

MCQs on Innate Immunity Molecules, Complement, Cytokines, and Acute Phase Reactants – Medical Immunology

Pattern Recognition Molecules (Cell-bound and Soluble)

1. Which of the following is a membrane-bound pattern recognition receptor that detects bacterial lipopolysaccharide (LPS)?
 - A) TLR2
 - B) TLR3
 - C) TLR4
 - D) TLR7
 - E) TLR9
2. Which cytosolic receptor family detects microbial DNA and activates the inflammasome?
 - A) TLRs
 - B) NLRs
 - C) RLRs
 - D) CLRs
 - E) Fc receptors
3. A mutation in the NOD2 gene predisposes to which inflammatory disorder?
 - A) Rheumatoid arthritis
 - B) Crohn's disease
 - C) Systemic lupus erythematosus
 - D) Psoriasis
 - E) Asthma
4. Which soluble pattern recognition molecule binds microbial mannose residues to activate the lectin pathway of complement?
 - A) C-reactive protein
 - B) Mannose-binding lectin
 - C) Surfactant protein D
 - D) Serum amyloid A

E) Ficolin

5. Which receptor recognizes viral double-stranded RNA within endosomes?

A) TLR3

B) TLR5

C) TLR7

D) TLR8

E) TLR9

Complement System

1. Which of the following describes the role of C3b in complement activation?

A) Formation of MAC

B) Opsonization of microbes

C) Anaphylatoxin activity

D) Chemotaxis

E) Red blood cell lysis

2. A patient with recurrent *Neisseria* infections likely has a deficiency in:

A) C1q

B) C2

C) C3

D) C5-C9

E) Factor H

3. Which pathway is triggered by antigen–antibody complexes?

A) Classical

B) Lectin

C) Alternative

D) Terminal

E) Bypass

4. Which regulatory protein dissociates C3 convertase on host cells to prevent complement attack?

- A) Factor D
- B) Factor I
- C) DAF (CD55)
- D) Properdin
- E) C9

5. A newborn with recurrent pyogenic infections and low C3 levels likely has:

- A) C1 esterase inhibitor deficiency
- B) C2 deficiency
- C) Factor B deficiency
- D) C3 deficiency
- E) C9 deficiency

Proinflammatory Cytokines

1. Which cytokine is the key endogenous pyrogen?

- A) IL-4
- B) IL-1 β
- C) IL-10

2. IL-6 primarily functions to:

- A) Inhibit inflammation
- B) Induce hepatic acute-phase reactants
- C) Activate complement

3. Which cytokine attracts neutrophils to infection sites?

- A) IL-4

- B) IL-8
- C) IL-10
- D) IL-12
- E) IFN- γ

4. Which cytokine from macrophages promotes Th1 differentiation?

- A) IL-2
- B) IL-4
- C) IL-6
- D) IL-12
- E) IL-17

Acute Phase Reactants

1. Which acute-phase reactant binds phosphocholine on bacteria and activates complement?

- A) Serum amyloid A
- B) Fibrinogen
- C) C-reactive protein (CRP)
- D) Haptoglobin
- E) Alpha-1-antitrypsin

2. A 50-year-old man with rheumatoid arthritis has high ESR due to elevated:

- A) CRP
- B) Fibrinogen
- C) Serum amyloid A
- D) Complement C3
- E) Ferritin

3. Which acute-phase protein decreases during inflammation?

- A) CRP
- B) Ferritin

C) Albumin

D) Fibrinogen

E) Serum amyloid A

4. A patient with pneumonia shows elevated CRP and IL-6. This indicates:

A) Viral infection

B) Chronic inflammation

C) Acute-phase response

D) Immunodeficiency

E) Autoimmunity

Answers and Explanations

Pattern Recognition Molecules (Cell-bound and Soluble)

1. Answer: C

Explanation: TLR4 recognizes LPS from Gram-negative bacteria, activating NF- κ B signaling and cytokine release.

2. Answer: B

Explanation: NOD-like receptors (NLRs) detect intracellular microbial products and activate caspase-1 for IL-1 β maturation.

3. Answer: B

Explanation: Loss of NOD2 function impairs bacterial sensing in the gut, leading to Crohn's disease.

4. Answer: B

Explanation: Mannose-binding lectin (MBL) binds microbial carbohydrates and activates complement through MASP enzymes.

5. Answer: A

Explanation: TLR3 detects viral dsRNA, triggering type I interferon production.

Complement System

1. Answer: B

Explanation: C3b acts as an opsonin, tagging pathogens for phagocytosis by neutrophils and macrophages.

2. Answer: D

Explanation: Deficiency in terminal complement components (C5–C9) leads to defective MAC formation and susceptibility to *Neisseria*.

3. Answer: A

Explanation: The classical pathway begins when C1q binds to IgG or IgM bound to antigens.

4. Answer: C

Explanation: DAF (CD55) prevents host cell injury by disrupting C3 convertase.

5. Answer: D

Explanation: C3 deficiency causes defective opsonization and recurrent infections with encapsulated bacteria.

Proinflammatory Cytokines

1. Answer: C

Explanation: IL-1 β induces fever by acting on the hypothalamic thermoregulatory center.

2. Answer: C

Explanation: IL-6 promotes synthesis of CRP, fibrinogen, and other acute-phase reactants in the liver.

3. Answer: B

Explanation: IL-8 (CXCL8) acts as a chemokine for neutrophil migration to inflamed tissues.

4. Answer: D

Explanation: IL-12 drives differentiation of CD4⁺ T cells into Th1 cells, enhancing IFN- γ production.

Acute Phase Reactants

1. Answer: C

Explanation: CRP binds bacterial phosphocholine, triggering complement activation via C1q.

2. Answer: B

Explanation: Fibrinogen increases RBC aggregation, raising ESR during inflammation.

3. Answer: C

Explanation: Albumin synthesis decreases as part of the negative acute-phase response.

4. Answer: C

Explanation: High CRP and IL-6 levels reflect acute inflammation and hepatic acute-phase response.