CONCEPT: INTRODUCTION TO THE COMPLEMENT SYSTEM

System: system of <i>inactive</i> proteins in blood initiating immune response when <i>activated</i> by infection.
□ Signals of microbes during infection activate proteins & a <i>cascade</i> of reactions generates a
□ Responses include removal of invading microbes & inflammation.
□ Is not adaptable & it is considered part of immunity.
□ HOWEVER, it "complements" (acts in combination with) response of adaptive immunity.
□ Activated by one of 3 pathways: 1) Alternative 2) Lectin 3) Classical
(Innate Immunity)
1st_Line Defense 2nd-Line Defense
© Cells of Immunity
Scanning Phagocytosis Pattern Recognition Recieptors Complement System Complement system phagocytosis & inflammation
Alternative Pathway *Complements Immunity *Immunity

PRACTICE: What does the word "complement" mean in the name complement system?

- a) This is a system of proteins that complements or enhances the abilities of the immune system to kill microbes.
- b) This is a system of proteins that replaces the innate immune system when the infection is too extreme.
- c) This is a system of proteins that competes with the adaptive immune system to kill pathogens.

PRACTICE: Which of the following are results of activation of the complement system?

- 1. Removal or destruction of microbes.
- 2. Inflammation.
- 3. Production of antibodies.

a) 2 only.

c) 3 only.

b) 1 and 2.

d) 1, 2, and 3.

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Proteins of the Complement System
●Complement proteins are designated with a letter & numbered C1-C9 (order of discovery).
□ Proteins remain until fragmented (activated fragments indicated by lowercase a & b).
• is a <i>critical,</i> inactive complement protein that is activated by <i>C3 convertase</i> .
□ C3 convertase: enzyme that activates C3 by hydrolyzing (or fragmenting) it into C3 & C3
□ C3a & C3b interact with other complement system components causing an response.
□ Recall: Immune responses to complement activation include opsonization, cell lysis, & inflammation.
C3 Opsonization C3 C3 C3 C3 C3 C3 C3 C3 C3 C
PRACTICE: If the complement proteins are always present in the body, then why are the results of the complement syst

- a) The complement system proteins need to be activated by the invasion of a microbe.
- b) The complement system proteins are held in the lymph nodes until an infection occurs.
- c) The complement system proteins are inactive until cleaved by another complement protein.
- d) The complement system proteins are not always present and only translated when an infection occurs.
- e) A and B.
- f) A and C.
- g) D only.

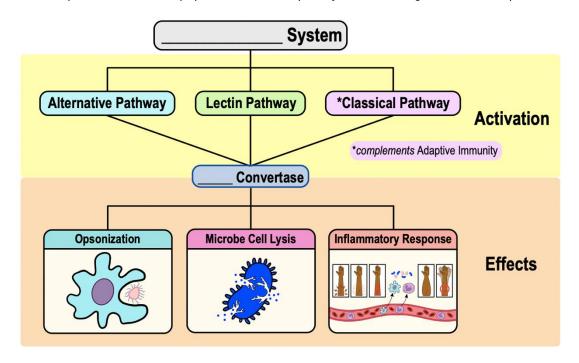
PRACTICE: Plac	ce the steps of the complement system in the correct order (Order steps 1-3).
	Opsonization, cell lysis of microbes, or inflammation occurs.
	C3 convertase splits C3 into C3a and C3b.
	C3a and C3b recruit other complement proteins to create an immune response.

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Map of the Lesson on the Complement System

- •Activation of the complement system can be *initiated* by one of _____ different pathways:
 - 1) Alternative Pathway
- 2) Lectin Pathway

- 3) Classical Pathway
- Each pathway differs in initiation; however, all 3 pathways result in formation of the enzyme convertase.
 - □ Results in 3 possible effects: 1) opsonization
- 2) cell lysis of invading microbe
- 3) inflammatory response.



PRACTICE: How do the three pathways of the complement system differ?

- a) The pathways differ in the resulting immune response they trigger.
- b) The pathways differ in the complement proteins that they activate.
- c) The pathways differ in what triggers the initiation of the pathway.

PRACTICE: The possible effects of the lectin pathway of the complement system are?

- a) C3 convertase formation.
- b) Opsonization of infecting microbes.
- c) Cell lysis of infecting microbes.
- d) Triggering the inflammatory response.
- e) All of the above.