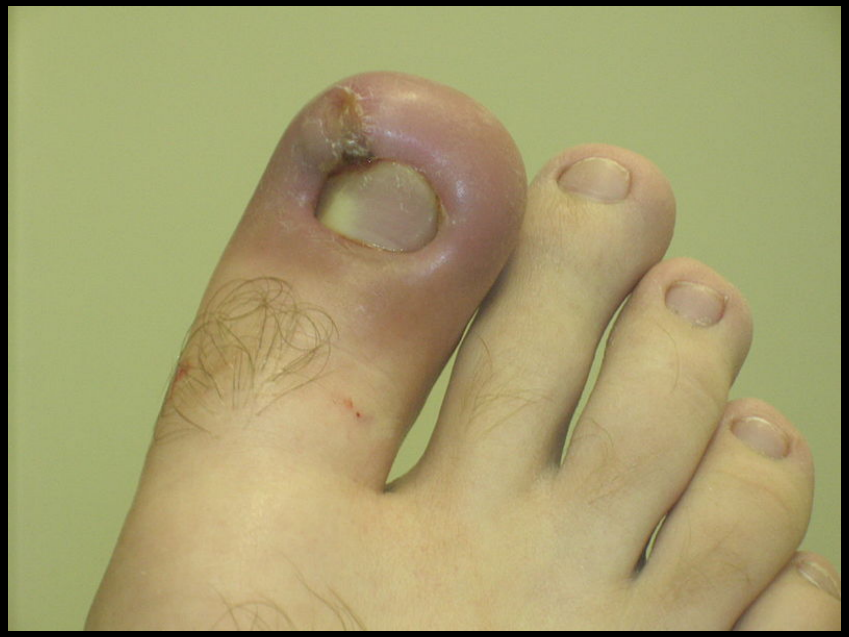
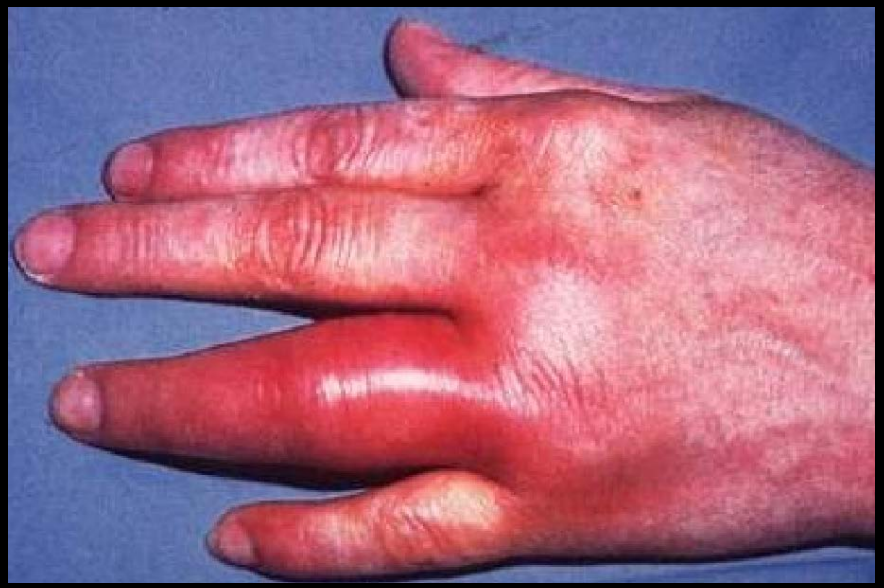
Immune System

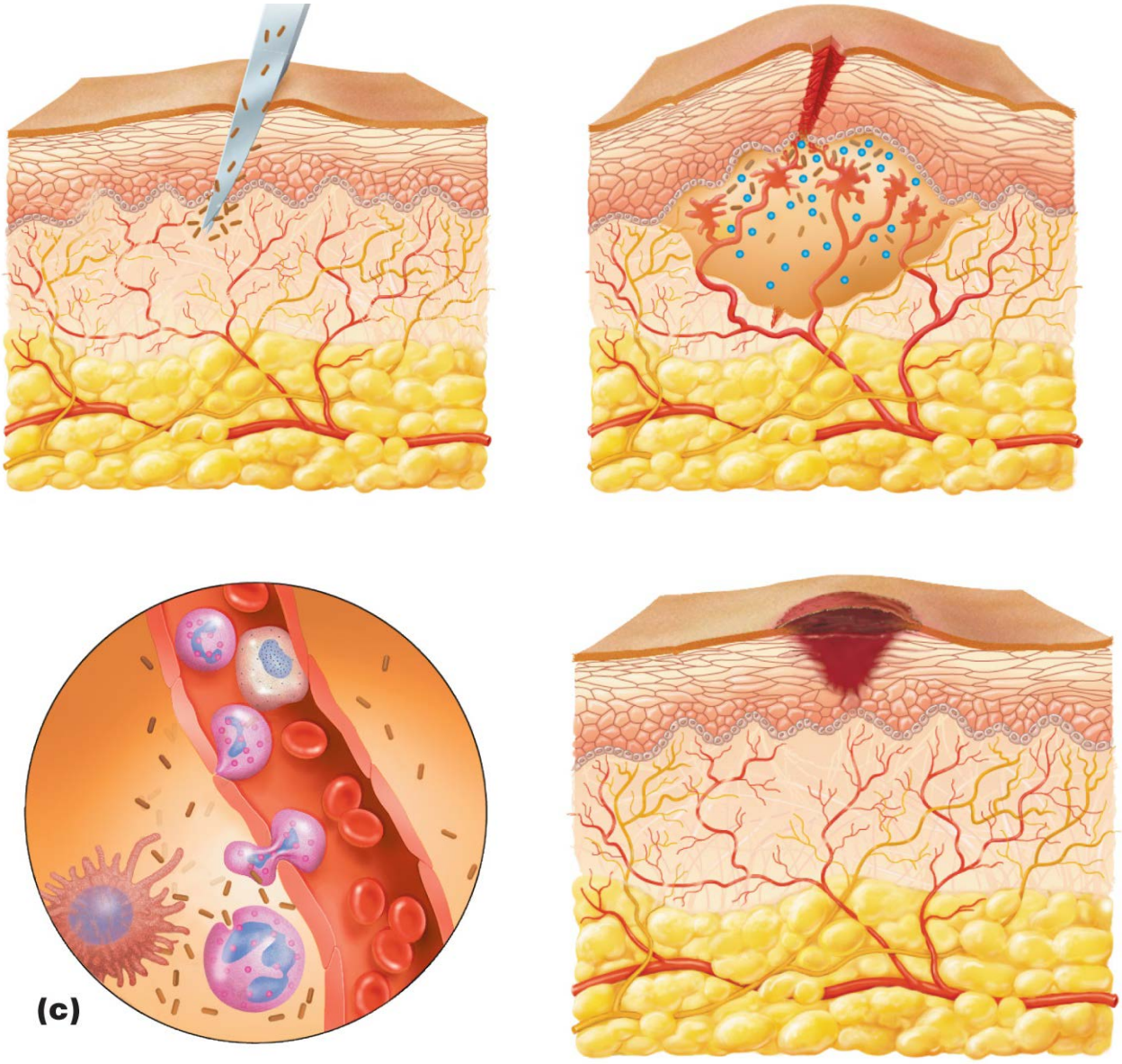
Inflammation





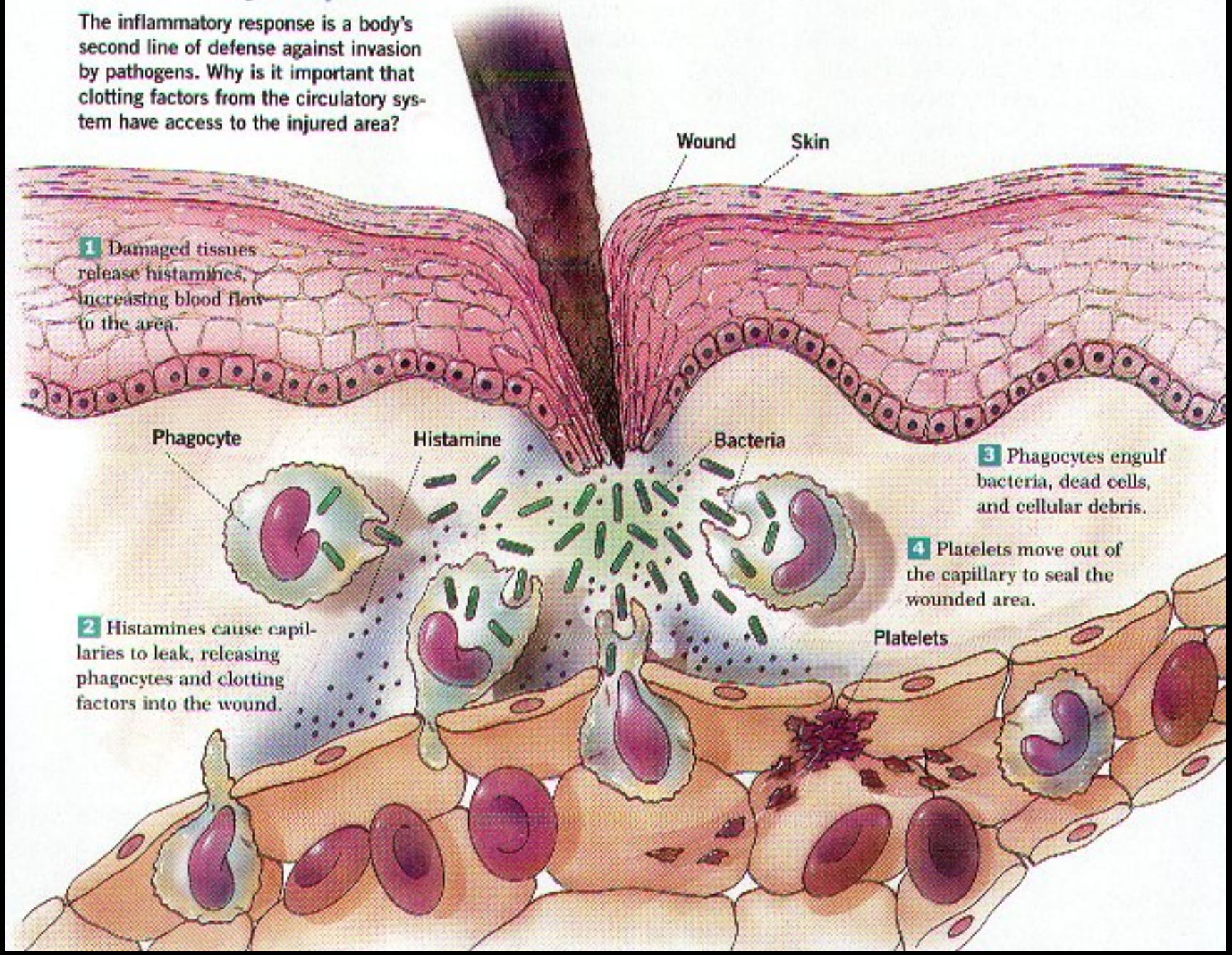
clinicalscienceblogbabongile.files.wordpress.com, Wikipedia.com

Inflammation

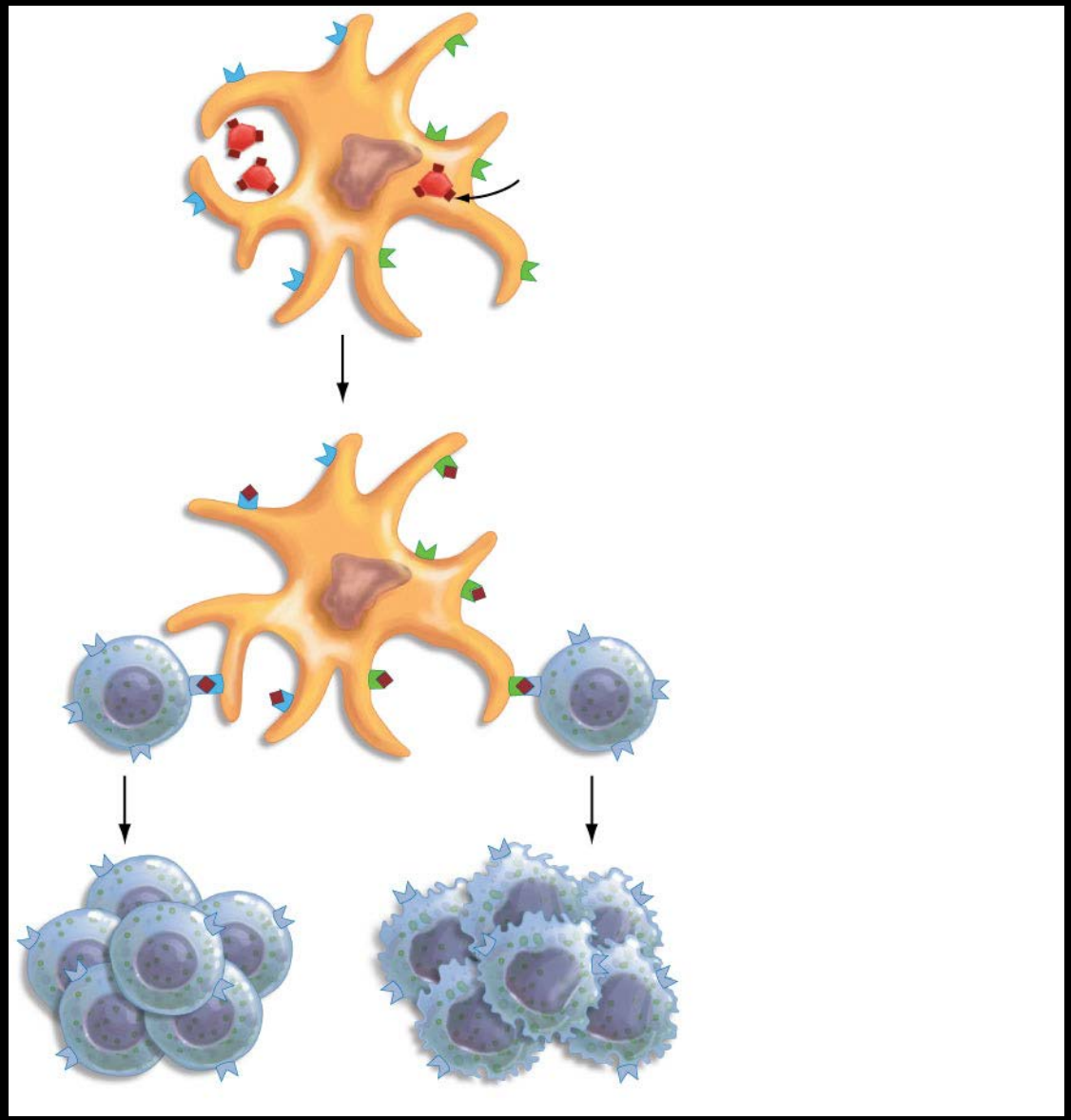


Steps of the Inflammatory Response

The inflammatory response is a body's second line of defense against invasion by pathogens. Why is it important that clotting factors from the circulatory system have access to the injured area?



Cell-mediated Immunity

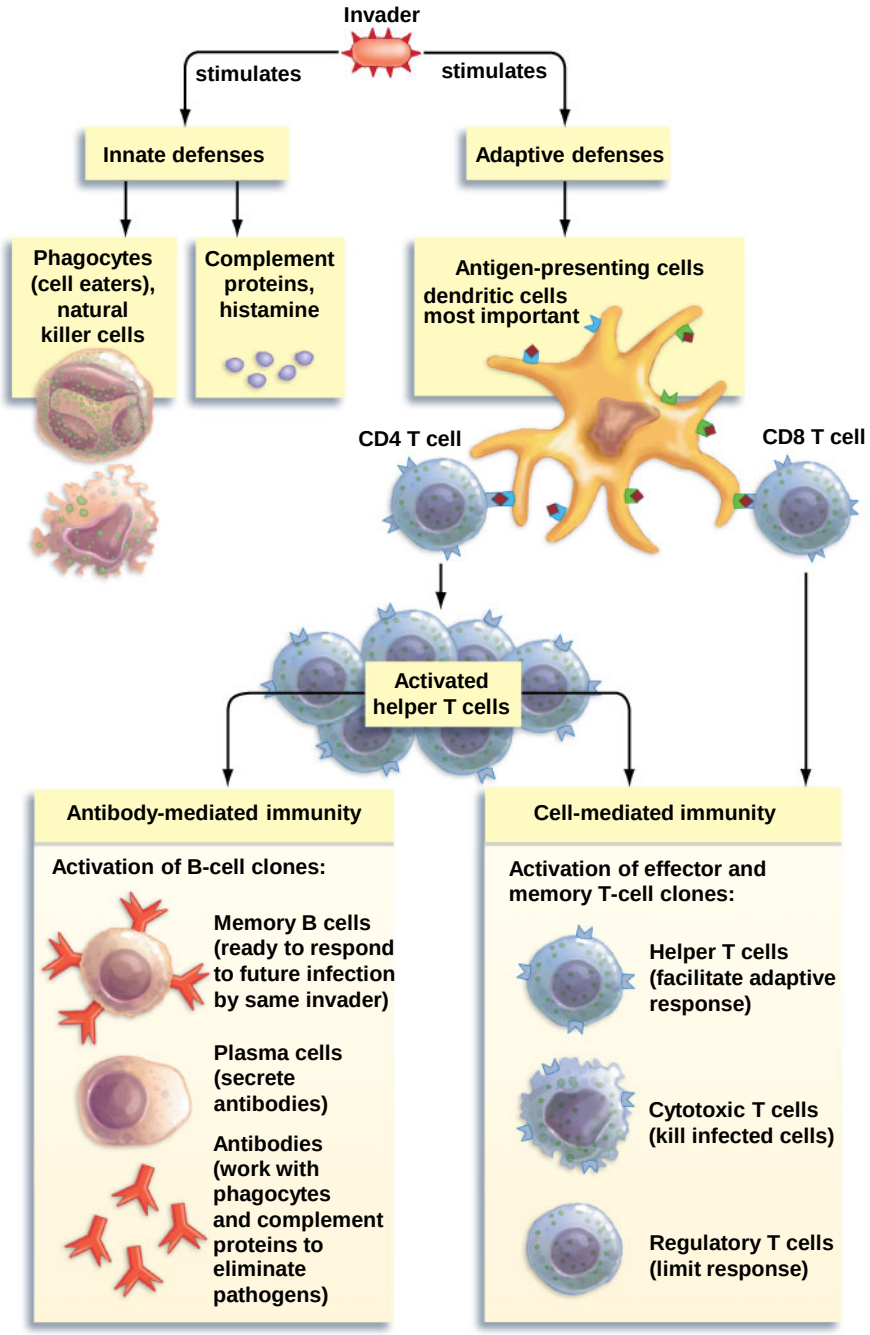


helper T cells

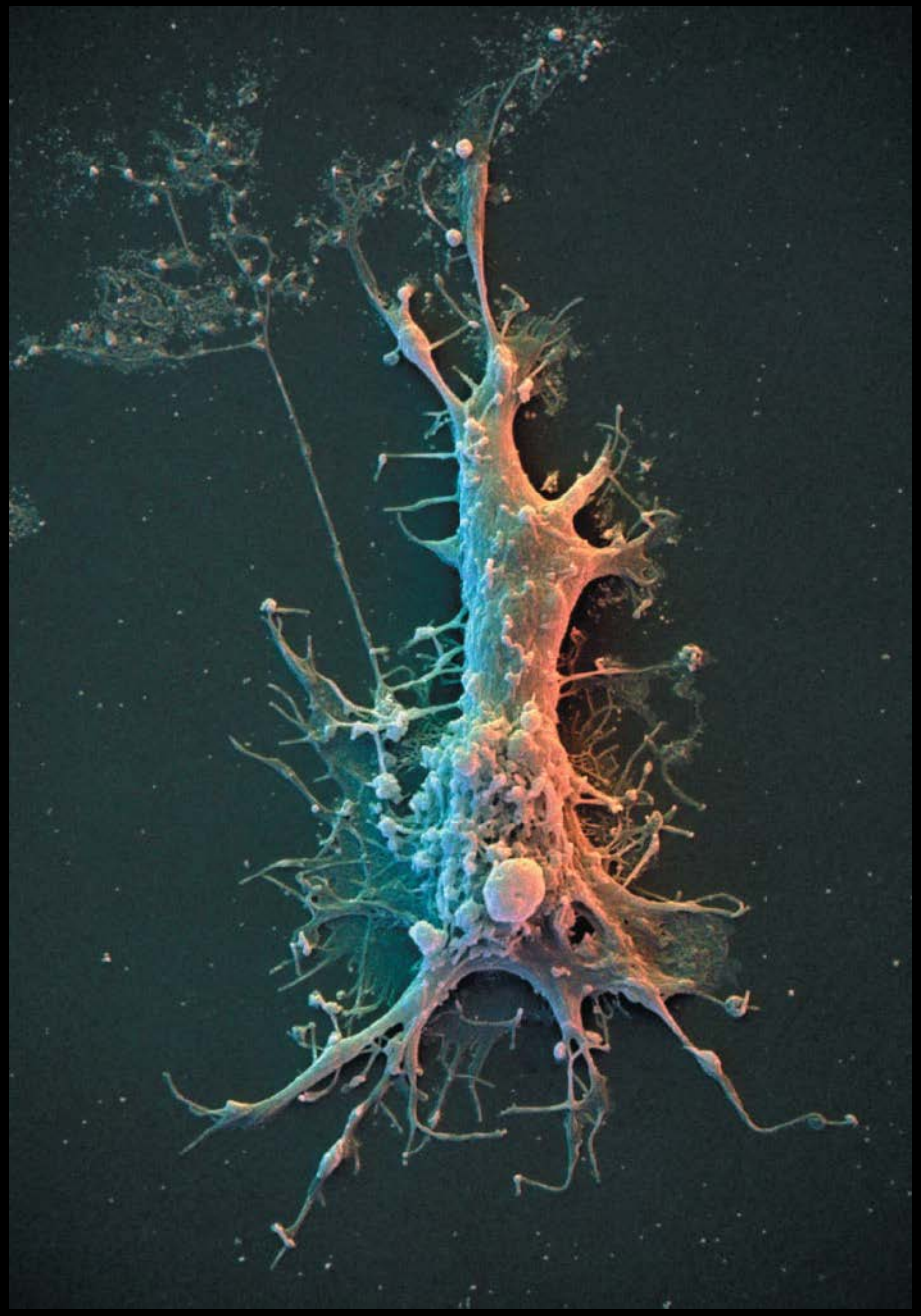
cytotoxic (killer) T cells

Figure 29.7

Cell-mediated Immunity



Dendritic cell



Charlie Chaplin in "The Rink" (1916)
1min. in

Figure 29.6

Immune System Explained:
https://www.youtube.com/watch?v=zQGOcOUBi6s

Protective Immunity

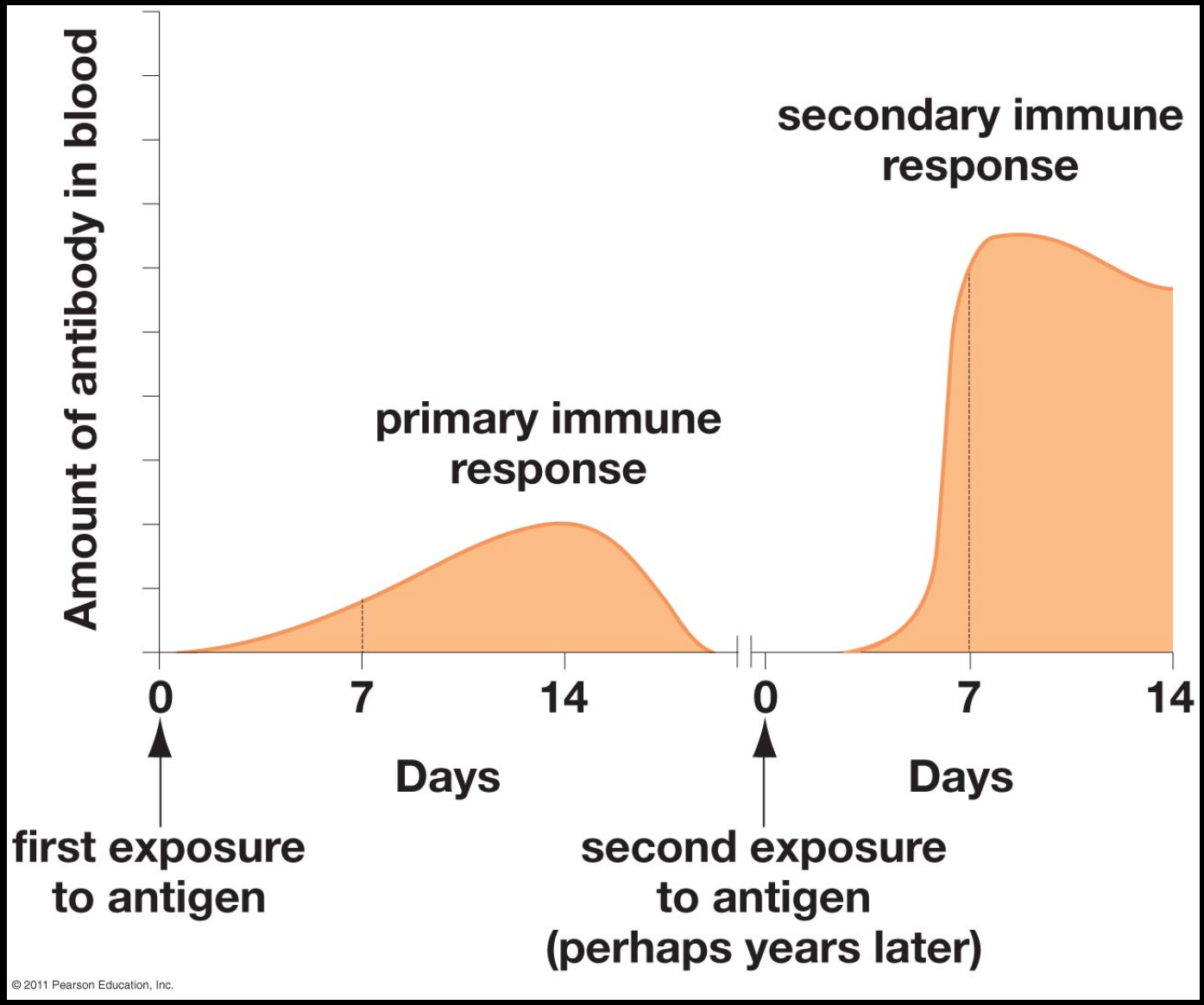
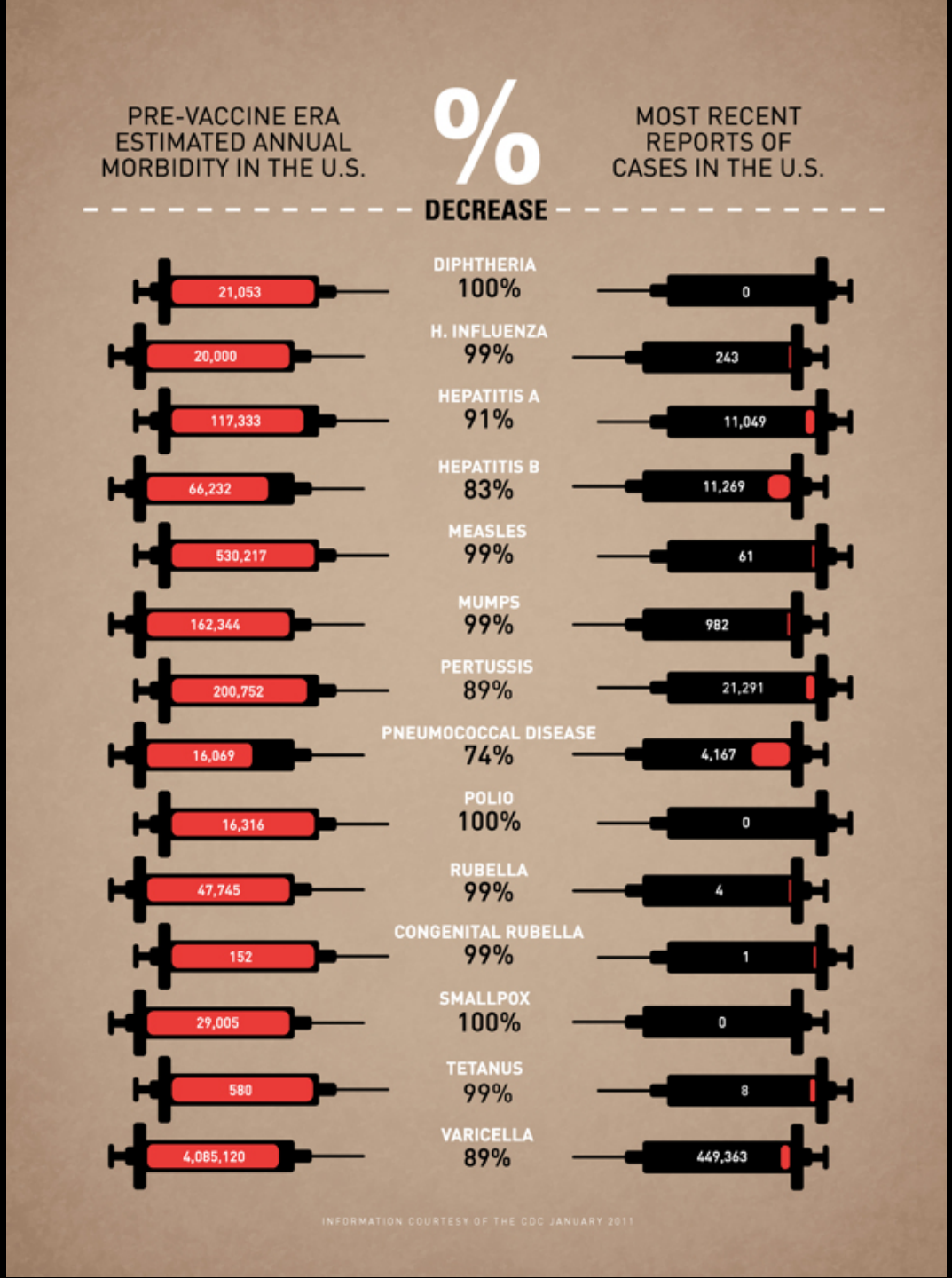


Figure 29.8

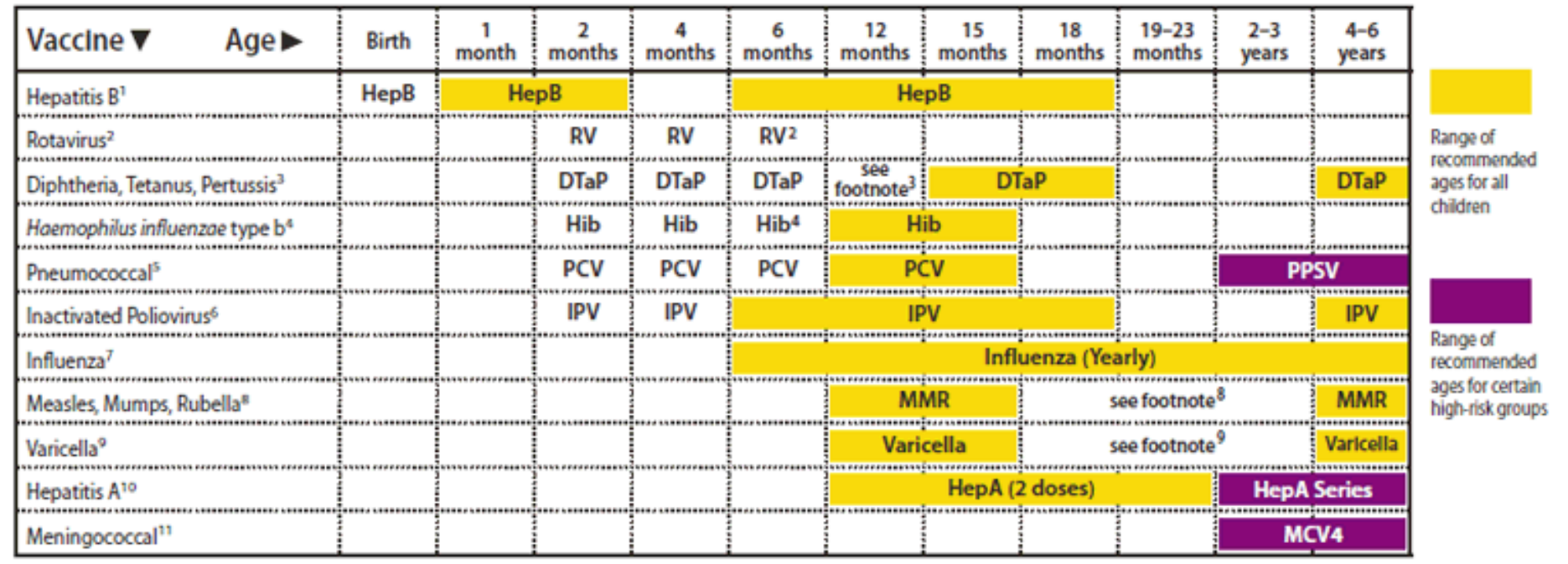
Vaccines


VACCINES DON'T KILL PEOPLE.
DIPHTHERIA
HAEMOPHILUS INFLUENZAE
HEPATITIS A
HEPATITIS B
HUMAN PAPILLOMAVIRUS
H1N1
INFLUENZA
MEASLES
MENINGITIS
MUMPS
PERTUSSIS
PNEUMOCOCCAL DISEASE
POLIO
ROTAVIRUS
RUBELLA
TETANUS
VARICELLA
DO.
www.SkepticalLibertarian.com



behance.net, CDC.gov

Vaccine schedule



Vaccine ▼ Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B[1]	HepB	HepB			HepB						
Rotavirus[2]			RV	RV	RV[2]						
Diphtheria, Tetanus, Pertussis[3]			DTaP	DTaP	DTaP	see footnote[3]	DTaP				DTaP
Haemophilus influenzae type b[4]			Hib	Hib	Hib[4]	Hib					
Pneumococcal[5]			PCV	PCV	PCV	PCV				PPSV	
Inactivated Poliovirus[6]			IPV	IPV	IPV						IPV
Influenza[7]					Influenza (Yearly)						
Measles, Mumps, Rubella[8]						MMR		see footnote[8]			MMR
Varicella[9]						Varicella		see footnote[9]			Varicella
Hepatitis A[10]						HepA (2 doses)				HepA Series	
Meningococcal[11]										MCV4	

Range of recommended ages for all children

Range of recommended ages for certain high-risk groups

[Whooping cough / Pertussis]

http://www.cfr.org/interactives/GH_Vaccine_Map/#map

https://youtu.be/o65l1YAVaYc

cdc.gov

Immune System (Ch. 29):

(Eventually) be able to:

1. describe what Edward Jenner did to perform his first vaccination.
2. explain how our body defends itself against pathogens, with salty, densely-packed skin cells, mucous, and acids.
3. explain how the innate immune system can trigger inflammation.
4. explain what inflammation involves.
5. explain how pus forms.
6. explain how cell-mediated immunity uses proteins on body cells to recognize cells that are infected with viruses.
7. explain what dendritic cells do.
8. describe how protective immunity develops.
9. describe how a vaccine works.

Immune System

Cells that work together to defend the body against infectious microbes

Parts of immune system:

1. Skin and other tissue barriers
2. Chemical barriers
3. Innate immunity (phagocytic cells and inflammation)
4. Adaptive immunity
   - antibody-mediated
   - cell-mediated

Edward Jenner first vaccine

- Jenner, a physician, tested the hypothesis that exposure to cowpox made you immune to smallpox

Experimental design:

Used his gardener's son as test subject (no previous exposure to either disease)

Rubbed pus from cowpox sores into cuts on arm

After infection from cowpox was clear he exposed subject to smallpox

Result:

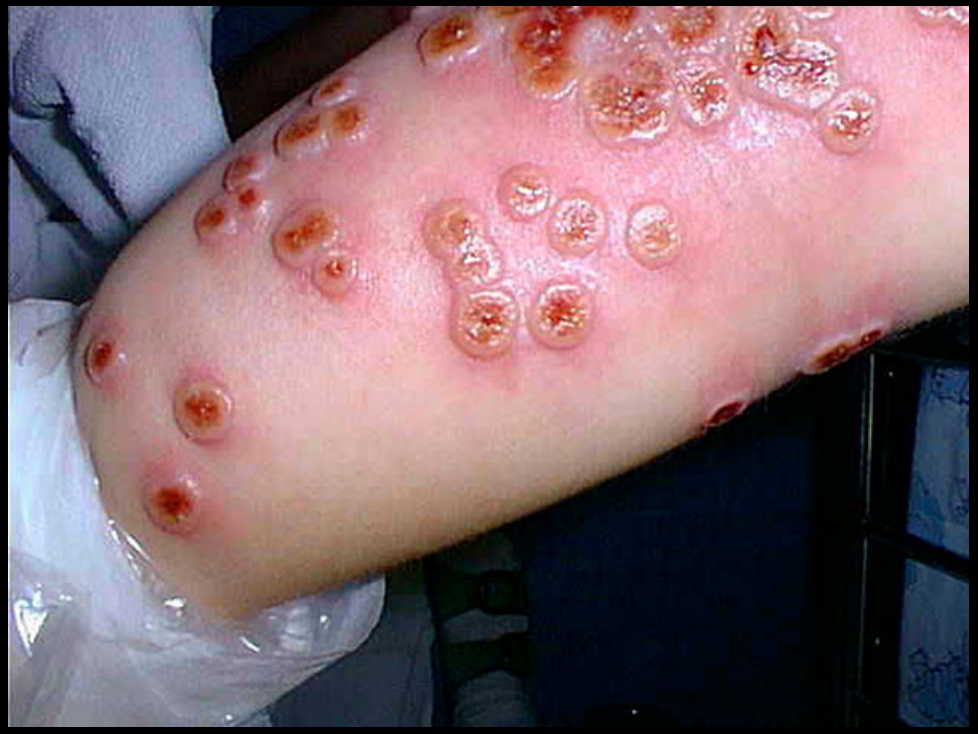
Child did not get sick with smallpox

How did cowpox exposure give immunity to smallpox?

Cowpox and Smallpox

Both are caused by very similar types of virus

- Cowpox is typically non lethal, smallpox is more serious, often lethal, infection




ROBERT THOM

First line of defense
Barriers and chemicals

Skin as a barrier:

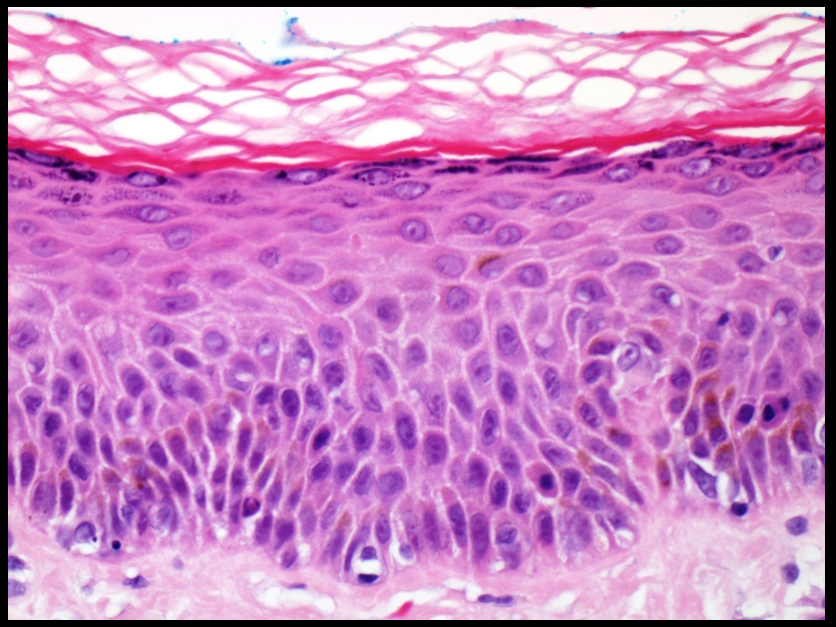
- prevents microbes from accessing internal tissue

- skin outer layer is dead keratinized cells

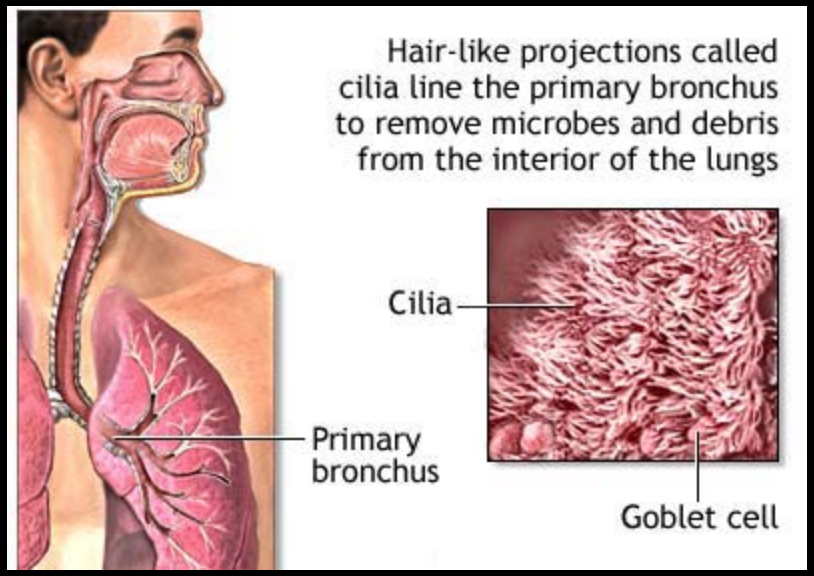
- multiple layers of cells

- sweat, tears, and gland secretions

Salty and contain enzymes, makes these secretions chemically inhospitable to microbes



Weak Spots



Any internal opening (mouth, nose etc..)

- each has defenses

Mucous (nasal cavity)

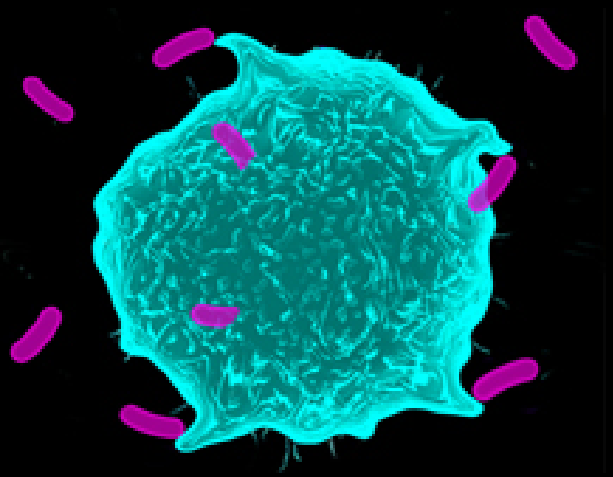
Cilia (respiratory lining)

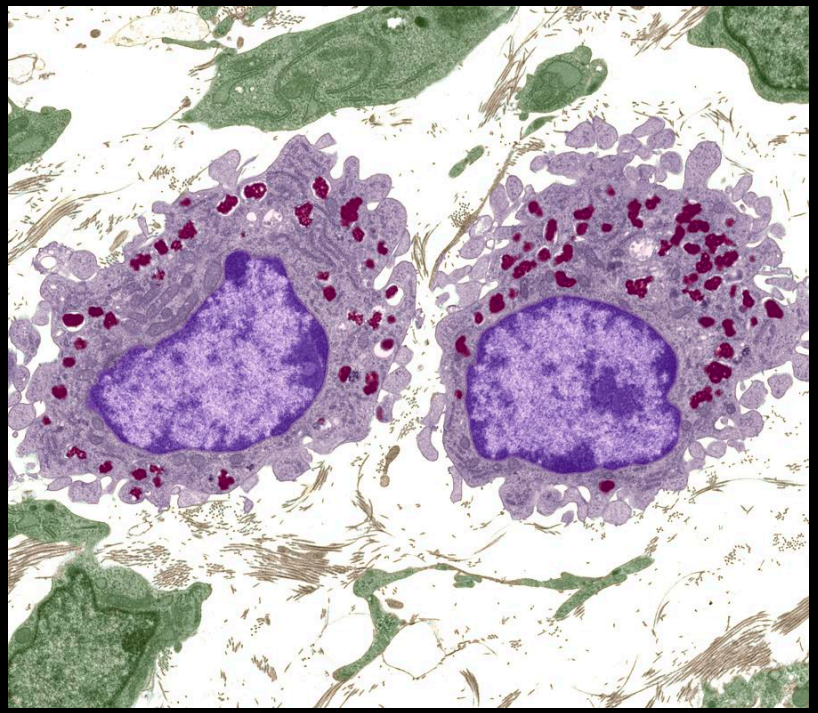
pH and enzymes (stomach/GI tract)

Urine (sterilizes urethra)

Innate Immunity (Innate response)

- Non-specific immune response
- Cells (Macrophages) and Proteins (toll-like receptors) recognize microbes as foreign and attack them and signal that infection has occurred





- Toll-like receptors are activated by molecules from the microbe
- This system can recognize different general types of microbe
- Activation of TLRs causes synthesis and release of cytokines
- Cytokines recruit immune cells to the infection site

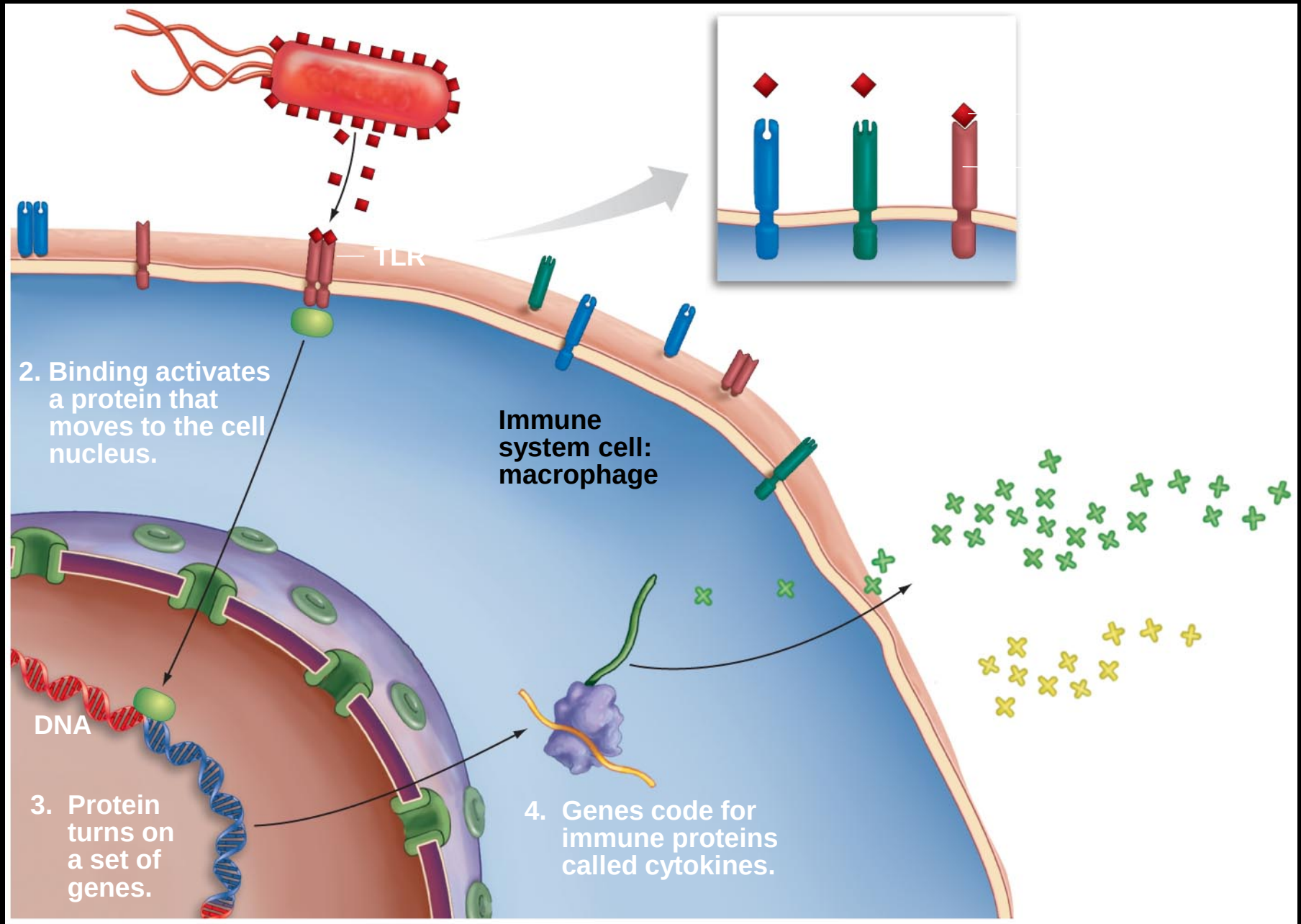


Figure 29.1

Inflammation

- Localized response to infection
- After recognition of pathogen, mast cells are recruited to the site
- Mast cells release histamine, a major inflammation signaling molecule

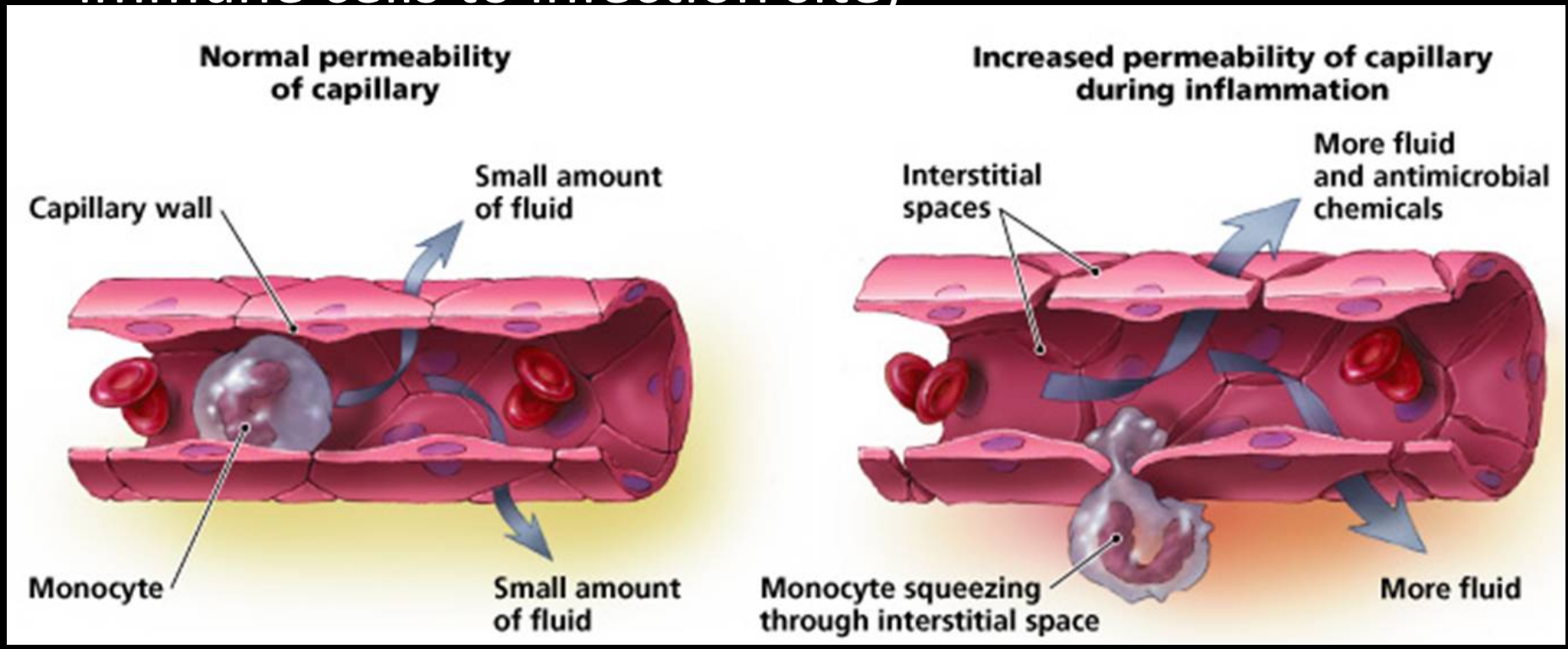
Effects of inflammation signaling molecules:

- dilate blood vessels

(increases blood flow, increases temperature at site)

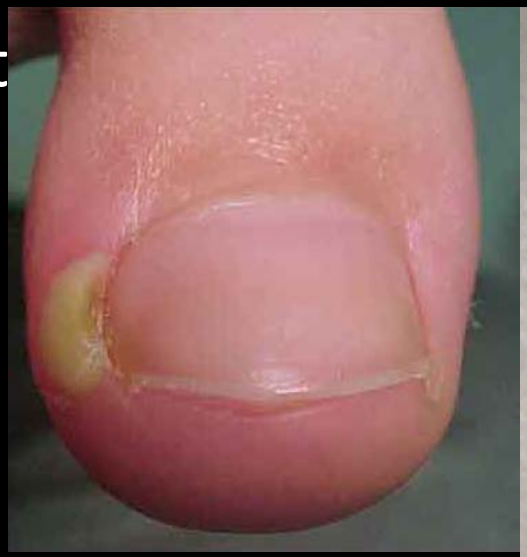
- blood vessels become leaky

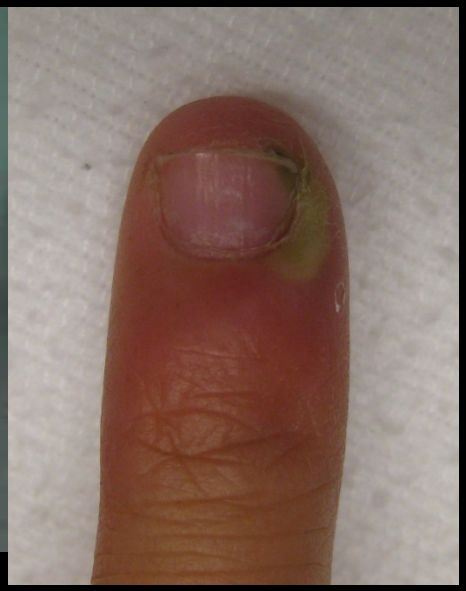
(causes swelling “edema”, allows greater access for immune cells to infection site)



Formation of Pus

- Immune cells fighting at infection sites leak digestive enzymes and damage the tissue
- Dead cells, tissue fragments, and phagocytic cells form pus





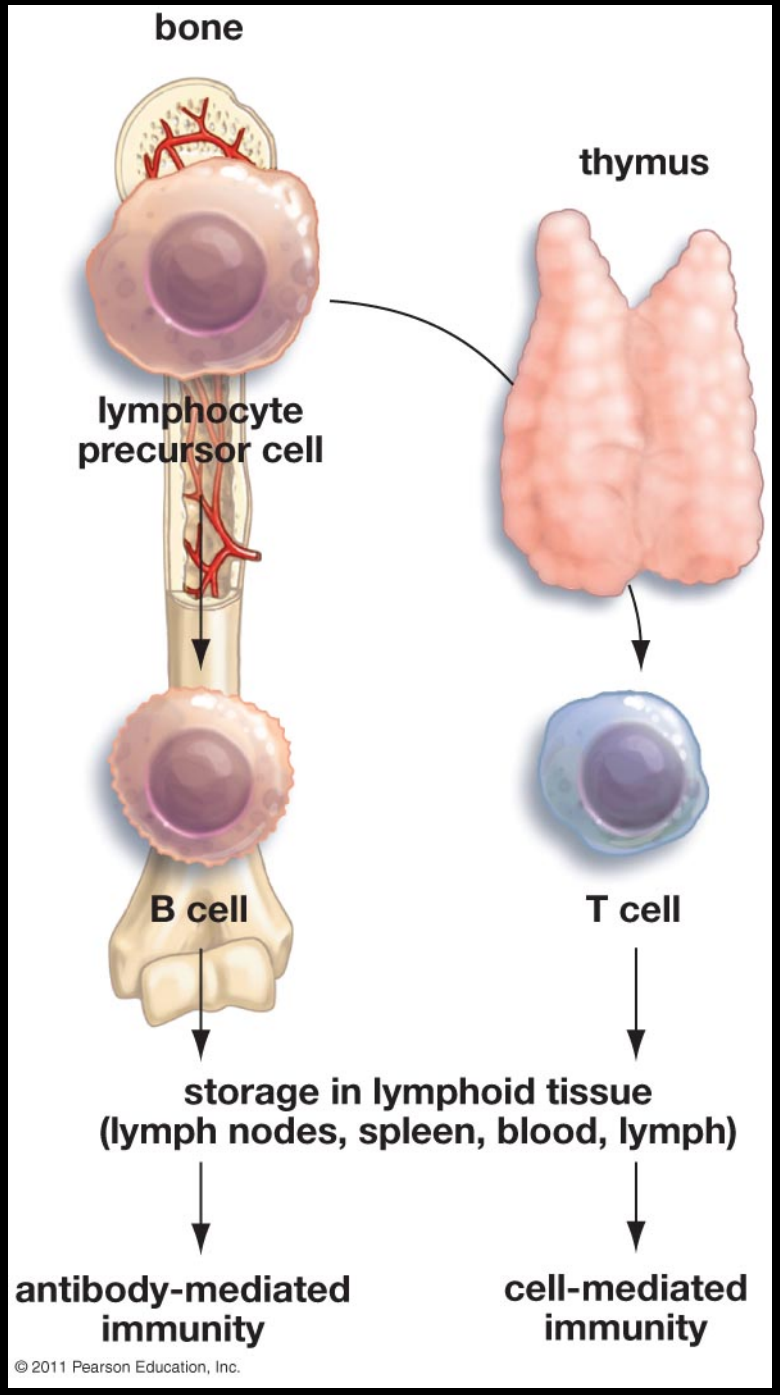
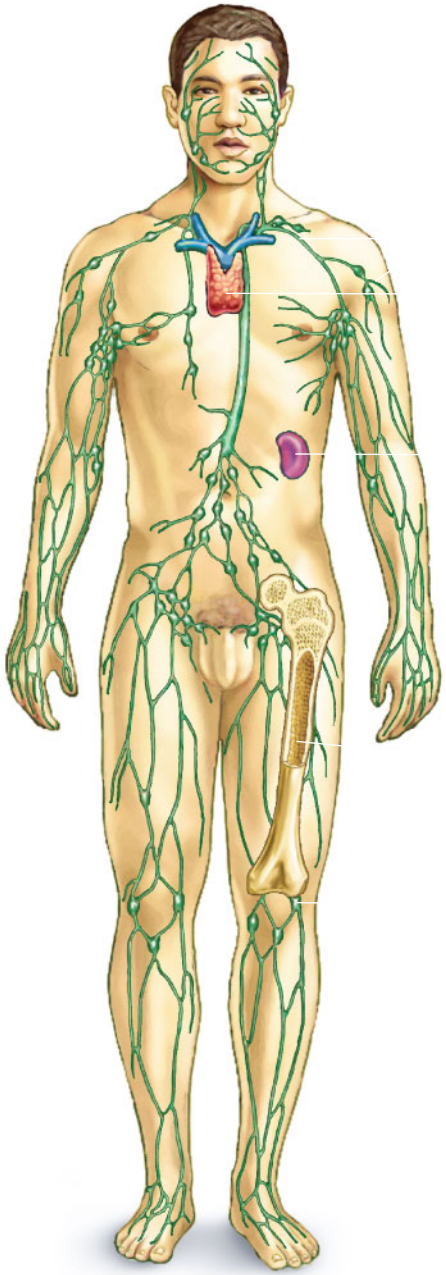
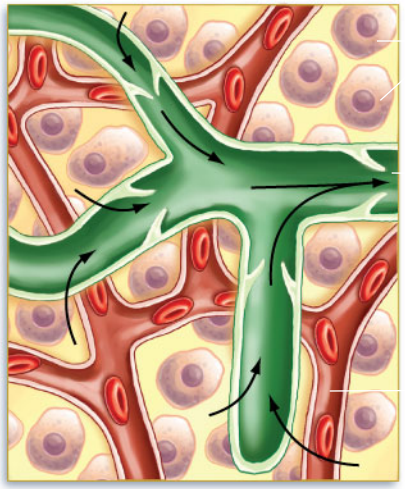
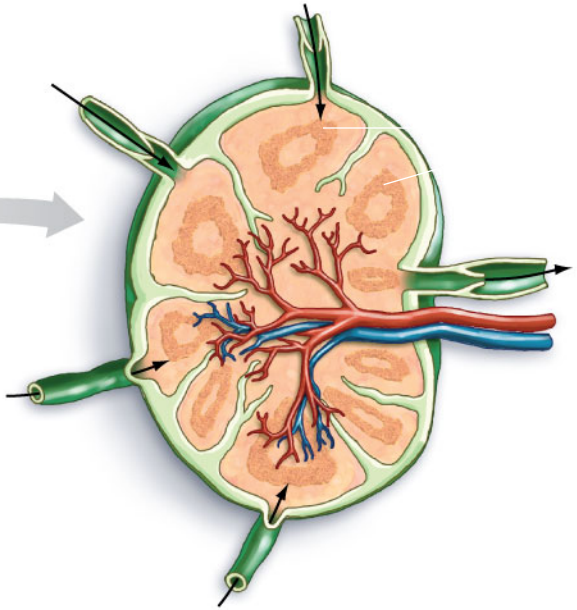
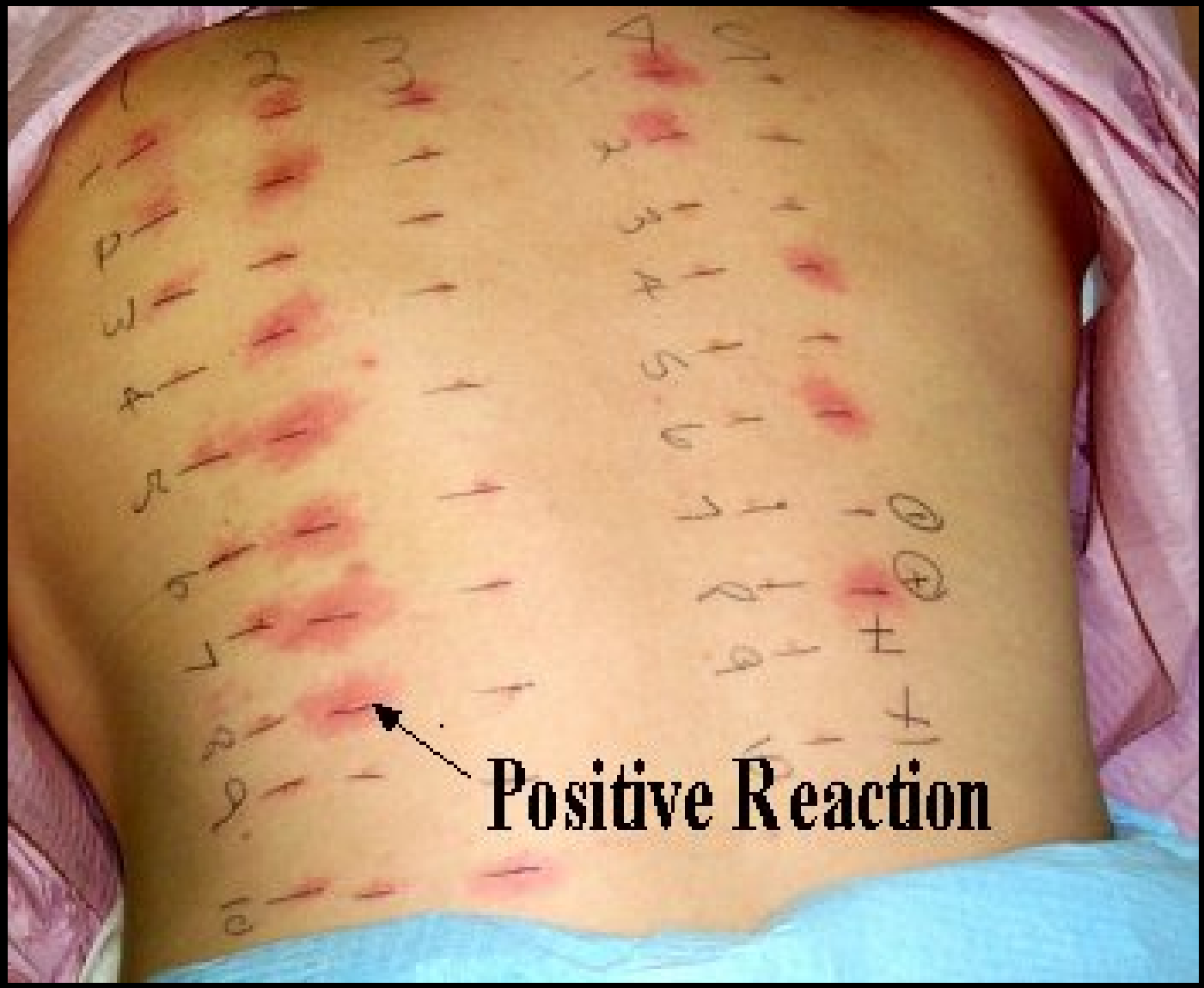

bone
thymus
lymphocyte precursor cell
B cell
T cell
storage in lymphoid tissue (lymph nodes, spleen, blood, lymph)
antibody-mediated immunity
cell-mediated immunity
© 2011 Pearson Education, Inc.

Figure 29.3








Positive Reaction