

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?
- II. CVDs Prevention & Treatment Follow-up or Q?**
Exercise, dietary modifications anti-inflammatory oils?
- 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: O₂-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 ≥ 80)

Assume 100% for lecture (20% of grade)

+ lab attendance & participation (20% of grade!)

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

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

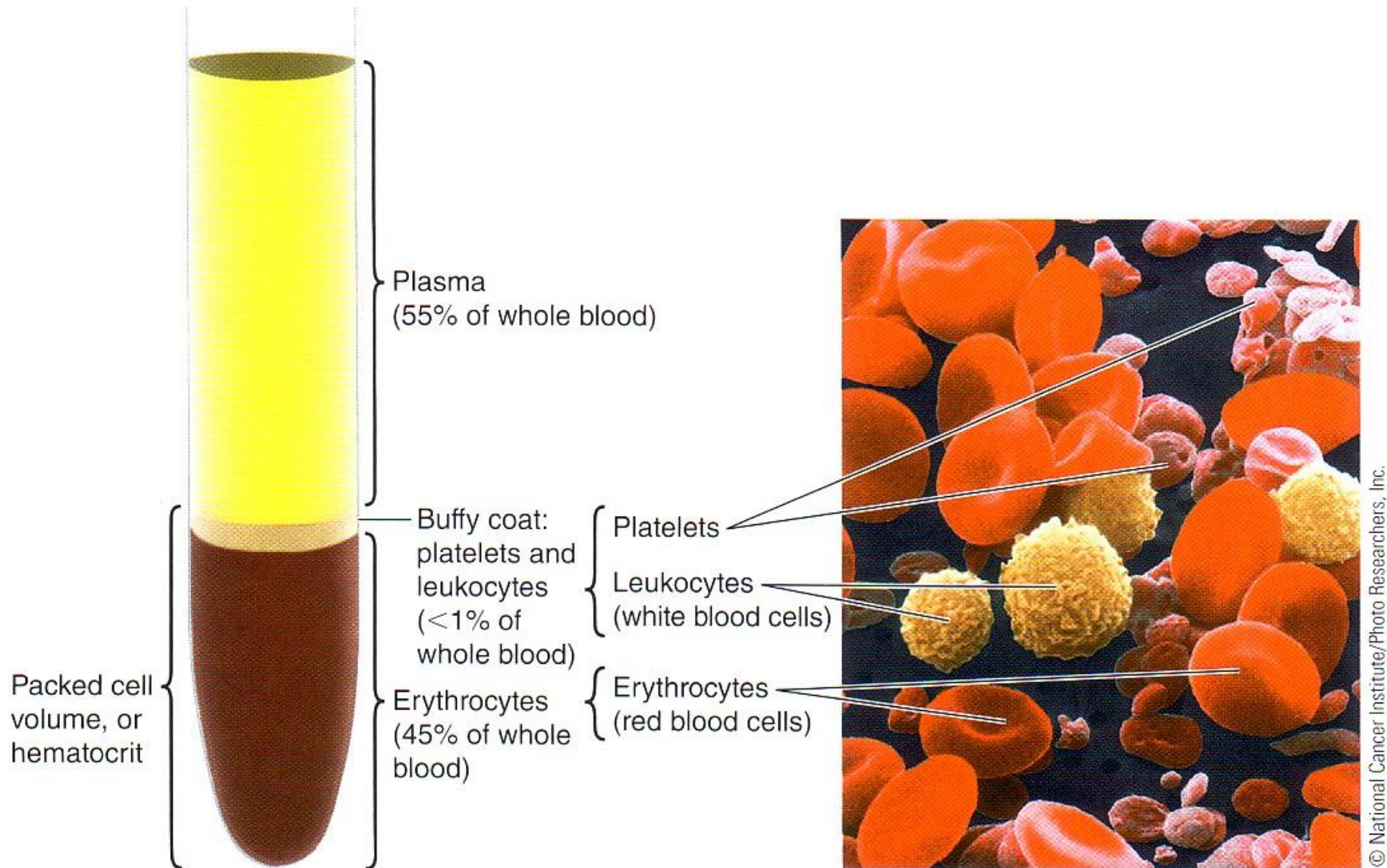
$$X = [21.4] / 0.3 = 71.3$$

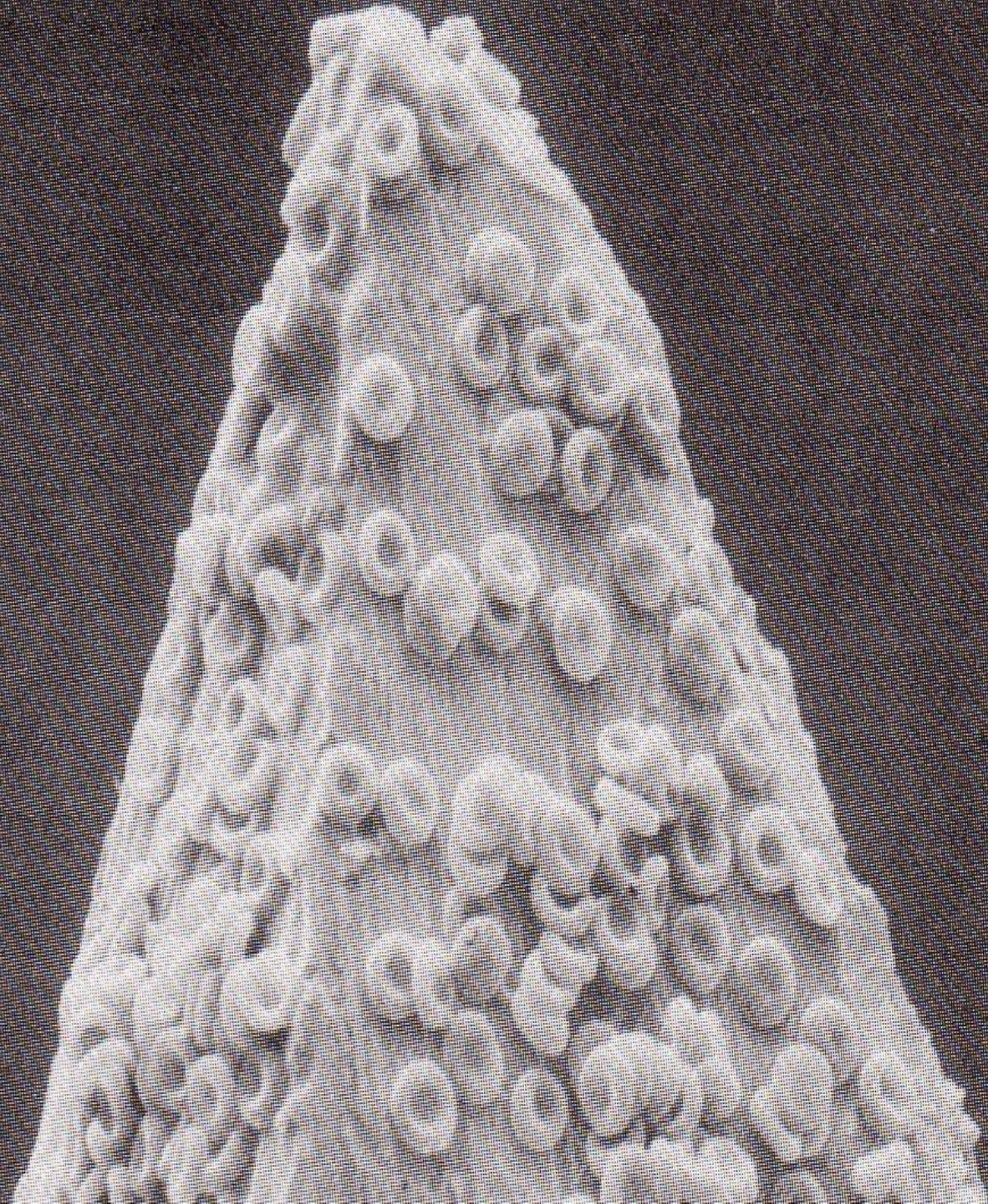
Need this on Exam II for B^- for course!



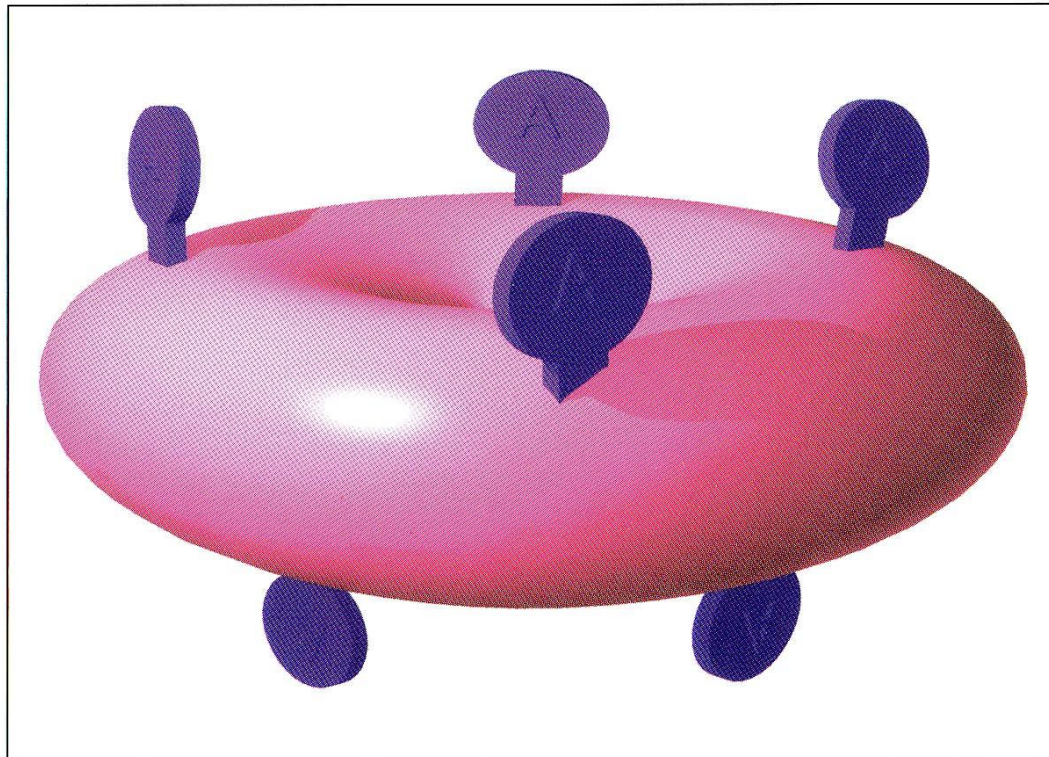
...Fortunately, lecture & lab attendance buffer the grade!

What's in Blood? Plasma & Blood Cells



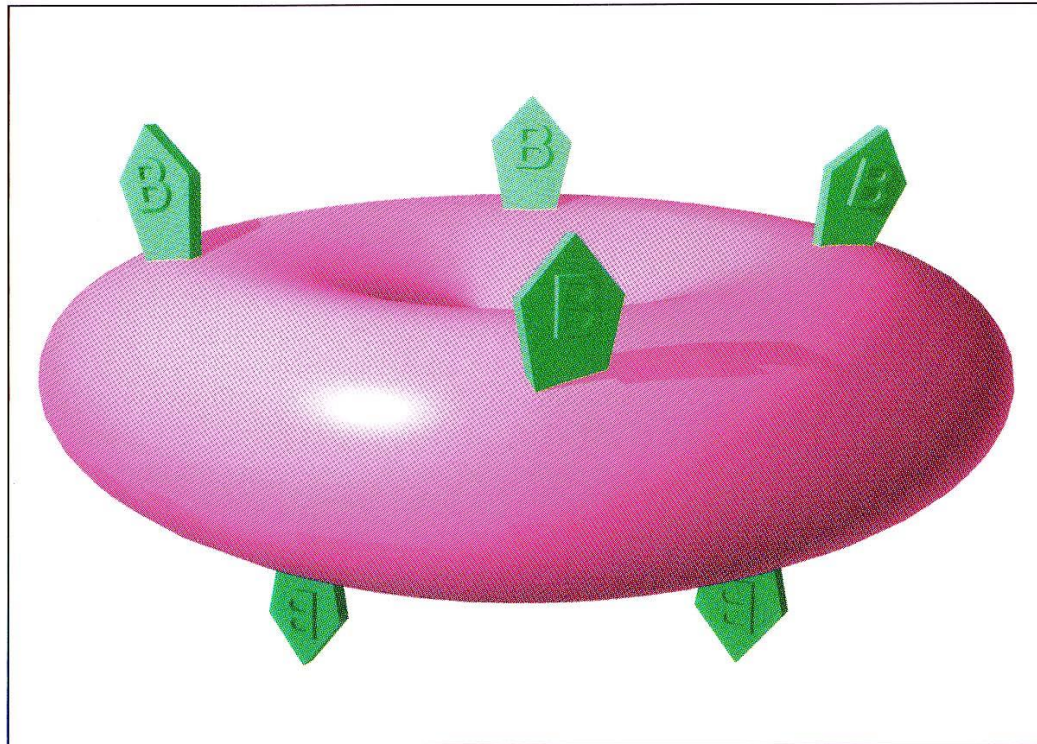


A



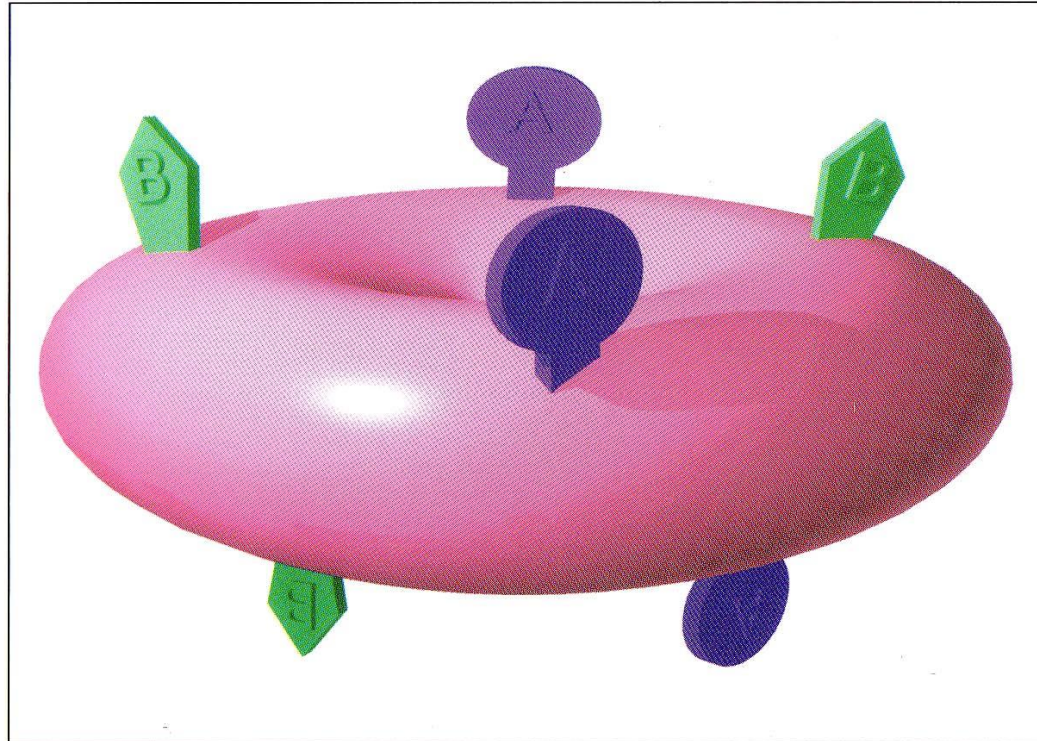
A Antigens
(Agglutinogens)

B

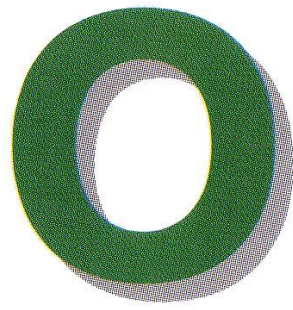


B Antigens
(Agglutinogens)

AB



A & B Antigens
(Agglutinogens)

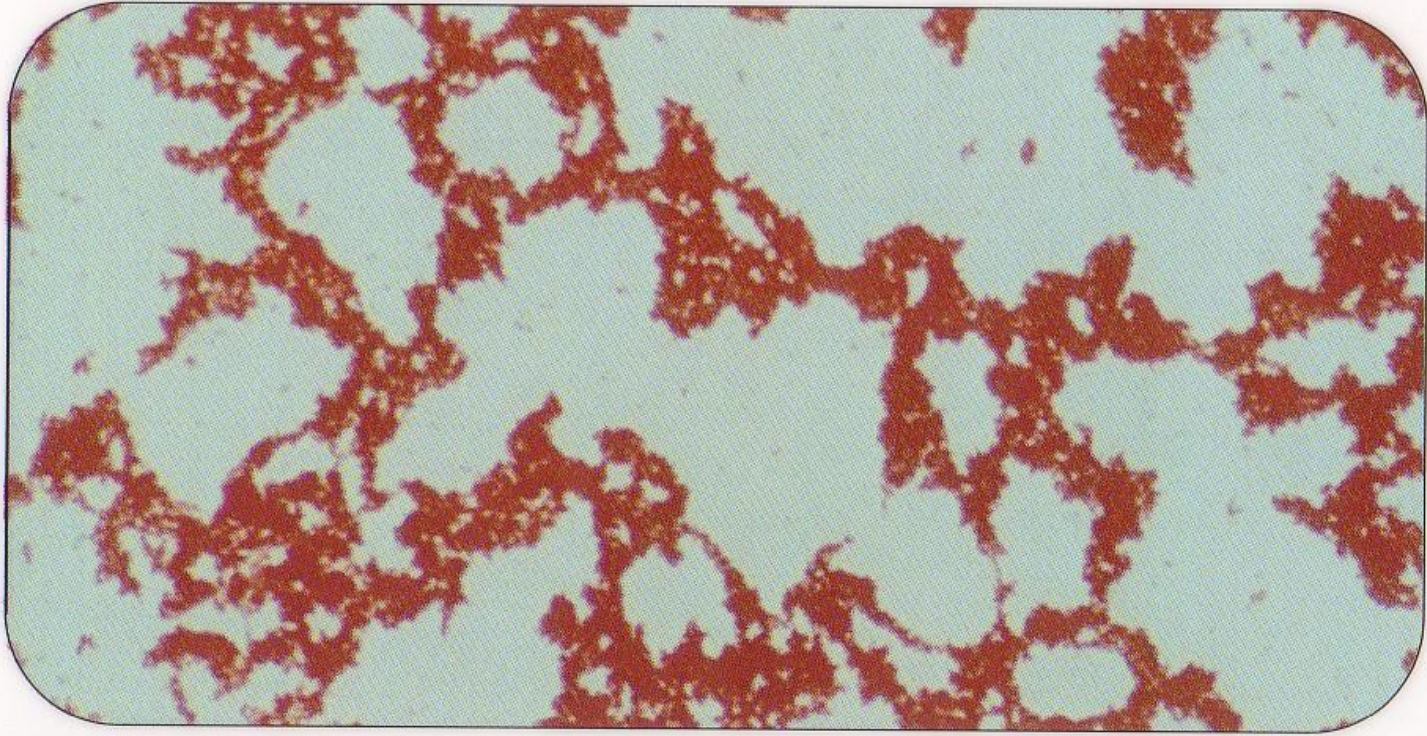


No Antigens
(Agglutinogens)

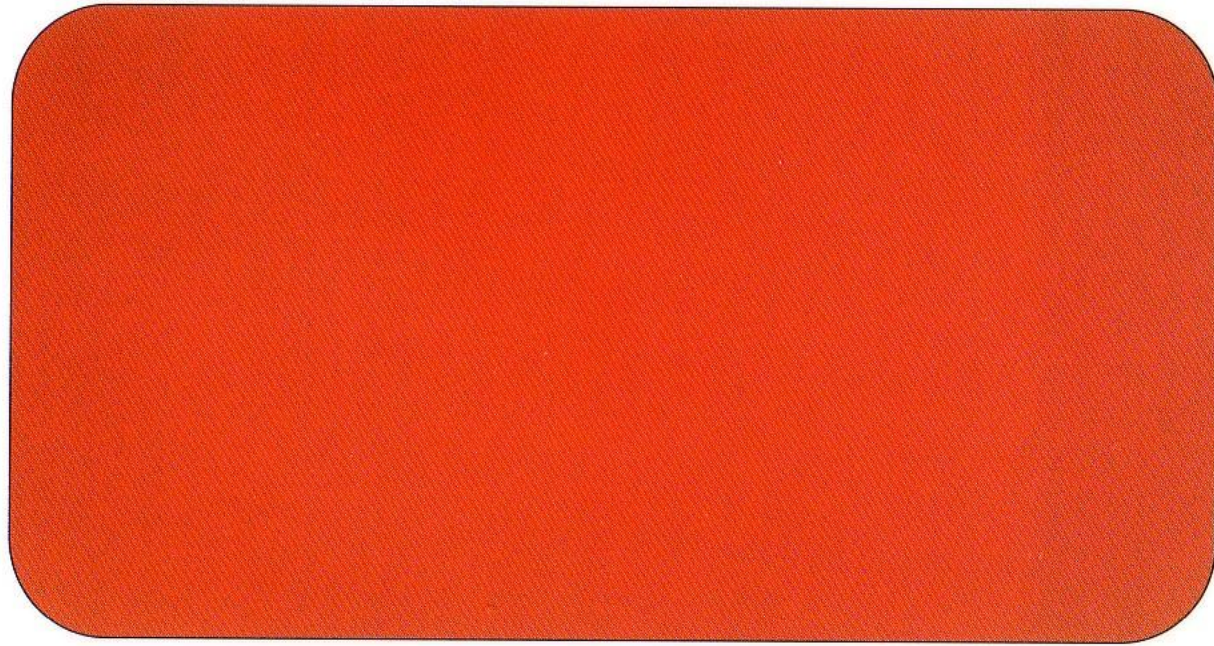


A Antibodies

(Agglutinins)

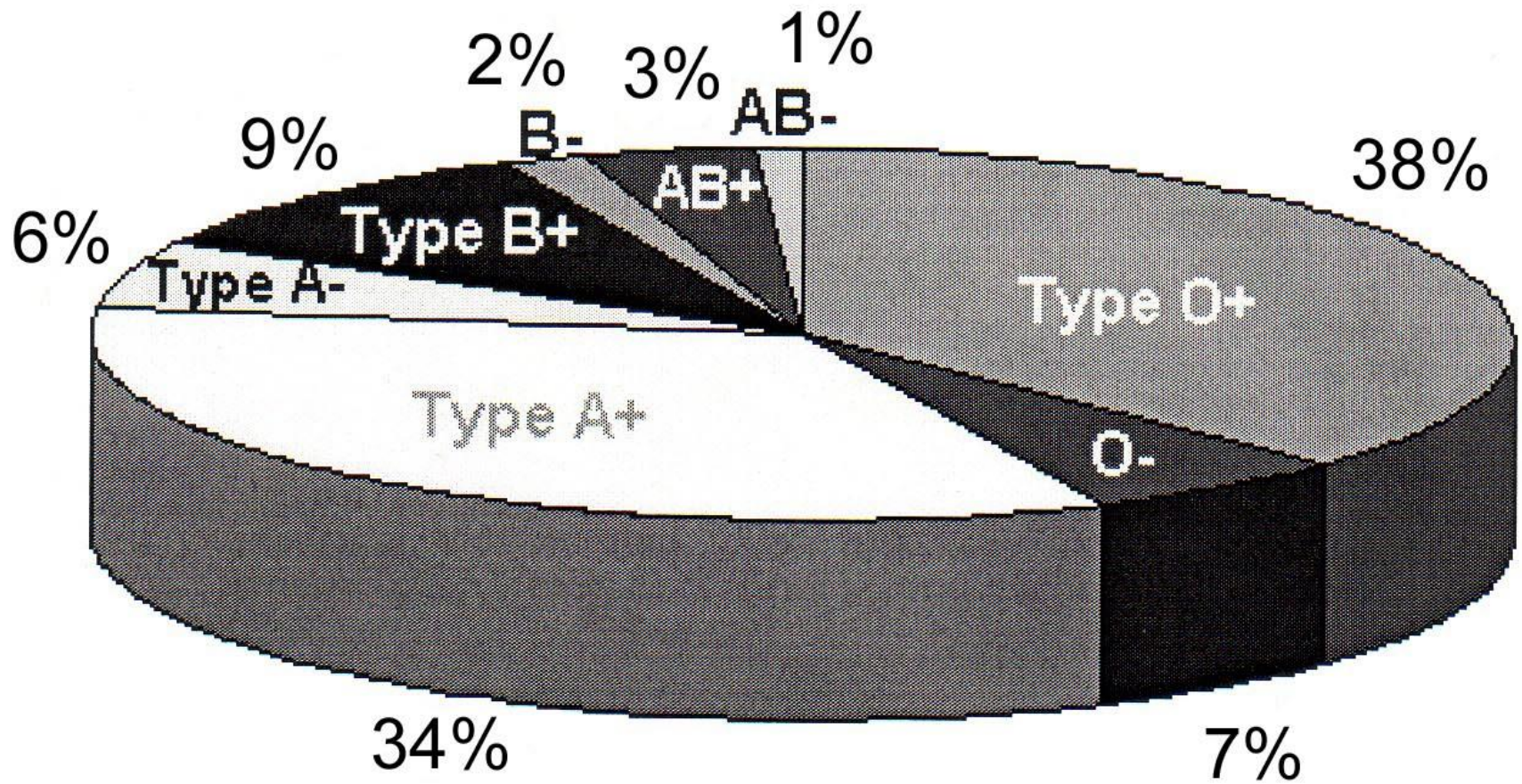


Clumping with
anti-A serum



No Clumping with
anti-A serum

Blood Type Distribution, General Population



Erythroblastosis Fetalis?

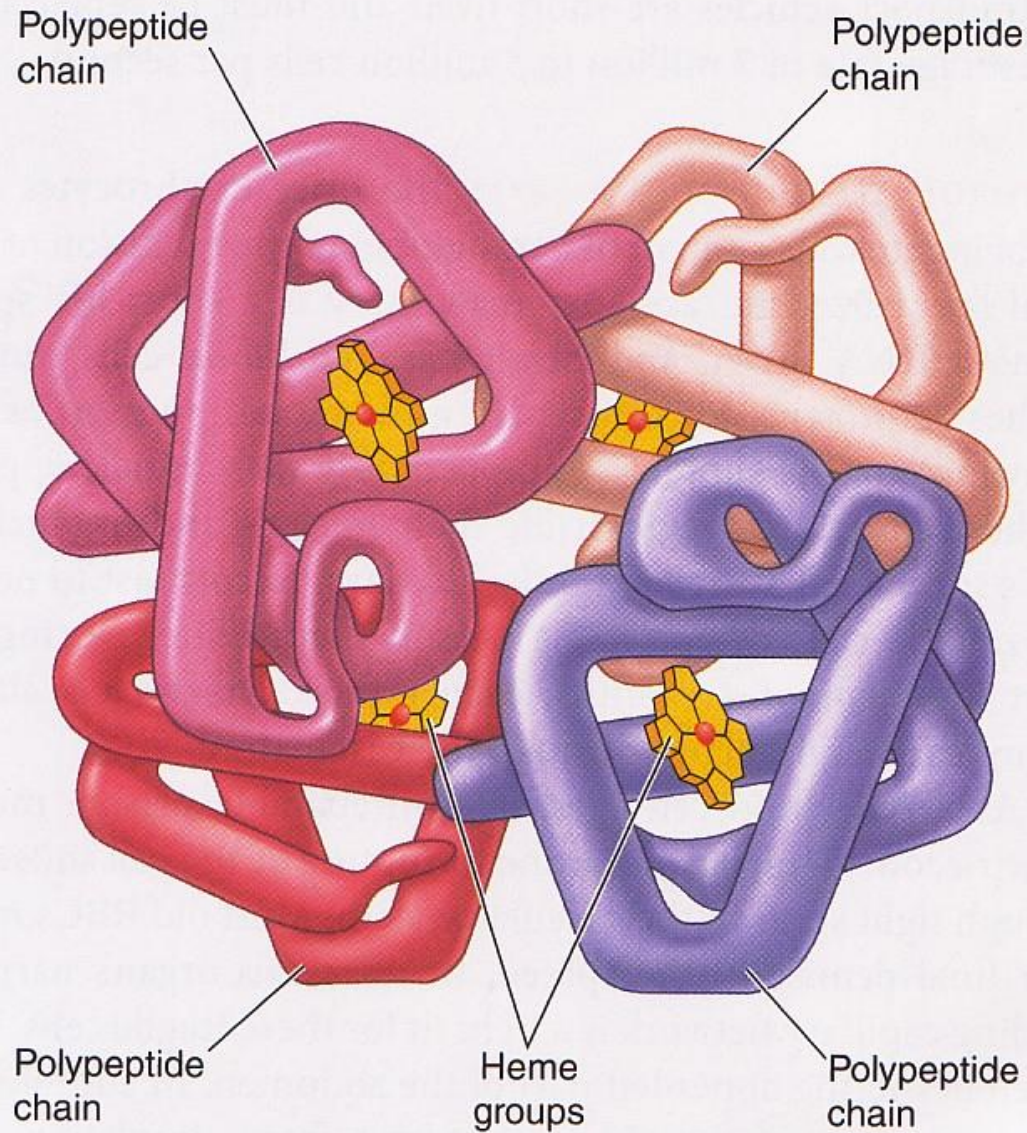
**eg, Rh- mom
Rh+ baby**

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



2000 x GMBH,
Nat Geog 1986
Jun p 714

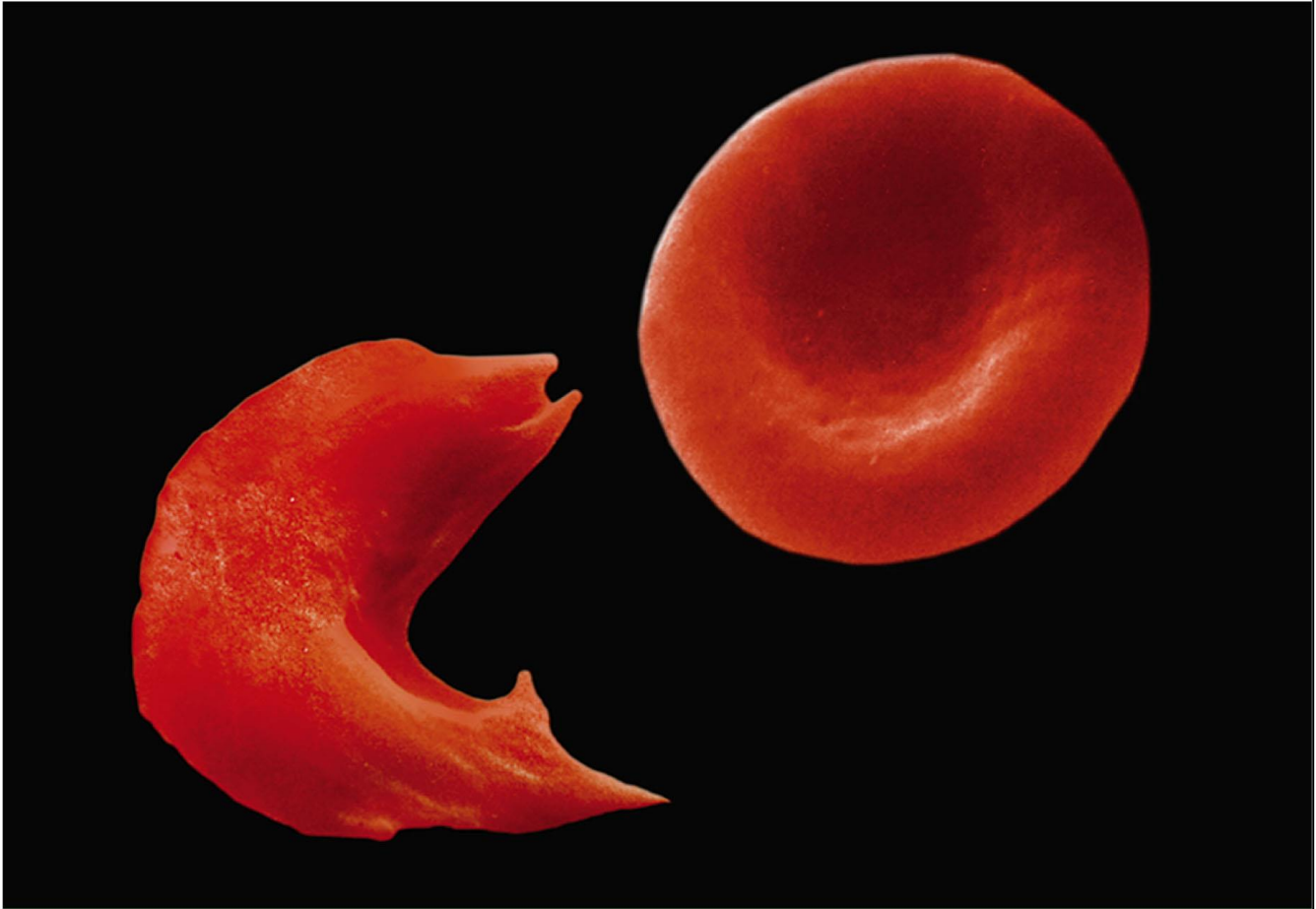
Hemoglobin Structure



Sickle-shaped blood cells

Normal red blood cells

© Dr. Stanley Flegler/Visuals Unlimited



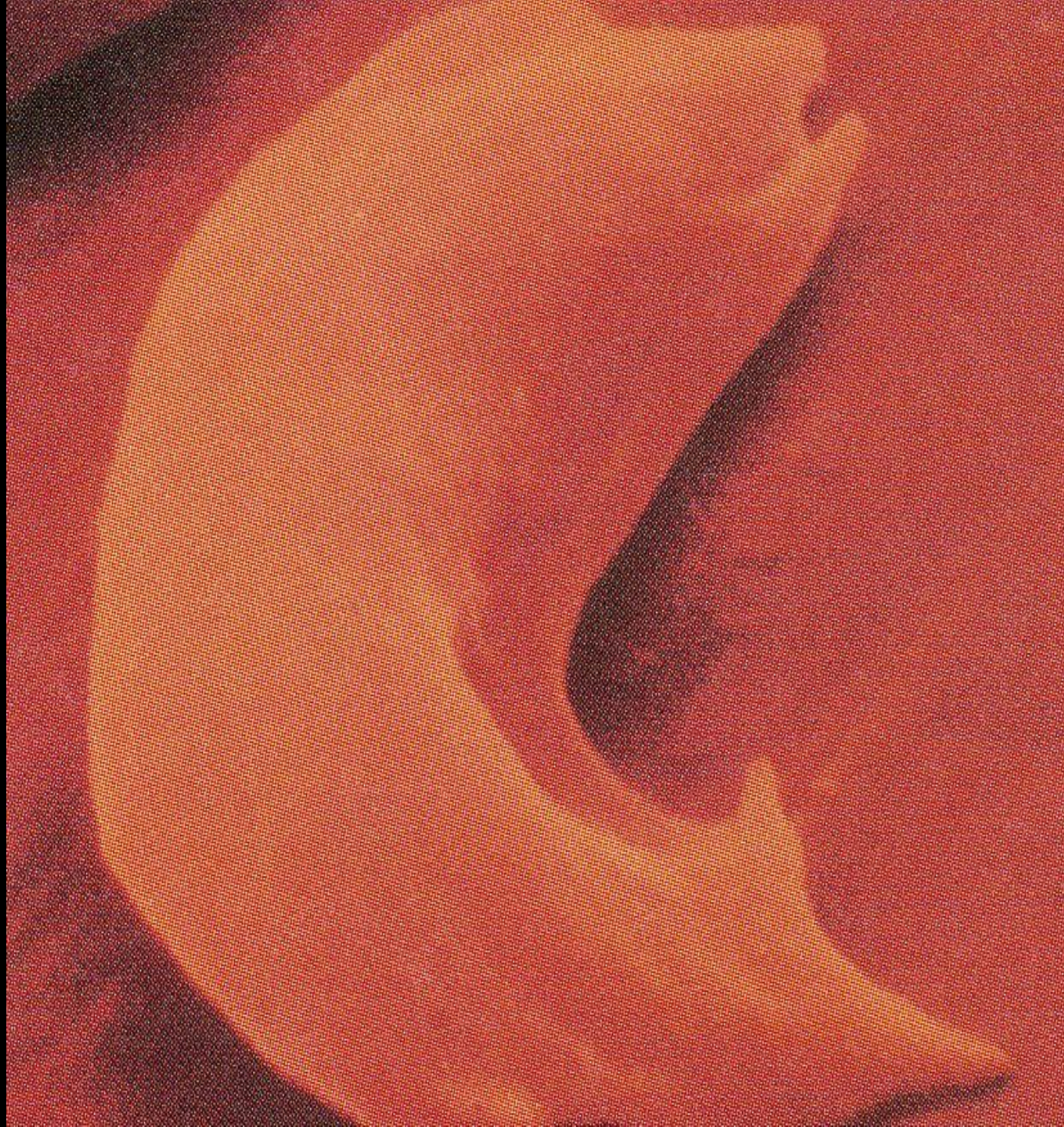
What a difference one amino acid can make!

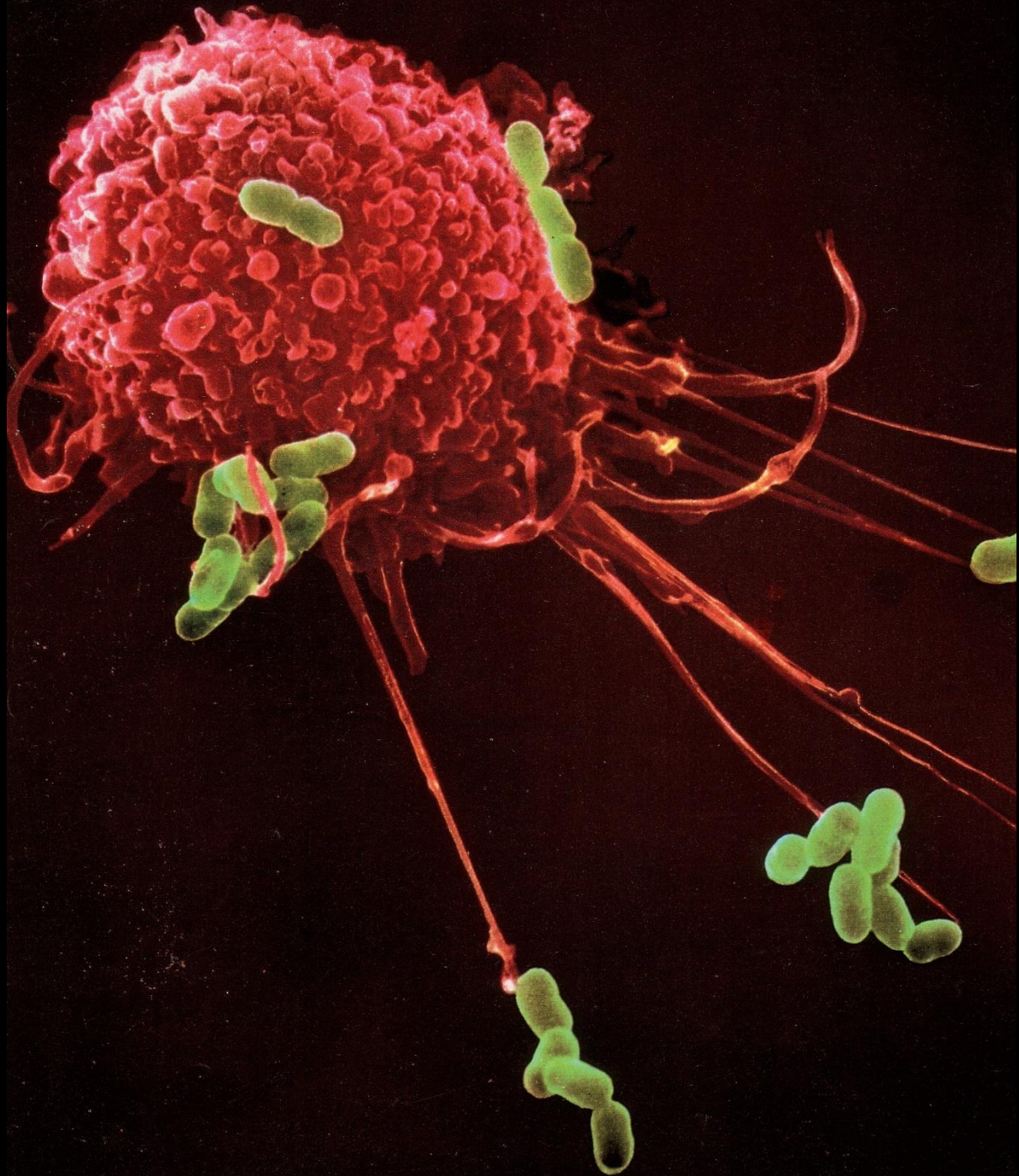
Amino acid sequence of normal hemoglobin:



Amino acid sequence of sickle-cell hemoglobin:

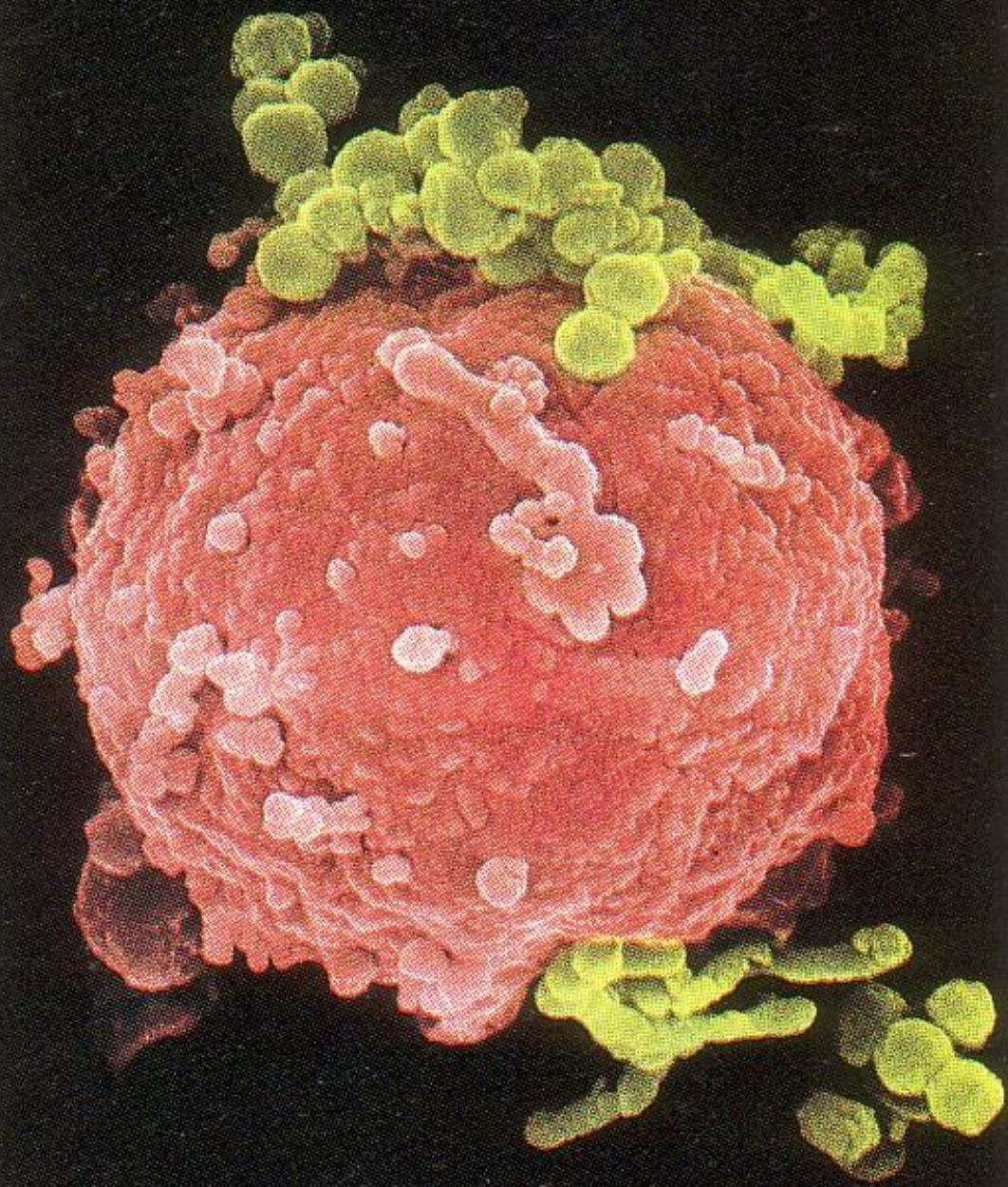


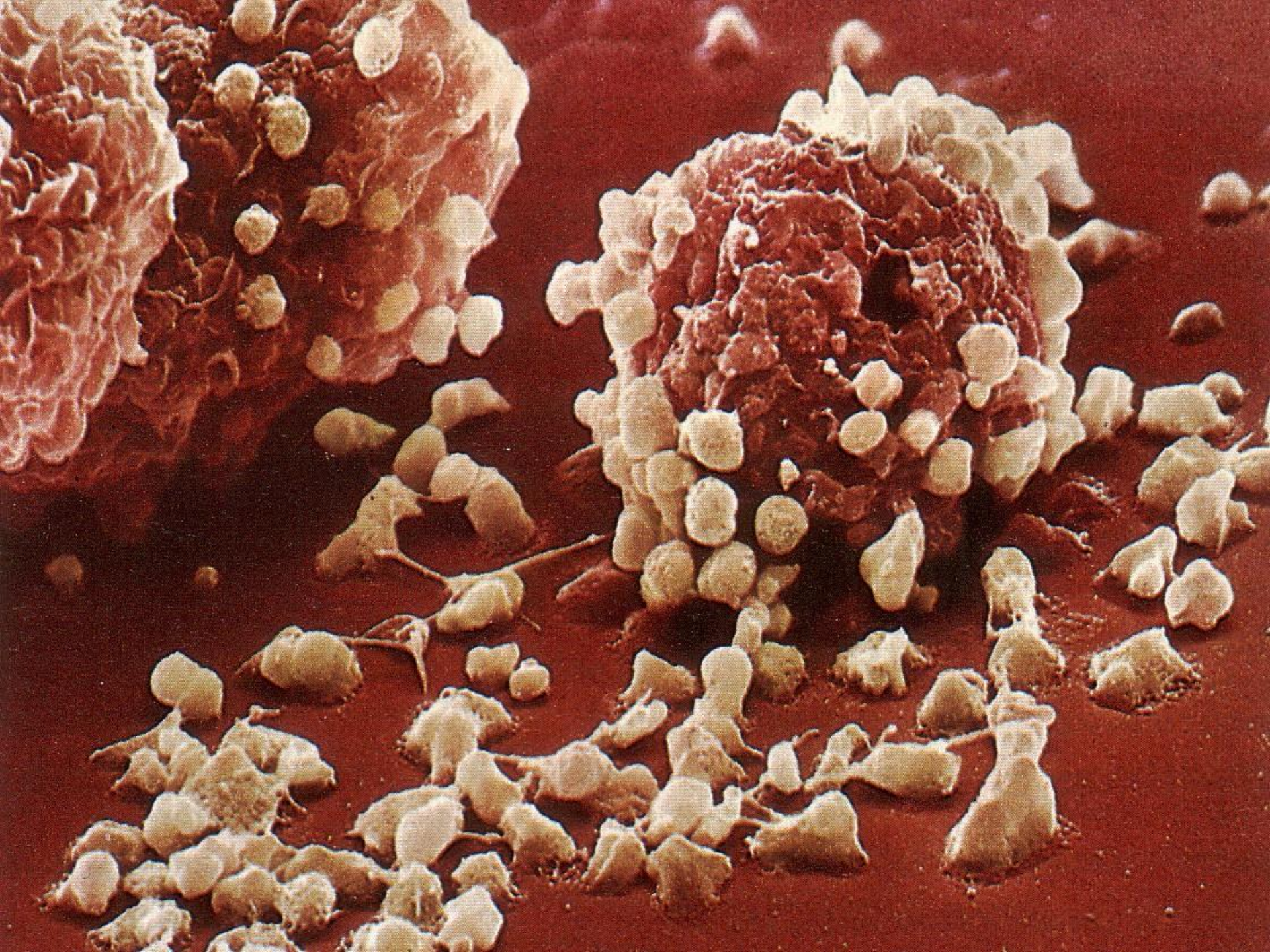


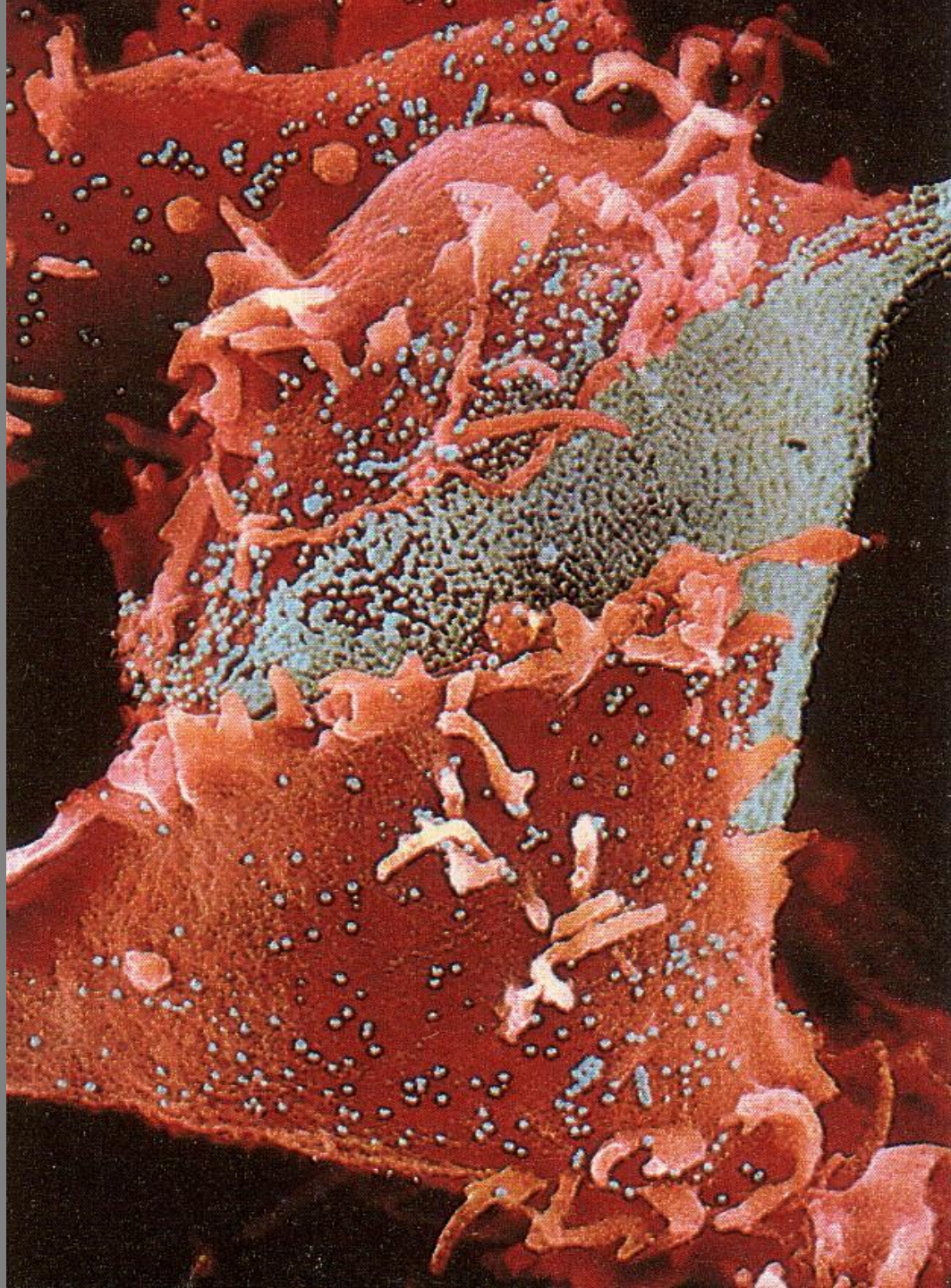




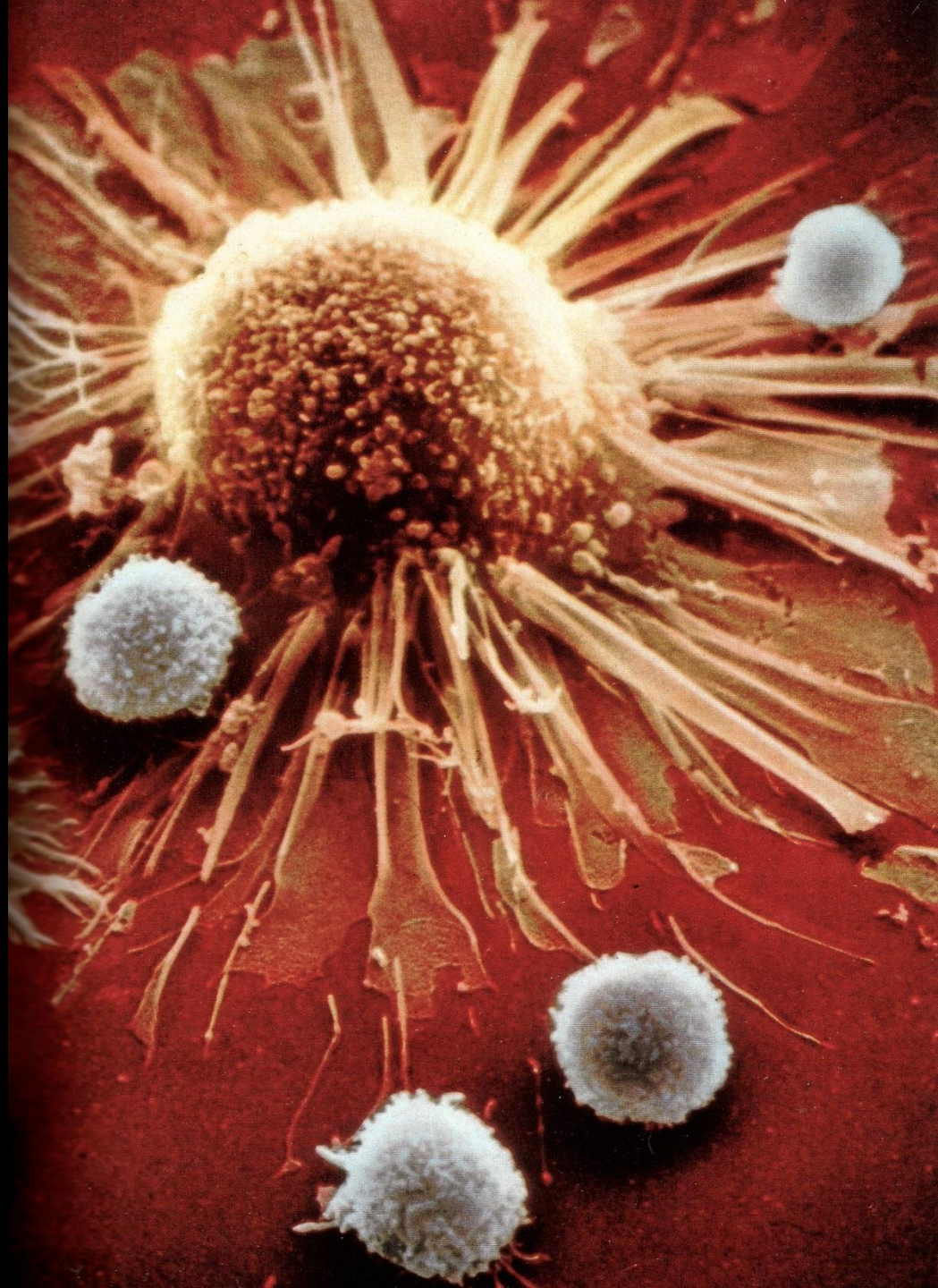
3000 x GMBH
Nat Geog 1986



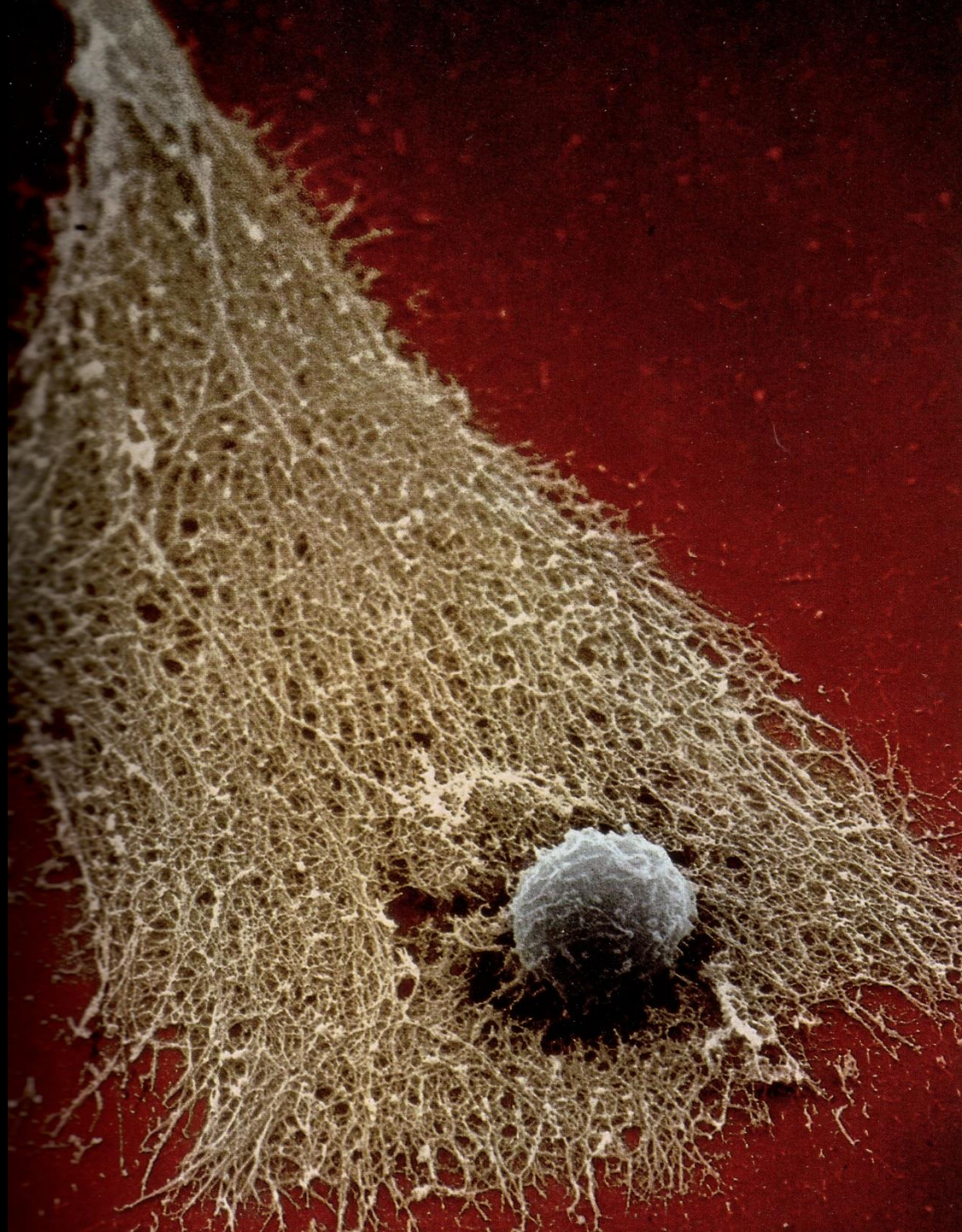


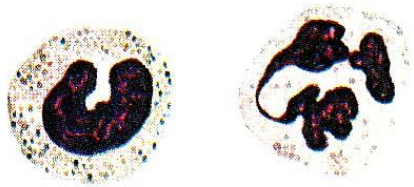
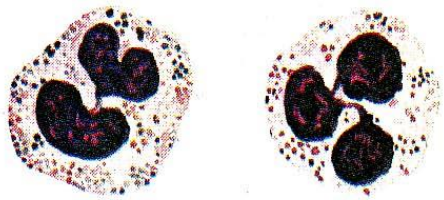




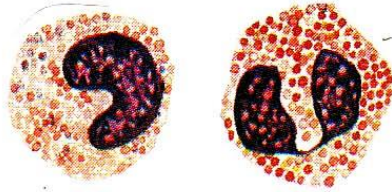
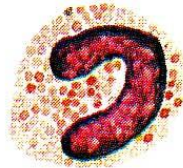
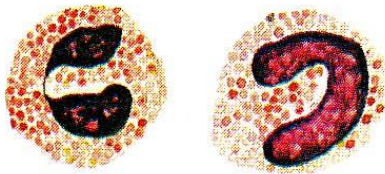




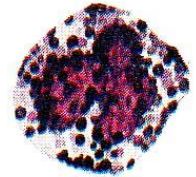
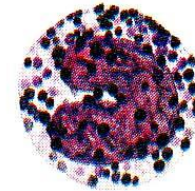
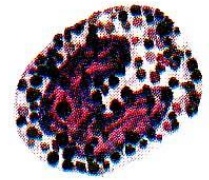
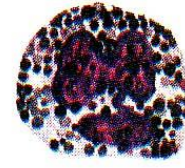




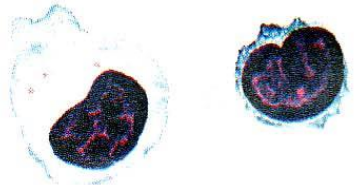
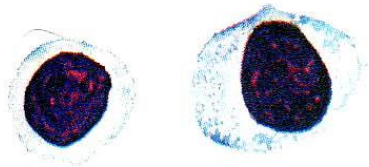
NEUTROPHILS



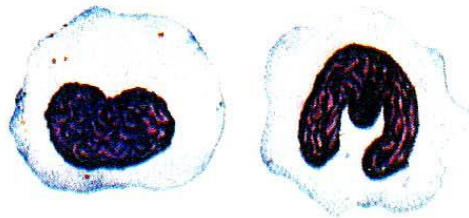
EOSINOPHILS



BASOPHILS



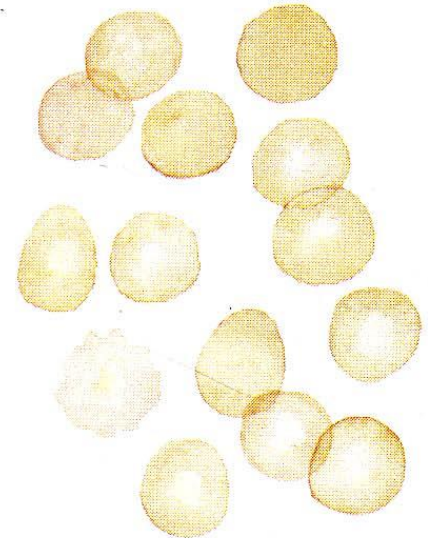
LYMPHOCYTES



MONOCYTES



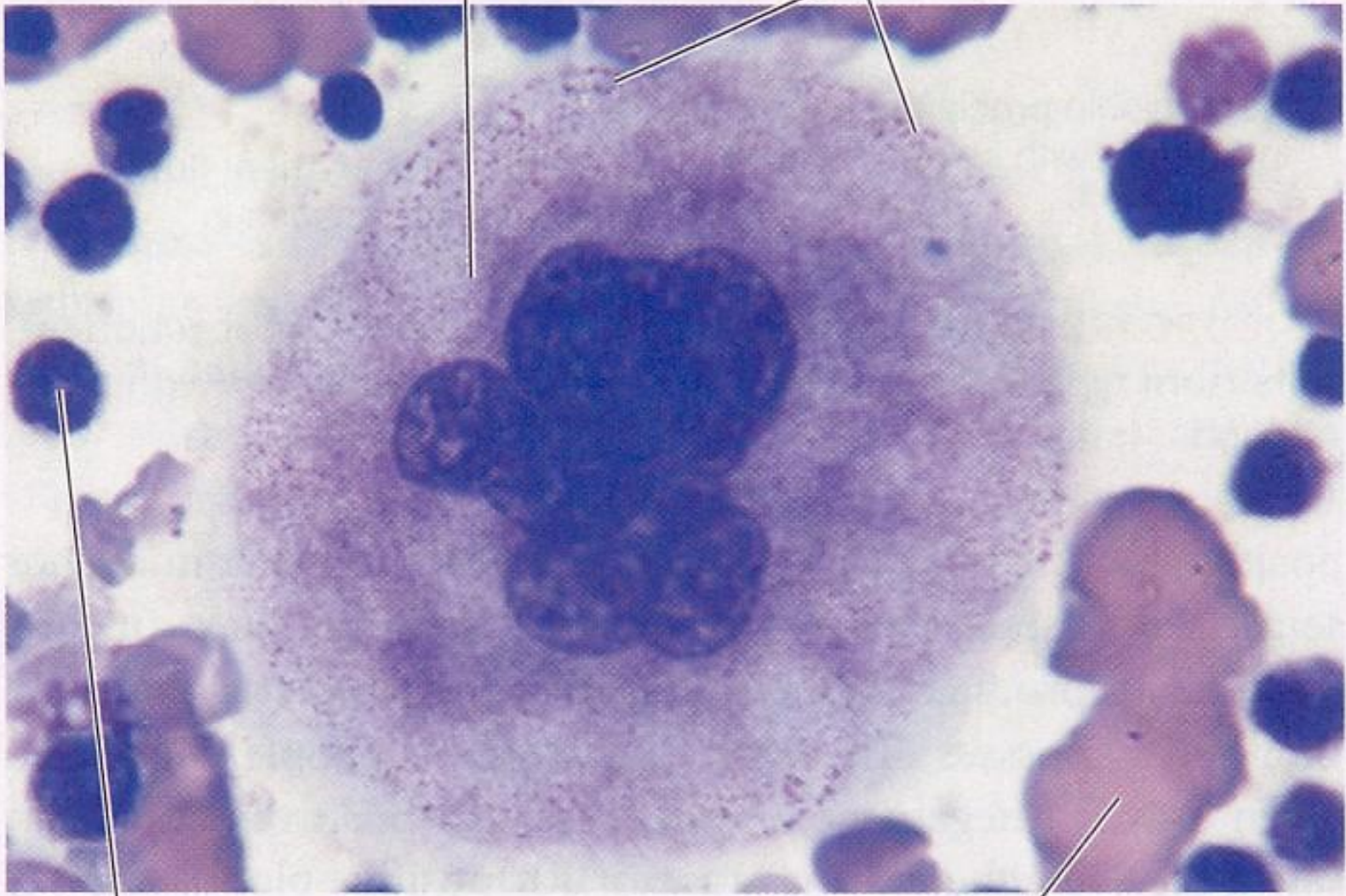
PLATELETS



ERYTHROCYTES

Megakaryocyte

Clusters of platelets
about to shed off

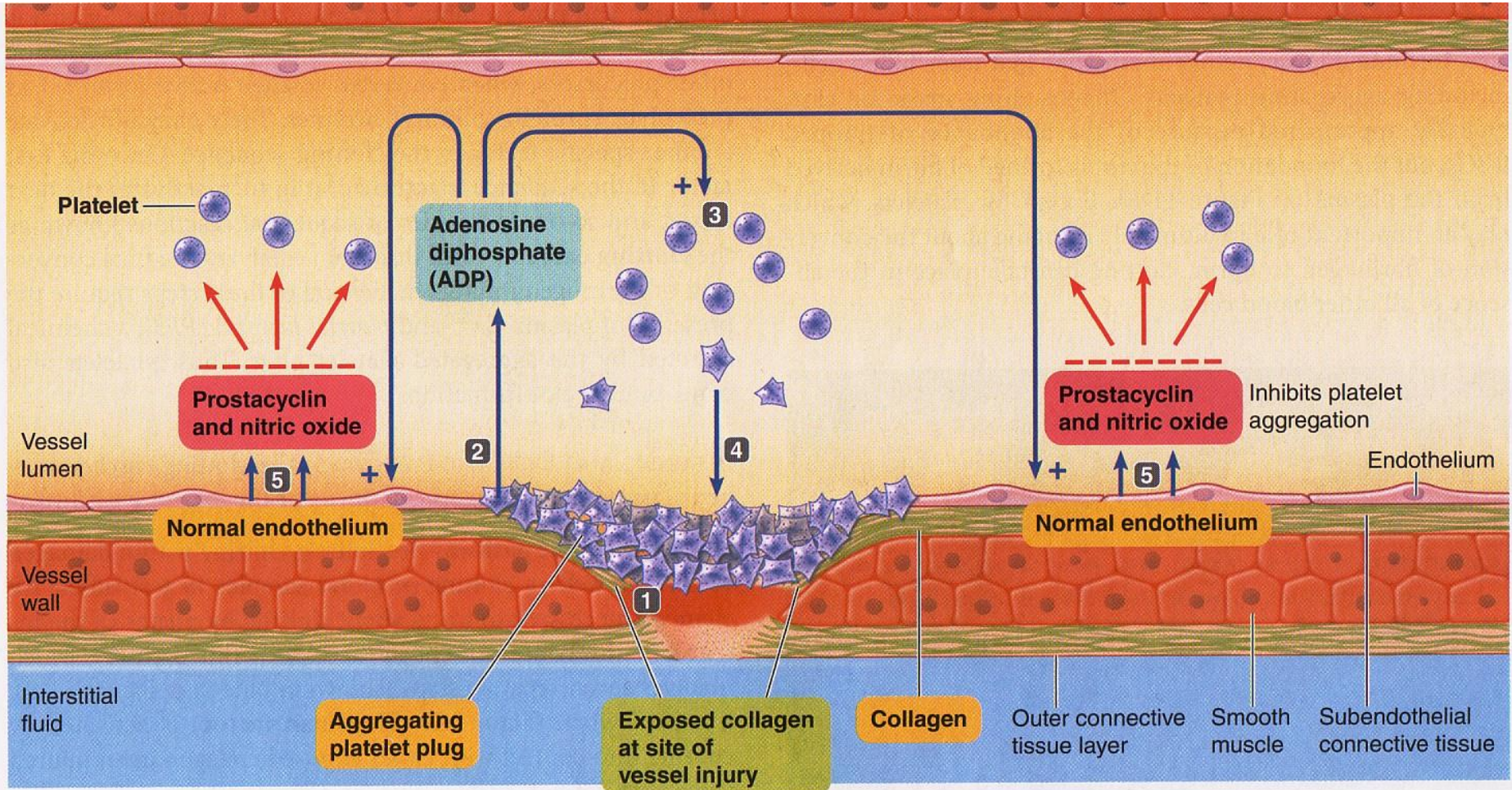


Developing
leukocyte

Cluster of developing
erythrocytes

Carolina Biological/Visuals Unlimited

Formation of the Platelet Plug



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

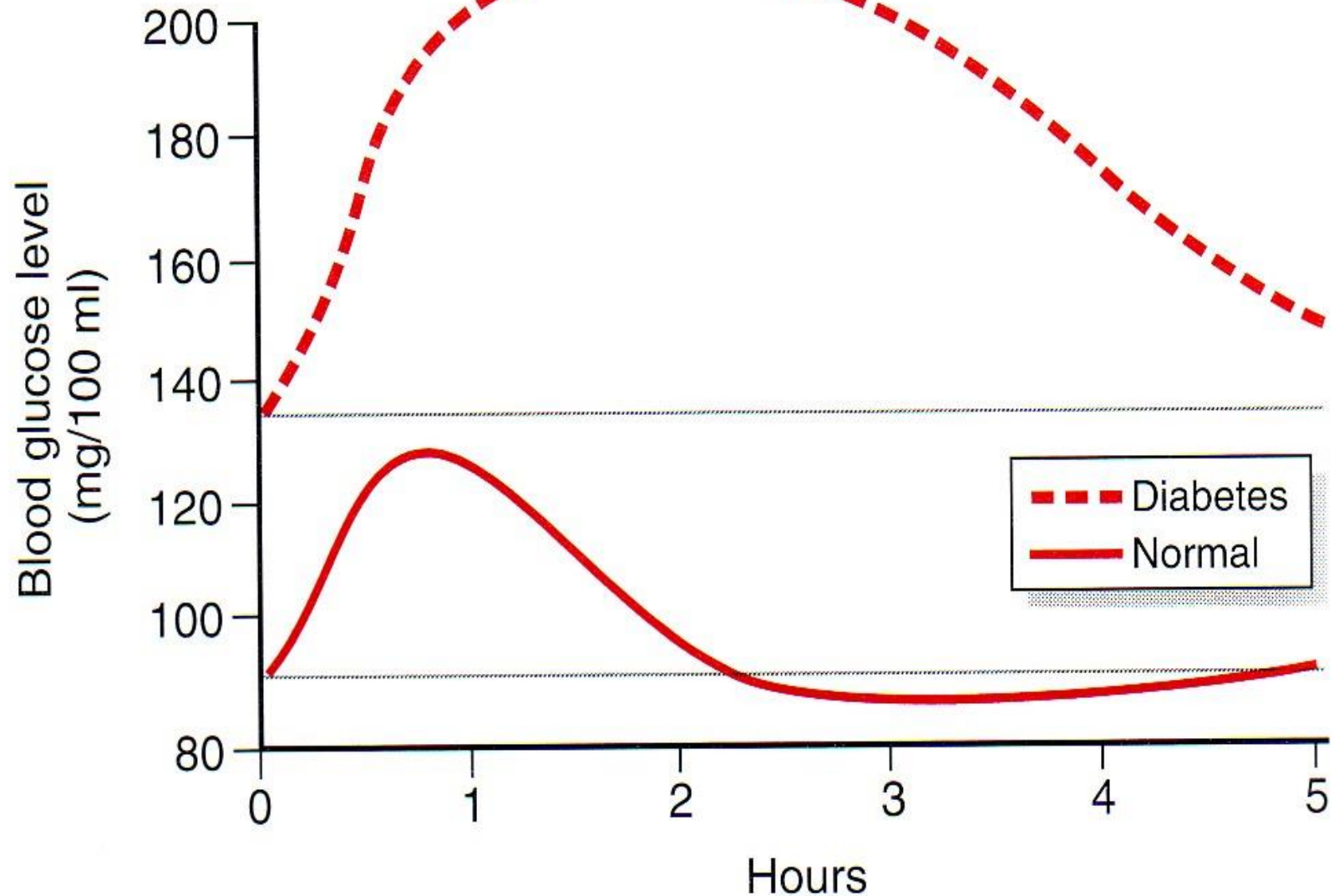
2 Activated platelets release ADP.

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: ≥ 126 mg/dL

Proinsulin with C-Connecting Peptide

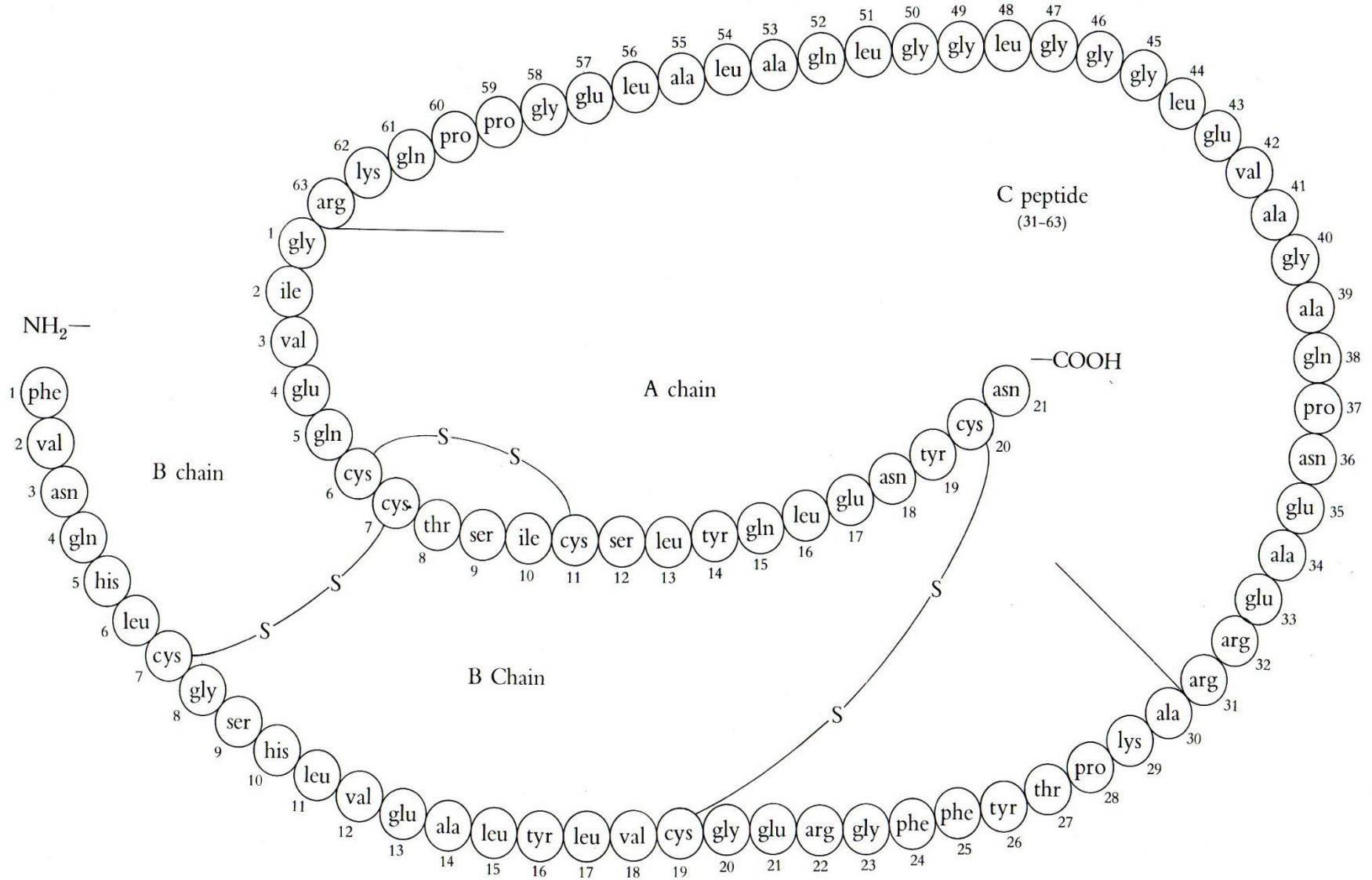


FIG. 10-4. Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.

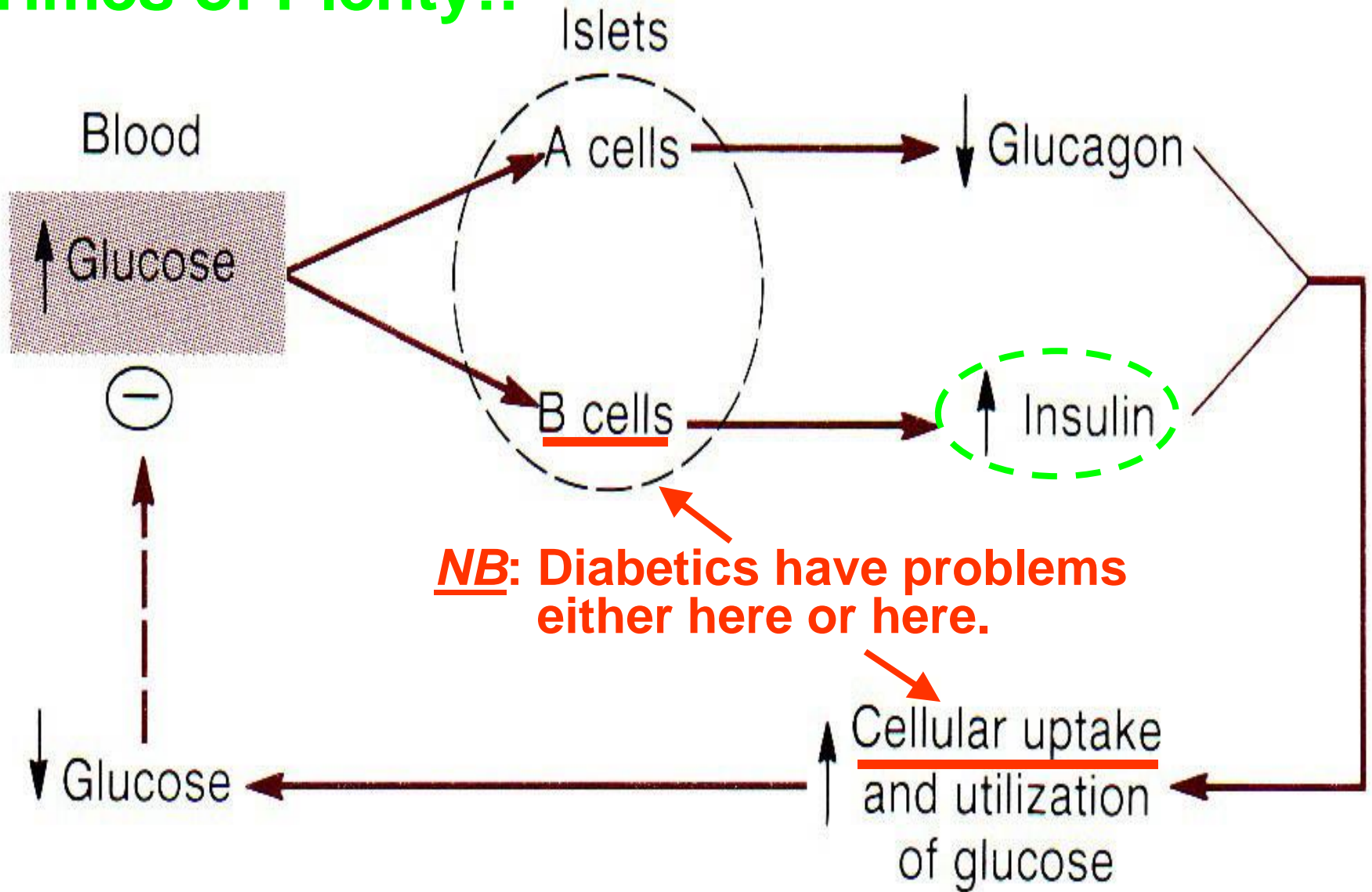
TABLE
4-7

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

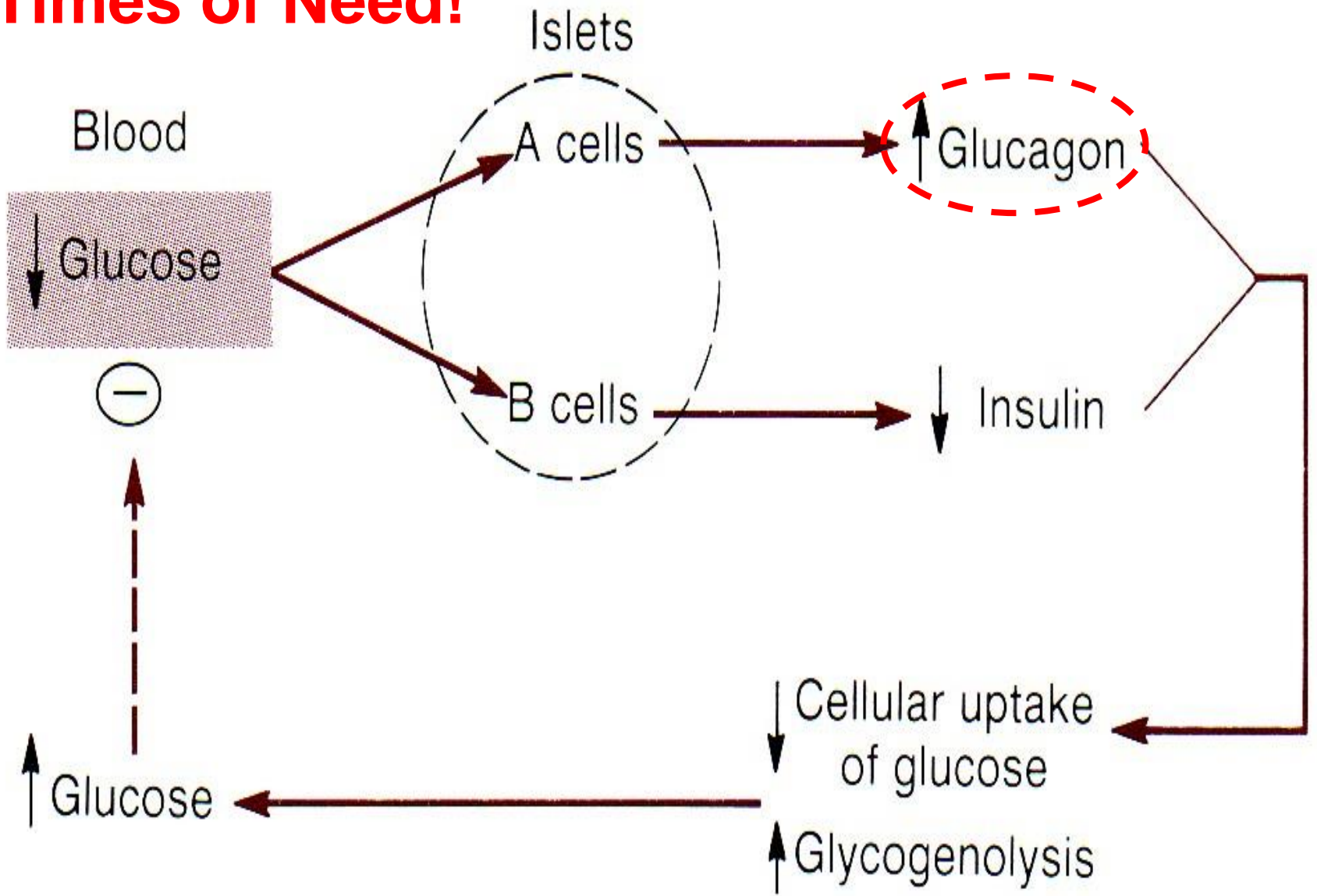
Times of Plenty!!



NB: Diabetics have problems either here or here.

Store!

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!

