VOLGOGRAD STATE MEDICAL UNIVERSITY

DEPARTMENT OF PHARMACOLOGY AND BIOINFORMATICS

Methodological recommendations for students for practical classes
«Immunobiological and gene therapy drugs»

Thematic block: **Immunobiological drugs**

Class topic:
Vaccines based on viral vectors and based on messenger RNA (mRNA). Advantages and disadvantages of these groups of immunobiological drugs.

Pharmaceutical faculty

1. Class aims

- learn to analyze the action of immunobiological drugs (vaccines) based on the totality of their pharmacological properties, mechanisms and localization of action;
- learn the general principles of the immunological basis of vaccination;
- learn to evaluate the effectiveness of vaccines based on viral vectors and based on messenger RNA (mRNA). Advantages and disadvantages of these groups of immunobiological drugs. depending on their type and method of application;
- learn to evaluate the advantages and disadvantages of this group of immunobiological drugs;
- become familiar with the need to conduct educational work with the population on issues of vaccination - as a significant factor in the fight against infectious diseases

2. TASKS

- For viral vector-based and messenger RNA (mRNA)-based vaccines, study:

– classification and composition;
– advantages and disadvantages of these groups of immunobiological drugs;
– main mechanisms of action and application in medicine of these vaccines.

- Study the features of development and production of the studied group of vaccines.
- Study the basic terms and definitions used in the process of creating vaccines.
- Study the general requirements for the production, transportation and storage of vaccines.

3. THE FOLLOWING PRACTICAL SKILLS AND ABILITIES ARE PRACTISED IN THE CLASS

- ability to classify vaccines based on the mechanism of action, methods of application;
- ability to analyze the possibilities of using vaccines based on the type of vaccine and source of antigen, the speed of the immune response;
- ability to analyze the advantages and disadvantages of vaccines based on viral vectors and based on messenger RNA (mRNA).

4. Class timetable:

Venue: classroom of the Department of Pharmacology and Bioinformatics.
Time of event: part 1 –2 AH

Formed competencies УК-1.1.3, УК-1.2.1, УК-1.2.2, УК-1.2.3., УК-1.3.1, УК-1.3.2., УК-6.1.1., УК-6.2.1, УК-6.2.2, УК-6.3.1, УК-6.3.2, УК-6.3.3, УК-6.3.4, ОПК-1.1.1., ОПК-1.2.1, ОПК-1.2.2., ОПК-1.3.1, ОПК-6.1.1, ОПК-6.2.1, ОПК-6.3.1, ПК-7.1.1, ПК-7.2.1, ПК-7.3.1.

4.1 Technological map of the lesson

Part	№	Class stage	Time
1	1	Checking the students present at the lesson, lesson mode, lesson topic.	5 min
	2	Checking the initial level of students' knowledge (written survey).	10 min
	3	Survey on the topic of the lesson.	45 min
	4	Independent work of students (on prescriptions with analysis of the most complex prescriptions (if any in the topic), analysis of errors in medical prescriptions written by students; work with synonyms).	15 min
	5	Checking independent work	5 min
	6	Summing up the lesson. Assignment for the next lesson.	5 min
	7	Cleaning of workplaces.	5 min

4.2 Demonstrations

1. Demonstration of advertising brochures on this topic during a survey on the topic of the lesson.

4.3 Lesson plan

4.3.1 The lesson begins with an introductory speech by the teacher, a statement of the purpose of the lesson and answers to students' questions.

The importance of the topic in the system of training and activities of a pharmacist:

- *informing the population on vaccination issues in accordance with the National Vaccination Calendar;*
- *drawing the attention of pharmacists to the prohibition of dispensing medicinal products by pharmacies (clause 5, 6 of the RF Government Resolution of 22.12.2011 No. 1081 "On licensing pharmaceutical activities")*

4.3.2 Checking the initial level of knowledge (written survey).

4.3.3 Analysis of theoretical material

Plan for analyzing theoretical material

1 Recombinant vector vaccines

- classification;
- general characteristics of vector vaccines;
- composition of vector vaccines;
- features of the immune response when using vector vaccines.

2 Biosynthetic vaccines:

- the main method used in the production of biosynthetic vaccines
- Biosynthetic vaccines are peptide fragments synthesized from amino acids that correspond to the amino acid sequence of those structures of the viral (bacterial) protein that are recognized by the immune system and cause an immune response. An important advantage of synthetic vaccines compared to traditional ones is that they do not contain bacteria and viruses, their metabolic products and cause an immune response of narrow specificity.
- advantages and disadvantages of using synthetic peptides compared to live vaccines (reversion of pathogenic properties, residual virulence, incomplete inactivation, low immunogenicity).
- requirements for storage and transportation of biosynthetic vaccines.

3 *Phases of vaccines clinical trials*

- *Phase 1 – immunogenicity, adverse events, optimal dosage*
- *Phase 2 – immunological efficacy, optimal dosage*
- *Phase 3 – prophylactic efficacy*
- *Phase 4 – immunogenicity, immunological, prophylactic and epidemiological efficacy*

4 *The Future of Vaccination*

- *vaccine based on artificial APCs*

- *vaccine based on virus-like particles*

4.3.4 Independent work:

1. Conduct a search and write down the names of vaccines based on viral vectors and based on messenger RNA (mRNA)
2. Fill in the table of the National Immunization Calendar in the Russian Federation for diseases prevented by vaccines based on viral vectors and based on messenger RNA (mRNA). The information is entered into students' workbooks.
3. Working with advertising brochures of medicines on this topic.

4.3.5 Checking the completion of independent work.

4.3.6 Summing up the lesson. Answers to questions.

4.3.7 Concluding remarks by the teacher.

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