

THE PLAN OF LABORATORY WORK ON IMMUNOLOGY

Lesson 1

Immunology, immunity and the main components of the immune system

Subtopics (review questions):

1. Immunology as a science.
2. The history of immunology.
3. Immune response.
4. The concept of immunity. Innate and acquired (active and passive) immunity.
5. The origin of cells of the immune system.
6. The structure of the lymphatic system. Lymphatic recirculation.
7. Primary (central) and secondary (peripheral) lymphoid organs structure.

Training program:

1. Make a synopsis of the subtopics.
2. Analyze the illustrative material and draw the pictures in a workbook.

Literature:

Khaitov R. M. Immunology / R. M. Khaitov. – Moscow : GEOTAR-Media, 2008. - 256 p. - <http://www.studentlibrary.ru/book/ISBN9785970407042.html>

Burmester G.-R., Pezzutto A. Color Atlas of immunology. Thieme – Stuttgart - New York, 2003.

Coico R., Sunshine G. Immunology: A Short Course, Seventh Edition. John Wiley & Sons, Ltd., 2015.

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Lesson 2

Antigens and their properties. Factors and mechanisms of innate immunity

Subtopics (review questions):

1. Antigens, their properties.
2. Antigens of microorganisms.
3. Antigens of viruses.
4. Superantigens.
5. Antigens of the human body.
6. Factors and mechanisms of innate immunity:
 - Factors of innate immunity;
 - Complement activation;
 - Pattern recognition receptors;
 - Macrophages' receptors;
 - Phagocytosis;
 - Opsonins and opsonisation;
 - Antimicrobial proteins;
 - Heat shock proteins;
 - Cytokines;
 - Interferon;
 - NK-cells;
 - Neutrophils, mast cells, eosinophils.

Training program:

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Lesson 3

Adaptive immunity mechanisms. Antibodies and receptors on T- and B-lymphocytes

Subtopics (review questions):

1. Adaptive immunity mechanisms.
2. Antibodies.
3. Immunoglobulin structure.
4. Immunoglobulin classes.
5. TCR, BCR, FcR.
6. Immunoglobulin gene organization. Immunoglobulin gene product expression.

Training program:

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2. Analyze the illustrative material and draw the pictures in a workbook.

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Lesson 4

Immune response. Antigen-presenting cells. T- and B-cells

Subtopics (review questions):

1. Stages of the immune response.
2. Antigen presentation. Antigen recognition receptors (TCR, BCR).
3. Antigen-presenting cells.
4. T-cells: development, selection, activation.
5. B-cells: development, selection, activation
6. Suppression of the immune response.

Training program:

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2. Analyze the illustrative material and draw the pictures in a workbook.

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Lesson 5

Types of immune response. Age features of the immune system

Subtopics (review questions):

1. Type I immune response (cellular).
2. Type II immune response (humoral).
3. Age features of the immune system.
4. Immune system in embryogenesis.
5. Immune system of newborns, children, adults, older persons.

Training program:

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Lesson 6

Acquired immunity mechanisms in the anti-infectious protection. Colloquium

Subtopics (review questions):

1. Immunity to bacterial infections.
2. Immunity to virus infections.
3. Immunity to fungi infections.
4. Immunity to protozoan infections.
5. Tumor immunology.
6. Transplant rejection.
7. Immunological memory. Immunological tolerance.
8. Suppression of the immune response.

Training program:

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Lesson 7

Hypersensitivity. Control work № 1

Subtopics (review questions):

1. Hypersensitivity.
2. Immediate and delayed Hypersensitivity.
3. Type I Hypersensitivity, its clinical manifestations.
4. Type II Hypersensitivity, its clinical manifestations.
5. Type III Hypersensitivity, its clinical manifestations.
6. Type IV Hypersensitivity, its clinical manifestations
7. **Colloquium № 1 (Control work)** (see the questions to Lessons 1-6).

Training program:

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Lesson 8

Laboratory applications

Subtopics (review questions):

1. Agglutination: mechanism, forms:
 - bacterial agglutination
 - Hemagglutination
2. Precipitation: mechanism, forms:
 - Radial immunodiffusion
 - turbidimetry
 - nephelometry
 - Radial double diffusion
 - electroimmunodiffusion
 - immunoelectrophoresis

Training program:

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Lesson 9

Laboratory applications

Subtopics (review questions):

1. Complement-binding reaction: mechanisms.
2. Immunfluorescence: mechanisms of direct and indirect methods.
3. Enzyme-linked analyses: direct ELISA, indirect ELISA, sandwich ELISA and competitive ELISA mechanisms.
4. Radioimmunoassay: classical method.
5. Immunoblotting (Western blot)

Training program:

1. Make a synopsis of the subtopics.
2. Analyze the illustrative material and draw the pictures in a workbook.

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Lesson 10

Allergic skin testing. Control work № 2

Subtopics (review questions):

1. Bacterial allergens.
2. Skin testing for Type I hypersensitivity assessment.
3. Skin testing for Type VI hypersensitivity assessment.
4. **Control work № 2 (Lessons 7-10).**

Training program:

1. Make a synopsis of the subtopics.
2. Analyze the illustrative material and draw the pictures in a workbook.

Literature:

- Khaitov R. M. Immunology / R. M. Khaitov. – Moscow : GEOTAR-Media, 2008. - 256 p. - <http://www.studentlibrary.ru/book/ISBN9785970407042.html>
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Lesson 11 Immunodeficiencies

Subtopics (review questions):

1. Primary and secondary immunodeficiencies.
2. Humoral immunodeficiencies.
3. Cellular immunodeficiencies.
4. Granulocytic deficiencies.
5. Complement, mannose-binding lectin deficiencies and defects.
6. Etiologic factors of secondary immunodeficiency.
7. Chronic fatig syndrome.
8. Acquired immunodeficiency syndrome: etiology, clinical manifestation.

Training program:

1. Make a synopsis of the subtopics 1, 6-8.
2. Fill the tables on subtopics 2-5:

Humoral immunodeficiencies

Immunodeficiency	Etiology	Clinical manifestations
X-linked Bruton's agammaglobulinemia		
X-linked agammaglobulinemia with hyper-IgM syndrome		
Common variable immunodeficiency		
Immunoglobulin A deficiency		
Transient hypogammaglobulinemia of infancy		

Cellular immunodeficiencies

Immunodeficiency	Etiology	Clinical manifestations
Severe combined immunodeficiencies		
Bare lymphocyte syndrome		
DiGeorge syndrome		
X-linked lymphoproliferative syndrome		
Ataxia-telangiectasia		
Wiscott-Aldrich syndrome		

Granulocytic deficiencies

Immunodeficiency	Etiology	Clinical manifestations
Chronic granulomatous disease		

Complement, mannose-binding lectin deficiencies and defects

Immunodeficiency	Etiology	Clinical manifestations
Hereditary angioneurotic edema		
Immune complex diseases		
Deficiency of mannose-binding lectin		

3. Analyze the illustrative material and draw the pictures in a workbook.

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Lesson 12

Autoimmune diseases

Subtopics (review questions):

1. Autoimmune diseases: etiology and pathogenesis.
2. Rheumatoid arthritis.
3. Psoriasis.
4. Bullous skin diseases.
5. Systemic lupus erythematosus.
6. Scleroderma.
7. Polymyositis.
8. Dermatomyositis.
9. Sjögren's Syndrome.
10. Primary systemic vasculitis.

Training program:

1. Make a synopsis of the subtopic 1.
2. Fill the table on subtopics 2-10:

Autoimmune disease	Etiology (Factors, Antigens etc.)	Pathogenesis	Clinical manifestations
Rheumatoid arthritis			
Psoriasis			
Bullous skin diseases			
Systemic lupus erythematosus			
Scleroderma			
Polymyositis			
Dermatomyositis			
Sjögren's Syndrome			
Primary systemic vasculitis			

3. Analyze the illustrative material and draw the pictures in a workbook.

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Lesson 13

Autoimmune diseases (Part II)

Subtopics (review questions):

1. Respiratory diseases: Sarcoidosis, Idiopathic pulmonary fibrosis.
2. Gastrointestinal tract diseases: Autoimmune gastritis and pernicious anemia, celiac disease, Ulcerative colitis, Crohns diseases.
3. Autoimmune liver diseases: Autoimmune hepatitis, Primary sclerosing cholangitis, Primary biliary cirrhosis.
4. Renal diseases: immunological mechanisms.
5. Blood diseases: Autoimmune hemolytic anemia, Drug-induced hemolysis, Hemolysis as a blood transfusion complication, Neonatal hemolytic disease, Idiopathic autoimmune thrombocytopenic purpura.
6. Nervous system diseases: Multiple sclerosis, Myasthenia gravis.
7. Endocrine diseases: Autoimmune hyperthyroidism, Hshimoto's disease, Type I diabetes mellitus.
8. Ophthalmic diseases: Anterior uveitis, Intermediate uveitis, Panuveitis.

Training program:

1. Fill the table on subtopics 1-8:

Autoimmune disease	Etiology (Factors, Antigens etc.)	Pathogenesis	Clinical manifestations
<i>Respiratory diseases:</i>			
Sarcoidosis			
Idiopathic pulmonary fibrosis			
<i>Gastrointestinal tract diseases:</i>			
Autoimmune gastritis and pernicious anemia			
Celiac disease			
Ulcerative colitis			
Crohns diseases			
<i>Liver diseases:</i>			
Autoimmune hepatitis			
Primary sclerosing cholangitis			
Primary biliary cirrhosis			
<i>Renal diseases</i>			
<i>Blood diseases:</i>			
Autoimmune hemolytic anemia			
Drug-induced hemolysis			
Hemolysis as a blood transfusion complication			
Neonatal hemolytic disease			
Idiopathic autoimmune thrombocytopenic purpura			
<i>Nervous system diseases:</i>			
Multiple sclerosis			
Myasthenia gravis			
<i>Endocrine diseases:</i>			
Autoimmune hyperthyroidism			
Hshimoto's disease			
Type I diabetes mellitus			
<i>Ophthalmic diseases:</i>			
Anterior uveitis			
Intermediate uveitis			
Panuveitis			

2. Analyze the illustrative material and draw the pictures in a workbook.

Literature:

- Khaitov R. M. Immunology / R. M. Khaitov. – Moscow : GEOTAR-Media, 2008. - 256 p. - <http://www.studentlibrary.ru/book/ISBN9785970407042.html>
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Lesson 14 Allergic diseases

Subtopics (review questions):

1. Systemic anaphylaxis.
2. Skin diseases: Atopic dermatitis, Contact dermatitis, Urticaria (hives).
3. Allergic conjunctivitis.
4. Allergic rhinitis.
5. Bronchial asthma.

Training program:

1. Fill the table on subtopics 1-5:

Allergic disease (Syndrome)	Typical allergens (common trigger)	Type(s) of hypersensitivity reactions	Clinical manifestations (symptoms)
Systemic anaphylaxis			
Atopic dermatitis			
Contact dermatitis			
Urticaria (hives)			
Allergic conjunctivitis			
Allergic rhinitis			
Bronchial asthma			

2. Analyze the illustrative material and draw the picture in a workbook.

Literature:

Khaitov R. M. Immunology / R. M. Khaitov. – Moscow : GEOTAR-Media, 2008. - 256 p. -

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Lesson 15

Allergic diseases (Part II)

Subtopics (review questions):

1. Drug allergy.
2. Organ-specific manifestations of the reactions to drug: Stevens-Johnson syndrome, Lyell's syndrome.
3. Food allergy.
4. Insect allergy.

Training program:

1. Fill the table on subtopics 1-5:

Allergic disease (Syndrome)	Type of hypersensitivity reactions	Typical allergens (common trigger)	Clinical manifestations (symptoms)	Diagnostics
Drug allergy	I			
	II			
	III			
	IV			
Food allergy	I			
	IV			
Insect allergy	I			
	III			
	IV			

2. Make a synopsis of the subtopic 2.
3. Analyze the illustrative material and draw the picture in a workbook.

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Lesson 16

Principles of immunotherapy.

Control work № 3

Subtopics (review questions):

1. Replacement therapy.
2. Immunosuppressive therapy: glucocorticoids, antimetabolites, cytotoxic preparations, immunosuppressive agents isolated from fungi and microorganisms.
3. Immunostimulating therapy.
4. Vaccines: attenuated, inactivated, subunit, recombinant vector vaccines, DNA vaccines, conjugate vaccines.
5. Adjuvants.
6. **Colloquium № 3 (Lessons 1-6).**

Training program:

1. Make a synopsis of the subtopic 1-5.
2. **Control work № 3 (Lessons 11-16).**

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