■ File 1: Lecture-16.-B-cell-activation-2 2.pdf

Q1. Which chemokine guides most B cells into follicles?

A. CCL19

B. CCL21

C. CXCL13

D. IL-21

Correct Answer: C

Explanation: CXCL13 secreted by follicular dendritic cells attracts B cells into follicles.

Q2. Which receptor on naïve B cells binds CXCL13?

A. CCR7

B. CXCR5

C. CR2

D. CD40

Correct Answer: B

Explanation: CXCL13 binds to CXCR5 on recirculating naïve B cells.

Q3. Which factor provides maturation and survival signals to naïve follicular B cells?

A. IL-4

B. IFN-γ

C. BAFF

D. IL-21

Correct Answer: C

Explanation: BAFF provides maturation and survival signals through the BAFF receptor.

Q4. Which cells capture large microbes in the subcapsular sinus?

A. Follicular dendritic cells

B. Marginal zone B cells

C. Subcapsular sinus macrophages

D. Plasma cells

Correct Answer: C

Explanation: Subcapsular sinus macrophages capture large microbes and deliver them to follicles.

Q5. Medium-sized antigens are transported to follicles mainly by:

A. Neutrophils

B. Resident dendritic cells

C. NK cells

D. Plasma cells

Correct Answer: B

Explanation: Resident dendritic cells capture and transport medium-sized antigens into follicles.

Q6. Which complement receptor is particularly involved in antigen transfer by marginal zone B cells?

A. CR1

B. CR2

C. CR3

D. FcγRIIB

Correct Answer: B

Explanation: Antigens in immune complexes bind CR2 on marginal zone B cells.

Q7. Naïve B-cell antigen receptors consist mainly of which immunoglobulins?

A. IgG and IgA

B. IgE and IgG

C. IgM and IgD

D. IgA and IgM

Correct Answer: C

Explanation: Membrane IgM and IgD are the antigen receptors of naïve B cells.

Q8. Which molecules transduce signals from membrane immunoglobulin?

A. CD40 and CD40L

B. Igα and Igβ

C. BAFF and BAFF-R

D. CCR7 and CXCR5

Correct Answer: B

Explanation: Ig-mediated signals are transduced by Igα and Igβ.

Q9. What happens to B cells after antigen receptor cross-linking?

A. Immediate apoptosis

B. Entry into G1 phase

C. Loss of cytokine receptors

D. Loss of Bcl-2

Correct Answer: B

Explanation: Cross-linking induces entry into G1 stage and cellular activation.

Q10. Which protein enhances survival of activated B cells?

A. Bax

B. Caspase-3

C. Bcl-2

D. Fas

Correct Answer: C

Explanation: Bcl-2 is an antiapoptotic protein enhancing B-cell survival.

Q11. T-independent antigens are usually:

A. Protein antigens

B. Polysaccharides with repetitive epitopes

C. Peptide antigens

D. Lipid antigens presented on MHC

Correct Answer: B

Explanation: T-independent antigens such as polysaccharides display multiple identical epitopes.

Q12. Which B-cell subset develops from fetal liver–derived HSCs?

A. Follicular B cells

B. Marginal zone B cells

C. B-1 B cells

D. Memory B cells

Correct Answer: C

Explanation: B-1 B cells develop from fetal liver–derived hematopoietic stem cells.

Q13. Which antibody is spontaneously secreted by B-1 cells?

A. IgG

B. IgA

C. IgE

D. IgM

Correct Answer: D

Explanation: B-1 cells spontaneously secrete IgM antibodies.

Q14. Where are marginal zone B cells primarily located?

A. Lymph node cortex

B. Bone marrow

C. Vicinity of the splenic marginal sinus

D. Thymus

Correct Answer: C

Explanation: Marginal zone B cells are located near the marginal sinus in the spleen.

Q15. Helper T cells upregulate which molecule to interact with B cells?

A. CD28

B. CD40L

C. CTLA-4

D. PD-1

Correct Answer: B

Explanation: Activated helper T cells express CD40 ligand (CD40L).

Q16. Which chemokine receptor allows activated T cells to migrate to follicles?

A. CCR7

B. CXCR5

C. CR2

D. CXCR3

Correct Answer: B

Explanation: Activated helper T cells increase CXCR5 expression to migrate toward follicles.

Q17. Isotype switching is mainly regulated by:

A. Complement proteins

B. Cytokines from helper T cells

C. Antigen dose

D. Fc receptors

Correct Answer: B

Explanation: Cytokines produced by helper T cells regulate isotype switching.

Q18. Which cytokine induces switching to IgE?

A. IFN-γ

B. IL-2

C. IL-4

D. IL-21

Correct Answer: C

Explanation: IL-4 produced by TH2 cells induces switching to IgE.

Q19. Affinity maturation depends on:

A. T-independent antigens

B. Somatic mutation of Ig genes

C. NK cell activity

D. Complement activation

Correct Answer: B

Explanation: Affinity maturation results from somatic mutation of Ig genes.

Q20. Long-lived plasma cells primarily reside in the:

A. Spleen

B. Lymph nodes

C. Bone marrow

D. Thymus

Correct Answer: C

Explanation: Long-lived plasma cells home to and persist in the bone marrow.

■ File 2: Lecture-17.-vaccines.pdf

Q1. Passive immunization refers to:

A. Exposure to live pathogens

B. Transfer of ready-made antibodies

C. Vaccine-induced immunity

D. Memory cell generation

Correct Answer: B

Explanation: Passive immunization is the transfer of ready-made antibodies.

Q2. Which is an example of natural passive immunity?

A. Hepatitis A vaccination

B. IVIG administration

C. Transplacental transfer of IgG

D. OPV vaccination

Correct Answer: C

Explanation: Maternal antibodies transferred through the placenta provide natural passive immunity.

Q3. Active immunity differs from passive immunity because it:

A. Is immediate

B. Is short-lived

C. Generates immunological memory

D. Uses exogenous antibodies

Correct Answer: C

Explanation: Active immunity generates adaptive responses and immunological memory.

Q4. Live attenuated vaccines are usually produced by:

A. Chemical inactivation

B. Recombinant protein synthesis

C. Serial passage in cell cultures

D. Polysaccharide conjugation

Correct Answer: C

Explanation: Live attenuated vaccines are produced by serial passage in cell cultures.

Q5. Which vaccine is a live attenuated bacterial vaccine?

A. IPV

B. BCG

C. Hepatitis A

D. Rabies

Correct Answer: B

Explanation: BCG is the only live attenuated bacterial vaccine currently in use.

Q6. A rare complication of OPV is:

A. Guillain-Barré syndrome

B. Vaccine-associated paralytic poliomyelitis

C. Hepatitis

D. Encephalitis

Correct Answer: B

Explanation: OPV can rarely mutate and cause vaccine-associated paralytic poliomyelitis.

Q7. Non-live vaccines generally:

A. Cause disease

B. Reactivate

C. Have good safety profiles

D. Induce lifelong immunity after one dose

Correct Answer: C

Explanation: Non-live vaccines do not contain infectious particles and are safer.

Q8. Inactivated vaccines are produced using:

A. Genetic deletion

B. Heat, radiation, or chemicals

C. Serial passage

D. Protein fusion

Correct Answer: B

Explanation: Inactivated vaccines are produced using heat, radiation, or chemicals.

Q9. Which is an example of an inactivated vaccine?

A. MMR

B. OPV

C. IPV

D. Varicella

Correct Answer: C

Explanation: IPV is an example of an inactivated vaccine.

Q10. Subunit vaccines contain:

A. Whole pathogens

B. Live organisms

C. Selected pathogen fragments

D. Replicating viruses

Correct Answer: C

Explanation: Subunit vaccines contain selected fragments of pathogens.

Q11. Toxoid vaccines are produced by:

A. Removing capsules

B. Detoxifying bacterial toxins

C. Genetic engineering

D. Serial passage

Correct Answer: B

Explanation: Toxoid vaccines are produced by detoxifying bacterial toxins.

Q12. Toxoid vaccines mainly protect against:

A. Infection

B. Transmission

C. Disease pathogenesis

D. Colonization

Correct Answer: C

Explanation: Toxoids protect against disease pathogenesis but not infection.

Q13. Herd immunity occurs when:

A. Everyone is vaccinated

B. No one is vaccinated

C. A large proportion is immune

D. Only children are immune

Correct Answer: C

Explanation: Herd immunity occurs when a large proportion of the population is immune.

Q14. Polysaccharide vaccines are usually:

A. Highly immunogenic

B. Poorly immunogenic

C. Live vaccines

D. T-dependent

Correct Answer: B

Explanation: Polysaccharide vaccines are poorly immunogenic.

Q15. Conjugate vaccines work by:

A. Removing adjuvants

B. Inducing T-independent responses

C. Converting T-independent to T-dependent responses

D. Inactivating toxins

Correct Answer: C

Explanation: Conjugation converts T-independent responses into T-dependent responses.

Q16. Which bacteria are targets of conjugate vaccines?

A. Mycobacterium tuberculosis

B. Streptococcus pneumoniae

C. Clostridium tetani

D. Escherichia coli

Correct Answer: B

Explanation: Conjugate vaccines target encapsulated bacteria like Streptococcus pneumoniae.

Q17. Adjuvants function mainly to:

A. Kill pathogens

B. Suppress immunity

C. Enhance immunogenicity

D. Replace antigens

Correct Answer: C

Explanation: Adjuvants enhance and modulate immune responses.

Q18. Which adjuvant has been used for almost a century?

A. MF59

B. AS01

C. Alum

D. CpG

Correct Answer: C

Explanation: Aluminium salts (alum) have been widely used for almost a century.

Q19. Live attenuated vaccines usually do not need adjuvants because they:

A. Are non-immunogenic

B. Actively replicate

C. Are inactivated

D. Lack antigens

Correct Answer: B

Explanation: Live attenuated vaccines replicate and self-enhance immune responses.

Q20. Vaccine safety is monitored:

A. Only before licensure

B. Only in animal studies

C. Only in clinical trials

D. Before and after licensure

Correct Answer: D

Explanation: Vaccine safety is evaluated before licensure and continuously monitored afterward.

■ File 1: Tolerance-AutoimmunityS.pdf

Q1. Immunological tolerance is defined as:

A. Enhanced immune activation

B. Lack of response to antigens induced by exposure

C. Elimination of all antigens

D. Permanent deletion of lymphocytes

Correct Answer: B

Explanation: Immunological tolerance is a lack of response to antigens induced by exposure of lymphocytes.

Q2. Antigens that induce tolerance are called:

A. Immunogenic

B. Pathogenic

C. Tolerogenic

D. Self-reactive

Correct Answer: C

Explanation: Antigens that induce tolerance are said to be tolerogenic.

Q3. Functional inactivation or death of lymphocytes results in:

A. Immunological ignorance

B. Autoimmunity

C. Tolerance

D. Hypersensitivity

Correct Answer: C

Explanation: Lymphocytes may be functionally inactivated or killed, resulting in tolerance.

Q4. Immunological ignorance refers to:

A. Absence of antigen

B. Lymphocyte apoptosis

C. Lymphocytes ignoring antigen presence

D. Enhanced immune response

Correct Answer: C

Explanation: Immunological ignorance implies lymphocytes simply ignore the presence of antigen.

Q5. Failure of self-tolerance leads to:

A. Immunodeficiency

B. Autoimmune diseases

C. Allergy

D. Transplant rejection

Correct Answer: B

Explanation: Failure of self-tolerance is the underlying cause of autoimmune diseases.

Q6. Central tolerance occurs in:

A. Peripheral tissues

B. Secondary lymphoid organs

C. Generative lymphoid organs

D. Blood

Correct Answer: C

Explanation: Central tolerance occurs when developing lymphocytes encounter antigens in generative lymphoid organs.

Q7. Peripheral tolerance involves:

A. Immature lymphocytes

B. Mature lymphocytes in peripheral tissues

C. Bone marrow only

D. Thymus only

Correct Answer: B

Explanation: Peripheral tolerance occurs when mature lymphocytes encounter self antigens in peripheral tissues.

Q8. Negative selection of T cells occurs mainly in the:

A. Spleen

B. Lymph nodes

C. Thymus

D. Bone marrow

Correct Answer: C

Explanation: Death of immature T cells (negative selection) occurs in the thymus.

Q9. AIRE protein is responsible for:

A. Cytokine secretion

B. Apoptosis induction

C. Thymic expression of peripheral antigens

D. TCR recombination

Correct Answer: C

Explanation: AIRE is responsible for thymic expression of peripheral tissue antigens.

Q10. T cell anergy is induced when antigen recognition occurs without:

A. MHC molecules

B. Costimulation

C. Cytokines

D. APCs

Correct Answer: B

Explanation: Antigen recognition without adequate costimulation results in T cell anergy.

Q11. Which inhibitory receptor removes B7 from APCs?

A. PD-1

B. CD28

C. CTLA-4

D. Fas

Correct Answer: C

Explanation: CTLA-4 blocks and removes B7 molecules from APCs.

Q12. PD-1 mainly terminates T cell responses to:

A. Acute infections

B. Self antigens and chronic infections

C. Vaccines

D. Tumor antigens

Correct Answer: B

Explanation: PD-1 terminates responses of T cells to self antigens and chronic infections.

Q13. Regulatory T cells are characterized by expression of:

A. CD8

B. CD25 and FoxP3

C. CD28

D. PD-1

Correct Answer: B

Explanation: Regulatory T cells express CD25 and the transcription factor FoxP3.

Q14. Survival of regulatory T cells depends on:

A. IFN-γ

B. IL-4

C. IL-2

D. IL-10

Correct Answer: C

Explanation: The survival and function of regulatory T cells are dependent on IL-2.

Q15. Fas–FasL interaction leads to:

A. Anergy

B. Proliferation

C. Apoptosis

D. Differentiation

Correct Answer: C

Explanation: Fas–FasL interaction activates caspases and apoptosis.

Q16. Receptor editing occurs in:

A. Mature T cells

B. Immature B cells

C. Plasma cells

D. Memory cells

Correct Answer: B

Explanation: Immature B cells may reexpress RAG genes and change receptor specificity.

Q17. B cell anergy is associated with:

A. Increased Ig expression

B. Reduced antigen receptor expression

C. Rapid proliferation

D. Antibody secretion

Correct Answer: B

Explanation: Anergic B cells have reduced antigen receptor expression.

Q18. Peripheral B cell tolerance often involves:

A. Receptor editing

B. Fas-mediated apoptosis

C. Somatic mutation

D. Isotype switching

Correct Answer: B

Explanation: Mature B cells express Fas and are killed by FasL-expressing T cells.

Q19. Autoimmunity is defined as:

A. Failure of innate immunity

B. Immune response against self antigens

C. Hypersensitivity

D. Immunodeficiency

Correct Answer: B

Explanation: Autoimmunity is an immune response against self antigens.

Q20. Molecular mimicry refers to:

A. APC activation

B. Cross-reactivity between microbial and self antigens

C. Antibody class switching

D. Cytokine imbalance

Correct Answer: B

Explanation: Cross-reactions between microbial and self antigens are termed molecular mimicry.

■ File 2: Ag-RecognitionLymphocytes-developmentS-1.pdf

Q1. An antibody molecule is composed of:

A. Two heavy chains

B. Two light chains

C. Two heavy and two light chains

D. Four identical chains

Correct Answer: C

Explanation: An antibody consists of two identical heavy and two identical light chains.

Q2. The antigen-binding site of an antibody is formed by:

A. Constant regions

B. Fc region

C. Variable regions of heavy and light chains

D. Hinge region

Correct Answer: C

Explanation: The antigen-binding site is composed of V regions of heavy and light chains.

Q3. The Fc region of antibodies is responsible for:

A. Antigen binding

B. Effector functions

C. Diversity generation

D. Receptor editing

Correct Answer: B

Explanation: The Fc region mediates most biologic activity and effector functions.

Q4. The hinge region allows:

A. Antibody secretion

B. Antigen degradation

C. Movement of Fab regions

D. Isotype switching

Correct Answer: C

Explanation: The hinge allows Fab regions to move independently.

Q5. Naive B lymphocytes express which receptors?

A. IgG and IgA

B. IgM and IgD

C. IgE and IgG

D. IgA only

Correct Answer: B

Explanation: Naive B cells express membrane-bound IgM and IgD.

Q6. Antibody affinity refers to:

A. Total binding strength

B. Single epitope interaction strength

C. Cross-reactivity

D. Effector function

Correct Answer: B

Explanation: Affinity is the strength of one antigen-binding surface binding one epitope.

Q7. Avidity refers to:

A. Single bond strength

B. Cross-reaction

C. Total binding strength

D. Antigen processing

Correct Answer: C

Explanation: Avidity is the total strength of antigen-antibody binding.

Q8. Monoclonal antibodies are produced from:

A. Multiple B cell clones

B. Hybridomas

C. Plasma cells only

D. T cells

Correct Answer: B

Explanation: Monoclonal antibodies are produced using hybridomas.

Q9. Hybridomas are formed by fusion of B cells with:

A. T cells

B. Stem cells

C. Myeloma cells

D. APCs

Correct Answer: C

Explanation: B cells are fused with myeloma cells to form hybridomas.

Q10. T cell antigen receptors are called:

A. Ig

B. BCR

C. TCR

D. Fc receptors

Correct Answer: C

Explanation: T lymphocytes express T cell receptors (TCRs).

Q11. The TCR of CD4+ and CD8+ T cells is composed of:

A. α and γ chains

B. β and δ chains

C. α and β chains

D. μ and δ chains

Correct Answer: C

Explanation: The TCR is a heterodimer of α and β chains.

Q12. Immune repertoire refers to:

A. One lymphocyte clone

B. All cytokines

C. Collection of lymphocyte clones

D. APC diversity

Correct Answer: C

Explanation: The immune repertoire is the entire collection of lymphocyte clones.

Q13. Antigen receptor diversity is generated by:

A. Somatic hypermutation only

B. V(D)J recombination

C. Class switching

D. Affinity maturation

Correct Answer: B

Explanation: Diversity is generated by V(D)J recombination.

Q14. RAG-1 and RAG-2 proteins mediate:

A. Isotype switching

B. Somatic mutation

C. V(D)J recombination

D. Apoptosis

Correct Answer: C

Explanation: RAG proteins mediate somatic recombination of antigen receptor genes.

Q15. Junctional diversity occurs at:

A. Constant regions

B. V-D-J junctions

C. Fc region

D. Hinge region

Correct Answer: B

Explanation: Junctional diversity occurs at recombining gene segment junctions.

Q16. Immature B cells express:

A. IgD only

B. IgM only

C. IgG

D. IgM and IgD

Correct Answer: B

Explanation: IgM-expressing B cells are immature B cells.

Q17. Mature B cells express:

A. IgM only

B. IgD only

C. IgM and IgD

D. IgG

Correct Answer: C

Explanation: IgM+ IgD+ cells are mature B cells.

Q18. Double-negative T cells lack expression of:

A. TCR

B. CD4 and CD8

C. CD3

D. MHC

Correct Answer: B

Explanation: Double-negative T cells do not express CD4 or CD8.

Q19. Positive selection ensures survival of T cells that recognize:

A. Foreign antigens

B. Self MHC molecules

C. Cytokines

D. Costimulators

Correct Answer: B

Explanation: T cells recognizing self MHC with low affinity survive.

Q20. Negative selection eliminates T cells that:

A. Fail to recognize antigen

B. Strongly recognize self antigens

C. Lack CD4

D. Lack CD8

Correct Answer: B

Explanation: Strong recognition of self antigens leads to apoptosis.

■ File 3: Lecture-14.-Autoimmunity-examples.pdf

Q1. Autoimmune diseases can be classified as:

A. Acute or chronic

B. Viral or bacterial

C. Systemic or organ-specific

D. Innate or adaptive

Correct Answer: C

Explanation: Autoimmune diseases are classified as systemic or organ-specific.

Q2. Central tolerance occurs during:

A. Peripheral activation

B. Lymphocyte maturation

C. Infection

D. Inflammation

Correct Answer: B

Explanation: Central tolerance occurs during maturation of lymphocytes.

Q3. Peripheral tolerance results in:

A. Enhanced activation

B. Antibody secretion

C. Apoptosis or unresponsiveness

D. Memory formation

Correct Answer: C

Explanation: Peripheral tolerance makes lymphocytes incapable of responding or induces apoptosis.

Q4. Autoimmunity results from:

A. Viral infection only

B. Genetic predisposition and environment

C. Vaccination

D. Aging

Correct Answer: B

Explanation: Autoimmunity occurs due to genetic predisposition and environmental influences.

Q5. Systemic lupus erythematosus is:

A. Organ-specific

B. Infectious

C. Systemic autoimmune disease

D. Allergic disease

Correct Answer: C

Explanation: SLE is a systemic autoimmune disease.

Q6. SLE commonly affects:

A. Only kidneys

B. Only joints

C. Multiple body systems

D. Only skin

Correct Answer: C

Explanation: SLE affects joints, skin, kidneys, blood cells, heart, and lungs.

Q7. Complement genes associated with SLE include:

A. C3 and C5

B. C1q, C2, C4

C. Factor B

D. Properdin

Correct Answer: B

Explanation: Genes related to C1q, C2, and C4 are associated with SLE.

Q8. B cells contribute to SLE by:

A. Killing β cells

B. Producing autoantibodies

C. Phagocytosis

D. NK activation

Correct Answer: B

Explanation: B cells produce autoantibodies in SLE.

Q9. Innate immunity in SLE involves activation of:

A. Neutrophils only

B. NK cells

C. TLRs on pDCs

D. Mast cells

Correct Answer: C

Explanation: TLRs on plasmacytoid dendritic cells are involved.

Q10. Type 1 diabetes is characterized by:

A. Insulin resistance

B. Autoimmune destruction of β cells

C. Obesity

D. Hyperinsulinemia

Correct Answer: B

Explanation: T1D involves autoimmune destruction of insulin-producing β cells.

Q11. The strongest genetic association in T1D is with:

A. Cytokine genes

B. TCR genes

C. HLA locus

D. Complement genes

Correct Answer: C

Explanation: The strongest genetic association is with HLA.

Q12. T1D is primarily a:

A. B cell-driven disease

B. T cell-driven disease

C. Antibody-only disease

D. Innate disease

Correct Answer: B

Explanation: T1D is viewed as a T cell-driven autoimmune disease.

Q13. Reduced negative selection allows escape of:

A. Regulatory T cells

B. β cell-specific T cells

C. B cells

D. NK cells

Correct Answer: B

Explanation: Reduced negative selection allows β cell-specific T cells to escape.

Q14. Graves' disease affects the:

A. Pancreas

B. Kidney

C. Thyroid

D. Adrenal gland

Correct Answer: C

Explanation: Graves' disease affects the thyroid.

Q15. Graves' disease is caused by autoantibodies against:

A. Insulin receptor

B. TSH receptor

C. Thyroglobulin

D. TPO

Correct Answer: B

Explanation: Autoantibodies against the TSH receptor cause Graves' disease.

Q16. Graves' disease commonly leads to:

A. Hypothyroidism

B. Hyperthyroidism

C. Diabetes

D. Anemia

Correct Answer: B

Explanation: Autoantibodies mimic TSH and induce hyperthyroidism.

Q17. Autoimmune diseases are clinically:

A. Uniform

B. Homogeneous

C. Heterogeneous

D. Rare

Correct Answer: C

Explanation: Autoimmune diseases are clinically heterogeneous.

Q18. Loss of tolerance leads to:

A. Immunodeficiency

B. Autoimmunity

C. Cancer

D. Allergy

Correct Answer: B

Explanation: Loss of tolerance results in autoimmunity.

Q19. Environmental factors in autoimmunity include:

A. Vaccines

B. Diet only

C. Infections

D. Exercise

Correct Answer: C

Explanation: Infections are important environmental triggers.

Q20. Autoimmunity affects approximately:

A. 1%

B. 2%

C. 5%

D. 8%

Correct Answer: D

Explanation: Autoimmunity affects approximately 8% of the global population.