

We survived the exam! Happy Halloween!!
Remember nutrient p & 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 $\geq 2x$ Lab 5, LM pp 5-1 thru 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?

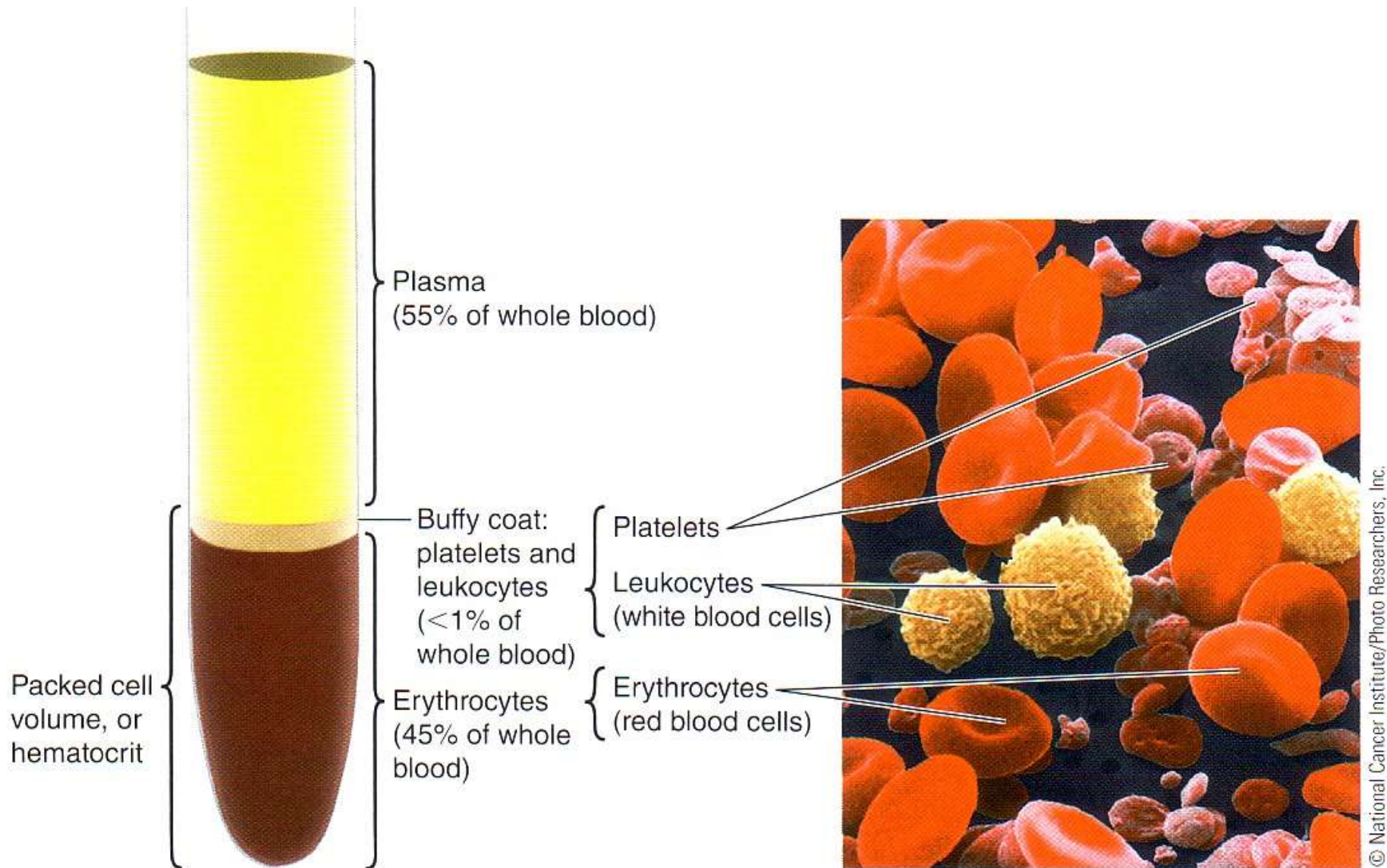
C. Diabetes + Treatment LS ch 17 pp 532-5

IV. Exam Comments & Return

Ghost, marshmallow
or white blood cell?



What's in Blood? Plasma & Blood Cells



Red blood cells on
hypodermic needle

~ 8 μ



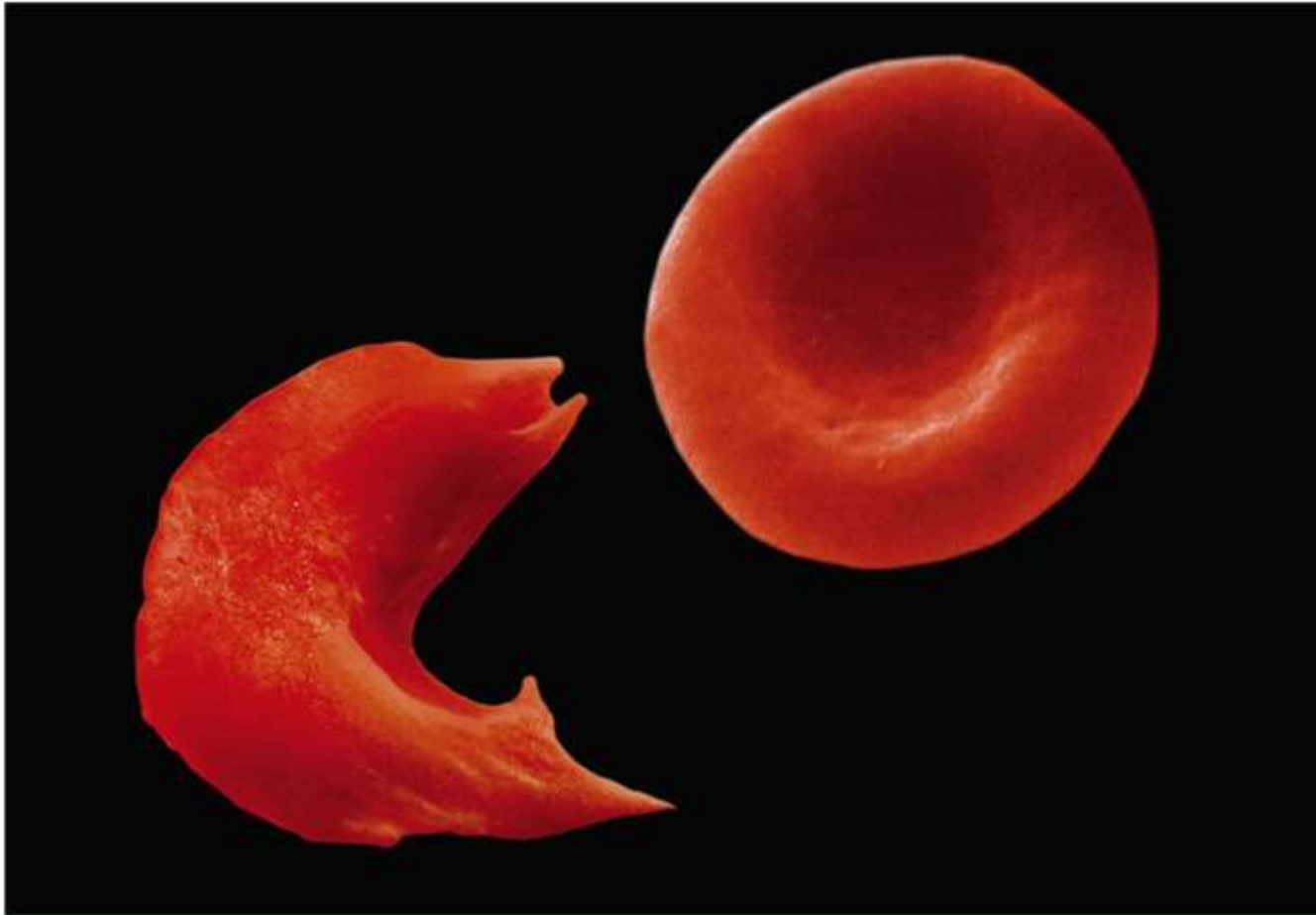
Red blood cells
trapped by fibrin clot

2000 x GMBH
Nat Geog 1986

Sickle-shaped blood cells

Normal red blood cells

© Dr. Stanley Flegler/Visuals Unlimited



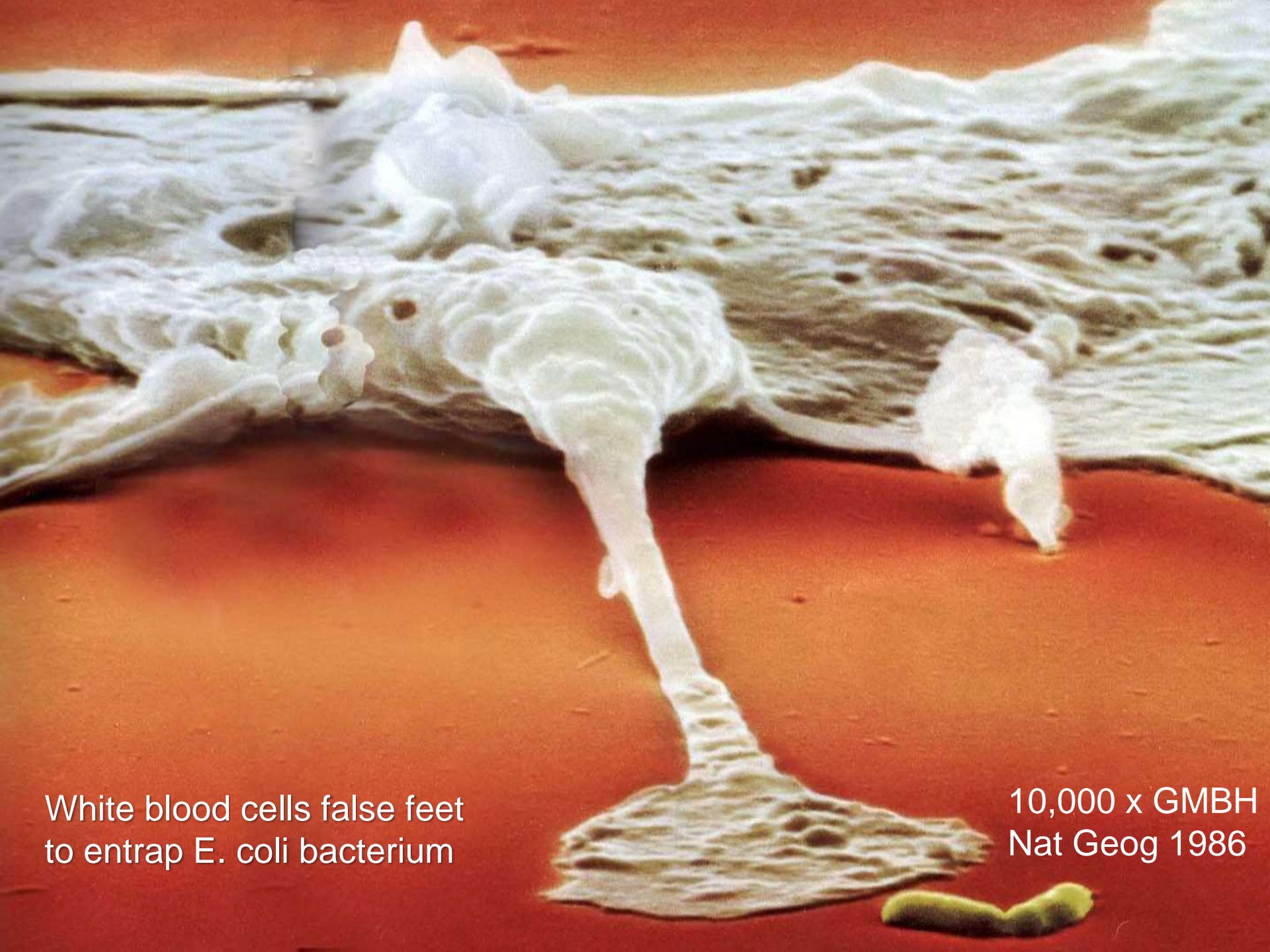
What a difference one amino acid can make!

Amino acid sequence of normal hemoglobin:

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

Amino acid sequence of sickle-cell hemoglobin:

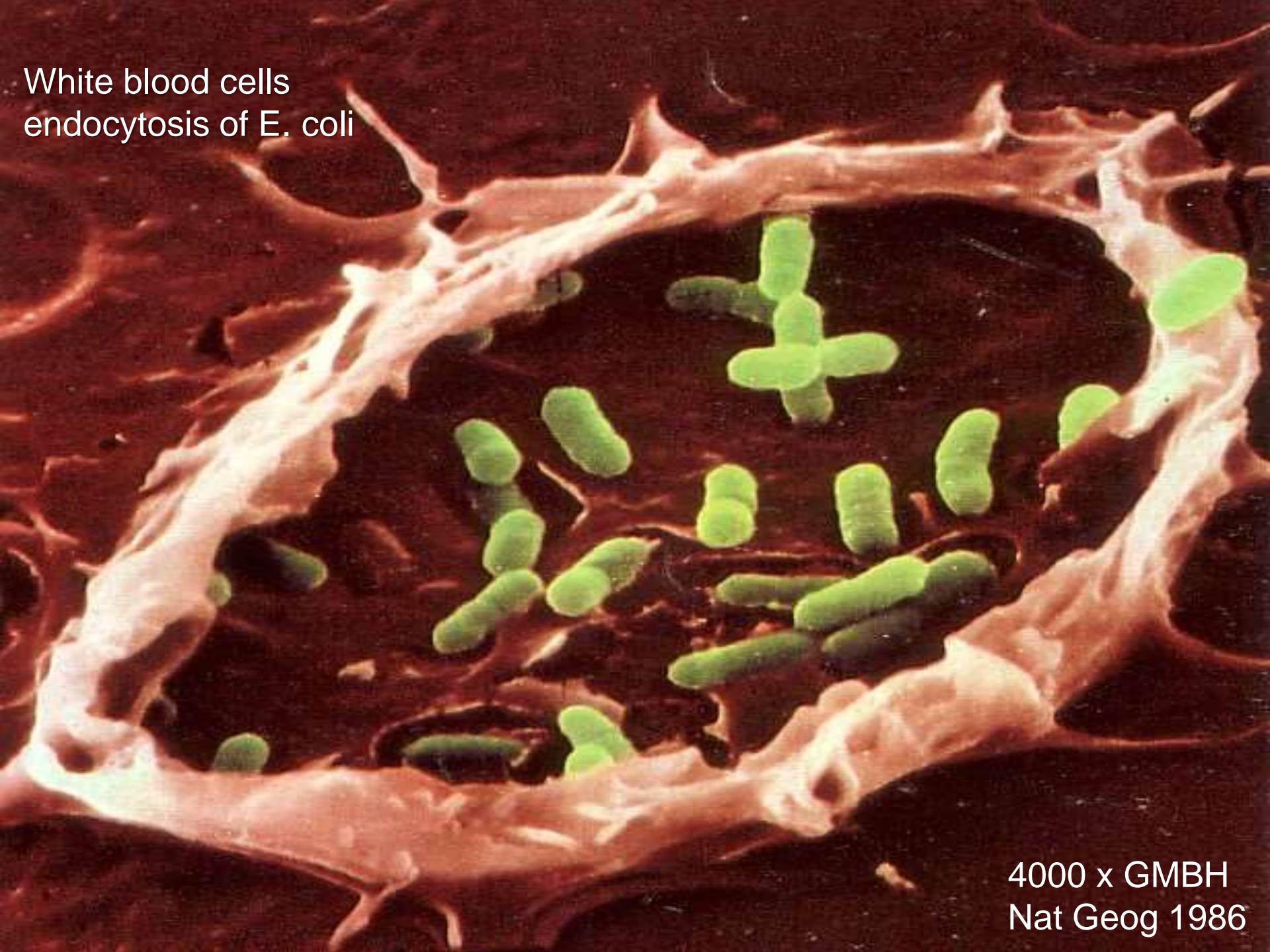
Val — His — Leu — Thr — Pro — Val — Glu



White blood cells false feet
to entrap E. coli bacterium

10,000 x GMBH
Nat Geog 1986

White blood cells
endocytosis of *E. coli*



4000 x GMBH
Nat Geog 1986

Endocytosis continued

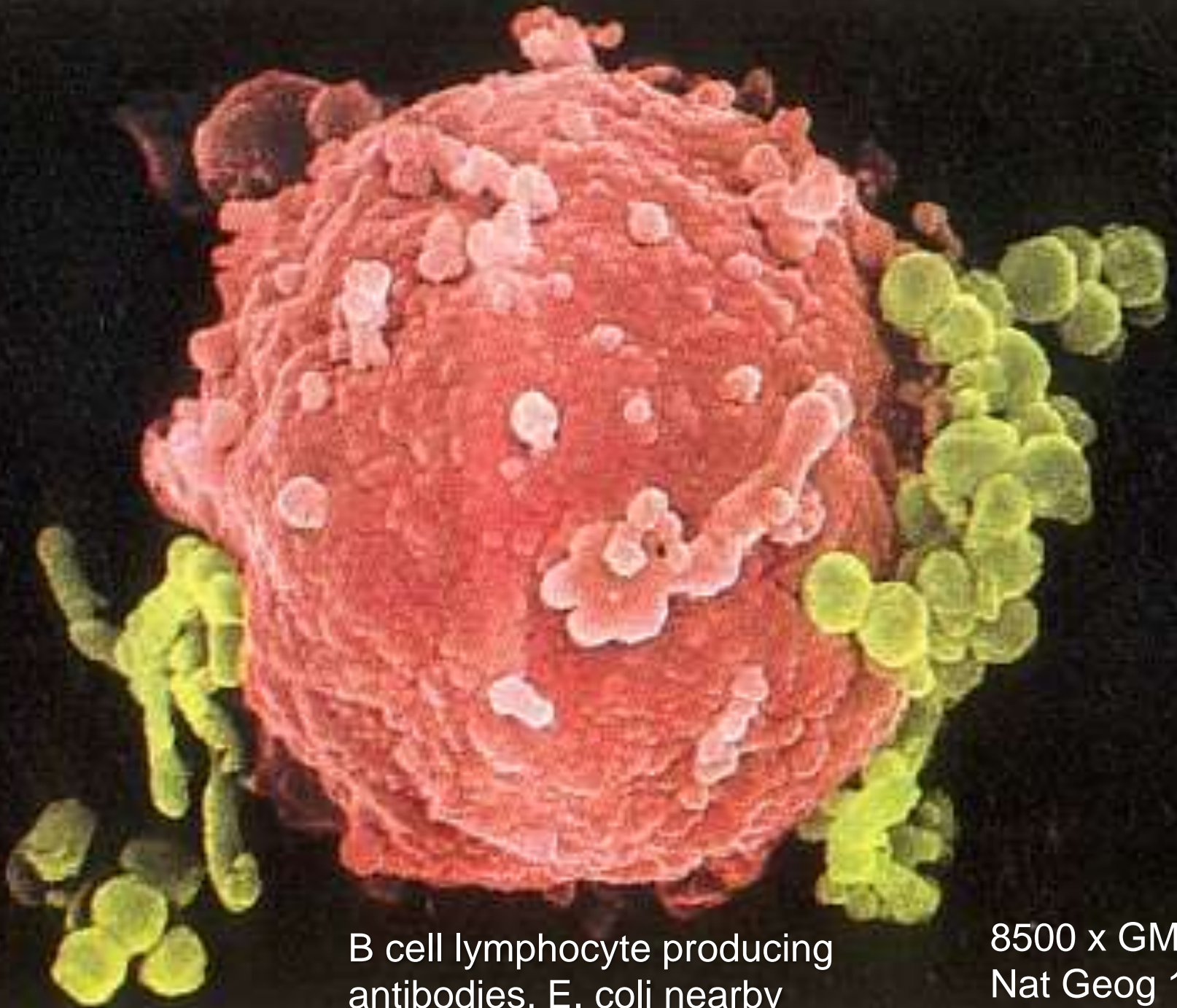


7000 x GMBH
Nat Geog 1986



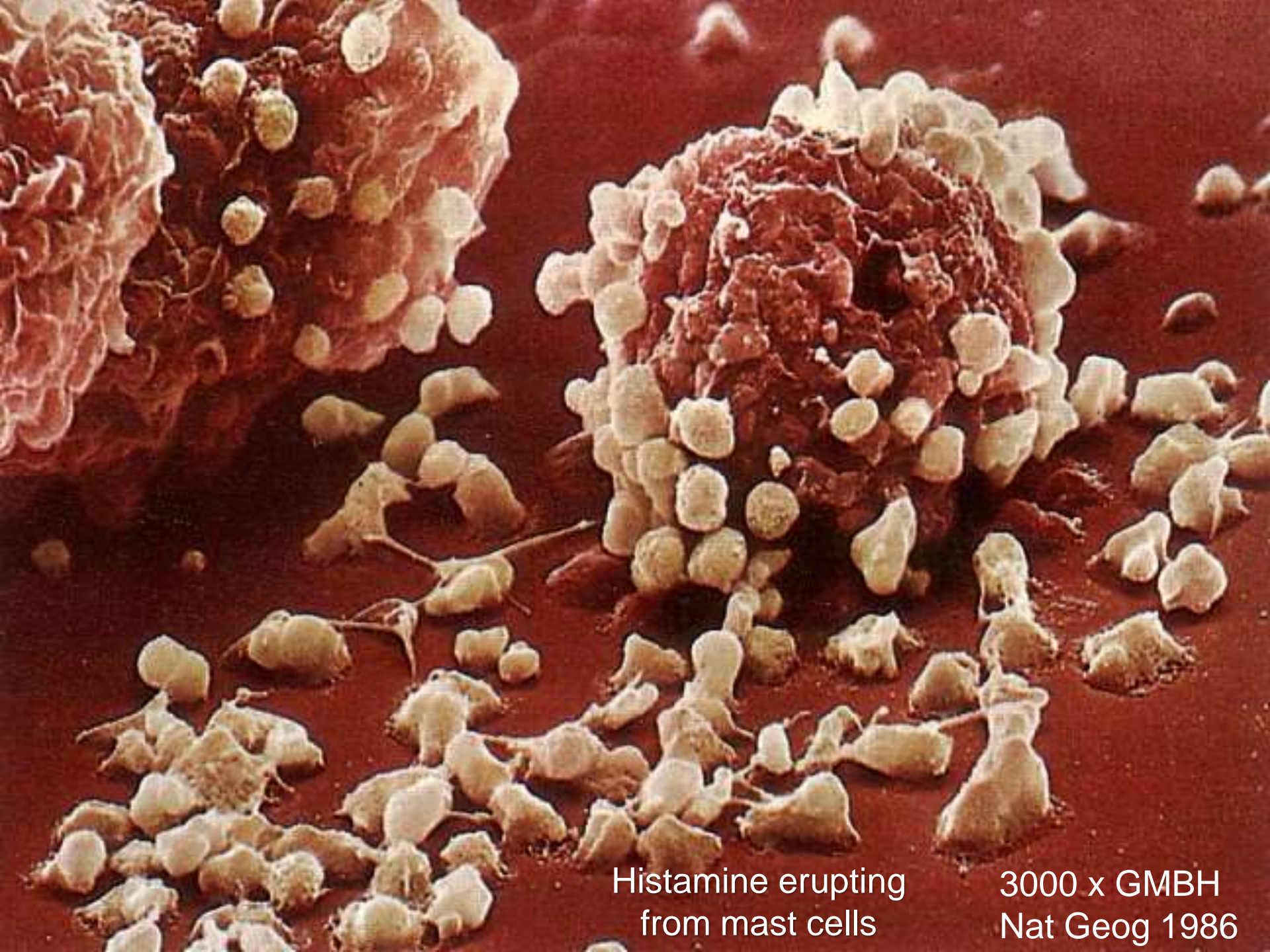
Pseudopods or false
feet to ensnare *E. coli*

6000 x GMBH
Nat Geog 1986



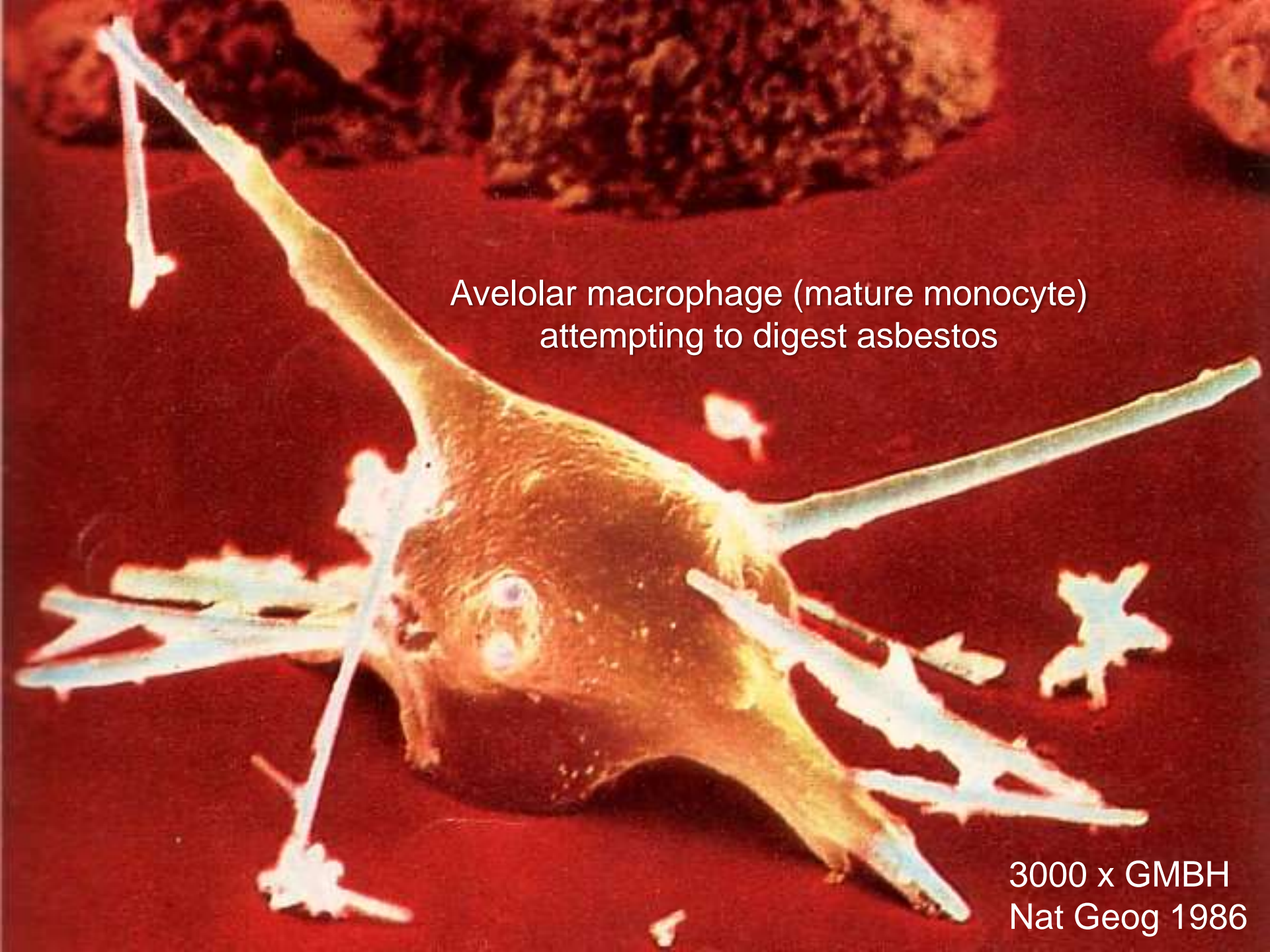
B cell lymphocyte producing antibodies, E. coli nearby

8500 x GMBH
Nat Geog 1986



Histamine erupting
from mast cells

3000 x GMBH
Nat Geog 1986

This electron micrograph shows a large, electron-dense alveolar macrophage (mature monocyte) in the center, surrounded by numerous thin, needle-shaped asbestos fibers. The macrophage has several long, thin processes extending outwards, some of which appear to be interacting with the fibers. The background is a dark, granular texture, likely representing the surrounding tissue or extracellular matrix. The overall scene illustrates the macrophage's attempt to engulf and digest these hazardous fibers.

Avelolar macrophage (mature monocyte)
attempting to digest asbestos

3000 x GMBH
Nat Geog 1986

Rhinovirus 14
attacking wbc



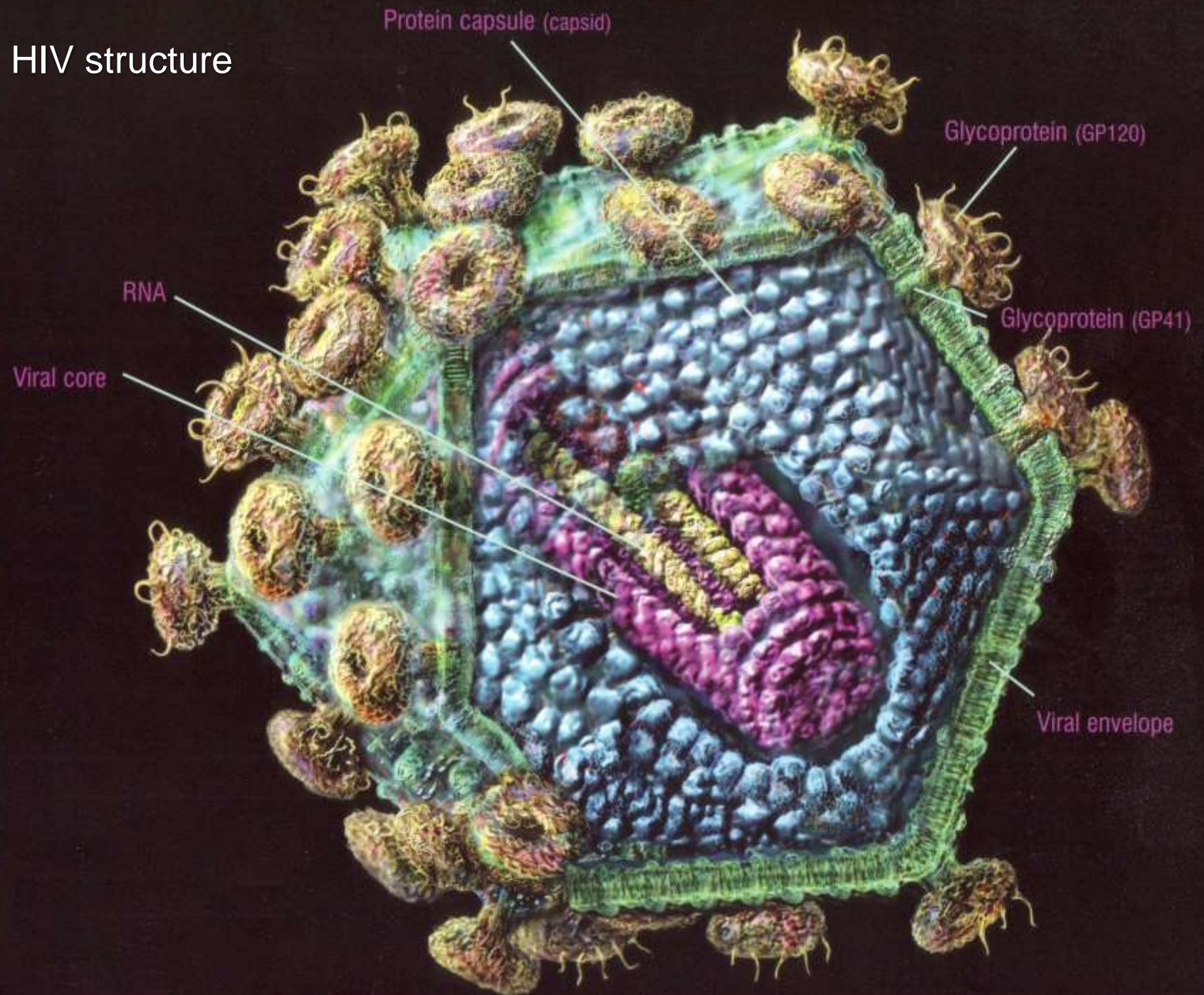
10,000 x GMBH
Nat Geog 1986

HIV attacking
T-helper cell
lymphocyte,
commander-
in-chief of the
immune
system



30,000 x GMBH
Nat Geog 1986

HIV structure



Dr. Louis Picker of OHSU on track to cure HIV!



[http://www.oregonlive.com/health/index.ssf/2015/11/
louis_pickers_hiv_vaccine_erad.html](http://www.oregonlive.com/health/index.ssf/2015/11/louis_pickers_hiv_vaccine_erad.html)

[http://www.oregonlive.com/health/index.ssf/2015/11/
superstar_scientist_dr_louis_p.html](http://www.oregonlive.com/health/index.ssf/2015/11/superstar_scientist_dr_louis_p.html)

<https://www.youtube.com/watch?v=ITwG6O9G81g>

Natural
killer cells
attacking
cancer cell

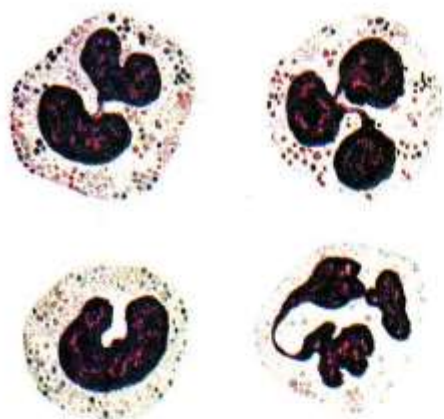


10,000 x GMBH
Nat Geog 1986

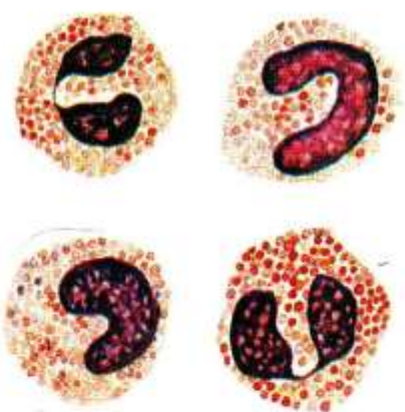
Lone killer
cell with
remnant
cytoskeleton



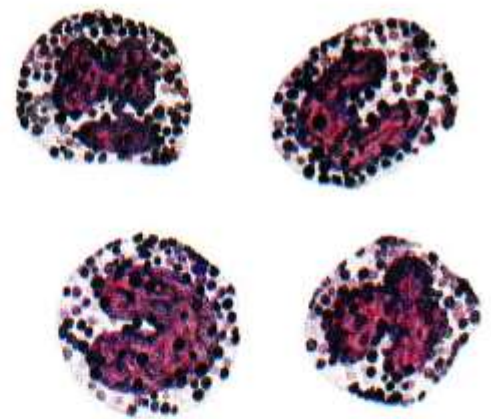
7000 x GMBH
Nat Geog 1986



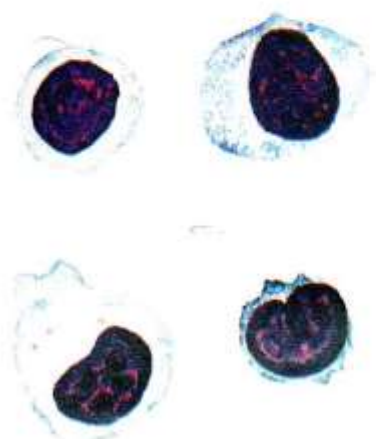
NEUTROPHILS



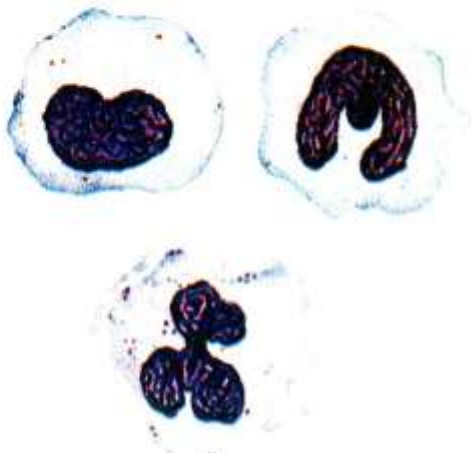
EOSINOPHILS



BASOPHILS



LYMPHOCYTES



MONOCYTES

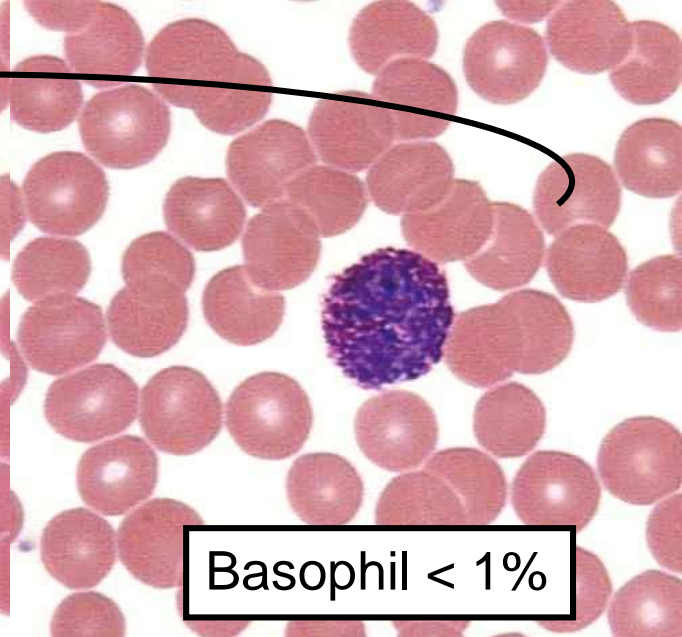
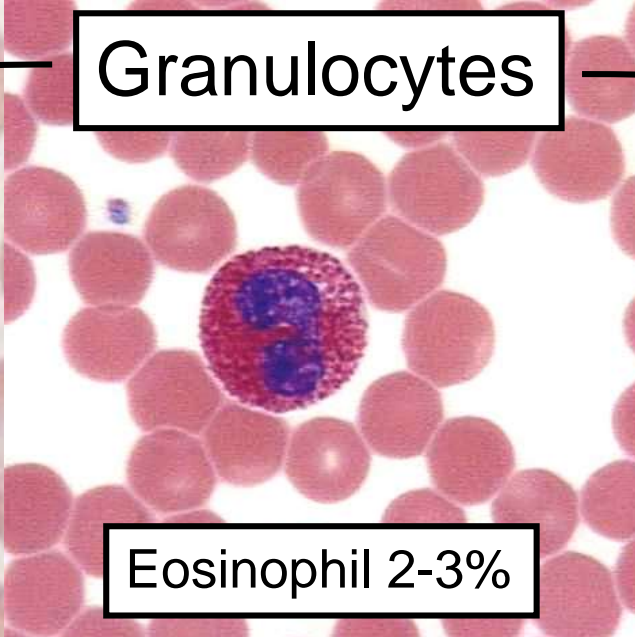
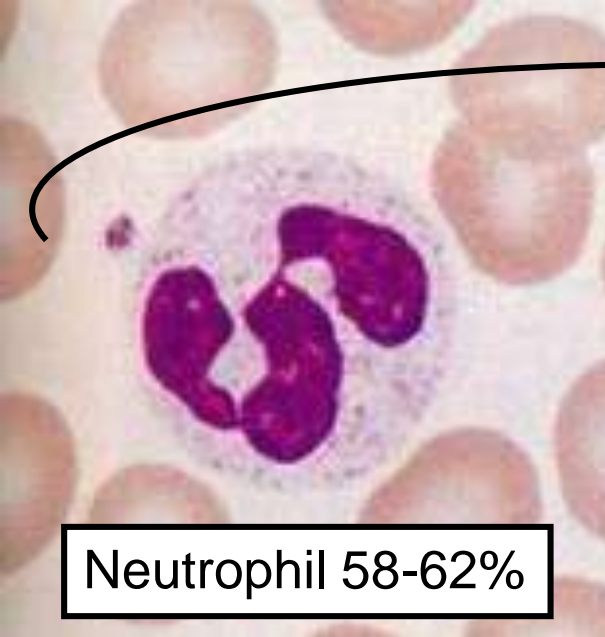


PLATELETS



ERYTHROCYTES

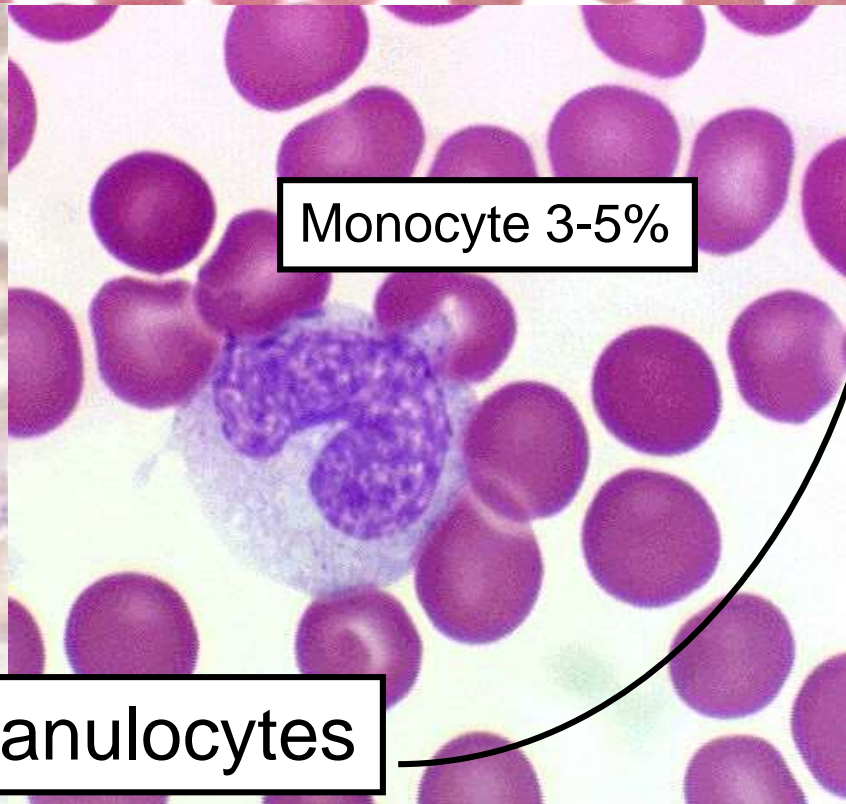
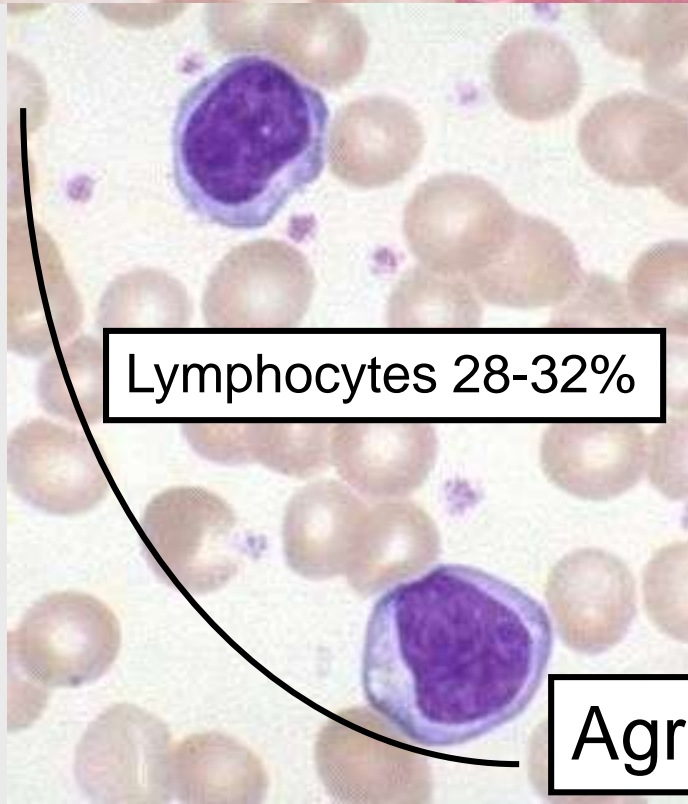
Granulocytes



Neutrophil 58-62%

Eosinophil 2-3%

Basophil < 1%



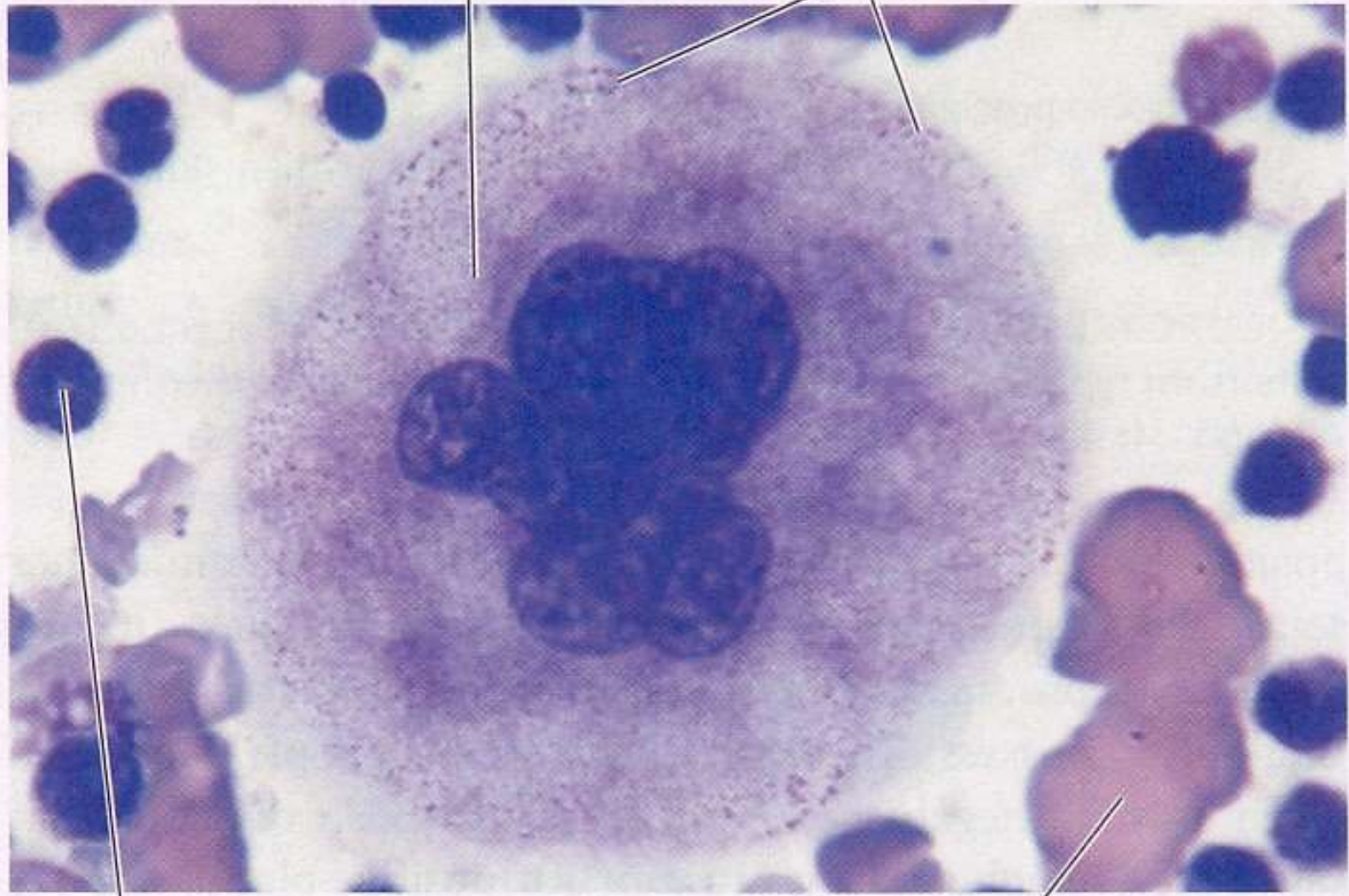
Lymphocytes 28-32%

Monocyte 3-5%

Agranulocytes

Megakaryocyte

Clusters of platelets
about to shed off



Developing
leukocyte

Cluster of developing
erythrocytes

Carolina Biological/Visuals Unlimited

Break for discussion/questions!



***No food, drink or gum in lab!
Thanks sincerely!***



...Healthy, tasty & fresh, but not in lab!!





Hand-washing

The right way to wash your hands:

Thoroughly wash with soap and warm running water — rubbing your hands together for at least 10 seconds.

Hand-washing is the single most effective thing you can do to reduce the spread of colds and other infectious disease.

It's not necessary to use anti-bacterial soaps when washing up. Regular soap and water do the job just fine.

Also, using germicidal soaps too often may produce antibiotic-resistant bacteria.

Source: Hospital Infections Program, U.S. Centers for Disease Control and Prevention



NB: Happy Birthday Song 20-30 sec!!



<http://www.squidsoap.com/>

PREPARATION



WASH & DRY



ALCOHOL



SAMPLE+TESTS



1

OBTAIN μ SAMPLE



2

BLOOD GLUCOSE



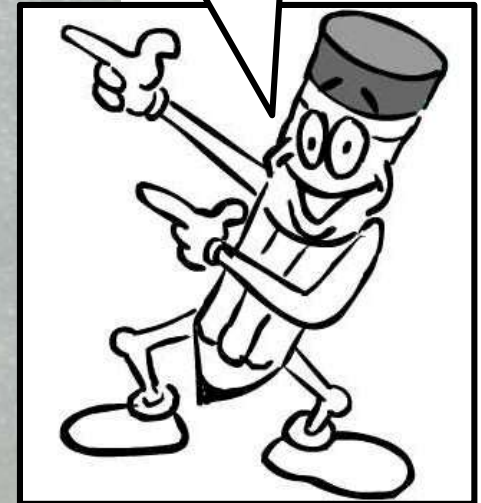
3

BLOOD TYPING

Glucose:
Sugar in Blood

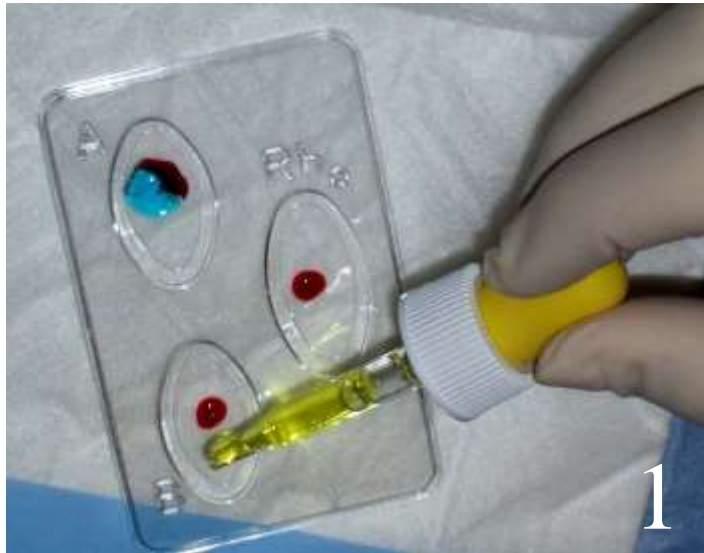


**NB: Read
& Record!**

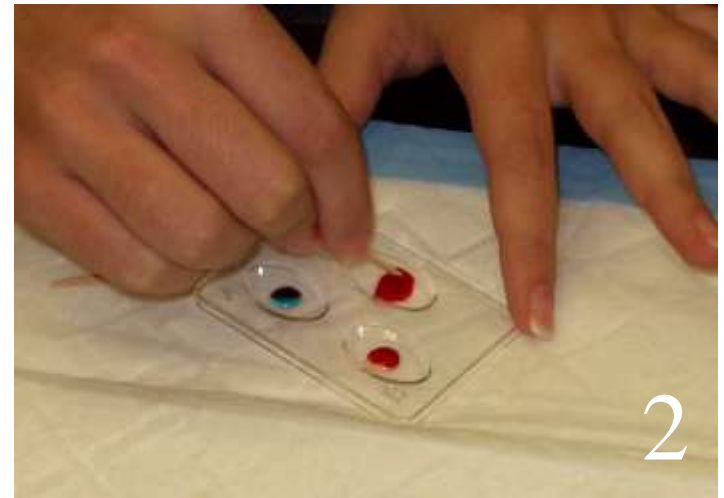


Normal: 70-99
Pre-Diabetes: 100-125
Diabetes: \geq 126 mg/dL

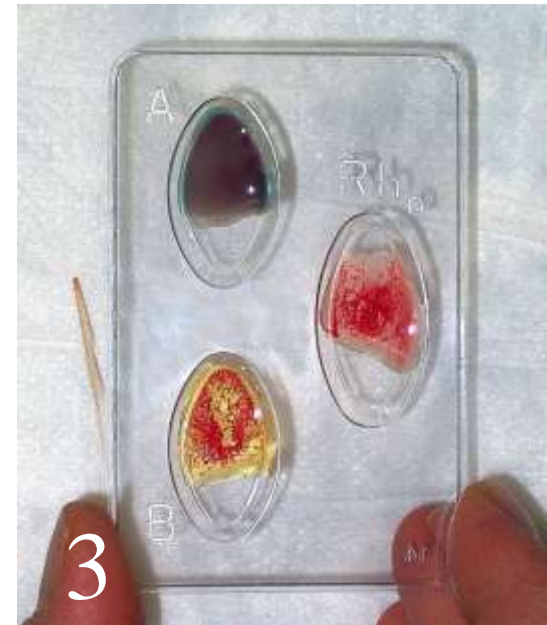
BLOOD TYPING



ADD ANTISERA



MIX W/TOOTHPICKS



READ & RECORD!!

1^o Q? Clumping in Any Wells?

Type AB+

Here?

Here?

Here?



CLEAN-UP!



1 FOLD DIAPER



2 BLOOD PRODUCTS

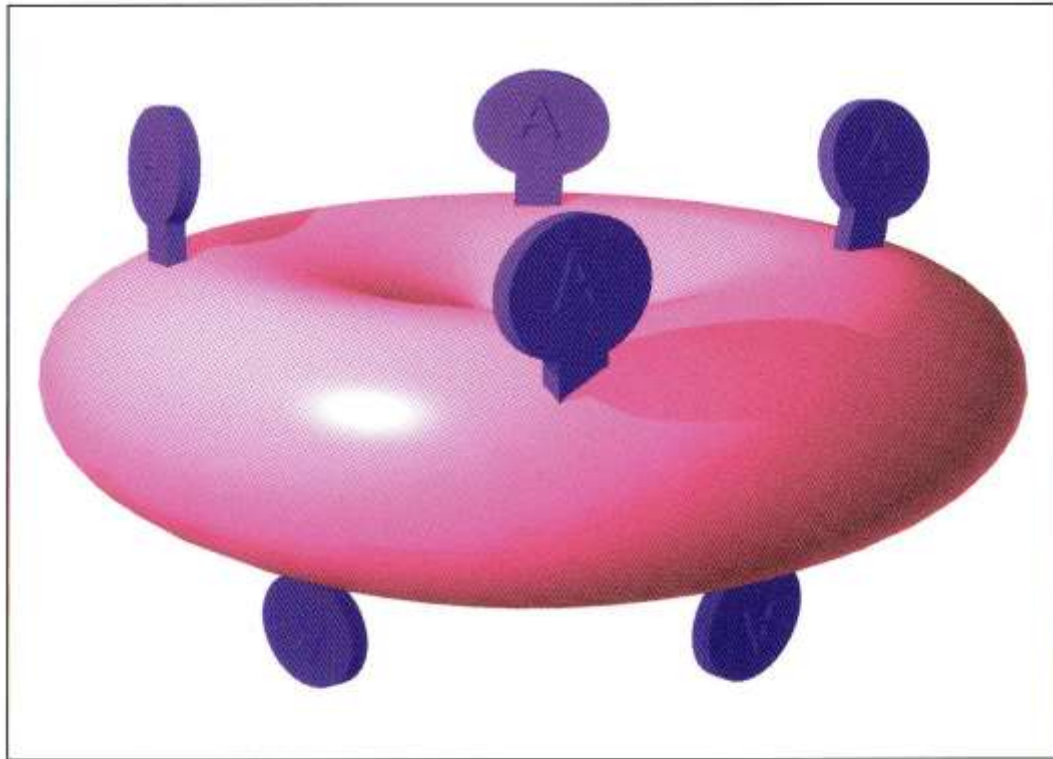


3 REWASH!!

Blood Chem Lab Q?

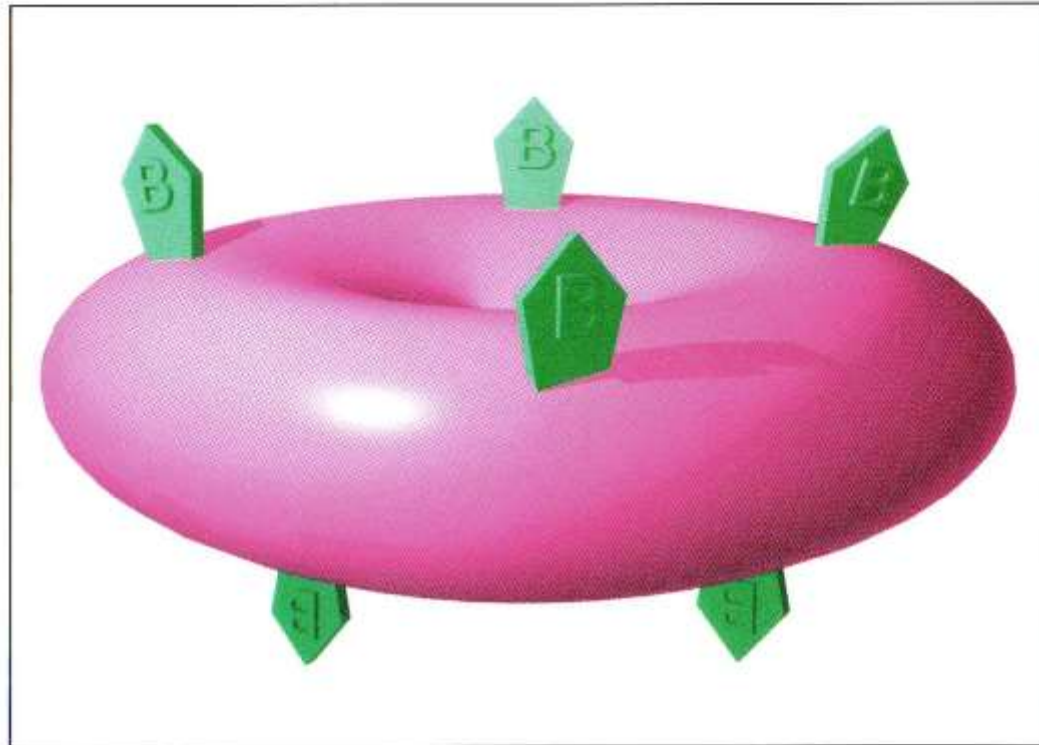


A



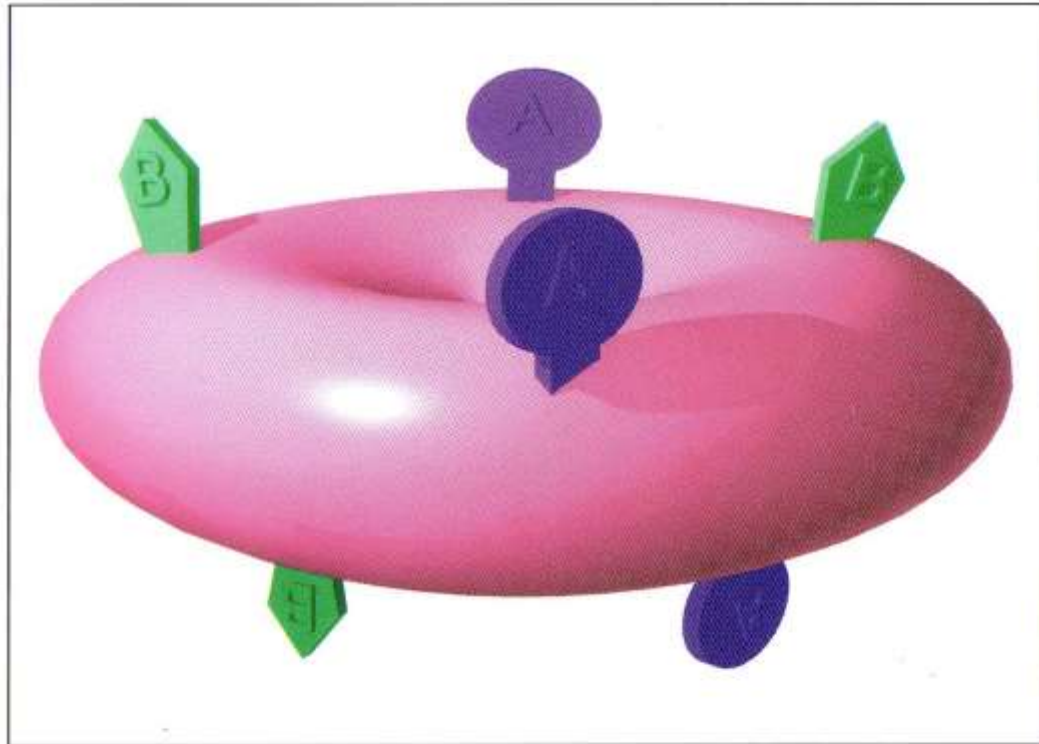
A Antigens
(Agglutinogens)

B



B Antigens
(Agglutinogens)

AB



A & B Antigens
(Agglutinogens)

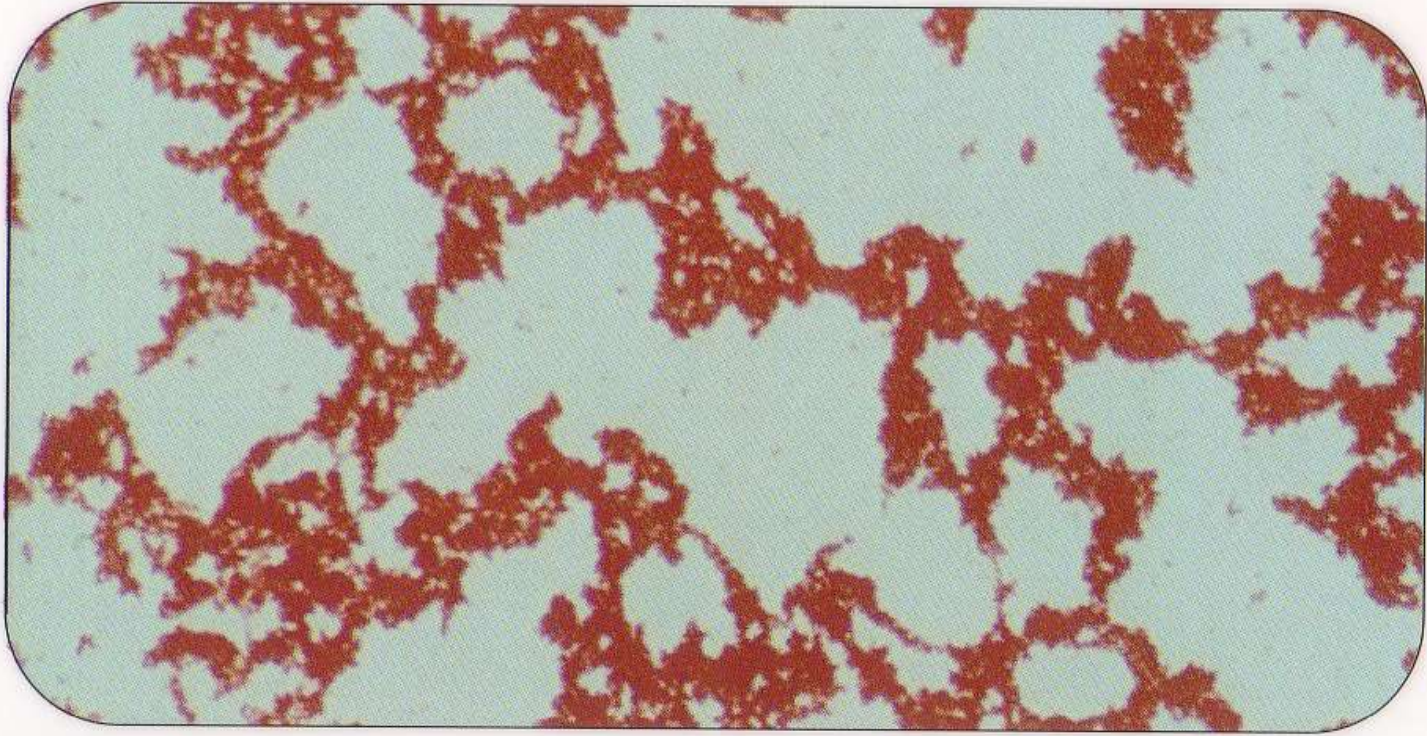


No Antigens
(Agglutinogens)

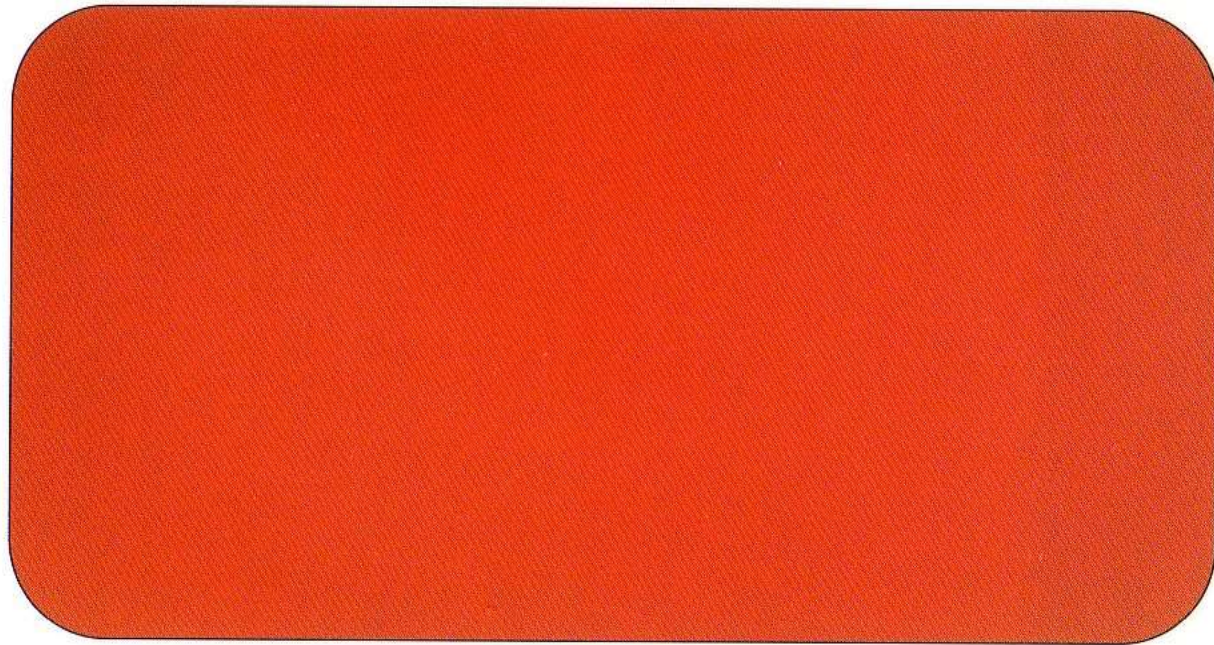


A Antibodies

(Agglutinins)

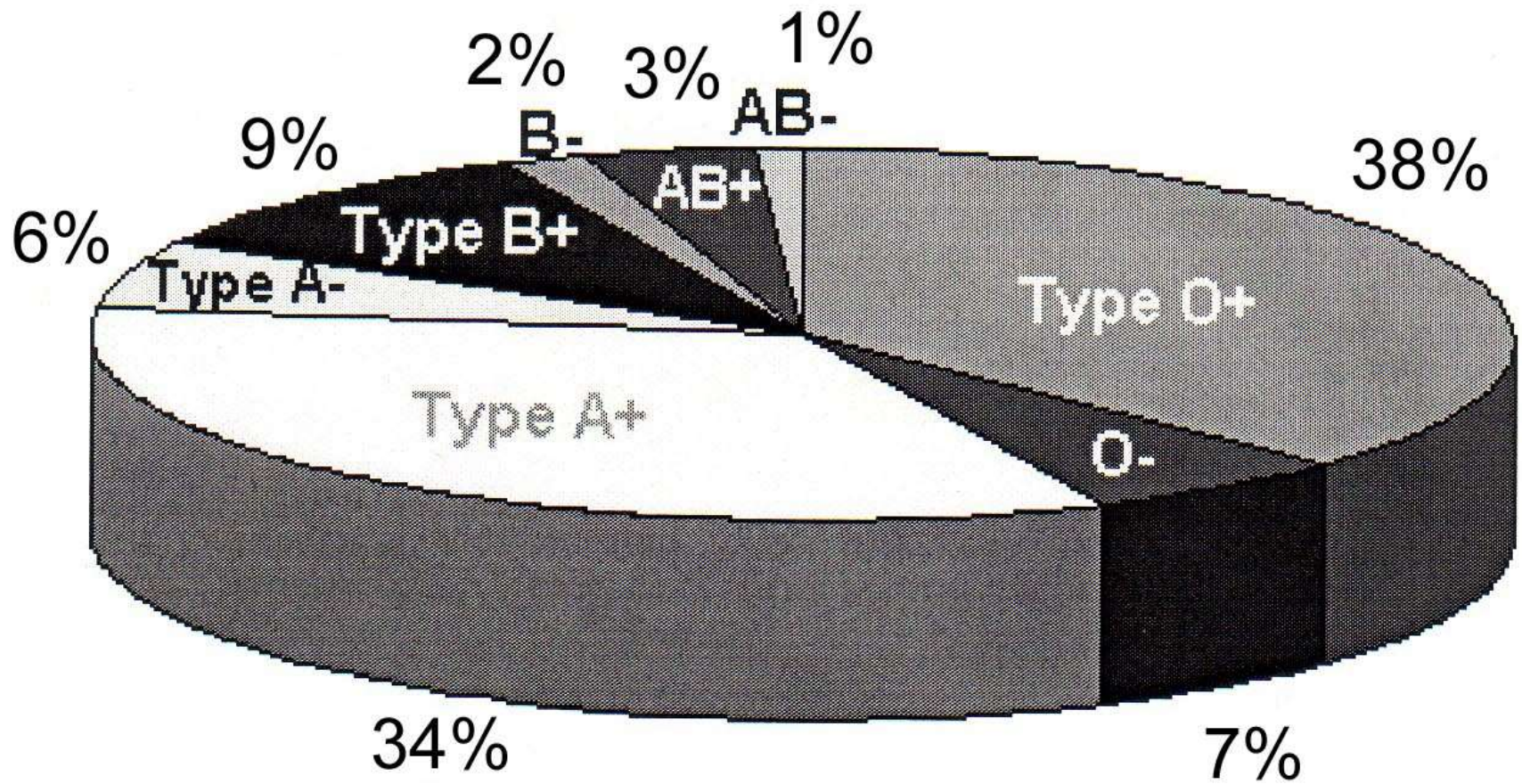


Clumping with
anti-A serum



No Clumping with
anti-A serum

Blood Type Distribution, General Population

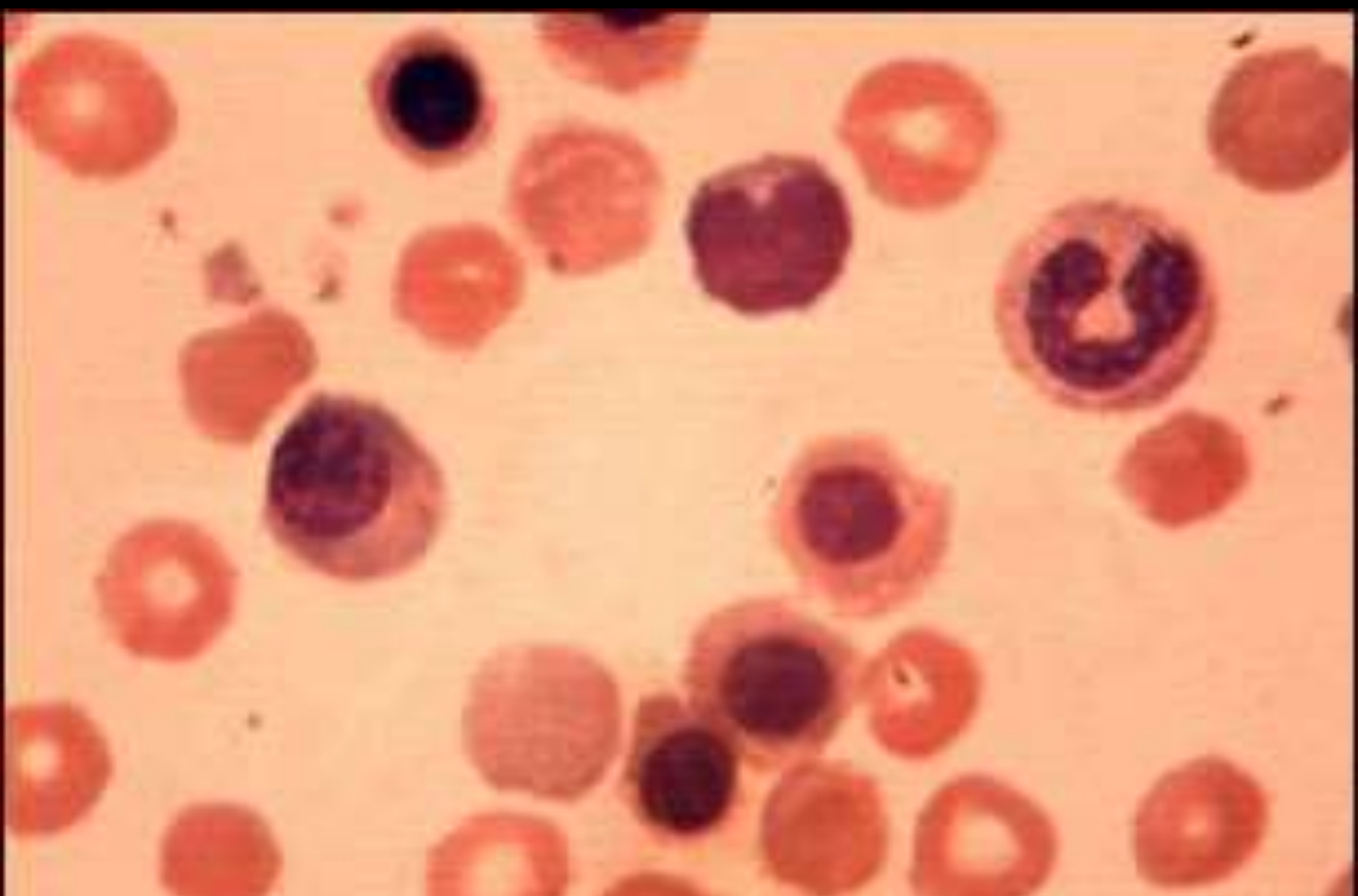


Erythroblastosis Fetalis?

eg, *Rh-* mom
Rh+ baby

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

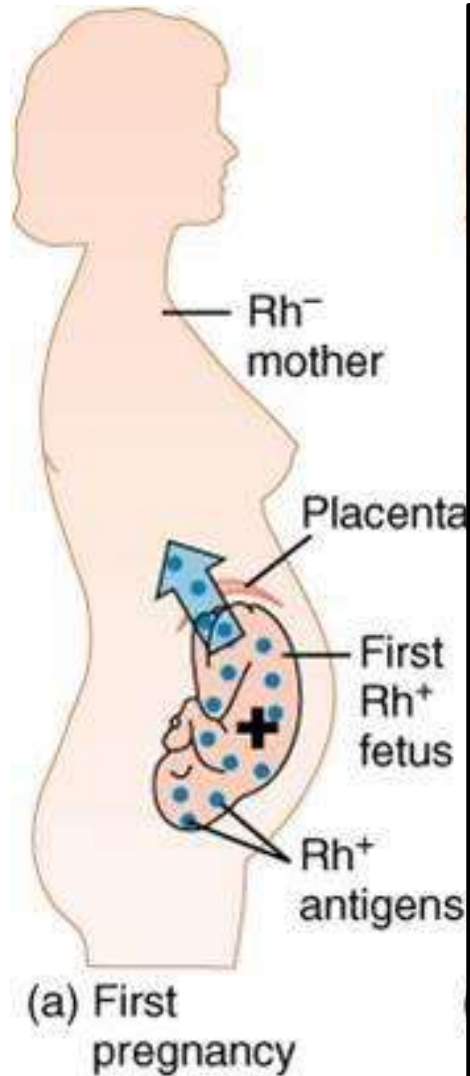
[http://www.nlm.nih.gov/MEDLINEPLUS/ency/article/001298
.htm#Alternative%20Names](http://www.nlm.nih.gov/MEDLINEPLUS/ency/article/001298.htm#Alternative%20Names)



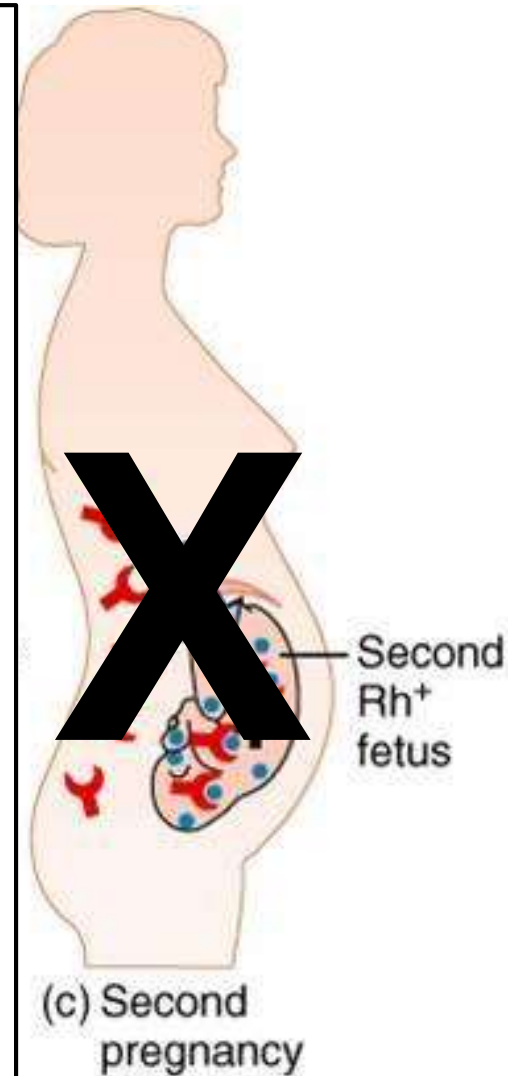
[http://www.nlm.nih.gov/medlineplus/ency/
imagepages/1665.htm](http://www.nlm.nih.gov/medlineplus/ency/imagepages/1665.htm)

 ADAM

Erythroblastosis Fetalis or Hemolytic Disease of the Unborn/Newborn



***Throw
Blanket
Over
This
Step!***

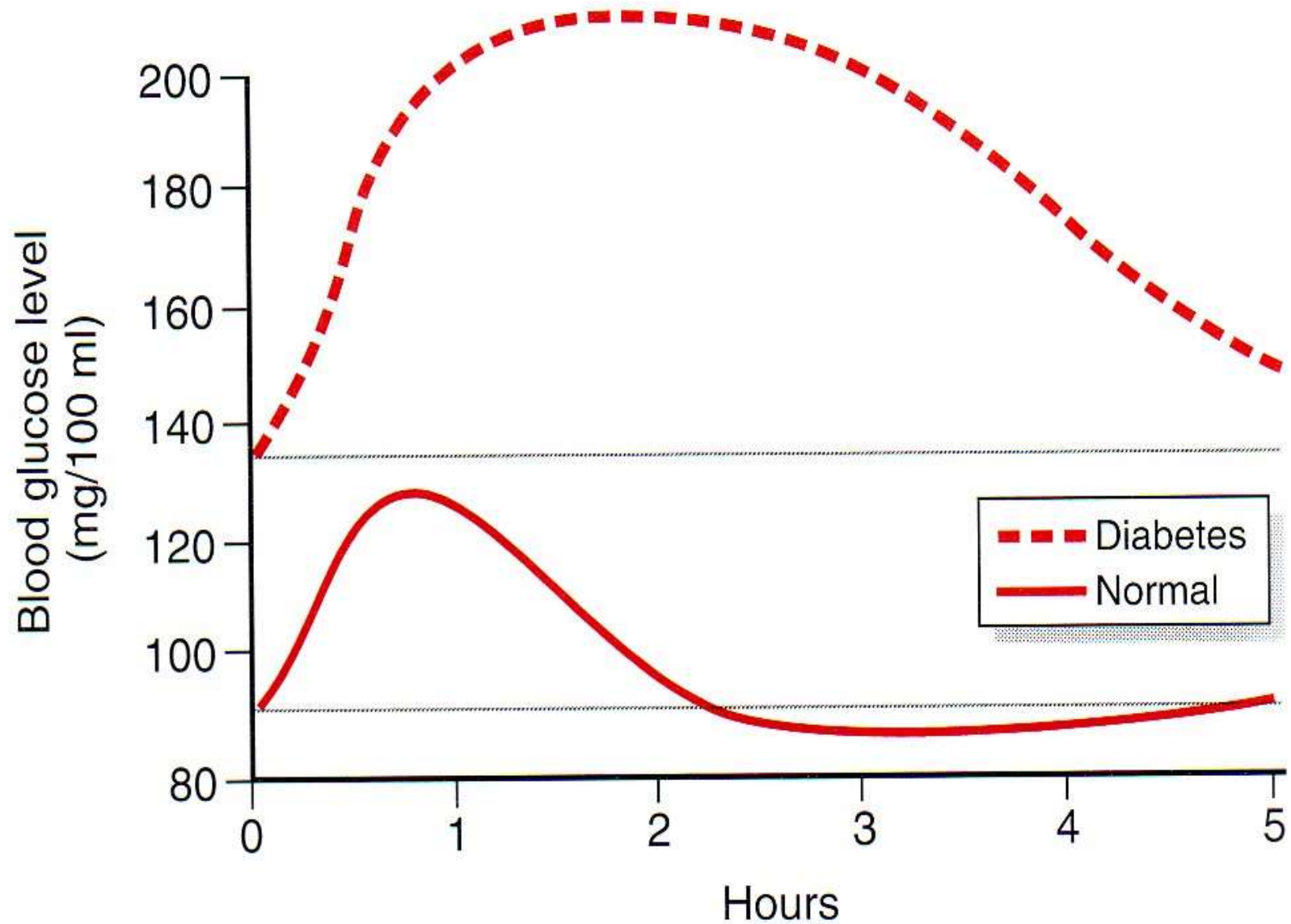


**Inject Mom with RhoGam \leq 48-72 hr
> each Rh+ Pregnancy**



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

Diabetic & Normal Response to Glucose Load



Proinsulin with C-Connecting Peptide

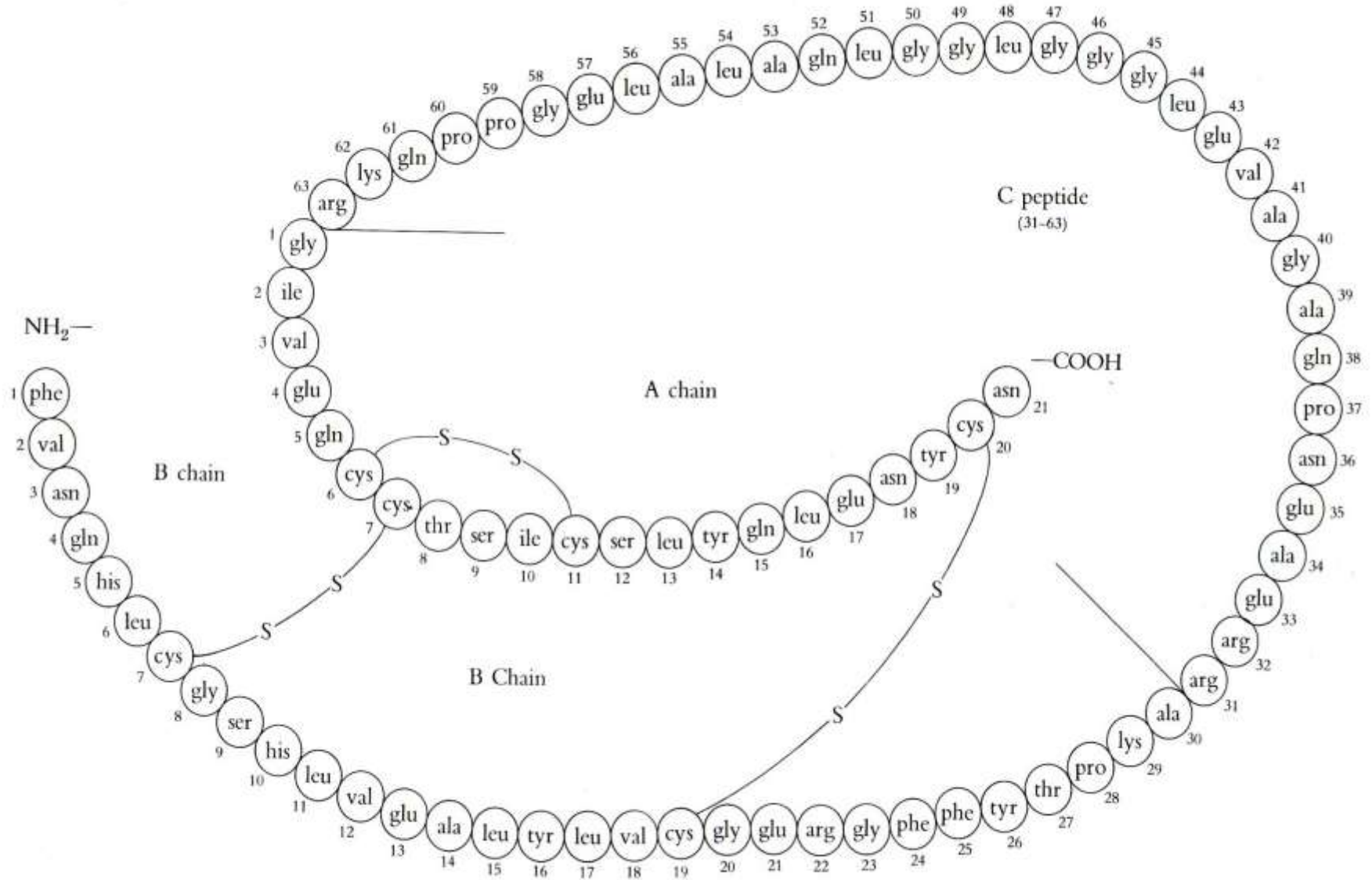
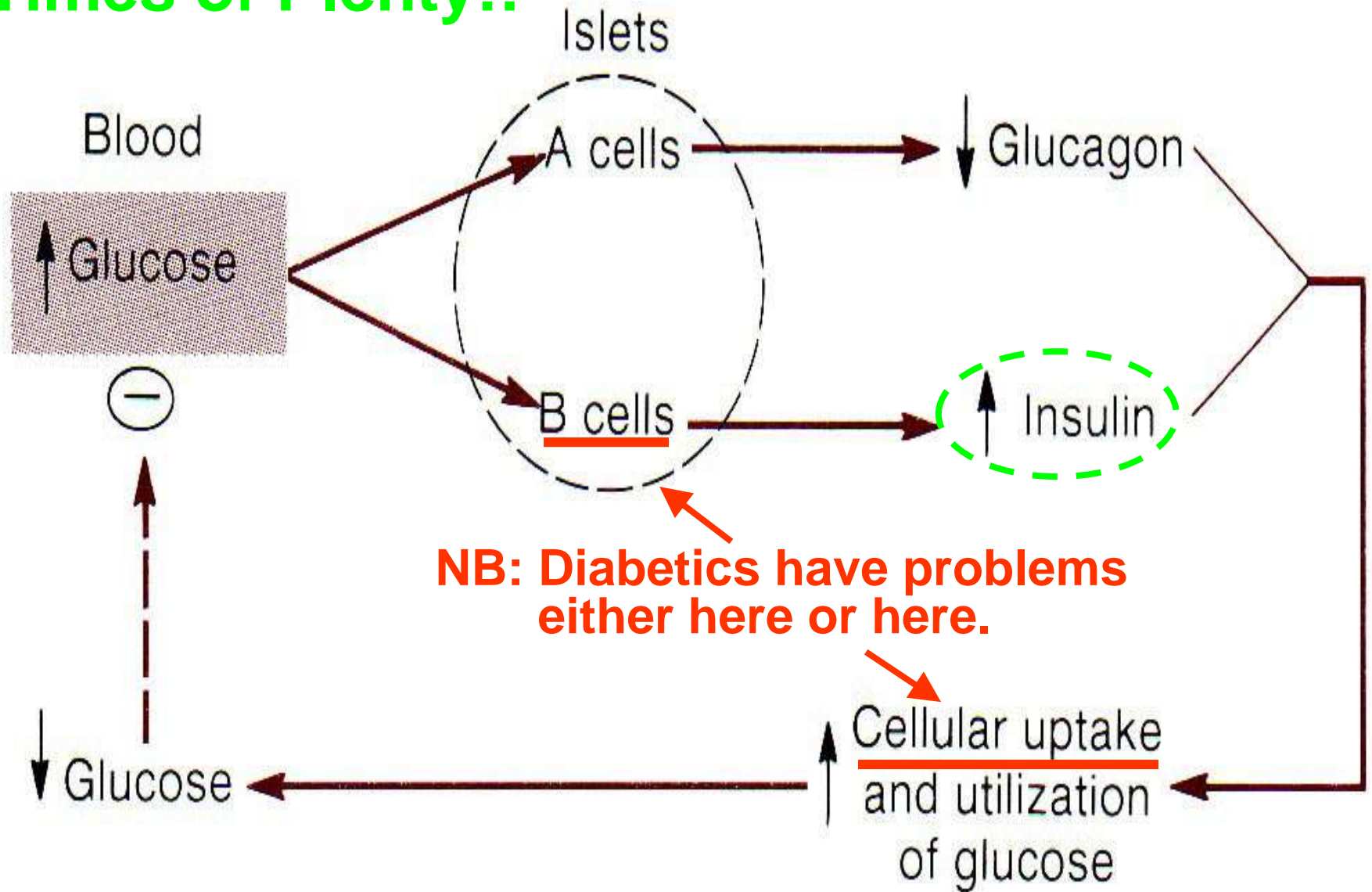


FIG. 10-4. Amino acid sequence of a mammalian proinsulin molecule. Note how the insulin molecule can be formed by cleaving this polypeptide chain at two locations to liberate the C peptide.

Times of Plenty!!



NB: Diabetics have problems either here or here.

Cellular uptake and utilization of glucose

Store!

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)

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

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

Medication



Exercise

Diet

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



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



WOW!



SUPER



~ TOP 5-10!

EXCELLENT!!



~ TOP 15!

GREAT EFFORT



~ TOP 20-25!