



...Fun lab week with much personal data!

## BI 121 Lecture 10

- 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?
- II. CVDs Prevention & Treatment** Exercise, dietary modifications anti-inflammatory oils? PTCA, CABG, ... Torstar, S&W ch 5+...
- 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!)**

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

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

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

**...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.



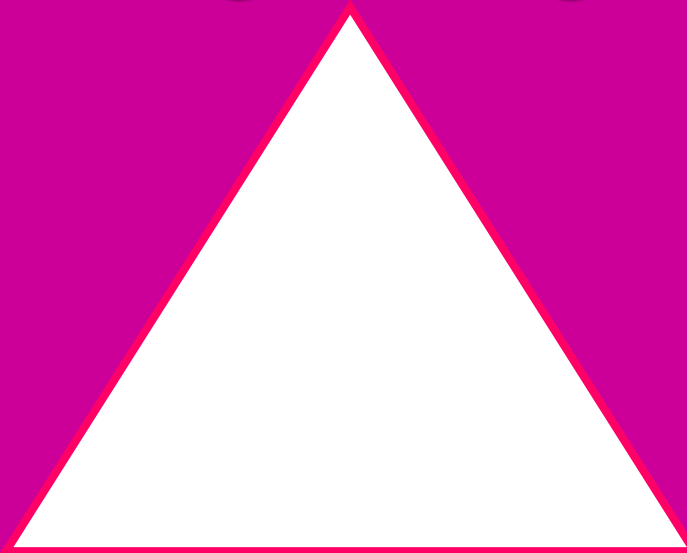
*Science Teaching Reconsidered*, National Academy Press, 1997.

# *Treatment Triad*

NB: Last blasted resort!!

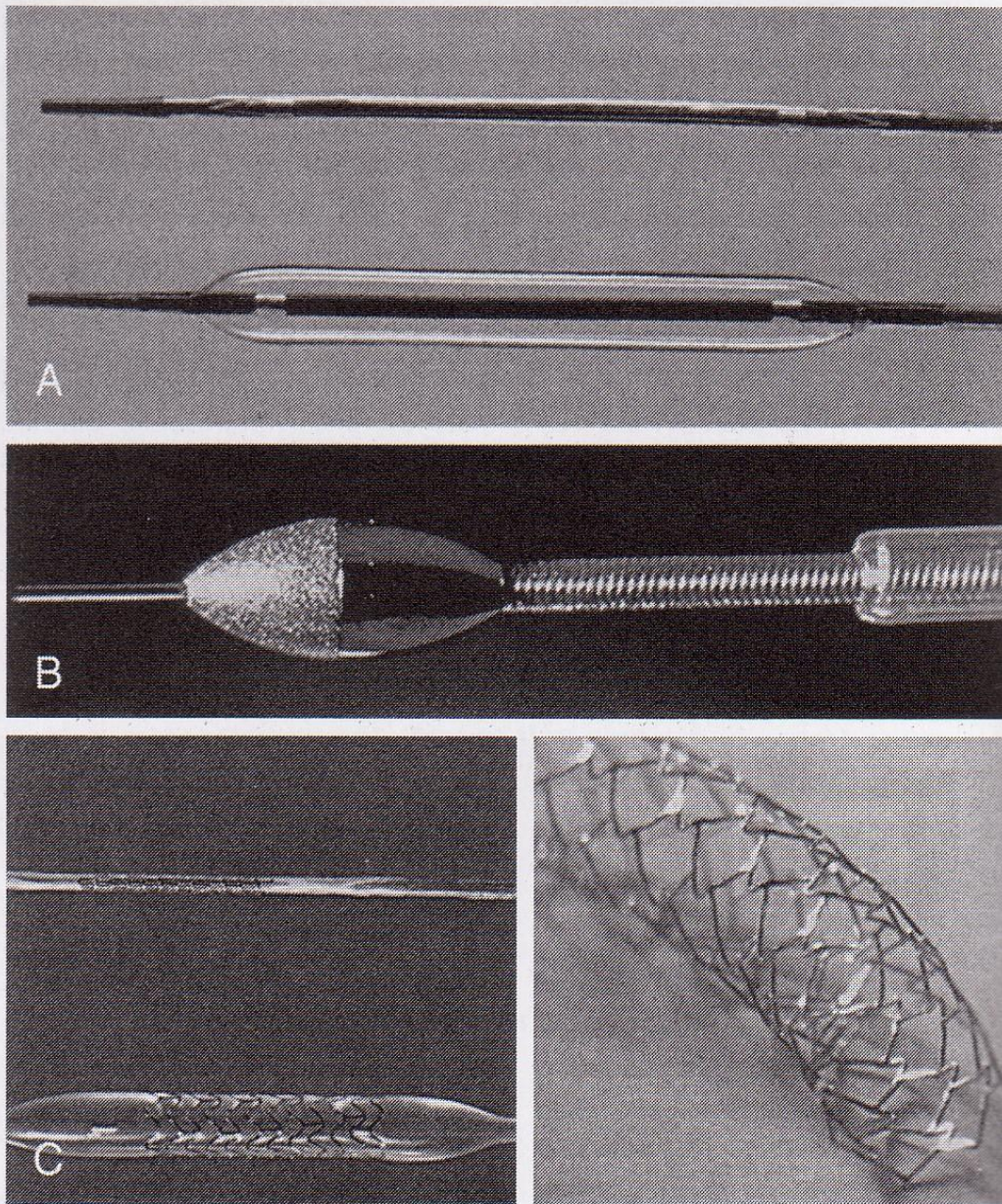


*Drugs/Surgery*

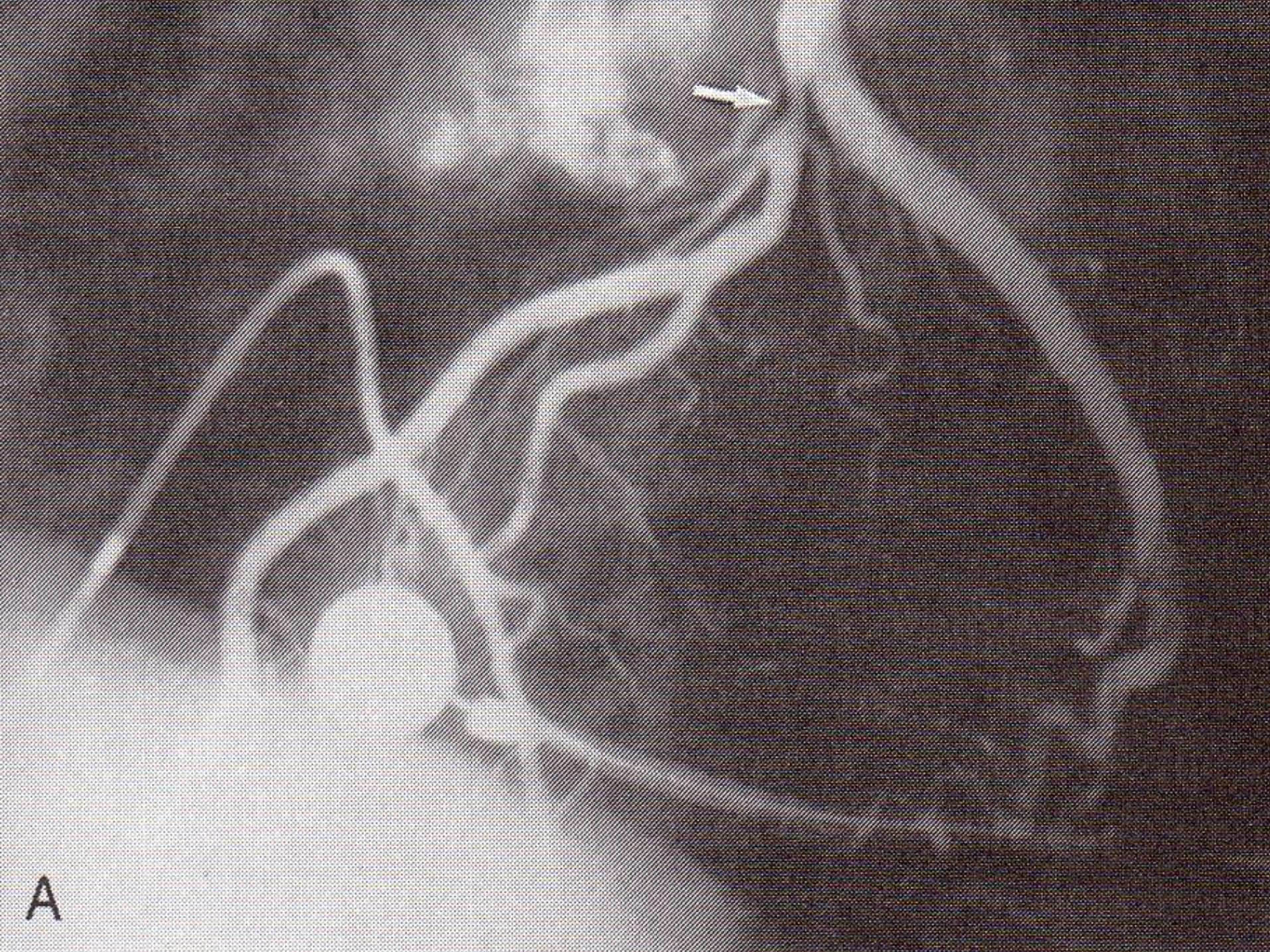


*Exercise*

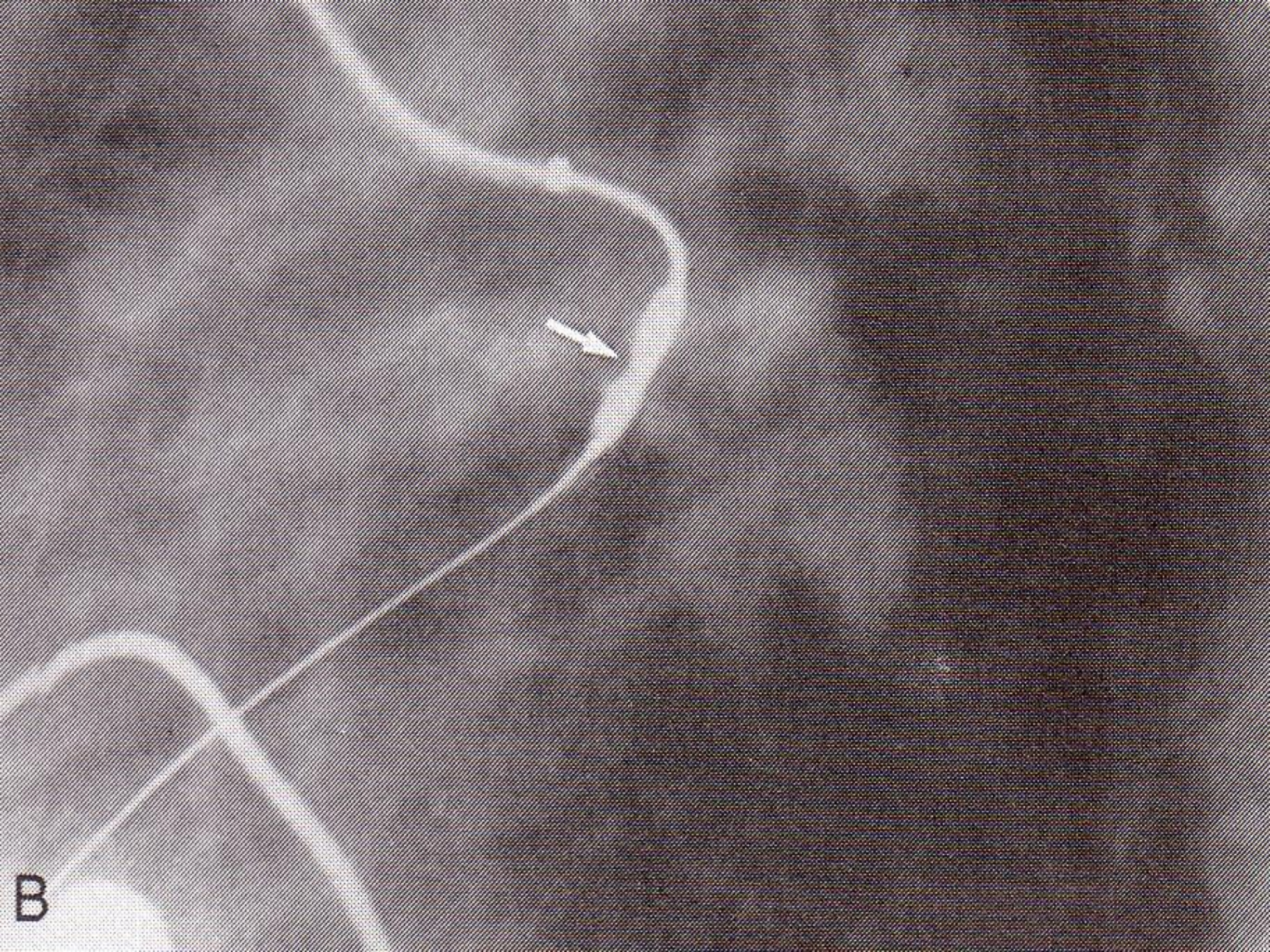
*Dietary  
Modification*



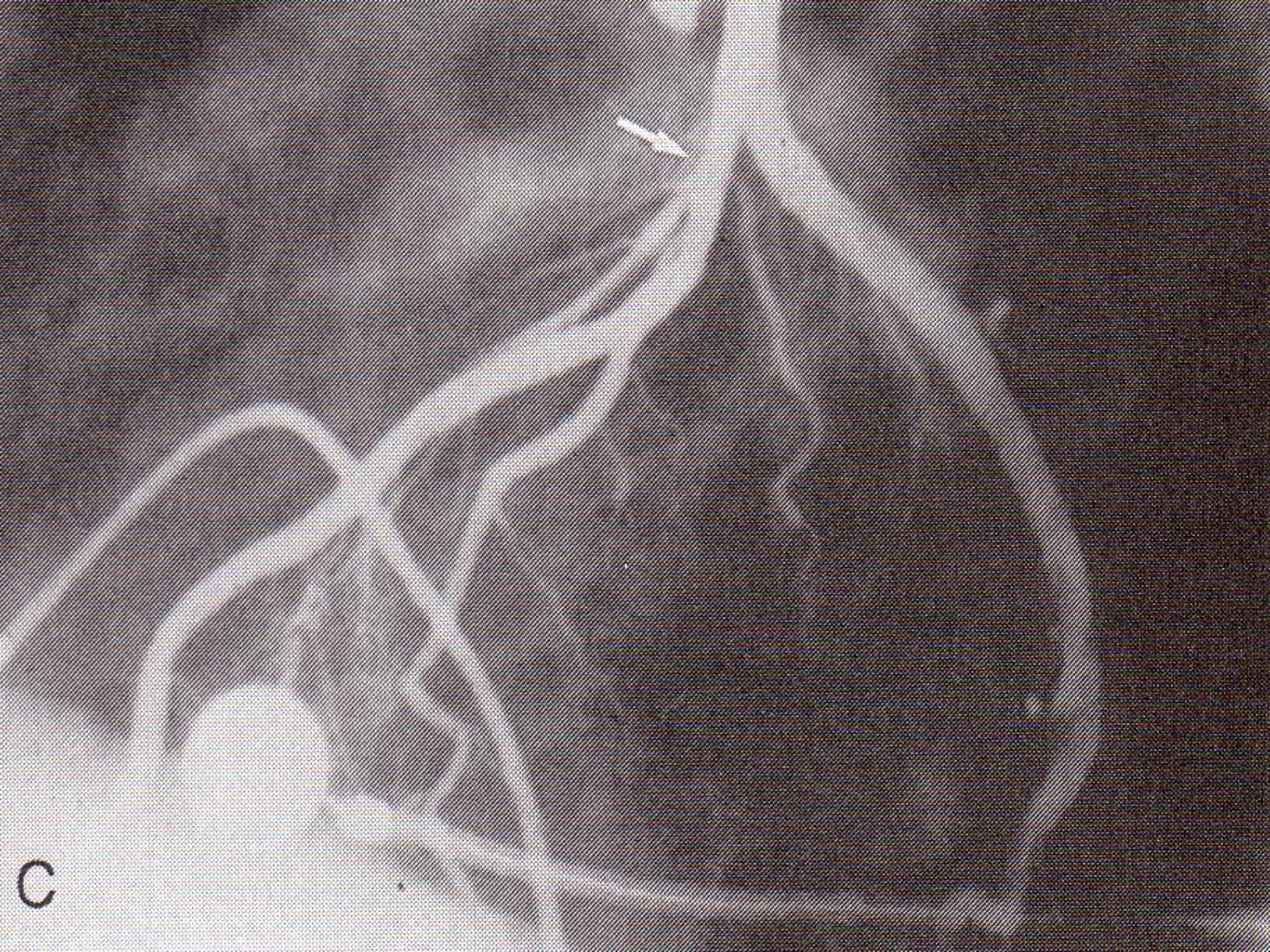
**FIGURE 37-1** Devices for percutaneous transluminal coronary interventions. **A**, Coronary balloon. **B**, Rotational atherectomy burr (Rotablator). **C**, Coronary stent.



A

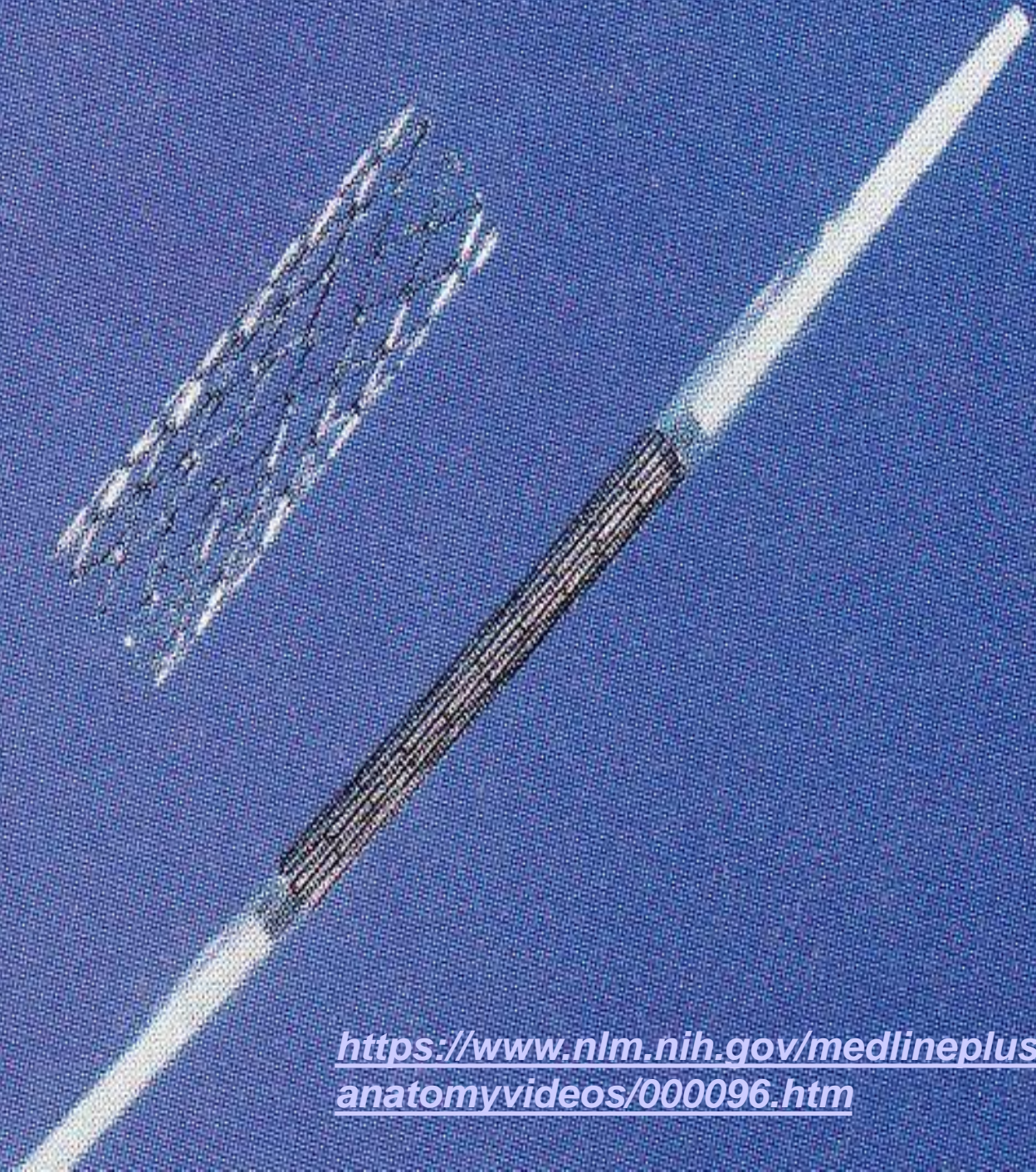


B



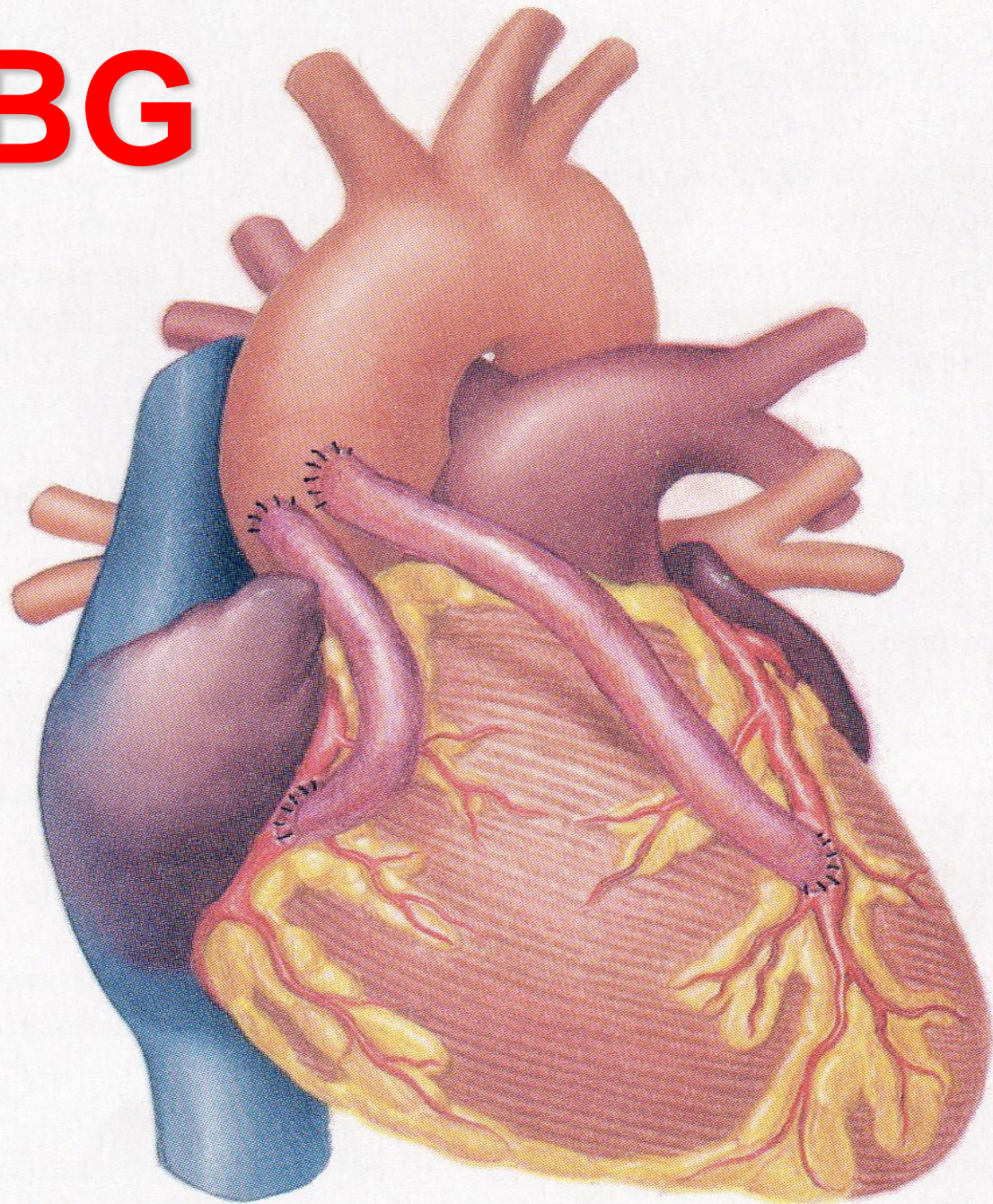
C

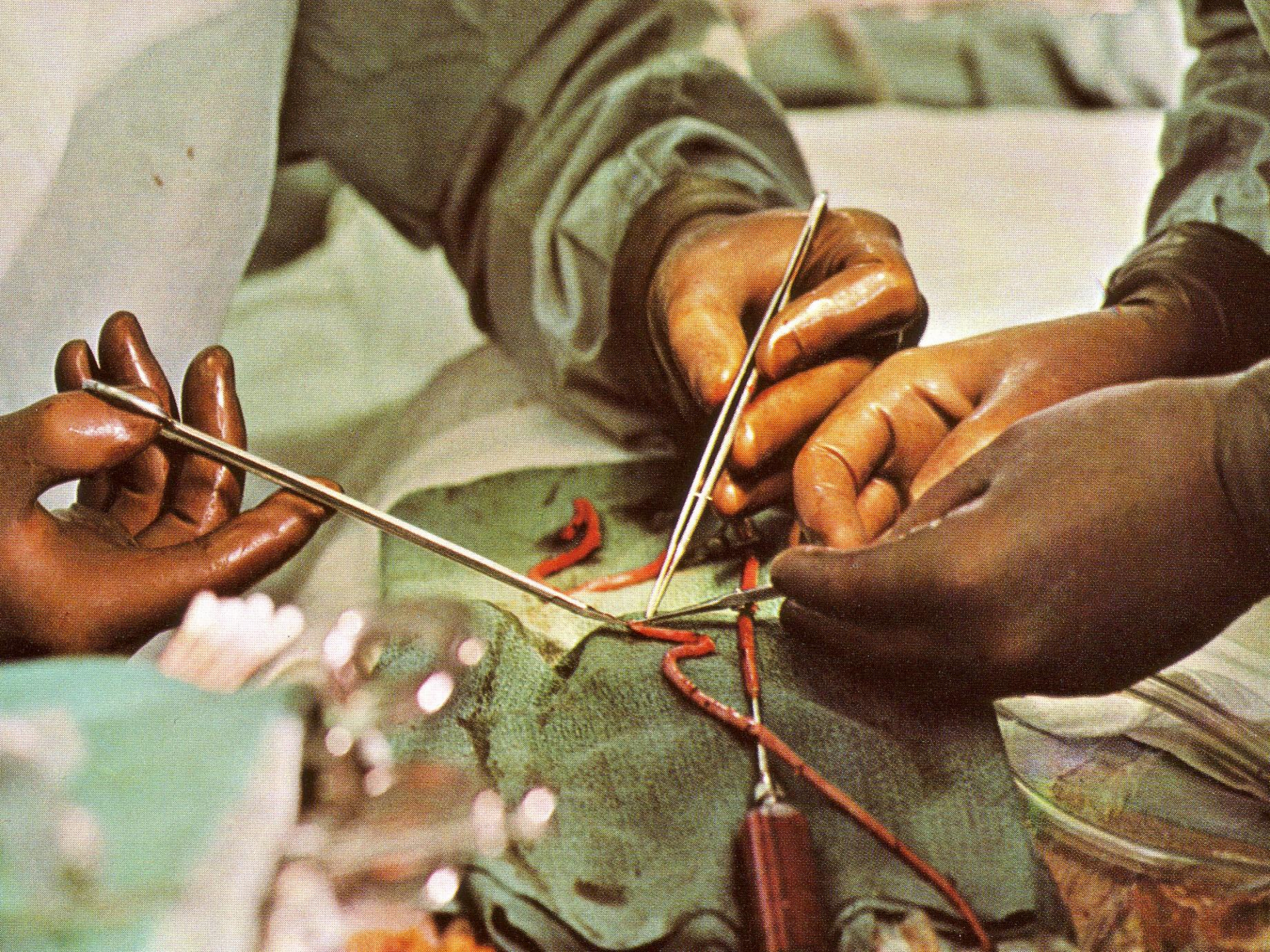


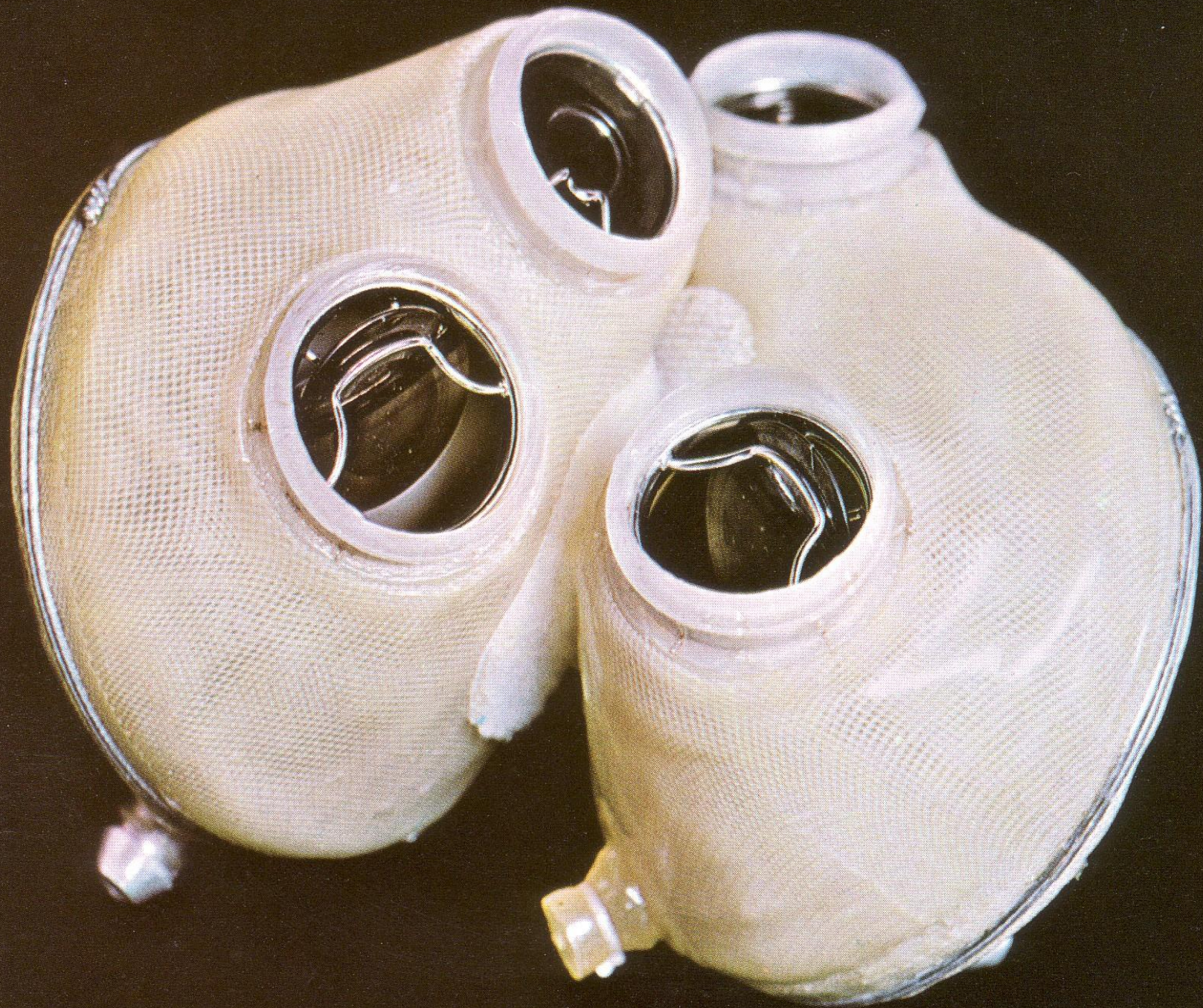


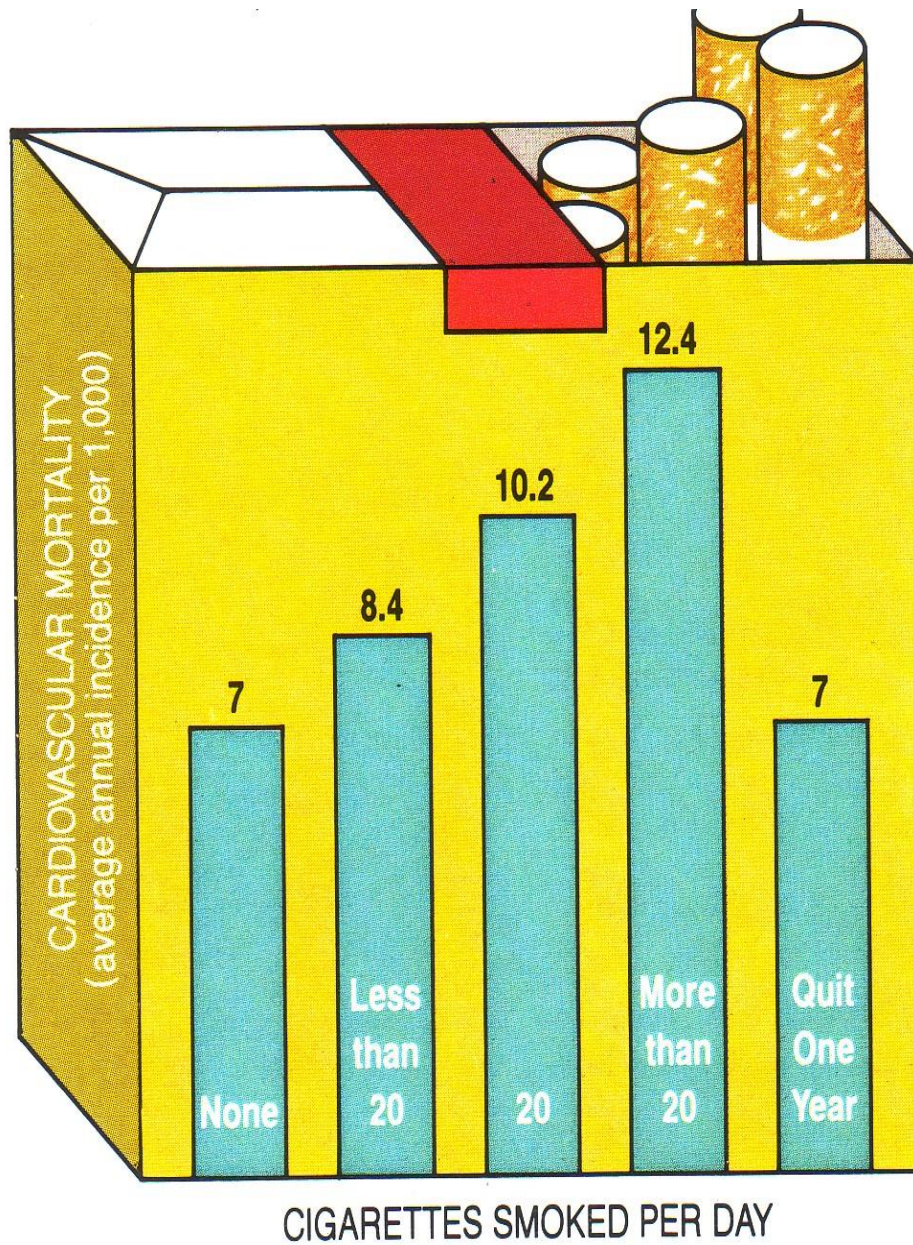
[https://www.nlm.nih.gov/medlineplus/ency/  
anatomyvideos/000096.htm](https://www.nlm.nih.gov/medlineplus/ency/anatomyvideos/000096.htm)

# CABG









# 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

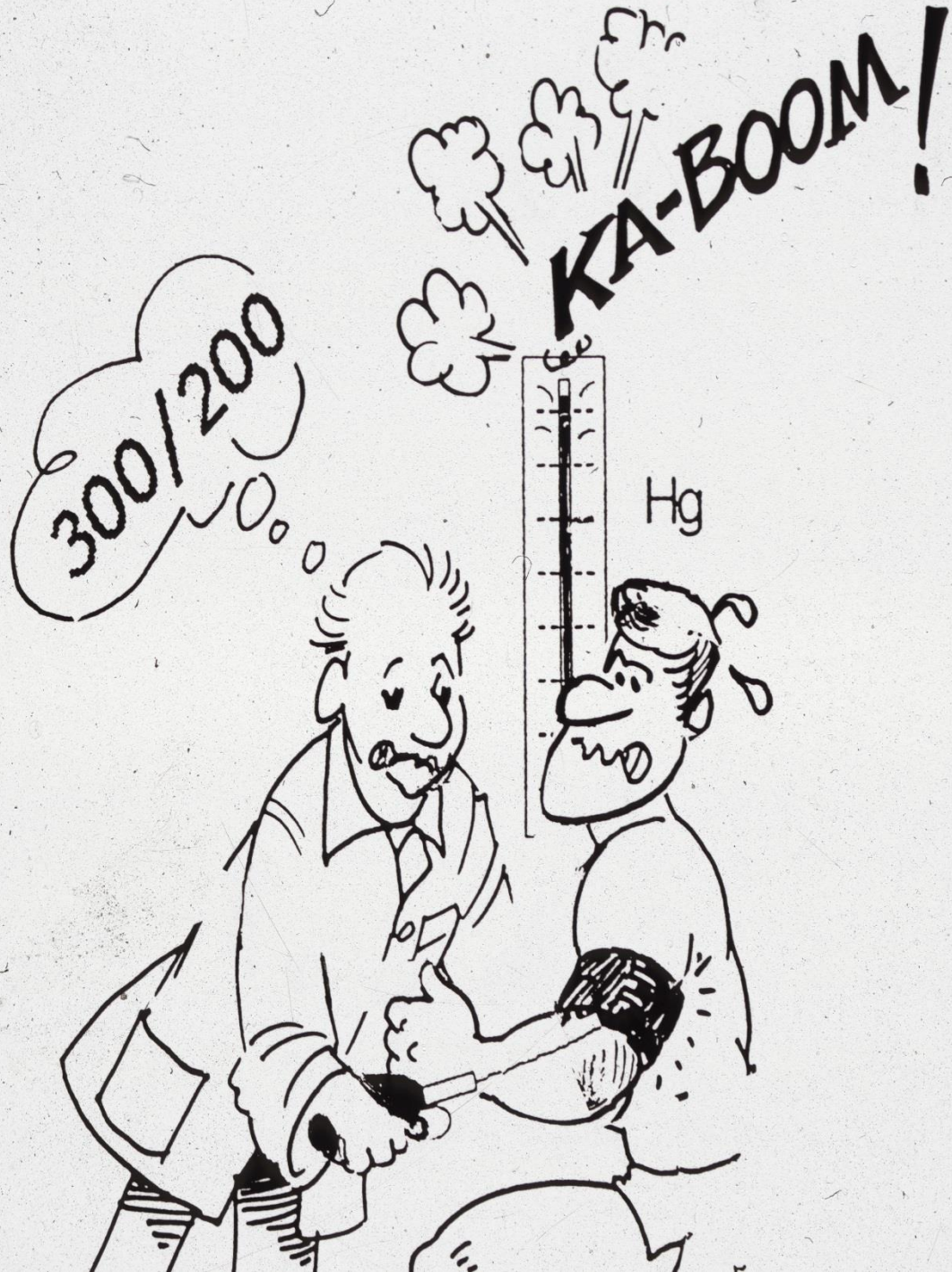


UNIVERSITY OF OREGON

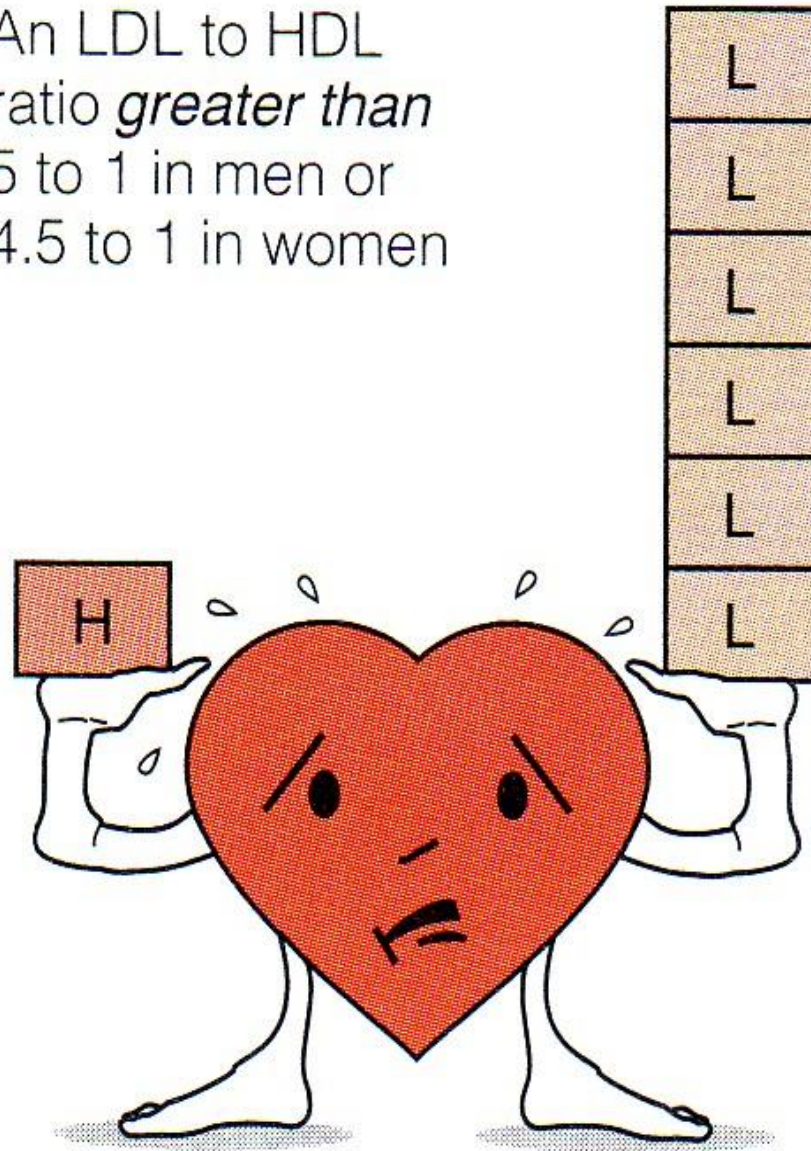
[tobaccofree.uoregon.edu](http://tobaccofree.uoregon.edu)



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

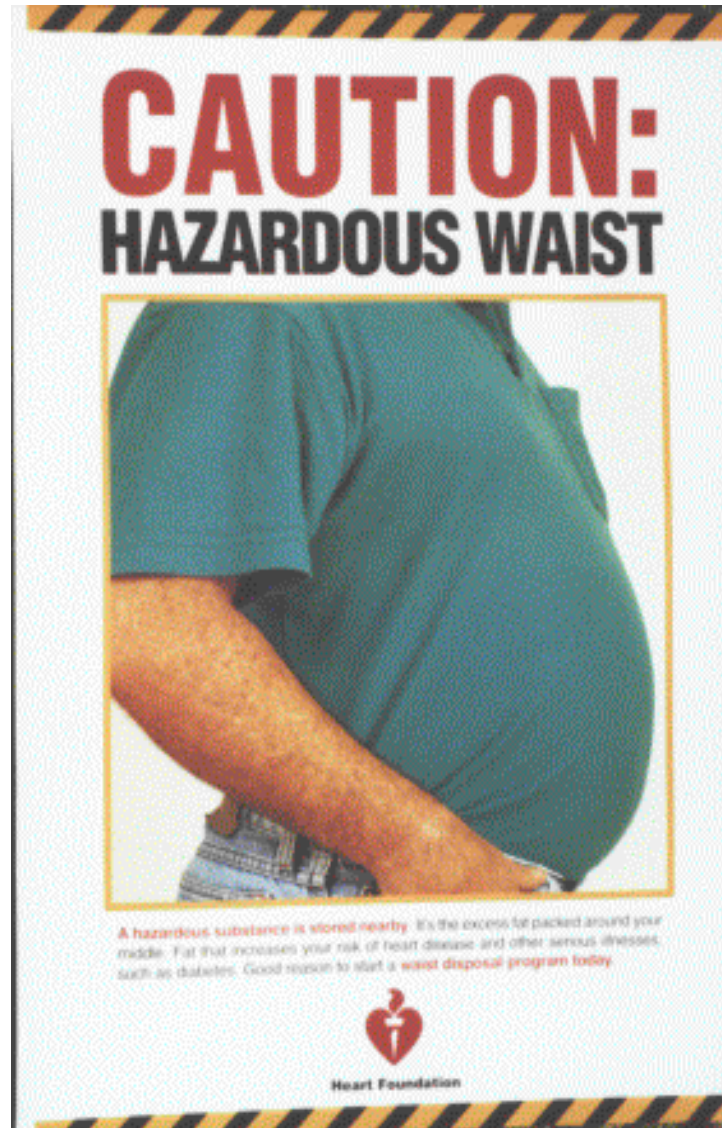


# Apple type of obesity predisposed to CVD!

Pear type of fat pattern...



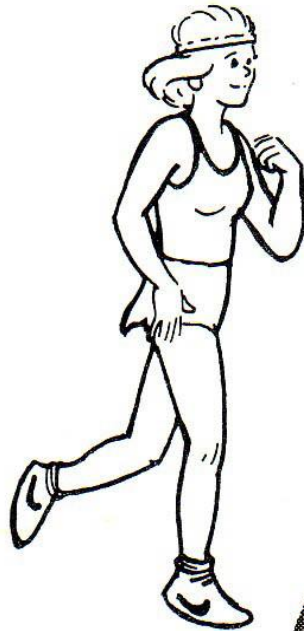
implies lower disease risk!



Eat more apples...



to help prevent the apple type of obesity!



**Cardiorespiratory  
Endurance**



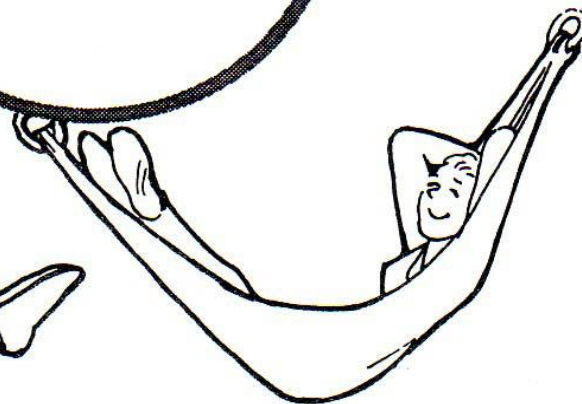
**Muscular  
Strength/Endurance**



**HEALTH-RELATED  
FITNESS**

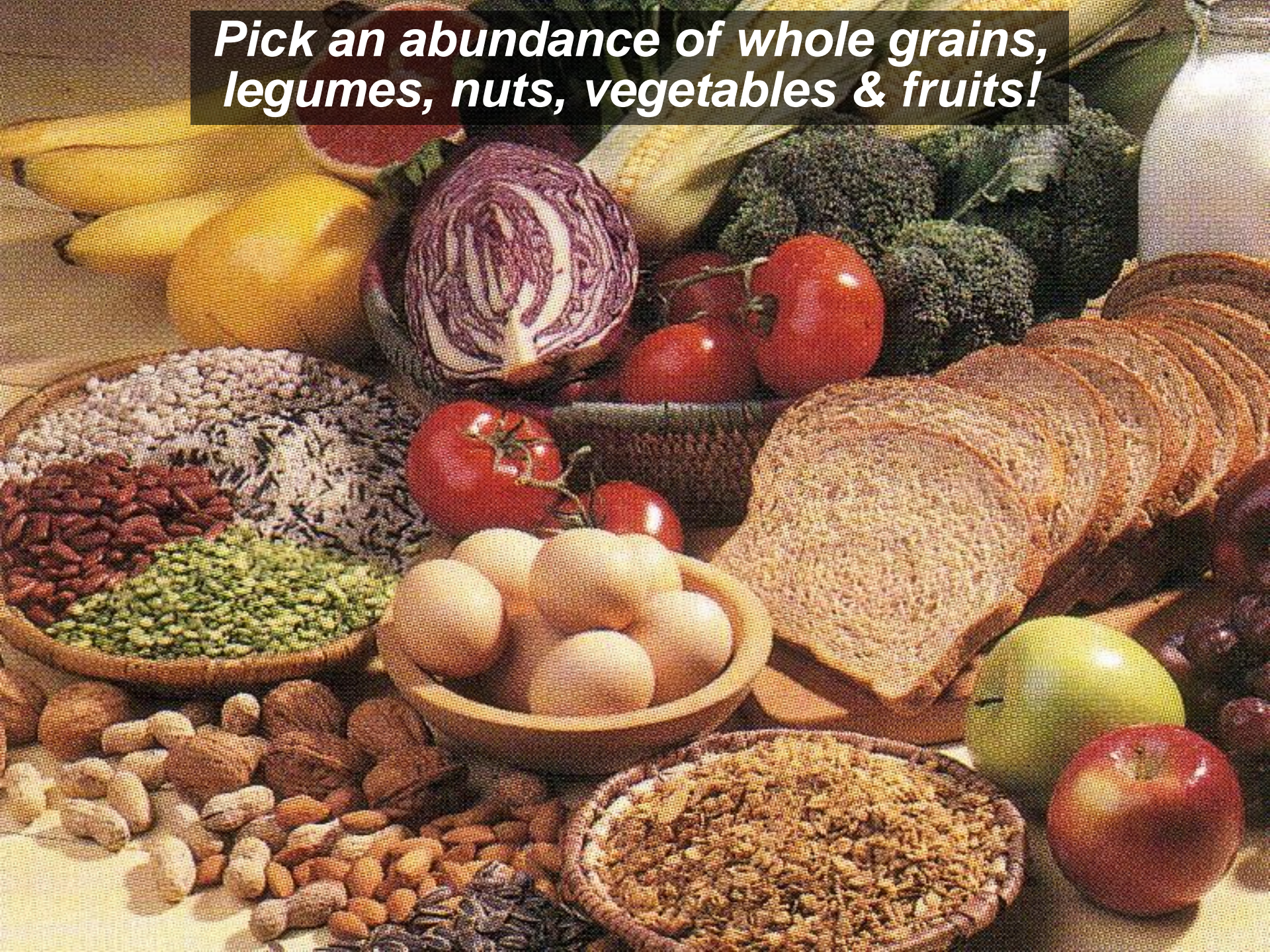


**Flexibility**



**Neuromuscular Relaxation**

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





# Healthy Oils to Minimize Atherosclerosis HAPOC?

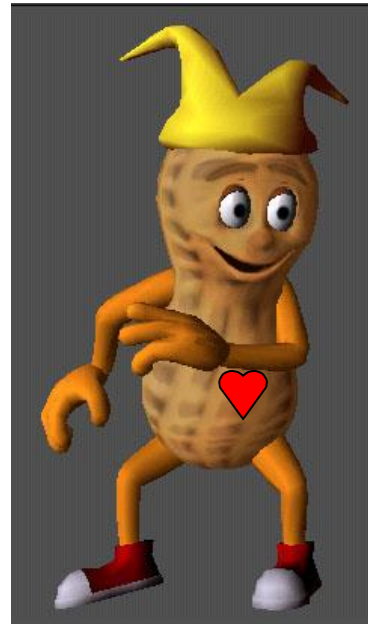
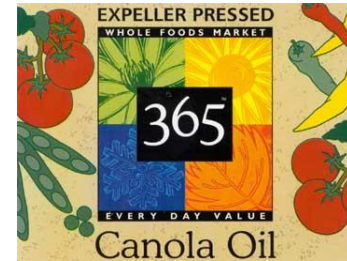
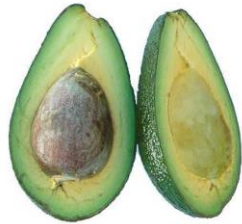
# H

# A

# P

# O

# C



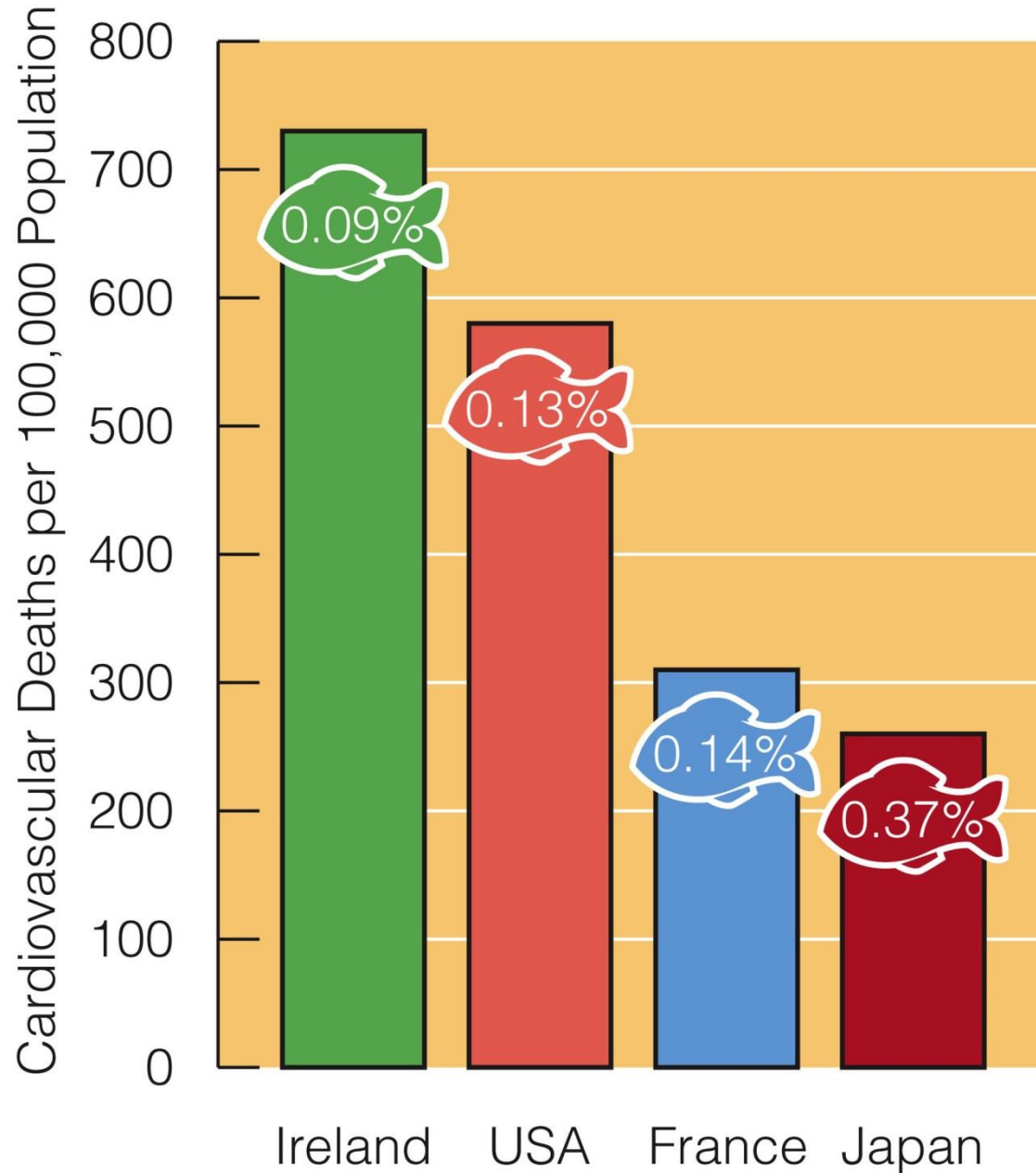
# *Olive Oil Loves Olive Oil & has some heartfelt advise for Popeye!!*



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



# *Fish Oil Intakes & Cardiovascular Death Rates*



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



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

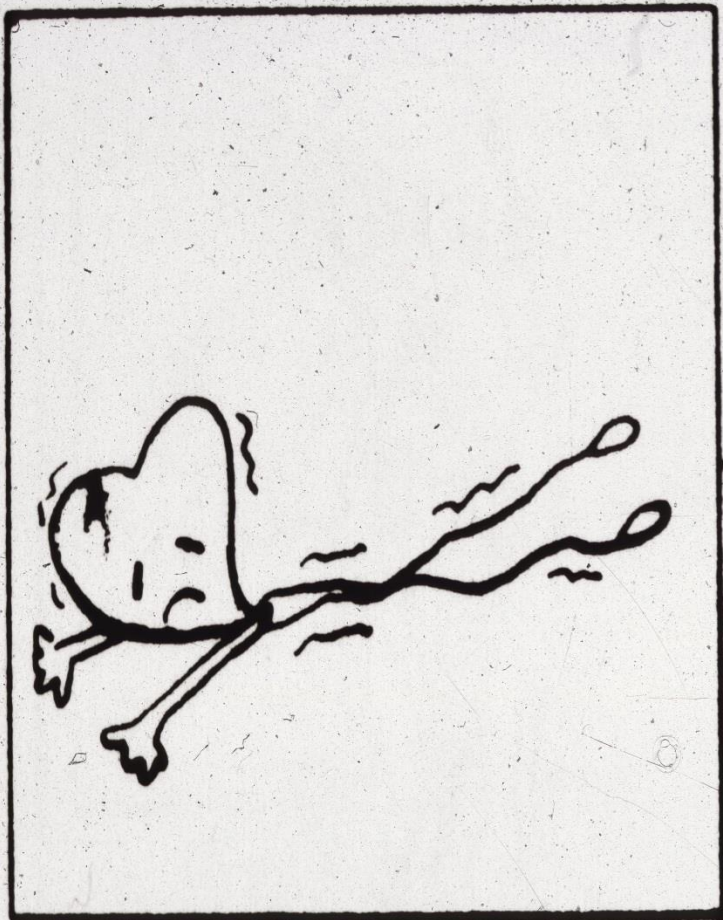
Linolenic  $\rightarrow$  EPA, DHA  $\rightarrow$  Anti-inflammatory



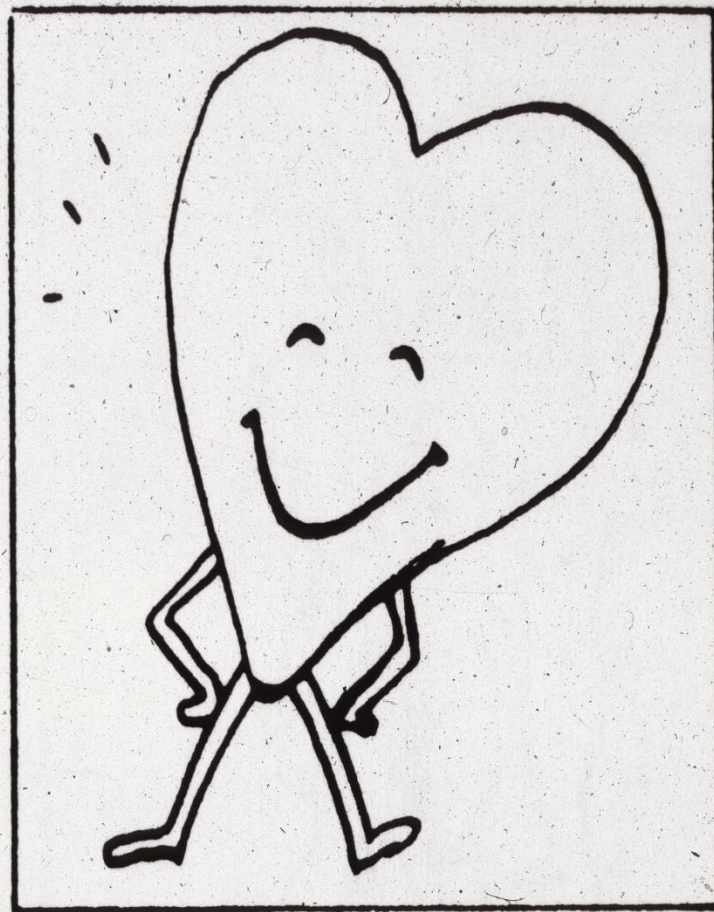


*Deep cold water fish are fabulous sources of  $\Omega$ -3 fatty acids!*



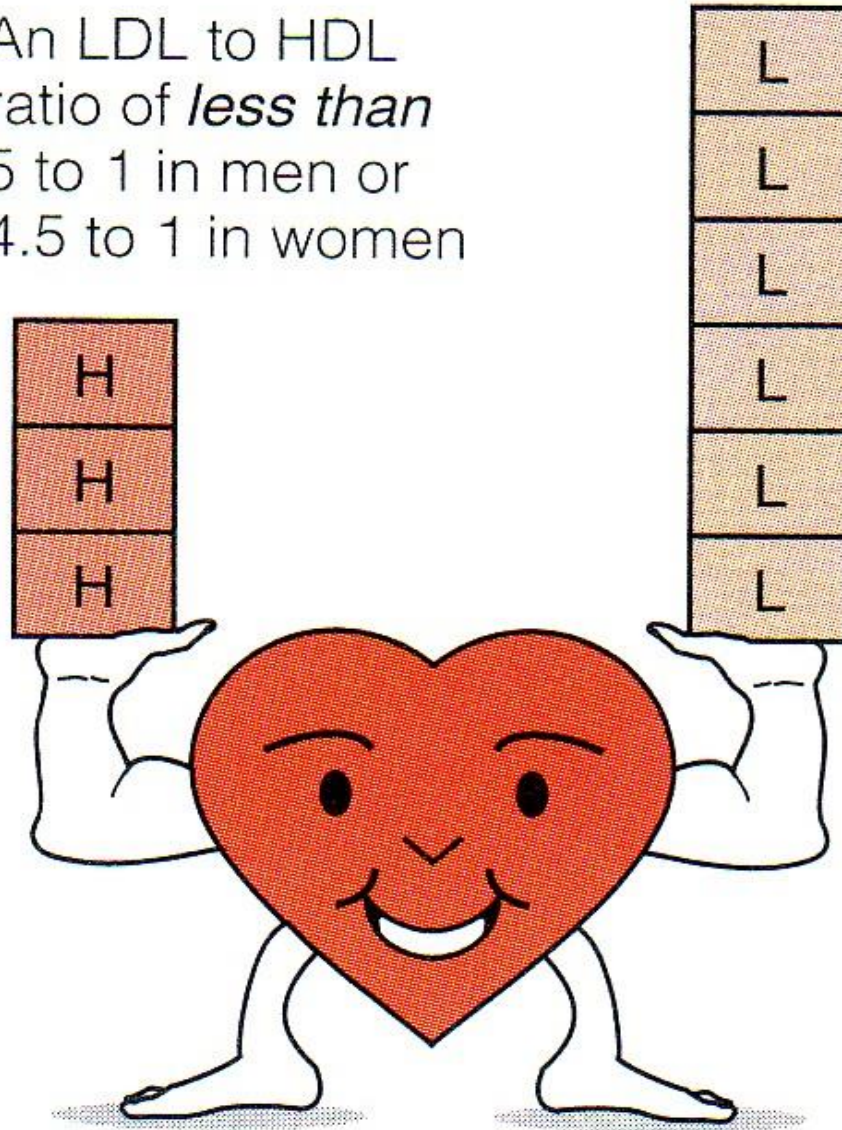


**Before**



**After**

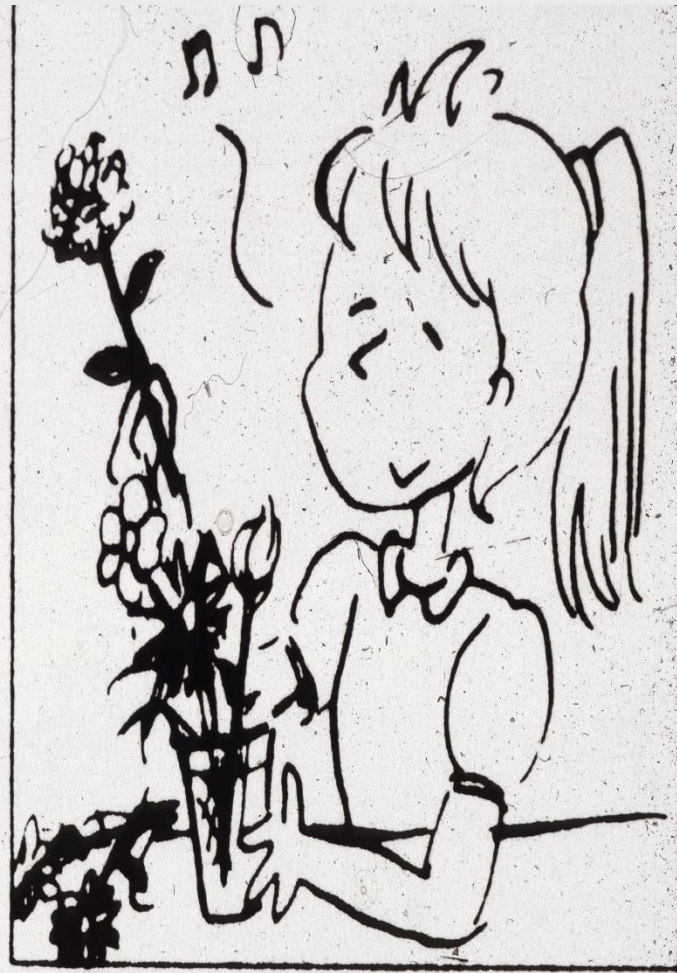
An LDL to HDL  
ratio of *less than*  
5 to 1 in men or  
4.5 to 1 in women



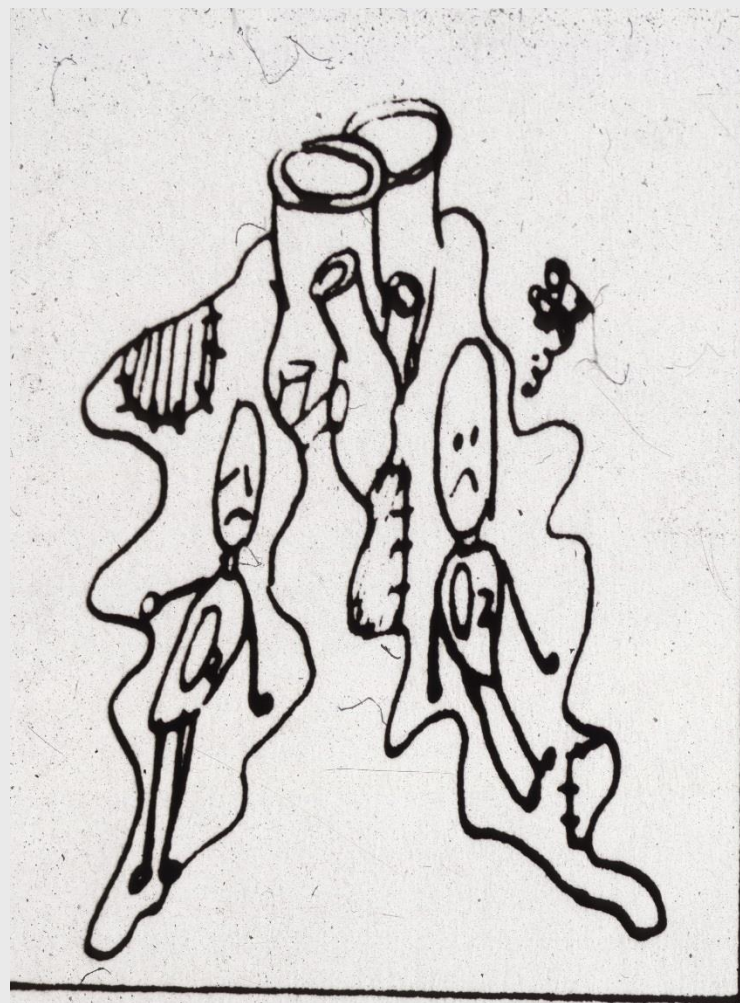
Reduced risk of  
heart disease



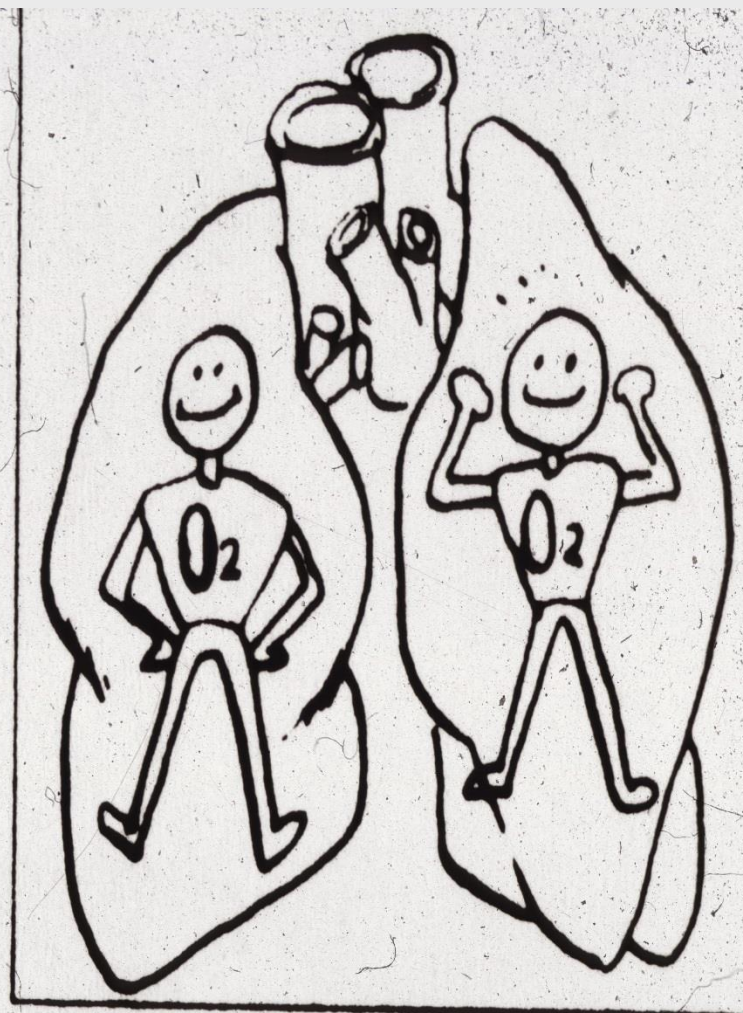
Before



After



**Before**



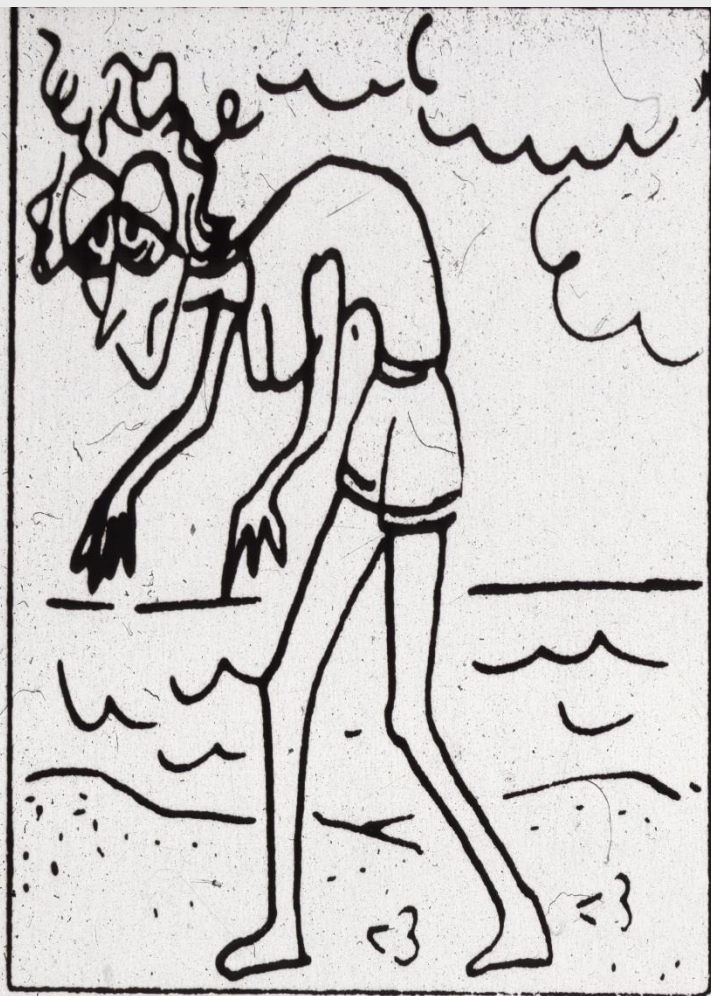
**After**



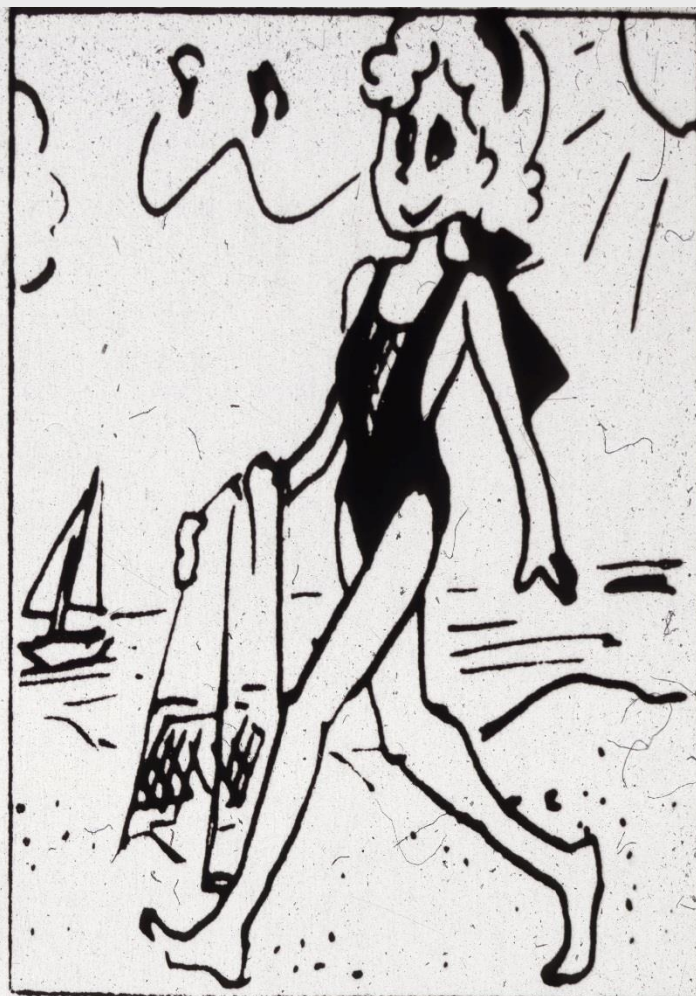
Before



After



Before



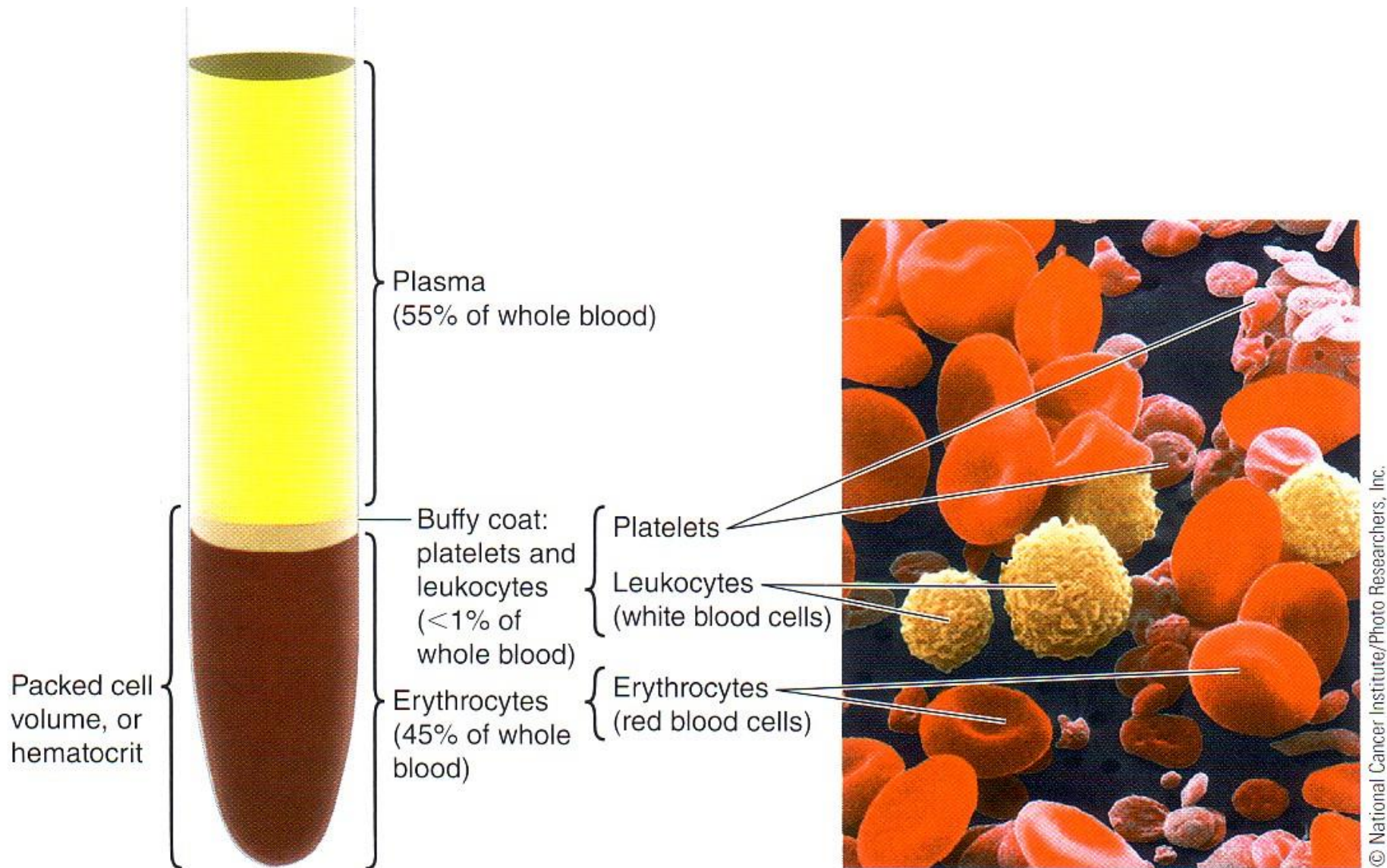
After

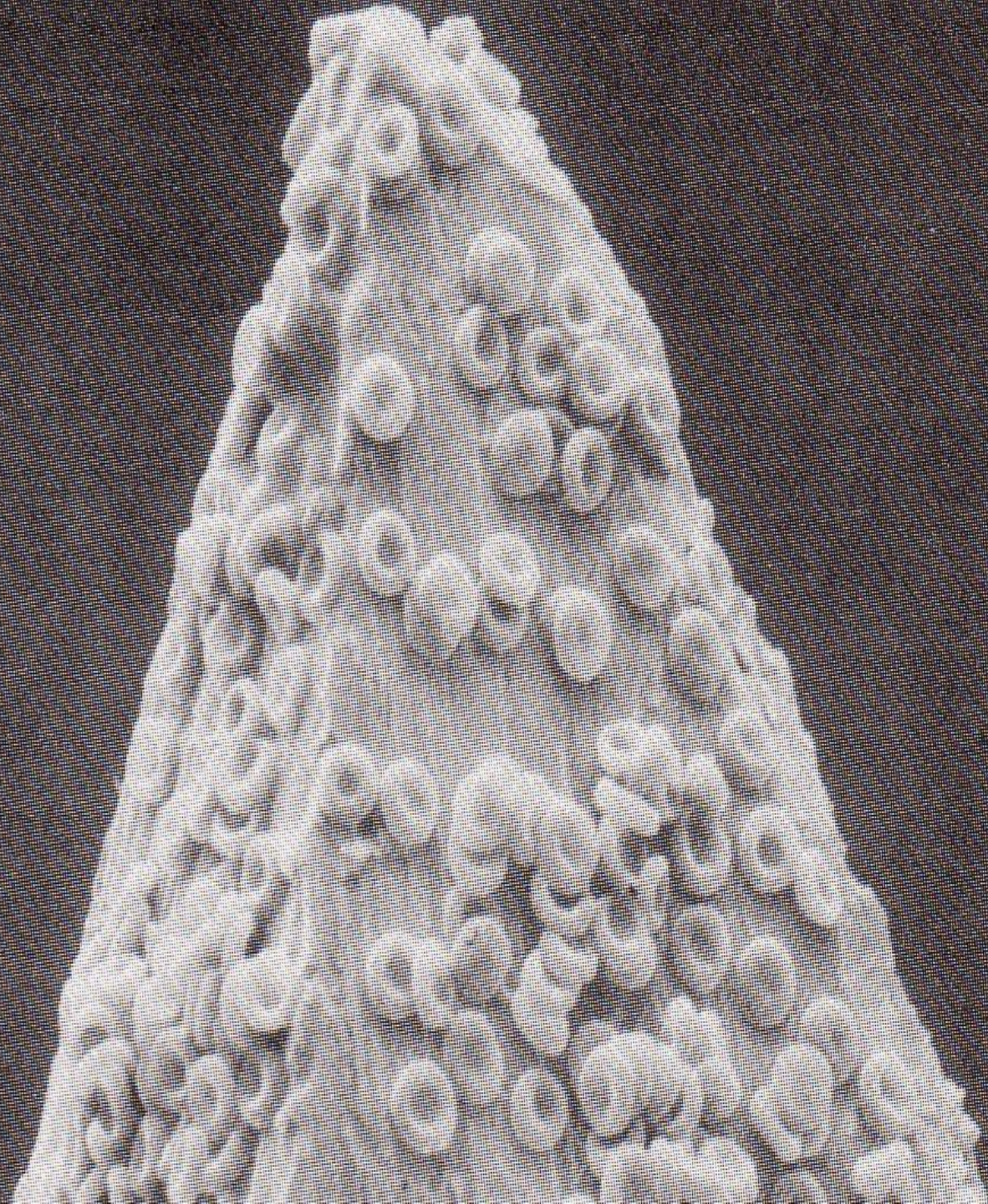
***Break for discussion/questions!***



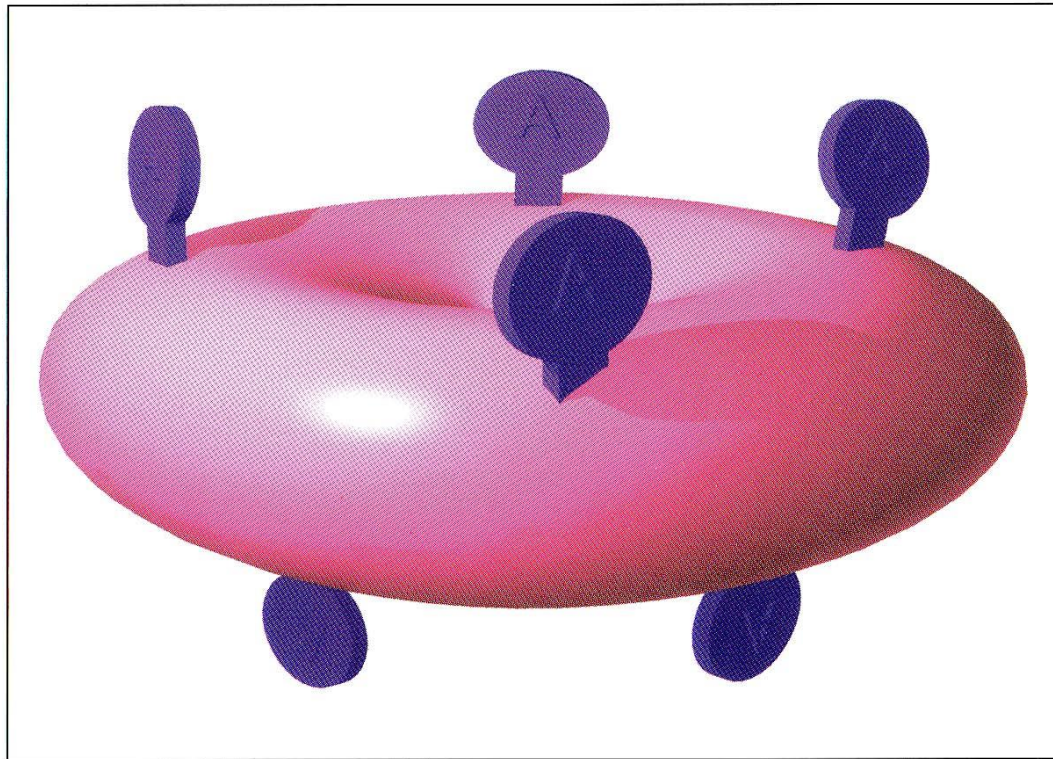


# What's in Blood? Plasma & Blood Cells



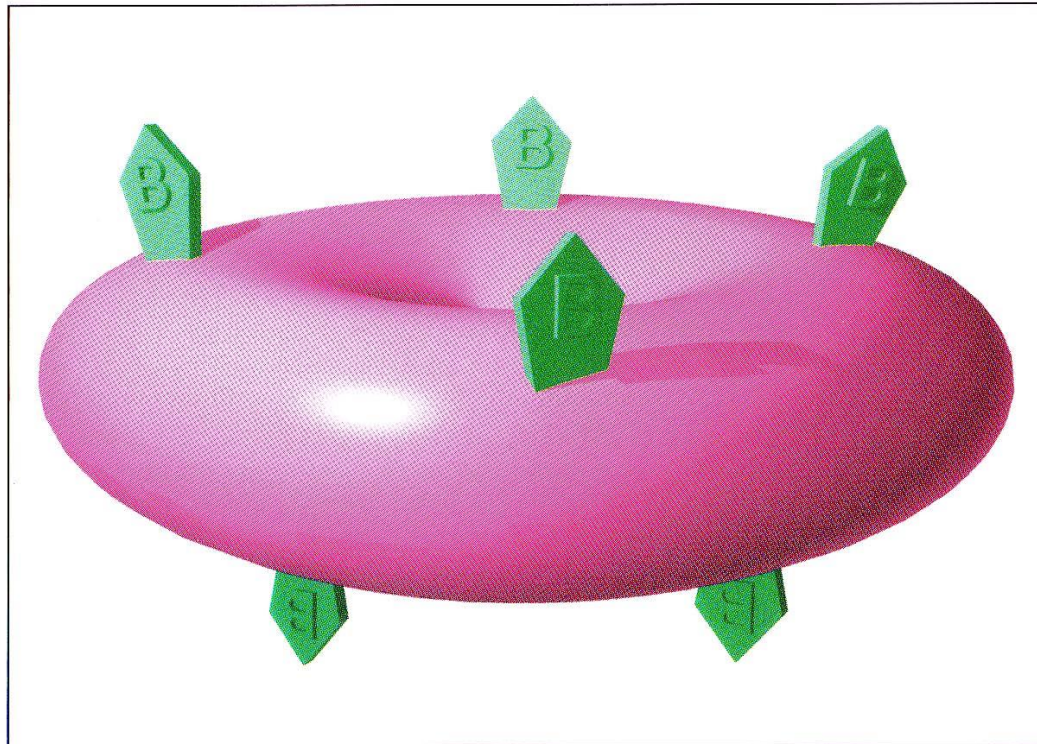


A



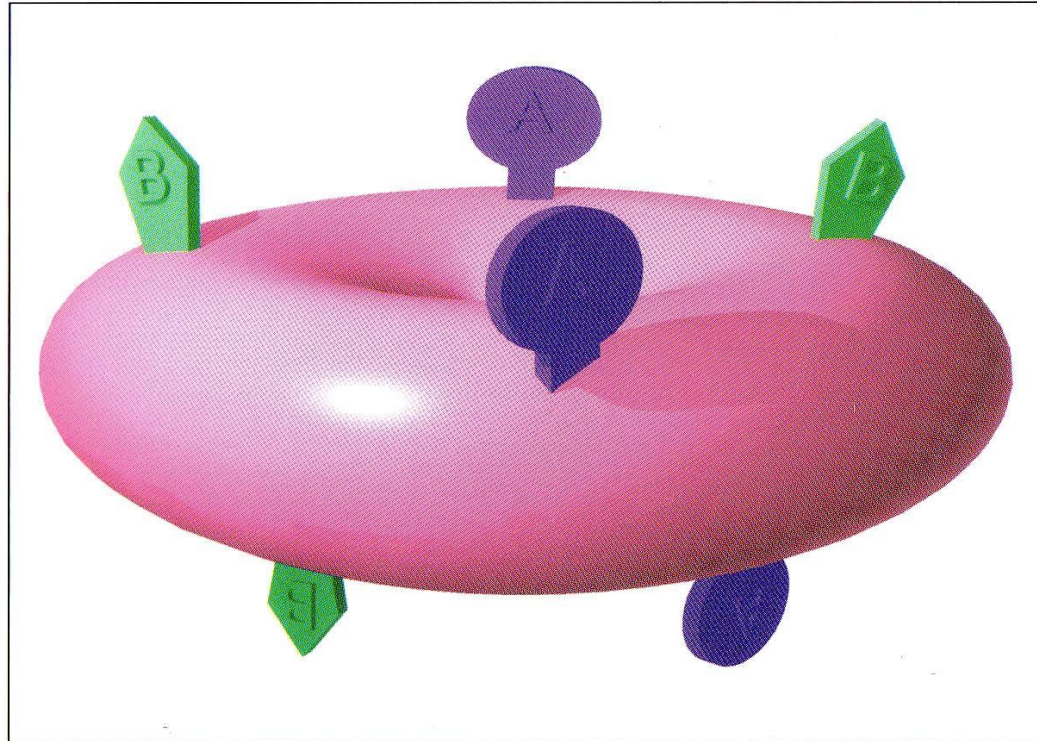
A Antigens  
(Agglutinogens)

# B

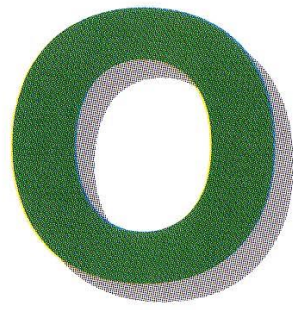


**B Antigens**  
(Agglutinogens)

# AB



A & B Antigens  
(Agglutinogens)

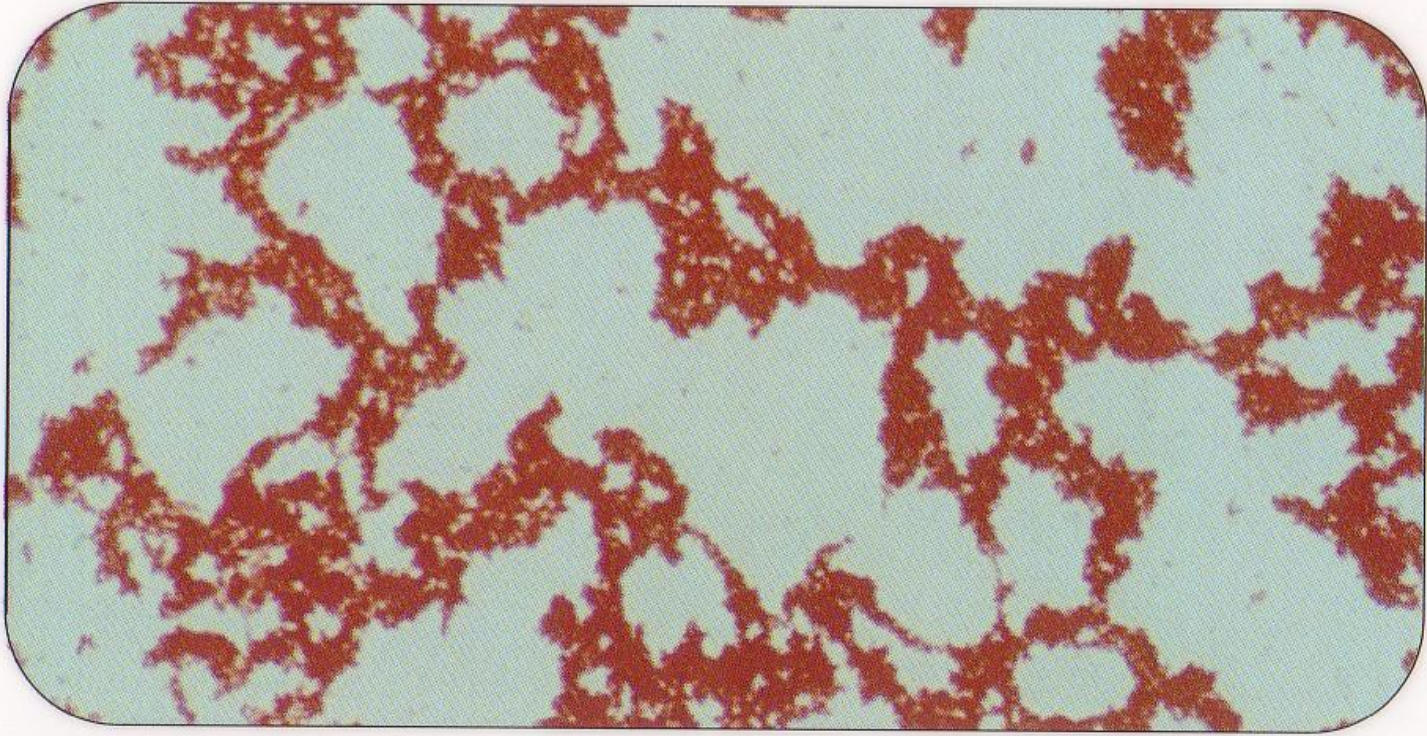


**No Antigens**  
(Agglutinogens)



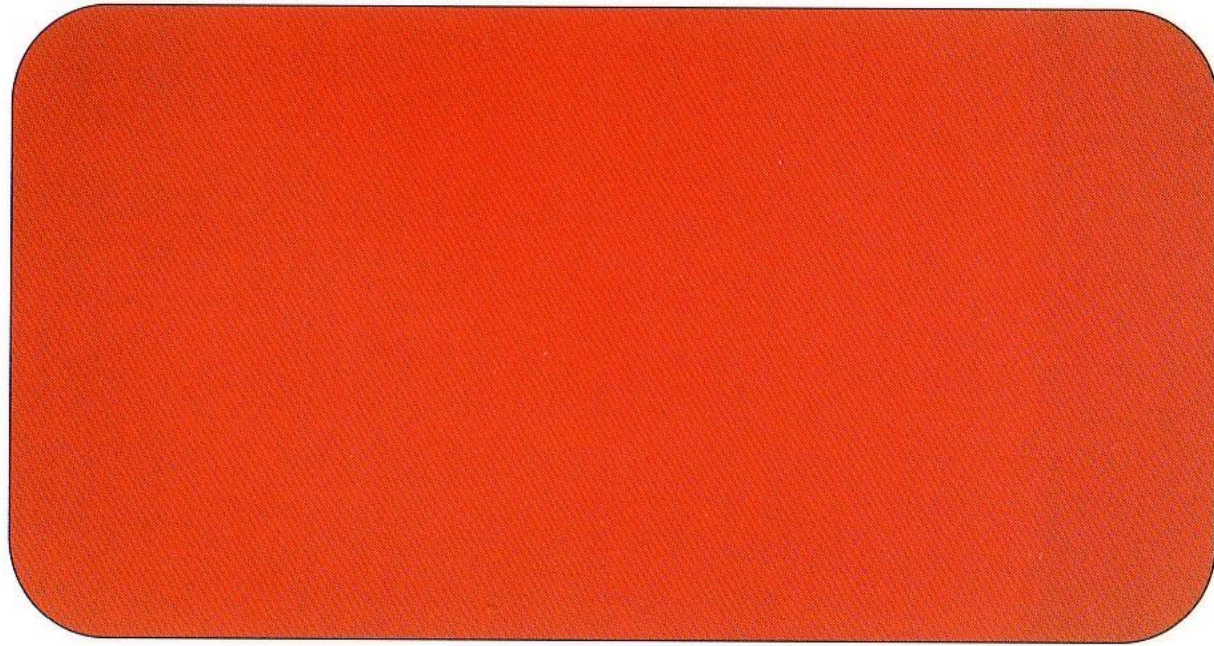
# A Antibodies

(Agglutinins)



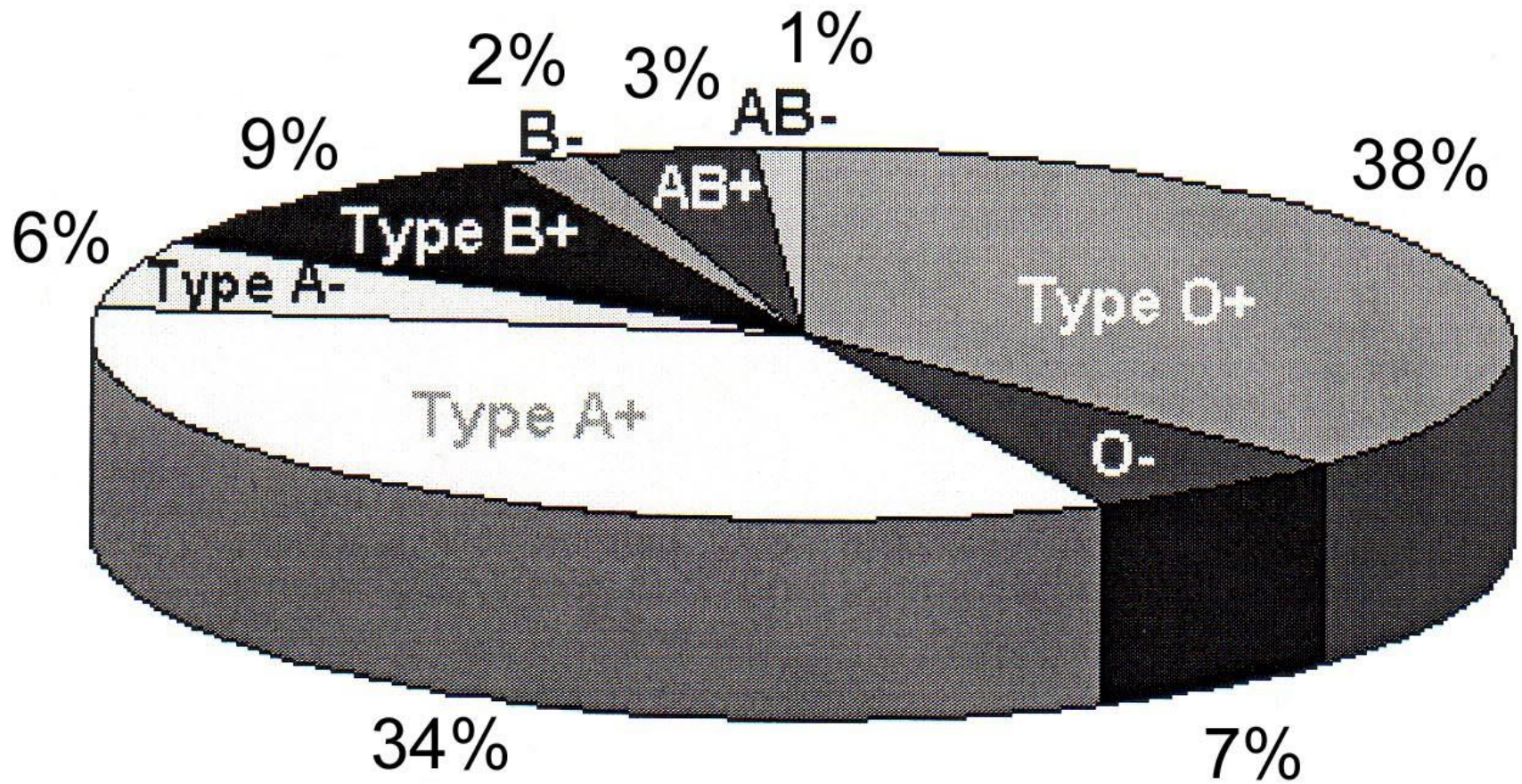
Clumping with  
anti-A serum





No Clumping with  
anti-A serum

# Blood Type Distribution, General Population



# ***Erythroblastosis Fetalis?***

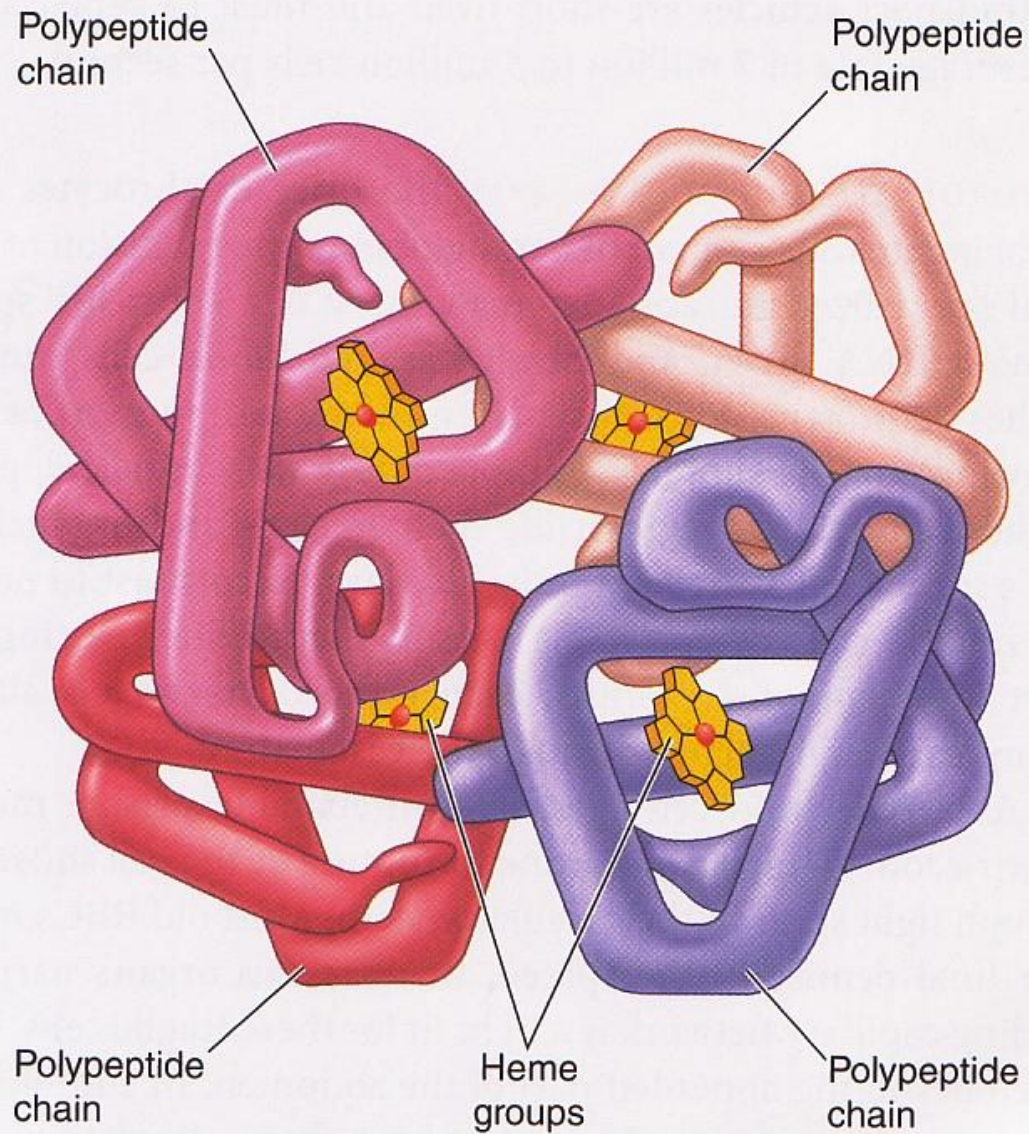
**eg, Rh- mom  
Rh+ baby**

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



2000 x GMBH,  
Nat Geog 1986  
Jun p 714

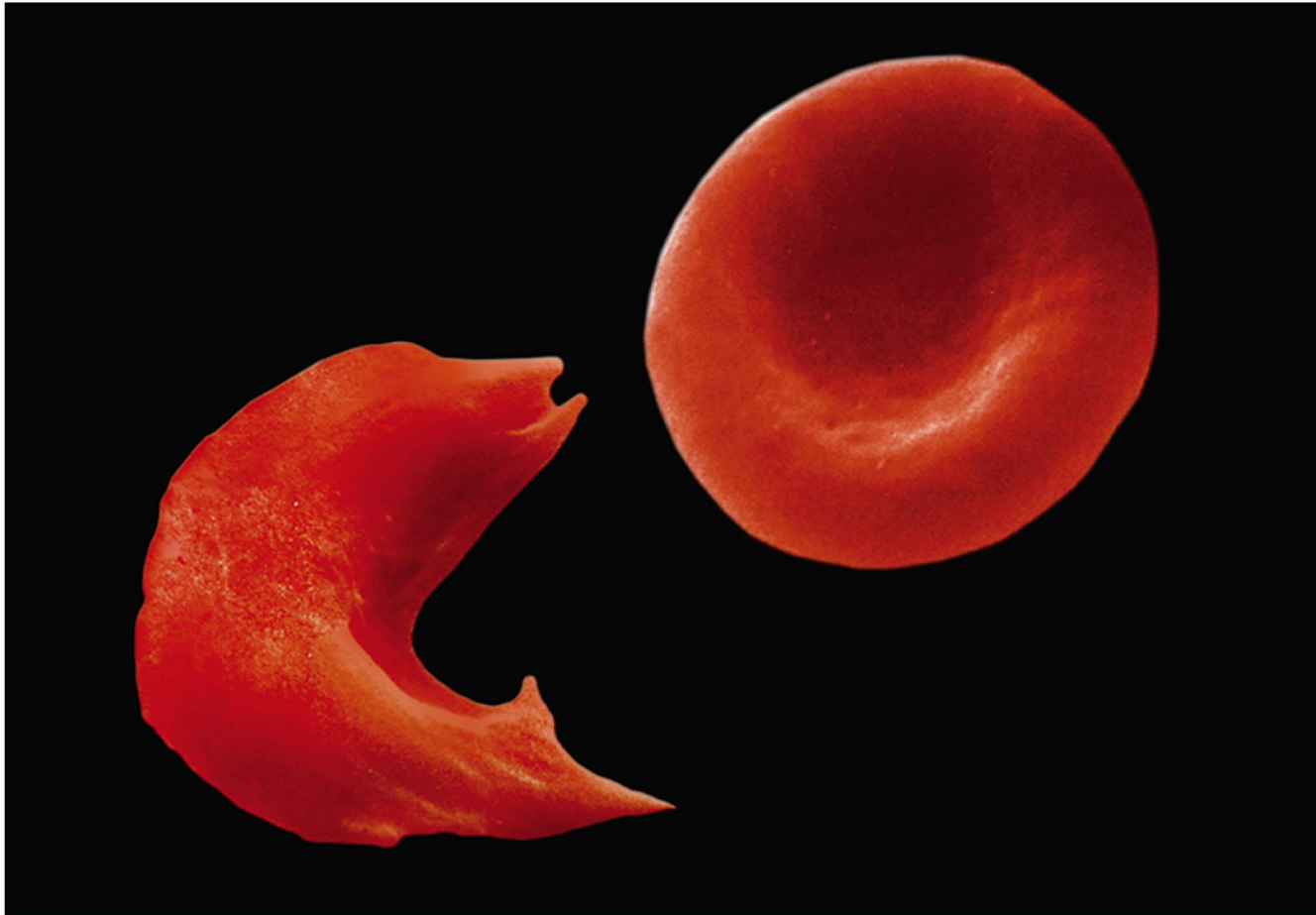
# Hemoglobin Structure



Sickle-shaped blood cells

Normal red blood cells

© Dr. Stanley Flegler/Visuals Unlimited



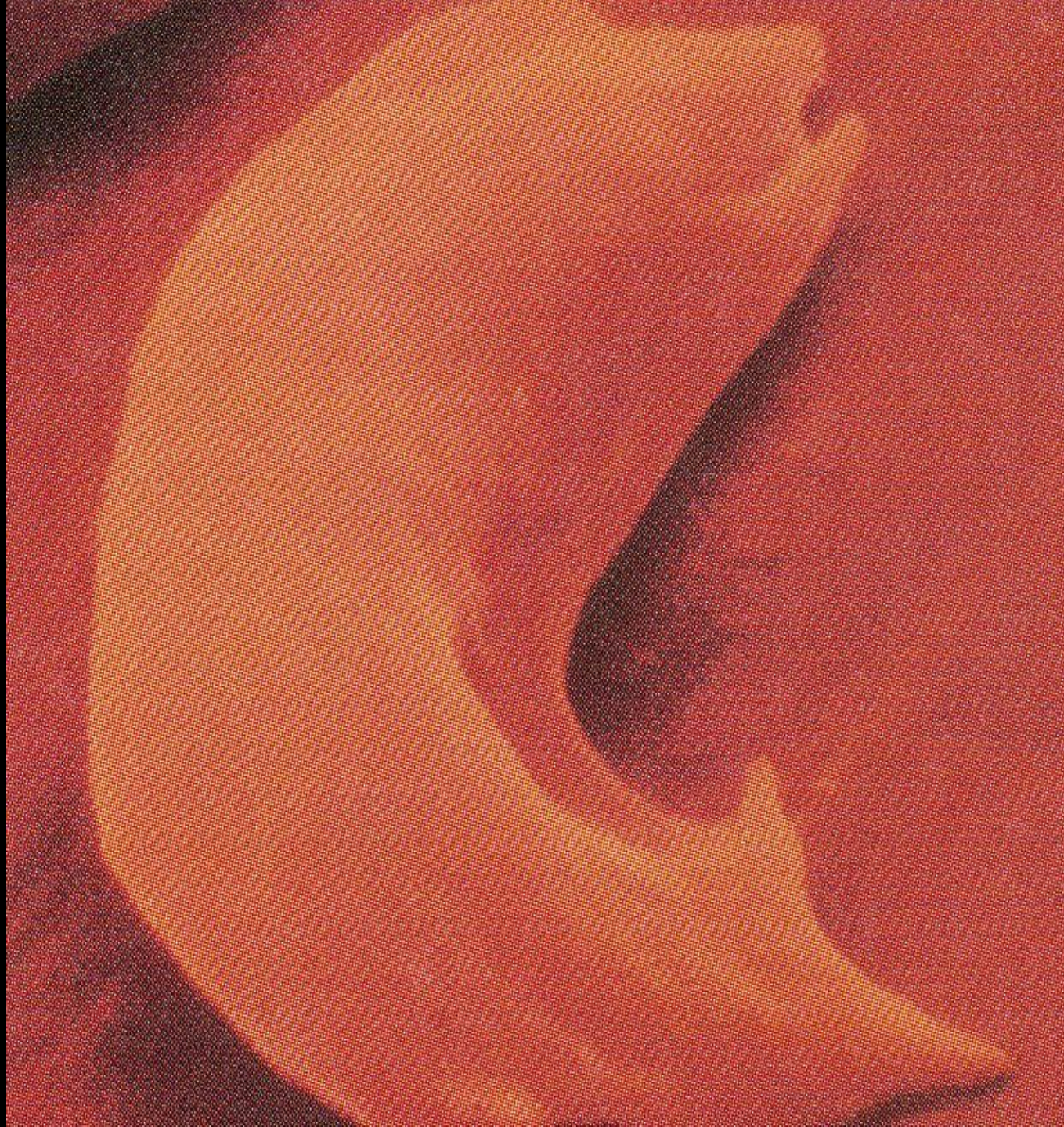
### What a difference one amino acid can make!

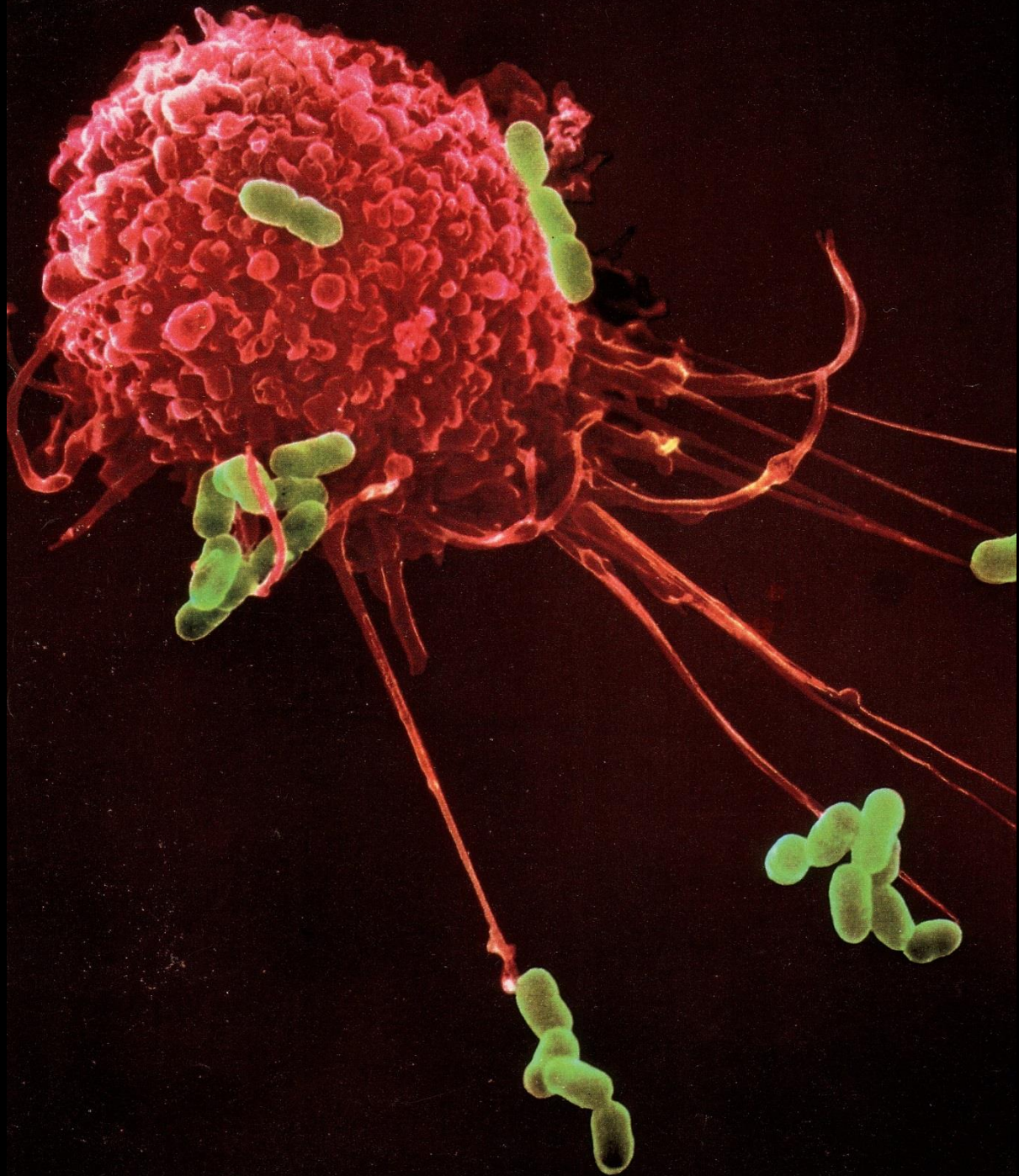
Amino acid sequence of normal hemoglobin:



Amino acid sequence of sickle-cell hemoglobin:



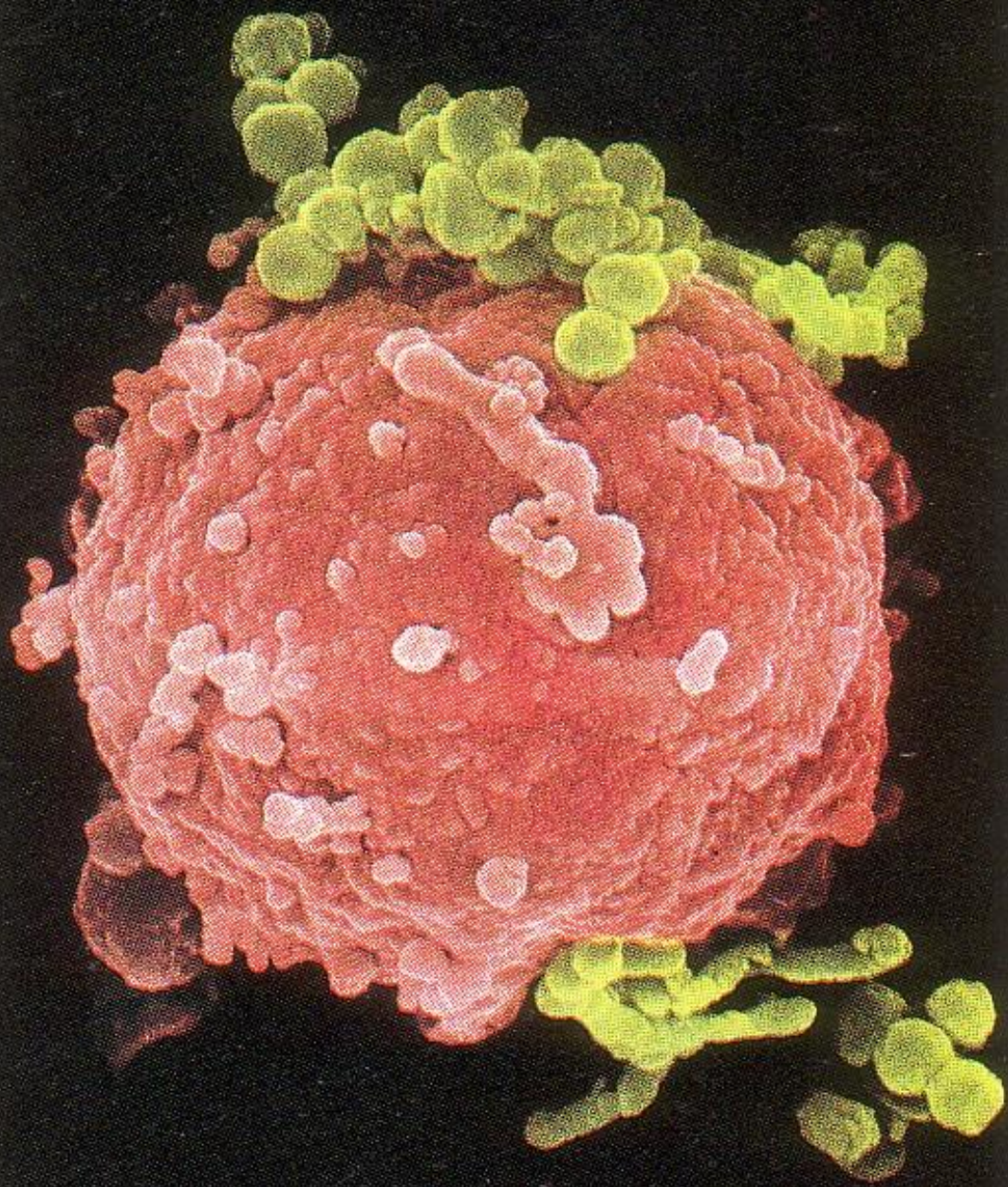


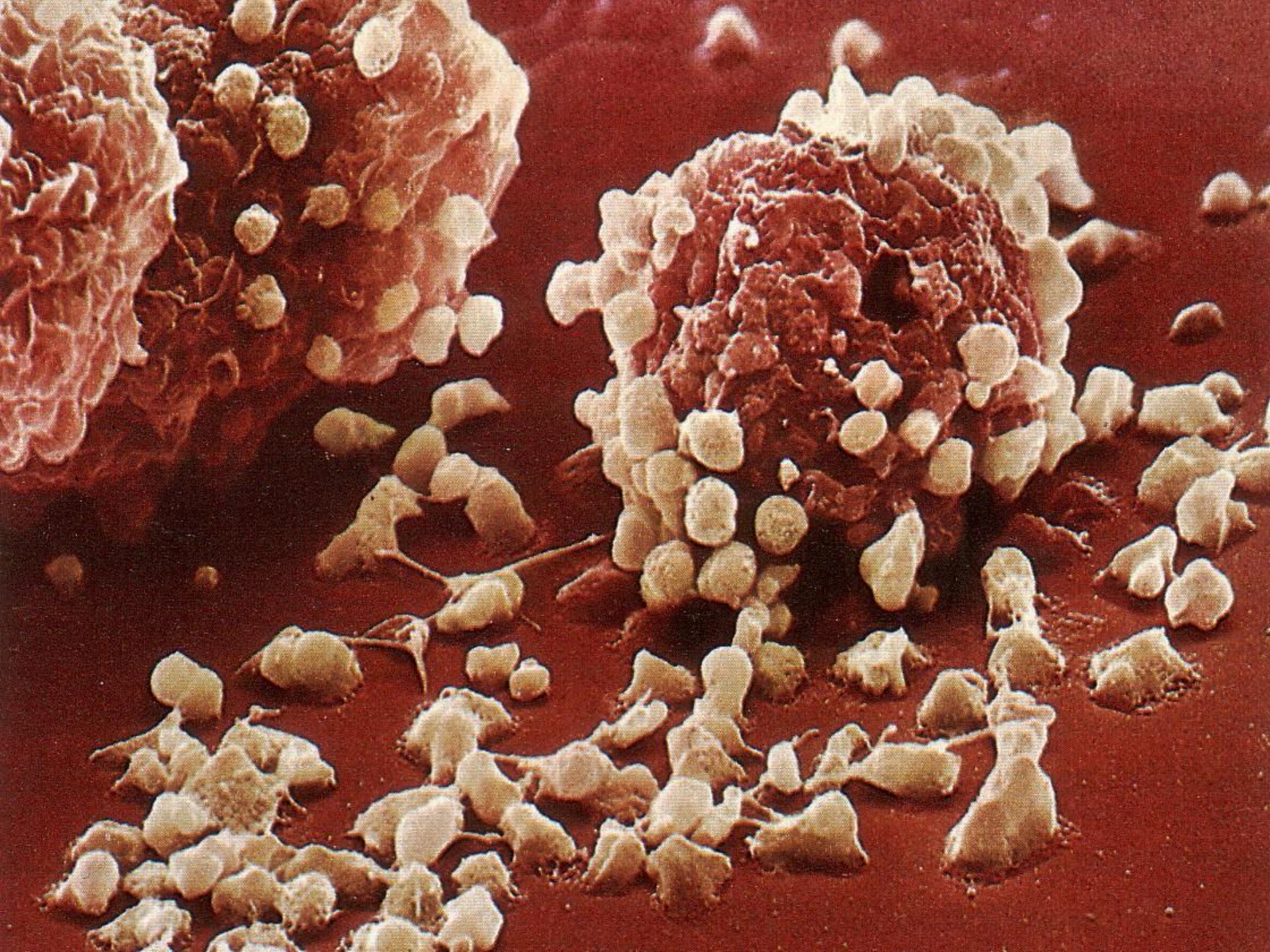


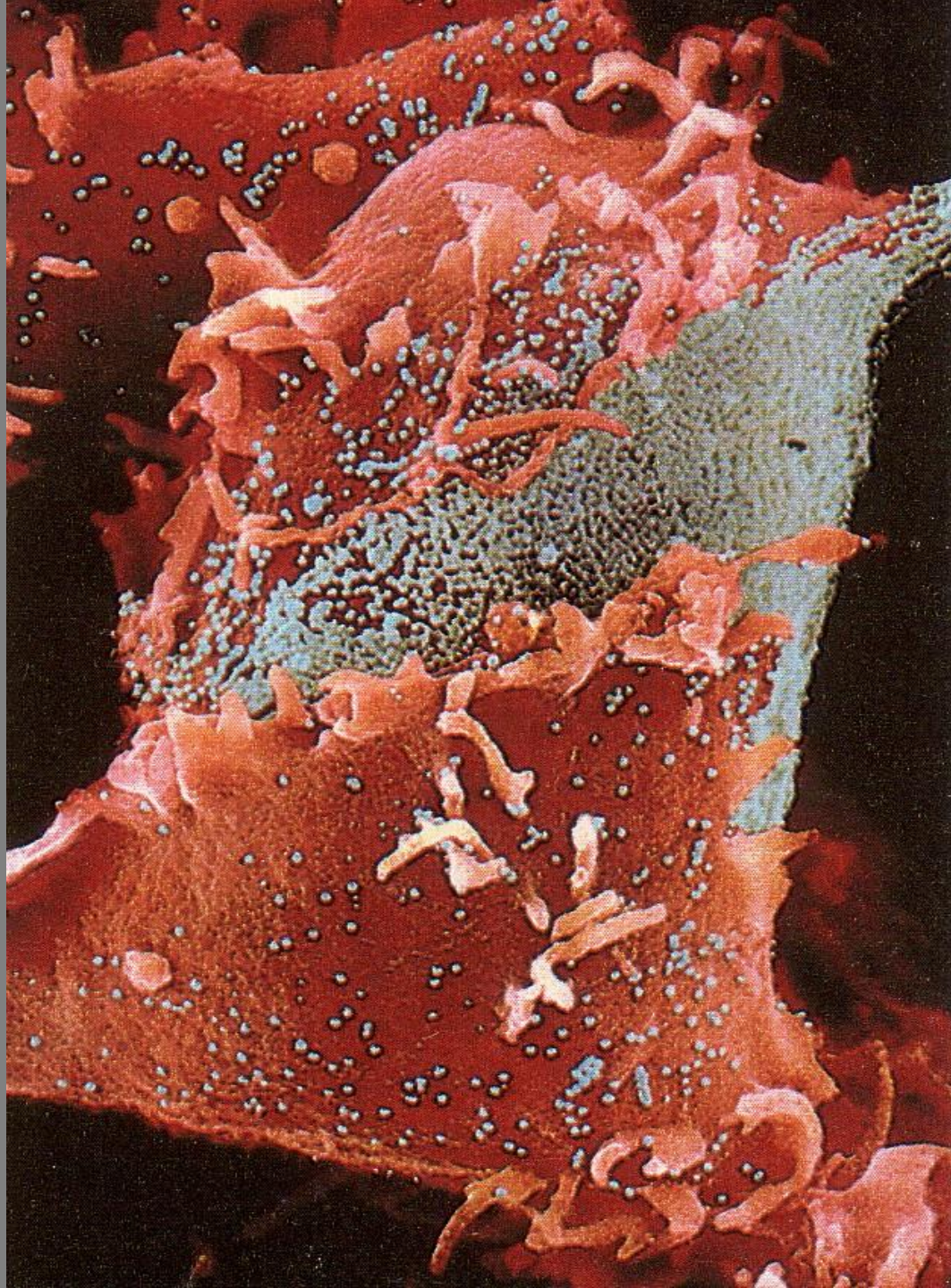




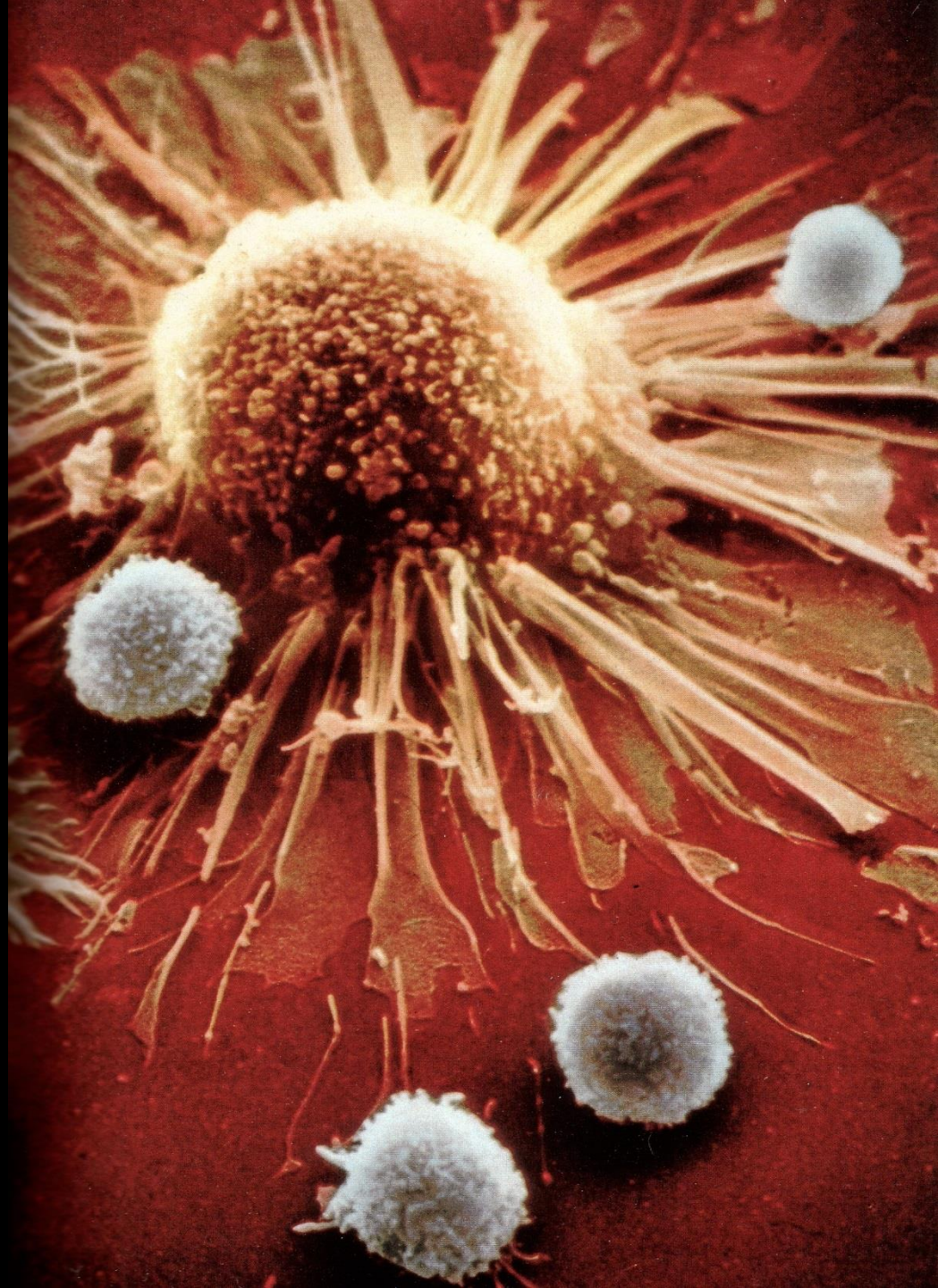
3000 x GMBH  
Nat Geog 1986



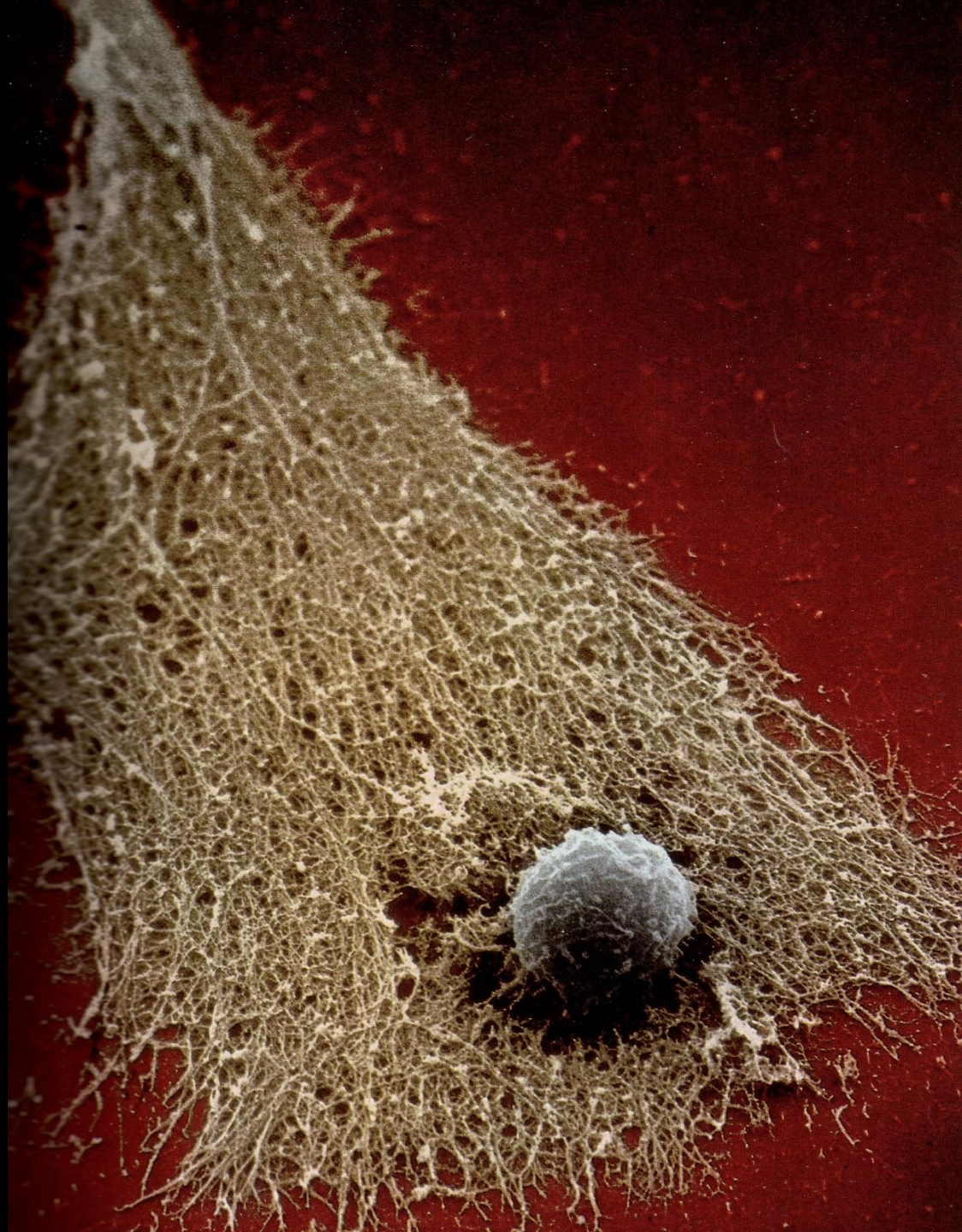




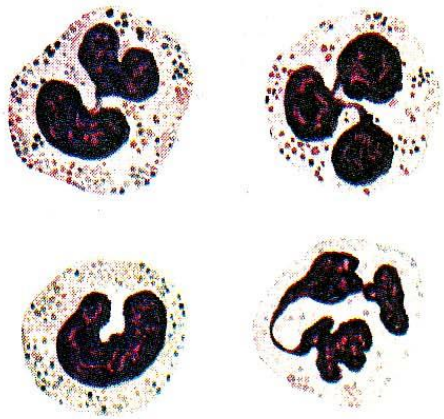




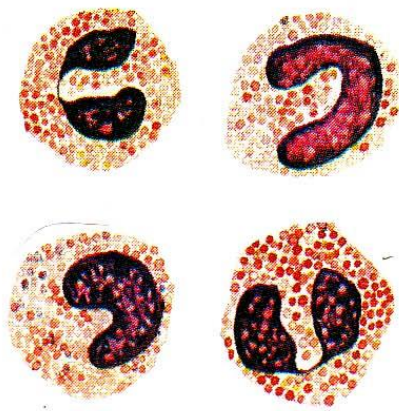




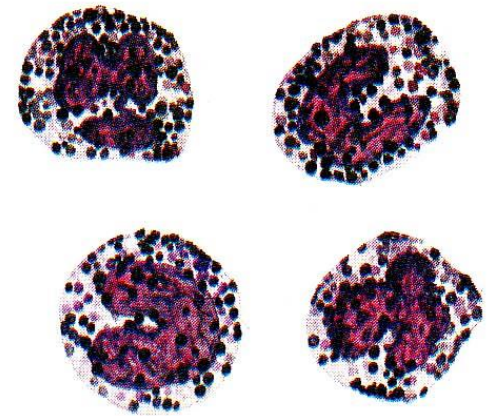




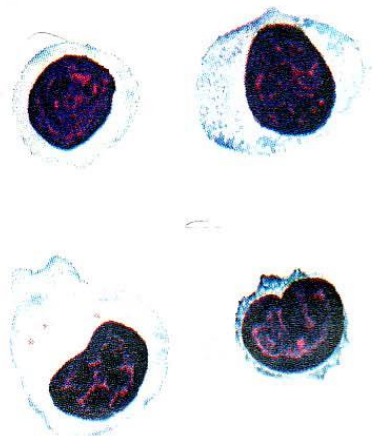
NEUTROPHILS



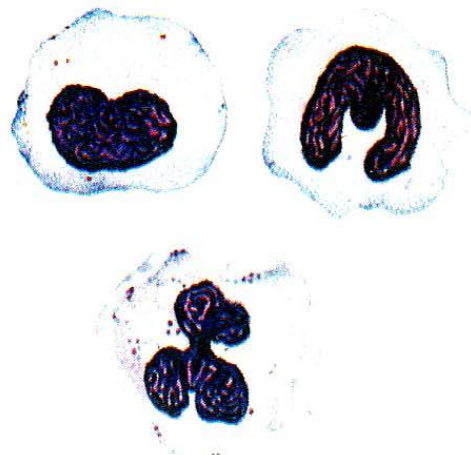
EOSINOPHILS



BASOPHILS



LYMPHOCYTES



MONOCYTES



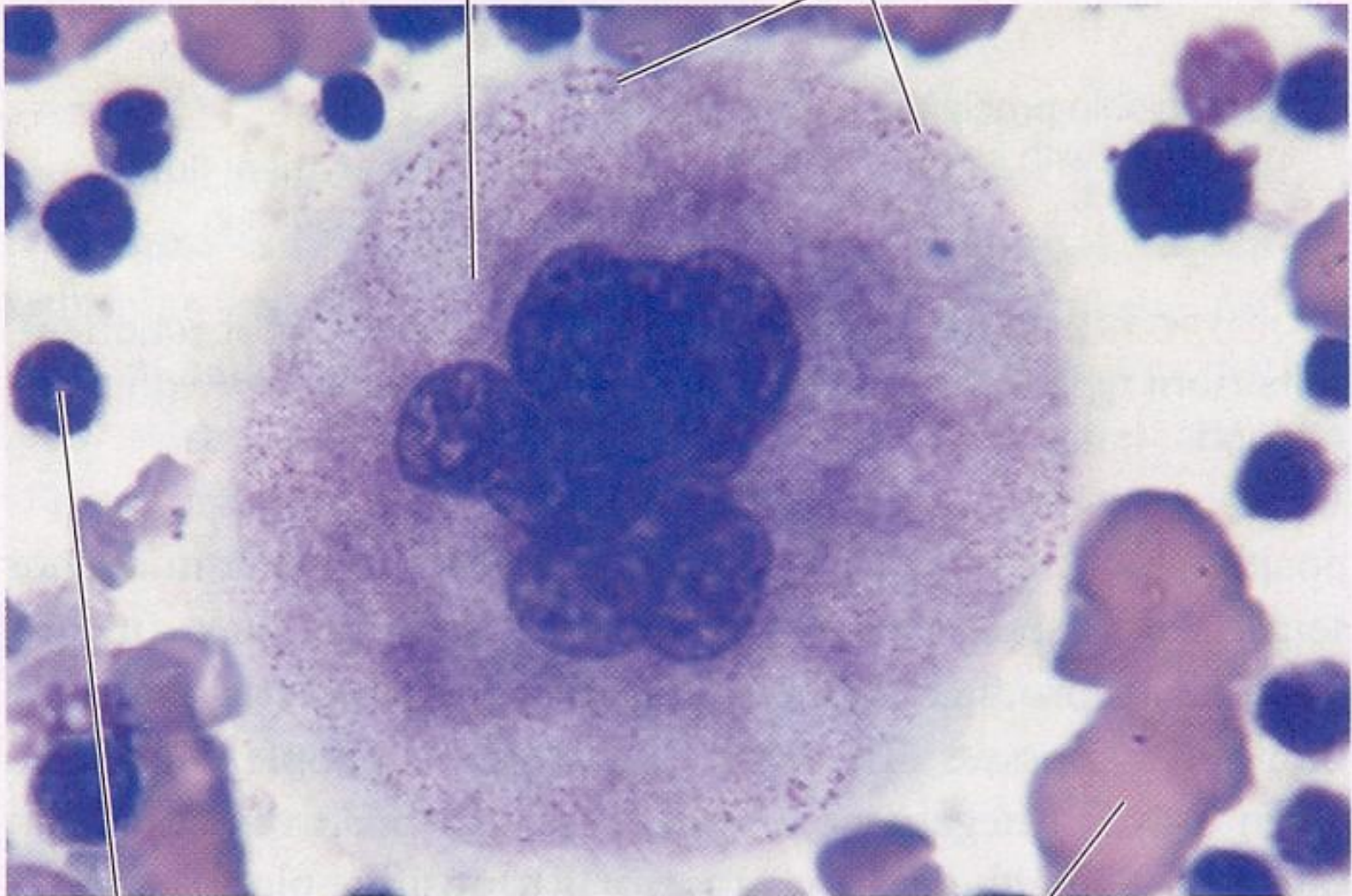
PLATELETS



ERYTHROCYTES

Megakaryocyte

Clusters of platelets  
about to shed off

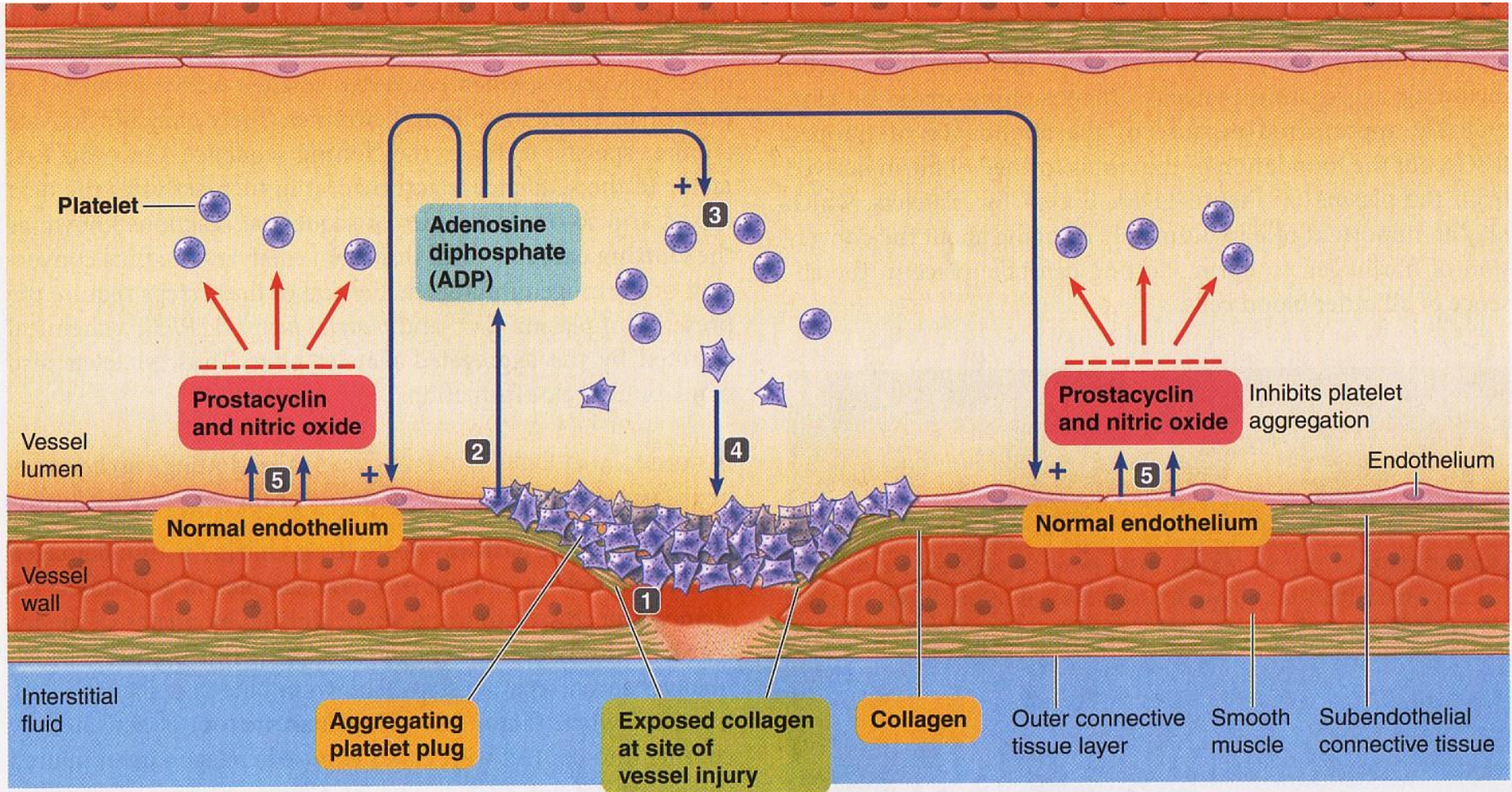


Carolina Biological/Visuals Unlimited

Developing  
leukocyte

Cluster of developing  
erythrocytes

# Formation of the Platelet Plug



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

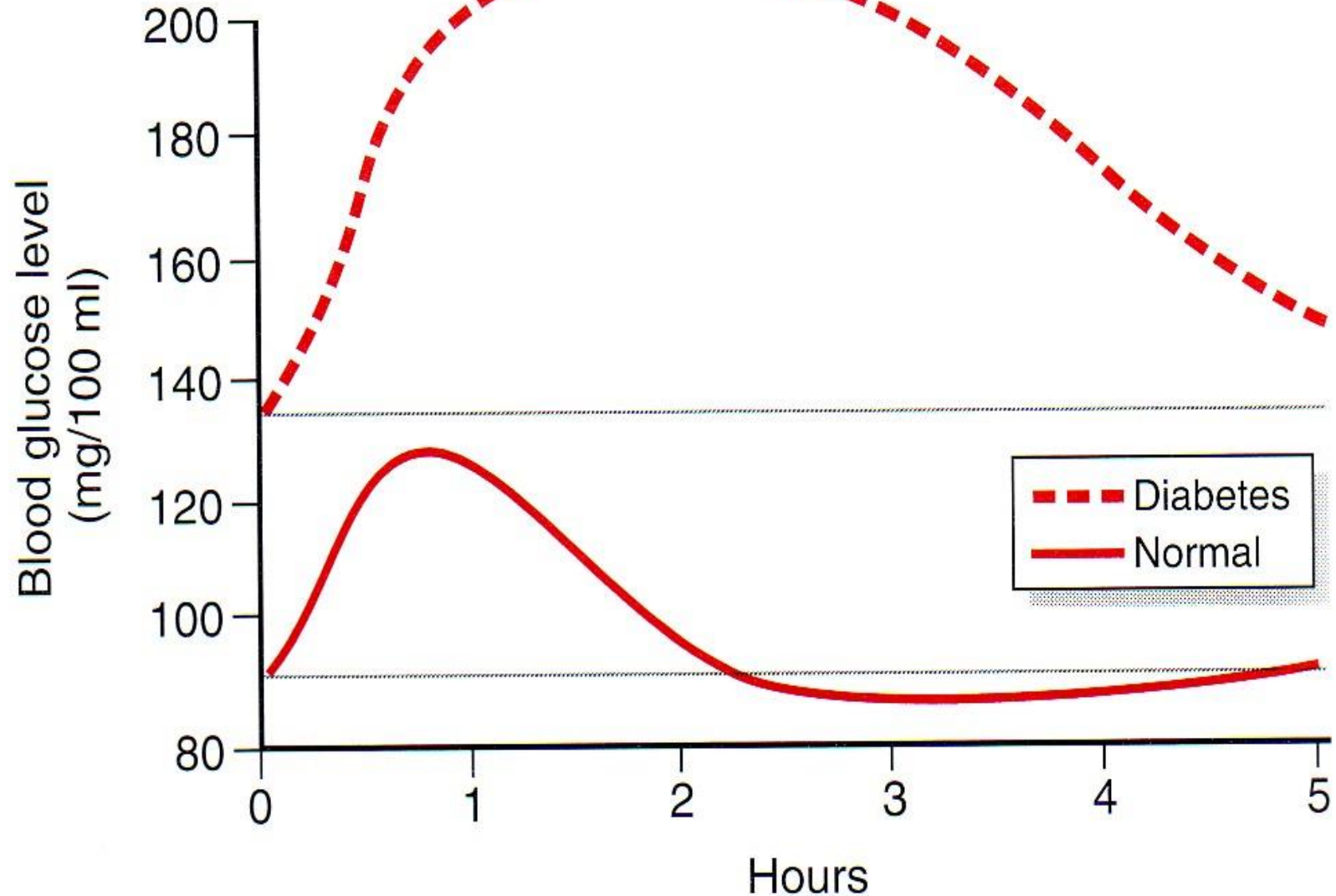
**2** Activated platelets release ADP.

**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

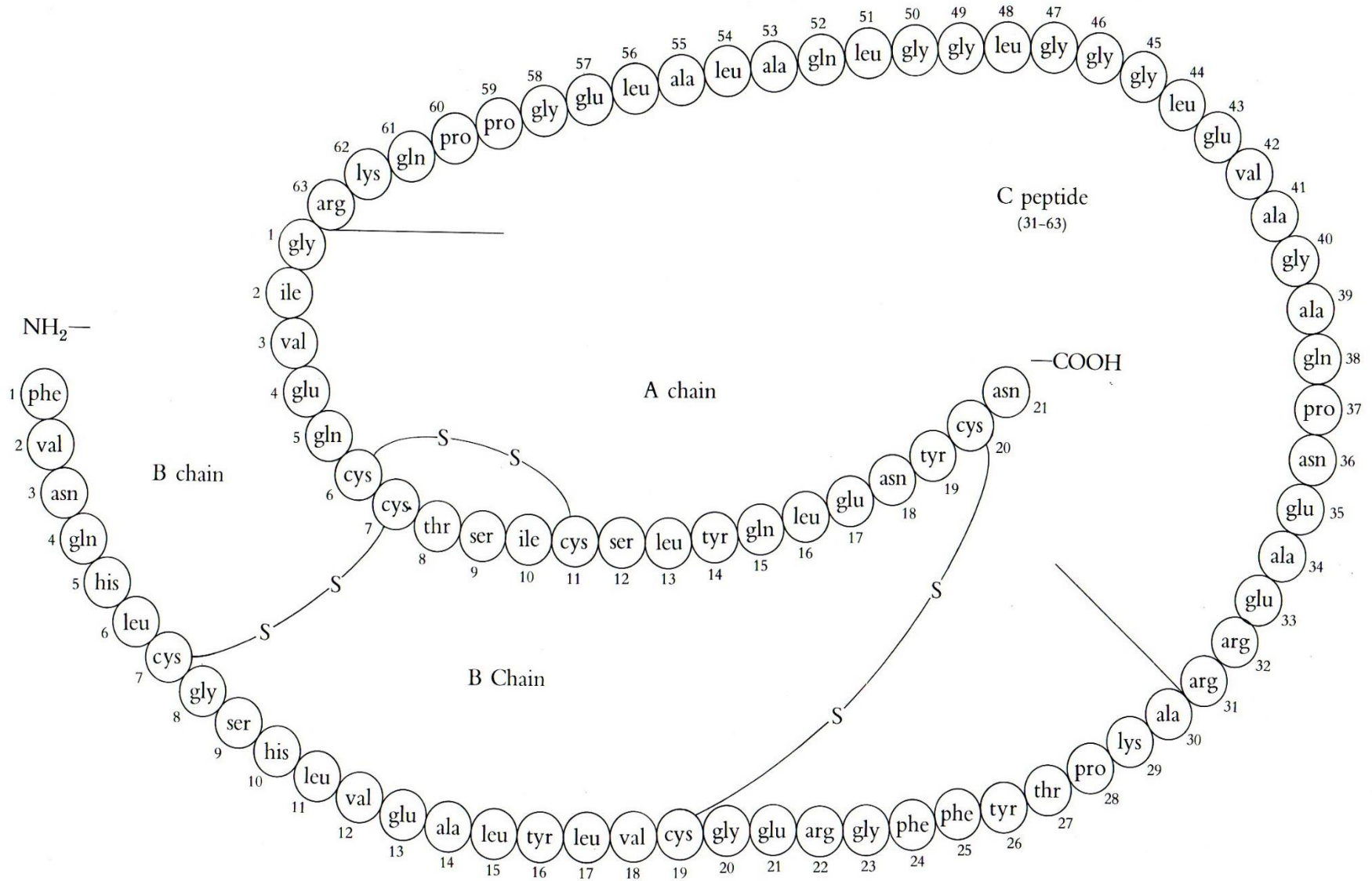


Glucose:  
Sugar in Blood



*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.

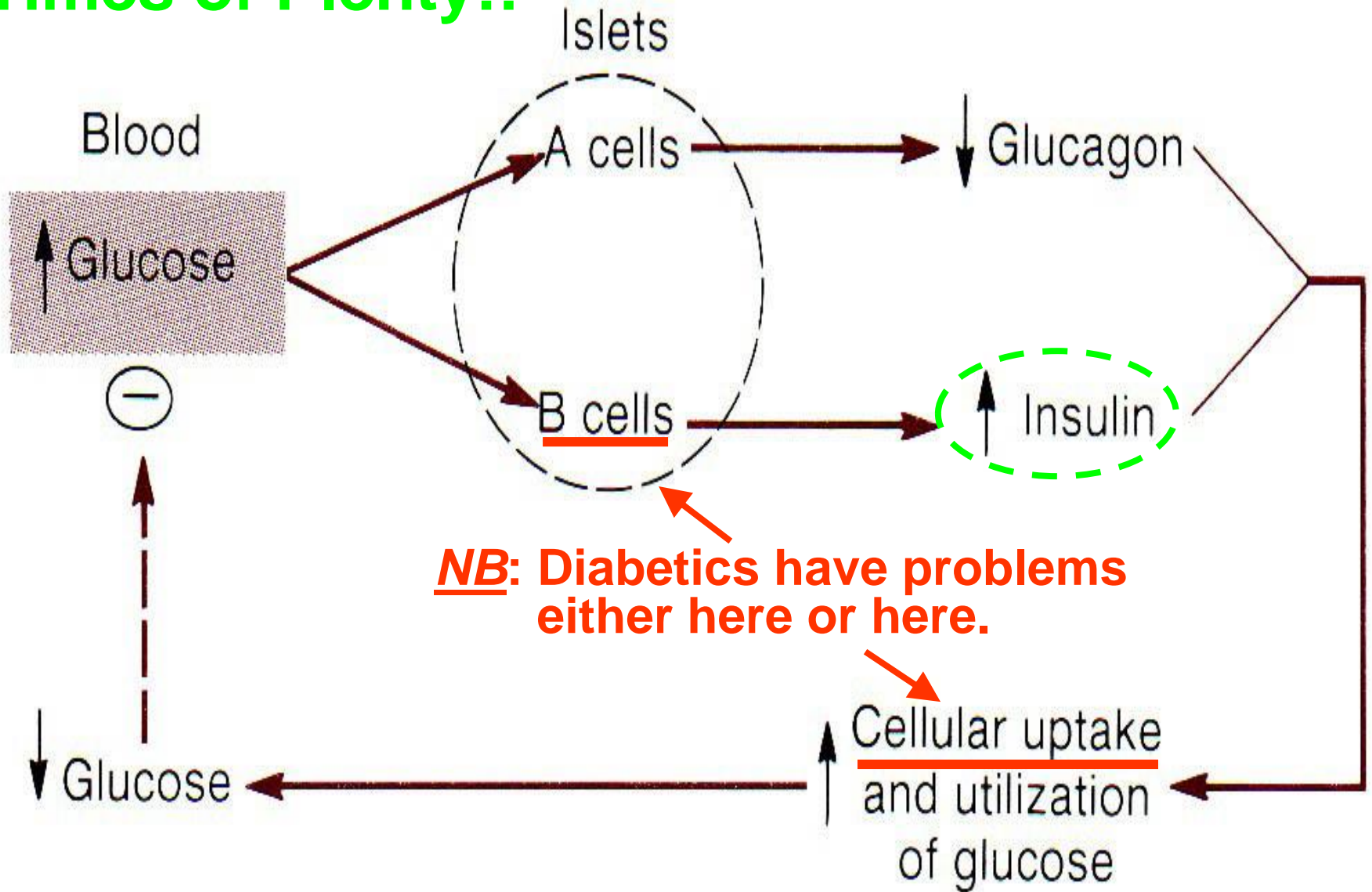
TABLE  
4-7

## Warning Signs of Diabetes

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

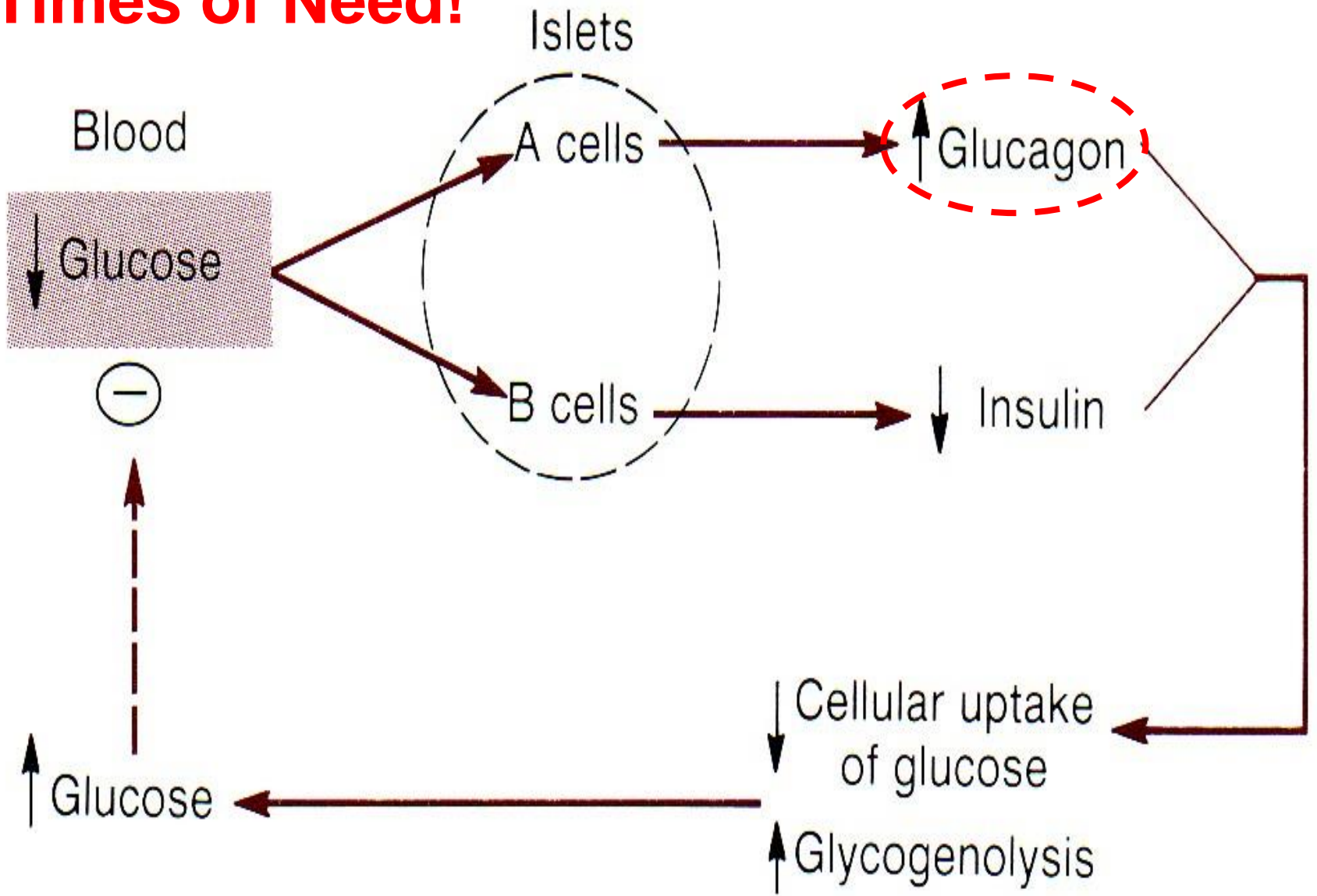
- Excessive urination and thirst
- Glucose in the urine
- Weight loss with nausea, easy tiring, weakness, or irritability
- Cravings for food, especially for sweets
- Frequent infections of the skin, gums, vagina, or urinary tract
- Vision disturbances; blurred vision
- Pain in the legs, feet, or fingers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

# Times of Plenty!!





# Times of Need!



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

**Medication**



**Diet**

**Exercise**

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

