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-1β

    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-κB signaling and cytokine release.

2. **Answer: B**

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