...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. ***CVD & Oil Connections*** **Anti-inflammatory vs. inflammatory? 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_2-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 ≥ *B*- (assume ≥ 80)

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

Hope for? MT Lecture Lab

$$X = [80 - ((0.3 \times 62) + (0.2 \times 100) + (0.2 \times 100))]/0.3$$

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

$$X = [21.4]/0.3 = 71.3$$

Need this on final for *B*- 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 &

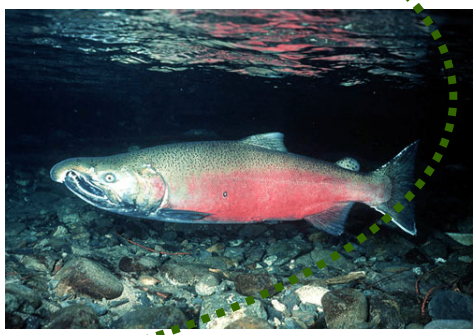
(7) **Discuss** concepts informally with fellow students.

Science Teaching Reconsidered, National Academy Press, 1997.

Essential Fatty Acids: Ω-6 Linoleic & Ω-3 Linolenic Acids

Linoleic → Arachadonic Acid → Inflammatory Cascade

Linolenic → EPA, DHA → Anti-inflammatory

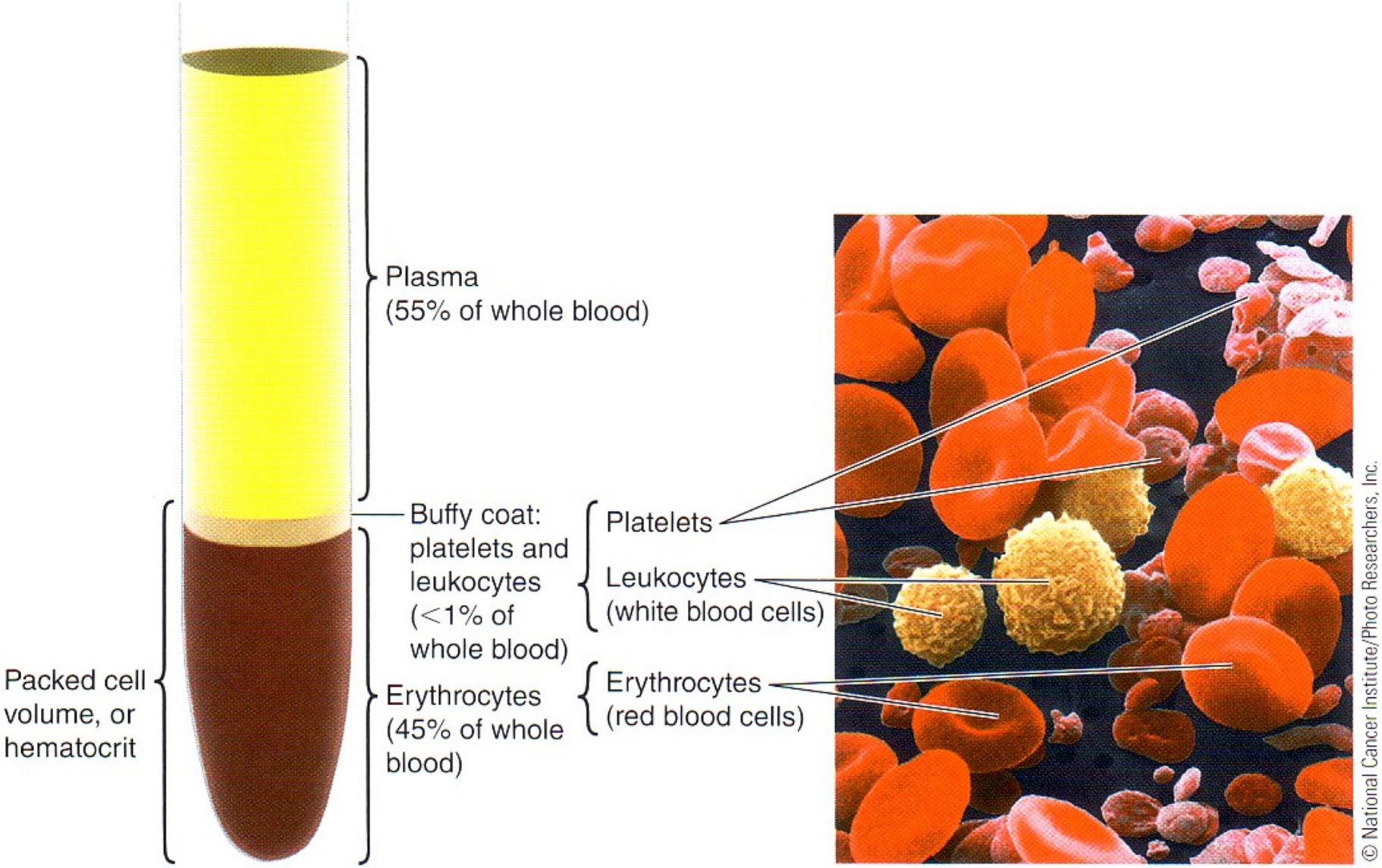


Deep cold water fish are fabulous sources of Ω-3 fatty acids!

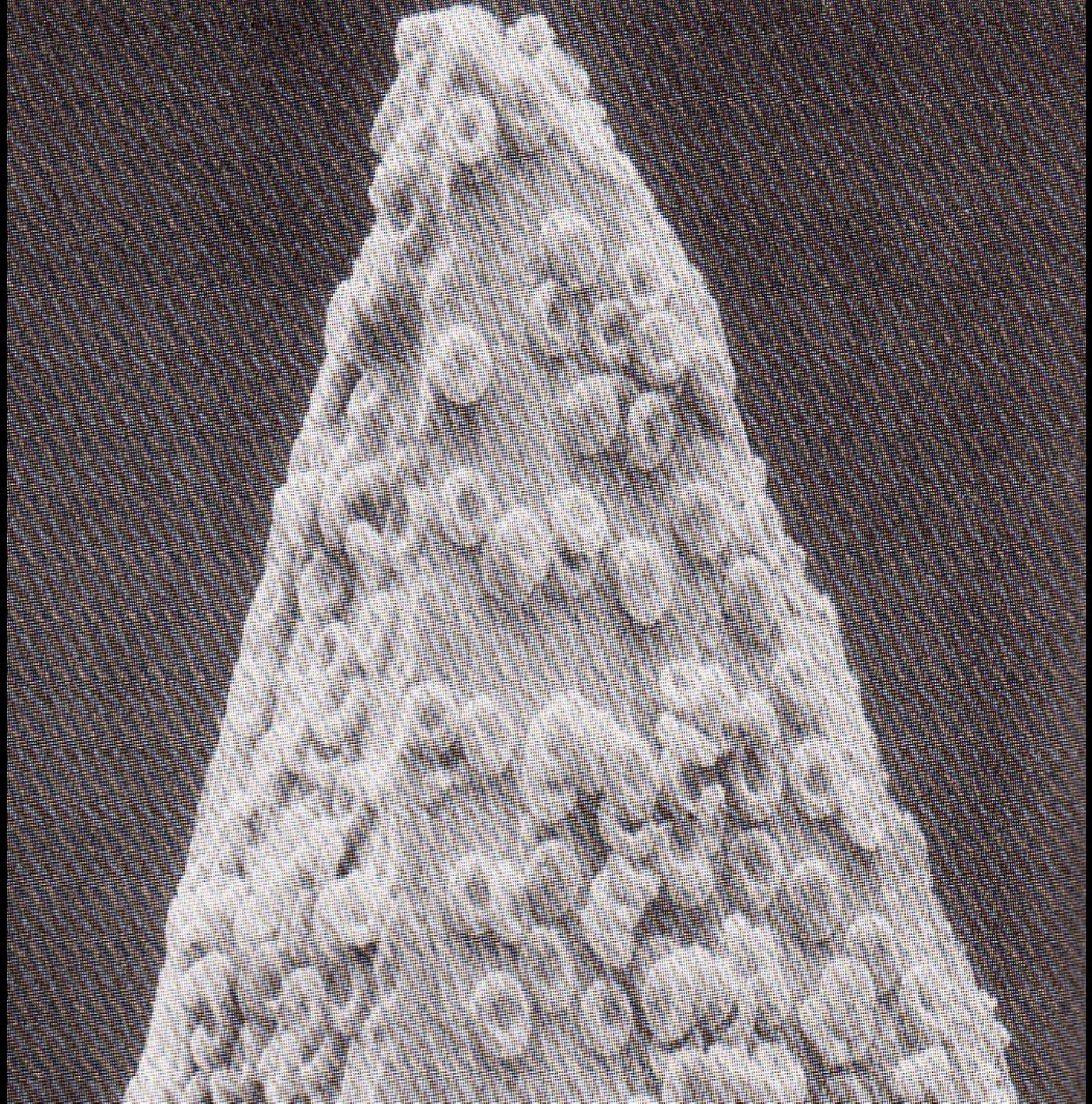
S&W p 167

Break for discussion/questions!

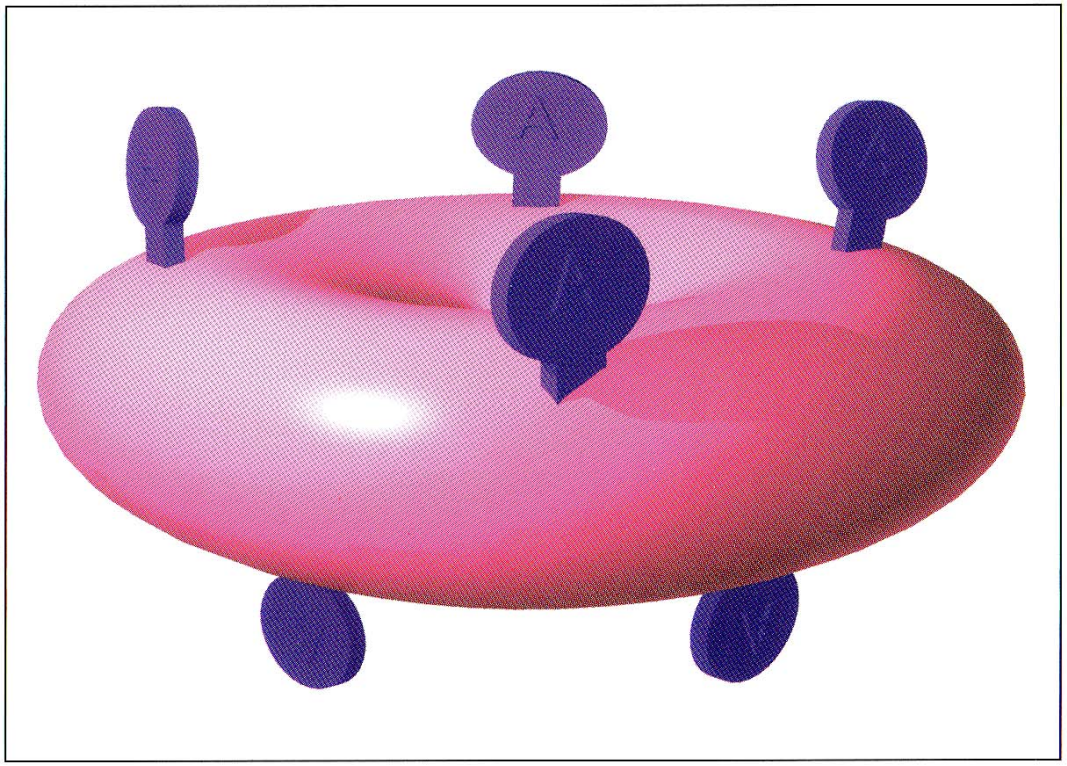
What's in Blood? Plasma & Blood Cells



LS 2012 fig 11-1

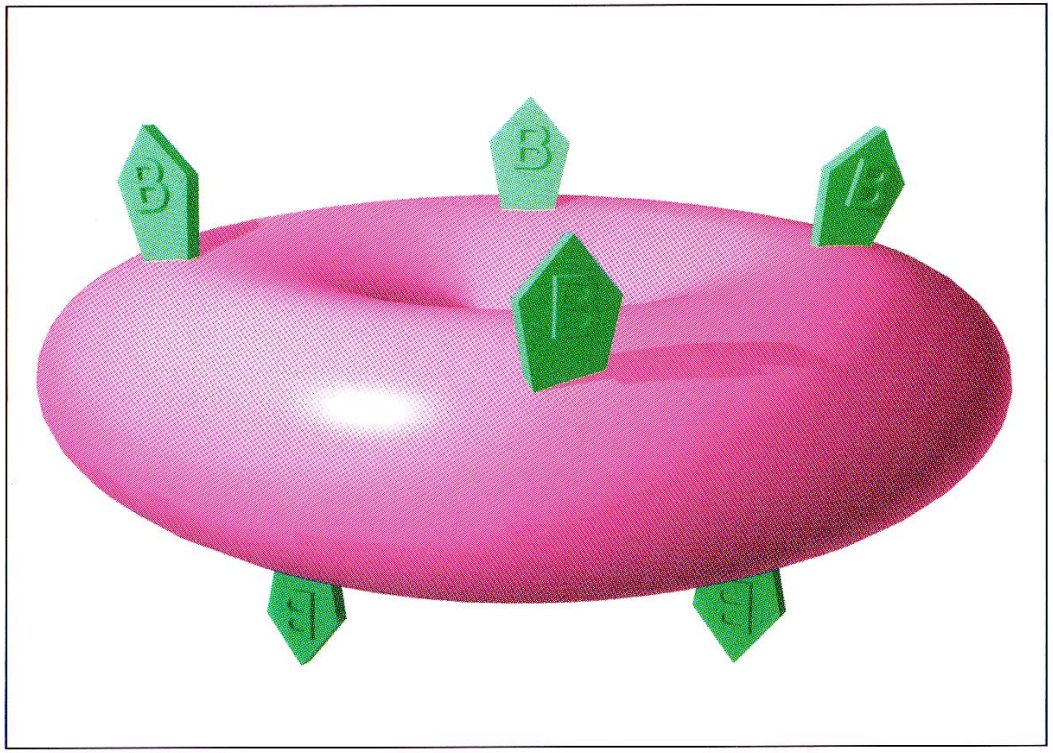


A



A Antigens

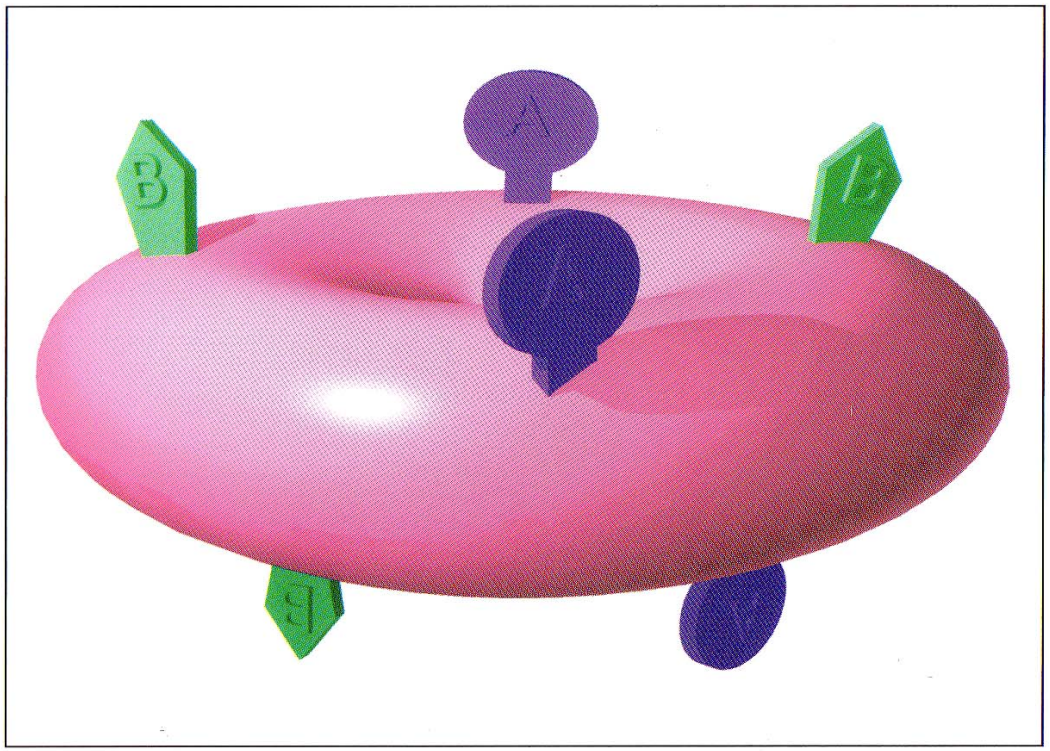
(Agglutinogens)



B Antigens

(Agglutinogens)

AB



A & B Antigens

(Agglutinogens)

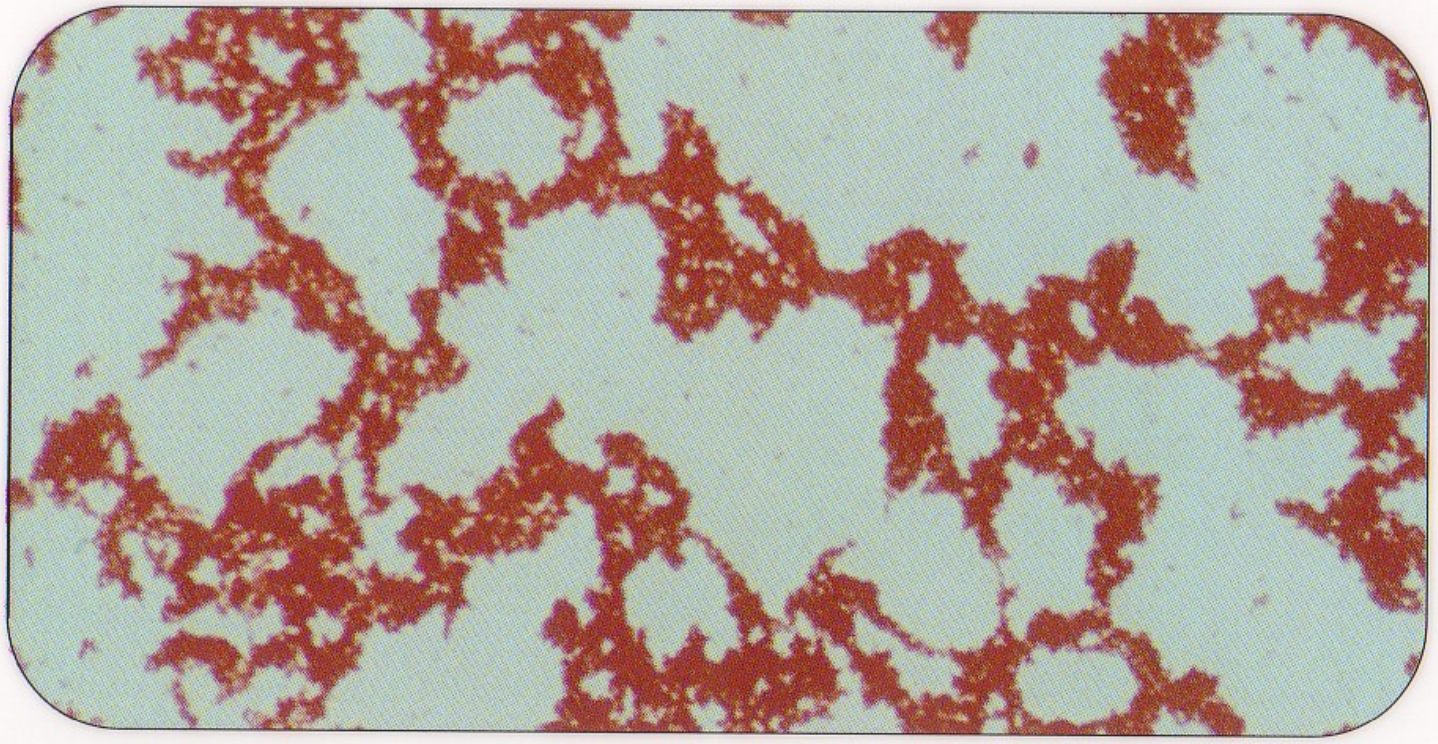
O

No Antigens

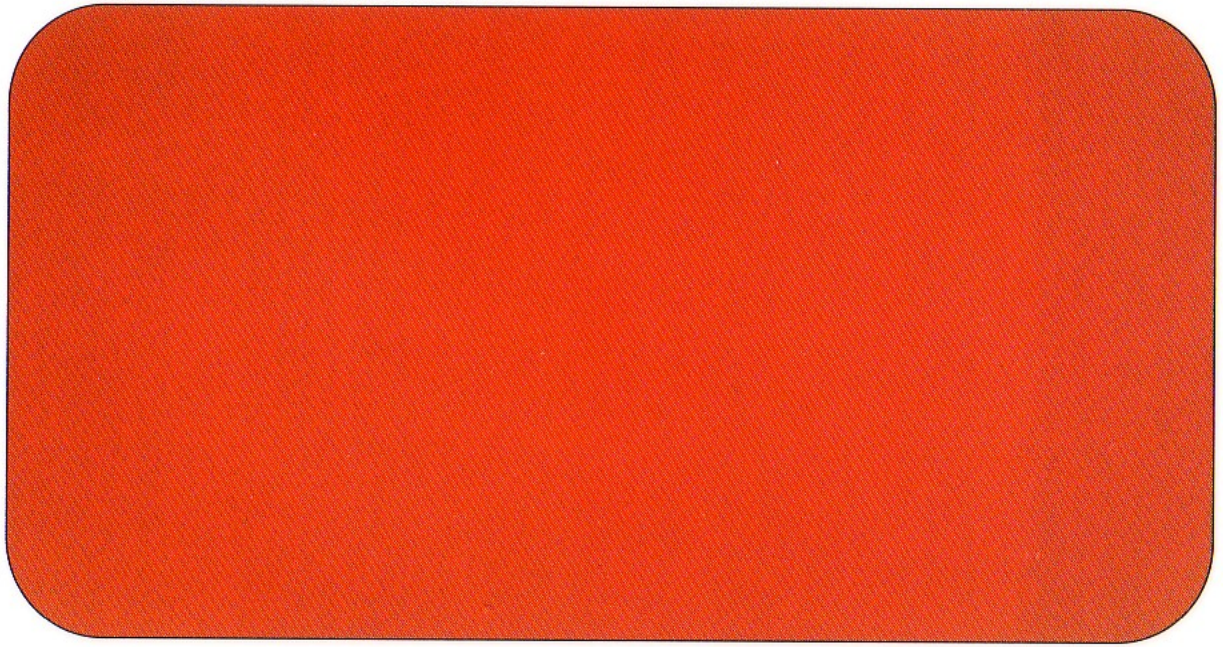
(Agglutinogens)

A Antibodies

(Agglutinins)

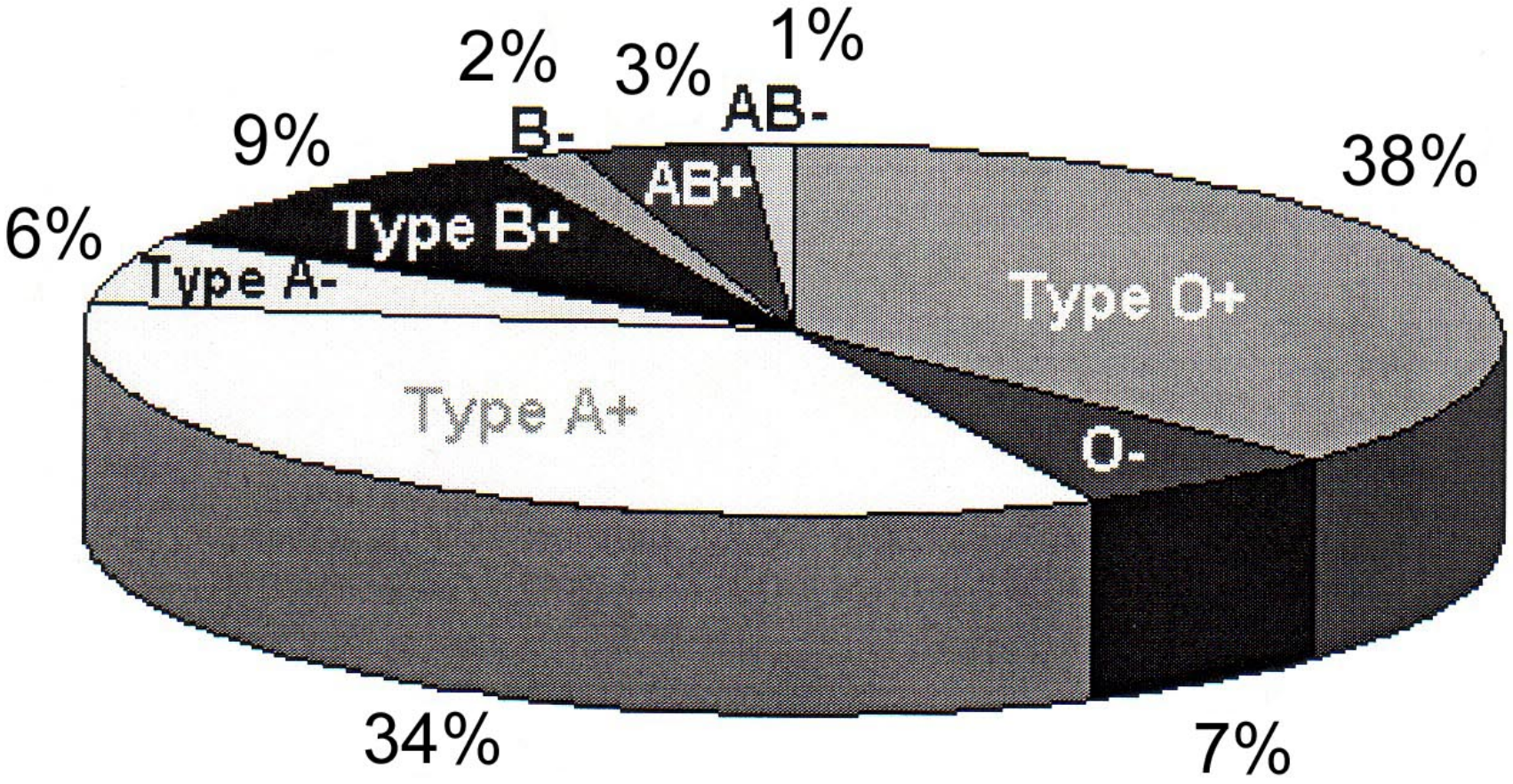


Clumping with anti-A serum



No Clumping with anti-A serum

Blood Type Distribution, General Population



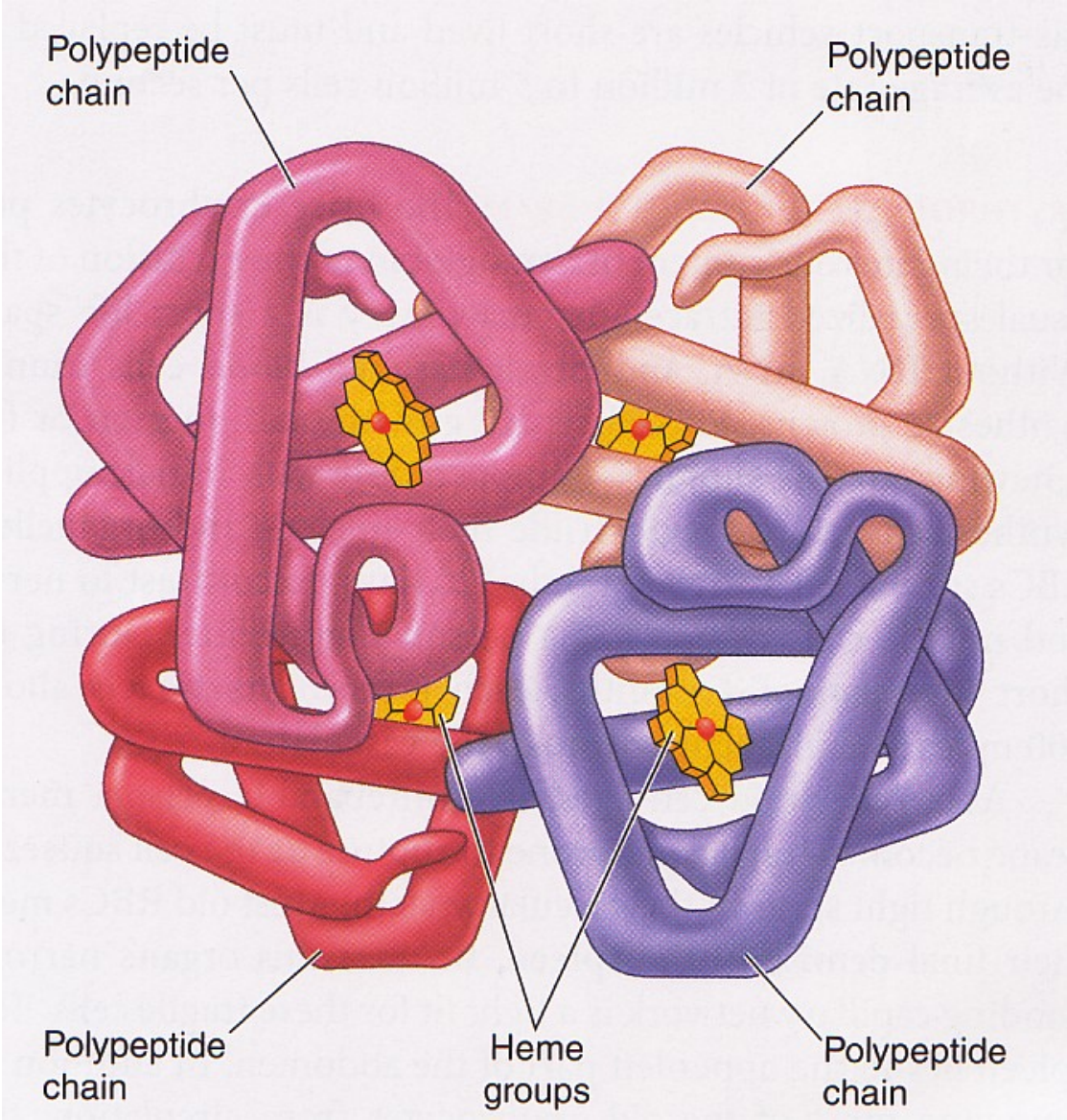
Erythroblastosis Fetalis?

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

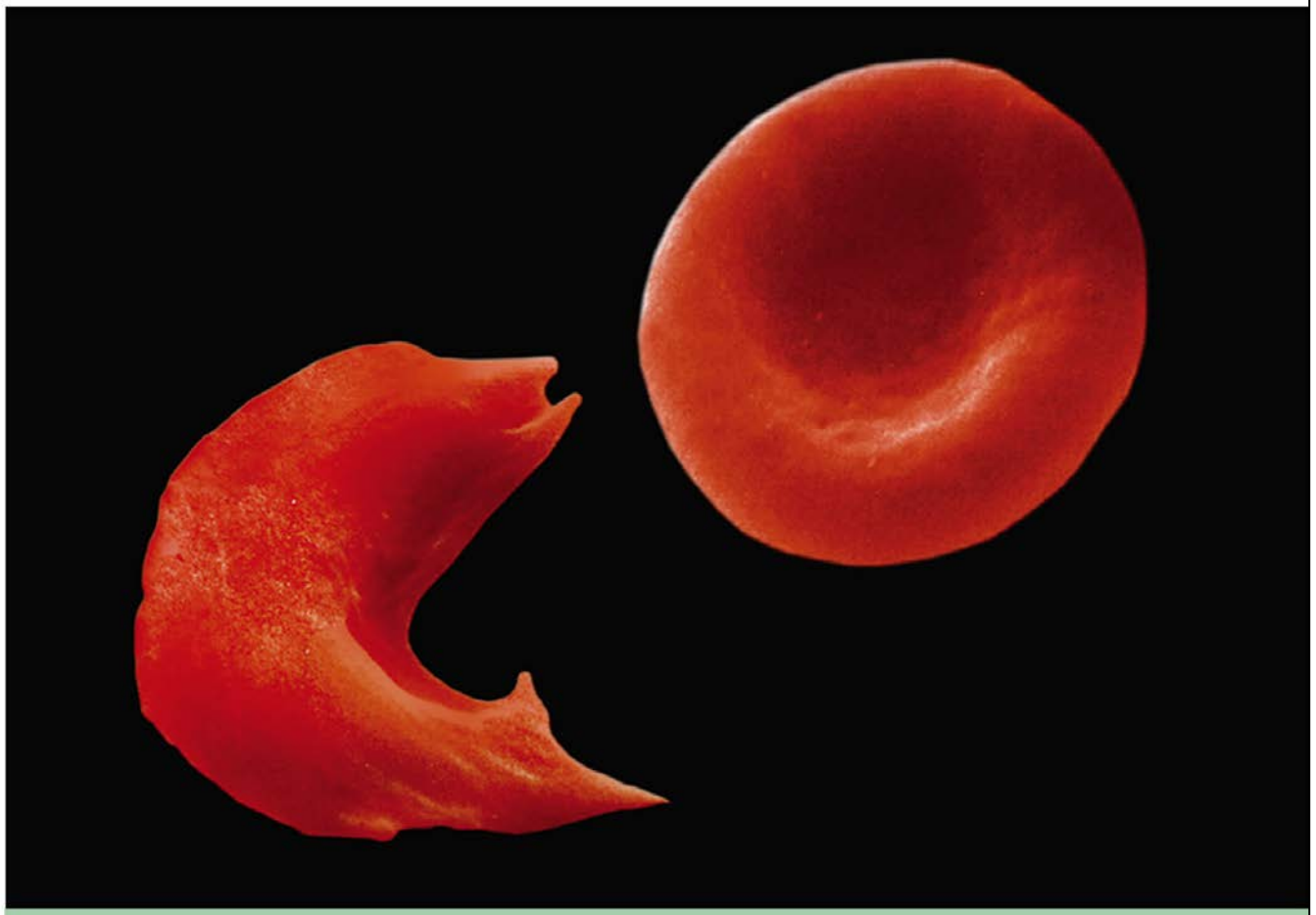
Hemoglobin Structure



L Sherwood 2011 fig 11-2

Sickle-shaped blood cells

Normal red blood cells



© Dr. Stanley Flegler/Visuals Unlimited

What a difference one amino acid can make!

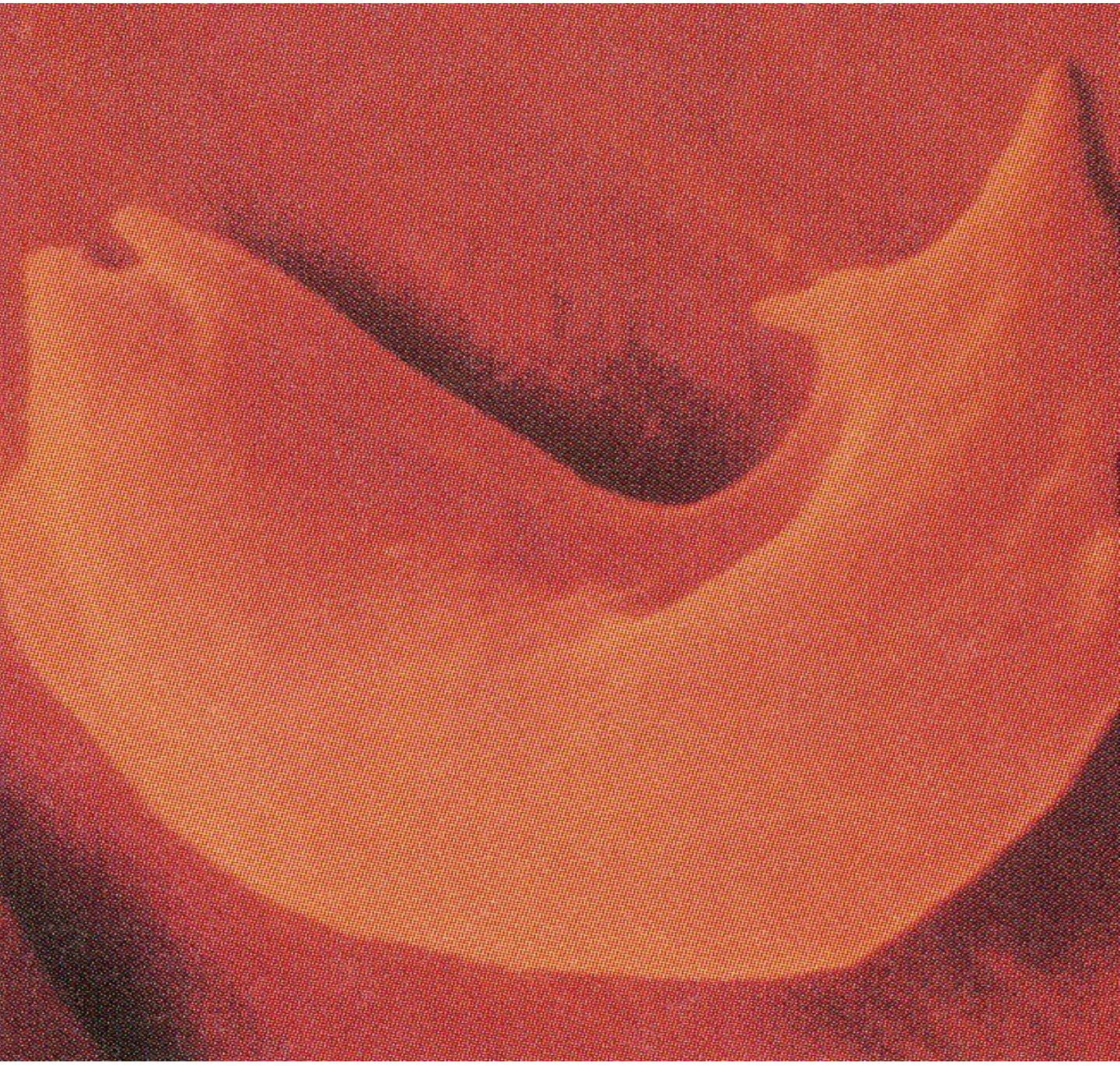
Amino acid sequence of normal hemoglobin:

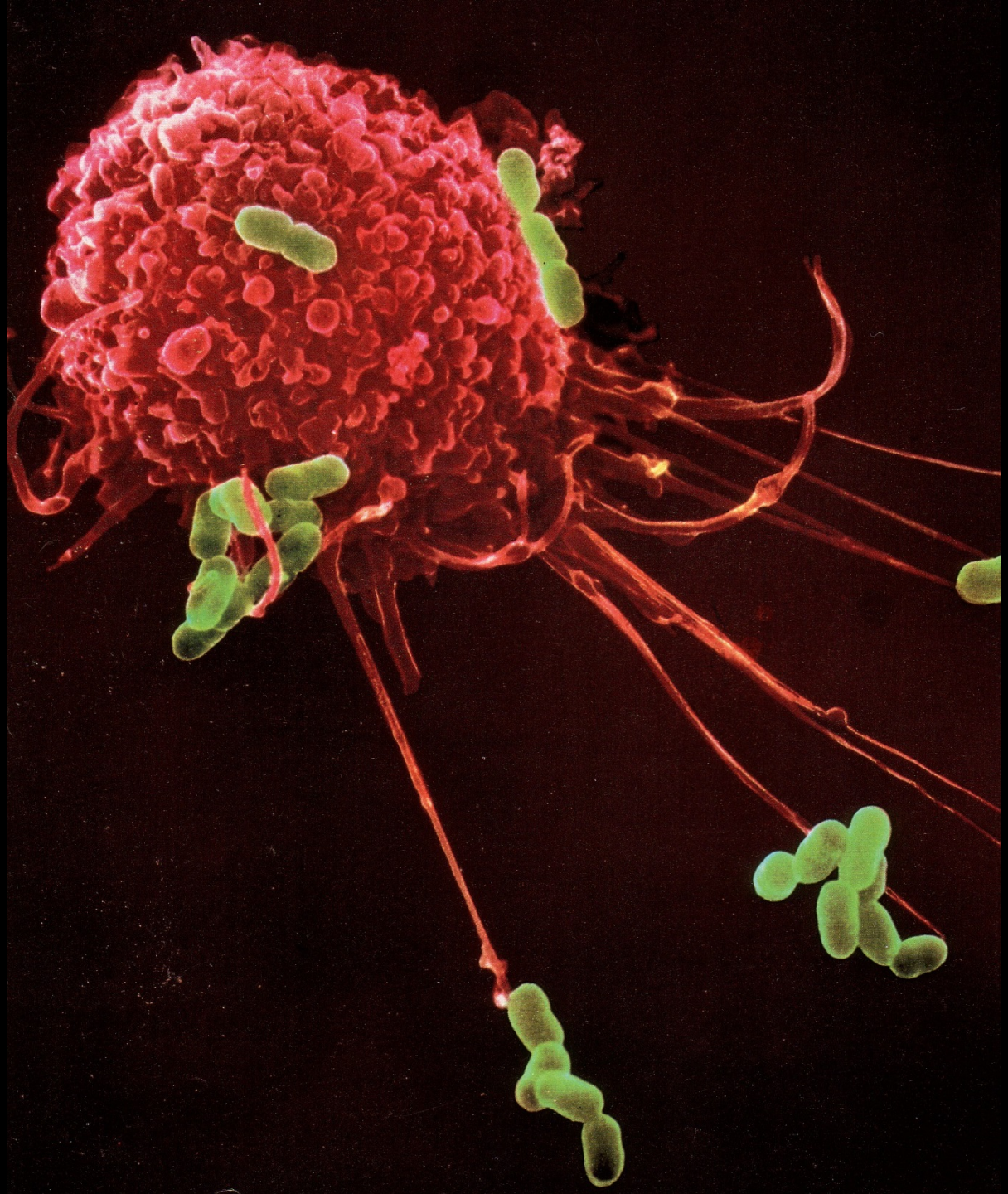
Val–His–Leu–Thr–Pro–Glu–Glu

Amino acid sequence of sickle-cell hemoglobin:

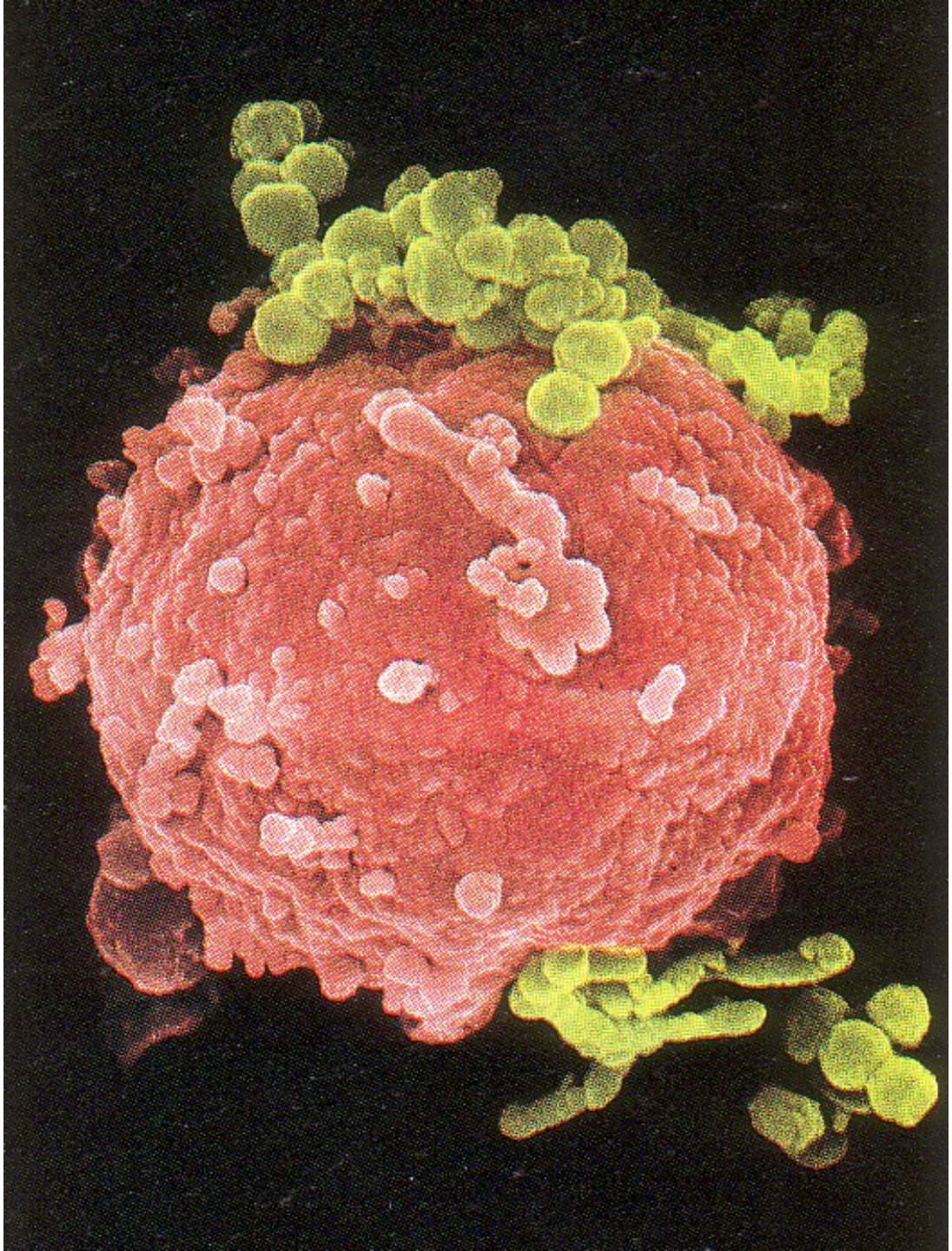
Val–His–Leu–Thr–Pro–Val–Glu

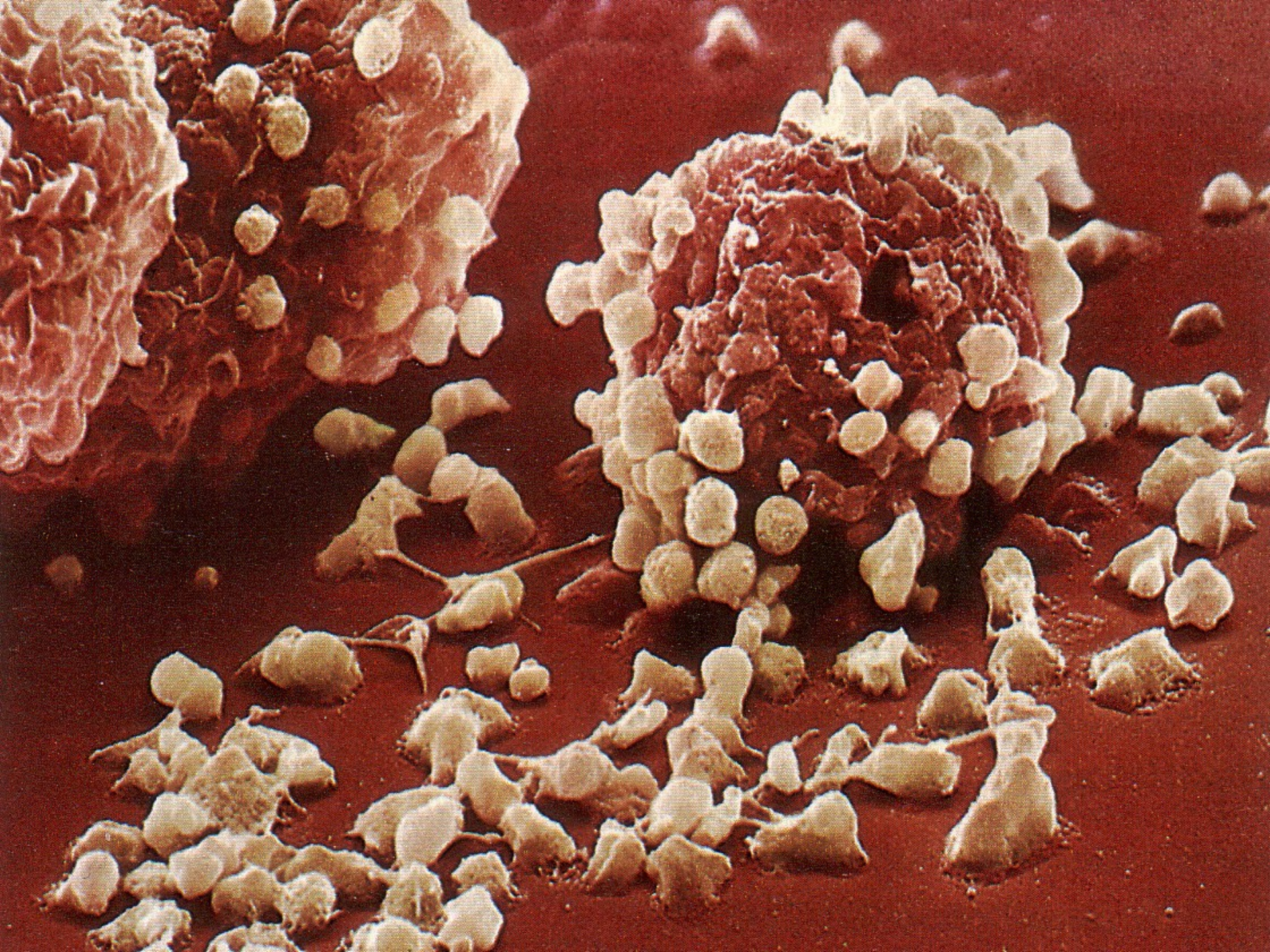
S&W 2011 fig 6-5 p 194

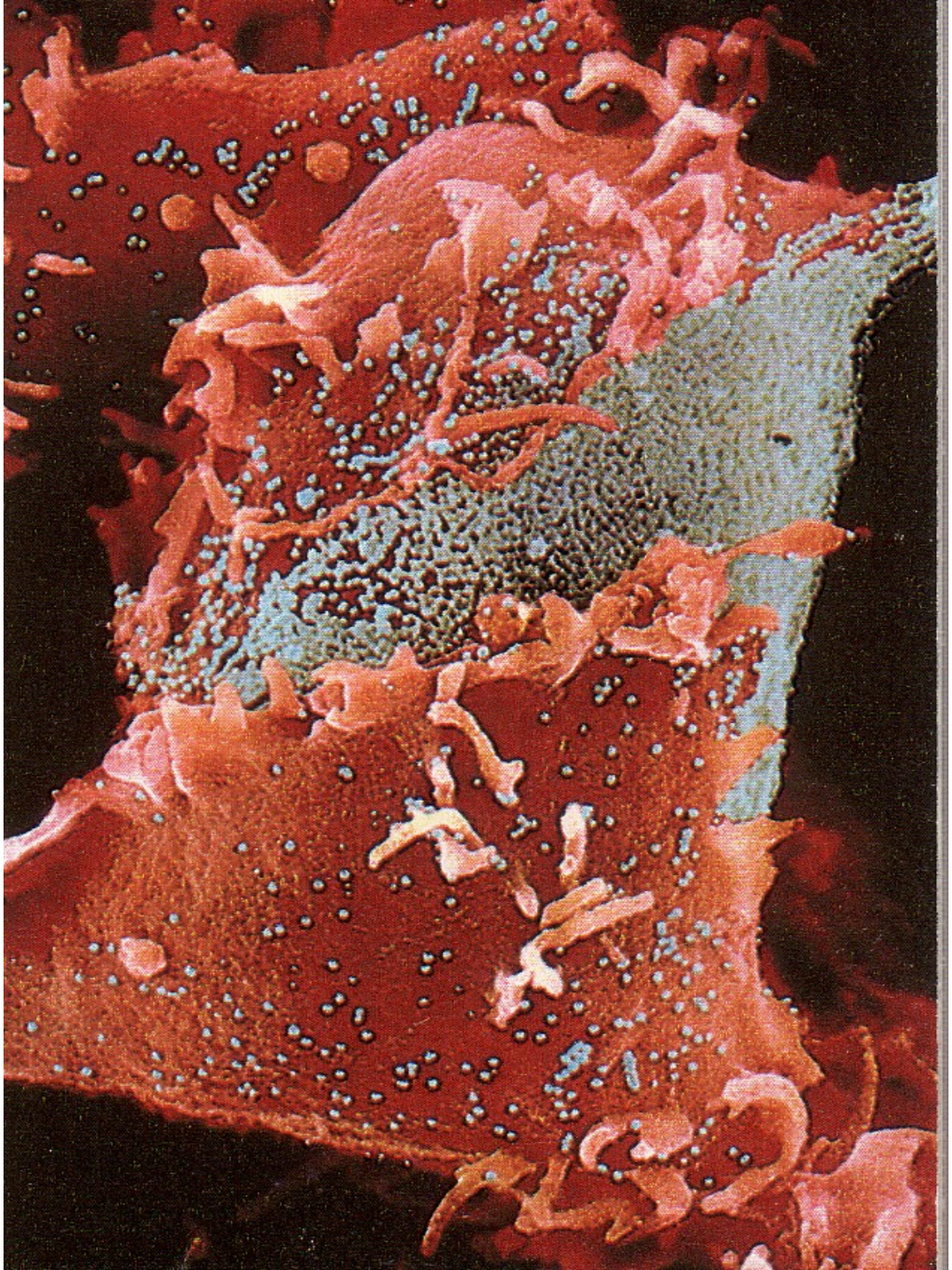


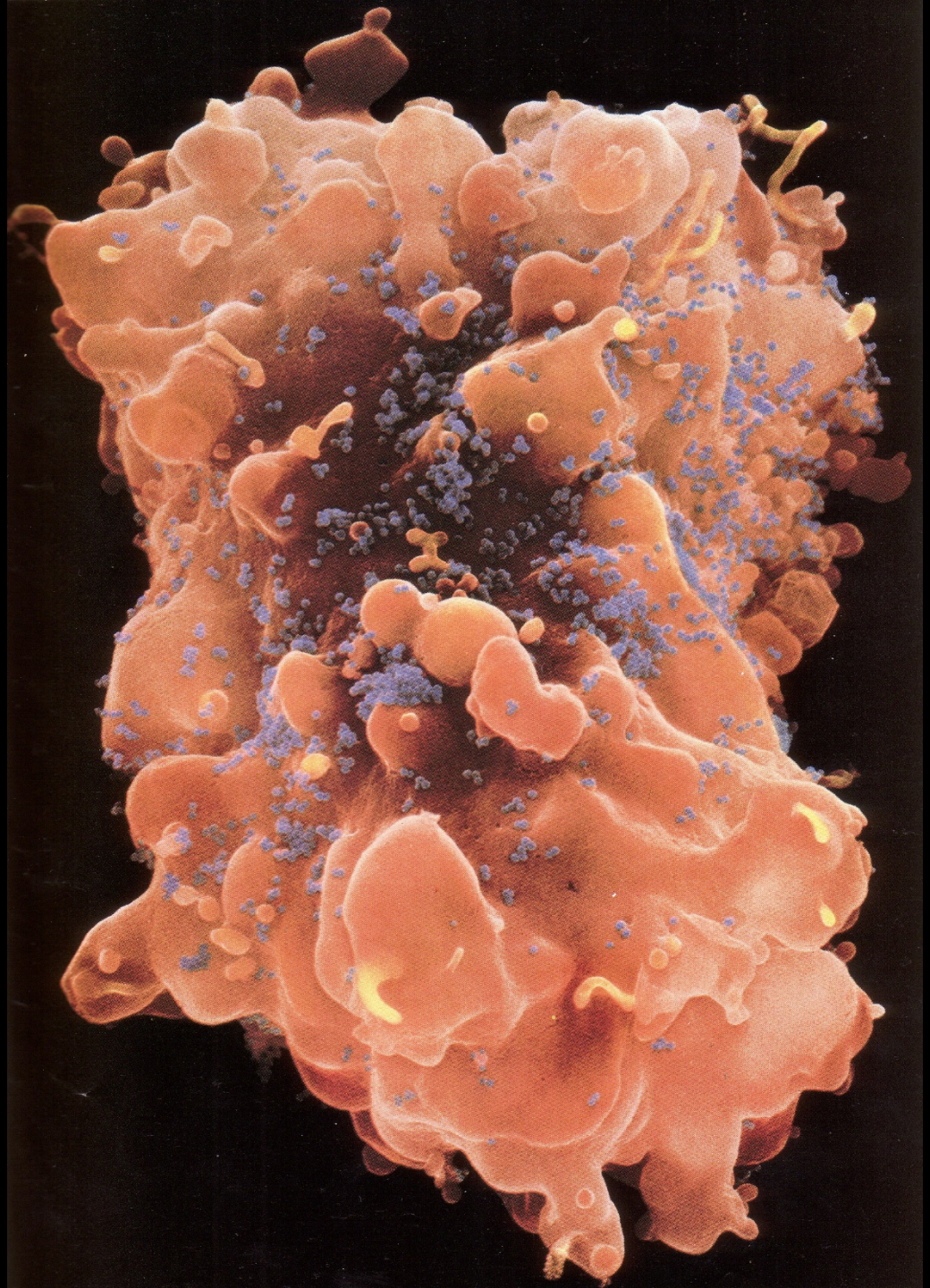


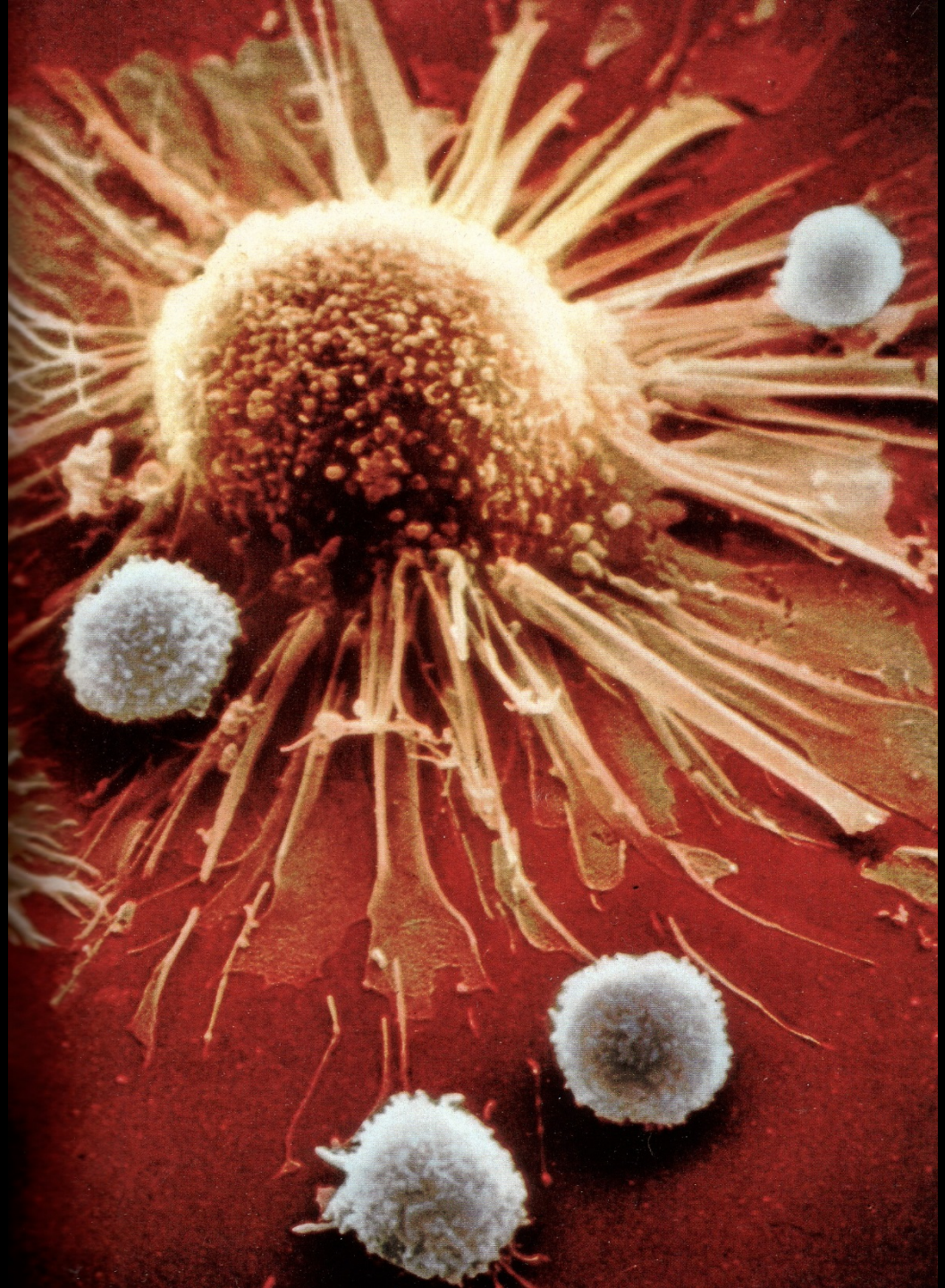
3000 x GMBH
Nat Geog 1986

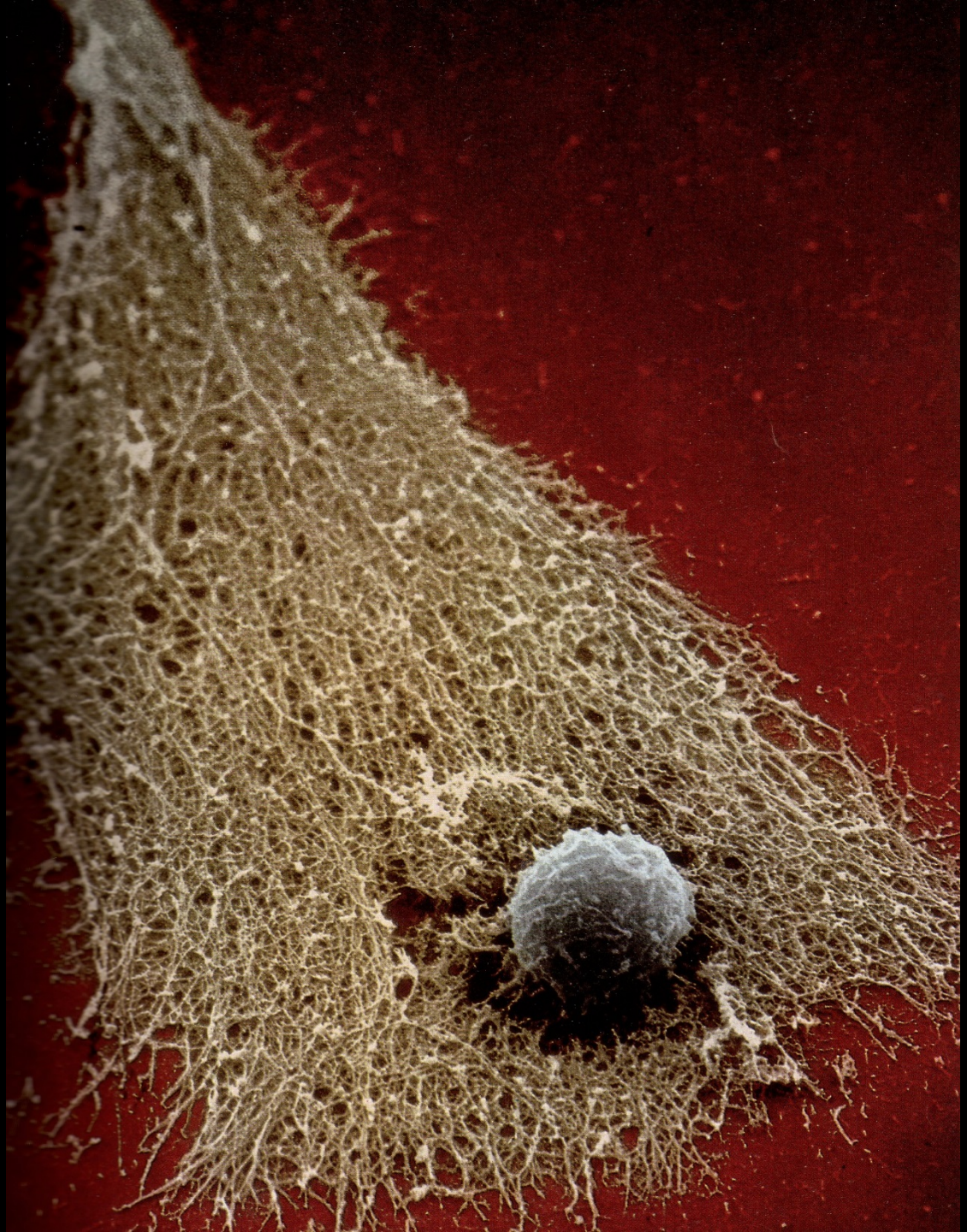


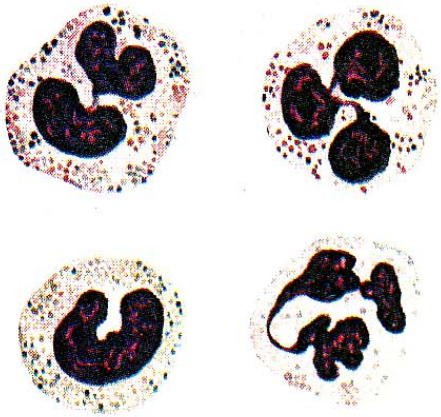




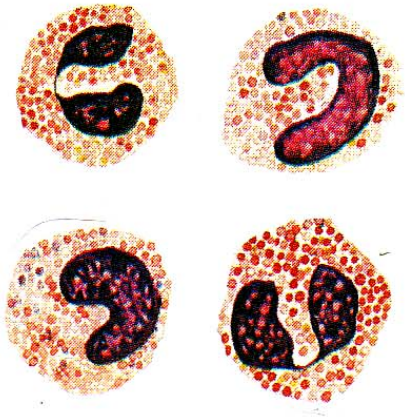




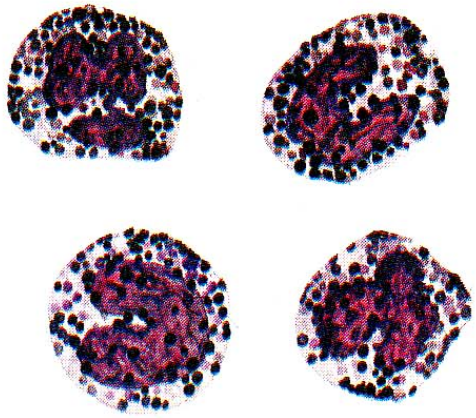




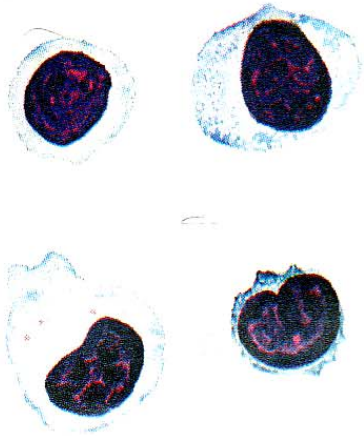
NEUTROPHILS



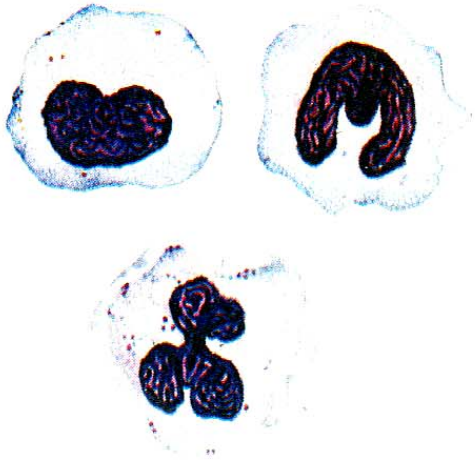
EOSINOPHILS



BASOPHILS

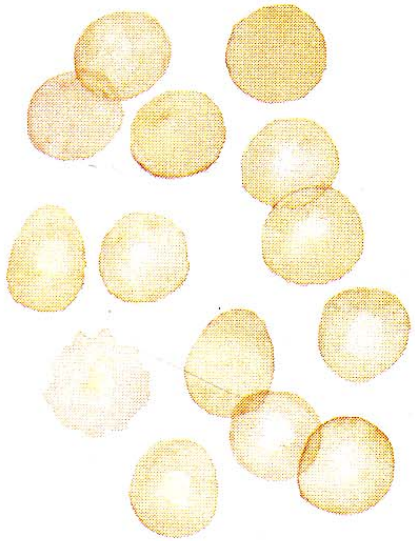


LYMPHOCYTES



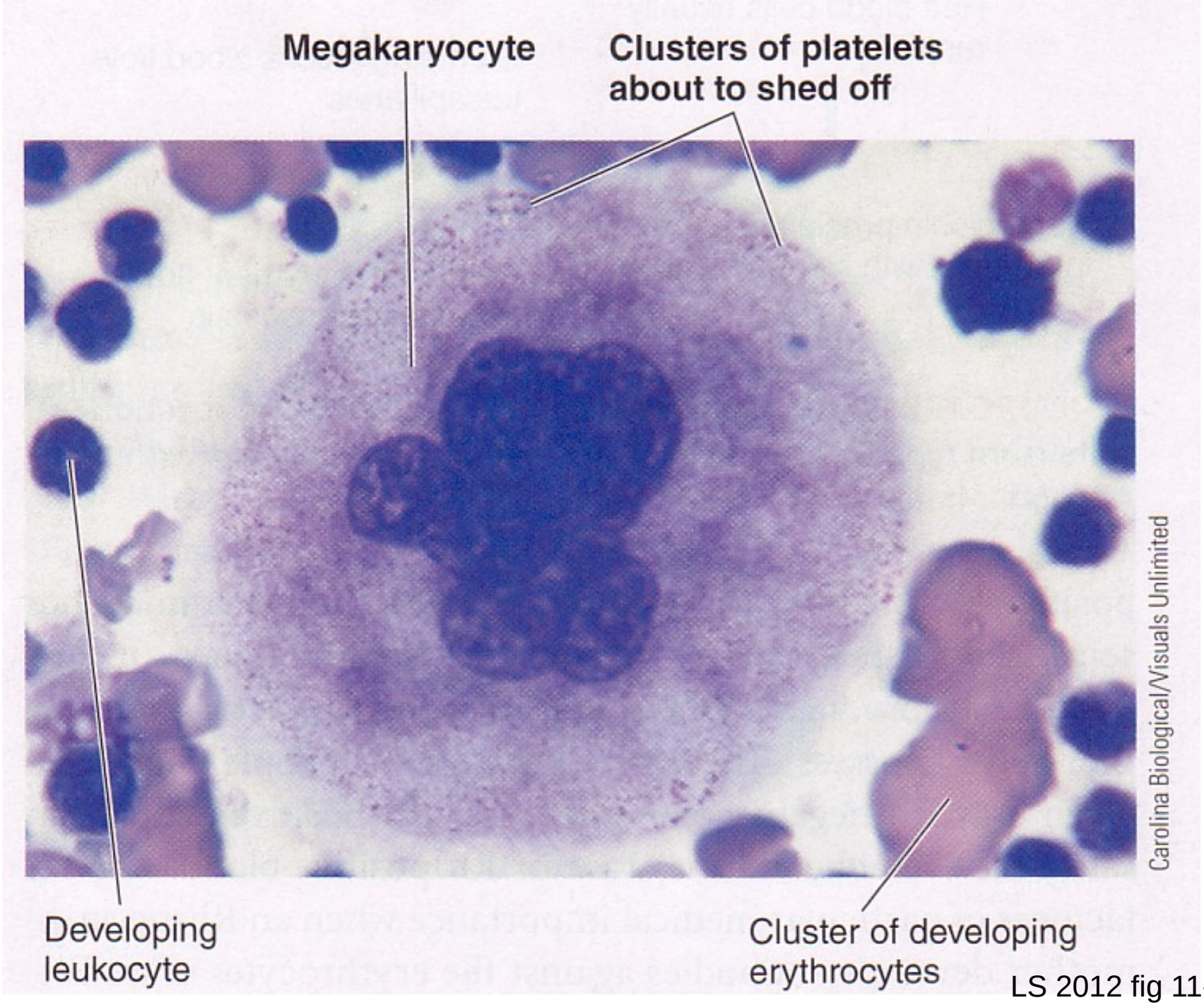
MONOCYTES

PLATELETS



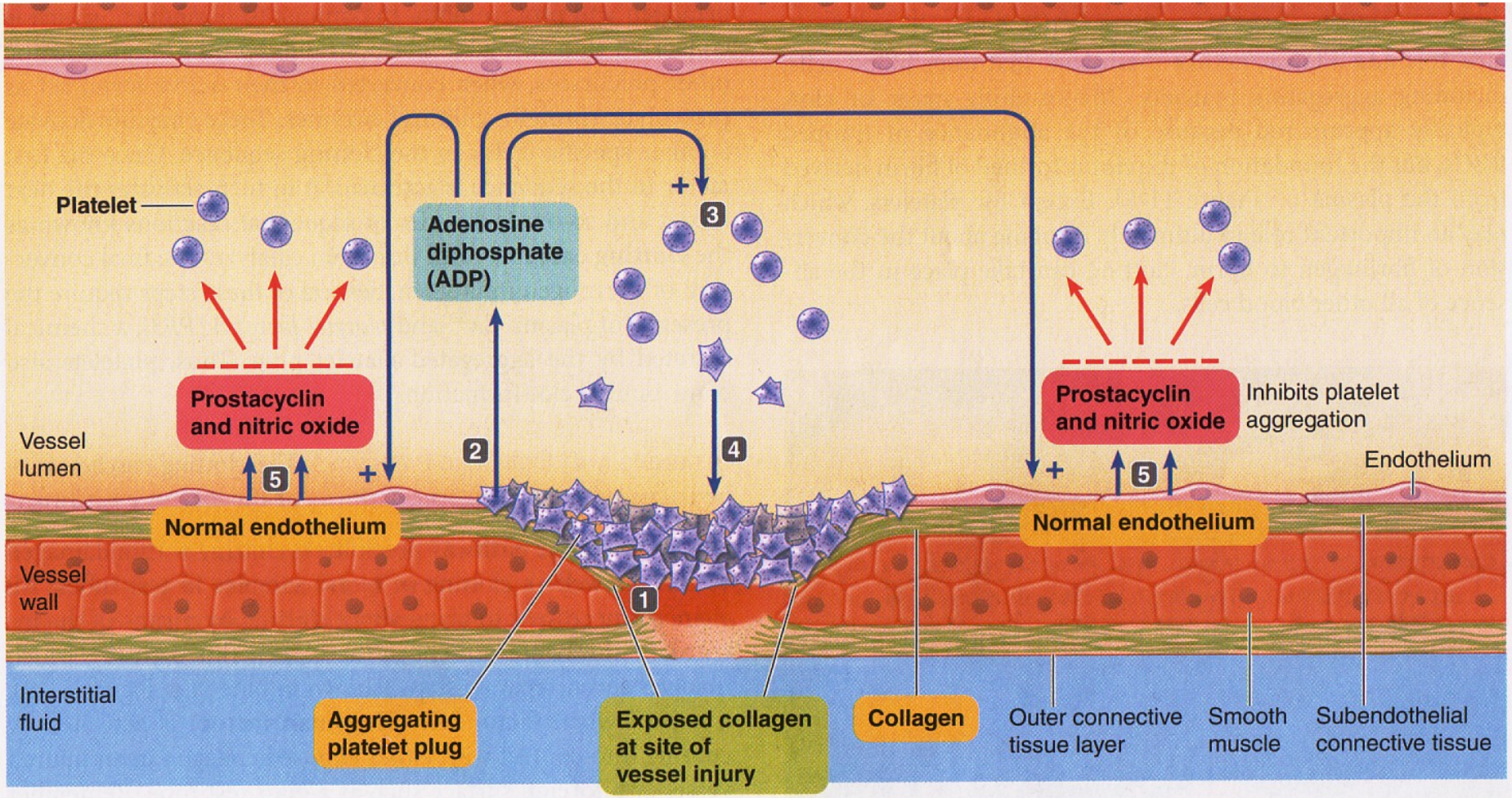
ERYTHROCYTES

SI Fox 2009 fig 10-2



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.

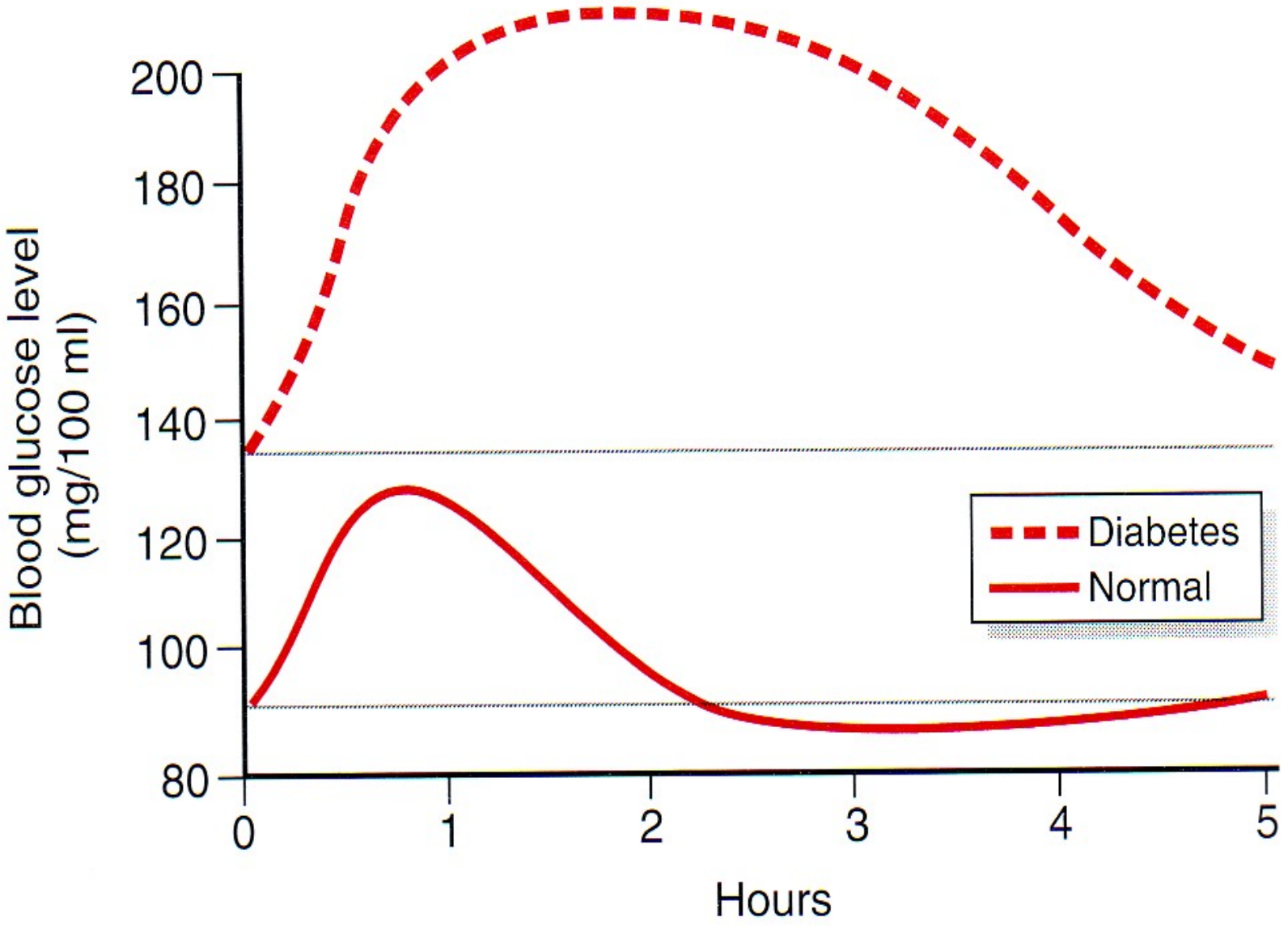
3 ADP activates other platelets passing by.

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.

LS 2012 fig 11-7

Diabetic & Normal Response to Glucose Load



Guyton & Hall 2000

Glucose:
Sugar in Blood

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

Proinsulin with C-Connecting Peptide

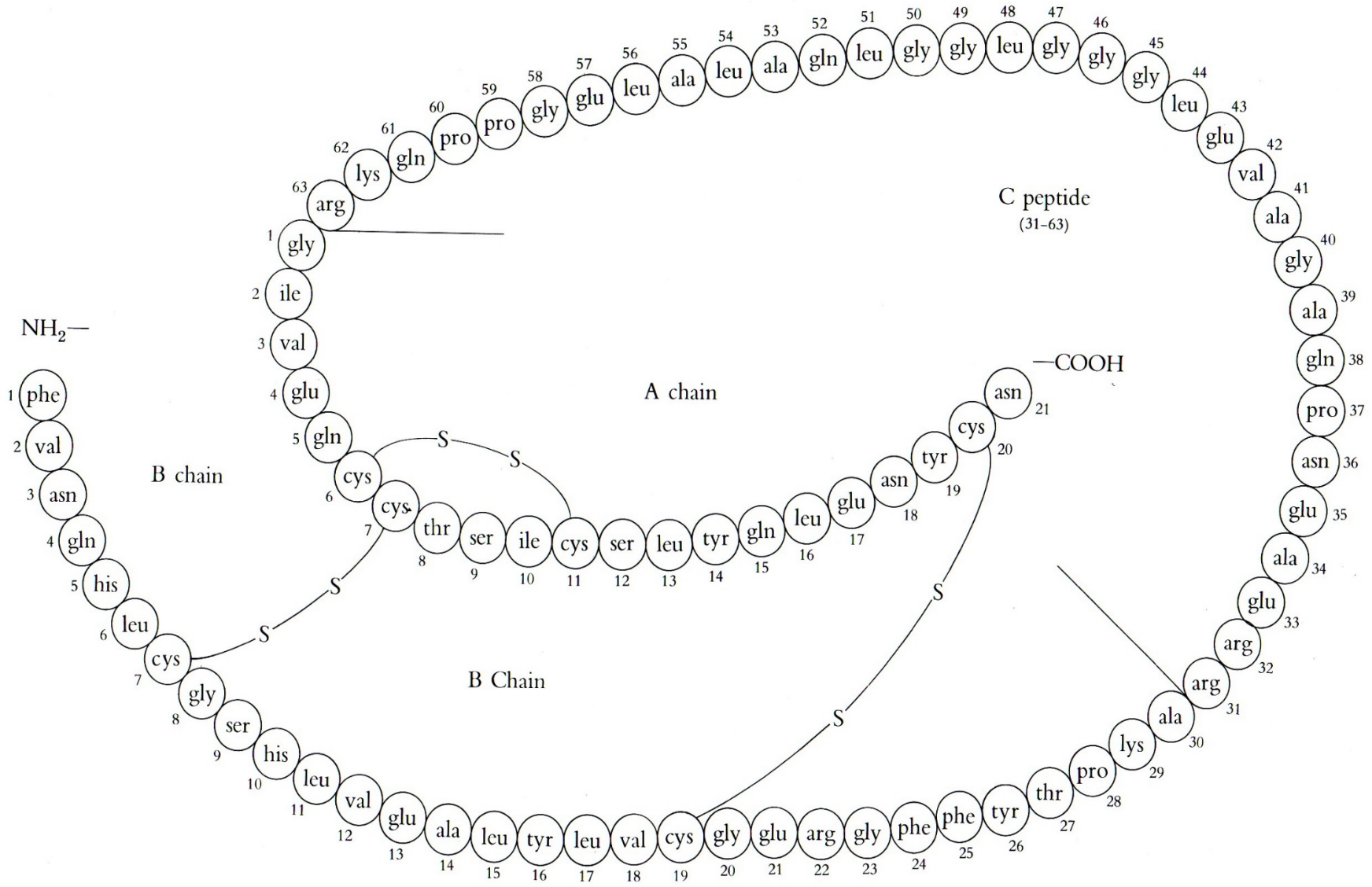


FIG. 10-4. Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.

DO Norris 1980

TABLE 4-7

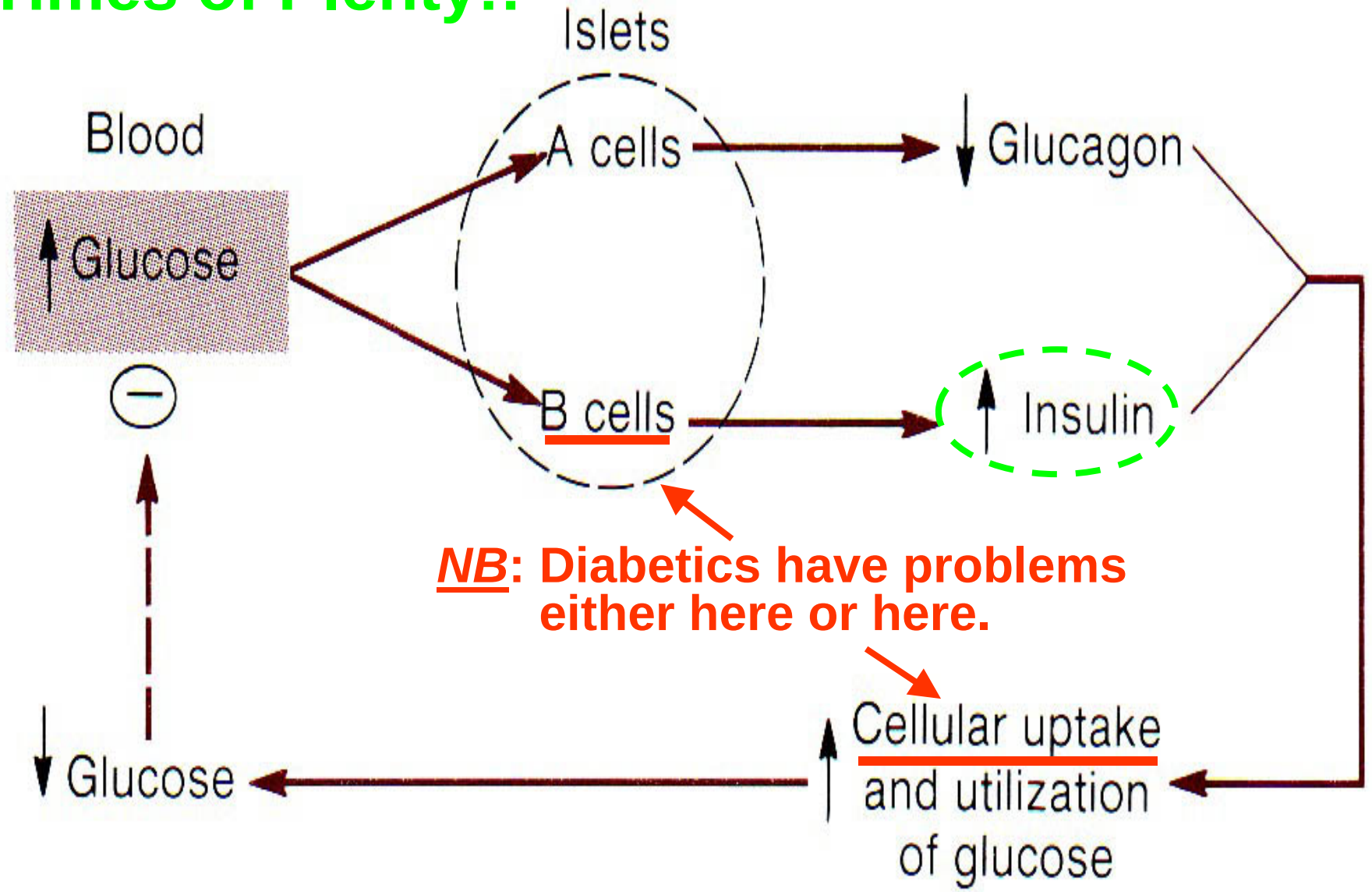
Warning Signs of Diabetes

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

S&W 2011 tab 4-7 p 131

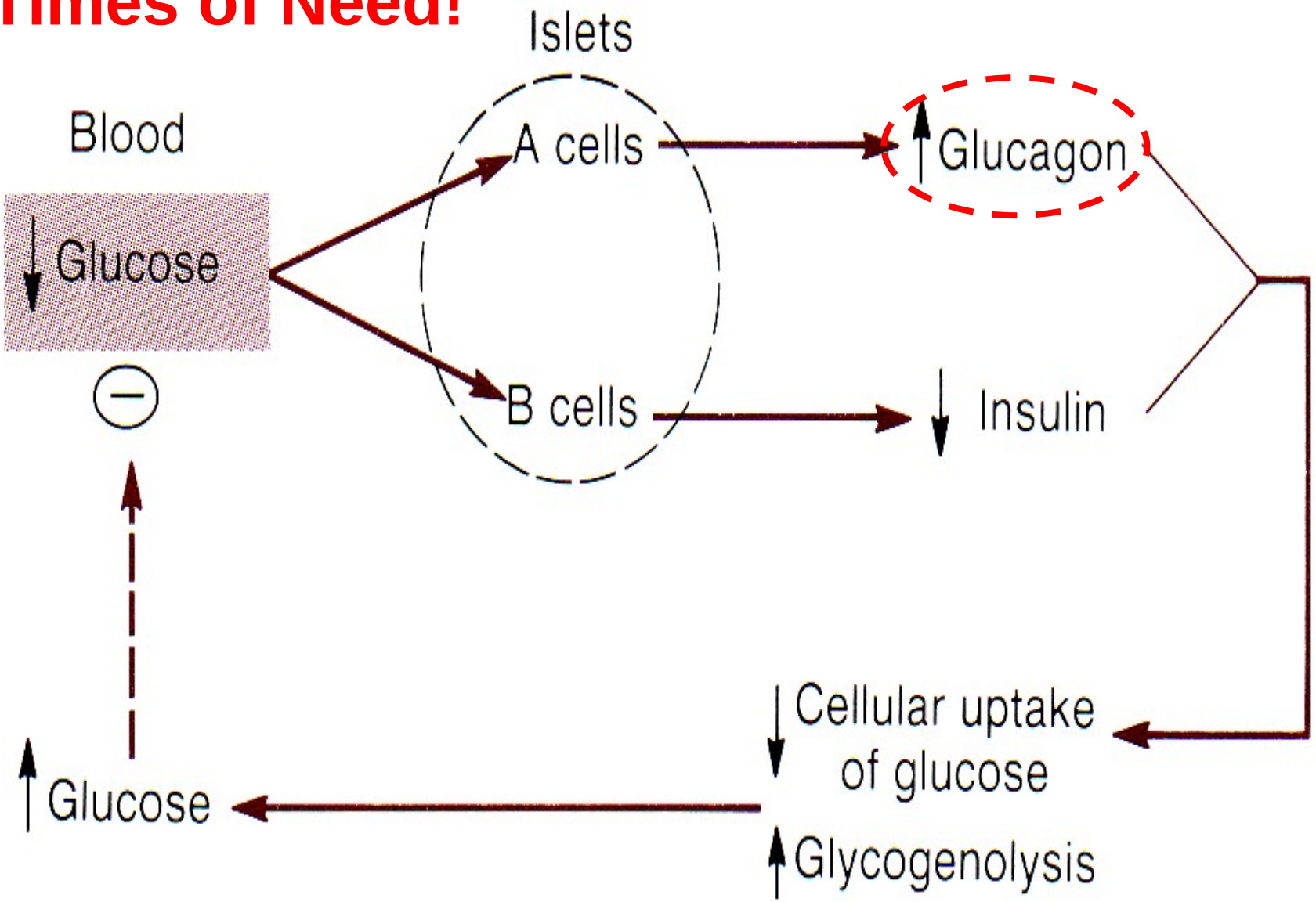
Times of Plenty!!



Fox 1987

Store!

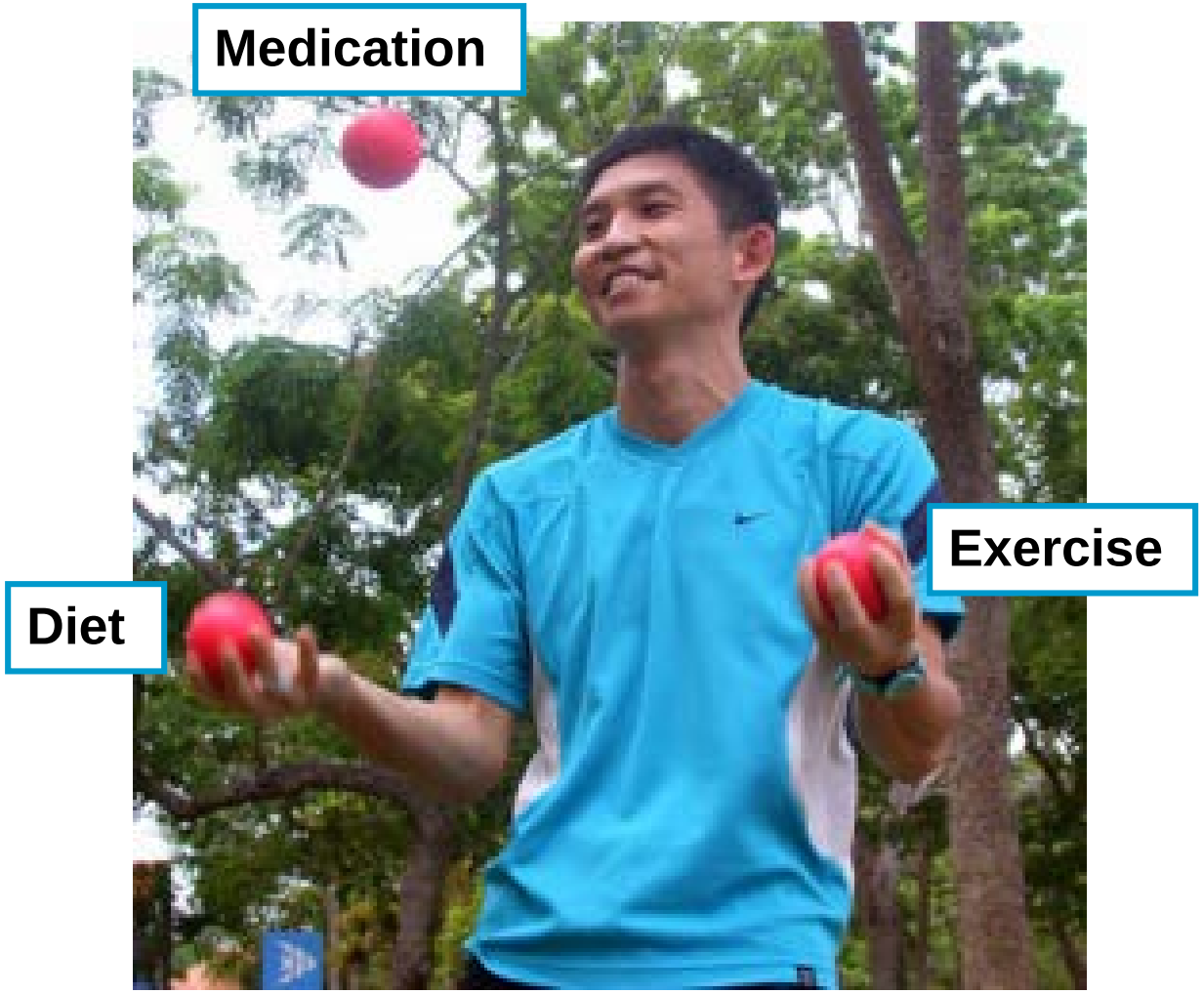
Times of Need!



Fox 1987

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!

S&W p 133