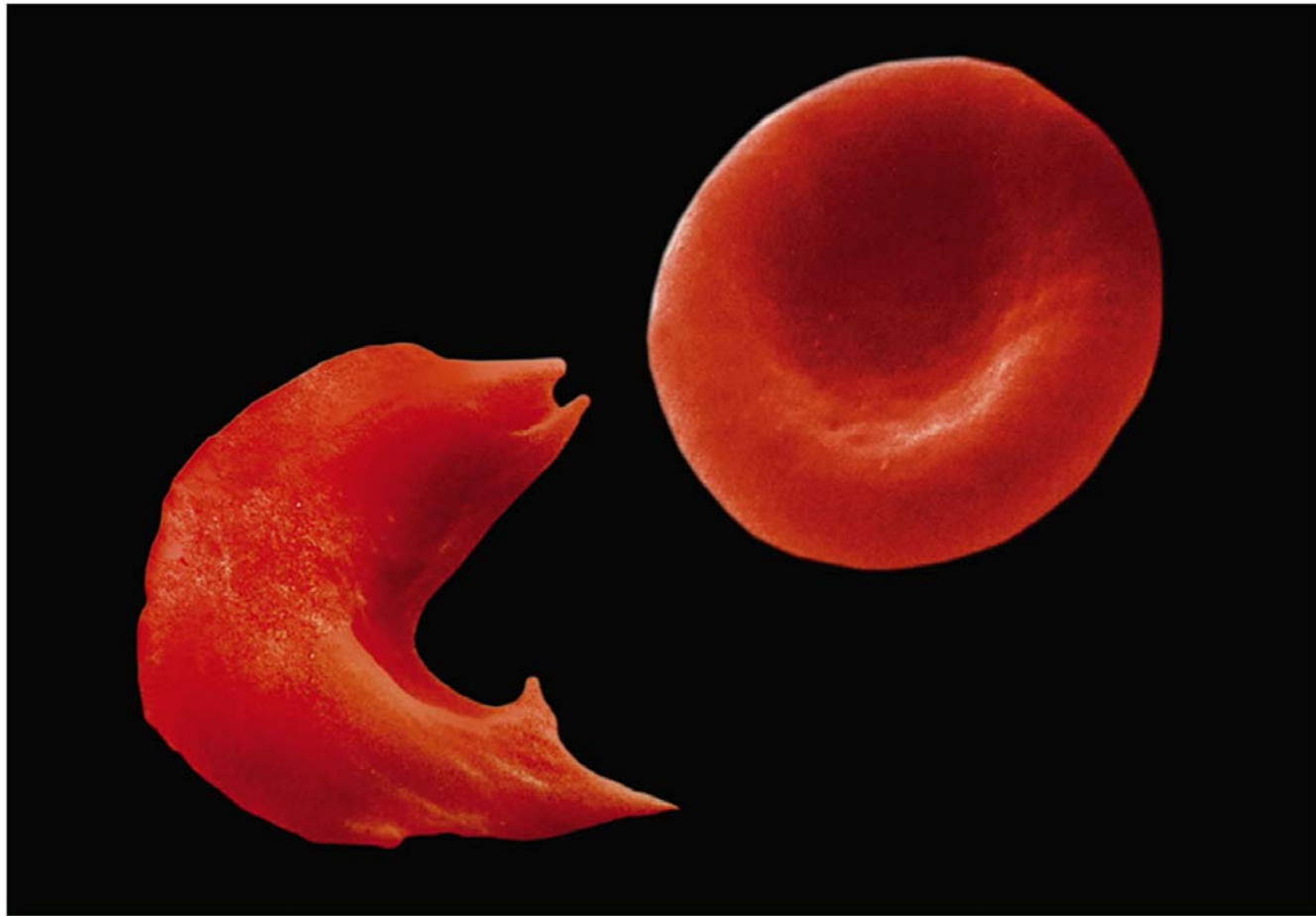
2000 x GMBH,  
Nat Geog 1986  
Jun p 714

# Hemoglobin Structure



Sickle-shaped blood cells

Normal red blood cells



© Dr. Stanley Flegler/Visuals Unlimited

### What a difference one amino acid can make!

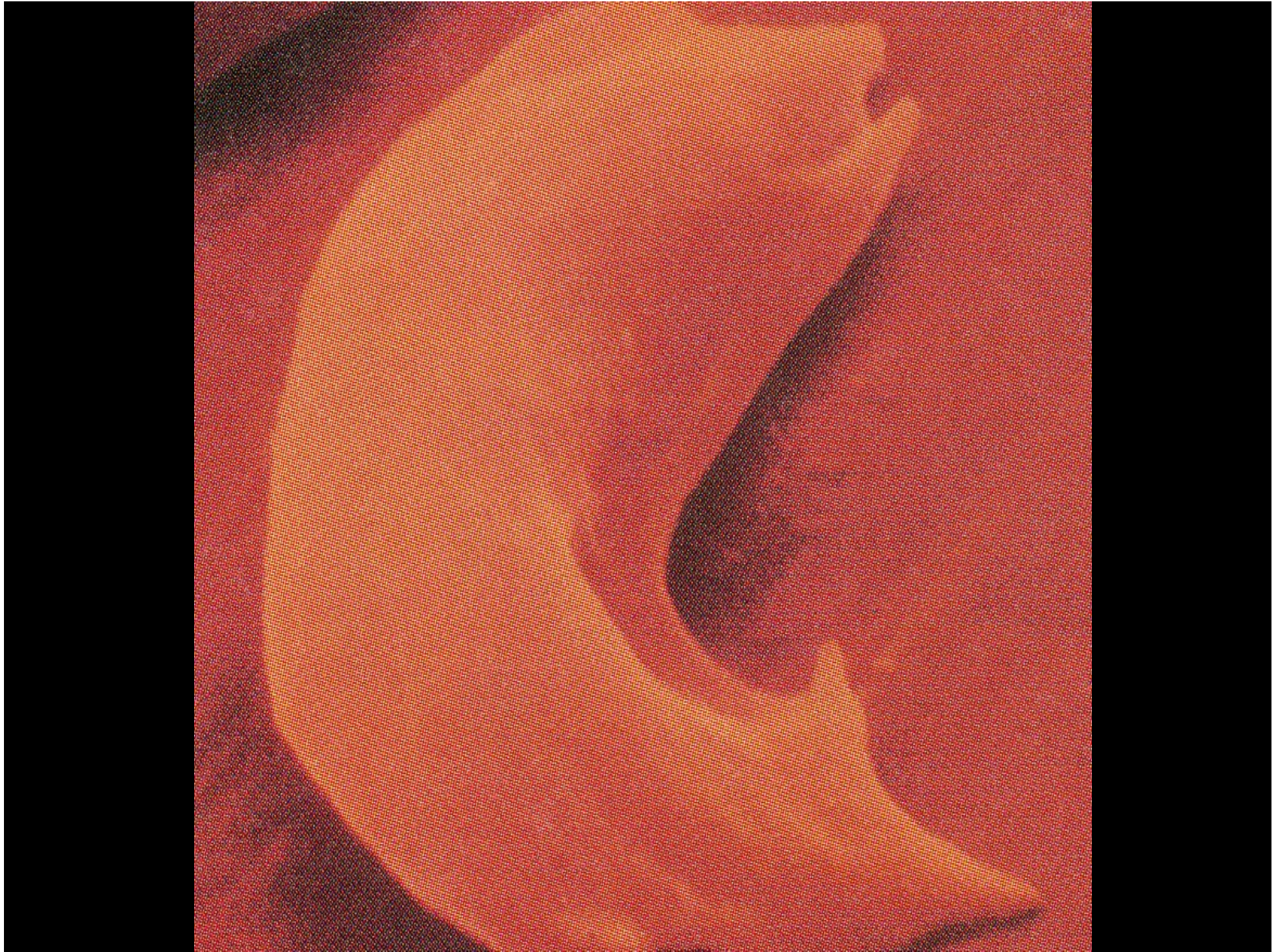
Amino acid sequence of normal hemoglobin:

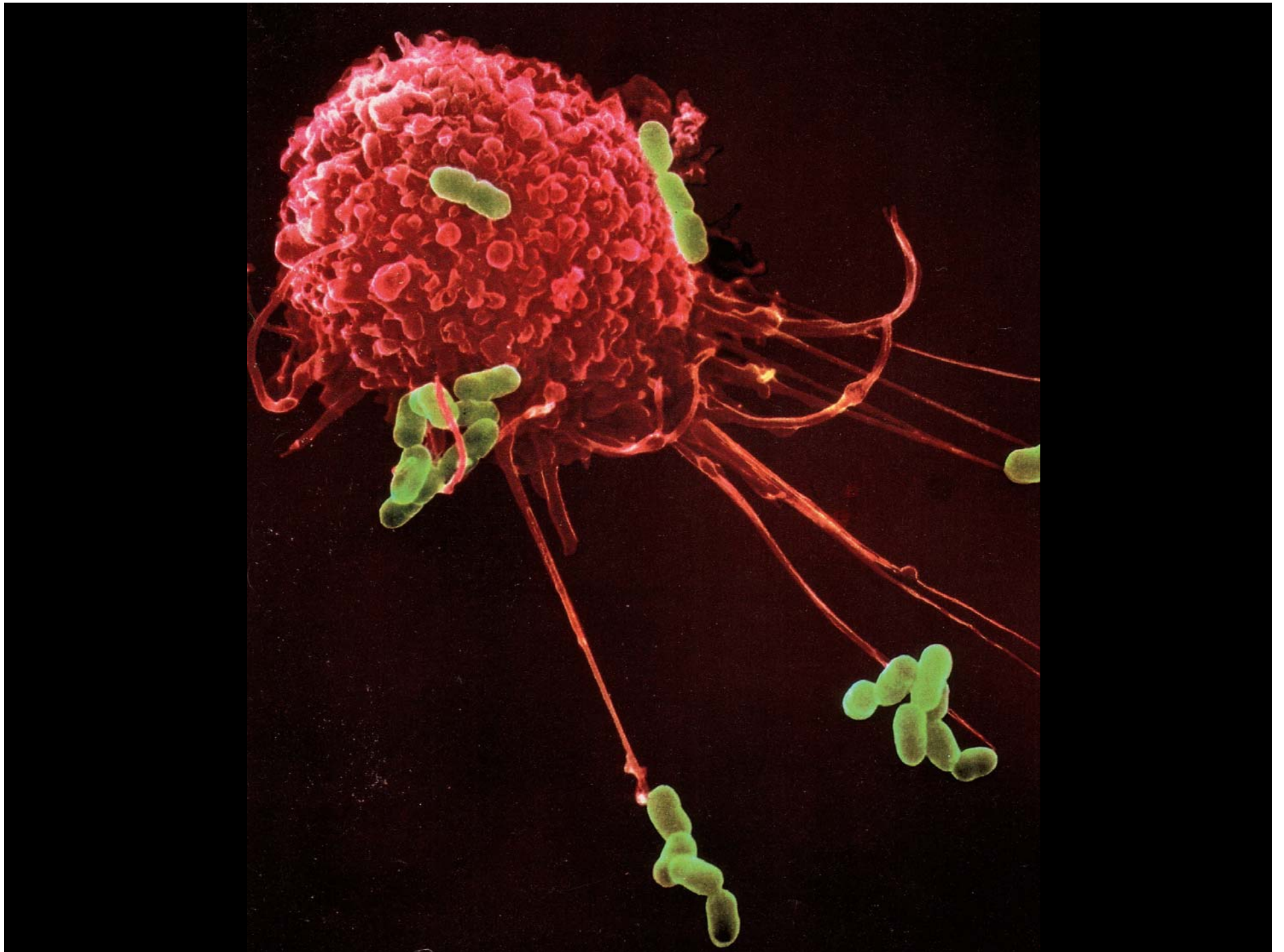
Val — His — Leu — Thr — Pro — Glu — Glu

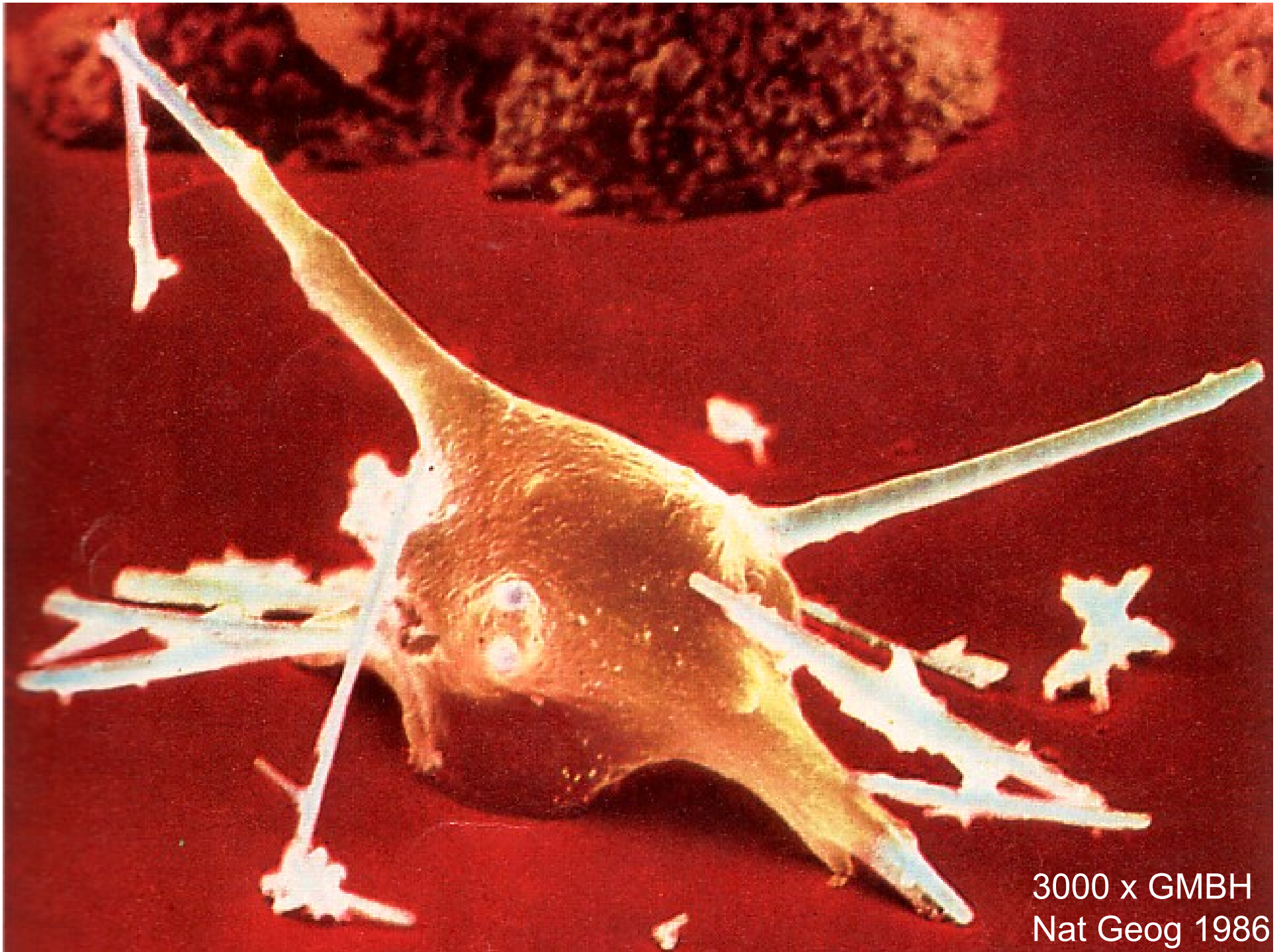
Amino acid sequence of sickle-cell hemoglobin:

Val — His — Leu — Thr — Pro — Val — Glu

S&W 2011 fig 6-5 p 194

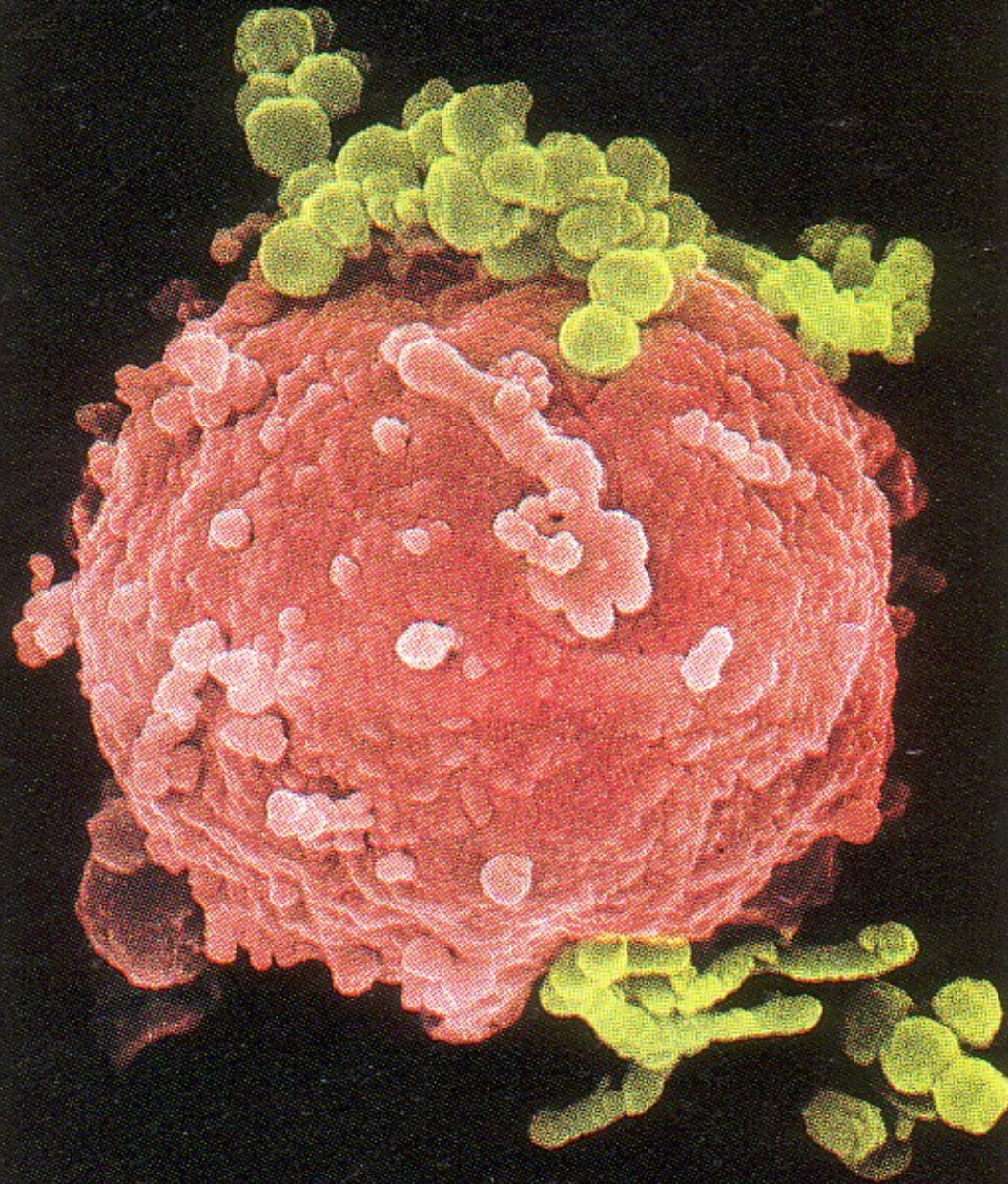


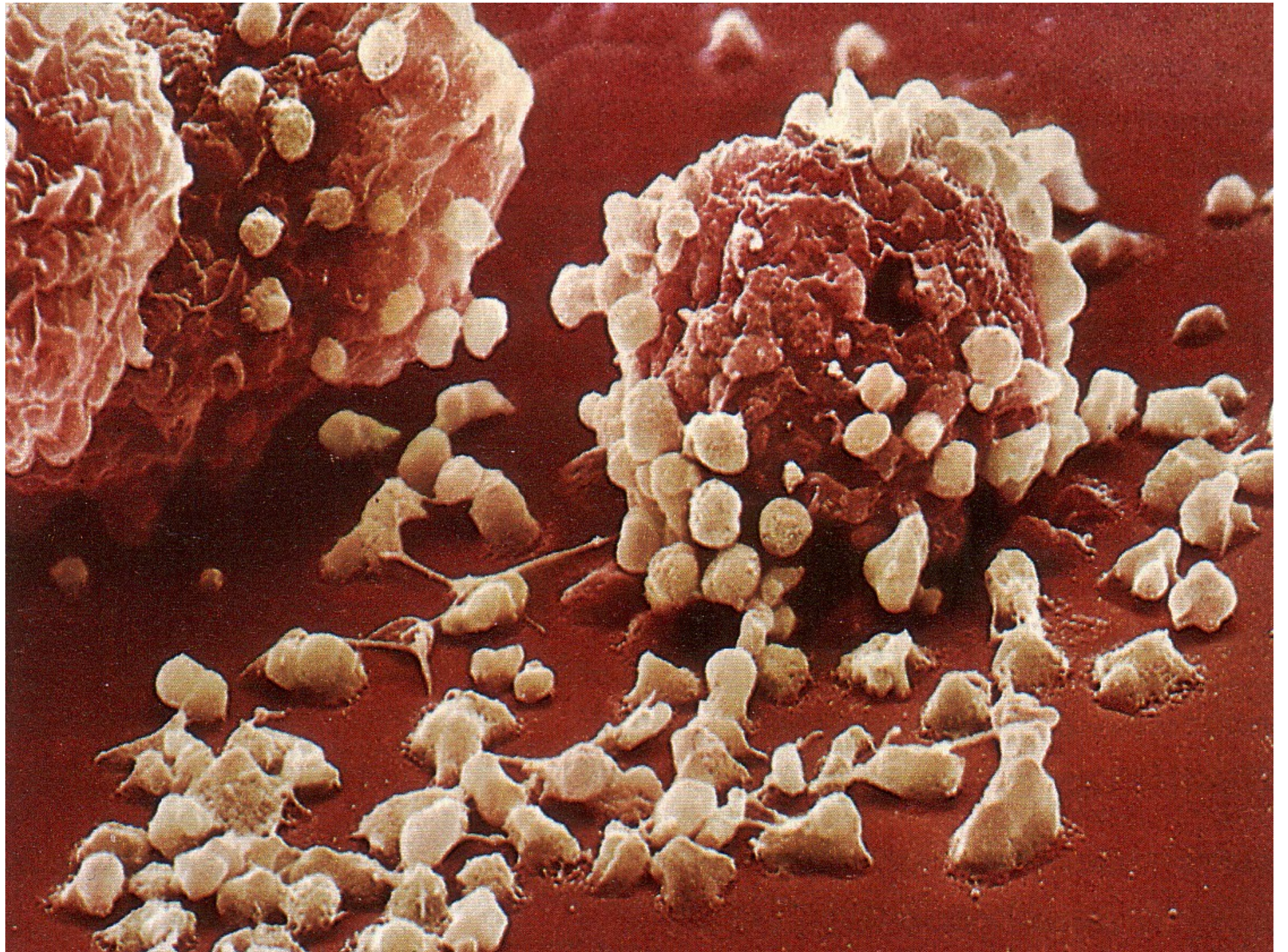


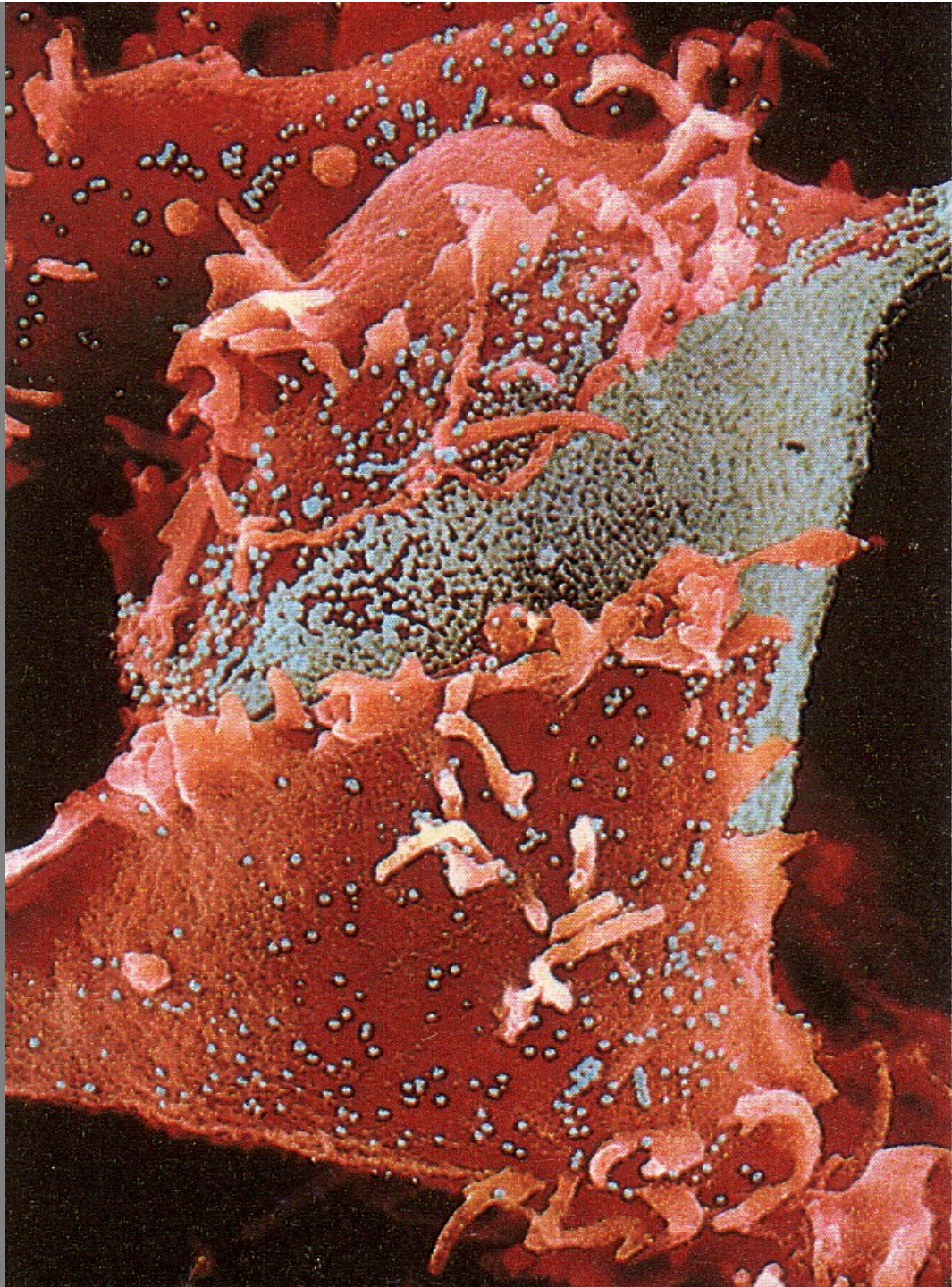


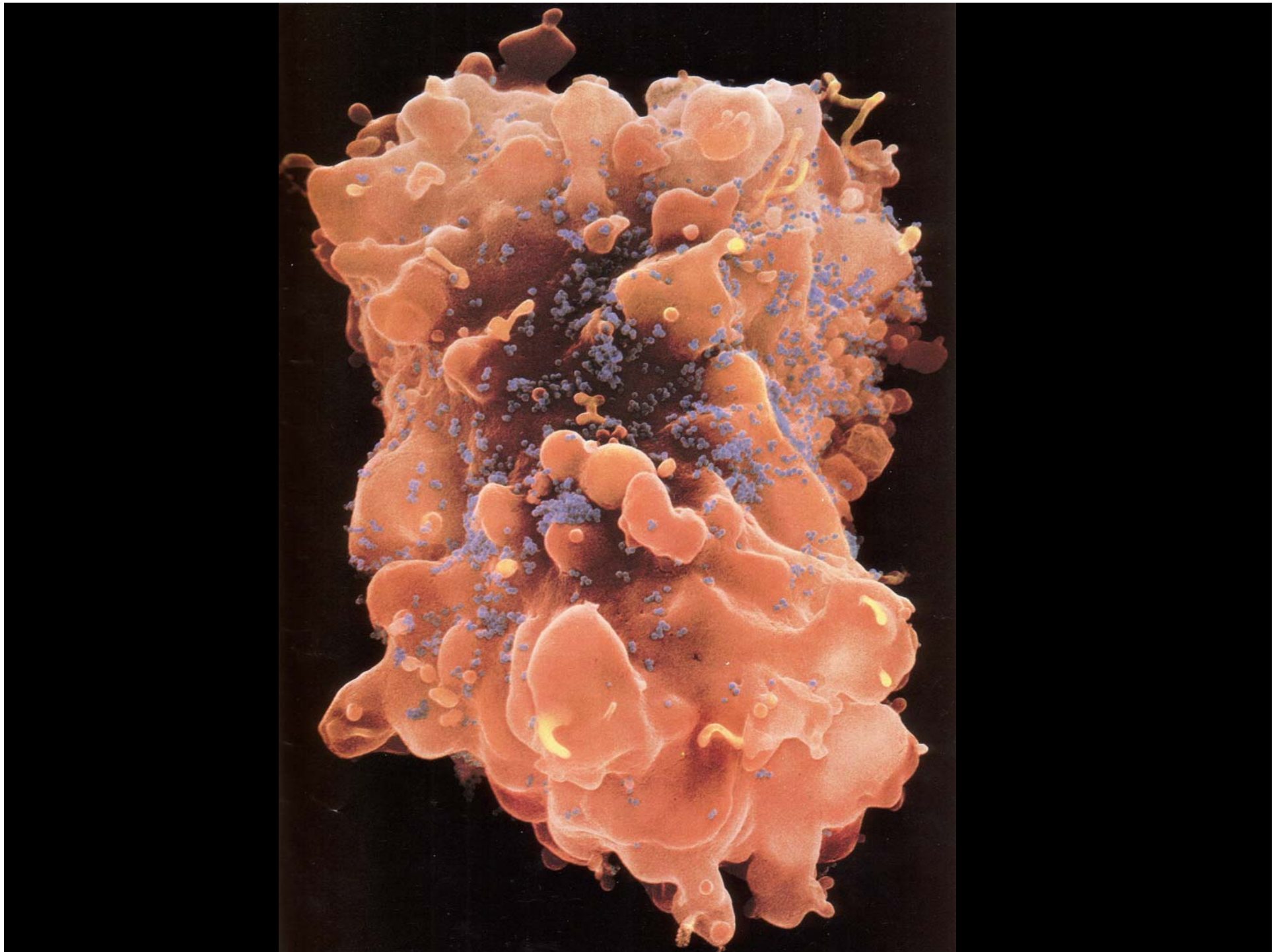
3000 x GMBH  
Nat Geog 1986

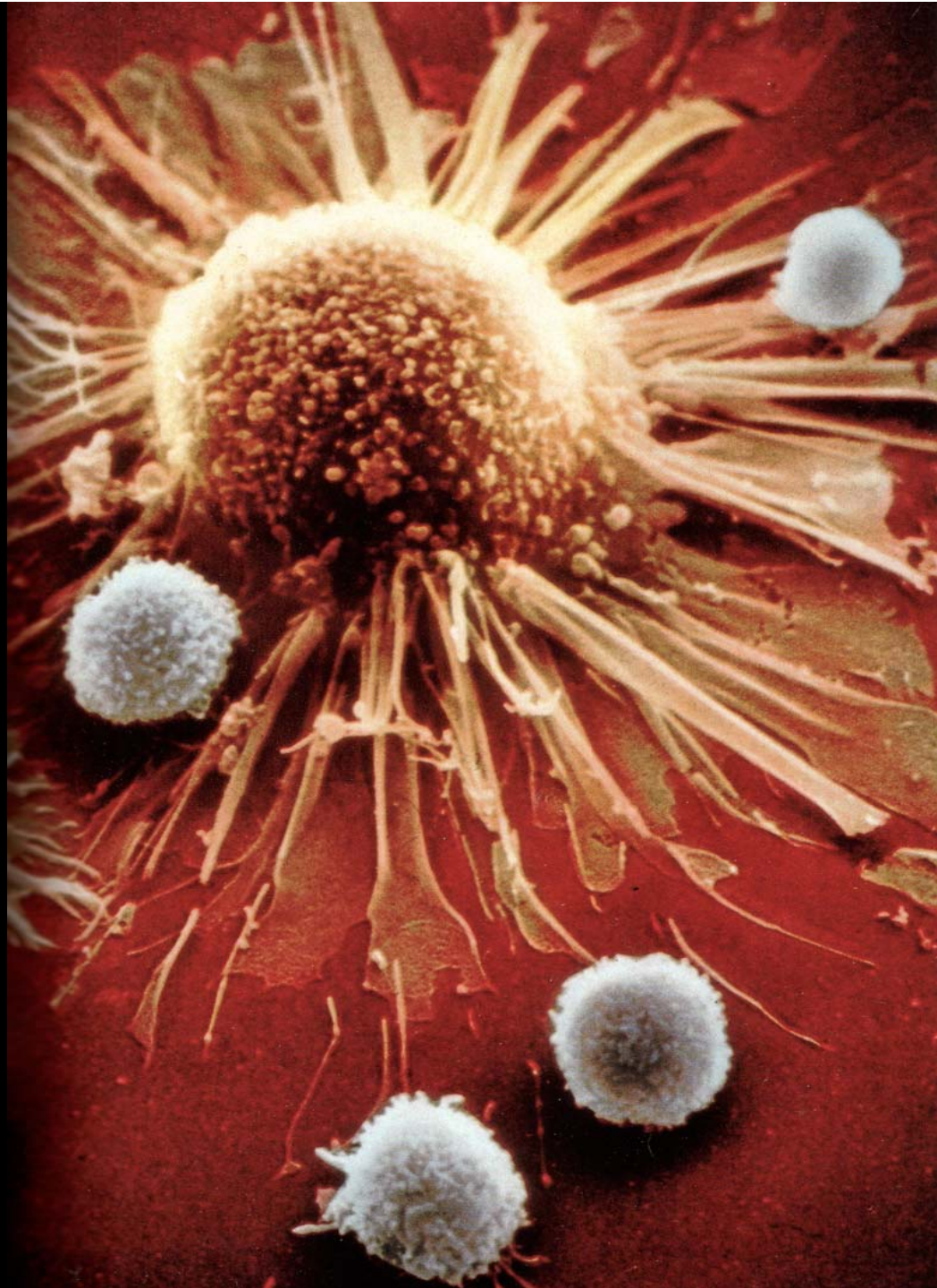


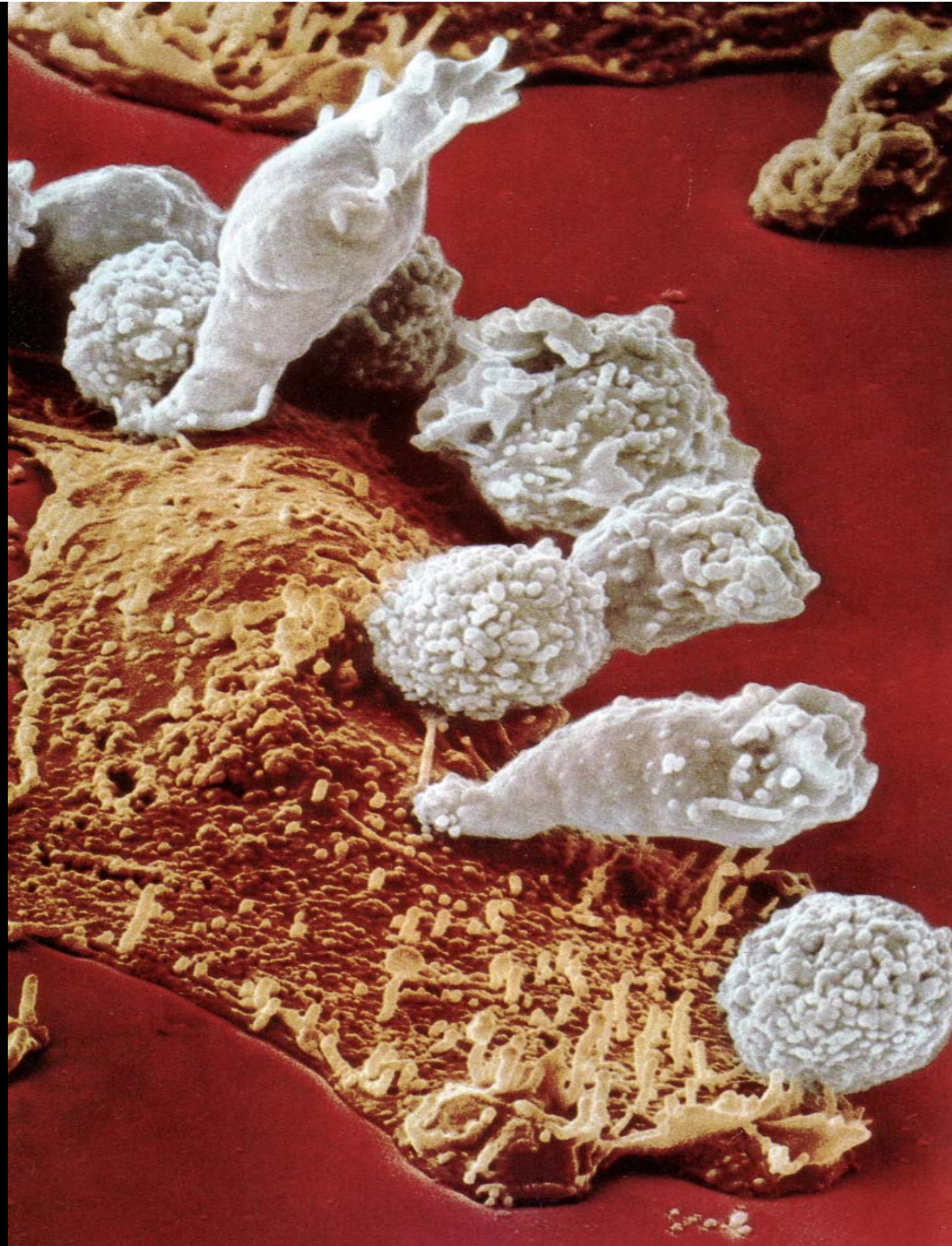




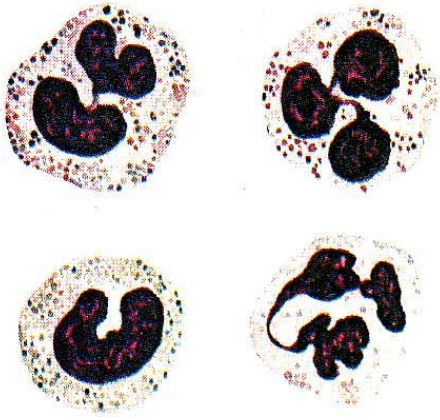




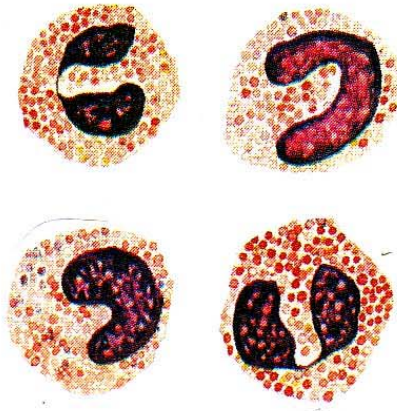




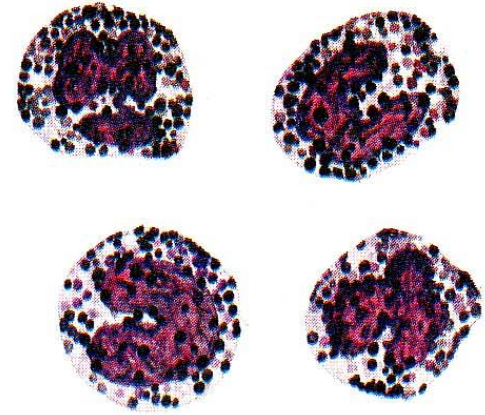




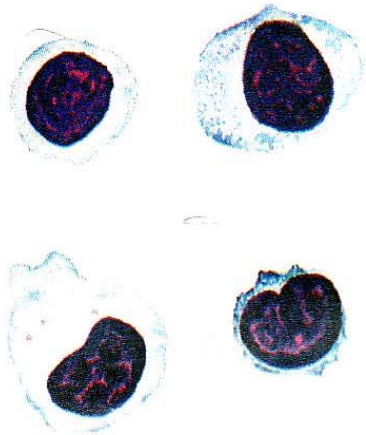
NEUTROPHILS



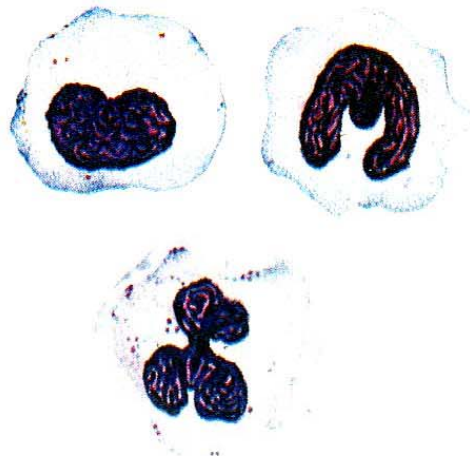
EOSINOPHILS



BASOPHILS



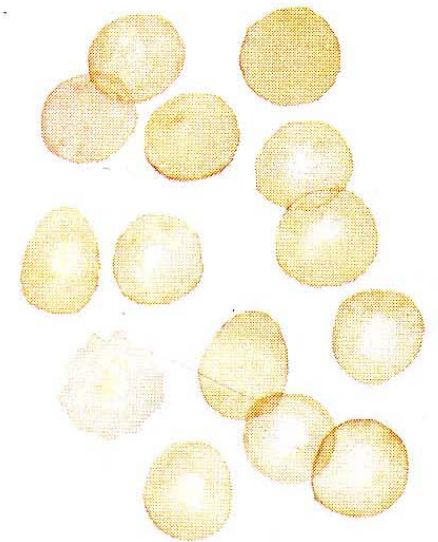
LYMPHOCYTES



MONOCYTES

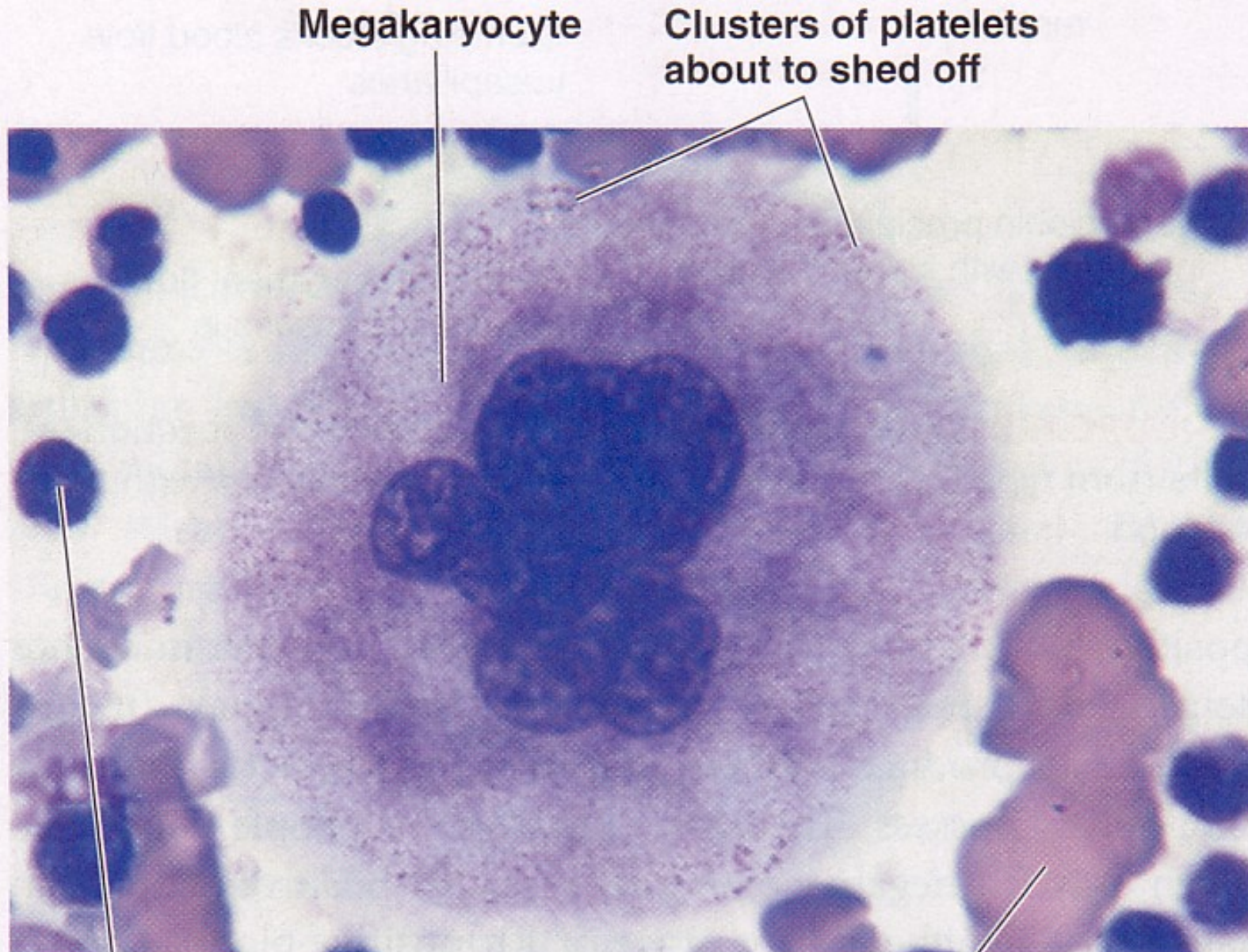


PLATELETS



ERYTHROCYTES





Megakaryocyte

Clusters of platelets  
about to shed off

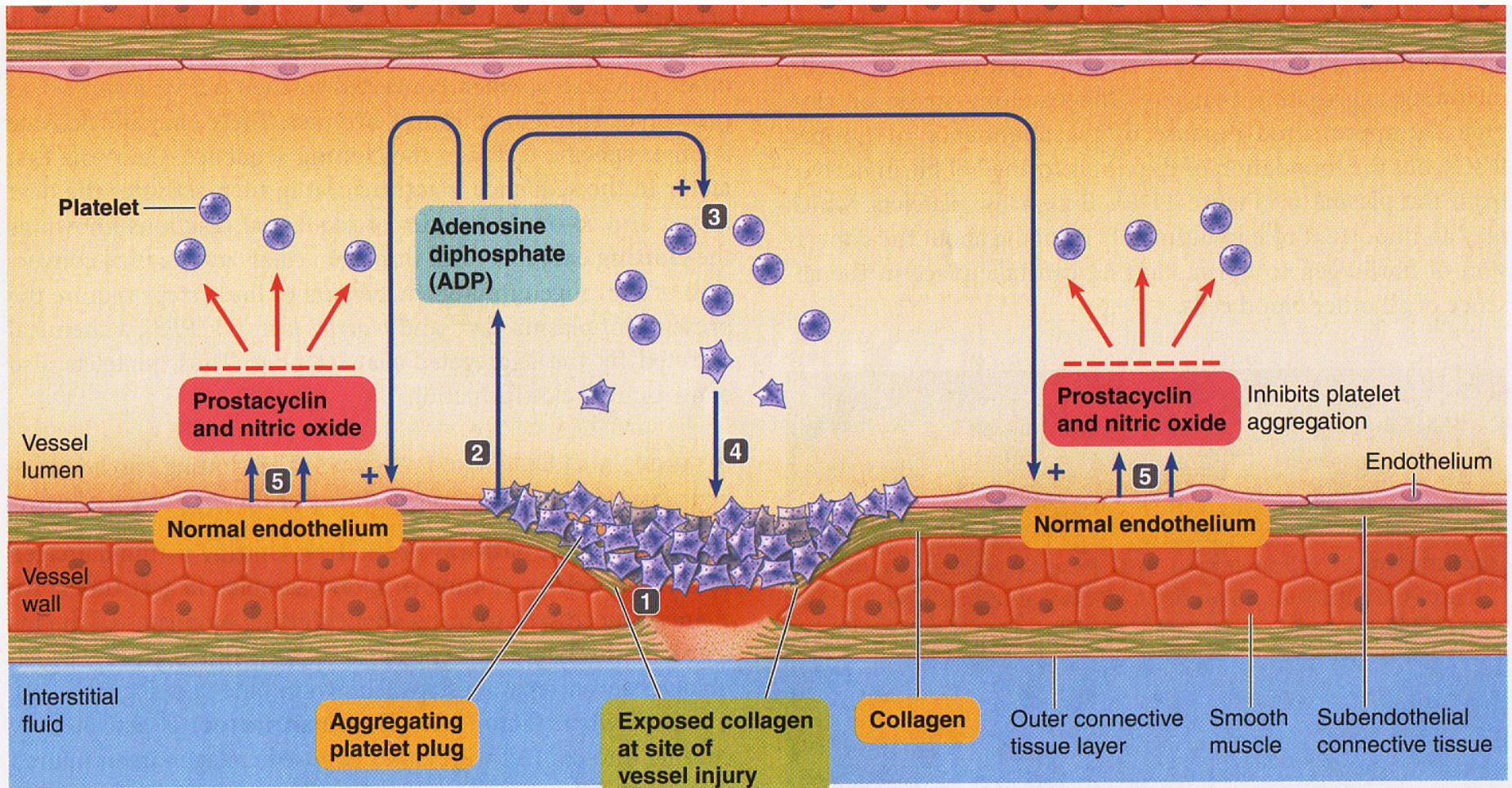
Developing  
leukocyte

Cluster of developing  
erythrocytes

Carolina Biological/Visuals Unlimited

LS 2012 fig 11-6

# Formation of the Platelet Plug



**1** Platelets adhere to and are activated by exposed collagen at the site of vessel injury.

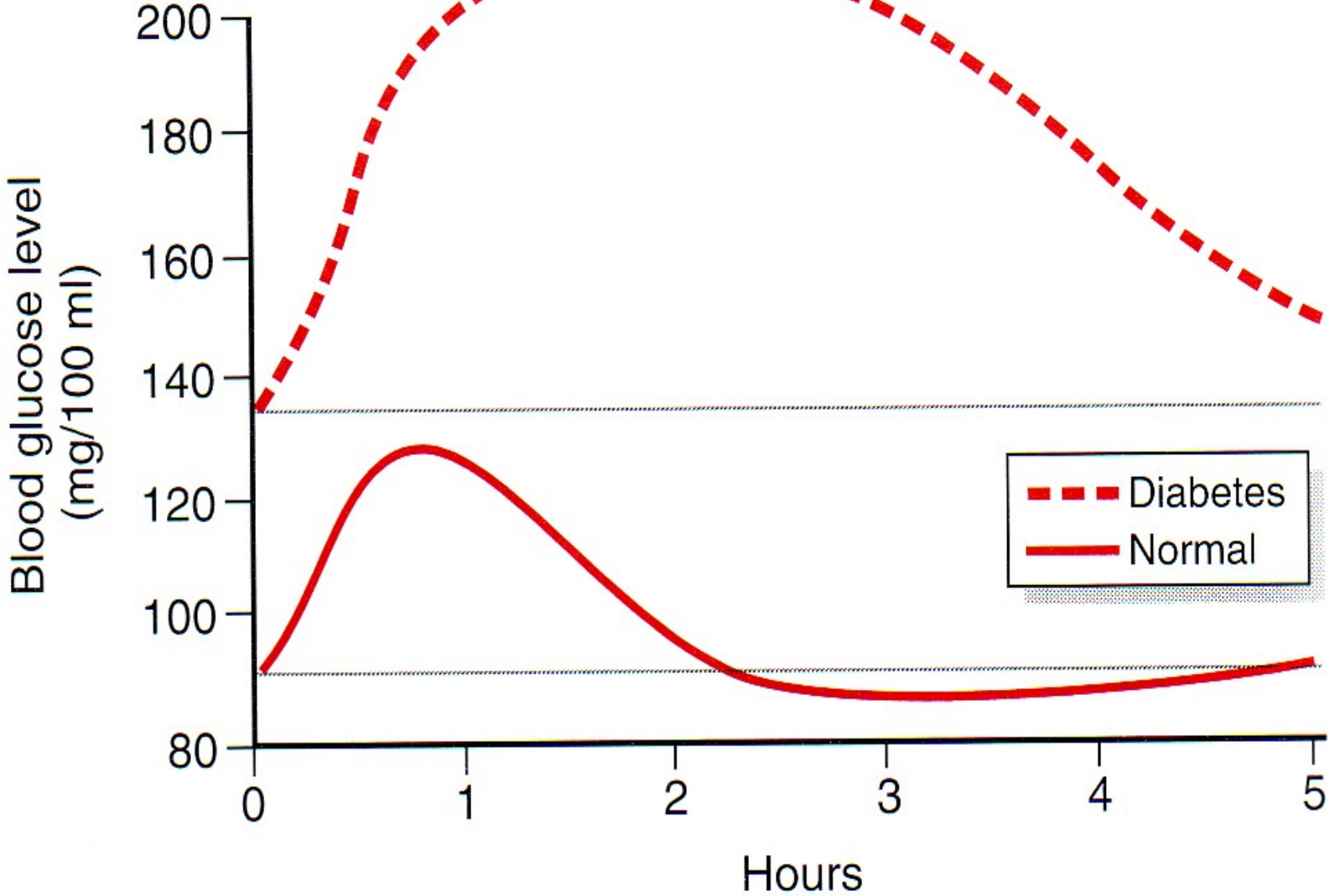
**2** Activated platelets release ADP.

**3** ADP activates other platelets passing by.

**4** Newly activated platelets aggregate onto growing platelet plug and release even more platelet-attracting chemicals.

**5** Normal (uninjured) endothelium releases prostacyclin and nitric oxide, which inhibit platelet aggregation, so platelet plug is confined to site of injury.

# Diabetic & Normal Response to Glucose Load



Glucose:  
*Sugar in Blood*

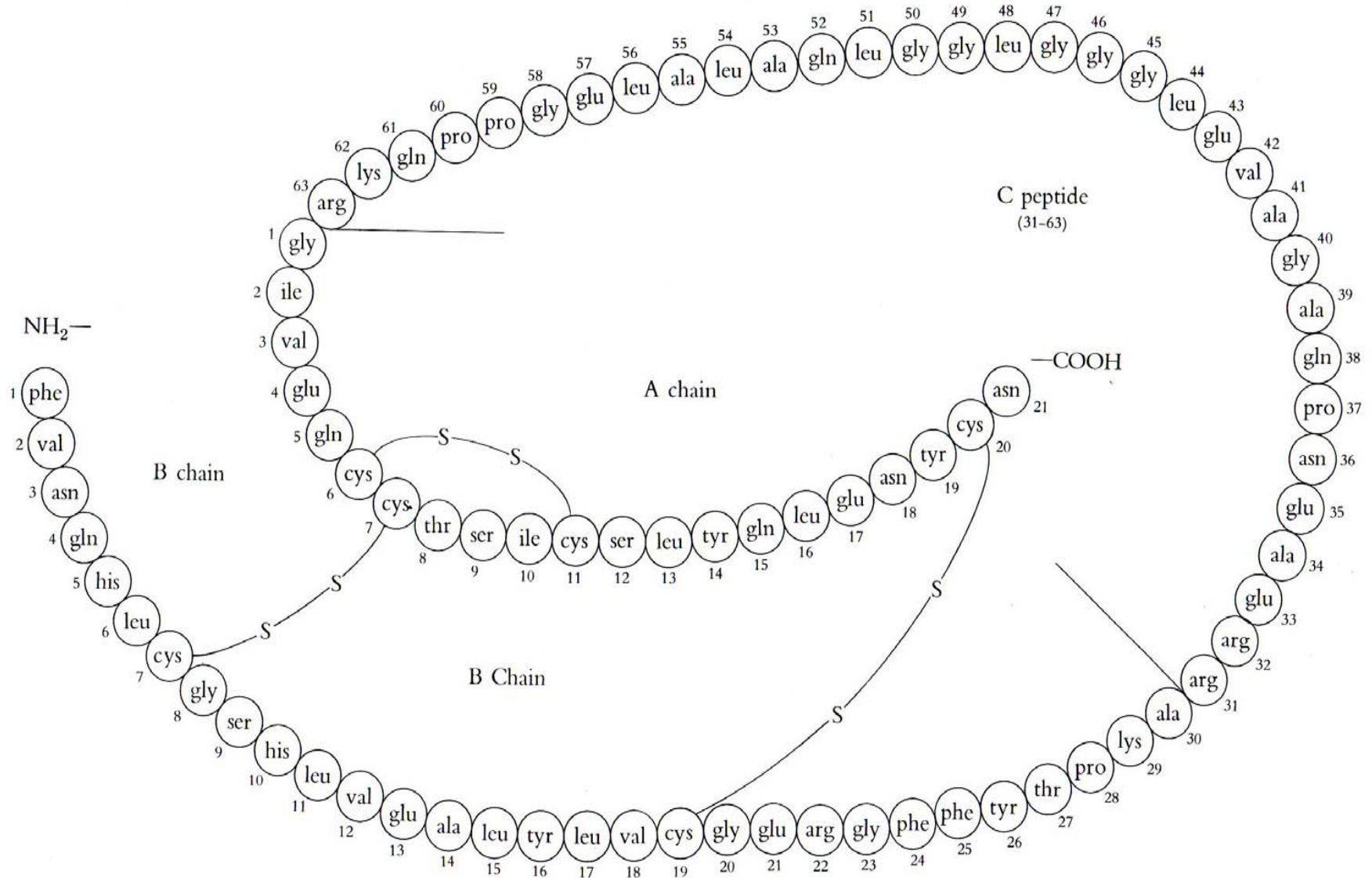


*Normal: 70-99*

*Pre-Diabetes: 100-125*

*Diabetes:  $\geq 126$  mg/dL*

# Proinsulin with C-Connecting Peptide



**FIG. 10-4.** Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.

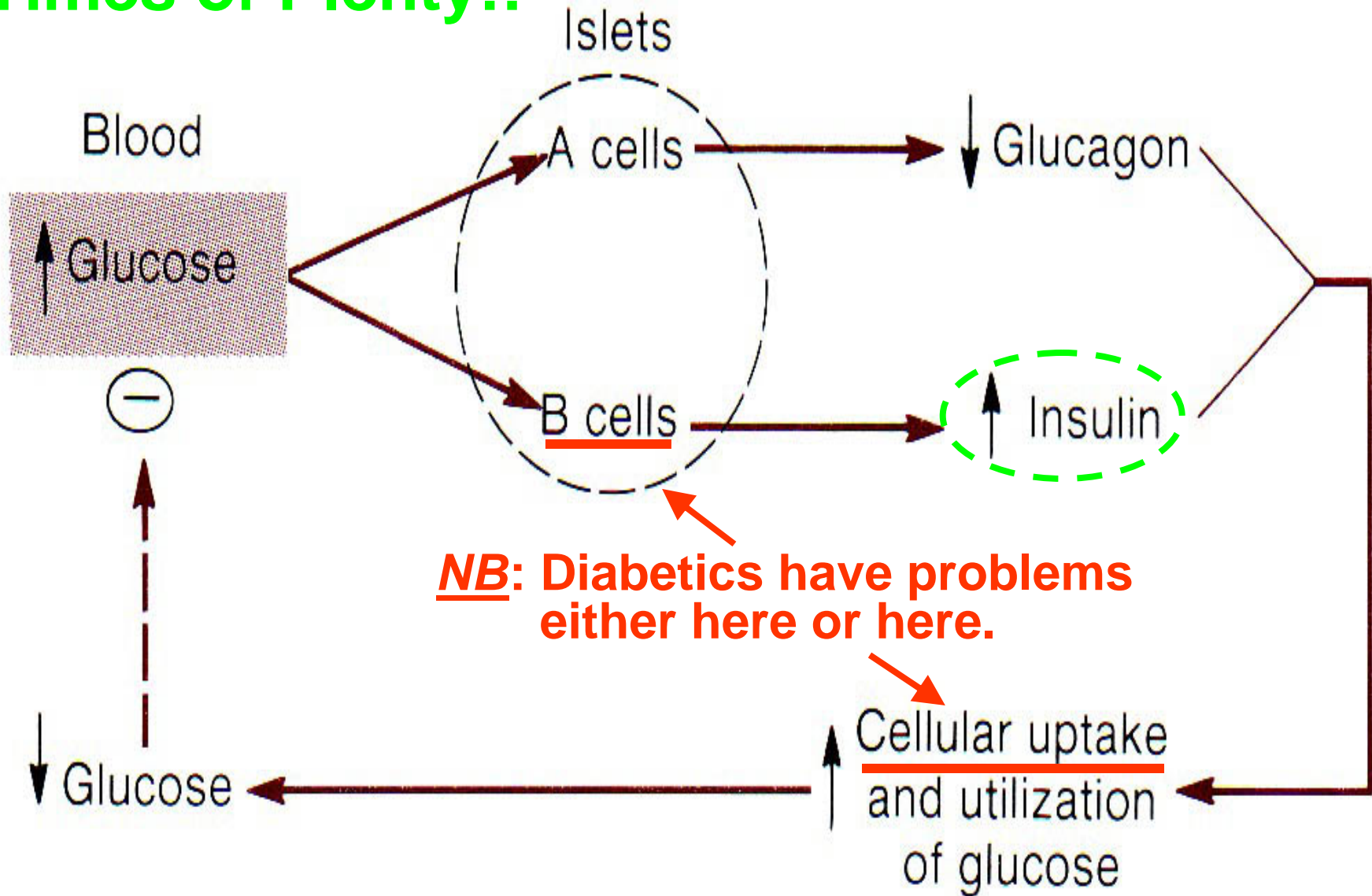
TABLE  
4-7

## Warning Signs of Diabetes

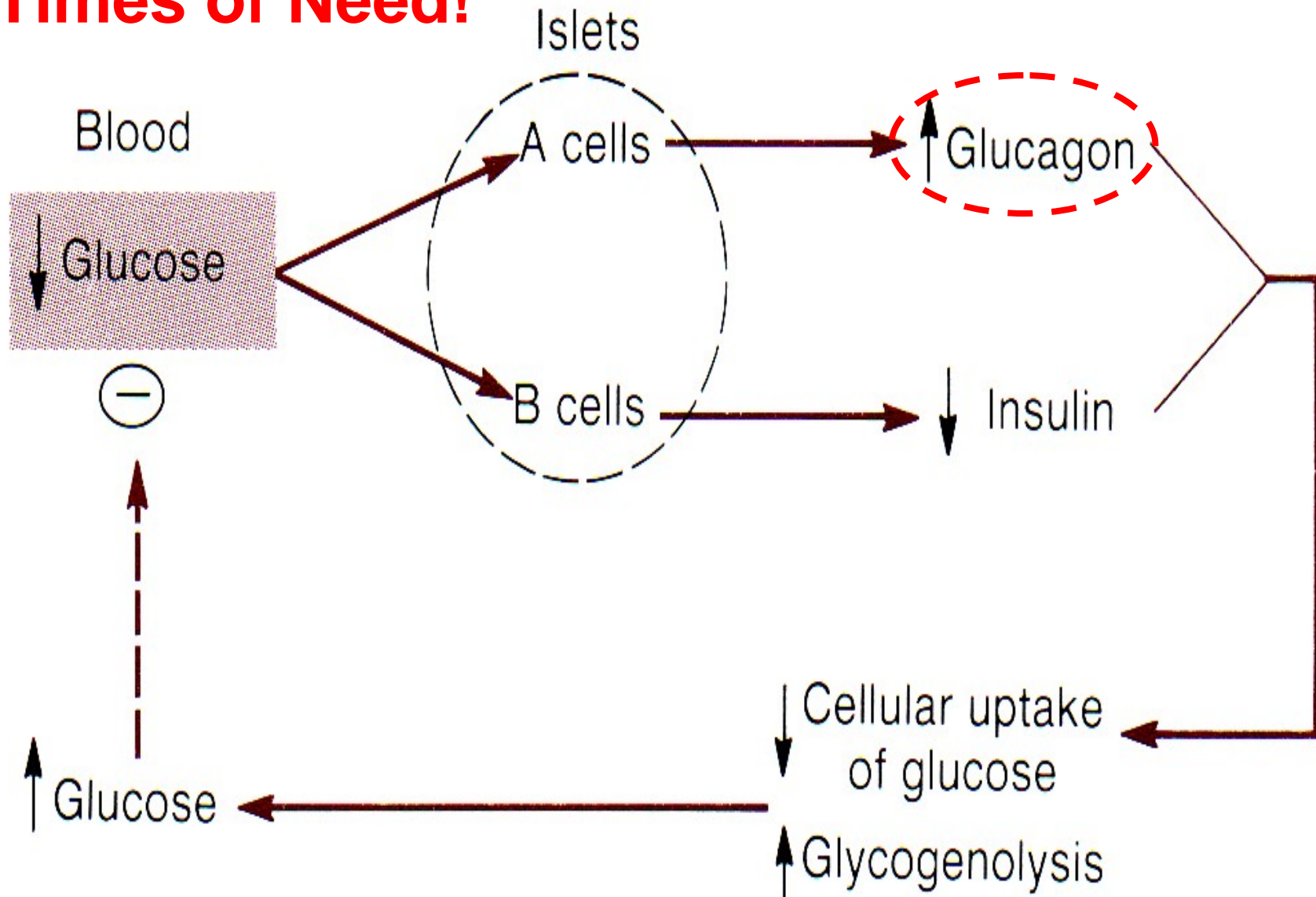
These signs appear reliably in type 1 diabetes and, often, in the later stages of type 2 diabetes.

- Excessive urination and thirst
- Glucose in the urine
- Weight loss with nausea, easy tiring, weakness, or irritability
- Cravings for food, especially for sweets
- Frequent infections of the skin, gums, vagina, or urinary tract
- Vision disturbances; blurred vision
- Pain in the legs, feet, or fingers
- Slow healing of cuts and bruises
- Itching
- Drowsiness
- Abnormally high glucose in the blood

# Times of Plenty!!



# Times of Need!



**Mobilize!!**



*Diabetics must constantly juggle diet, exercise & medication to control blood glucose!*



*Like others, diabetics benefit from whole grains, vegetables, fruits, legumes & non-/low-fat milk products!*

