

Exams will be in person

Question Details

[Export to CSV](#)[Export to Excel](#) Has Start Date 8/18/... Has End Date 8/25/... Apply

(Number of First Attempts: 89)

[What do the statistics on this page mean?](#)

Question 1 Difficulty: 1

what is your preferred format of exam

in person



Average Grade: 0.54 / 1 (53.93 %)

Standard Deviation: 50.13 %

Point Biserial: 0.99

Discrimination Index: 100.00 %

UC 114 8 pm-9:30 pm

Please bring pencils - scantron

Please email me with DRC accommodations one week ahead of scheduled time

One week ahead also for foreseen conflicts.

Make up will be within one week due to illness.

BrightSpace Introduction

The screenshot shows a web browser window with three tabs open: "Mail - Deng, Qing - Outlook", "Calendar - Deng, Qing - Outlook", and "Schedule - Fall 2022 BIOL 53700...". The main content area is the "Schedule" page for the course BIOL 53700.

The navigation bar at the top includes links for Course Home, Content, Classlist, Grades, Class Progress, Course Tools (with a dropdown menu), and Help.

The left sidebar contains a search bar labeled "Search Topics" and a list of course resources:

- Syllabus
- Bookmarks
- Course Schedule (marked with a red circle containing the number 2)
- Table of Contents (232 items)
- iclicker registration (marked with a checkmark)
- Course Content (218 items)
- Schedule (marked with a red circle containing the number 2)
- Lectures (215 items)
- University Policies (5 items)
- Accessibility Information (3 items)
- Library Course Guide (6 items)

The main content area is titled "Schedule" and features a "Download" button. A progress bar indicates "60 % 3 of 5 topics complete".

The "Materials" section lists several documents:

- BIOL53700_Schedule_2022** (Word Document) - marked with a checkmark
- Lockdown Browser student instruction** (PDF document)
- RLDB-Instructor FYI** (PDF document) - marked with a checkmark
- 2022 introduction** (PDF document)

The "General" section lists:

- BIOL537 2020 intro and brightspace** (External Learning Tool) - marked with a checkmark and the text "Updated"

At the bottom right of the main content area, there is a "Print" button.

BrightSpace Introduction

Lecture 3 4

Lecture 4 9

Lecture 5 5

Lecture 6 12

Lecture 7 7

Lecture 8 7

Lecture 9 9

Lecture 10 7

Lecture 11 6

Lecture 12 7

Lecture 13 8

Lecture 14 6

Lecture 15 6

Lecture 16 9

Lecture 17 6

Lecture 18 11

Lecture 1

Reading 2

Lecture 1 quiz

Assignment

Overdue - yesterday at 11:59 PM

Lecture 1

PDF document

Lecture 1-key

Word Document

Starts Aug 25, 2022 10:30 AM

BIOL537-Lec1-1-2020 (18:47)

External Learning Tool

BIOL537-Lec1-2-2020 (15:09)

External Learning Tool

BIOL537-Lec1-3-2020 (14:12)

External Learning Tool

Fall 2021 - BIOL537 - Deng 1

External Learning Tool

Fall 2022 - BIOL537 - Deng 1

External Learning Tool

Major Concepts

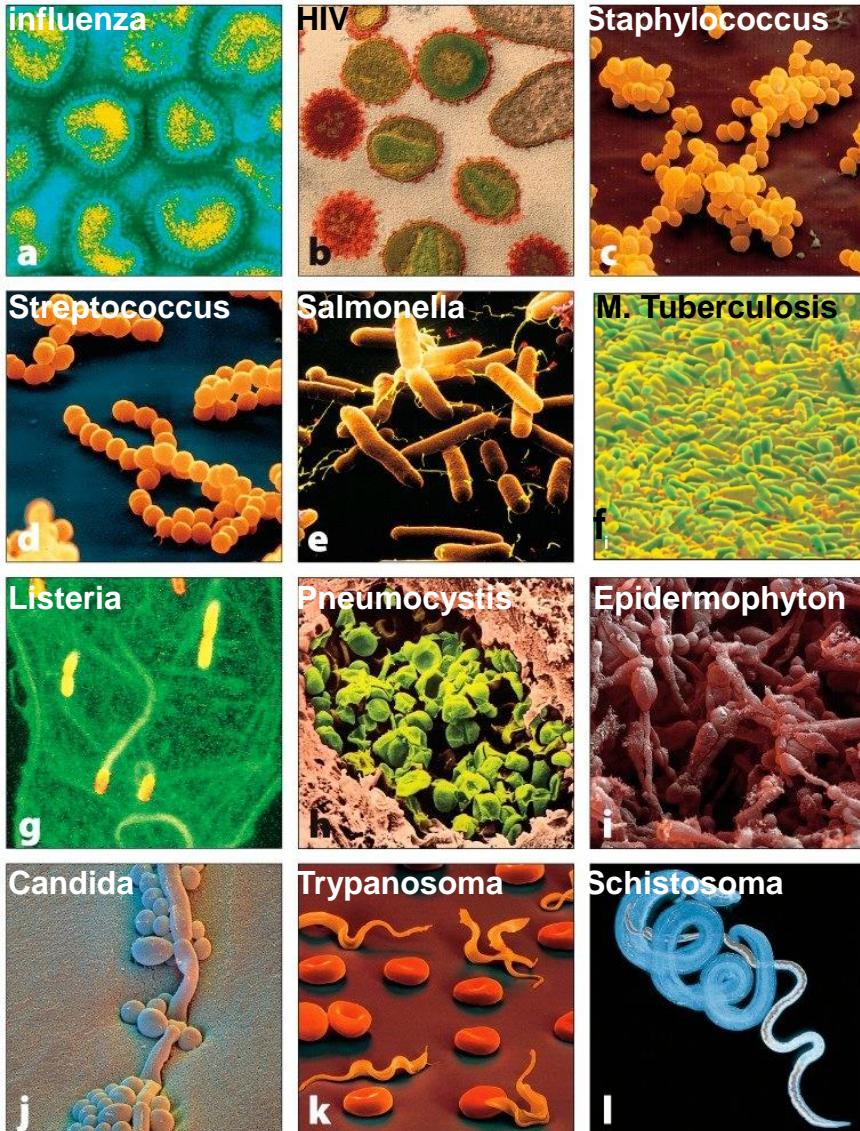


Figure 1.3 The Immune System, 3ed. (© Garland Science 2009)

Pathogen: An infectious agent

Extracellular: pathogen that can replicate outside the cell

- bacteria (c, d), parasites (k, l), fungus (h, i, j)

Intracellular: pathogen that requires cellular environment to replicate

- bacteria (e, f, g), viruses (a, b)

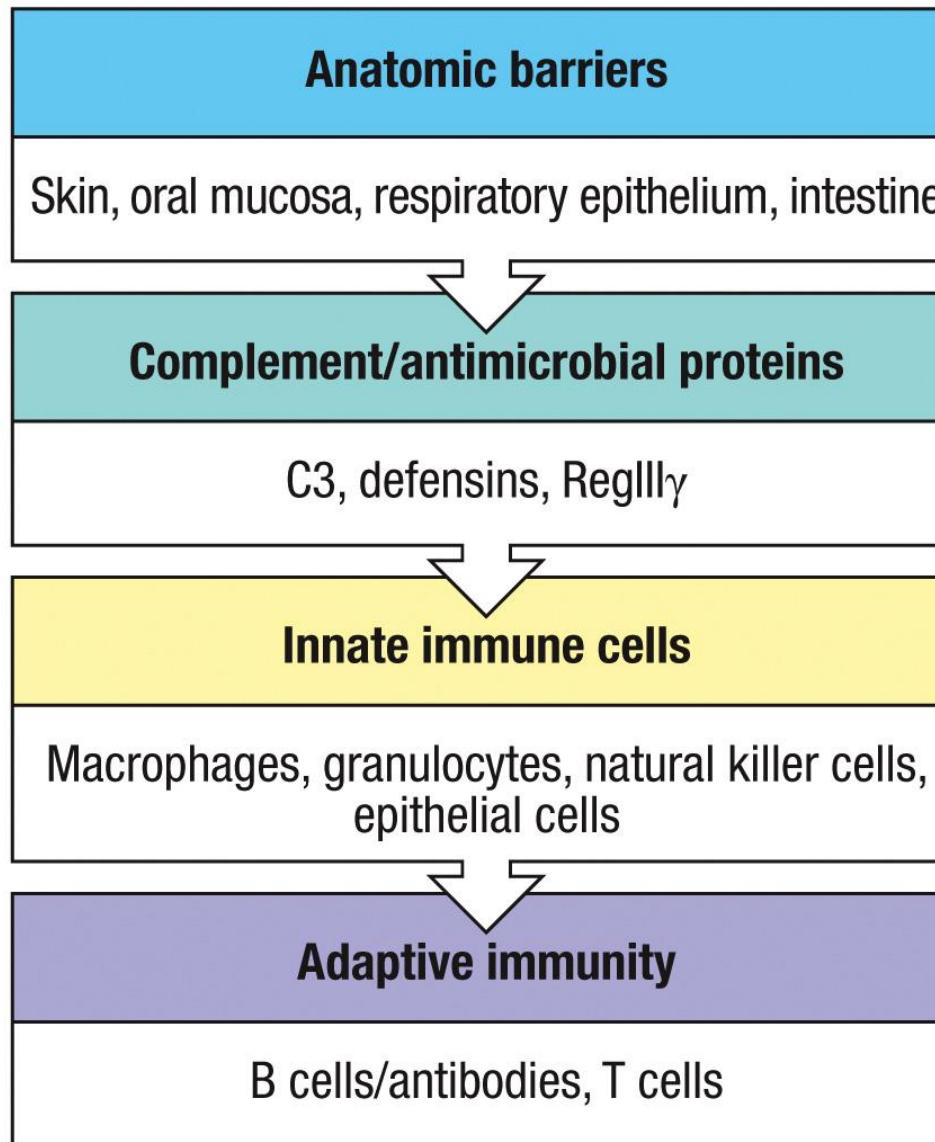
Mucosal immunity: response mounted at the mucosal surface

Innate immunity: early phase of host response to pathogen

Adaptive immunity: response of an antigen-specific lymphocyte to an infection

Antigen: a molecule which can stimulate an adaptive immune response

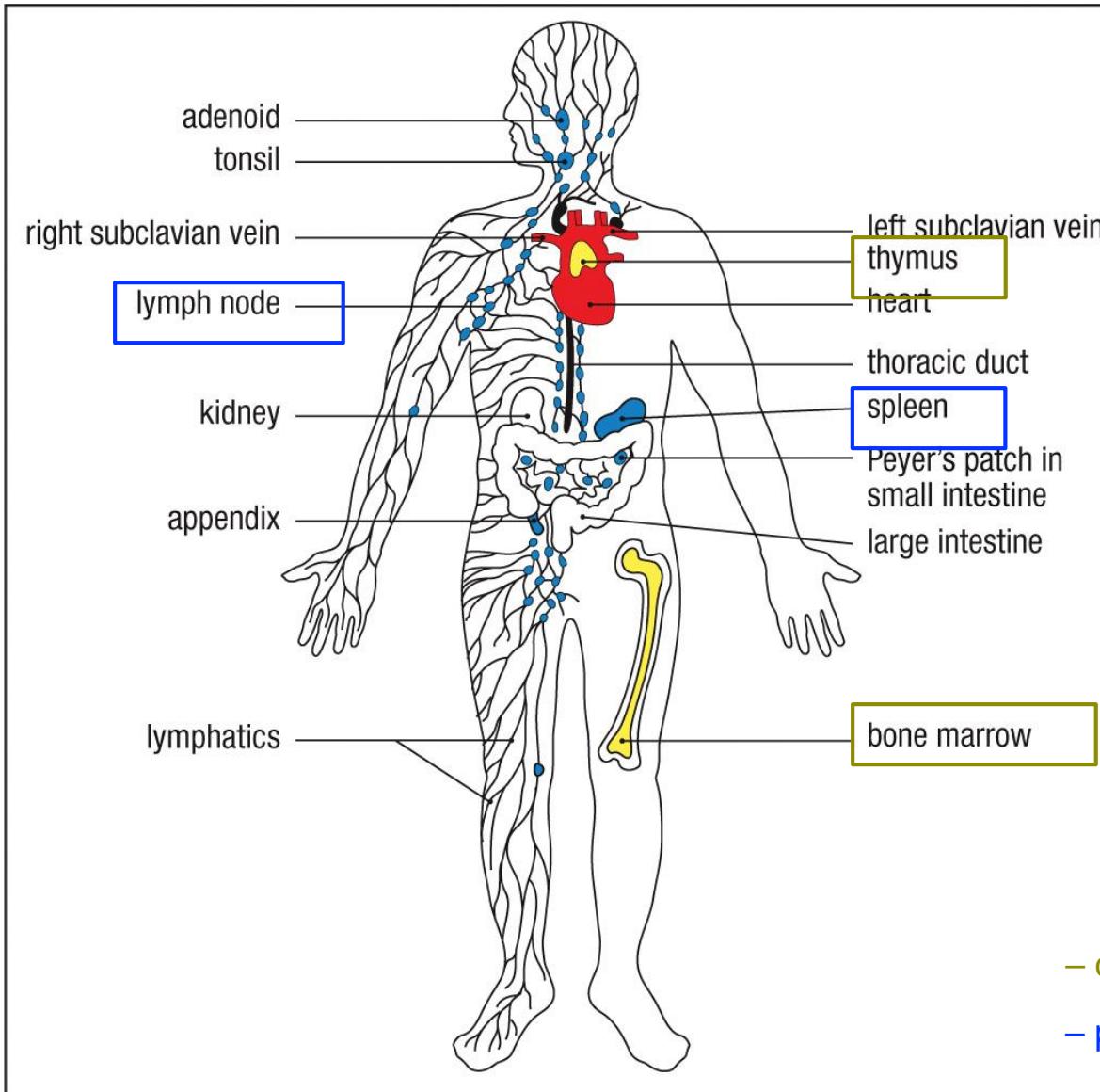
Barriers, Cells and Cytokines



Outline

- Cells and tissues of the immune system
- Case study: Congenital Asplenia

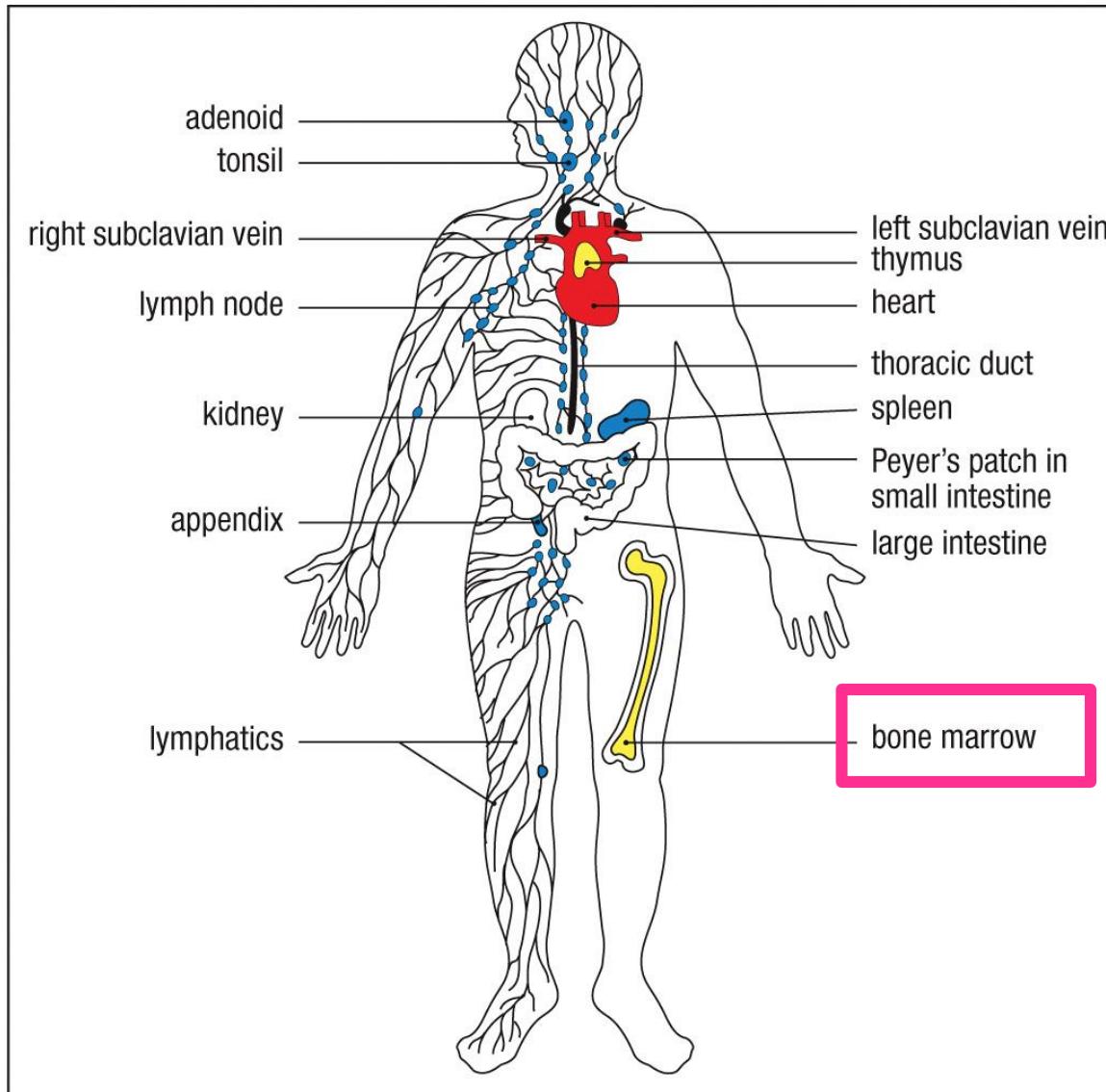
Lymphoid Tissue



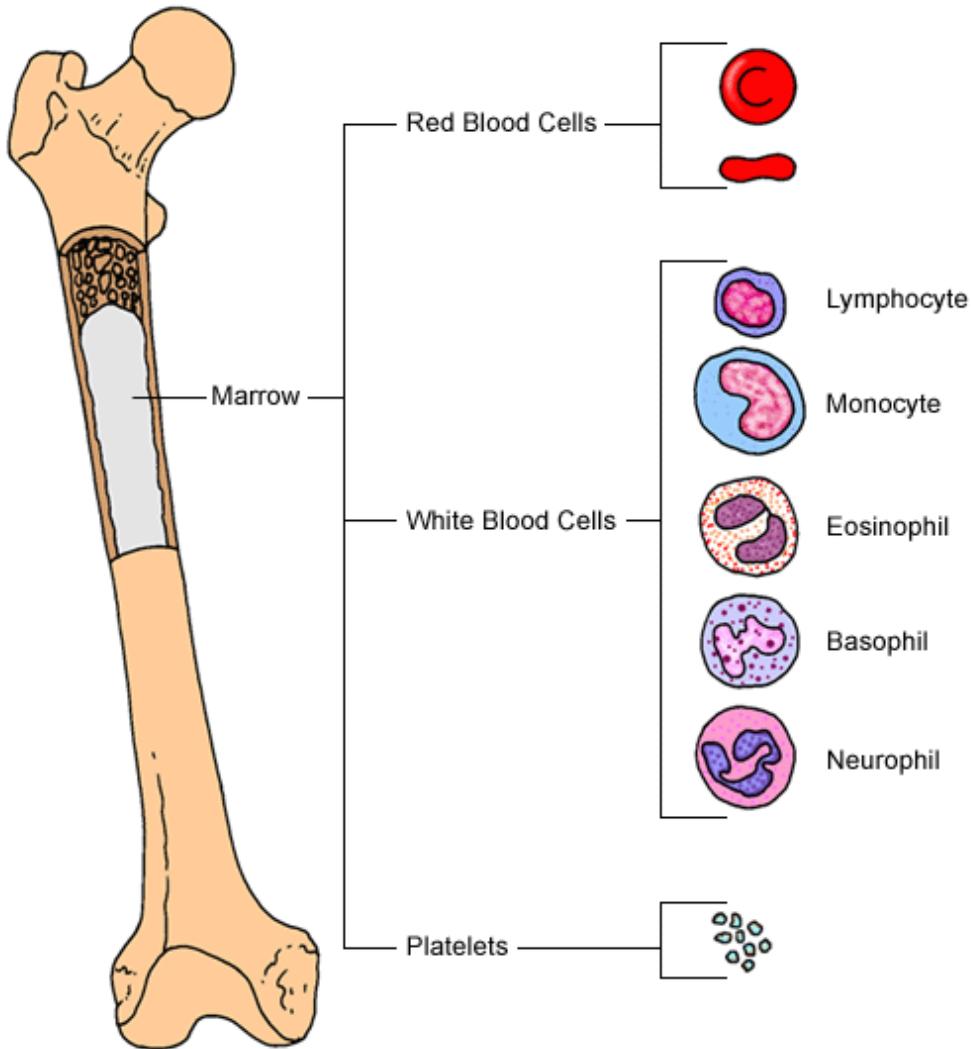
Lymphoid Tissue

- central lymphoid organ: where lymphocytes form and mature
- peripheral lymphoid organ: the sites of lymphocyte activation by antigens

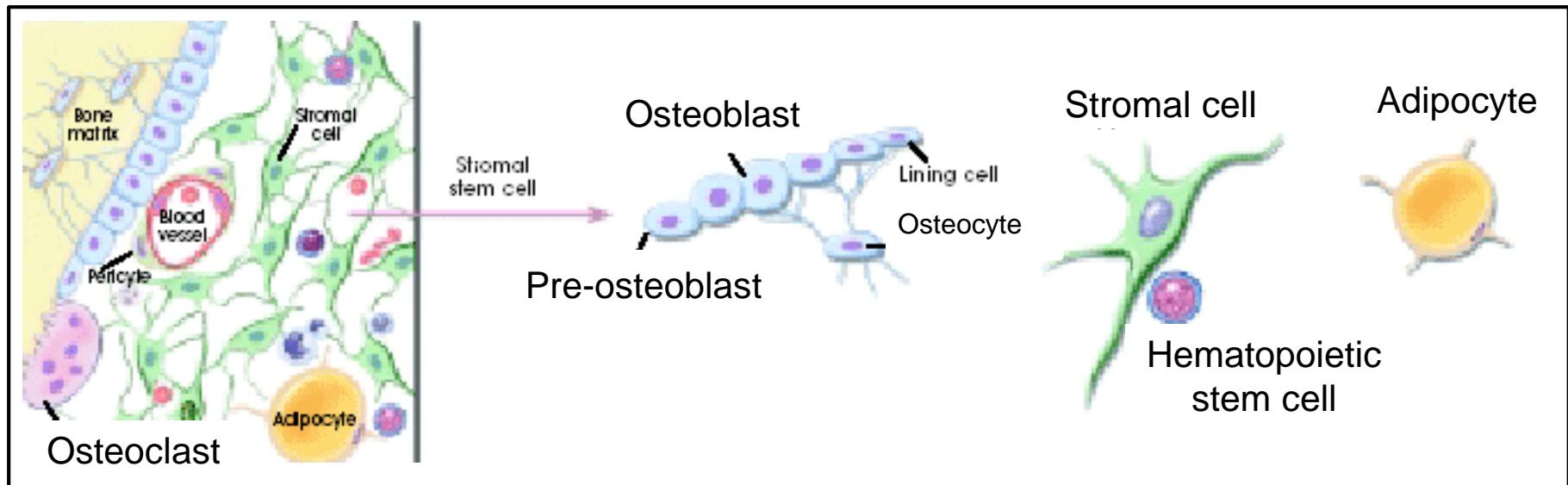
Bone Marrow Is the Site of Adult Hematopoiesis



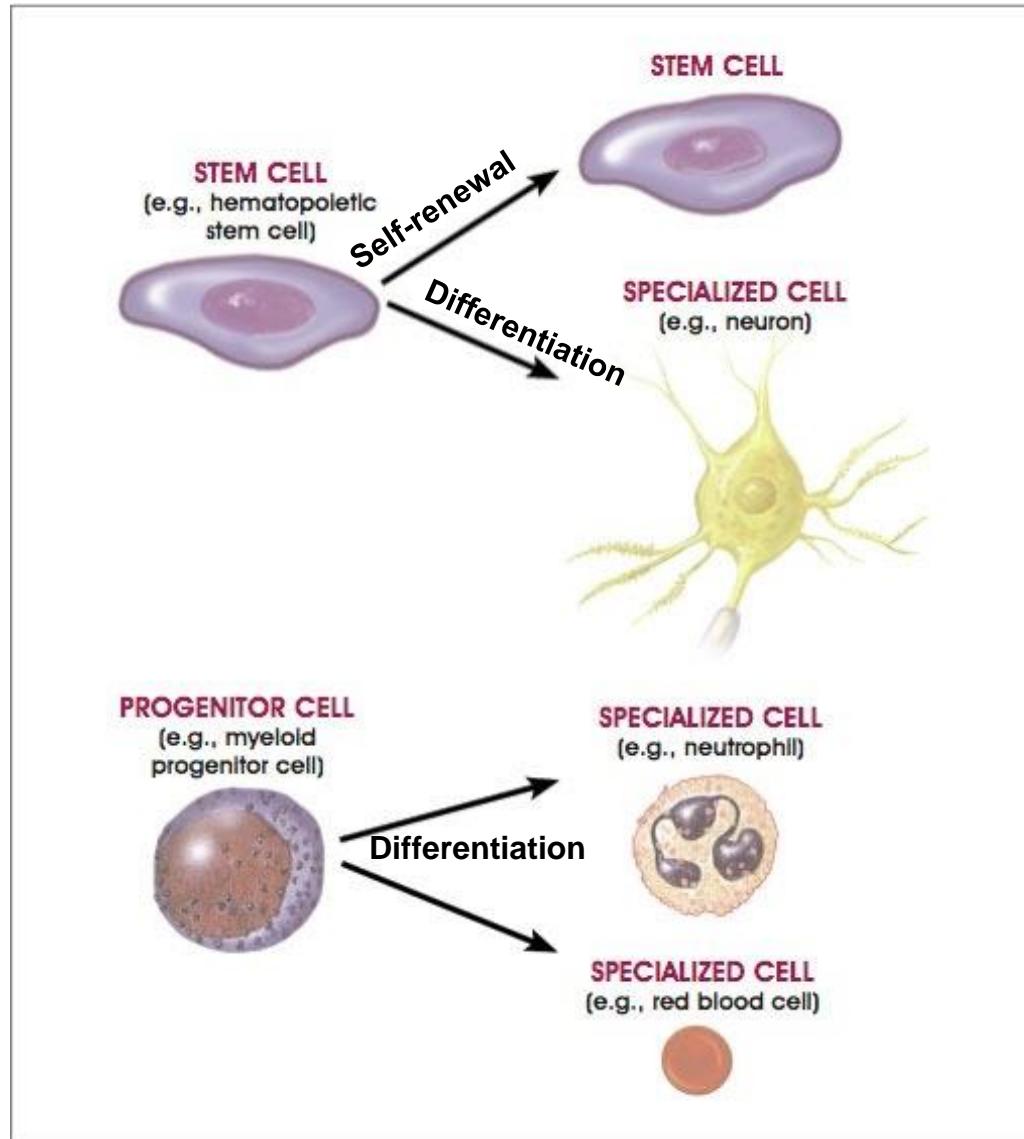
Hematopoietic Cells Develop in the Bone Marrow



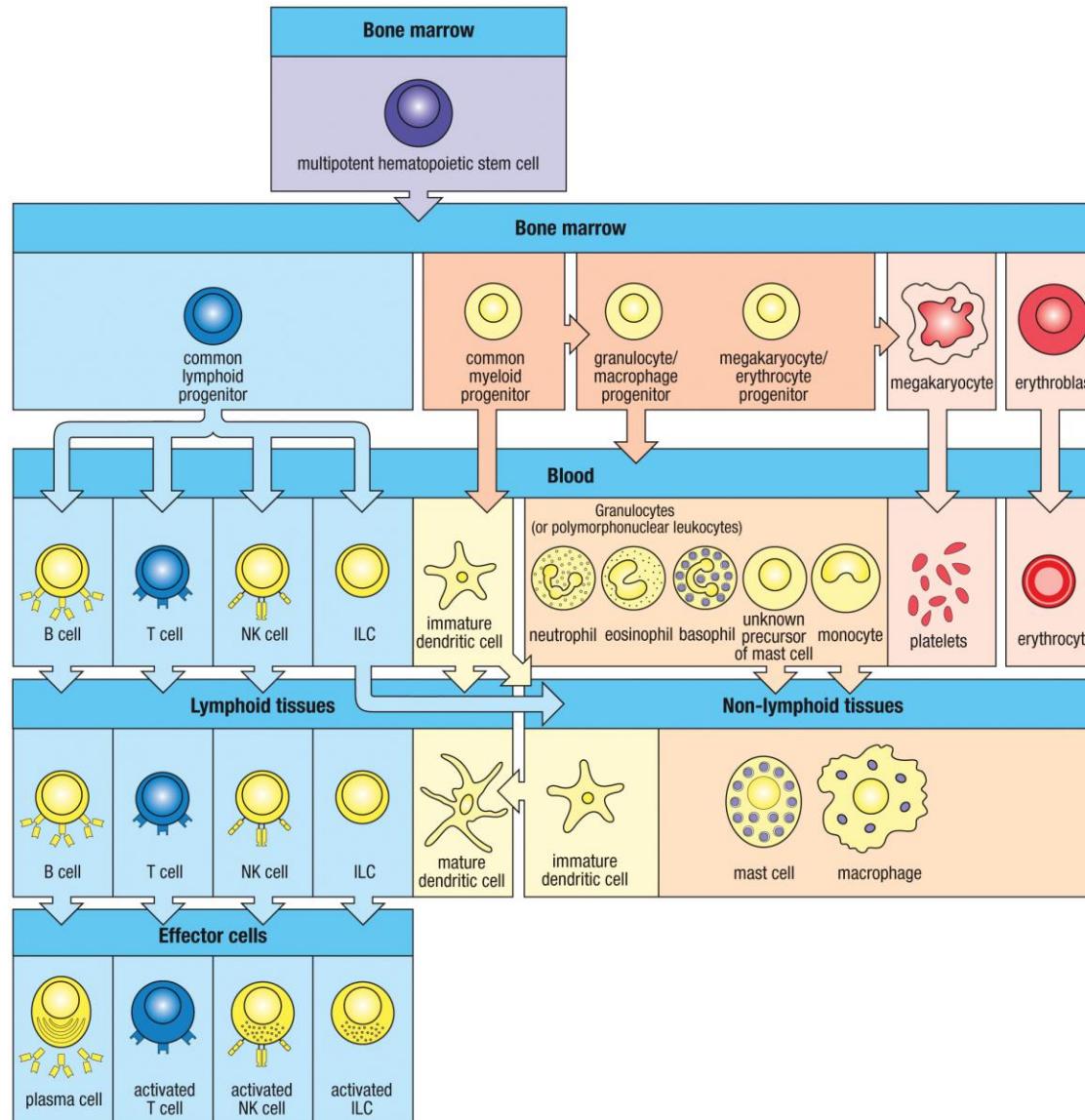
Bone Marrow Stromal Cells Support Hematopoiesis



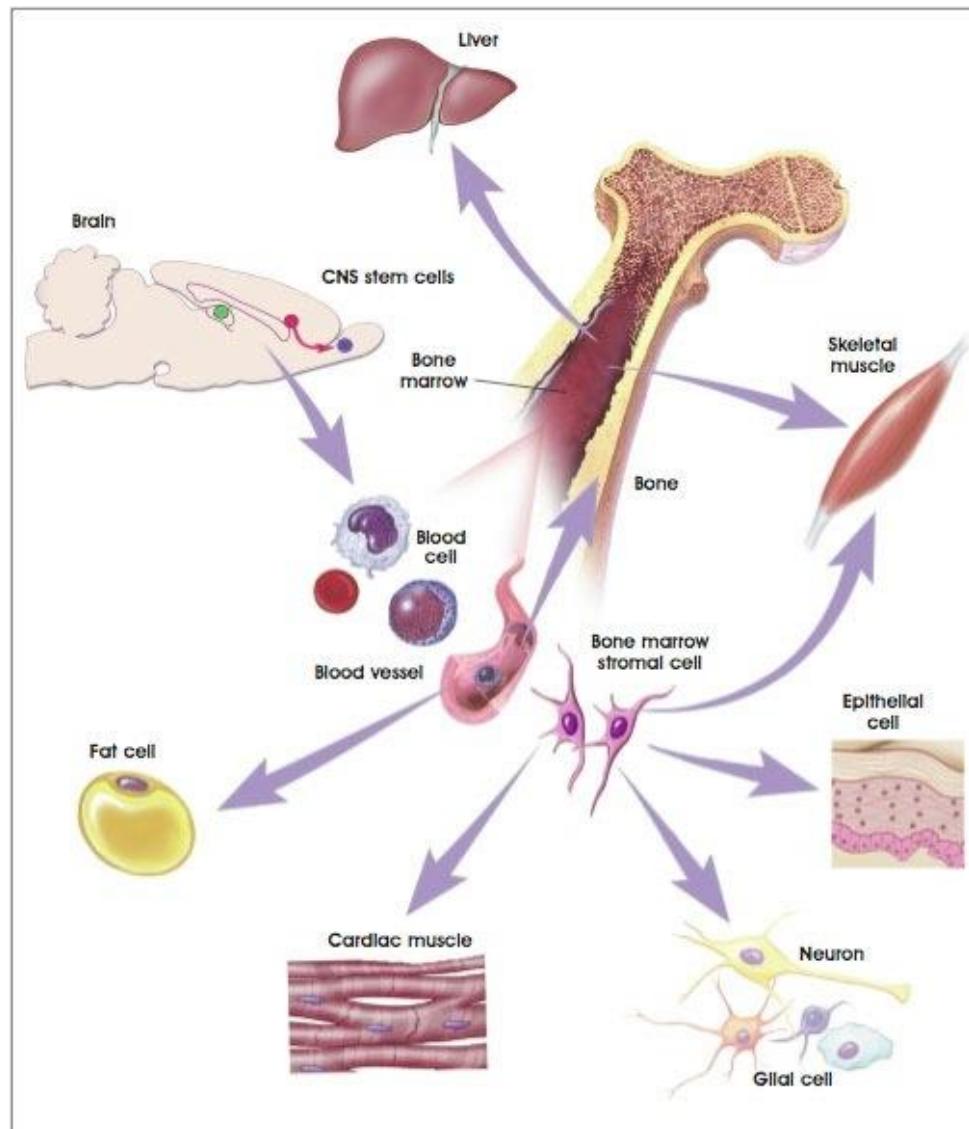
Distinguishing Features of Progenitor and Stem Cells



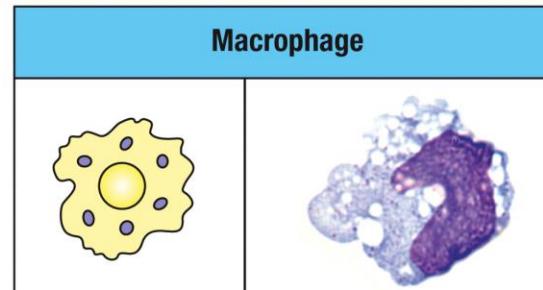
Hematopoiesis



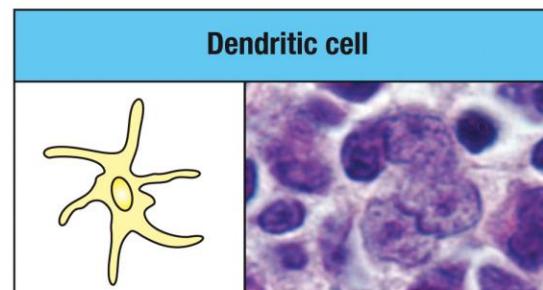
Plasticity of Bone Marrow Stem Cells



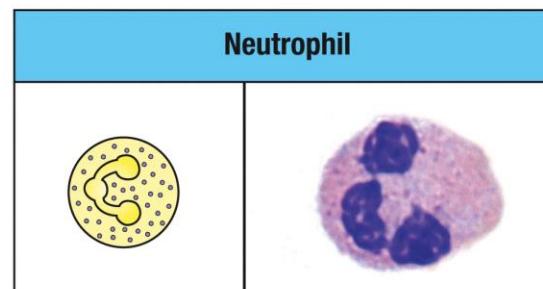
Myeloid Cells



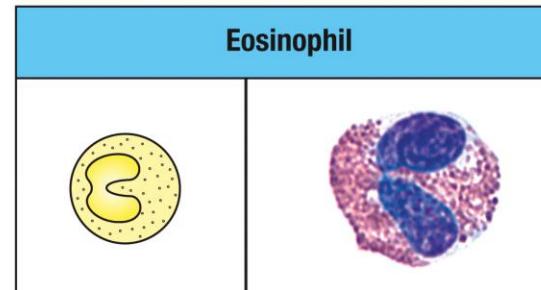
Phagocytosis and activation of bactericidal mechanisms
Antigen presentation and cytokine production



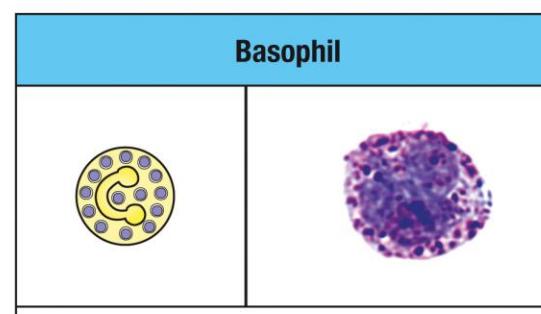
Antigen uptake in peripheral sites
Antigen presentation and cytokine production



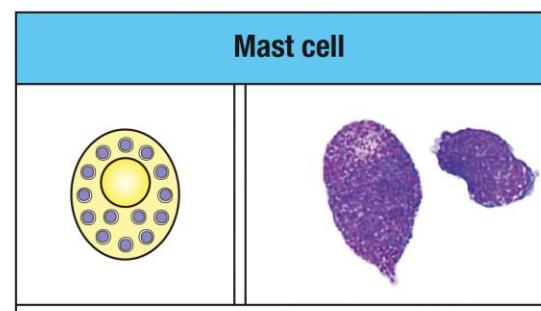
Phagocytosis and activation of bactericidal mechanisms



Killing of antibody-coated parasites



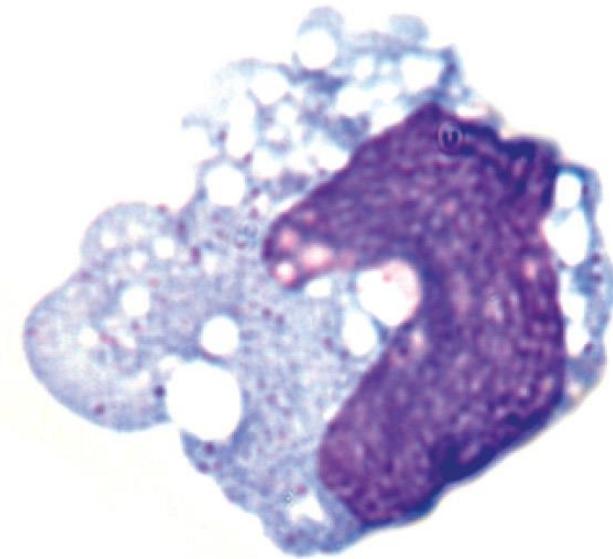
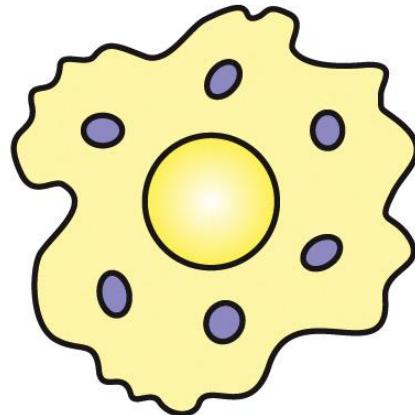
Promotion of allergic responses and augmentation of anti-parasitic immunity



Release of granules containing histamine and active agents

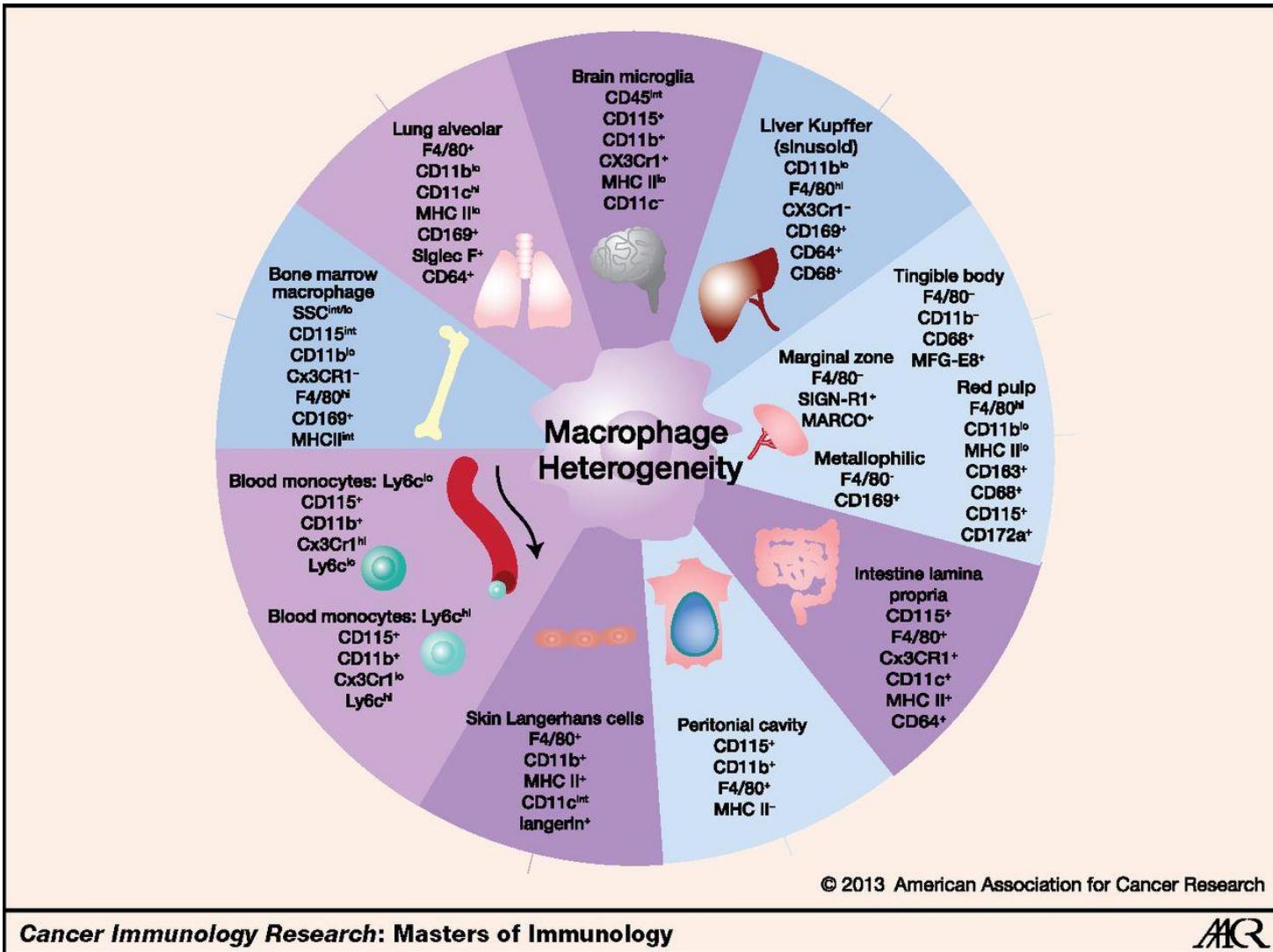
Macrophage

Macrophage

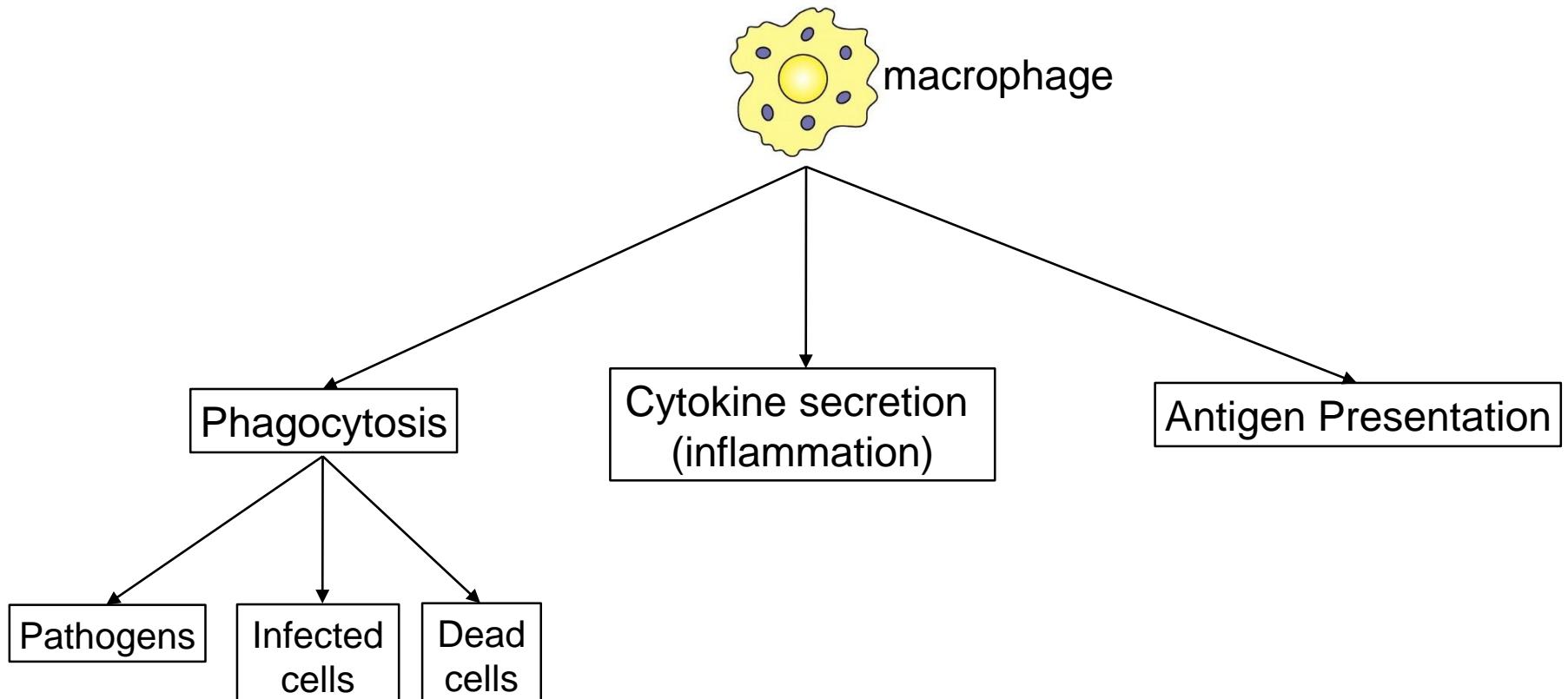


Phagocytosis and activation of bactericidal mechanisms
Antigen presentation and cytokine production

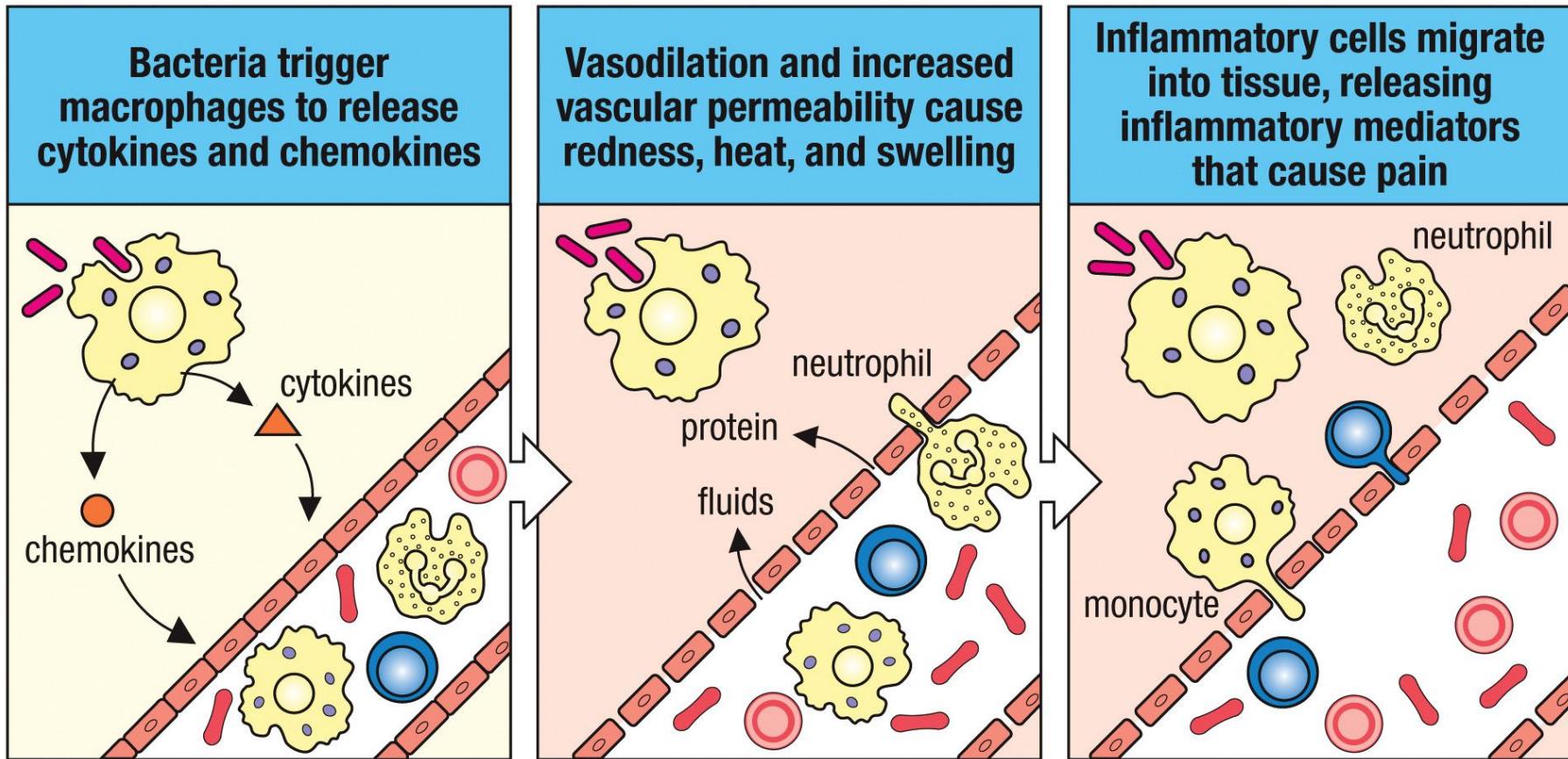
Tissue resident macrophages



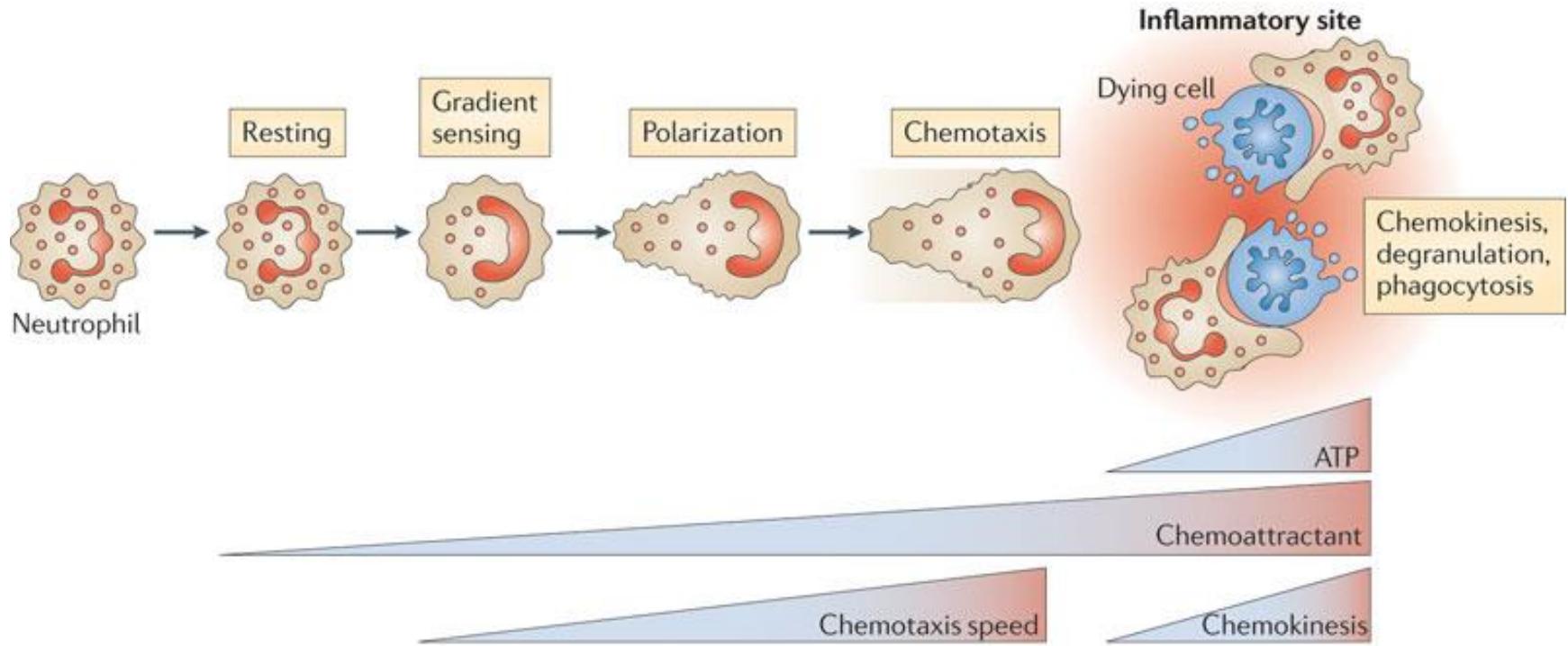
Macrophage Function



Macrophages Initiate an Immune Response And Recruit Other Immune Cells to Sites of Infection

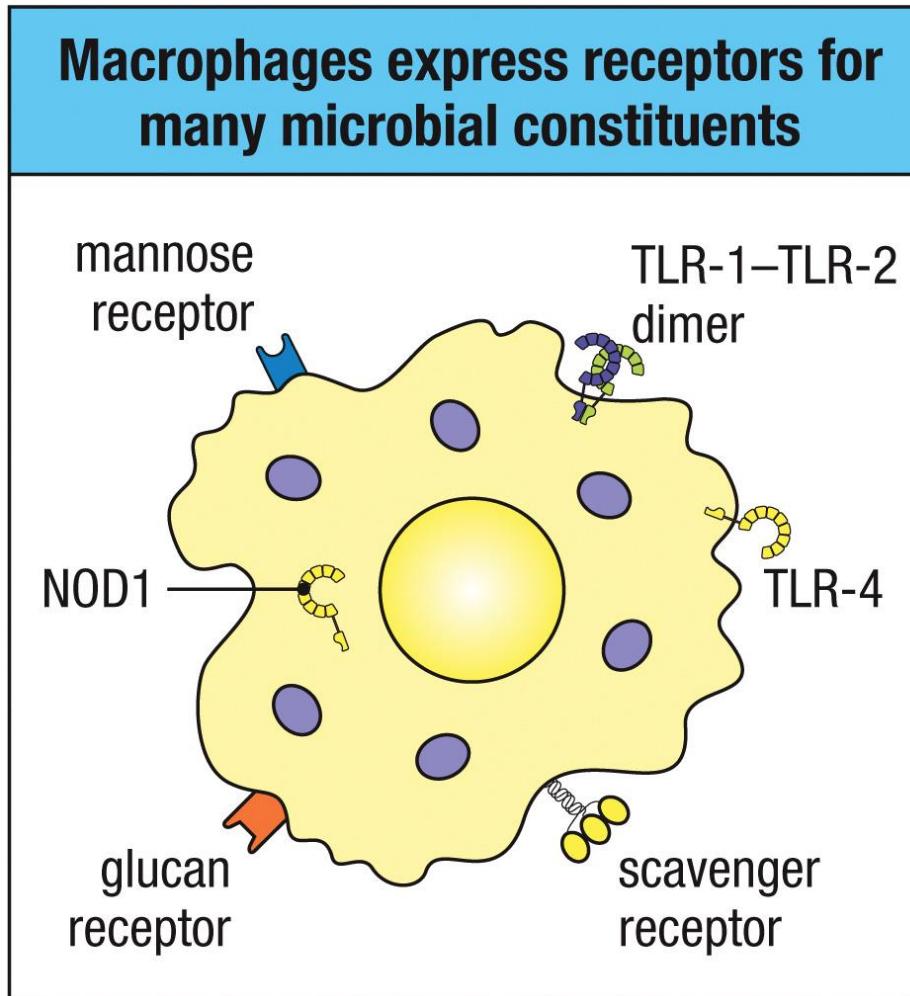


Homing of Leukocytes is Mediated By Chemokines



Nature Reviews | Immunology

Pathogen Receptors On Macrophages

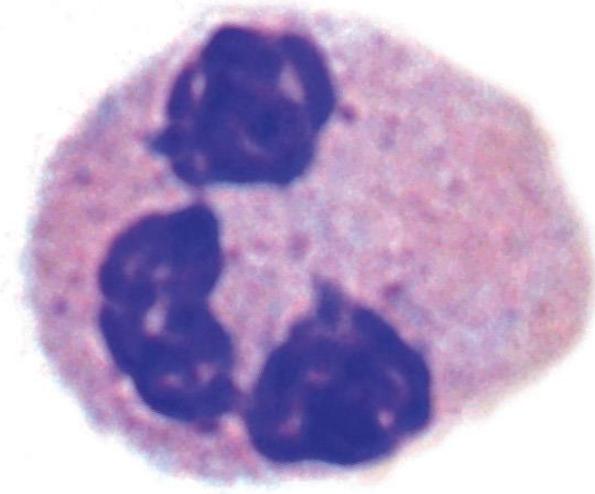
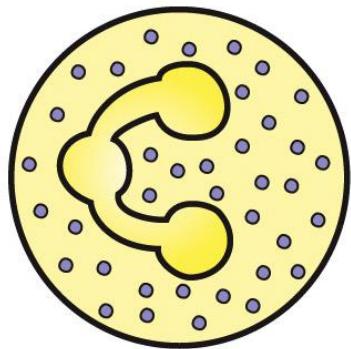


Receptor expression is constant, is not adapted based on the nature of the pathogen (unlike the receptors of the adaptive immune response).

- No problems with self-recognition

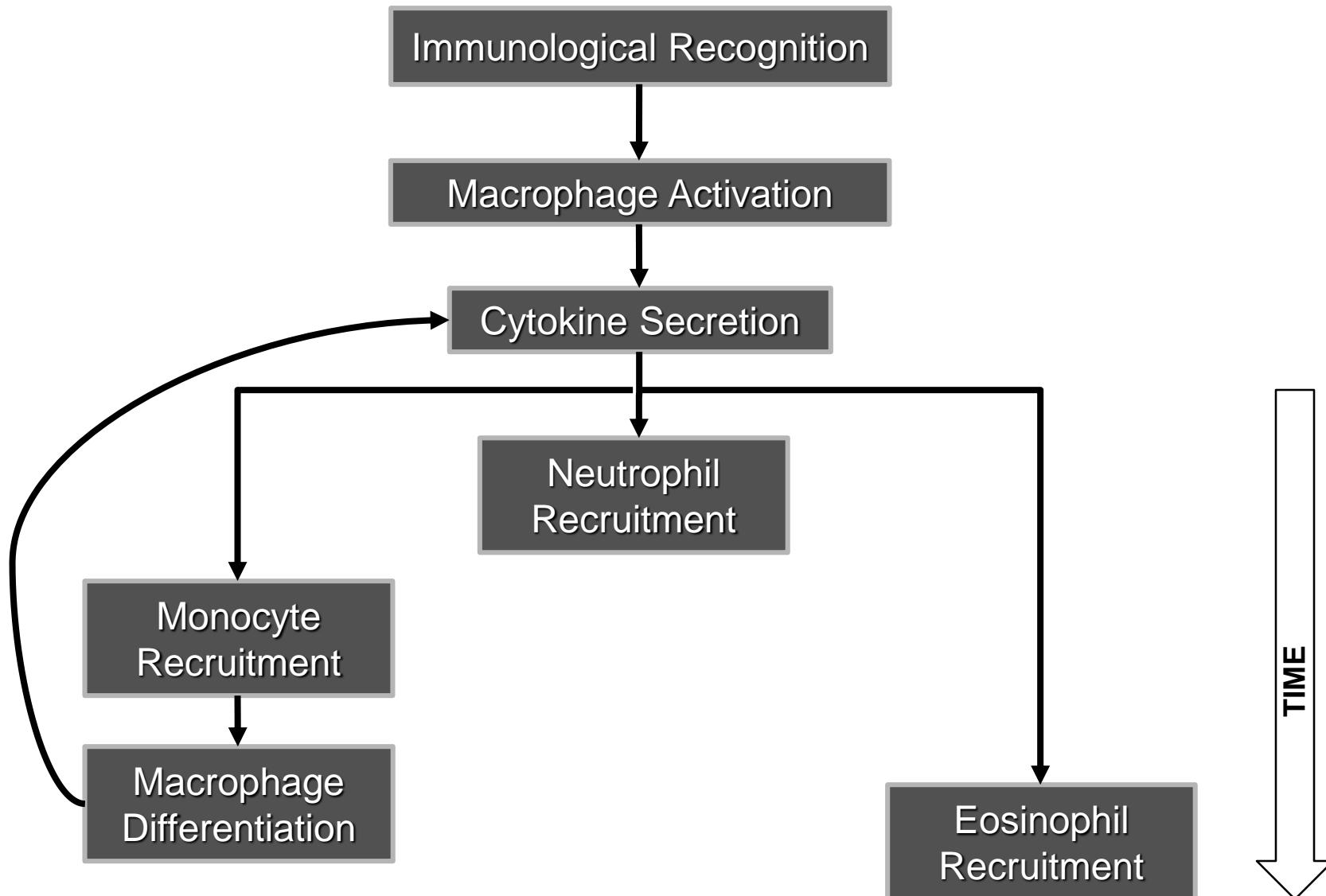
Neutrophils Phagocytose Pathogens

Neutrophil



Phagocytosis and activation of bactericidal mechanisms

Timecourse of Innate Immune Response

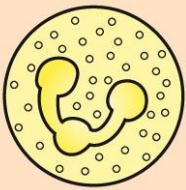


Dendritic Cell

Dendritic cells form the bridge between innate and adaptive immune responses

Innate immunity

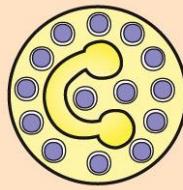
Granulocytes
(or polymorphonuclear leukocytes)



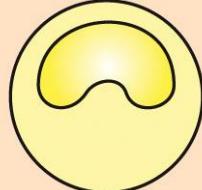
neutrophil



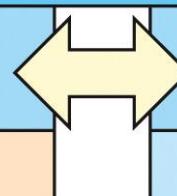
eosinophil



basophil

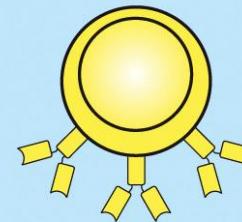


monocyte

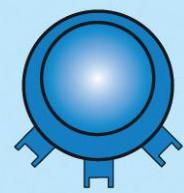


dendritic cell

Adaptive immunity

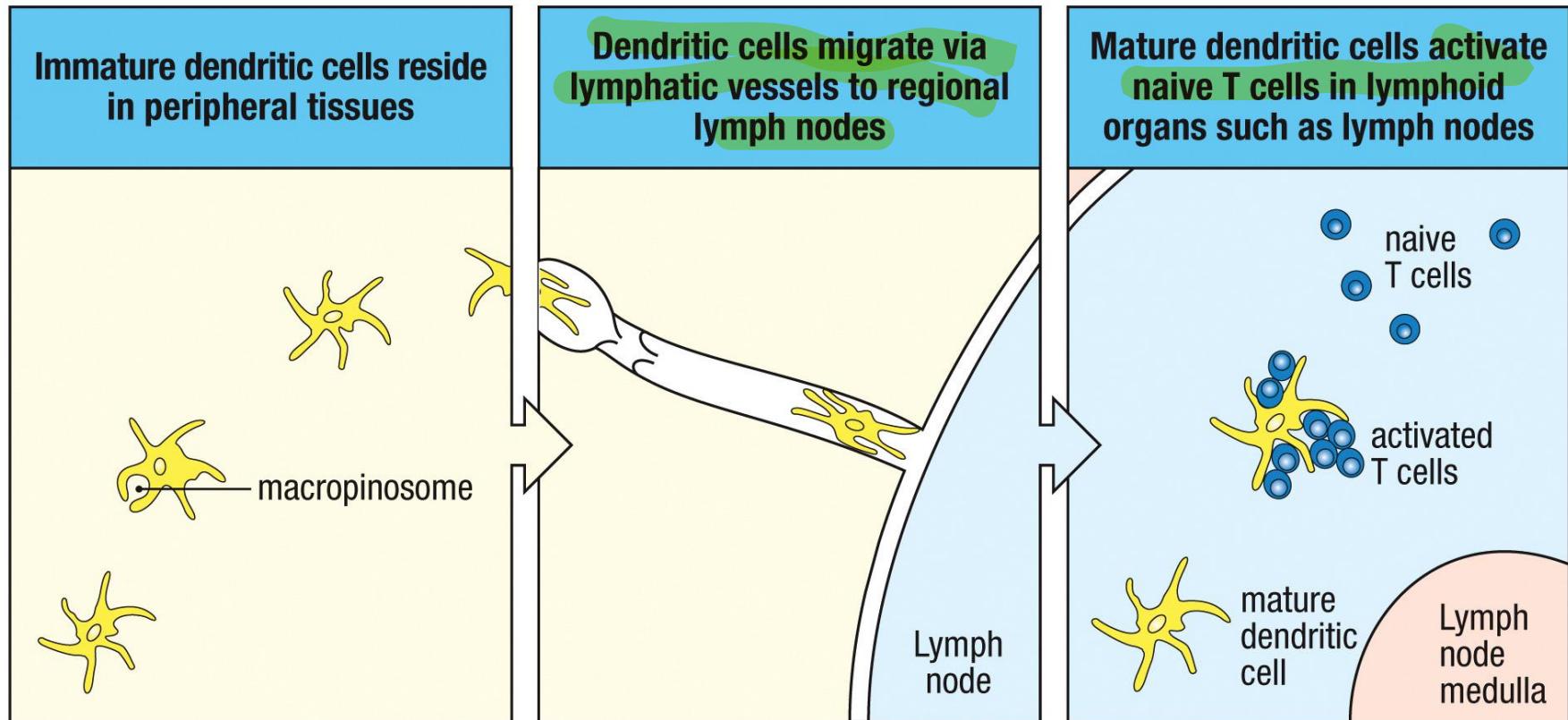


B cell

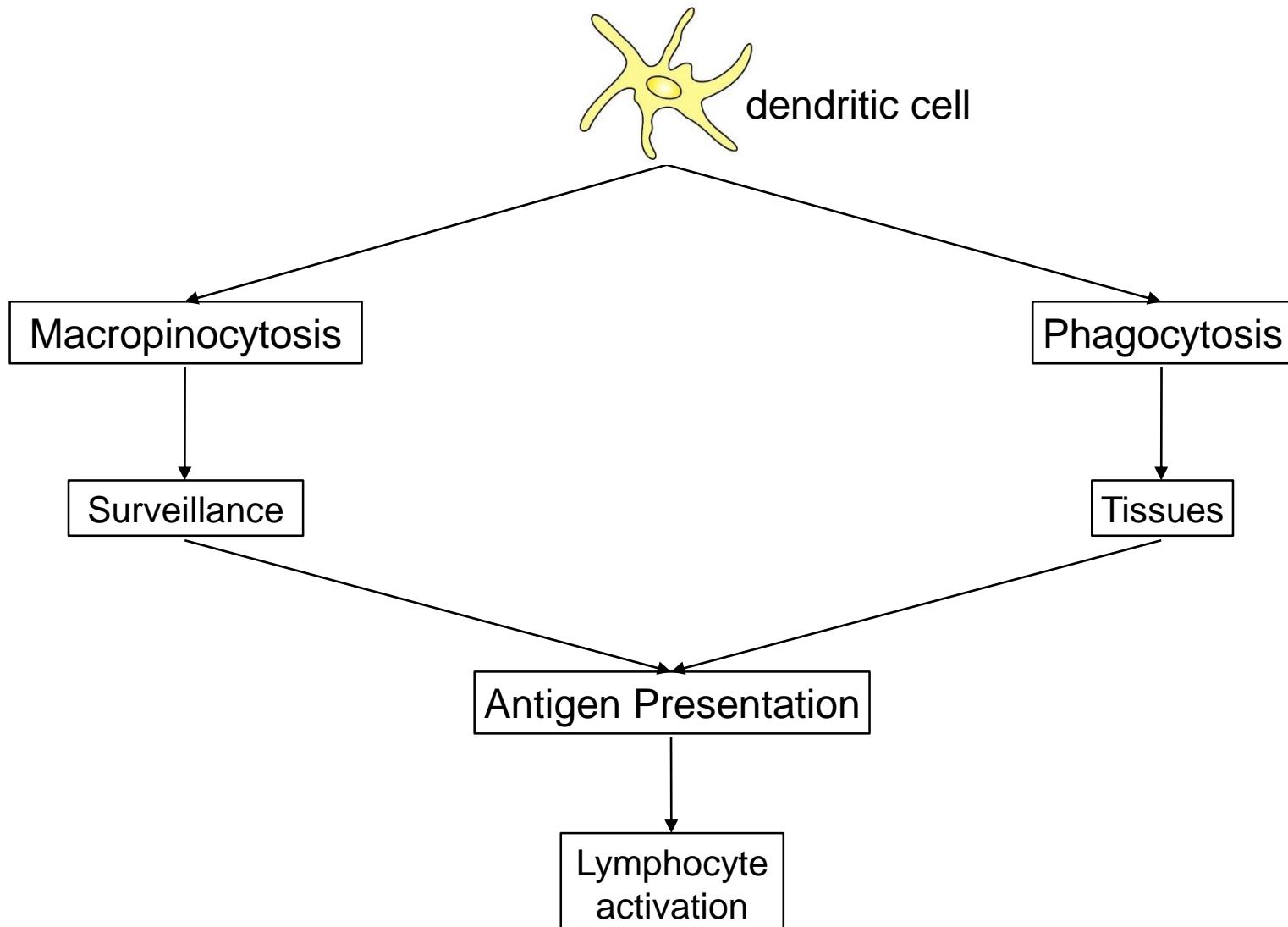


T cell

Dendritic Cells Initiate Adaptive Immune Responses



Dendritic Cell Function

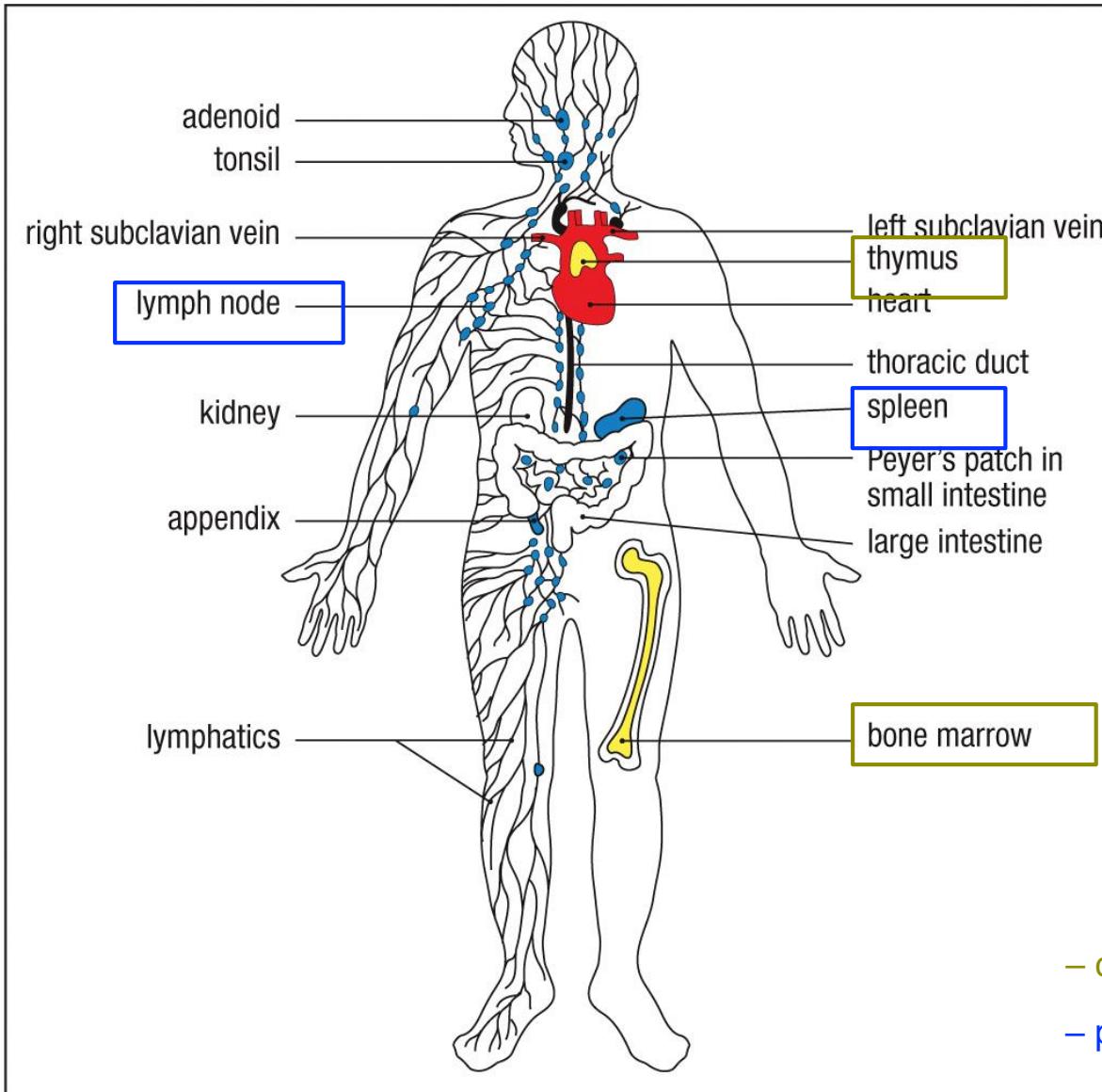


Question

What are the functions of macrophages?

What are the functions of dendritic cells?

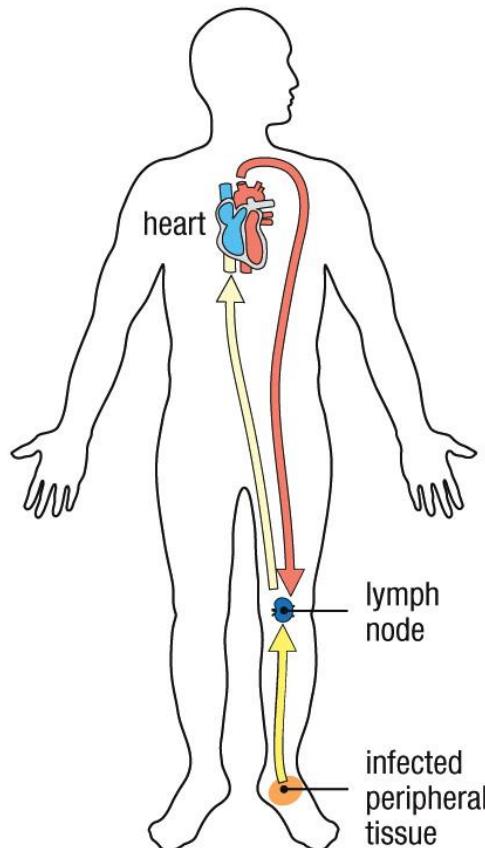
Lymphoid Tissue



Lymphoid Organs: Sites of Antigen Encounter

Lymphocytes and lymph return to blood via the thoracic duct

Naive lymphocytes enter lymph nodes from blood



Antigens from sites of infection reach lymph nodes via lymphatics

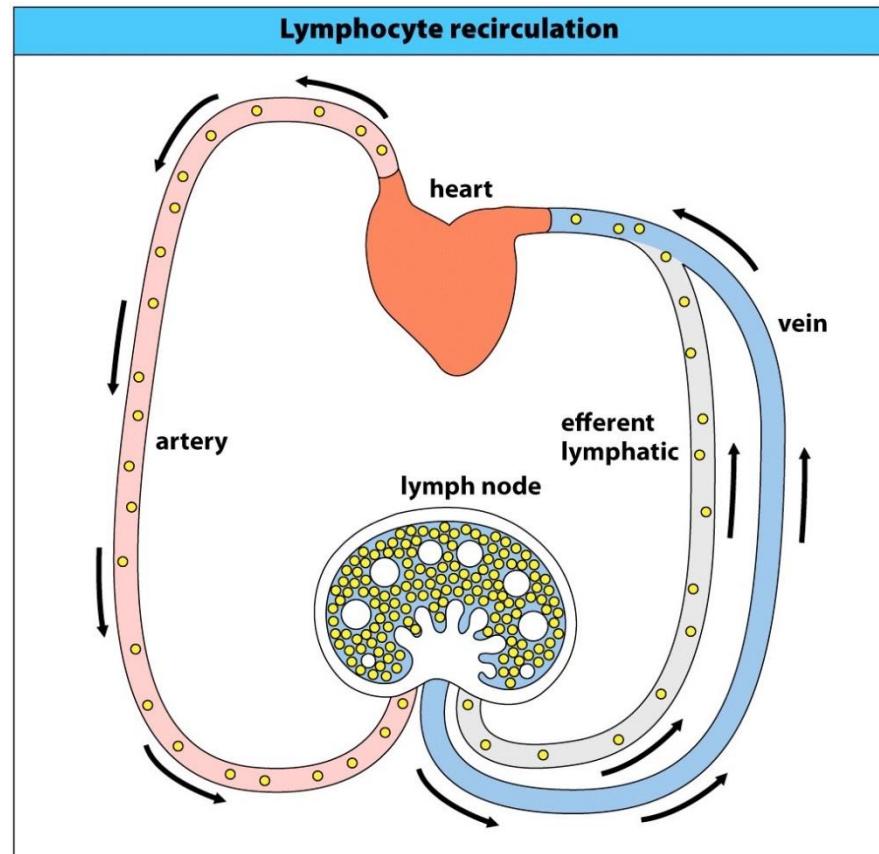
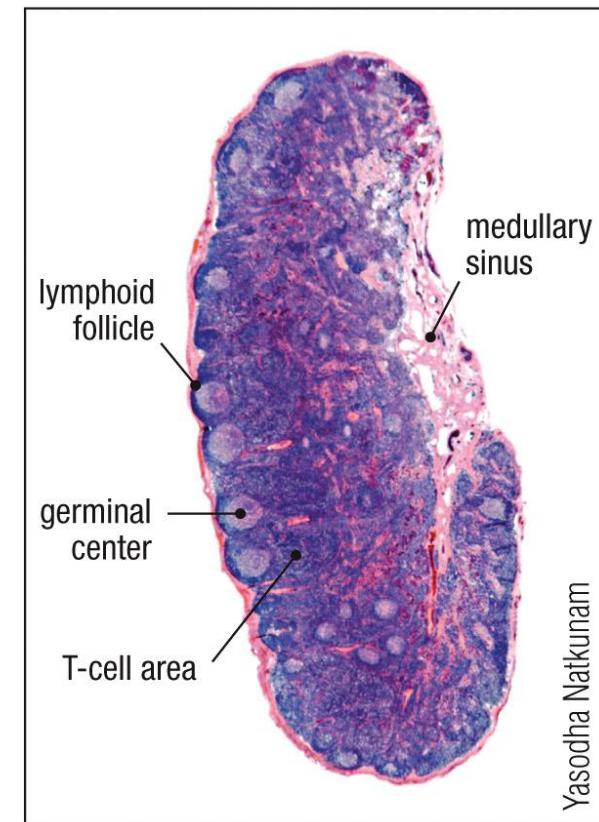
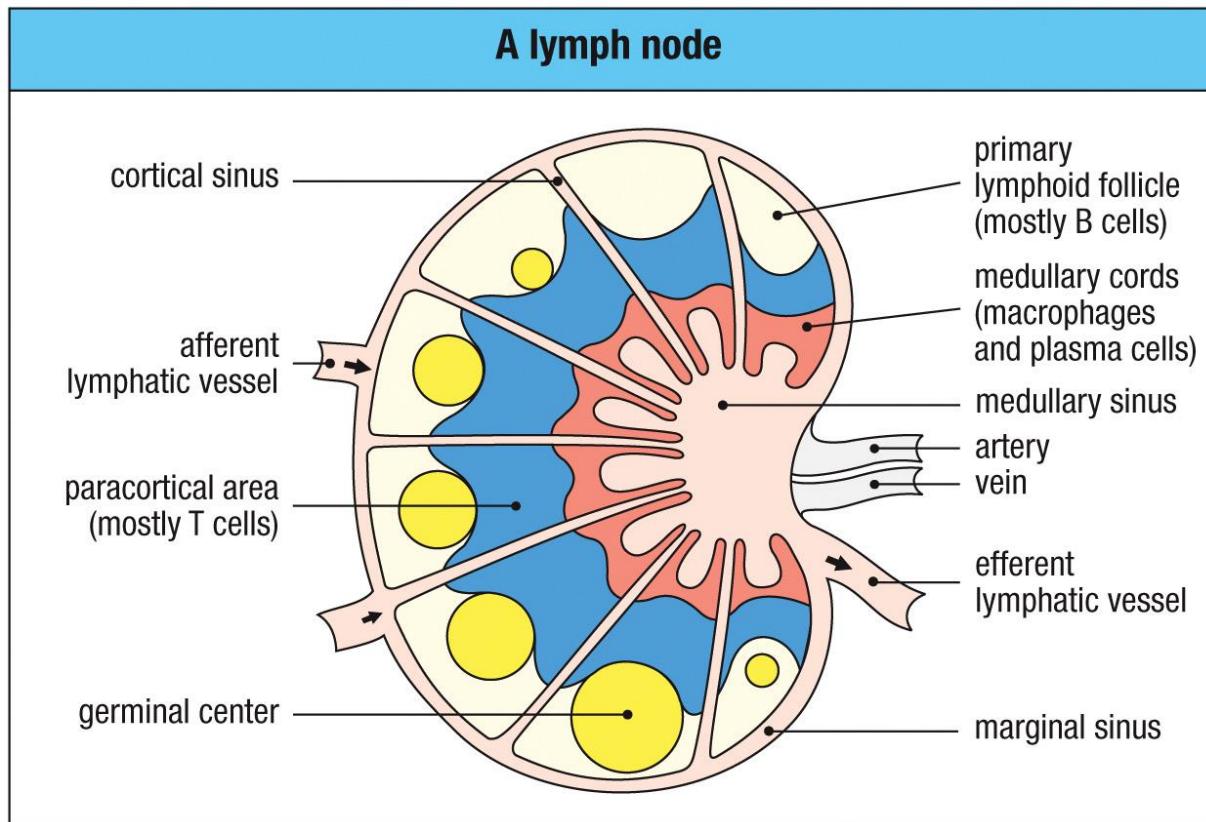


Figure 1.19 The Immune System, 3ed. (© Garland Science 2009)

Organization of a Lymph Node



Cellular Traffic to the Lymph Node

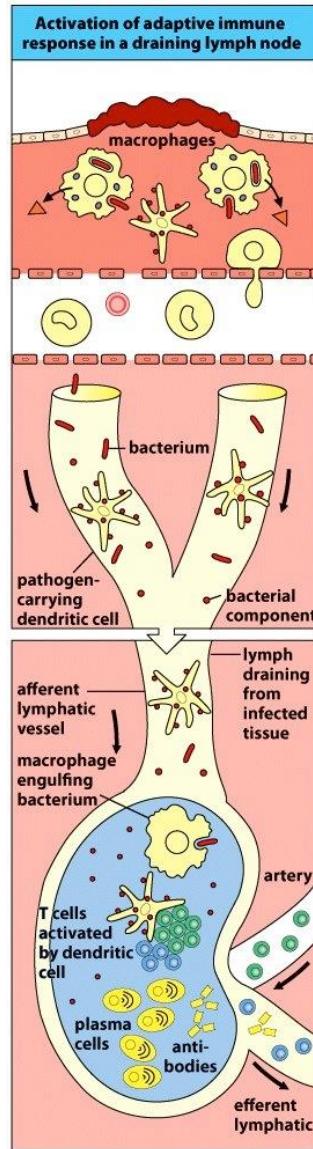


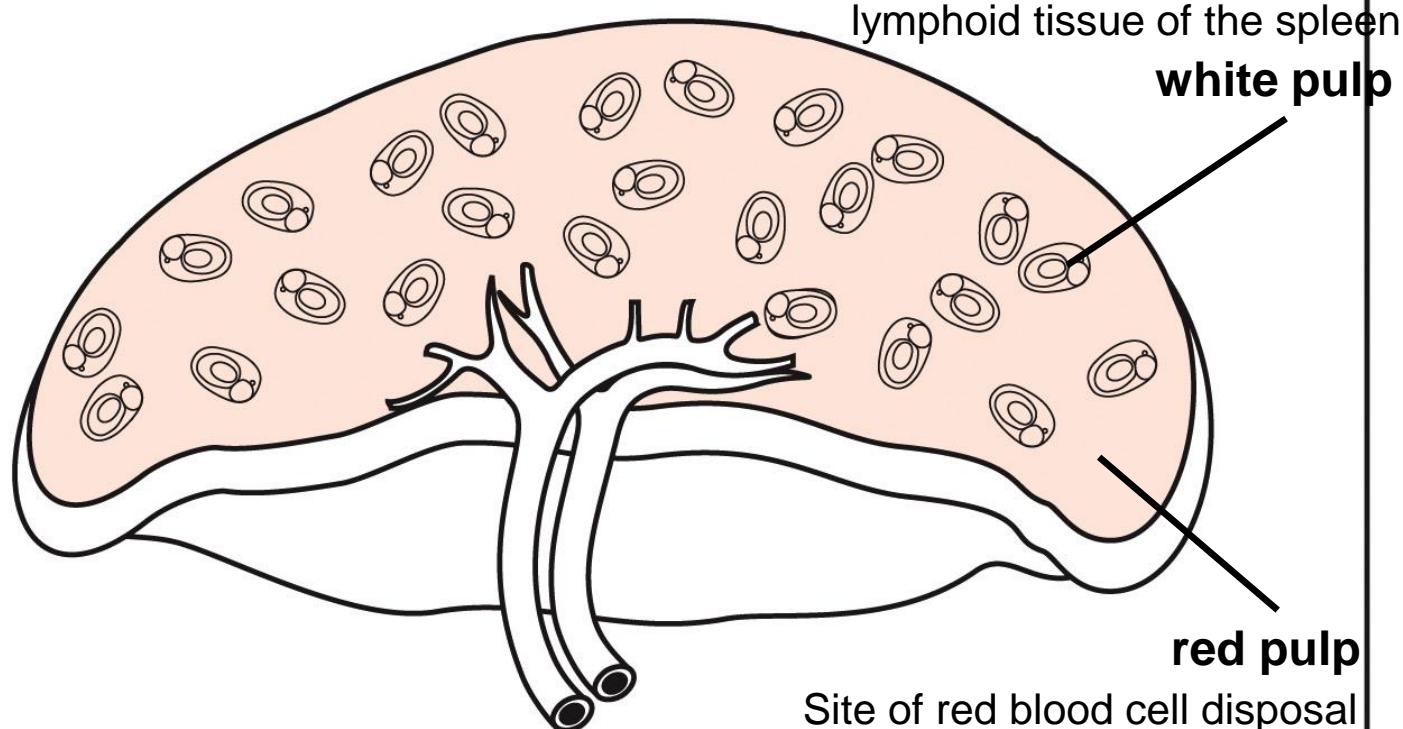
Figure 1.22 The Immune System, 3ed. (© Garland Science 2009)

Macrophages in the lymph node

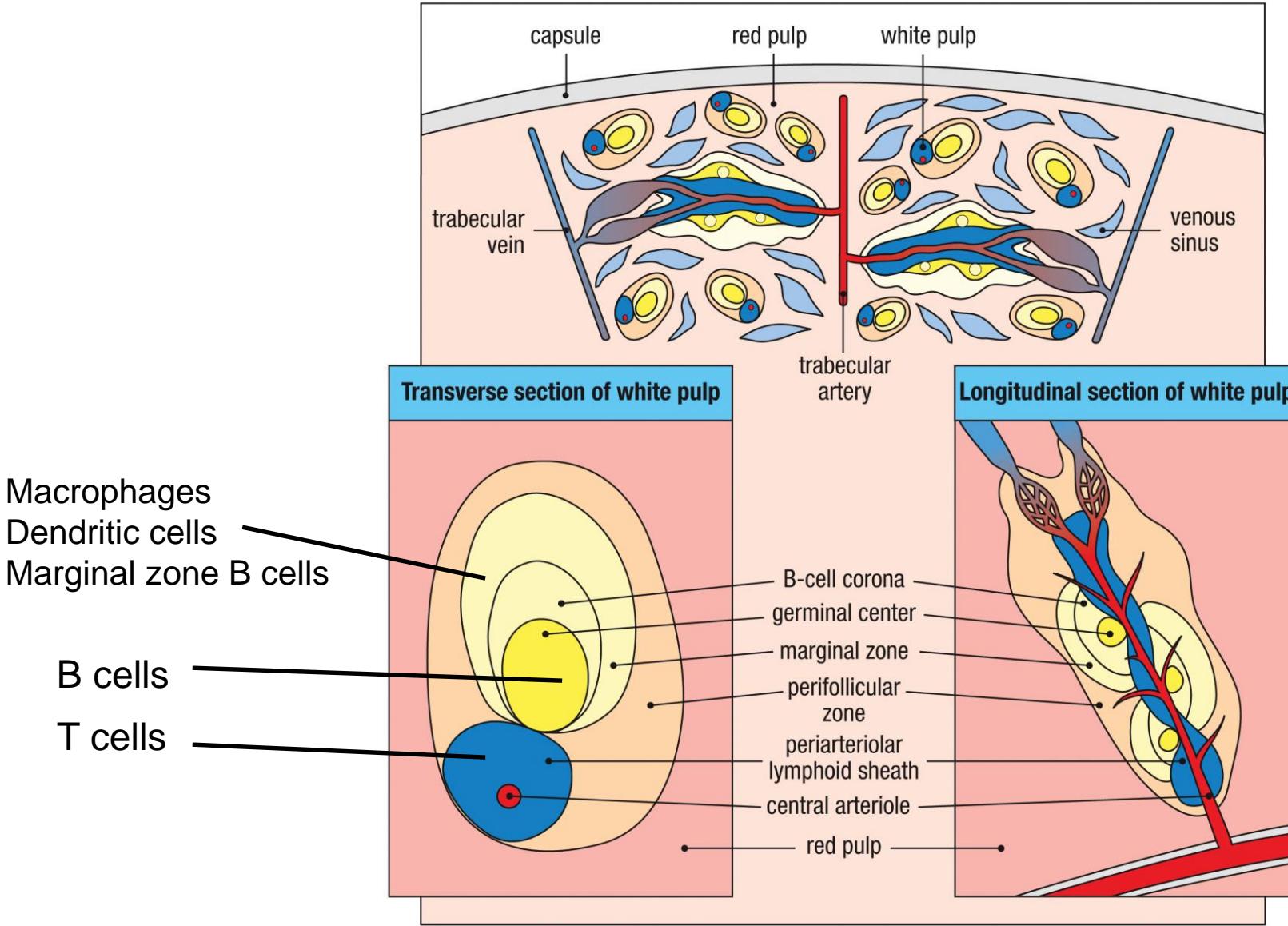
- Engulf free pathogen
- Antigen presentation
- Prevent the spread of the infection from the lymphatic system

Spleen

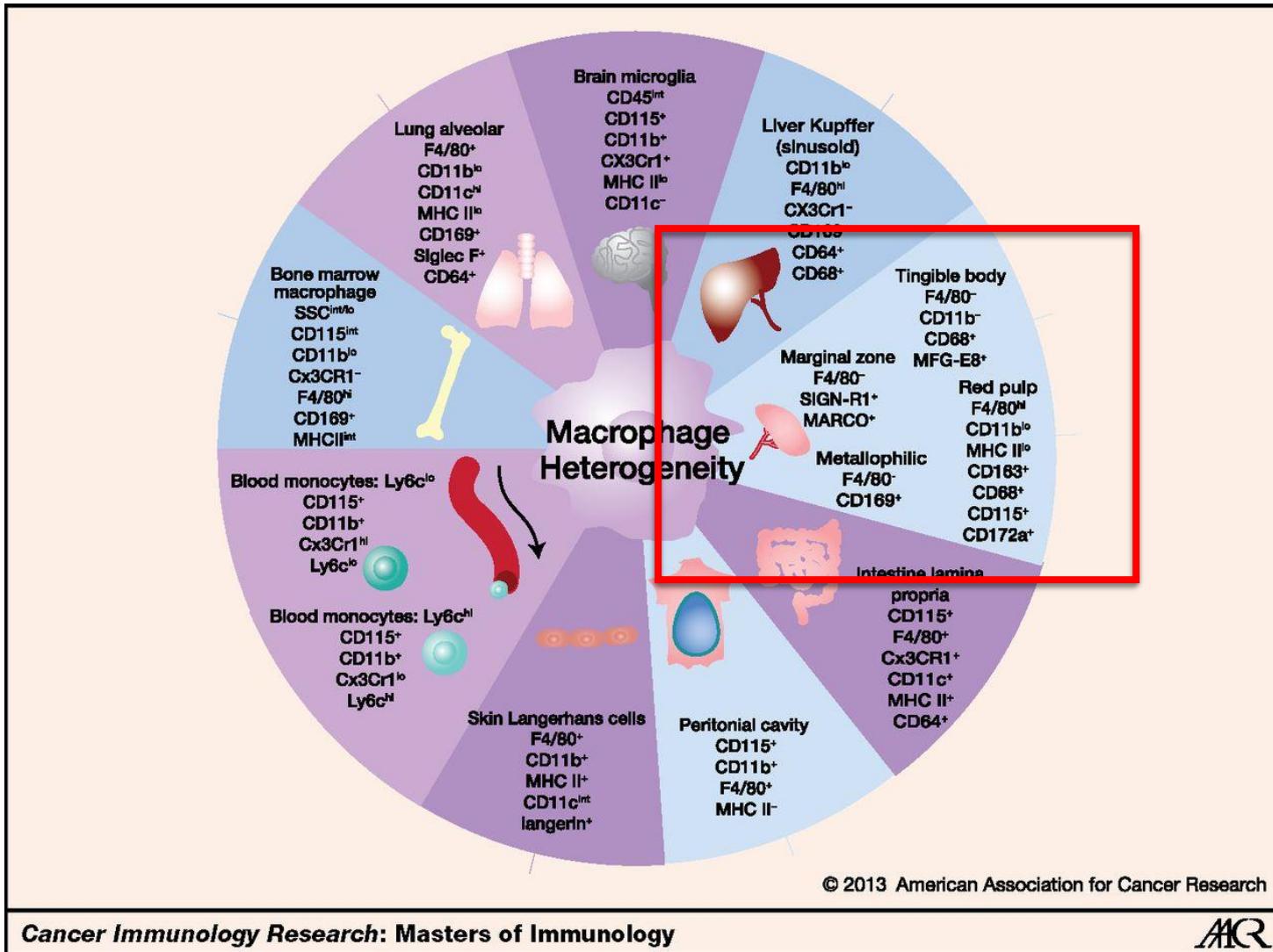
Immune responses to blood-borne pathogens



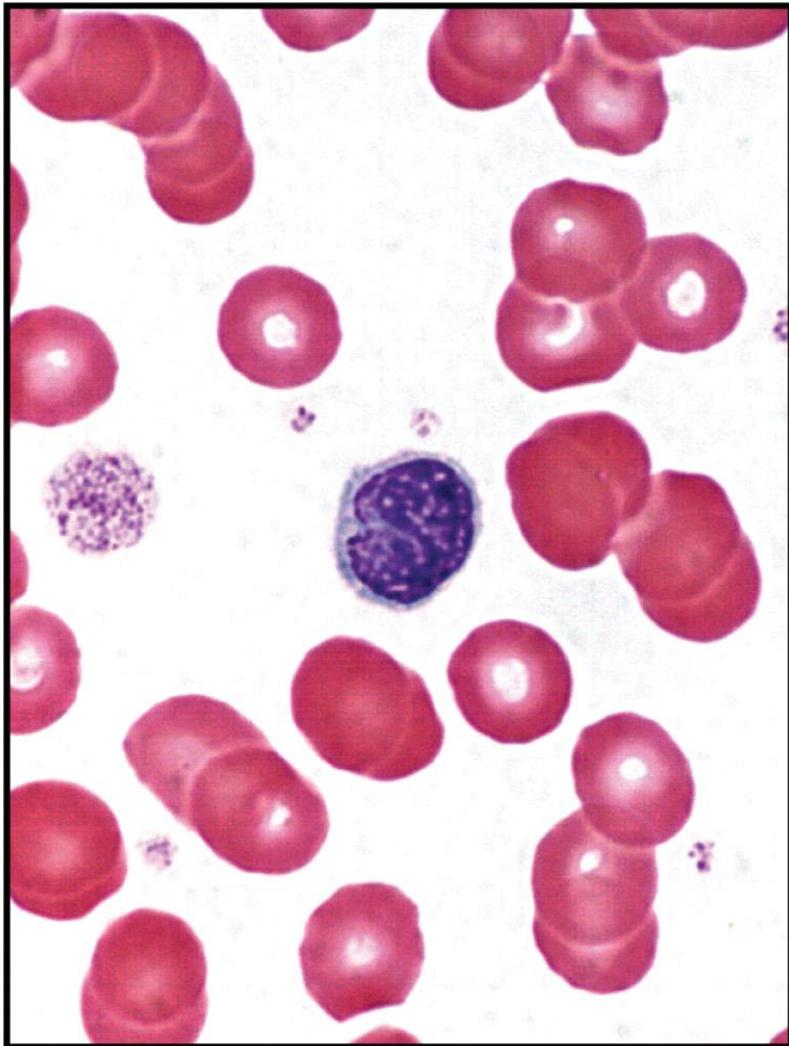
Lymphoid Tissues of the Spleen



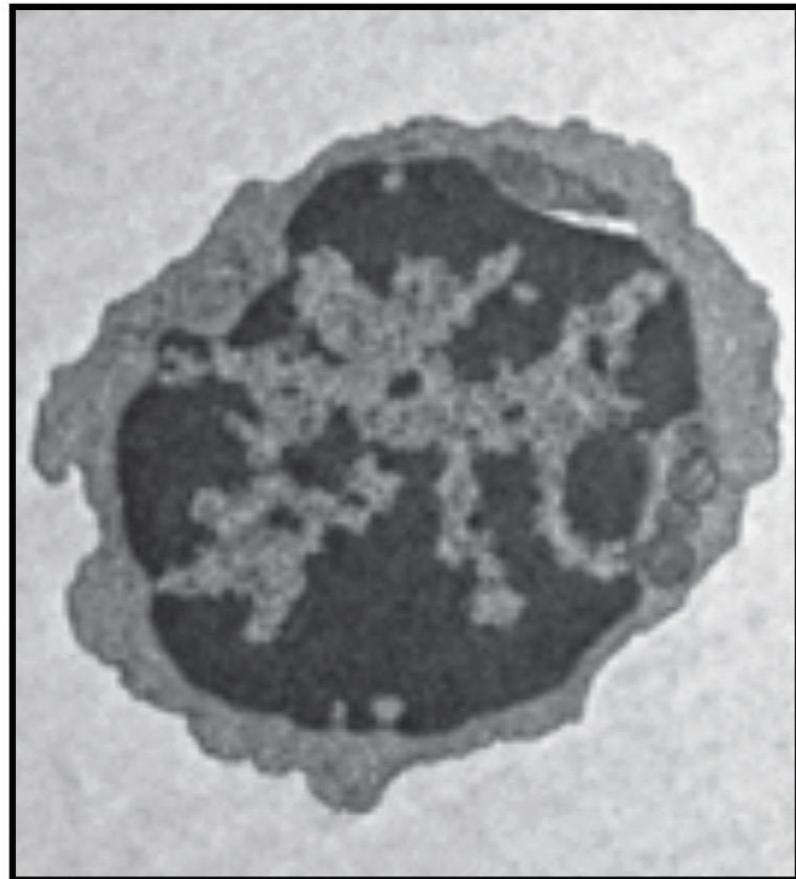
Tissue resident macrophages



Lymphocyte



Michael Ross/Science Source



Rawlings et al. (2011) *EMBO J* (2011) 30: 263–276. Reprinted with permission © Wiley

Stages of Lymphocyte Development

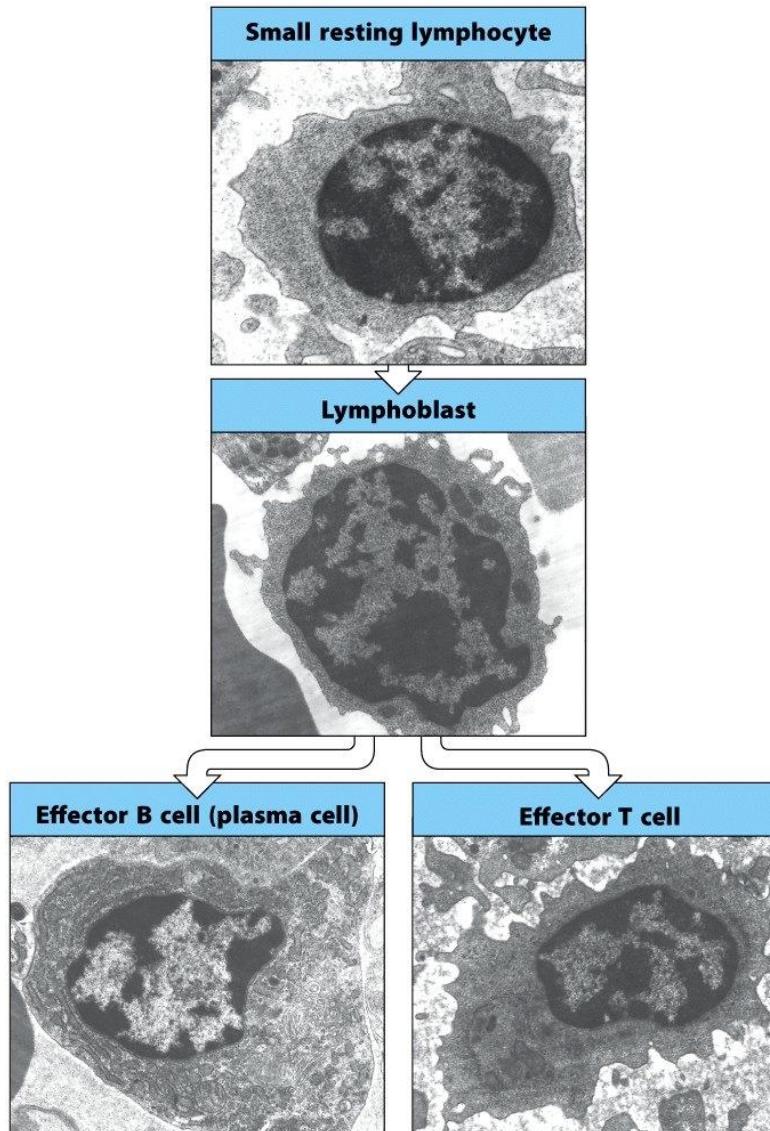
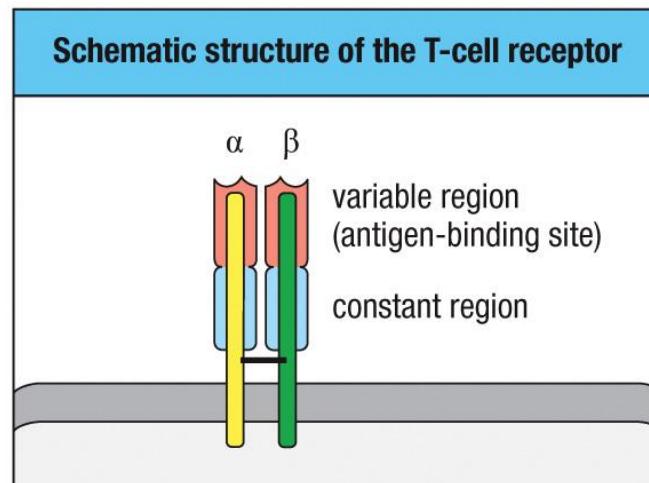
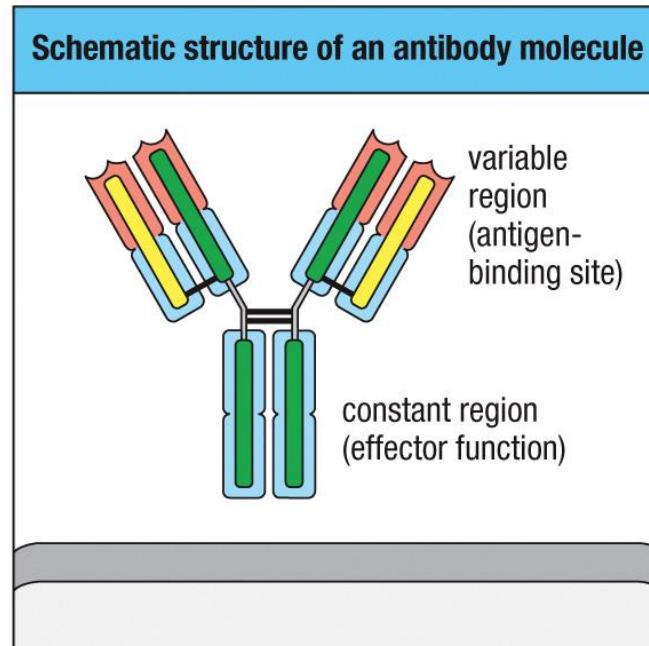
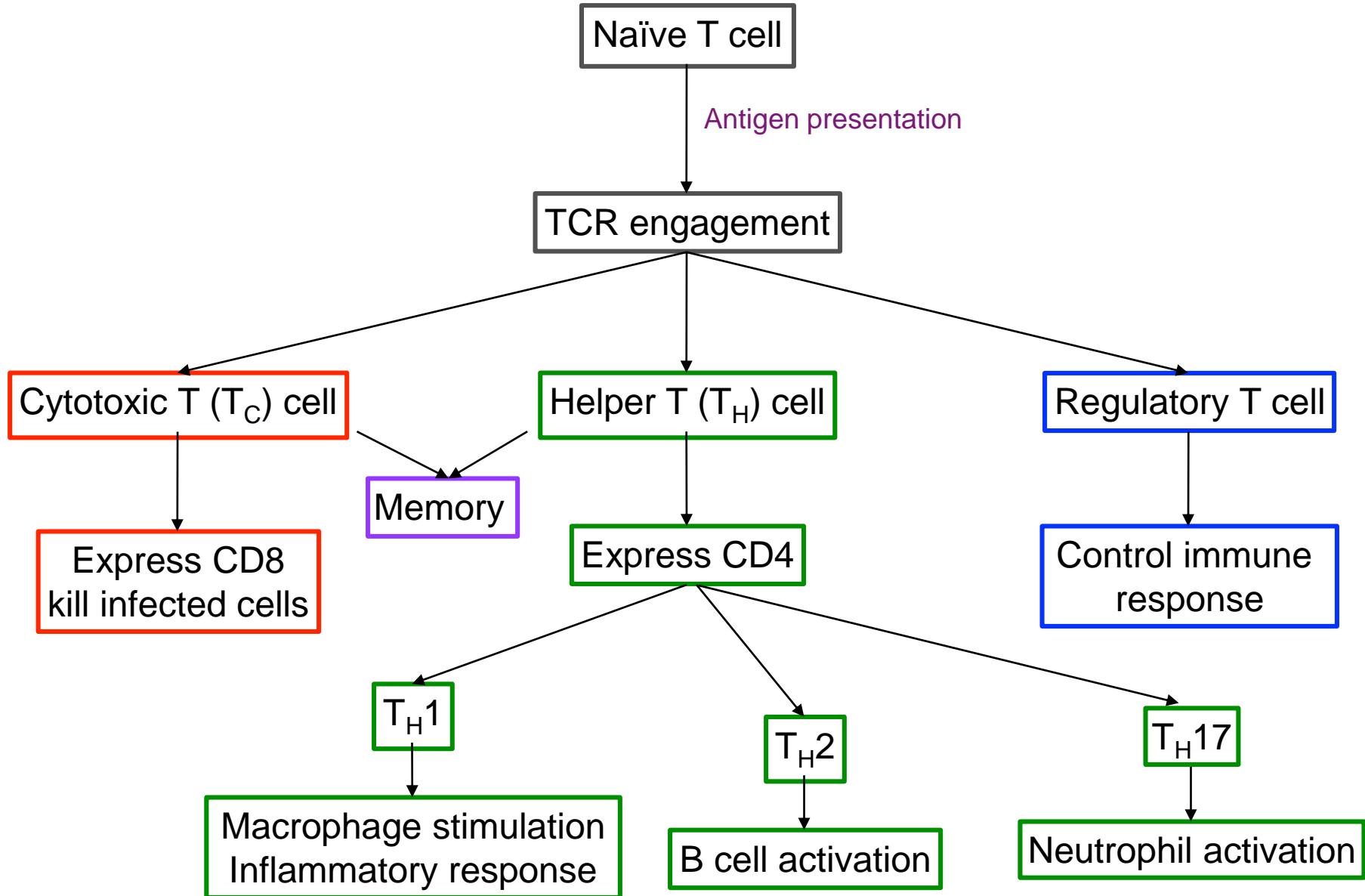


Figure 1-23 Immunobiology, 7ed. (© Garland Science 2008)

Antigen Receptors

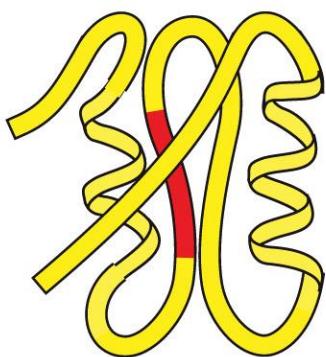


T Lymphocyte Differentiation

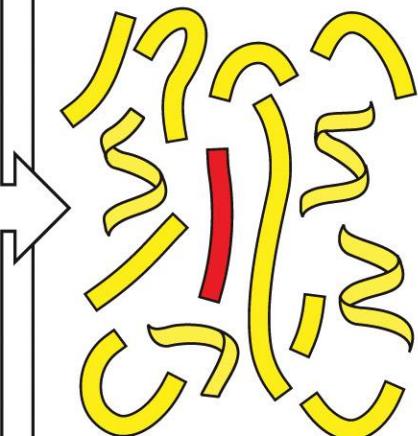


T Cell Receptors

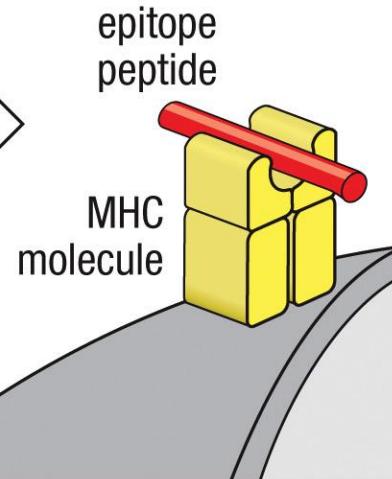
The epitopes recognized by T-cell receptors are often buried



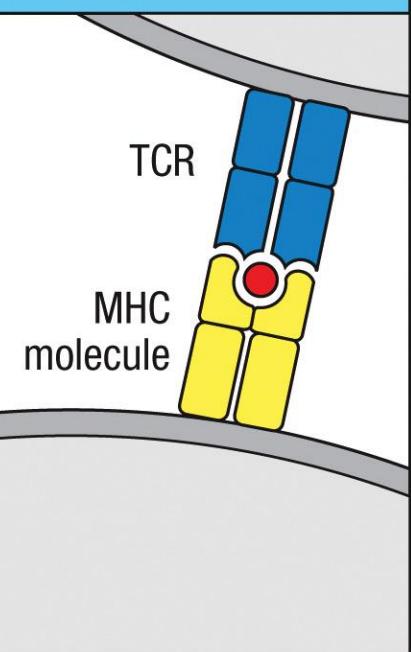
The antigen must first be broken down into peptide fragments



The epitope peptide binds to a self molecule, an MHC molecule



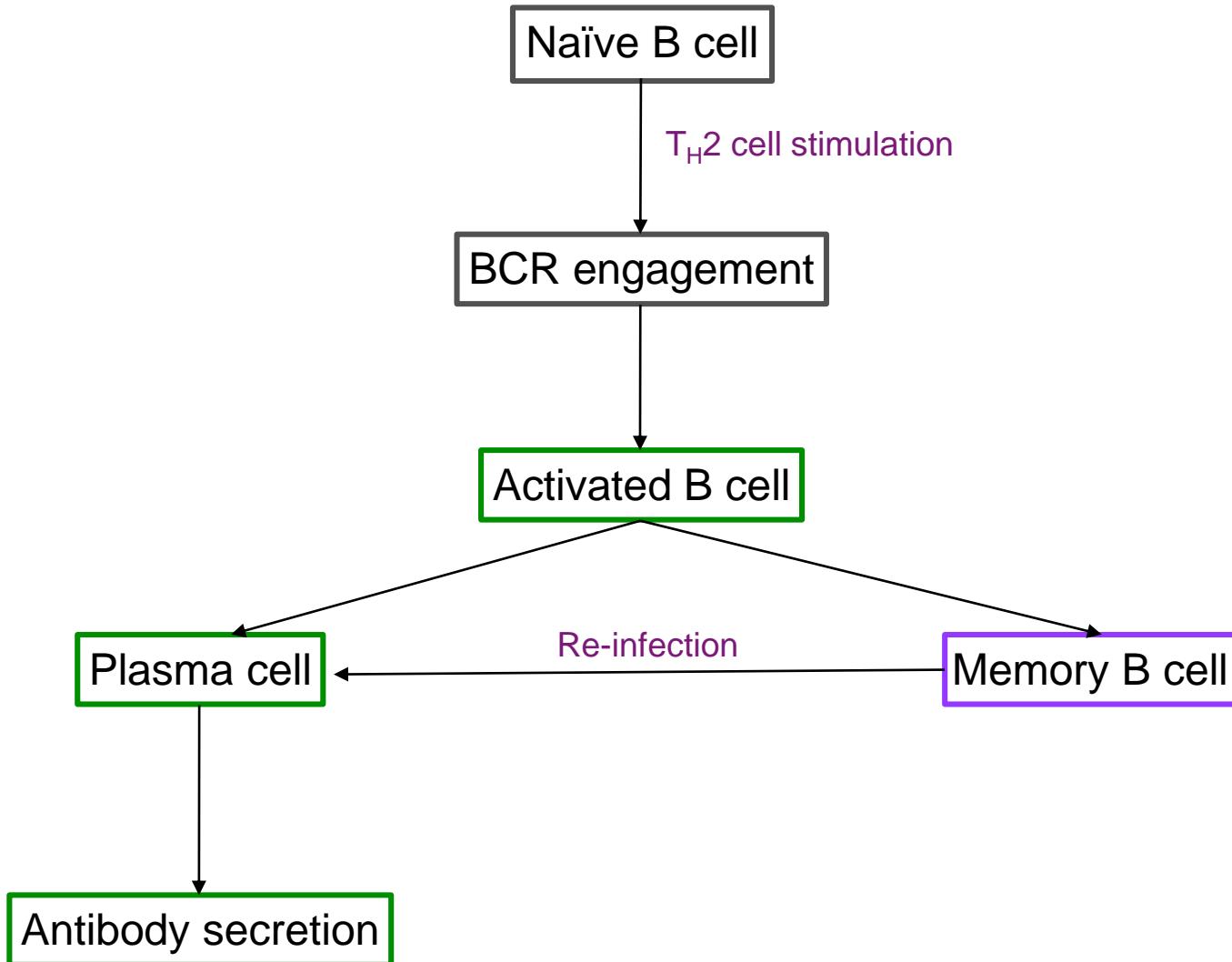
The T-cell receptor binds to a complex of MHC molecule and epitope peptide



T Lymphocyte Function

Effector module	Cell types, functions, and mechanisms
Cytotoxicity	NK cells, CD8 T cells
	Elimination of virally infected and metabolically stressed cells
Intracellular immunity (Type 1)	ILC1, T_H1 cells
	Elimination of intracellular pathogens; activation of macrophages
Mucosal and barrier immunity (Type 2)	ILC2, T_H2 cells
	Elimination and expulsion of parasites; recruitment of eosinophils, basophils, and mast cells
Extracellular immunity (Type 3)	ILC3, T_H17 cells
	Elimination of extracellular bacteria and fungi; recruitment and activation of neutrophils

B Lymphocyte Differentiation



Question

- What is the central lymphatic organ? What is its function?
- What are the two major peripheral lymphatic organs? What are their functions?

Outline

- Cells and tissues of the immune system
- Case study: Congenital Asplenia

Congenital Asplenia: Case Study

Patient:

- 10 month old female
- dead on arrival in emergency room
- prior illness, 2 weeks
- cultures positive for *H. influenzae* (bacterial)

Family history:

- Ancestors: Consanguineous marriages
- Sister, 3 years old, severe *H. influenzae* infection, recovered
- Brother, 5 years old, bacterial pneumonia at 21 & 27 months, and 3.5 years, recovered

Tests:

- Both siblings have normal responses to typhoid vaccine & tetanus toxoid
- Both siblings have impaired response to vaccination with sheep red blood cells (RBCs)
- Abnormal colloidal gold (^{198}Au) scan

Congenital Asplenia: Case Study

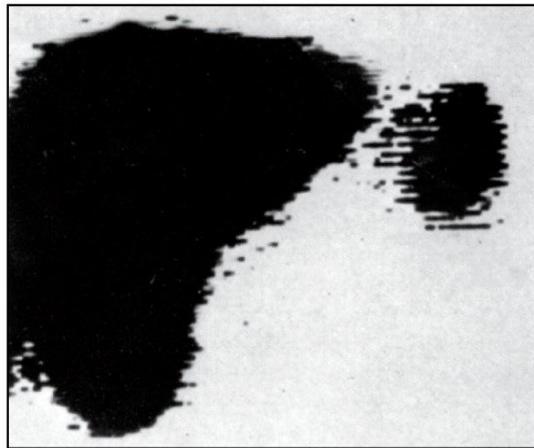
Why did the infant die?

NORMAL RESPONSES	IMPAIRED RESPONSES
Typhoid vaccine	Sheep RBCs
Subcutaneous vaccine (under the skin)	Intravenous vaccine
Response in lymph node	Response in spleen

Congenital Asplenia: Case Study

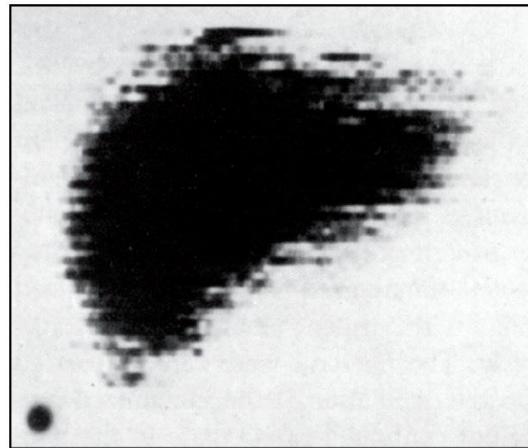
Colloidal gold (^{198}Au) scan

Mother



Liver

Children



Spleen

Congenital Asplenia: Case Study

Baby S.V. died of bacteremia

Due to her inability to mount an adaptive response against a pathogen in her blood stream.

Absent of spleen

Congenital Asplenia: Case Study

Absent or non-functional spleen

Susceptible to bloodstream infections by microorganisms against which they have no antibodies

- Streptococcus pneumonia
- Haemophilus influenzae

Treatment

Prophylactic antibiotics

Immunization