LEC 6 PATHOLOGY INFLAMMATION Q:

1. Which of the following cytokines is specifically involved in the activation of macrophages in the classic (M1) pathway?

A) IL-4
B) IFN-γ
C) IL-10
D) IL-13

2. Which of the following macrophage-derived mediators is most directly responsible for attracting additional leukocytes to an inflamed site during the M1 activation pathway?

A) IL-6
B) TNF-α
C) IL-1
D) Chemokines

3. What is the primary distinguishing feature of M2 macrophages in relation to their function in inflammation?

A) They promote inflammation through the release of IL-17.
B) They induce pathogen clearance by producing reactive oxygen species.
C) They regulate inflammation and promote tissue repair.
D) They primarily release pro-inflammatory cytokines such as TNF-α.

4. Which of the following is true regarding the relationship between macrophages and T cells during inflammation?

A) Macrophages only act as antigen-presenting cells for T cell activation.
B) Activated macrophages release mediators that inhibit T cell function.
C) Macrophages release mediators that can influence T cell differentiation and function.
D) T cells do not interact with macrophages in the inflammatory response.

5. Which macrophage marker or pathway is most involved in the formation of granulomas during chronic inflammation?

A) M2 activation and IL-10 secretion
B) M1 activation and TNF-α secretion

C) TH17 pathway and IL-17 secretion
D) Macrophage interaction with B cells via the classical pathway

6. What is the hallmark feature of granulomas in tuberculosis?

A) Presence of non-caseating epithelioid histiocytes
B) Central necrosis surrounded by multinucleated giant cells
C) Infiltration of lymphocytes without any tissue necrosis
D) Abundant eosinophils in the granuloma center

7. Which of the following is the most likely cause of non-necrotizing granulomas with abundant activated macrophages and no microorganisms detected in histopathology?

A) Sarcoidosis
B) Tuberculosis
C) Leprosy
D) Histoplasmosis

8. In eosinophilic inflammation, which of the following is a typical characteristic?

A) Infiltration by neutrophils and lymphocytes
B) Tissue damage mediated by IgE and parasitic infections
C) Chronic granuloma formation with central necrosis
D) Limited to acute reactions without chronic persistence

9. Which of the following is true about the role of eosinophils in allergic reactions?

A) Eosinophils act as primary phagocytic cells, eliminating pathogens.
B) Eosinophils can cause tissue damage by degranulation in severe allergic responses.
C) Eosinophils are not involved in the inflammatory response during allergic reactions.
D) Eosinophils produce antibodies in response to allergens.

10. Which cytokine is primarily secreted by TH2 cells to activate eosinophils and promote the alternative (M2) macrophage pathway?

A) IL-5
B) IL-17
C) IFN-γ
D) IL-12

11. Which of the following best describes the mechanism behind the "left shift" observed in leukocytosis during inflammation?

A) Increased production of platelets from the bone marrow
B) A rise in the number of immature neutrophils due to cytokine stimulation
C) Decreased release of neutrophils from bone marrow
D) An increase in mature neutrophils without a change in immature forms

12. What is the major difference between necrotizing and non-necrotizing granulomas in terms of tissue changes?

A) Necrotizing granulomas contain tissue with intact cellular outlines.
B) Non-necrotizing granulomas involve central caseous necrosis.
C) Necrotizing granulomas are characterized by central necrosis with amorphous, granular debris.
D) Non-necrotizing granulomas always have a prominent neutrophil infiltration.

13. Which of the following cytokines is responsible for the fever response during the acute-phase response in inflammation?

A) TNF-α
B) IL-4
C) IL-17
D) IL-12

14. Which of the following is a direct consequence of disseminated intravascular coagulation (DIC) in septic shock?

A) Widespread clotting leading to organ failure
B) Hyperglycemia and insulin resistance
C) Severe vasodilation and fluid retention
D) Decreased white blood cell count and immune suppression

15. What is the significance of the Ziehl-Neelsen (ZN) stain in the diagnosis of granulomatous inflammation?

A) It is used to detect fungal organisms in granulomas.
B) It is used to identify Mycobacterium tuberculosis (acid-fast bacilli) in granulomas.
C) It highlights non-necrotizing granulomas by staining macrophages.
D) It identifies eosinophils in granulomas.

16. In sepsis, what is the role of IL-1 and TNF in the development of septic shock?

A) They promote vasoconstriction and blood pressure elevation.
B) They inhibit the immune response and prevent tissue damage.
C) They cause widespread inflammation, leading to hypotension and organ failure.
D) They enhance the antimicrobial response of neutrophils.

17. Which of the following is most commonly associated with a systemic inflammatory response syndrome (SIRS) in the absence of infection?

A) Hypoglycemia
B) Sepsis
C) Pancreatitis
D) Hyperglycemia

18. Which of the following is the primary function of type I interferons (e.g., IFN-α, IFN-β) during an inflammatory response?

A) Stimulate macrophage activation and the M2 pathway
B) Suppress neutrophil activity to limit inflammation
C) Enhance antiviral responses and inhibit viral replication
D) Induce fever by acting on the hypothalamus

19. What is the most likely diagnosis for a patient presenting with non-necrotizing granulomas, negative acid-fast bacilli, and negative fungal tests?

A) Tuberculosis
B) Sarcoidosis
C) Leprosy
D) Cat-scratch disease

20. In cases of chronic inflammation, the presence of neutrophils alongside macrophages and lymphocytes typically indicates:

A) Chronic active inflammation or acute on chronic inflammation
B) Resolution of inflammation
C) Transition to a regenerative phase
D) Immune suppression

Answers:

1. B
2. D
3. C
4. C
5. B
6. B
7. A
8. B
9. B
10. A
11. B
12. C
13. A
14. A
15. B
16. C
17. C
18. C
19. B
20. A

1. Which of the following is the key cytokine produced by TH17 cells that contributes to both acute and chronic inflammation?

A) IL-10
B) IL-6
C) IL-17
D) IL-4

2. Which of the following is a distinguishing characteristic of epithelioid histiocytes in granulomatous inflammation?

A) Decreased number of organelles and large nuclei
B) A high nucleus-to-cytoplasm ratio and small cytoplasm
C) The ability to phagocytize large pathogens like bacteria
D) Increased number of organelles with a decreased nucleus-to-cytoplasm ratio

3. What is the main role of macrophages in the resolution phase of inflammation?

A) To promote pathogen clearance by releasing reactive oxygen species
B) To switch to an anti-inflammatory phenotype (M2) and promote tissue repair
C) To recruit additional neutrophils to eliminate the pathogen
D) To secrete IFN-γ to maintain inflammation

4. Which of the following statements is true about the role of macrophages in granuloma formation?

A) Macrophages in granulomas are unable to differentiate into epithelioid cells.
B) Granulomas are primarily composed of activated macrophages, lymphocytes, and plasma cells.
C) Macrophages in granulomas remain in the M1 activation state throughout granuloma formation.
D) Granulomas are characterized by the presence of only neutrophils.

5. Which of the following diseases is most likely to be associated with caseating granulomas?

A) Sarcoidosis
B) Crohn's disease
C) Tuberculosis
D) Cat-scratch disease

6. In granulomatous inflammation, the presence of multinucleated giant cells indicates which of the following?

A) Activation of TH2 cells and eosinophilic involvement
B) Persistent infection by an intracellular pathogen
C) The transition from acute to chronic inflammation
D) Successful pathogen clearance and tissue repair

7. Which type of granuloma is most likely caused by Mycobacterium tuberculosis and can be identified by the Ziehl-Neelsen stain?

A) Non-necrotizing granuloma
B) Sarcoid granuloma
C) Caseating granuloma
D) Foreign body granuloma

8. What distinguishes a non-necrotizing granuloma from a necrotizing granuloma on histopathology?

A) The presence of caseous necrosis in the center of the granuloma
B) A lack of organized tissue destruction and necrosis

C) The absence of activated macrophages
D) A dense infiltration of neutrophils within the granuloma

9. Which of the following is most likely to lead to the formation of foreign body granulomas?

A) Sarcoidosis
B) Mycobacterium tuberculosis infection
C) Inhaled environmental particles like silica
D) Treponema pallidum infection

10. Which inflammatory mediator is released by mast cells upon degranulation, contributing to both acute and chronic allergic reactions?

A) Prostaglandin E2
B) IL-17
C) TNF-α
D) Histamine

11. In chronic inflammation, which of the following is the primary source of TNF-α and other inflammatory mediators?

A) Neutrophils
B) Eosinophils
C) Macrophages
D) Mast cells

12. Which of the following is the hallmark of eosinophilic inflammation when visualized under a microscope?

A) Central necrosis with giant cell formation
B) Dense neutrophilic infiltration
C) Presence of eosinophils with bi-lobed nuclei and pink cytoplasm
D) A large number of plasma cells and macrophages

13. In chronic conditions such as asthma, eosinophils play a role by:

A) Acting as the primary antigen-presenting cells
B) Degranulating and releasing cytotoxic proteins that cause tissue damage
C) Secreting IL-4 to activate T helper cells
D) Producing pro-inflammatory cytokines to recruit neutrophils

14. Which of the following cytokines secreted by TH1 cells is responsible for activating macrophages in the classical pathway (M1 activation)?

A) IL-4
B) IFN-γ
C) IL-5
D) IL-13

15. Which of the following conditions is most likely to cause a "left shift" in the white blood cell count during an acute infection?

A) Chronic myelogenous leukemia (CML)
B) Severe bacterial infection with bone marrow stimulation
C) Viral infections leading to lymphocytosis
D) Bone marrow failure resulting in neutropenia

16. What is the major role of macrophages during the transition from the acute to the chronic phase of inflammation?

A) To recruit additional neutrophils to the site of infection
B) To produce antibodies that neutralize pathogens
C) To clear apoptotic cells and promote the switch to an anti-inflammatory state (M2 activation)
D) To increase the production of complement proteins

17. In cases of septic shock, which of the following is the primary mechanism by which TNF and IL-1 cause systemic effects like hypotension and organ failure?

A) Increased vasodilation and capillary permeability leading to shock
B) Activation of the coagulation cascade leading to DIC
C) Suppression of neutrophil function and immune response
D) Induction of immune tolerance and reduced cytokine production

18. Which of the following is true regarding the systemic inflammatory response syndrome (SIRS) in non-infectious conditions like pancreatitis?

A) It involves a hyperactive immune response that inhibits cytokine production
B) It is marked by the excessive release of TNF-α and IL-6 leading to systemic effects like fever and tachycardia
C) It primarily involves eosinophils and mast cells in tissue injury

D) It results in the suppression of bone marrow activity and reduced white blood cell production

19. What is the primary function of serum amyloid A (SAA) in the acute-phase response to inflammation?

A) To decrease platelet aggregation and prevent thrombosis
B) To promote the resolution of inflammation by downregulating pro-inflammatory cytokines
C) To serve as an opsonin, aiding in pathogen clearance
D) To increase erythrocyte sedimentation rate (ESR) as part of the systemic response

20. Which of the following is the most likely outcome if corticosteroids are given prematurely in a case of sarcoidosis without ruling out infectious causes?

A) Enhanced immune function and quicker resolution of inflammation
B) Suppression of granuloma formation, leading to faster tissue healing
C) Exacerbation of infection due to the suppression of the immune response
D) Resolution of granulomatous inflammation without further complications

Answers:

1. C
2. D
3. B
4. B
5. C
6. B
7. C
8. B
9. C
10. D
11. C
12. C
13. B
14. B
15. B
16. C
17. A
18. B
19. C
20. C

1. Which of the following best describes the role of TH2 cells in inflammation?

A) Secrete IFN-γ to activate macrophages in the classical M1 pathway
B) Release IL-4, IL-5, and IL-13 to activate eosinophils and macrophages in the alternative M2 pathway
C) Inhibit the activity of macrophages in both the M1 and M2 pathways
D) Induce chemokine production to recruit neutrophils and PMNs

2. Which of the following cell types is primarily involved in the phagocytosis and elimination of pathogens during the acute phase of inflammation?

A) Neutrophils
B) Eosinophils
C) Macrophages
D) Lymphocytes

3. The activation of M1 macrophages leads to the secretion of which of the following inflammatory mediators?

A) IL-4 and IL-10
B) TNF, IL-1, and IL-12
C) IL-17 and IL-13
D) IL-6 and TGF-β

4. What is the primary function of macrophages in the M2 activation pathway during the resolution phase of inflammation?

A) To produce pro-inflammatory cytokines that perpetuate inflammation
B) To enhance phagocytosis of pathogens and apoptotic cells
C) To release anti-inflammatory cytokines that promote tissue repair and healing
D) To recruit additional neutrophils and lymphocytes to the site of infection

5. Which of the following cell types is responsible for mediating the immune response in granulomatous inflammation and transforming into epithelioid cells?

A) B lymphocytes
B) Macrophages
C) Neutrophils
D) Mast cells

6. Which of the following features is characteristic of necrotizing granulomas?

A) Presence of caseous necrosis in the center of the granuloma
B) Organized layers of fibroblasts around the granuloma
C) No central necrosis, with only lymphocytes and plasma cells
D) Formation of multinucleated giant cells surrounded by eosinophils

7. In chronic inflammation associated with asthma, what is the primary role of eosinophils in the pathophysiology?

A) Recruitment of neutrophils to exacerbate inflammation
B) Degranulation, releasing toxic proteins that damage tissue
C) Activation of T helper cells to sustain inflammation
D) Suppression of inflammation by secreting IL-10

8. Which of the following conditions is most associated with the formation of non-necrotizing granulomas?

A) Tuberculosis
B) Crohn's disease
C) Sarcoidosis
D) Leprosy

9. Which of the following is true regarding the systemic effects of inflammation, particularly the acute-phase response?

A) It is exclusively mediated by local cytokines at the site of infection
B) The acute-phase response leads to the production of CRP and ESR by the liver
C) Fever caused by cytokines directly stimulates neutrophil apoptosis
D) It causes significant bone marrow suppression and reduced white blood cell count

10. What is the primary reason for the systemic hypotension seen in sepsis and septic shock?

A) Widespread vascular constriction leading to decreased blood flow
B) Increased capillary permeability leading to fluid leakage and hypovolemia
C) Overproduction of insulin and hypoglycemia
D) Excessive neutrophil apoptosis reducing the immune response

11. In granulomatous inflammation, which of the following is the role of multi-nucleated giant cells?

A) To secrete anti-inflammatory cytokines that resolve inflammation
B) To form an impermeable barrier to contain pathogens
C) To perform phagocytosis of large particles and pathogens
D) To produce tissue-degrading enzymes during the inflammatory response

12. Which of the following best describes the role of mast cells in inflammation?

A) They are the primary cells involved in chronic inflammation, secreting cytokines that sustain the immune response.
B) They release histamine and prostaglandins to mediate acute allergic reactions and inflammation.
C) They are responsible for promoting tissue repair in the resolution phase of inflammation.
D) They act as the main phagocytic cells in both acute and chronic inflammation.

13. Which of the following statements is true about the acute phase response during systemic inflammation?

A) It results in a decrease in the levels of C-Reactive Protein (CRP).
B) It is characterized by the suppression of white blood cell production.
C) It involves the liver producing acute-phase proteins like CRP and fibrinogen.
D) It exclusively involves local inflammatory responses and does not affect the systemic circulation.

14. What is the primary function of serum amyloid A (SAA) during the acute-phase response to inflammation?

A) To enhance the production of neutrophils and macrophages at the site of infection
B) To bind to bacterial lipopolysaccharides (LPS) and neutralize their toxic effects
C) To serve as an opsonin, enhancing pathogen clearance by phagocytes
D) To increase the production of pro-inflammatory cytokines like TNF and IL-1

15. Which of the following is the most significant consequence of systemic inflammation in sepsis?

A) Tissue repair and regeneration
B) Widespread vasodilation and subsequent hypotension
C) Decreased white blood cell count and impaired immune response
D) Decreased vascular permeability, leading to fluid retention

16. Which of the following is a key feature of granulomatous inflammation that helps distinguish it from other types of chronic inflammation?

A) Presence of an overwhelming neutrophilic infiltrate
B) Formation of granulomas with activated macrophages, epithelioid cells, and sometimes giant cells
C) Absence of immune cells in the inflammatory area
D) Extensive fibrosis and scarring with no cellular infiltration

17. Which of the following cytokines is primarily responsible for the systemic effects such as fever and fatigue during the acute phase of inflammation?

A) IL-10
B) TNF-α
C) IFN-γ
D) IL-4

18. In cases of chronic inflammation such as rheumatoid arthritis, which cell type is most responsible for the destruction of tissue and ongoing immune response?

A) T lymphocytes (especially CD8+ T cells)
B) Neutrophils
C) Macrophages and fibroblasts
D) Eosinophils

19. Which of the following is a hallmark feature of a "left shift" in the white blood cell count during an acute bacterial infection?

A) Increased levels of lymphocytes
B) Presence of immature neutrophils (band cells) in the blood
C) Decreased white blood cell count due to bone marrow suppression
D) Increased eosinophil count

20. Which of the following best describes the systemic effects observed in SIRS (Systemic Inflammatory Response Syndrome)?

A) Increased blood pressure and tachycardia without fever
B) Hypotension, fever, and tachycardia due to widespread cytokine release
C) Reduced white blood cell count and widespread vasoconstriction
D) Localized inflammation without systemic manifestations

1. B
2. A
3. B
4. C
5. B
6. A
7. B
8. C
9. B
10. B
11. C
12. B
13. C
14. C
15. B
16. B
17. B
18. C
19. B
20. B

1. Which of the following best describes the interaction between macrophages and T lymphocytes in the inflammatory response?

A) Macrophages only present antigens to T lymphocytes in chronic inflammation.
B) T lymphocytes activate macrophages through cytokine secretion, especially in the M1 pathway.
C) T lymphocytes suppress macrophage activation to limit the immune response.
D) Macrophages and T lymphocytes work independently without any feedback loops in chronic inflammation.

2. Which of the following is a key characteristic of M1 macrophages in acute inflammation?

A) They suppress inflammation by releasing anti-inflammatory cytokines.
B) They promote tissue healing by secreting growth factors.
C) They engage in phagocytosis and secrete pro-inflammatory cytokines like TNF and IL-1.
D) They are predominantly involved in the repair and resolution phase of inflammation.

3. Which of the following is true about the role of TH17 cells in inflammation?

A) They secrete IL-10, which has anti-inflammatory effects.
B) They activate eosinophils and macrophages in the classical M1 pathway.
C) They secrete IL-17, a key cytokine that recruits neutrophils and induces chemokine production.
D) They directly neutralize pathogens through phagocytosis.

4. In granulomatous inflammation, which of the following best describes epithelioid histiocytes?

A) They are neutrophils that accumulate in the granuloma center and release digestive enzymes.
B) They are activated macrophages that assume an epithelium-like appearance and play a role in pathogen clearance.
C) They are plasma cells that produce antibodies in the granuloma.
D) They are lymphocytes that perpetuate the inflammatory response in granulomas.

5. Which cytokine released by macrophages in the M2 pathway helps to promote tissue repair and anti-inflammatory responses?

A) TNF-α
B) IL-10
C) IL-1
D) IFN-γ

6. Which of the following best explains the pathophysiological process behind eosinophilic inflammation?

A) Eosinophils release histamine, leading to vasodilation and increased permeability.
B) Eosinophils degranulate and release major basic proteins that are toxic to parasitic organisms and contribute to tissue damage.
C) Eosinophils suppress the immune response by secreting anti-inflammatory cytokines.
D) Eosinophils primarily promote tissue repair by secreting collagen and fibroblast growth factors.

7. What is the role of mast cells in allergic reactions, particularly during acute inflammation?

A) They produce antibodies that neutralize allergens in the bloodstream.
B) They activate eosinophils and basophils by secreting IL-4 and IL-5.
C) They release histamine and prostaglandins to mediate vasodilation and promote inflammation.

D) They suppress the inflammatory response by releasing anti-inflammatory cytokines.

8. Which of the following best describes the morphological appearance of a necrotizing granuloma?

A) A mass of lymphocytes and plasma cells with no necrosis at the center.
B) Granulomas that contain multinucleated giant cells with surrounding epithelioid macrophages and central necrosis (caseous necrosis).
C) A cluster of neutrophils surrounded by activated macrophages.
D) A fibrotic scar tissue with no cellular infiltration or necrosis.

9. What is the primary function of the acute-phase proteins such as C-Reactive Protein (CRP) during inflammation?

A) They act as opsonins, enhancing the recognition and clearance of pathogens by phagocytes.
B) They increase neutrophil production and activation in the bone marrow.
C) They directly neutralize toxins produced by bacteria.
D) They induce fever and hypotension through cytokine secretion.

10. In granulomatous inflammation, which of the following is a key diagnostic method to identify Mycobacterium tuberculosis as the causative agent?

A) Ziehl-Neelsen (ZN) stain for acid-fast bacilli.
B) PCR-based detection of Mycobacterium DNA in tissue samples.
C) Enzyme-linked immunosorbent assay (ELISA) for Mycobacterium antibodies.
D) Gram stain to visualize the presence of Gram-positive bacteria.

11. Which of the following is true regarding the development of chronic osteomyelitis?

A) It is primarily caused by viral infections in the bone marrow.
B) Neutrophils are the main cells involved in the bone destruction and persistence of the infection.
C) Macrophages are not involved in the immune response to bone infections.
D) Chronic osteomyelitis is typically resolved without the need for antibiotic treatment.

12. What is the primary consequence of systemic inflammatory response syndrome (SIRS) in sepsis?

A) Increased glucose production and insulin sensitivity.
B) Widespread vasodilation, decreased blood pressure, and organ failure.
C) A marked reduction in white blood cell count due to immune suppression.
D) Severe fluid retention and hypervolemia due to the release of antidiuretic hormone.

13. Which of the following diseases is most commonly associated with the formation of non-necrotizing granulomas?

A) Tuberculosis
B) Sarcoidosis
C) Leprosy
D) Chronic infections with foreign body material

14. Which of the following is a consequence of a "left shift" in the white blood cell count during bacterial infections?

A) Increased percentage of mature neutrophils and a decrease in immature forms.
B) An increase in the number of eosinophils due to parasite infections.
C) The presence of more band cells (immature neutrophils) in circulation.
D) A decrease in neutrophil production in response to cytokines.

15. What is the main pathological feature observed in chronic obstructive pulmonary disease (COPD) related to neutrophil activity?

A) Excessive neutrophil degranulation leading to alveolar destruction.
B) Formation of granulomas and scarring in the lung tissue.
C) Neutrophil apoptosis and impaired immune response in the lungs.
D) Neutrophil-mediated fibrosis in the bronchi.

16. Which of the following is the key mediator responsible for initiating the acute-phase response in sepsis?

A) IL-10
B) IL-1 and TNF-α
C) IL-4
D) IFN-γ

17. Which of the following is the hallmark feature of a granulomatous response to foreign body material?

A) Formation of giant cells and caseous necrosis at the center of the granuloma.
B) The infiltration of plasma cells, eosinophils, and lymphocytes around the foreign material.
C) Complete fibrosis without any cellular infiltration.
D) Absence of granuloma formation due to lack of immune response.

18. What is the significance of serum amyloid A (SAA) in the acute-phase response?

A) It acts as a neutralizing antibody against bacterial toxins.
B) It enhances the function of neutrophils in pathogen killing.
C) It is an acute-phase protein that increases during inflammation and can contribute to amyloidosis.
D) It downregulates the release of pro-inflammatory cytokines.

Answers:

1. B
2. C
3. C
4. B
5. B
6. B
7. C
8. B
9. A
10. A
11. B
12. B
13. B
14. C
15. A
16. B
17. B
18. C

1. Which of the following is most directly responsible for the tissue destruction observed in chronic inflammation, particularly in conditions like chronic osteomyelitis or COPD?

A) Activation of TH2 cells and eosinophils.
B) Prolonged activation of neutrophils and macrophages, leading to the release of enzymes and reactive oxygen species.
C) The formation of granulomas with multinucleated giant cells.
D) The chronic presence of foreign body material causing fibrosis and necrosis.

2. In granulomatous inflammation, what is the role of multinucleated giant cells (Langhans cells)?

A) They are macrophages that have undergone apoptosis to remove dead cells.
B) They form as a result of the fusion of epithelioid histiocytes to contain persistent pathogens or foreign materials.
C) They suppress the inflammatory response by releasing anti-inflammatory cytokines.
D) They promote angiogenesis and tissue repair.

3. Which cytokine produced by macrophages in the M1 activation pathway has the primary effect of inducing systemic fever and further promoting inflammation?

A) TNF-α
B) IL-10
C) IL-4
D) IL-6

4. What is the characteristic feature of non-necrotizing granulomas, as seen in diseases like sarcoidosis?

A) Presence of central necrosis with caseous material.
B) Accumulation of macrophages and lymphocytes, without necrosis at the core of the granuloma.
C) Infiltration of neutrophils and eosinophils around the granuloma.
D) Formation of abscesses in the affected tissue.

5. Which of the following cells is primarily involved in the pathogenesis of eosinophilic inflammation, especially in allergic reactions and parasitic infections?

A) Mast cells
B) Neutrophils
C) Eosinophils
D) T lymphocytes

6. Which statement is true regarding the function of TH1 cells in inflammation?

A) TH1 cells primarily activate eosinophils and neutrophils to clear pathogens.
B) TH1 cells secrete IFN-γ, which activates macrophages and contributes to the classical M1 pathway.
C) TH1 cells release IL-4 and IL-13, which promote tissue repair.
D) TH1 cells are involved in the resolution phase of inflammation.

7. Which of the following is the primary mechanism by which the liver contributes to the acute-phase response during systemic inflammation?

A) Production of immune cells like neutrophils and T lymphocytes.
B) Secretion of acute-phase proteins such as CRP, SAA, and hepcidin.
C) Synthesis of cytokines that directly neutralize pathogens.
D) Inhibition of leukocyte proliferation to reduce inflammation.

8. In the context of septic shock, which of the following best explains the pathophysiological role of TNF and IL-1?

A) They help in the resolution of inflammation by promoting tissue repair.
B) They induce fever, hypotension, and the widespread activation of the coagulation cascade.
C) They promote the production of antibodies to neutralize endotoxins.
D) They increase insulin sensitivity and help control blood glucose levels during infection.

9. Which of the following best describes the primary action of mast cells in allergic reactions?

A) They neutralize pathogens by phagocytosis.
B) They release histamine and other mediators to cause vasodilation and increase vascular permeability.
C) They activate B lymphocytes and promote antibody production.
D) They induce the apoptosis of infected cells by releasing cytotoxic molecules.

10. Which of the following best describes the role of TH17 cells in chronic inflammation?

A) They are involved in the suppression of macrophage activation and the resolution of inflammation.
B) They primarily recruit neutrophils to the site of inflammation and promote the release of pro-inflammatory cytokines.
C) They induce T cell apoptosis to reduce the immune response.
D) They inhibit the activity of TH1 cells and reduce cytokine production.

11. Which of the following is the most likely consequence of prolonged activation of neutrophils in chronic inflammatory conditions like COPD?

A) Neutrophil-mediated fibrosis and tissue repair.
B) Inhibition of macrophage activation and reduced pathogen clearance.
C) Ongoing tissue destruction due to the release of proteolytic enzymes and reactive oxygen species.
D) Increased angiogenesis and tissue regeneration.

12. What is the key histological feature of caseous necrosis, typically seen in tuberculosis and some fungal infections?

A) A dense infiltration of neutrophils with fibrosis.
B) The presence of a well-defined granuloma with multinucleated giant cells and central necrosis resembling "cheese."
C) The formation of abscesses surrounded by eosinophils.
D) A diffuse accumulation of lymphocytes without central necrosis.

13. Which of the following is a potential complication of septic shock due to the release of excessive pro-inflammatory cytokines like TNF and IL-1?

A) Hypertension and increased tissue perfusion.
B) Widespread clotting leading to Disseminated Intravascular Coagulation (DIC) and organ failure.
C) Reduced blood pressure leading to increased cardiac output and tissue oxygenation.
D) A decrease in immune function and increased susceptibility to secondary infections.

14. Which of the following conditions is most associated with the presence of non-caseating granulomas in the lung tissue?

A) Tuberculosis
B) Sarcoidosis
C) Leprosy
D) Fungal infections (e.g., Aspergillosis)

15. In the context of chronic inflammation, which of the following is true regarding the involvement of macrophages?

A) Macrophages are predominantly involved in the acute phase of inflammation and resolve inflammation once neutrophils arrive.
B) Macrophages shift from a pro-inflammatory (M1) to an anti-inflammatory (M2) phenotype as inflammation progresses, aiding in tissue repair.
C) Macrophages only release pro-inflammatory cytokines like TNF and IL-1 in chronic inflammation.
D) Macrophages have no significant role in chronic inflammation and primarily clear dead cells during acute inflammation.

16. Which of the following is a characteristic feature of systemic inflammatory response syndrome (SIRS)?

A) High blood glucose levels with impaired insulin response.
B) Fever, tachycardia, tachypnea, and hypotension as a result of widespread cytokine activation.
C) Decreased white blood cell count due to immune suppression.
D) Reduced levels of acute-phase proteins and CRP in the blood.

17. What is the role of acute-phase proteins like CRP (C-reactive protein) during inflammation?

A) They inhibit the activity of pro-inflammatory cytokines like TNF and IL-1.
B) They act as opsonins, promoting pathogen clearance by enhancing phagocytosis.
C) They promote tissue repair by stimulating collagen synthesis in the liver.
D) They neutralize bacterial toxins and prevent sepsis.

18. Which of the following is the best explanation for the phenomenon of "left shift" in the context of a leukocyte count?

A) The presence of immature neutrophils in the circulation due to increased bone marrow production in response to cytokines.
B) A shift toward increased T lymphocyte production and decreased neutrophil activity.
C) The movement of neutrophils from the tissue back into the bloodstream.
D) A reduction in the number of circulating white blood cells, indicating immune suppression.

Answers:

1. B
2. B
3. A

4. B
5. C
6. B
7. B
8. B
9. B
10. B
11. C
12. B
13. B
14. B
15. B
16. B
17. B
18. A

A 55-year-old man with a 30-year history of smoking presents with chronic cough, dyspnea, and sputum production. He has a history of frequent respiratory infections. A chest X-ray reveals emphysema and bronchitis. A sputum sample shows increased numbers of neutrophils.

Question: Which of the following best explains the role of neutrophils in the pathogenesis of chronic obstructive pulmonary disease (COPD) in this patient?

A) Neutrophils activate TH2 cells and promote fibrosis.

B) Neutrophils cause ongoing tissue destruction by releasing proteolytic enzymes and reactive oxygen species.

C) Neutrophils decrease the number of macrophages in the lungs, leading to less inflammation.

D) Neutrophils act as anti-inflammatory cells that resolve tissue damage in the lungs.

Answer:B

A 67-year-old woman with a history of diabetes presents to the emergency department with fever, hypotension, tachycardia, and confusion. Her laboratory results show an elevated white blood cell count (WBC 22,000/µL) and an elevated C-reactive protein (CRP). The patient has a history of a urinary tract infection, which is suspected to have progressed to sepsis.

Question:
Which of the following systemic effects is most likely to occur in this patient due to the release of TNF-α and IL-1 during sepsis?

A) Increased insulin sensitivity and control of blood glucose levels.

B) Reduced systemic inflammatory response and tissue healing.

C) Increased blood pressure and improved tissue perfusion.

D) Widespread clotting, leading to Disseminated Intravascular Coagulation (DIC).

Answer:D

A 30-year-old man with a history of prolonged cough, night sweats, and weight loss is diagnosed with tuberculosis. A chest X-ray reveals granulomatous inflammation with areas of caseous necrosis. His sputum culture grows *Mycobacterium tuberculosis*.

Question:
What is the key histological feature of the granulomas seen in tuberculosis?

A) Caseating granulomas with central necrosis, epithelioid histiocytes, and multinucleated giant cells.

B) Non-necrotizing granulomas with an abundance of lymphocytes and plasma cells.

C) A fibrotic response with dense collagen deposition and few inflammatory cells.

D) Acute inflammation with a predominance of neutrophils and no tissue destruction.

Answer:A

A 10-year-old boy presents with difficulty swallowing, chest pain, and food impaction. Endoscopy reveals a pattern of esophageal rings, and biopsy shows marked eosinophilic infiltration (15 eosinophils per high-power field).

Question:
What is the most likely underlying cause of the eosinophilic infiltration in this patient?

A) Parasitic infection leading to chronic eosinophilic inflammation.

B) A hypersensitivity reaction, possibly allergic in nature.

C) Chronic bacterial infection causing granuloma formation.

D) Viral infection leading to direct epithelial damage and eosinophil recruitment.

Answer:B

A 72-year-old woman undergoes abdominal surgery to remove a malignant tumor. Postoperatively, she develops fever, tachycardia, and elevated white blood cell count. Her CRP levels are also elevated.

Question:
Which of the following is most likely to contribute to the fever and systemic inflammation in this patient?

A) Increased production of acute-phase proteins by the liver, including CRP.

B) Decreased production of neutrophils in response to surgical stress.

C) Release of IL-10 and TGF-β from macrophages to promote tissue repair.

D) Activation of anti-inflammatory pathways, reducing cytokine levels.

Answer:A

A 5-year-old child presents with recurrent bacterial and fungal infections. Laboratory tests show an inability of phagocytes to produce reactive oxygen species (ROS) due to a deficiency in the NADPH oxidase complex. His diagnosis is chronic granulomatous disease (CGD).

Question:
Which of the following best describes the nature of granuloma formation in this patient?

A) Formation of caseating granulomas with extensive necrosis due to impaired phagocytosis.

B) Non-necrotizing granulomas with abundant neutrophils and a lack of macrophage activation.

C) Granuloma formation with macrophage activation, but insufficient ROS production to eliminate pathogens.

D) Granulomas composed of T lymphocytes and minimal macrophage involvement.

Answer: C

A 40-year-old woman presents with persistent cough, shortness of breath, and fatigue. A chest X-ray shows bilateral hilar lymphadenopathy, and biopsy of the lymph nodes reveals non-necrotizing granulomas.

Question:
Which of the following is the most likely diagnosis for this patient based on the findings?

A) Tuberculosis

B) Sarcoidosis

C) Fungal infection

D) Rheumatoid arthritis

Answer:B

A 25-year-old man sustains extensive third-degree burns over 40% of his body in a fire. Upon admission, he is febrile, hypotensive, and exhibits signs of systemic inflammation.

Question:
Which of the following is most likely elevated in this patient's blood as part of the acute-phase response?

A) Antibodies against *Staphylococcus aureus*

B) Serum amyloid A (SAA) and C-reactive protein (CRP)

C) Gamma globulin levels due to immune system activation

D) Cortisol levels to suppress inflammation

Answer:B

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