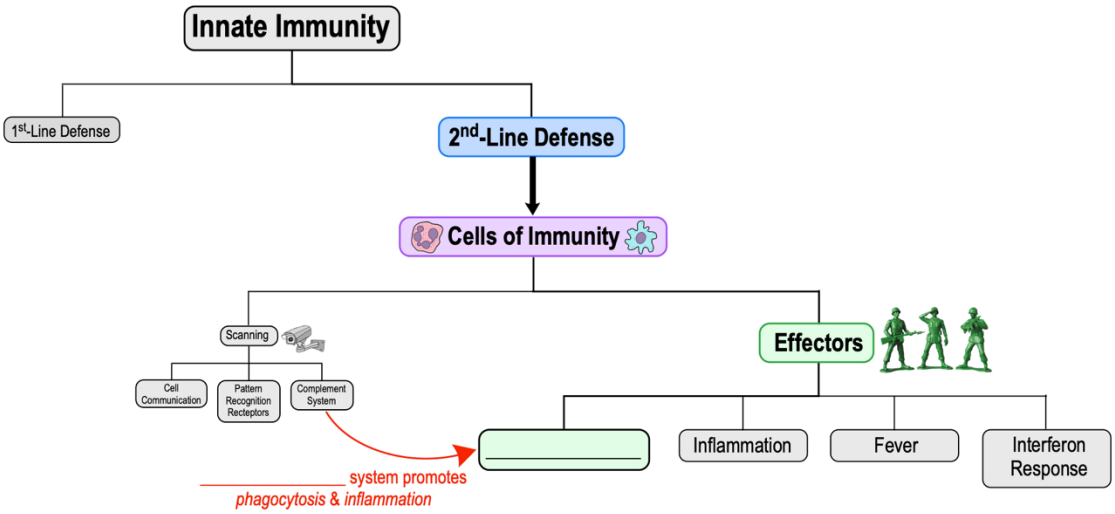
CONCEPT: PHAGOCYTOSIS

●*Recall:* **Phagocytosis** is the process of cell "_____" by engulfing & digesting material, including invading microbes.

□ Many types of immune cells are capable of phagocytosis including macrophages, dendritic cells, & neutrophils.



Steps of Phagocytosis

●The process of phagocytosis involves a series of _____ steps:

1) Chemotaxis: phagocytes _____ to site of infection by *chemoattractants* (Ex. cytokines & C5a).

2) Recognition & Attachment: phagocytes _____ microbe directly via MBLs or indirectly via *opsonins*.

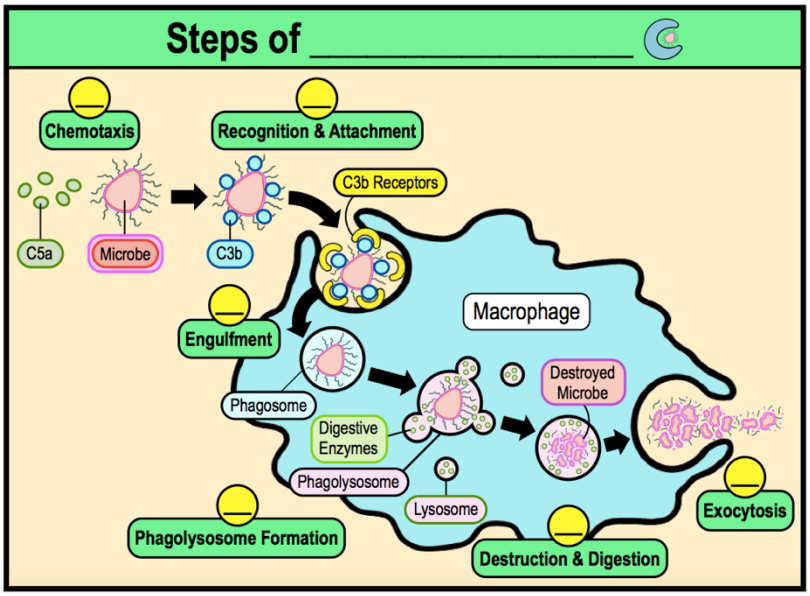
3) Engulfment: phagocyte sends out *pseudopods* to surround & engulf the material creating a _____.

4) Phagolysosome Formation: TLRs detect phagosome contents before _____ with lysosomes.

5) Destruction & Digestion: lysosome components (enzymes/ROS) _____ the invader as pH *decreases*.

6) Exocytosis: phagolysosome fuses with cytoplasmic membrane to _____ debris.

●If invading microbes are not cleared immediately, macrophages may produce _____ to recruit more phagocytes.



CONCEPT: PHAGOCYTOSIS

PRACTICE: Where are bacteria killed by enzymes and toxic substances once ingested by a white blood cell?

a) Nucleus.
b) Phagolysosome.
c) Lysosome.
d) Cytoplasm.
e) Phagosome.

PRACTICE: Which of the following statements about phagosomes and phagolysosomes are true?

a) Phagosomes are vesicles surrounding an engulfed microbe.
b) Phagosomes can be found in neutrophils, macrophages, and T cells.
c) Phagolysosomes destroy the engulfed microbe with digestive enzymes.
d) Phagolysosomes are the fusion of a phagosome and a lysosome.
e) A and C.
f) B and D.
g) A, C, and D.
h) All of the above.

PRACTICE: Which of the following statements about phagocytosis is *incorrect*?

a) Digestion of the pathogen occurs in the phagolysosome.
b) Cells capable of phagocytosis have receptors that recognize C3b proteins or antibodies bound to the pathogen.
c) Cells capable of phagocytosis move toward the infected area of the body via chemotaxis.
d) Macrophages die after phagocytosis of a pathogen while neutrophils regenerate and survive.

PRACTICE: Some pathogens create C5a peptidase, an enzyme that destroys C5a proteins. Which of the following is *not* a benefit that the pathogen would experience after destroying C5a proteins?

a) Without C5a, the pathogen is less likely to attract a phagocytotic cell via chemotaxis.
b) Without C5a, complement proteins and immune cells are less likely to come to the site of infection.
c) C5a would not be able to bind to the pathogen and trigger opsonization.
d) Without C5a, mast cells are less likely to release histamines & cytokines which trigger inflammation.