BI 121 Lecture 9

We survived the exam! Happy Halloween!!
Remember nutrient ρ & have safe fun!

I. ***Announcements*** **No lab today! Break for exam week! Next R Blood Chemistry. Thanks sincerely for helping us optimize safety by reading ≥ 2x Lab 5, LM pp 5-1 to 5-6.**

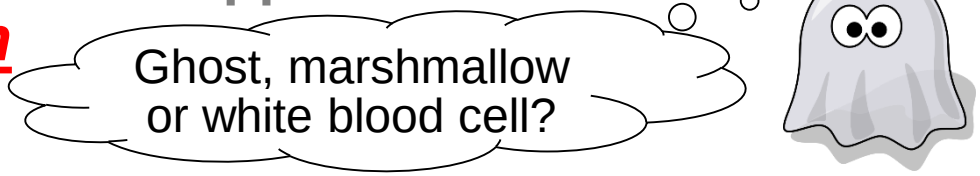
II. ***Blood Form & Function*** **LS ch 11, DC Module 5 pp 35-9**

- **A. Formed vs Nonformed/cells vs plasma LS fig + tab 11-1**
  Cell origin - bone marrow. What's in plasma? LS p 297
- **B. Red blood cells/erythrocytes: O_2 carrying LS p 299**
  Normal flexible vs fragile sickle cell LS p 301
- **C. White blood cells/leukocytes: defense/immunity**
  differential + general functions LS pp 298, 309-12
- **D. Platelets/thrombocytes: clotting LS pp 304-6 fig 11-6+7**

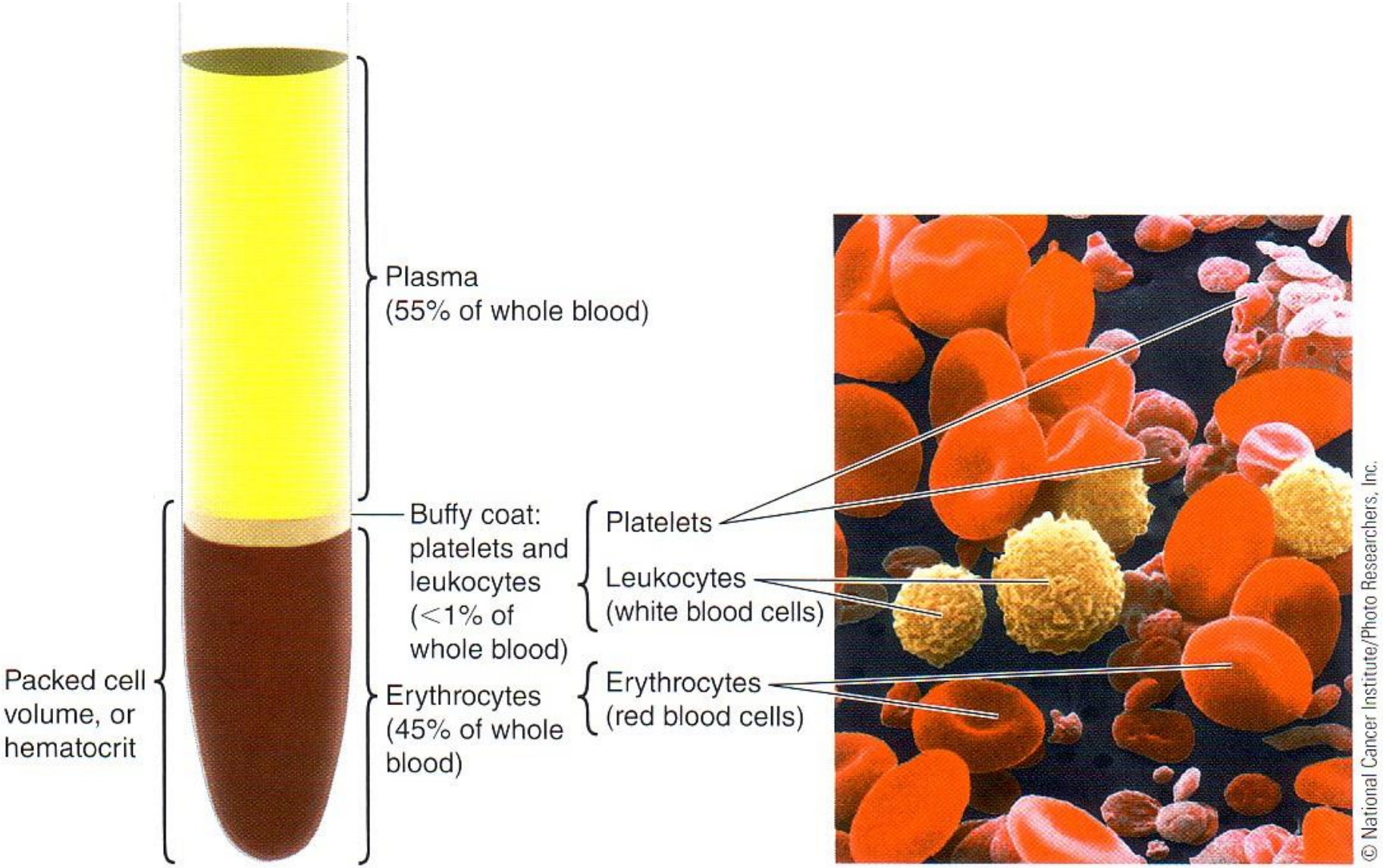
III. ***Blood Chemistry Lab: Basics*** **LM + LS ch 11 & 17**

- **A. What's blood typing? *ABo* System LS pp 302- 4**
  Rhesus factor? Erythroblastosis fetalis? LS p 303-4
- **B. What's blood glucose? Clinically healthy range?**
- **C. Diabetes + Treatment LS ch 17 pp 532-5**

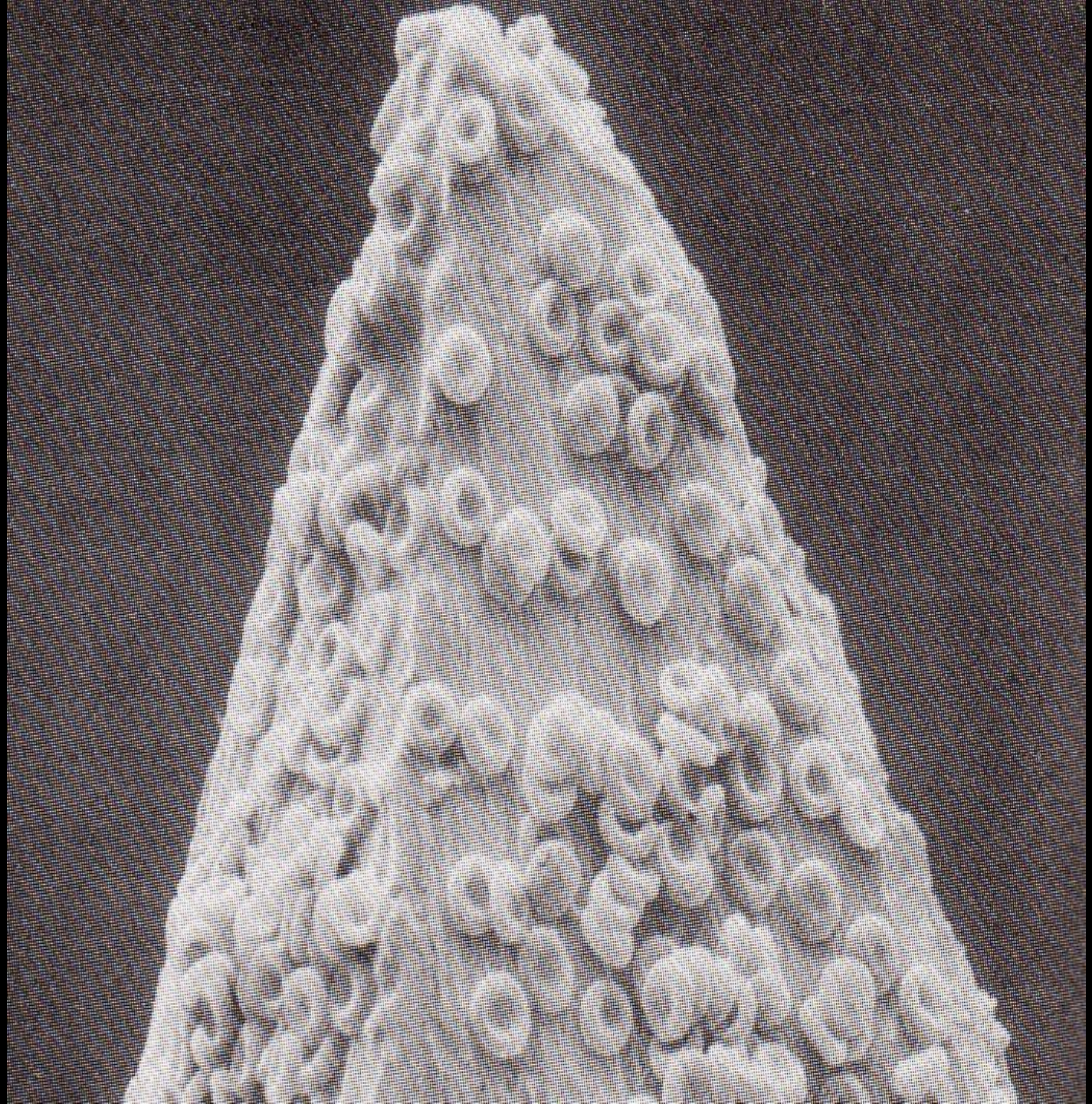
IV. ***Exam Comments & Return***



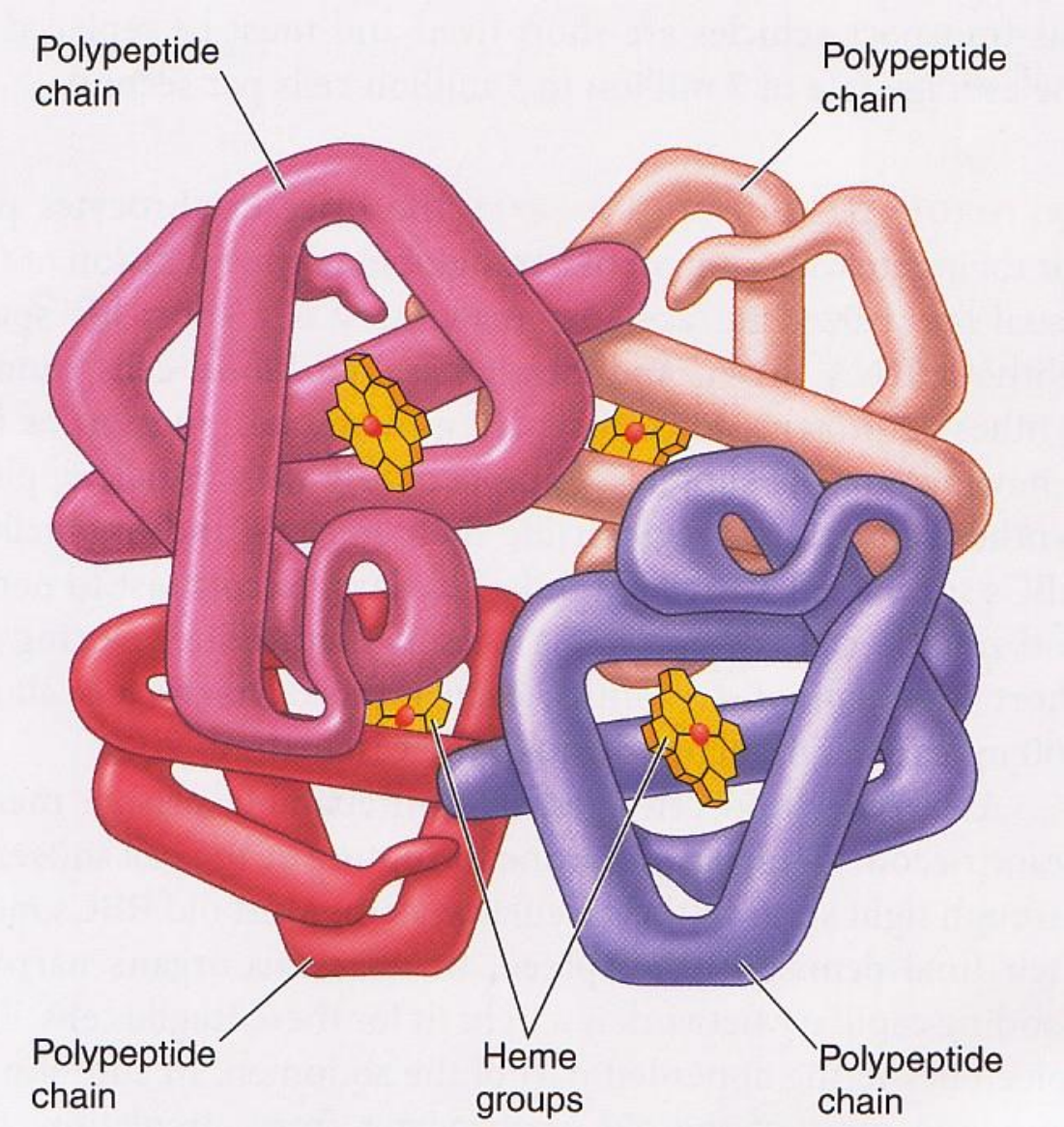
What's in Blood? Plasma & Blood Cells



LS 2012 fig 11-1



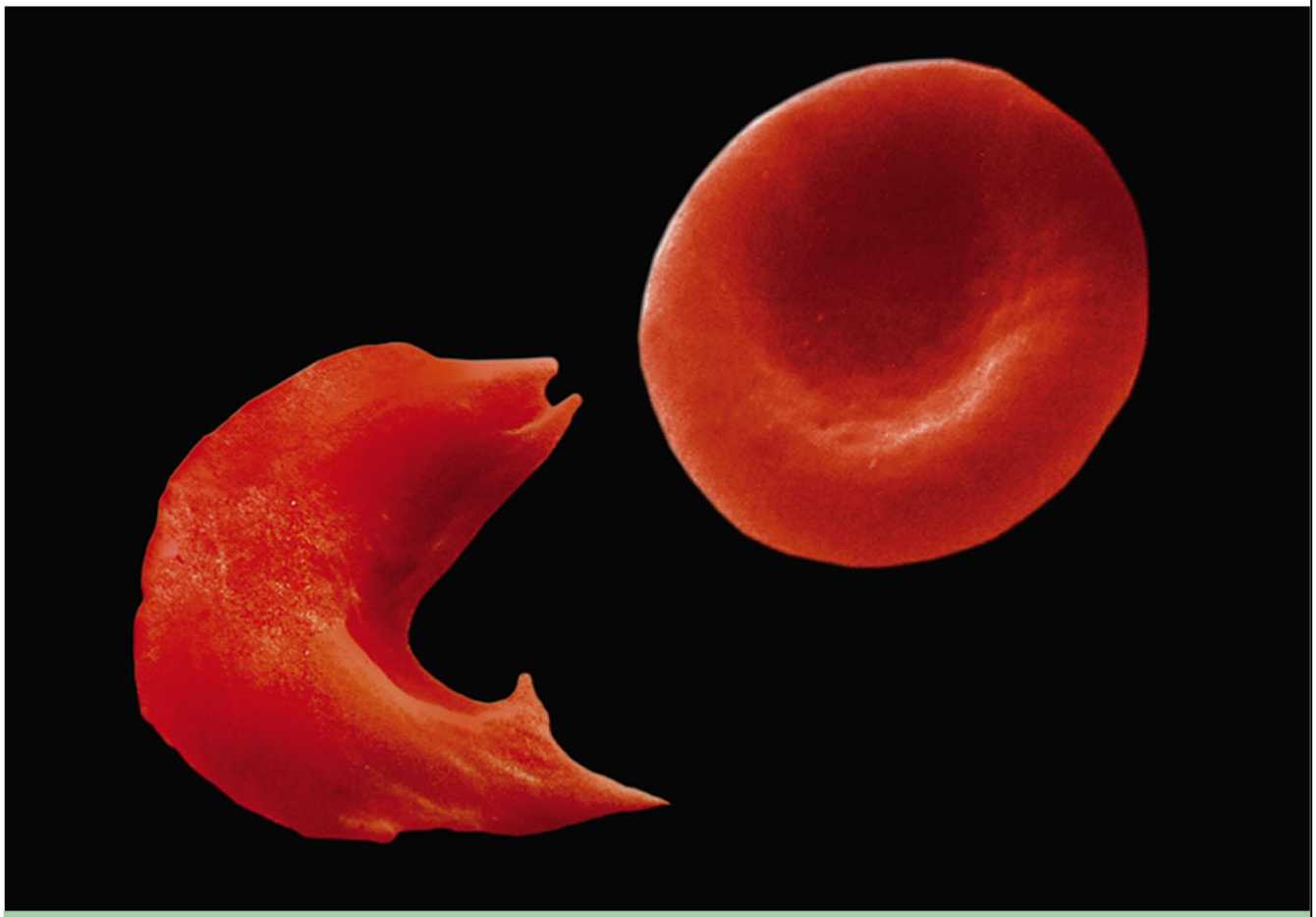
Hemoglobin Structure



L Sherwood 2011 fig 11-2

Sickle-shaped blood cells

Normal red blood cells



What a difference one amino acid can make!

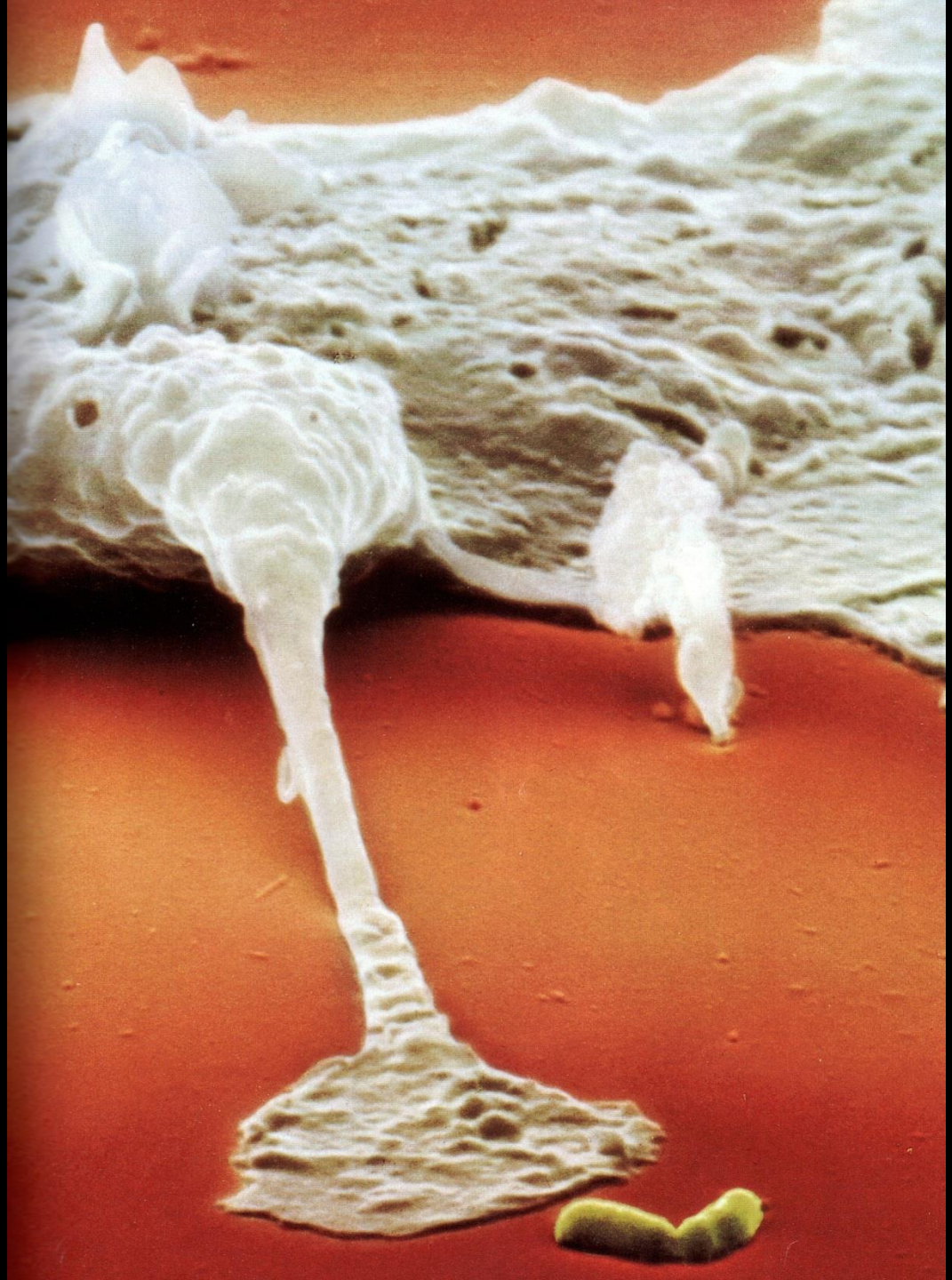
Amino acid sequence of normal hemoglobin:

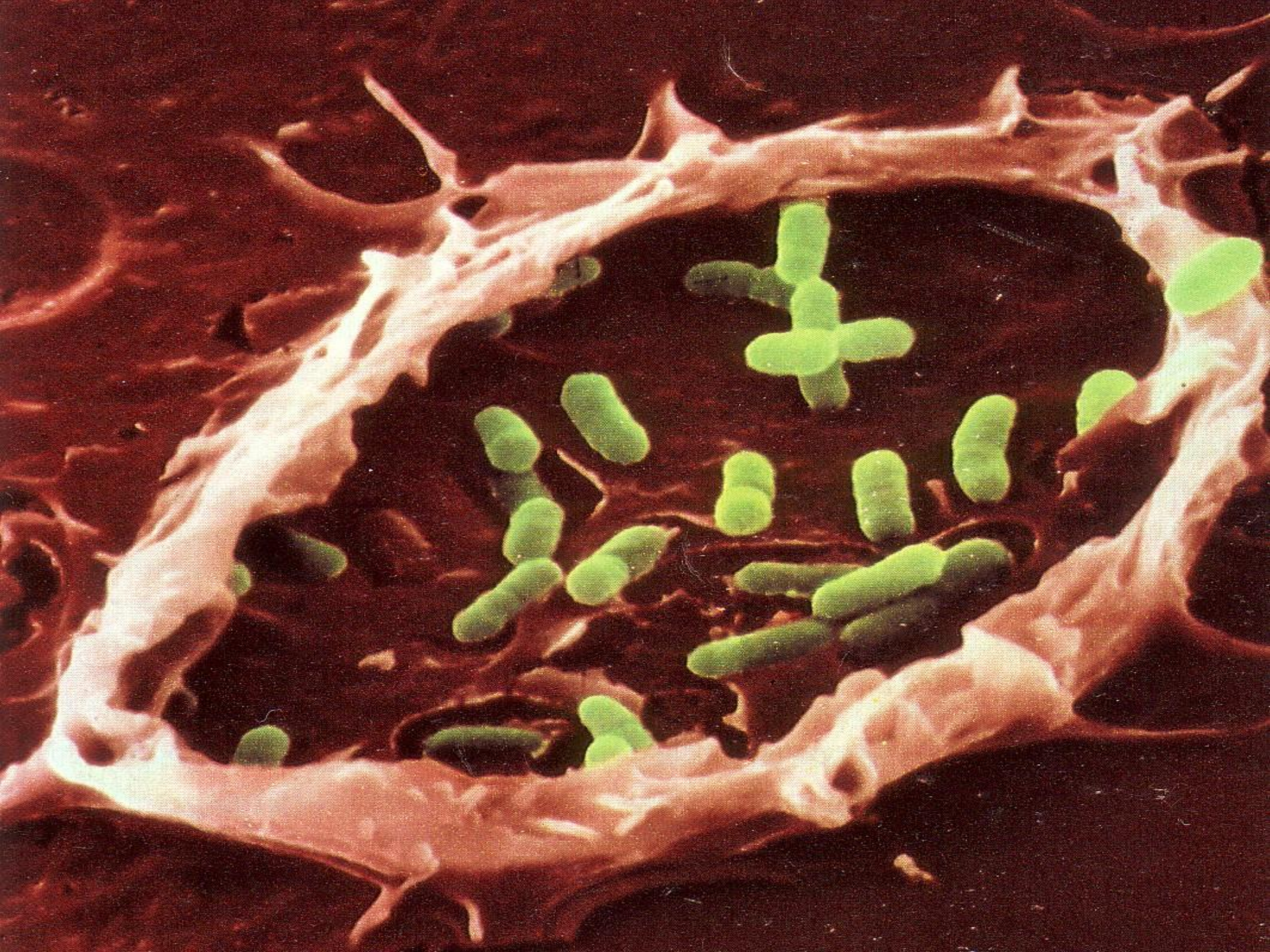
Val—His—Leu—Thr—Pro—Glu—Glu

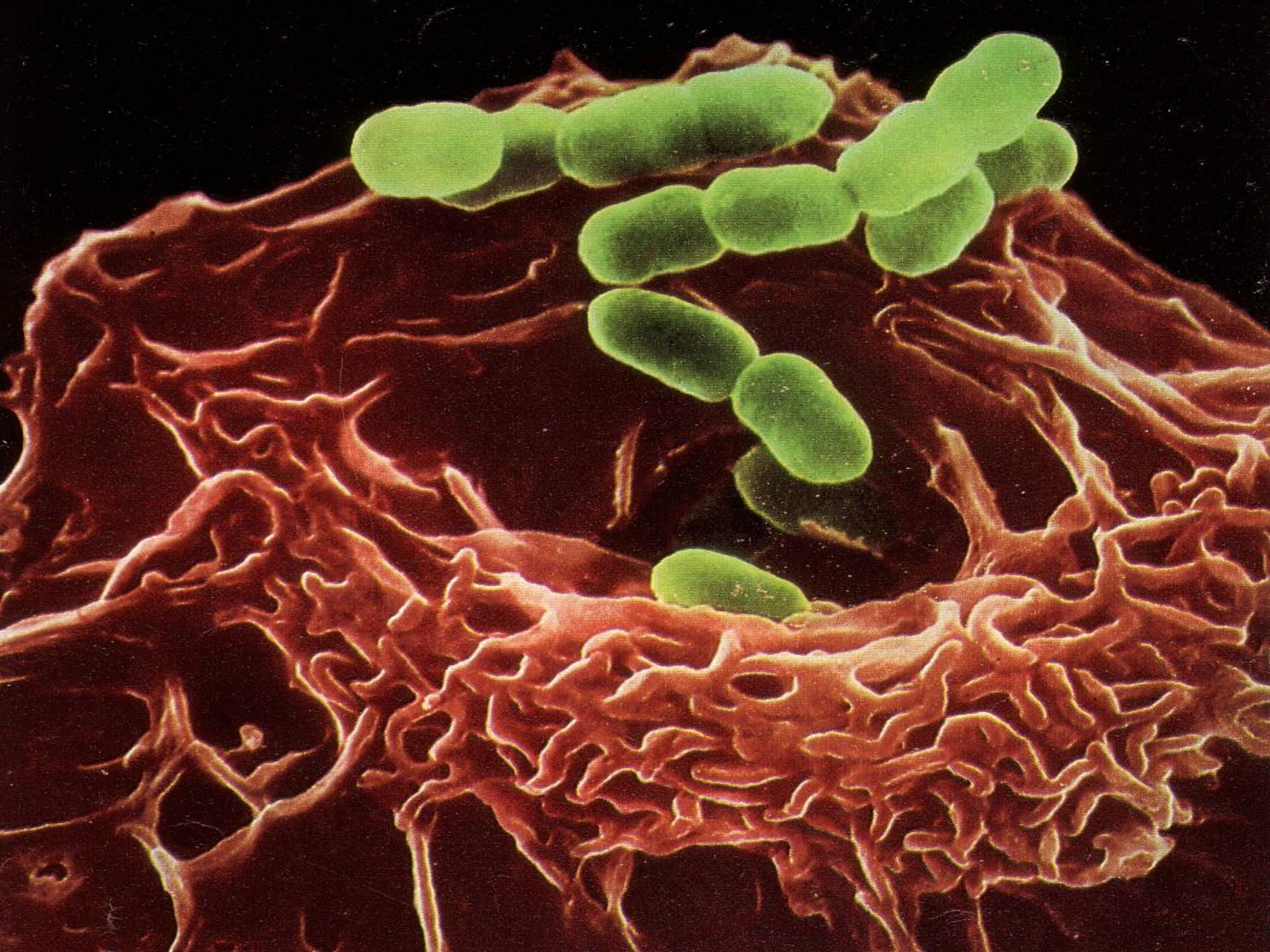
Amino acid sequence of sickle-cell hemoglobin:

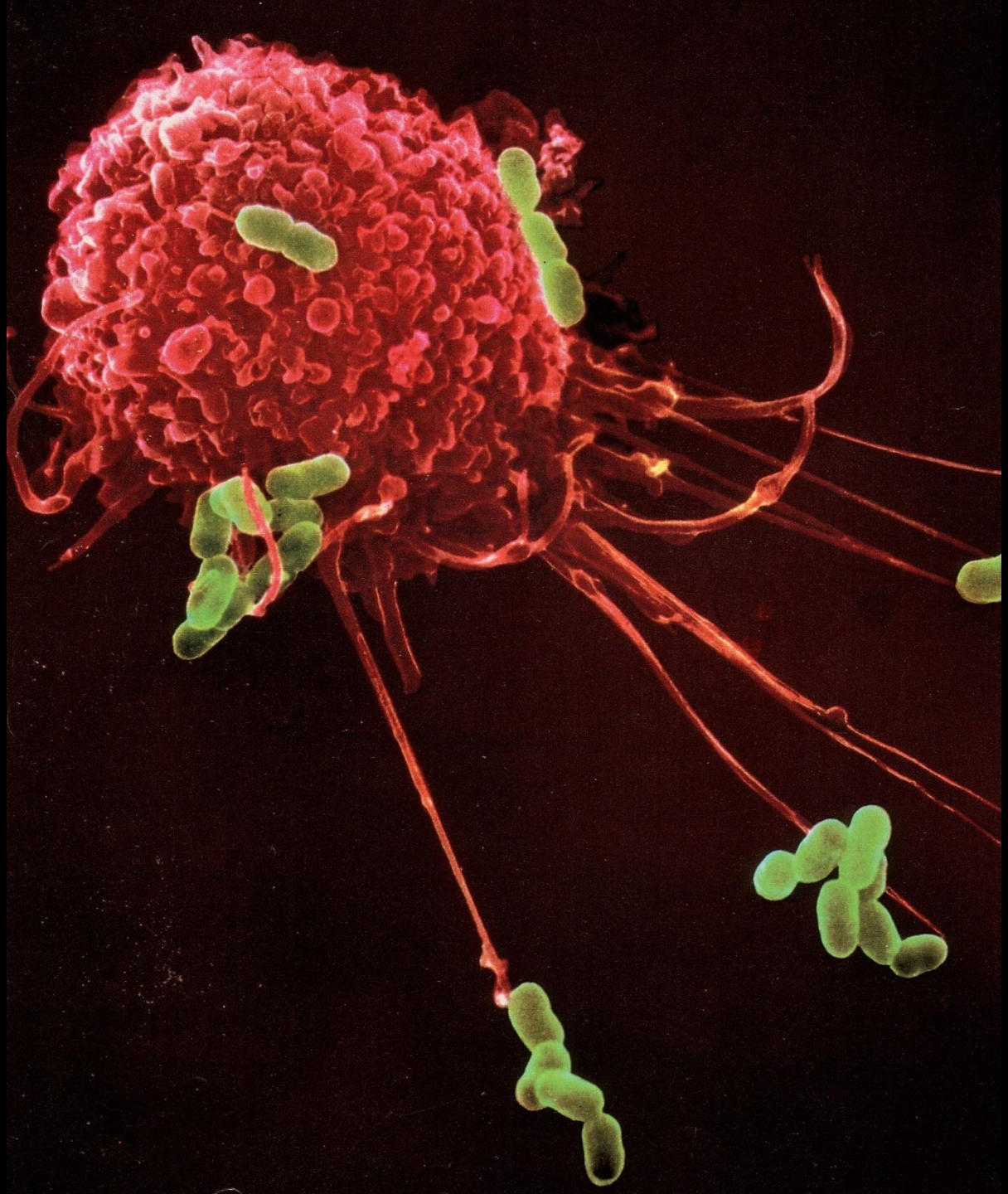
Val—His—Leu—Thr—Pro—Val—Glu

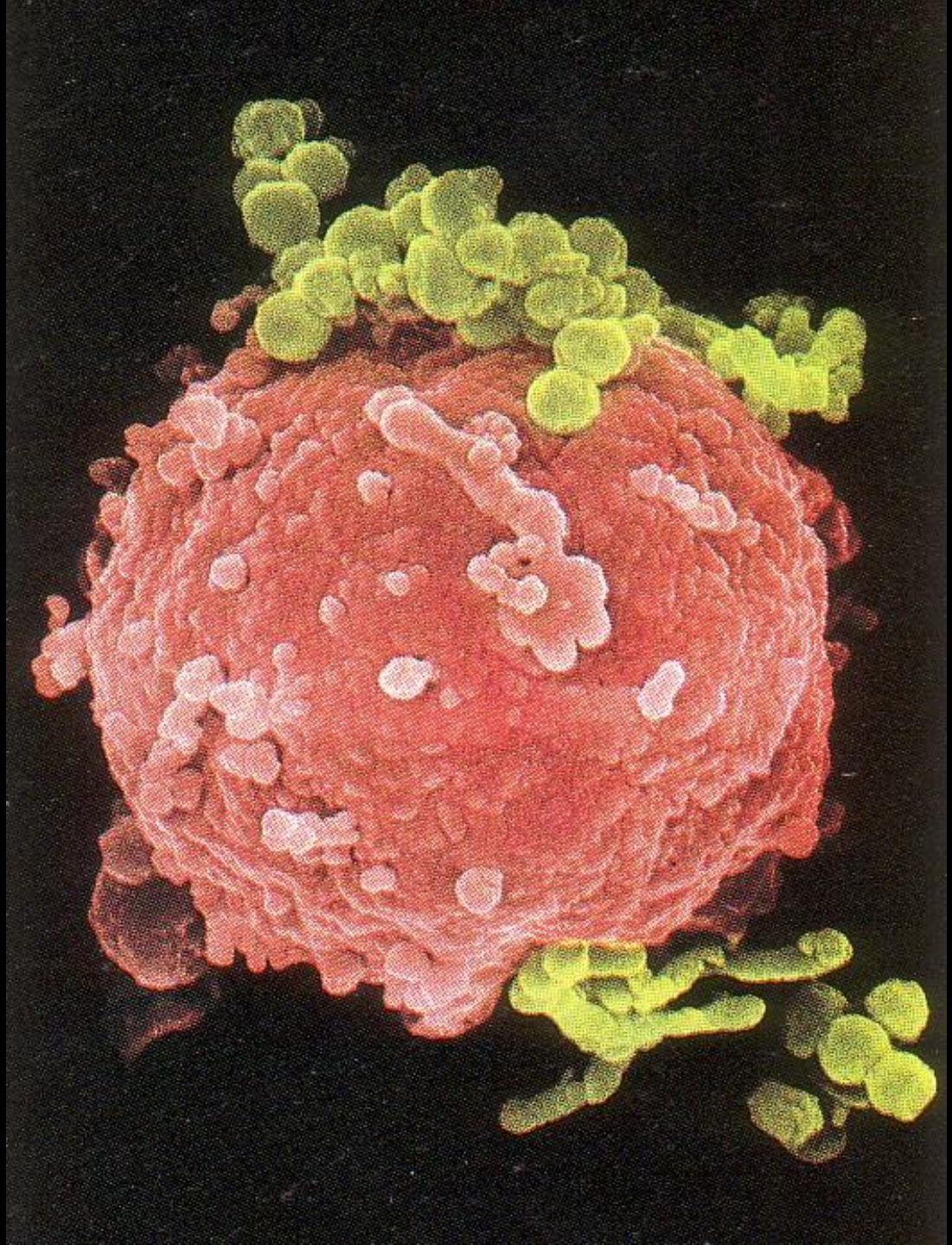
S&W 2011 fig 6-5 p 194

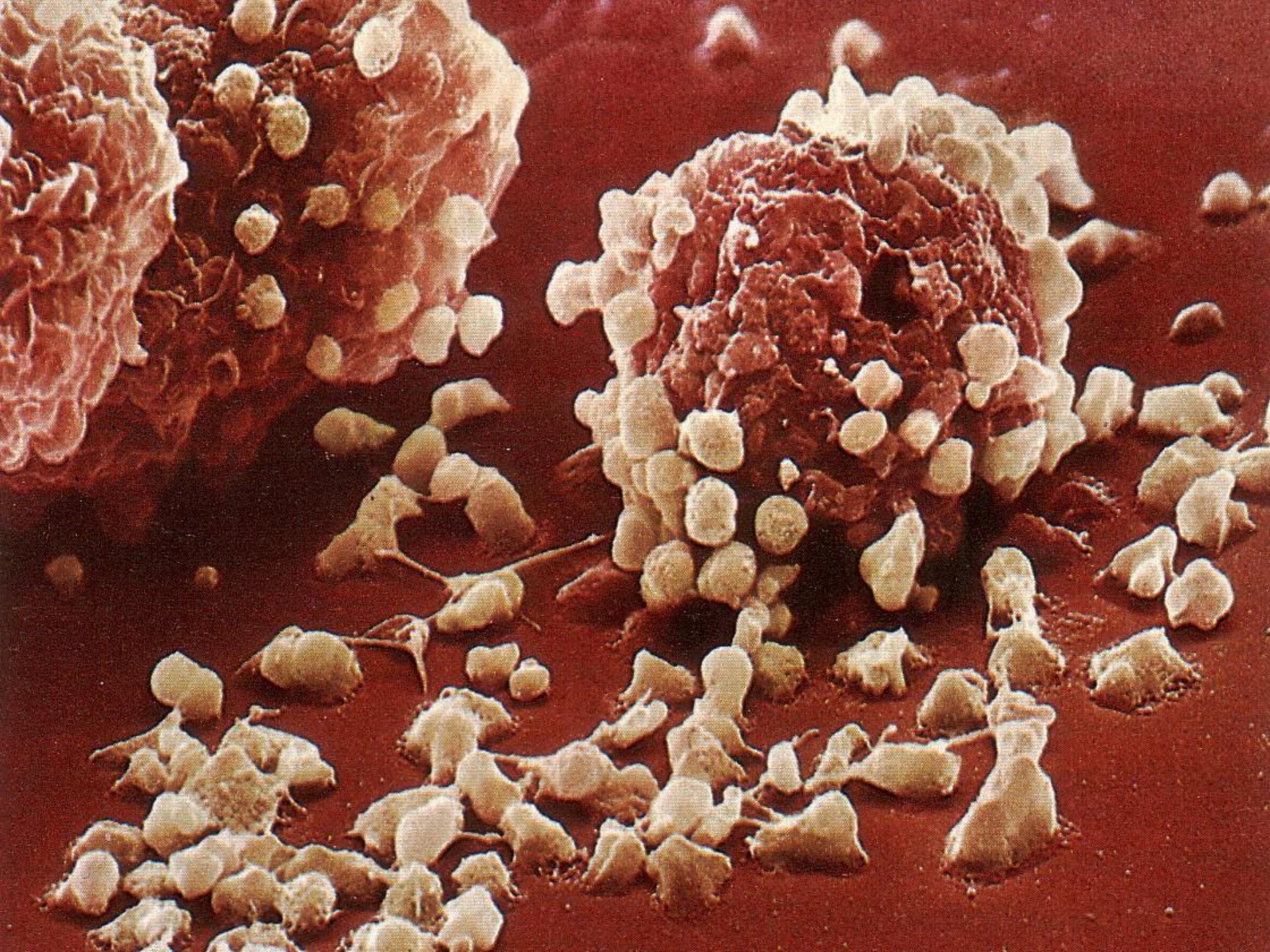


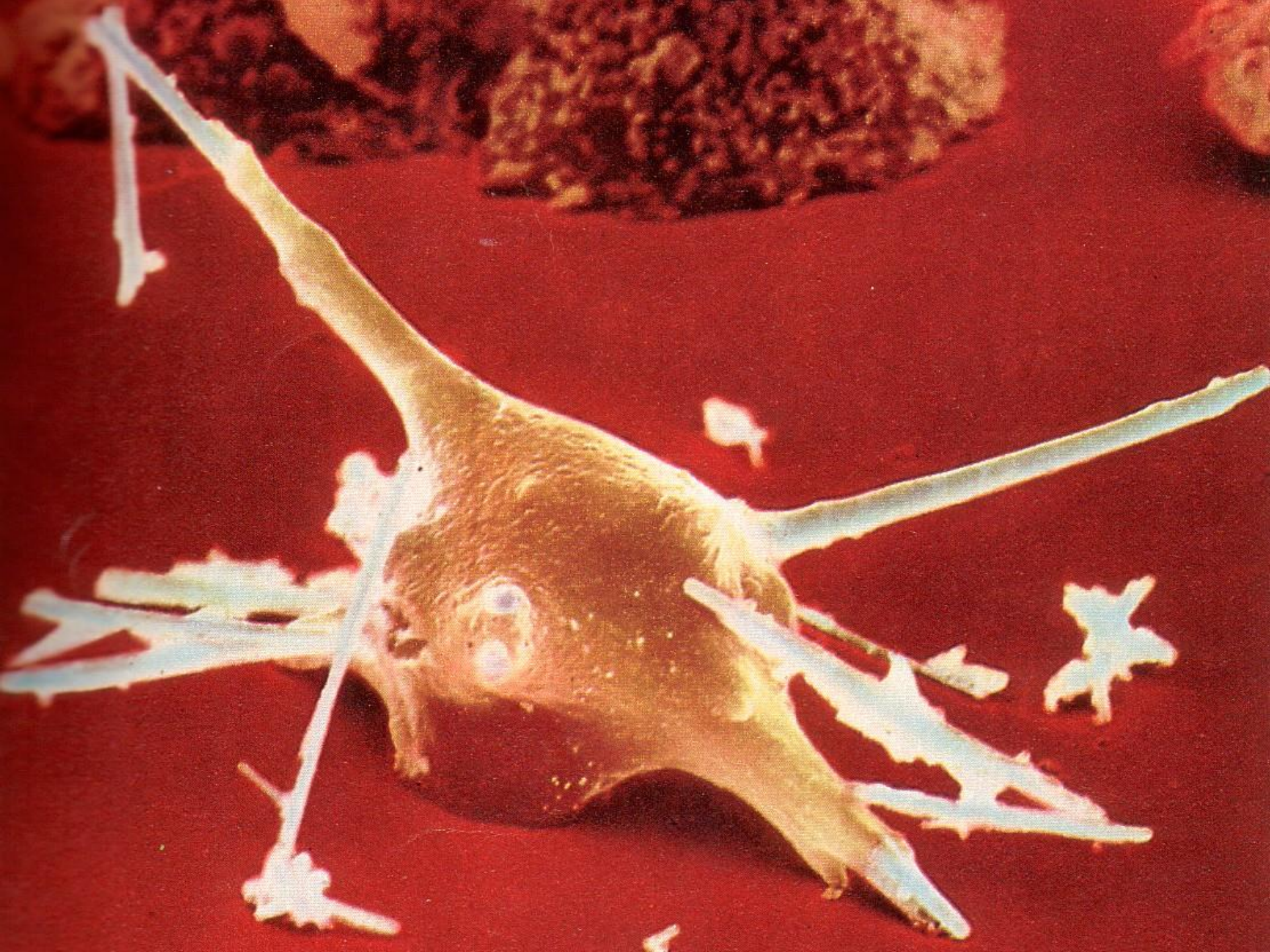


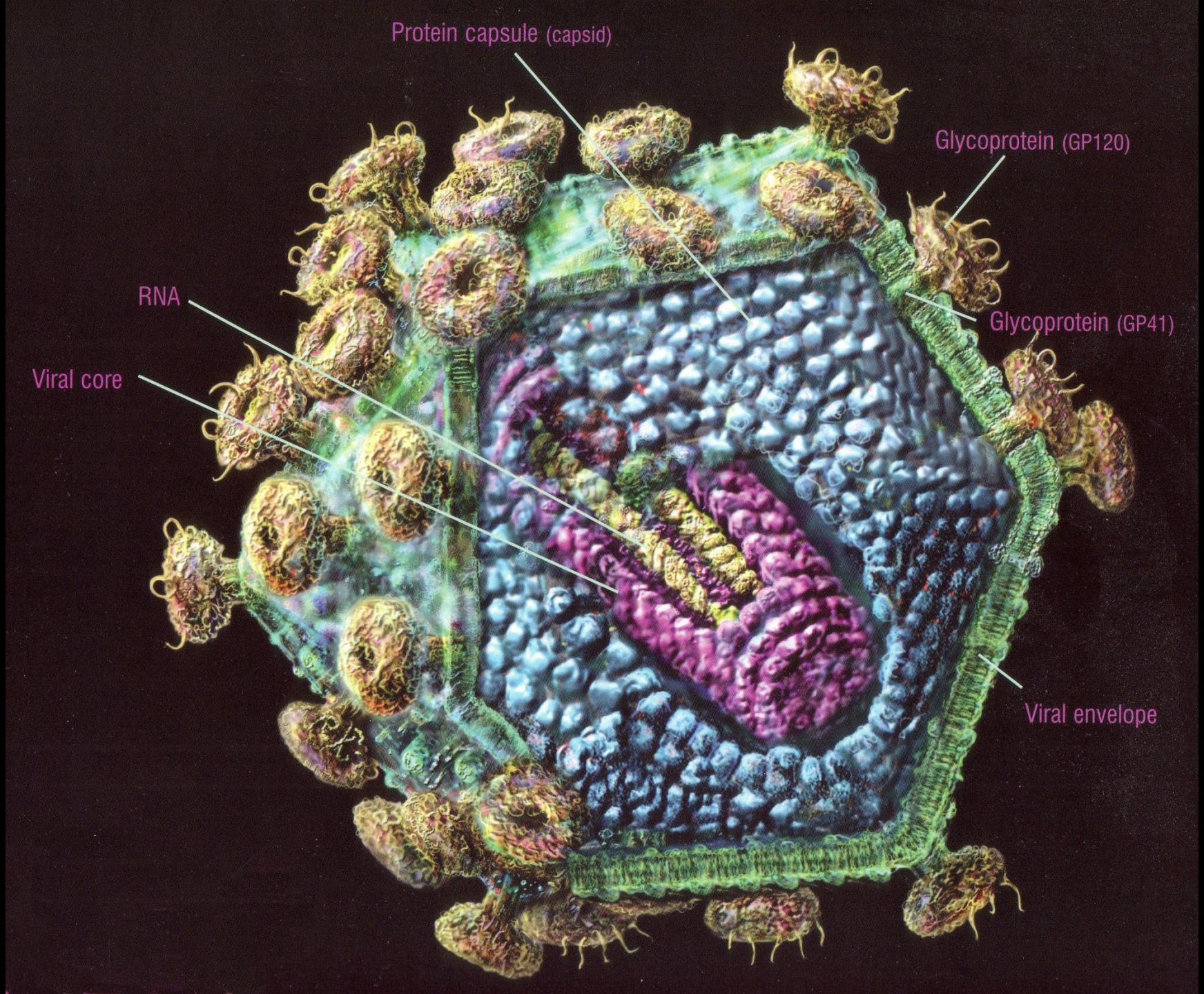


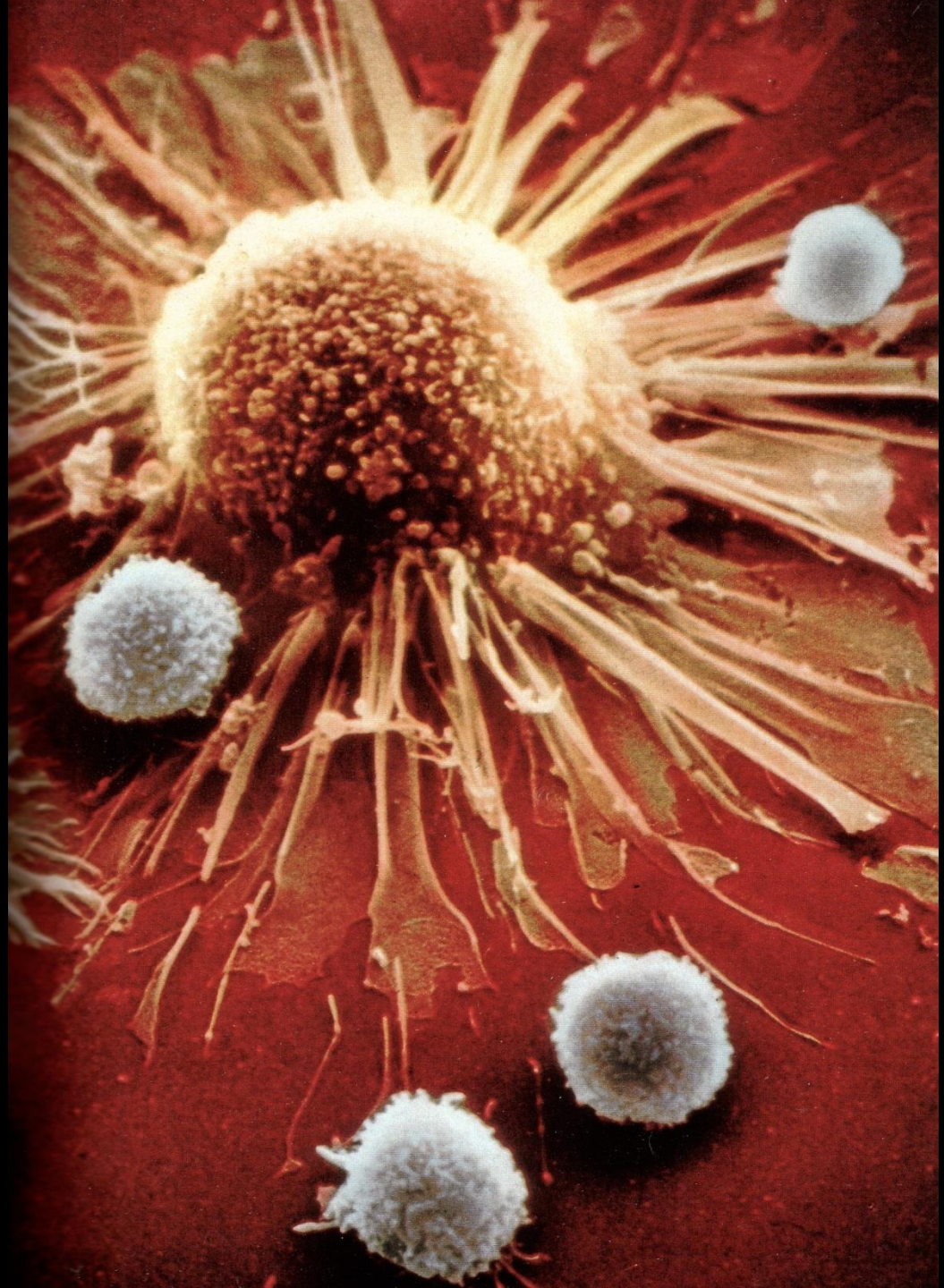


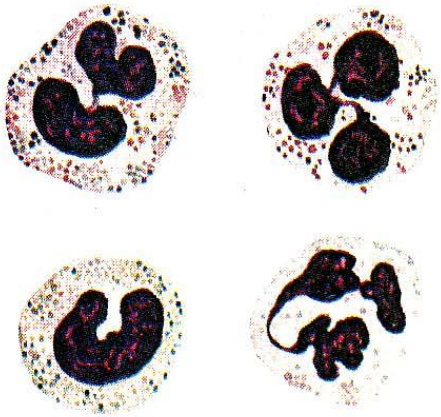




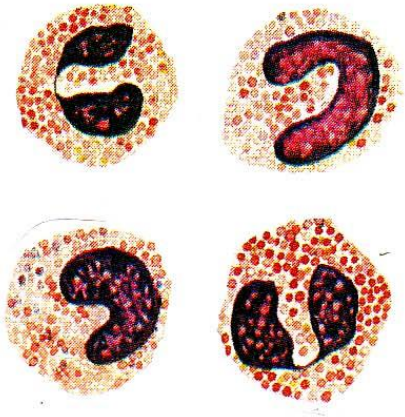



Protein capsule (capsid)
Glycoprotein (GP120)
RNA
Glycoprotein (GP41)
Viral core
Viral envelope

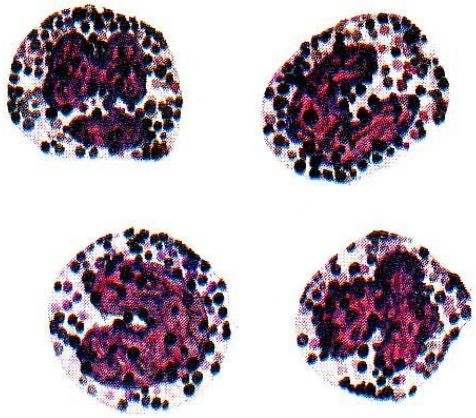




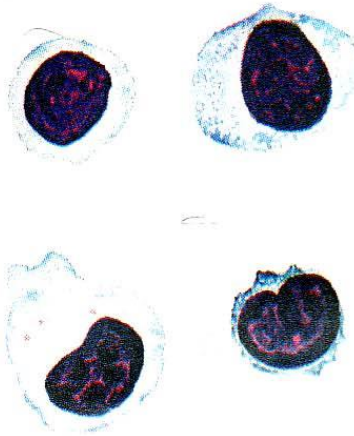
NEUTROPHILS



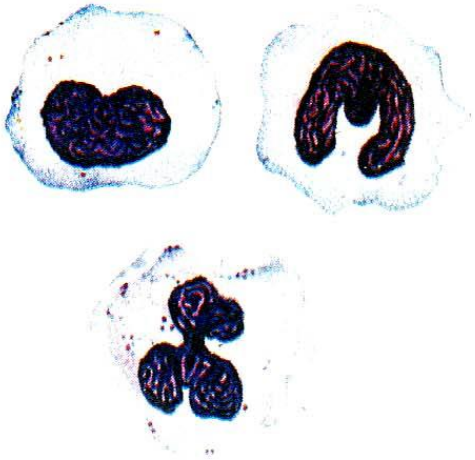
EOSINOPHILS



BASOPHILS

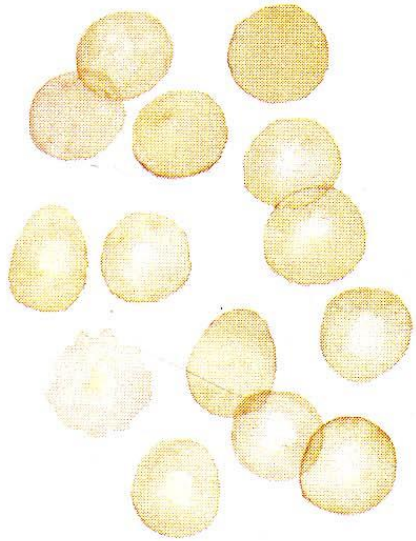


LYMPHOCYTES

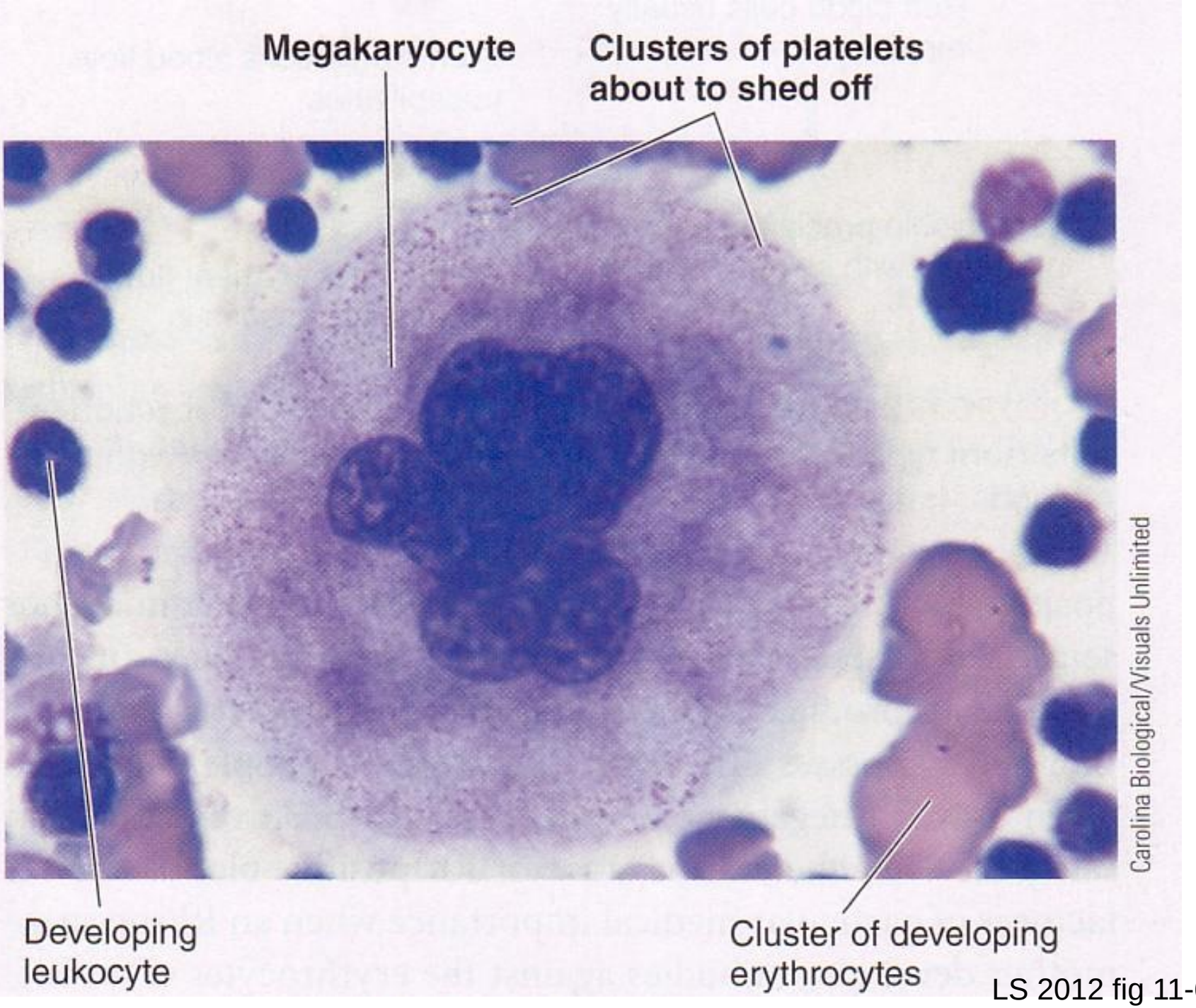


MONOCYTES

PLATELETS

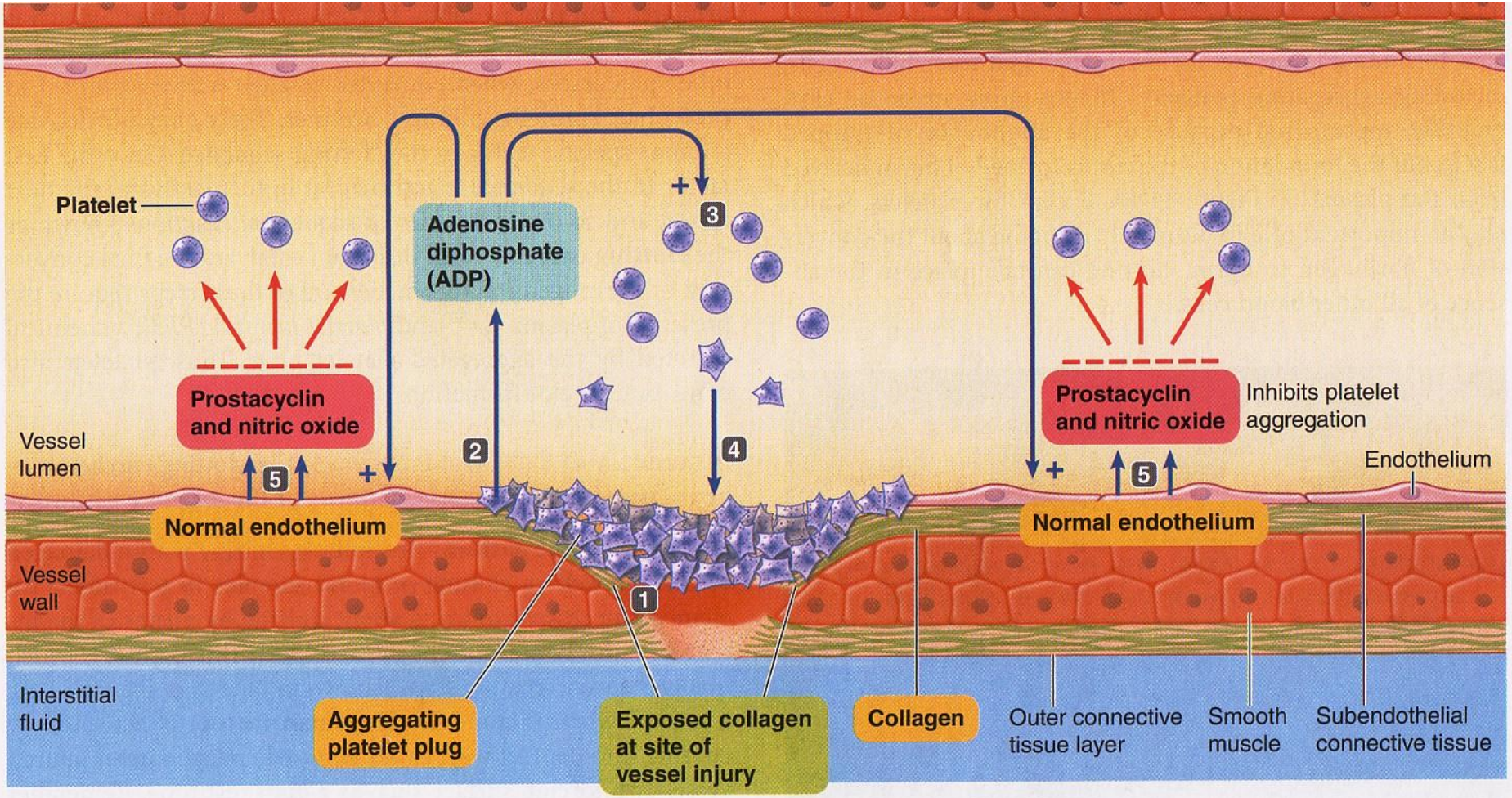


ERYTHROCYTES



LS 2012 fig 11-6

Platelet Plug Formation



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.

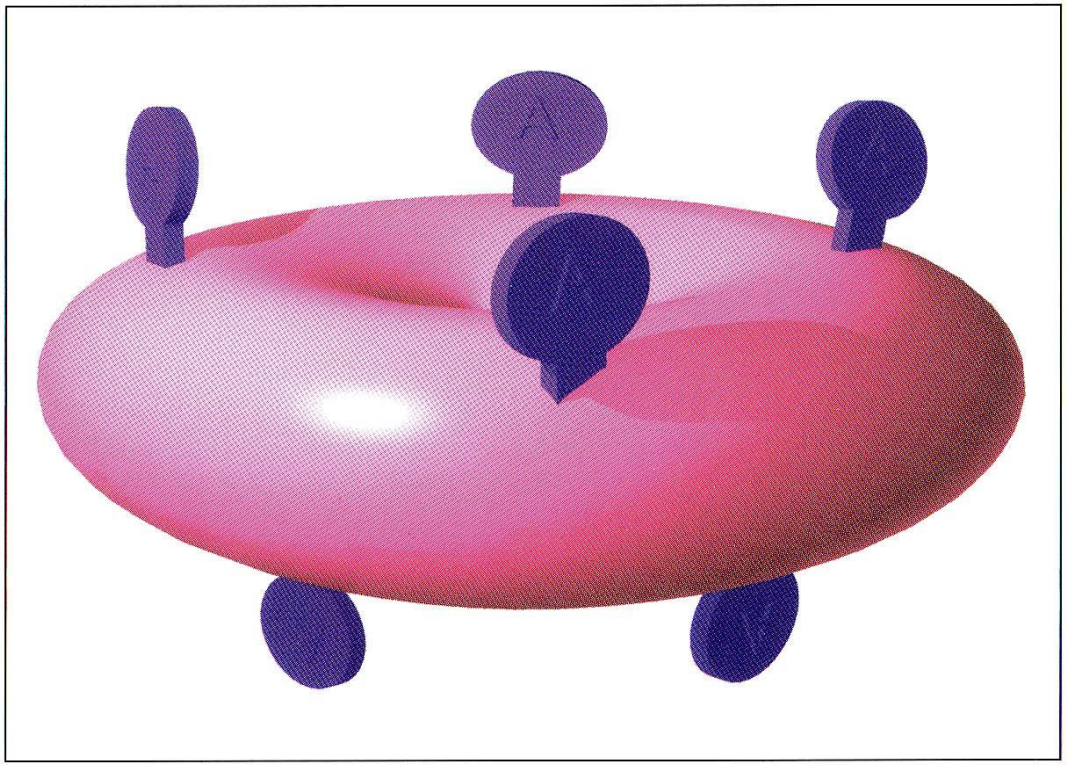
4 Newly activated platelets aggregate onto growing platelet plug and release even more platelet-attracting chemicals.

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

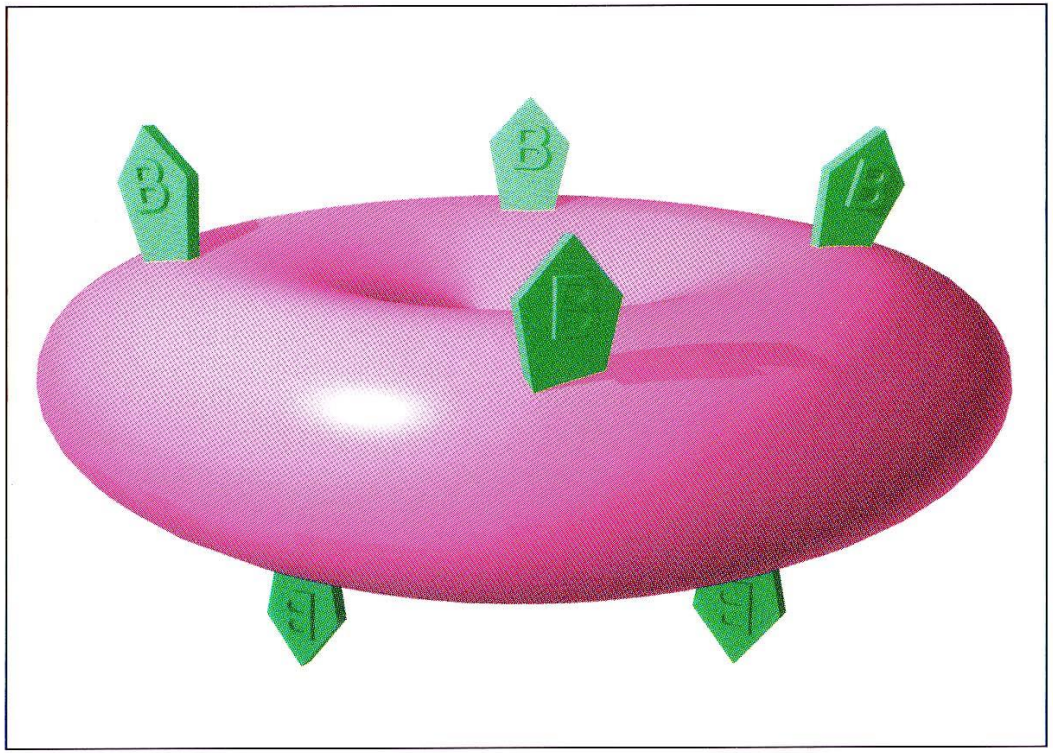
Break for discussion/questions!

A



A Antigens

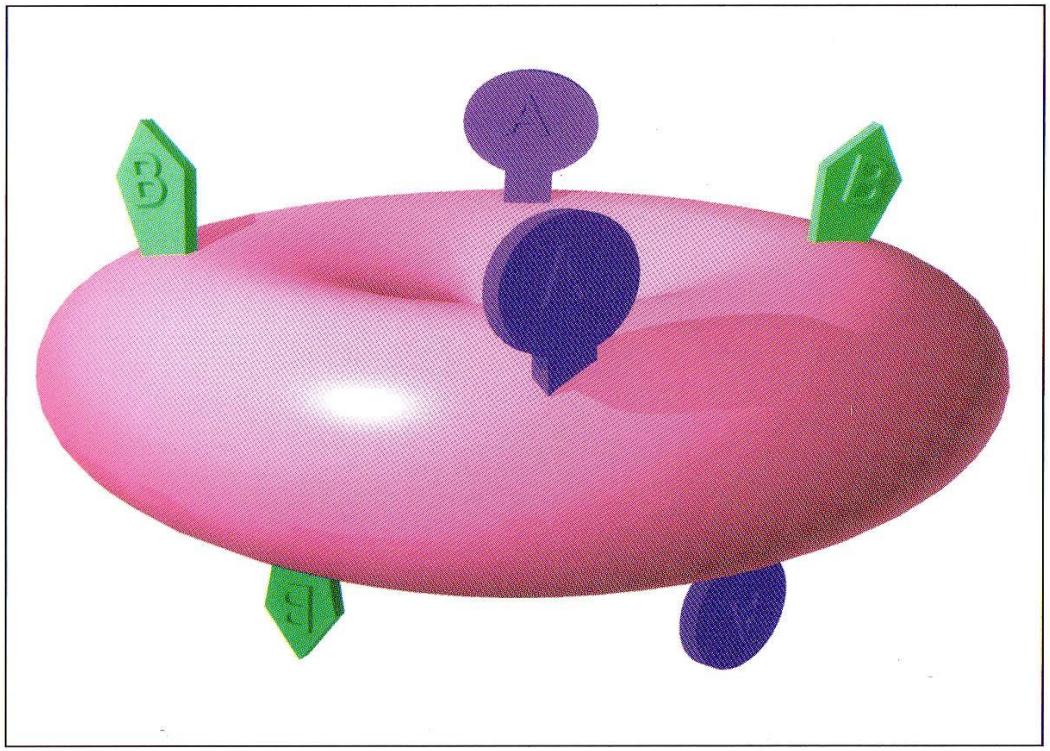
(Agglutinogens)



B Antigens

(Agglutinogens)

AB



A & B Antigens

(Agglutinogens)

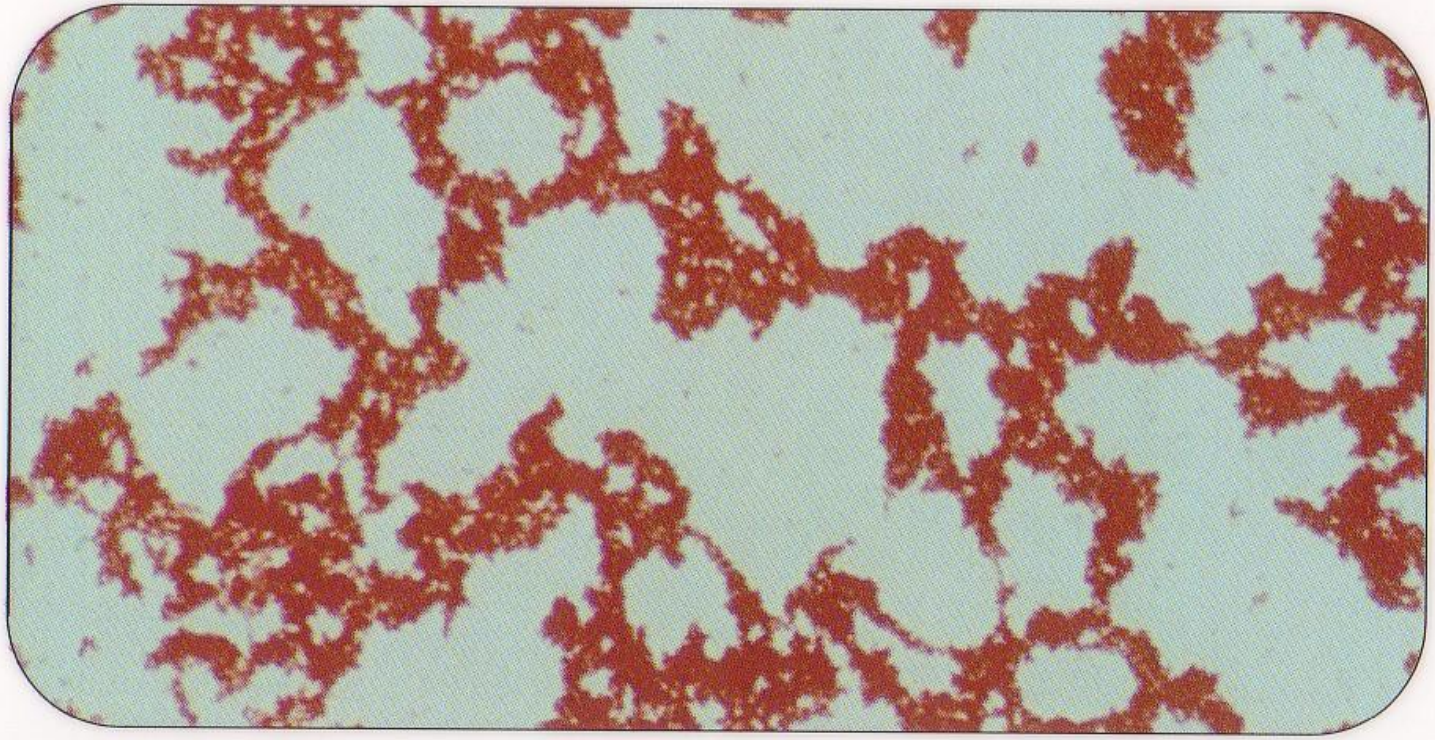
O

No Antigens

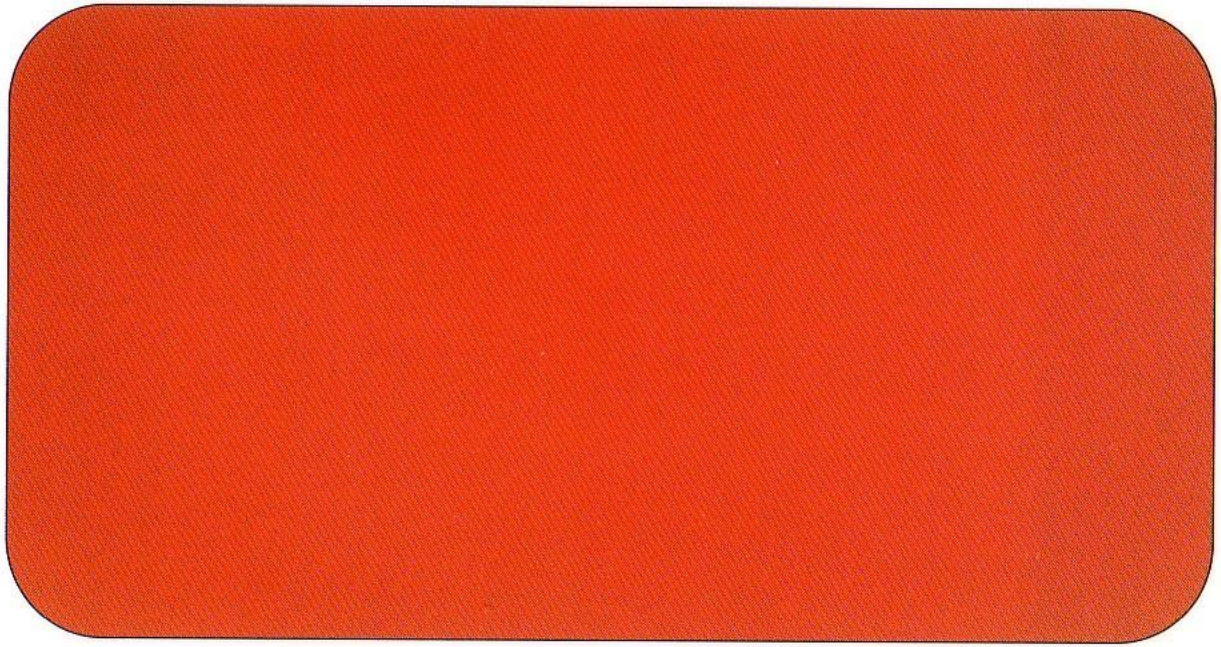
(Agglutinogens)

A Antibodies

(Agglutinins)

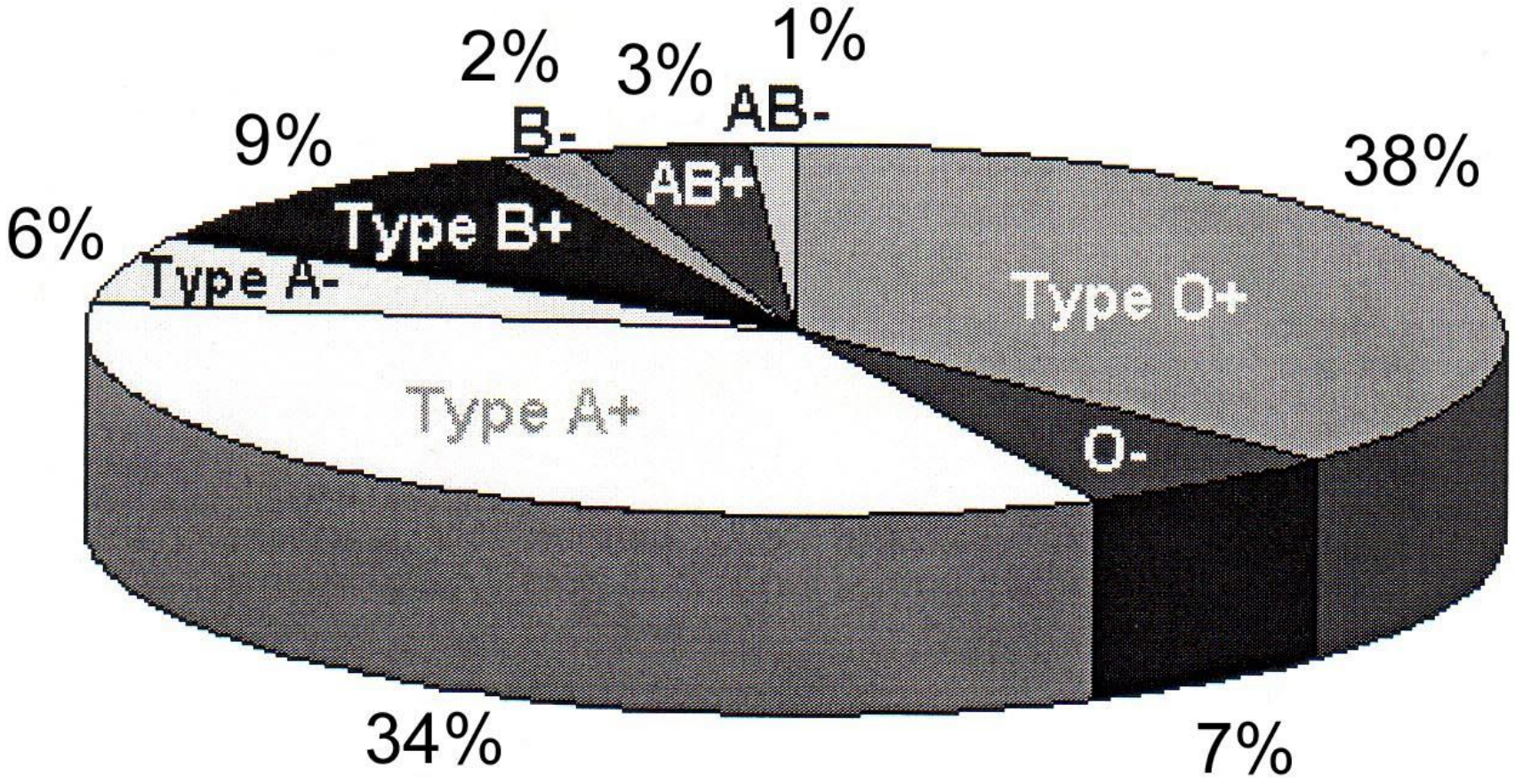


Clumping with anti-A serum



No Clumping with anti-A serum

Blood Type Distribution, General Population

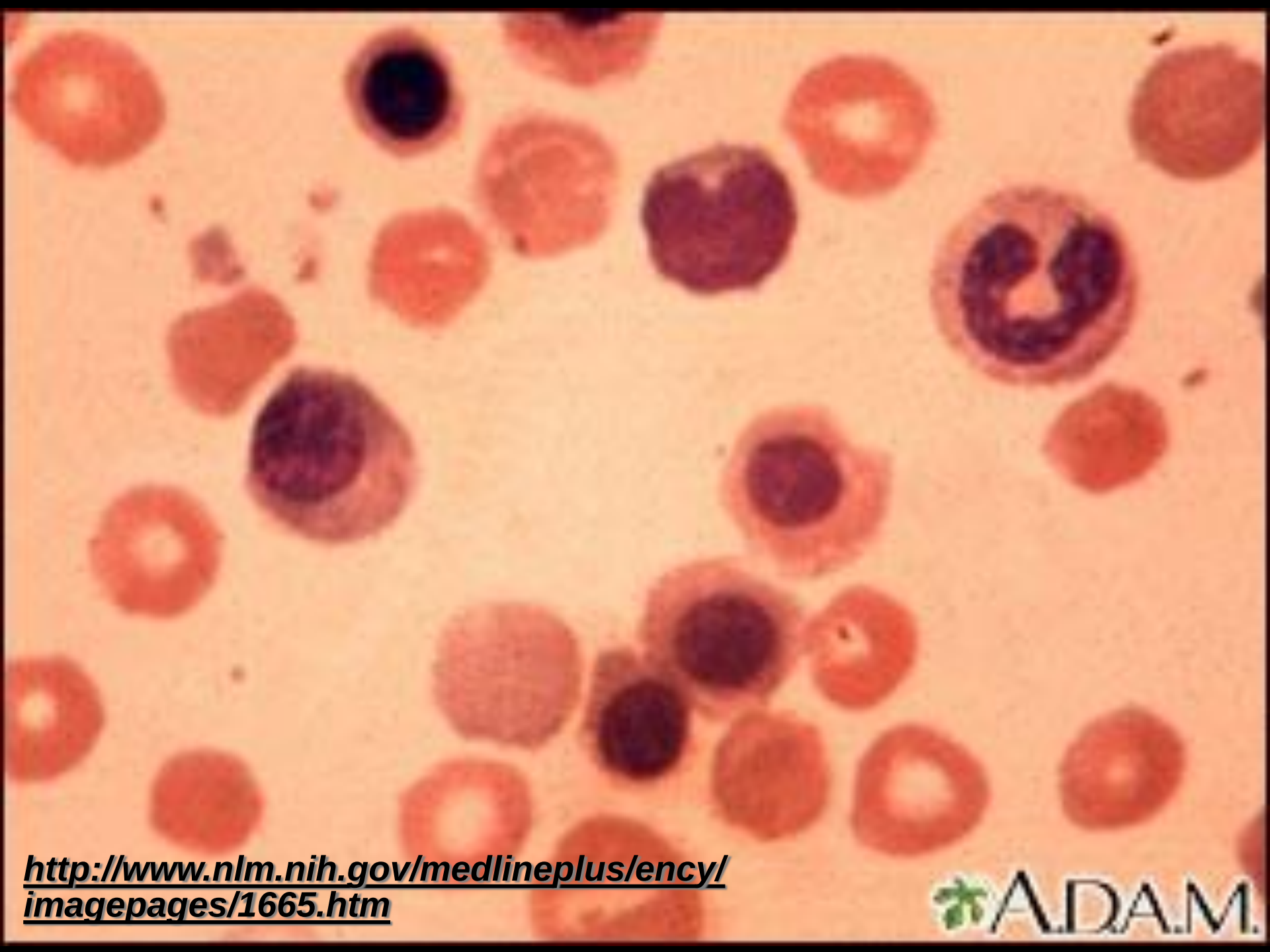


Erythroblastosis Fetalis?

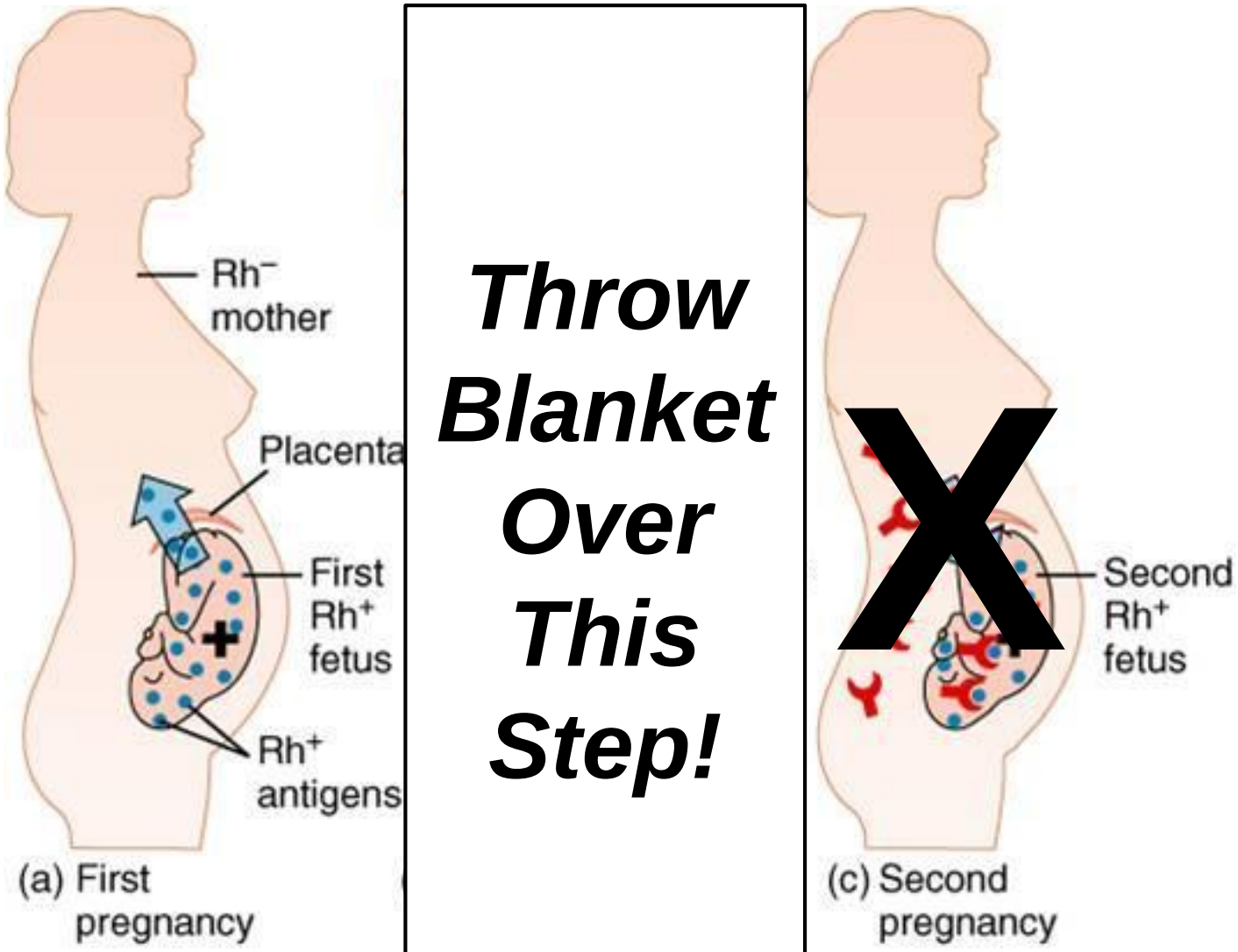
eg, *Rh-* mom
Rh+ baby

https://www.nlm.nih.gov/medlineplus/rhincompatibility.html

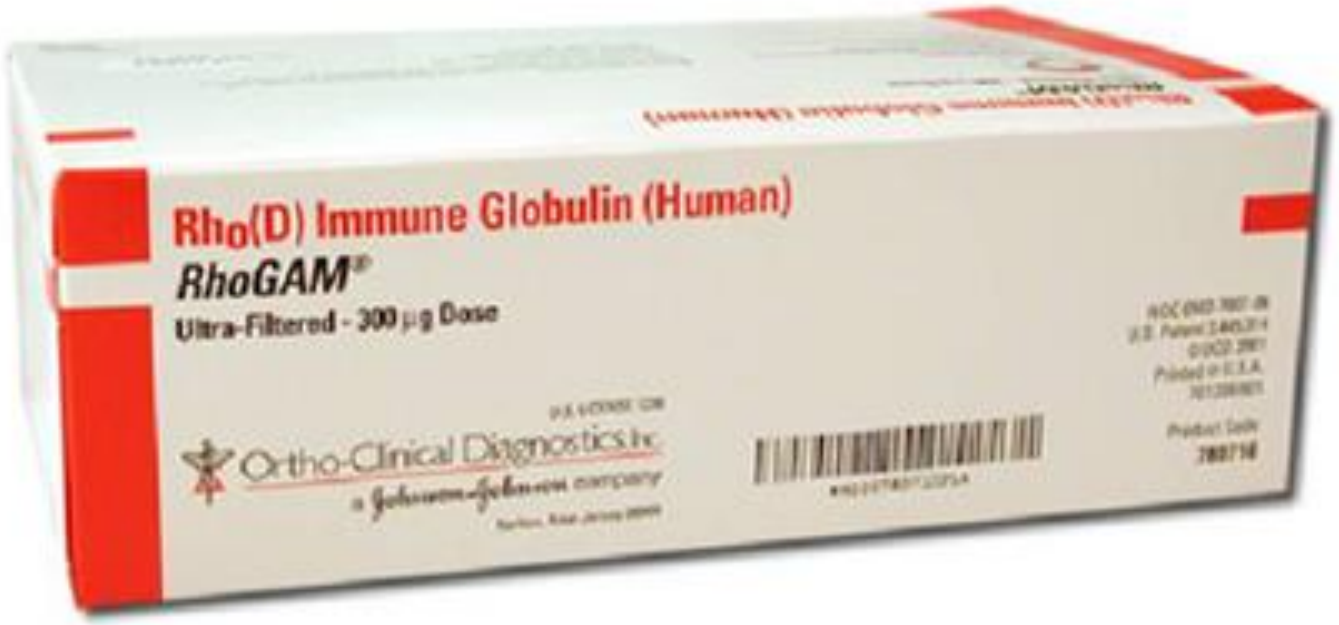
http://www.nlm.nih.gov/MEDLINEPLUS/ency/article/001298.htm#Alternative%20Names


http://www.nlm.nih.gov/medlineplus/ency/imagepages/1665.htm
A.D.A.M.

Erythroblastosis Fetalis or Hemolytic Disease of the Unborn/Newborn

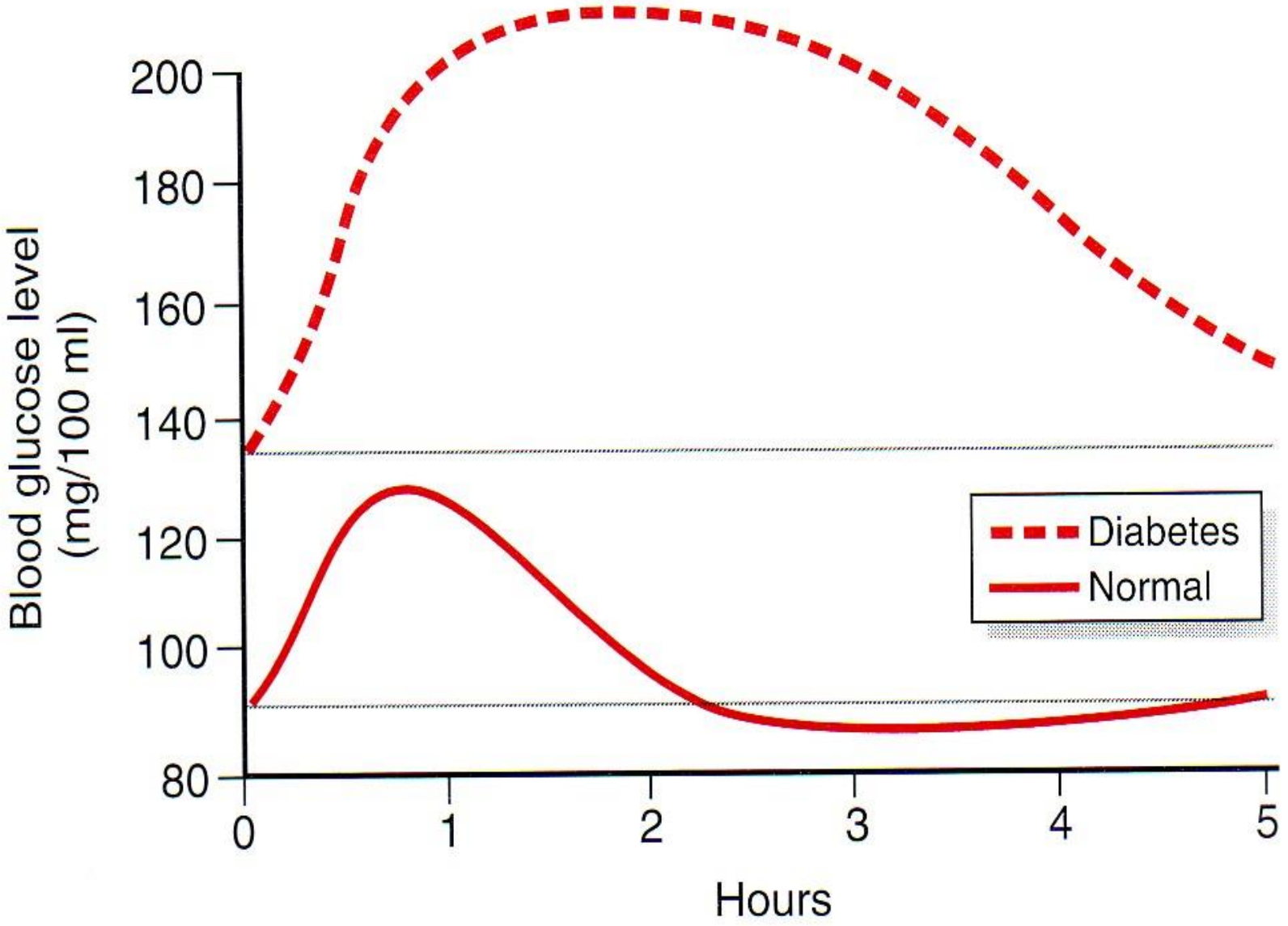


Inject Mom with RhoGam ≤ 48-72 hr > each Rh+ Pregnancy



The Blanket is RhoGam → Masks the Mom's Immune System!

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

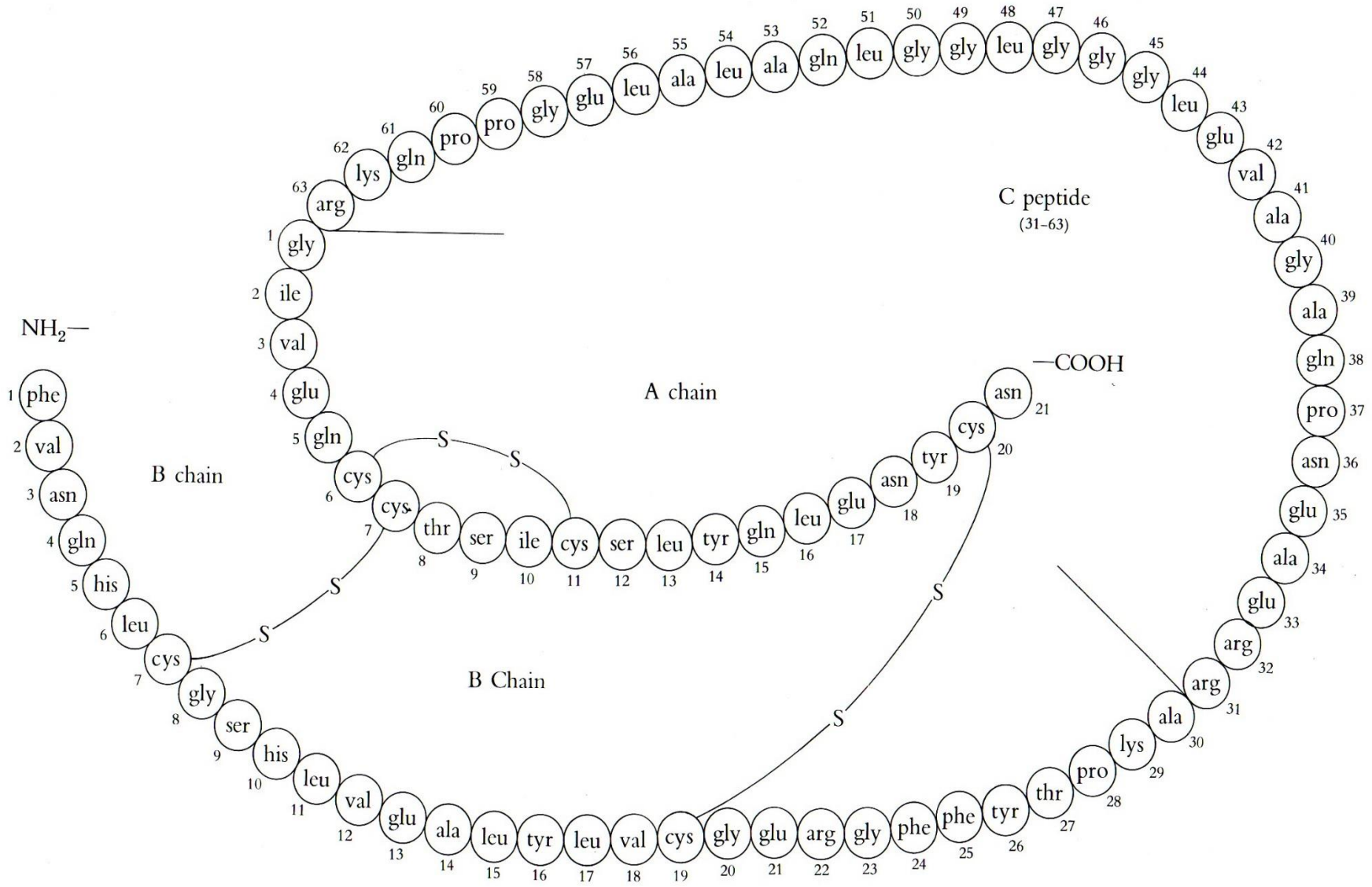
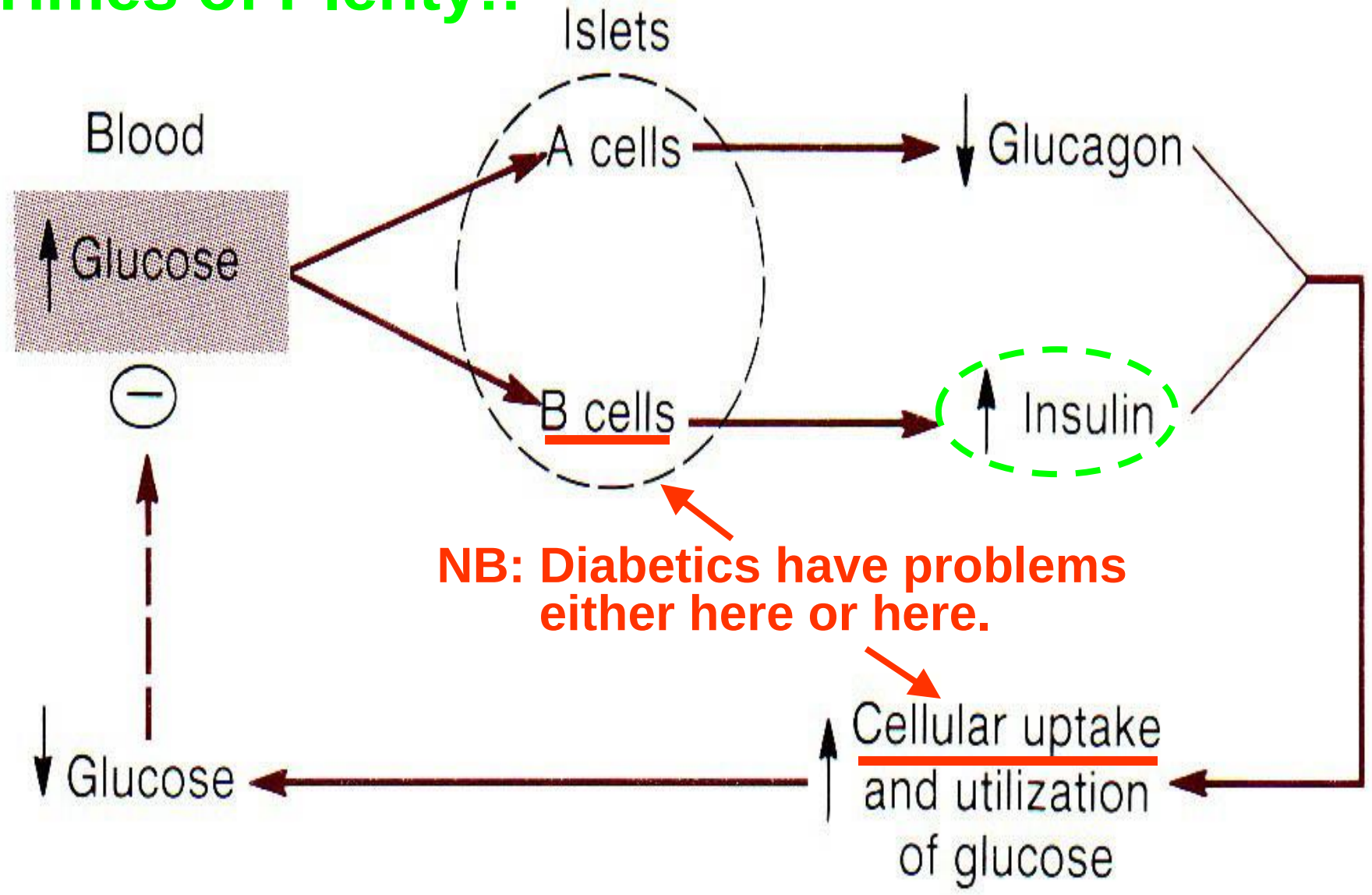


FIG. 10-4. Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.

DO Norris 1980

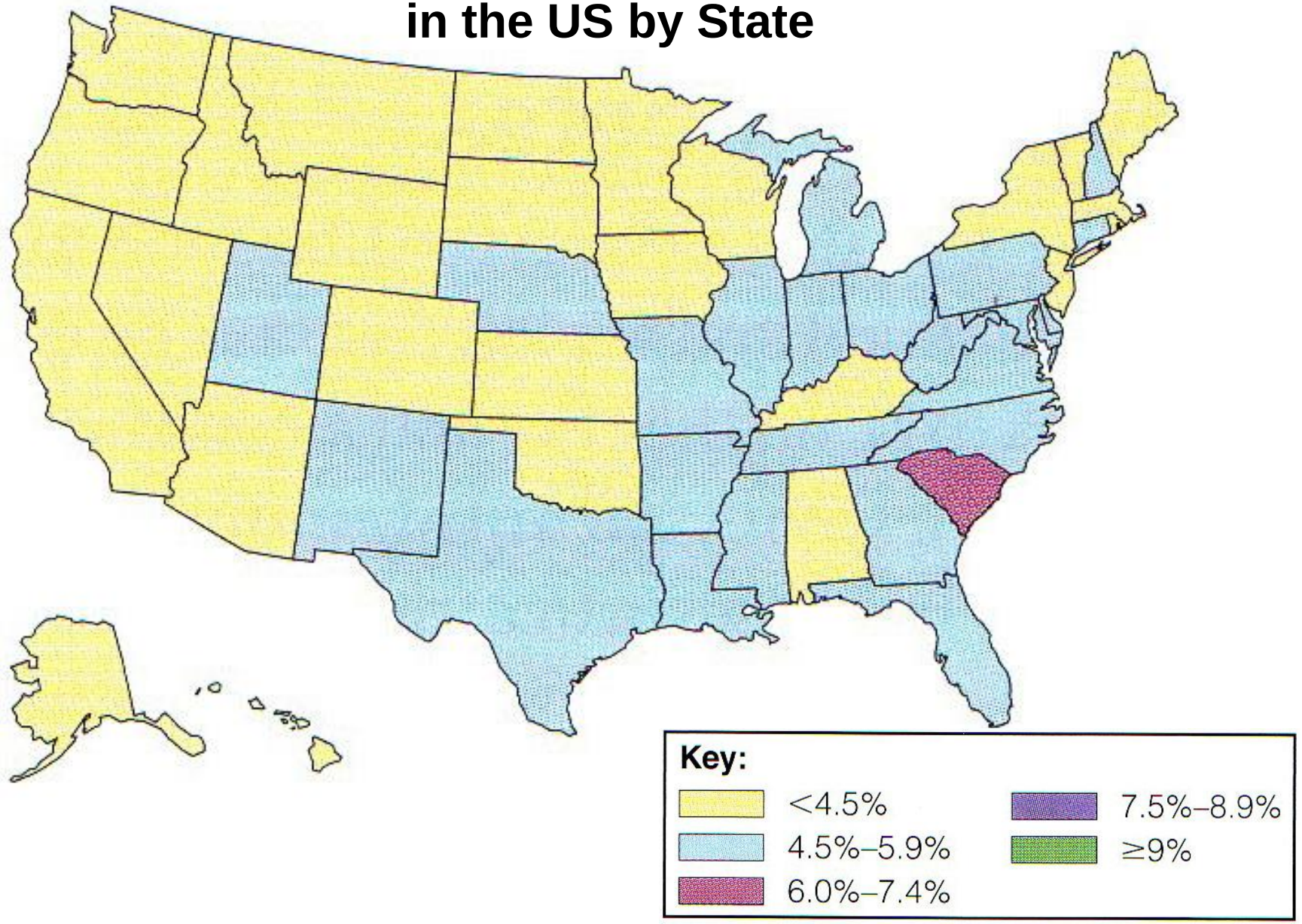
Times of Plenty!!



Fox 1987

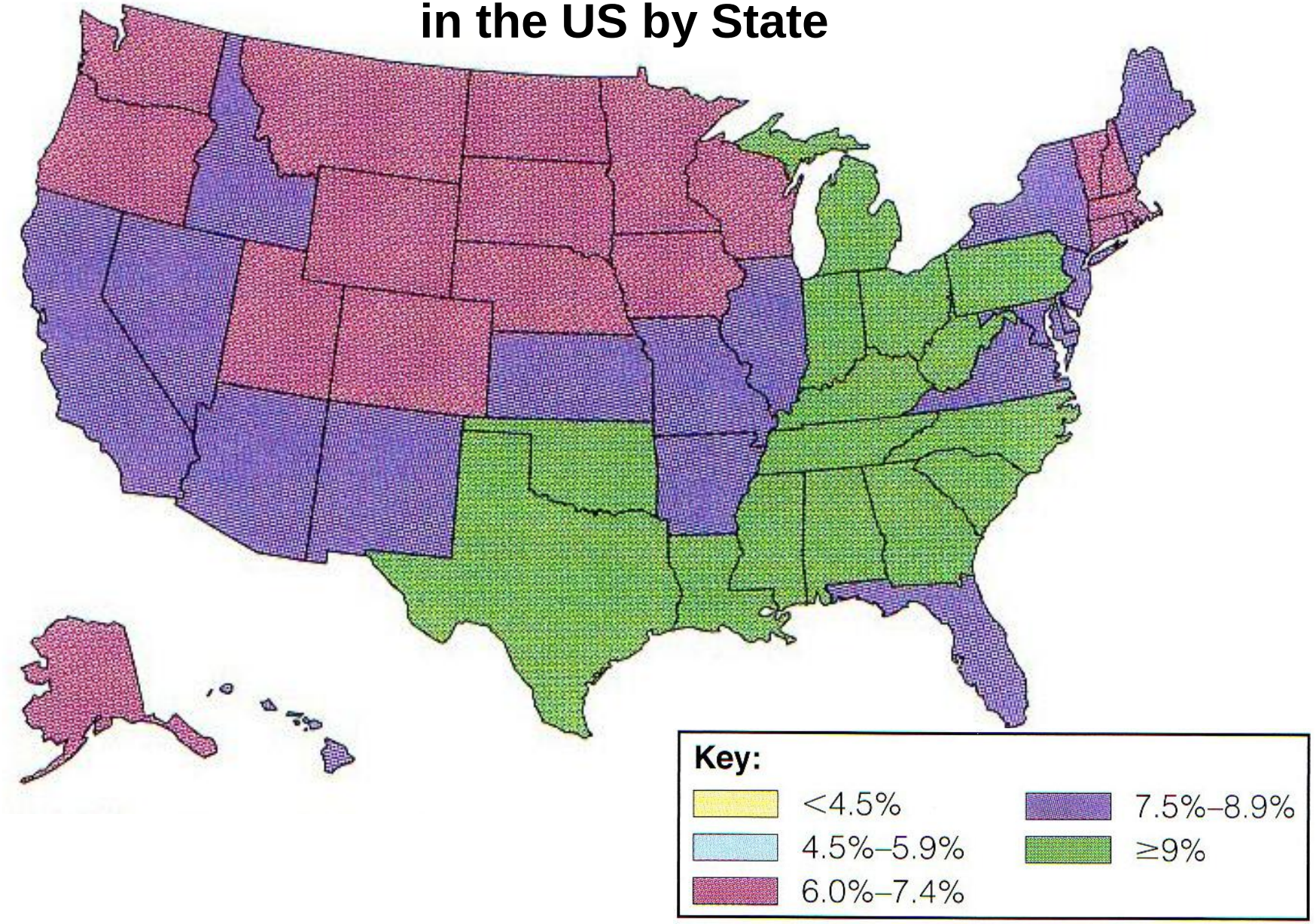
Store!

1994 Diabetes Prevalence in the US by State



Source: Centers for Disease Control, Division of Diabetes Translation, *http://www.cdc.gov/diabetes/statistics*, S&W 2014 fig 4-15 p139A.

2010 Diabetes Prevalence in the US by State



Source: Centers for Disease Control, Division of Diabetes Translation, *http://www.cdc.gov/diabetes/statistics*, S&W 2014 fig 4-15 p139B.

Table 4–8

Type 1 and Type 2 Diabetes Compared

	Type 1	Type 2
Percentage of cases	5–10%	90–95%
Age of onset	<30 years	>40 years[a]
Associated characteristics	Autoimmune diseases, viral infections, inherited factors	Obesity, aging, inherited factors
Primary problems	Destruction of pancreatic beta cells; insulin deficiency	Insulin resistance, insulin deficiency (relative to needs)
Insulin secretion	Little or none	Varies; may be normal, increased, or decreased
Requires insulin	Always	Sometimes
Older names	Juvenile-onset diabetes Insulin-dependent diabetes mellitus (IDDM)	Adult-onset diabetes Noninsulin-dependent diabetes mellitus (NIDDM)

S&W 2014 tab 4-8 p 139

Table 4–9

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 2014 tab 4-9 p 140

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 2011 p 133

Exercise is a must based on its insulin-like effect!

S&W 2011 p 135

WOW! SUPER

~ TOP 5 - 10 j.

EXCELLENT!!

~ TOP 15 j.

GREAT EFFORT

~ TOP 20 - 25 j.