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## **IMMUNOPROPHYLAXIS AND VACCINATION OF ATHLETES FROM COVID-19**

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### **SUMMARY**

*This article provides data on the problems of immunoprophylaxis during the Covid-19 pandemic. The main changes concerning the body as a whole, as well as the immune system, are summarized. The problems of vaccination among the sports continent with a detailed algorithm are also considered.*

**KEYWORDS:** coronavirus, Covid-19, vaccine, vaccination, immune system, immunoprophylaxis, athletes.

COVID-19, or coronavirus, has dramatically changed the lives of people around the world, including the sports contingent. Despite ongoing efforts to combat COVID-19, its effects may remain for many years or even decades. A clear example of changes in life after the pandemic was the increase in the number of people working at home, implementation of online learning, online training of athletes, increase of the usage of social networks were actively introduced. In addition, the pandemic contributed to an increase in the frequency of various latent types of disorders and other anxiety conditions [2,4]. All this dictates an increase in the activity of research work to solve the problems of vaccination, which is especially relevant for athletes, given the specifics of their occupation.

If we turn to history, vaccination and immunoprophylaxis has a rather long historical path, when the first reports of improvements in clinical conditions in patients appeared, for example, when children were vaccinated against measles and mumps [3]. There was a significant decrease in the number of cases, during immunization (vaccination) the disease proceeded with unexpressed clinical manifestations and regressed significantly and faster, while the clinical manifestations of the disease were not as pronounced as compared to those who were not vaccinated.

According to the definition given by the World Health Organization (WHO), "vaccination is a simple, safe and effective way to protect against diseases before a person comes into contact with their pathogens. Vaccination activates the body's natural defense mechanisms to form resistance to a number of infectious diseases and makes the immune system stronger" [5].

But, it should be noted that in the light of the latest literature data, there is a scientific consensus that vaccination is a fairly safe and effective way to combat infectious diseases and destroy them [6]. However, there are limitations to its effectiveness. Sometimes the defense does not work, due to the lack of response of the host's immune system, or an inadequate response. This may be due to the presence of clinical factors such as diabetes, steroid use, co-infection, or age [7]. It may also be due to genetic causes, such that the host's immune system lacks strains of B cells that can generate antibodies suitable for efficient reaction and binding to pathogen-associated antigens.

Vaccination is the most effective method of preventing infectious diseases. Widespread immunity due to vaccination is largely responsible for the worldwide eradication of smallpox and the limitation of diseases such as polio, measles and tetanus in most countries of the world [8].

The emergence of the New Coronavirus 2 (SARS - CoV-2), its ubiquitous spread around the world, has posed a global challenge to the health system in terms of strengthening preventive measures, as well as developing vaccines to reduce the incidence rate and prevent further spread.

Immunoprophylaxis and vaccination are one of the effective ways to combat this disease, which has quite serious complications and manifestations. The activation of the immune system begins with an immune response to the introduction of the virus, which turns on the innate immunity and antigen-specific reaction of bone marrow (B-cells) and thymus (T-cells).

Vaccination is the safest and most effective way to prevent infectious and viral diseases. The effectiveness of the action and the epidemiological effect of vaccination of the population against various diseases (influenza, respiratory infections) have been



proven more than 30 years ago. In connection with the development of immunology as a science, new methods for studying the effects of vaccines on the body of vaccinated patients became available, which made it possible to approach the disclosure of immune mechanisms and the effects of vaccines in the post-vaccination period.

According to the latest data, vaccines can be considered not only as drugs capable of creating protection and immunity to invasive and non-invasive forms of the disease, but also capable of activating the innate and adaptive mechanisms of the immune system. This allows us to conclude that the vaccine preparation in the early stages of the post-vaccination period is an immunotropic agent.

Modern vaccines created against respiratory infections with improved production technology contain adjuvants or conjugates that, when introduced into the body of patients, work as immunotropic drugs, showing at the beginning a non-specific transient effect with a subsequent protective effect on existing pathogenetic agents. It should be noted that the duration of the preservation of cellular memory has not been determined, but it is obvious that when the molecular and cellular mechanisms of the body's immune system are activated or reactivated upon contact with a foreign antigen, it is of priority importance, since the outcome of the disease depends on its functional activity.

In the sports world, COVID -19 has significantly limited sports activities, which has contributed to the postponement or cancellation of a large number of national and international competitions. This caused the issue of vaccination against the new virus among elite athletes to become relevant. Sports doctors have faced a number of challenges, including the effects of exercise on vaccine effectiveness, possible side effects, and selecting the most appropriate vaccine.

Population studies have shown an increase in the effectiveness of vaccines with elevated antibody titers in individuals who performed moderate-intensity exercise before vaccination, however, the evidence is not conclusive and requires research and study of the mechanisms of the immune response after vaccination of athletes.

Given the emergence of new vaccines against COVID -19, questions have arisen about the choice of the most preferred vaccine for athletes. The main thing in choosing a vaccine is its availability, the presence of special requirements for storage and transportation, for example, among elite athletes who are preparing to participate in major competitions, have carefully regulated and pre-planned training schedules, while any breaks in training associated with vaccination processes can have a negative impact on the body of athletes, causing various acute symptoms of the disease, as well as post-vaccination reactions. This leads to the fact that vaccination in athletes is always critical, especially if the vaccine is repeated after 3-4 weeks, when severe side effects occur. As such, sports physicians should be aware of athlete-specific factors, such as scheduling vaccinations in the context of peak training, or during periods of deceleration prior to major competitions.

Based on the foregoing, the staff of Samara State Medical University and the author developed the organizational framework for conducting immunoprophylaxis (COVID-19) among the sports contingent, taking into account temporary recommendations based on the version of the 8th revision of the Ministry of Health of the Republic of Uzbekistan.

## **ORGANIZATION AND IMPLEMENTATION OF VACCINATION AGAINST COVID-19 OF THE SPORTS CONTINGENT**

Immunoprophylaxis consisted in vaccination against COVID-19 of the sports contingent according to epidemic indications. According to the temporary recommendations adopted by the Ministry of Health of the Republic of Uzbekistan (8th version), vaccination can be carried out if the organization has a license that provides for the performance of works (services) for "vaccination (prophylactic vaccinations)".

The organization and implementation of vaccination against COVID-19 of the sports contingent is provided by a formed working group. Vaccination against COVID-19 is carried out by health workers who have been trained in the use of immunobiological drugs for the immunoprophylaxis of infectious diseases, the organization of vaccination, vaccination techniques, as well as in the provision of medical care in an emergency or urgent form, the rules for observing the "cold chain".

To implement vaccination activities, it is necessary to appoint responsible persons, with the development and approval of standard operating procedures, algorithms, vaccination schedule (taking into account the storage time of the thawed vaccine), routing schemes, action plans for the implementation of the "cold chain" when storing the vaccine, including a contingency plan in the event of an emergency.

Vaccination against COVID-19 of the sports contingent was carried out with the Gam-COVID-Vac vaccine (hereinafter referred to as the vaccine), according to the instructions for use, for athletes who do not have medical contraindications, registered in accordance with the generally accepted rules for the registration of Pharmaceuticals, vaccines and sera in the Pharmaceutical Committee Uzbekistan [1].

When vaccinating a sports contingent, it is necessary to follow the procedure for introducing vaccines in a certain sequence and on time.

Indications for use: Prevention of novel coronavirus infection (COVID-19) in adults over 18 years of age.

Contraindications for use are:

- hypersensitivity to any component of the vaccine or a vaccine containing similar components;
- history of severe allergic reactions;
- acute infectious and non-infectious diseases, exacerbation of chronic diseases;



- vaccination is carried out 2-4 weeks after recovery or remission. For non-severe acute respiratory viral infections, acute infectious diseases of the gastrointestinal tract, vaccination is carried out after the temperature normalizes;

- pregnancy and breastfeeding period;
- age up to 18 years (due to lack of data on efficacy and safety).

Contraindications for the injection of component II:

- severe post-vaccination complications (anaphylactic shock, severe generalized allergic reactions, convulsive syndrome, temperatures above 40°C, etc.) to the injection of component I of the vaccine.

It was used with caution in: chronic diseases of the liver and kidneys, endocrine diseases (severe disorders of the thyroid gland and diabetes mellitus in the stage of decompensation), severe diseases of the hematopoietic system, epilepsy and other diseases of the central nervous system, acute coronary syndrome and acute cerebrovascular accident, myocarditis, endocarditis, pericarditis.

Due to lack of information, vaccination may pose a risk for the following patient groups:

- with autoimmune diseases (stimulation of the immune system can lead to an exacerbation of the disease, especially care should be taken in patients with autoimmune pathology, which tends to develop severe and life-threatening conditions);
- with malignant neoplasms.

Special instructions: in patients receiving immunosuppressive therapy, and patients with immunodeficiency may not develop a sufficient immune response. Therefore, the use of drugs that suppress the function of the immune system is contraindicated for at least 1 month before and after vaccination due to the risk of reduced immunogenicity.

The decision to vaccinate should be based on an assessment of the benefit/risk ratio in each specific situation.

The Gam-COVID-Vac vaccine was obtained by a biotechnological method that does not use the SARS - CoV - 2 virus pathogenic for humans. The drug consists of two components: component I and component II. Component I includes a recombinant adenoviral vector based on human adenovirus serotype 26 carrying the S protein gene of the SARS virus - CoV -2, component II includes a vector based on human adenovirus serotype 5 carrying the S protein gene of the SARS virus - CoV -2. Adenovirus vector - genetically modified adenovirus. The vaccine induces the formation of humoral and cellular immunity against coronavirus infection caused by the SARS virus - CoV -2. Vaccination is carried out in 2 stages with an interval of 21 days.

It is necessary to adhere to all strict rules, especially clearly indicated in the methodological manuals.

Vaccination against COVID-19 of the sports contingent is carried out in accordance with the requirements of SanPiN No. 02-39-07 Supplement No. 3 of 2015 and Order of the Ministry of Health of the Republic of Uzbekistan No. 31 of February 15, 2021. "About the preparation and holding of mass vaccination against coronavirus infection" in the vaccination rooms of medical organizations, in compliance with the regime of cleaning, ventilation, disinfection. In the vaccination room, it is necessary to have written instructions on the procedure for cleaning and disinfecting the premises [9]. Before vaccination against COVID-19, the person to be vaccinated or his legal representative is informed by medical workers about the need for vaccination, possible post-vaccination reactions and complications, as well as the consequences of refusing to vaccinate; an athlete's questionnaire (Form 1) is issued for filling out; information material and informed voluntary consent to medical intervention is issued (form 2).

### Form 1. Athlete Questionnaire

1. FULL NAME. \_\_\_\_\_
2. Date of Birth: \_\_\_\_\_

Questions - answers : YES NO

3. Are you sick now?
4. Have you had contact with people with infectious diseases in the last 14 days?
5. Have you had COVID-19? (if yes, then when)
6. In the last 14 days, have you experienced:

- Temperature increase
- A sore throat
- Loss of smell
- Runny nose
- loss of taste
- Cough
- Difficulty breathing

7. Have you had a flu/pneumococcal or other vaccination?

If "yes", indicate the date: \_\_\_\_\_

8. Have you had allergic reactions?
9. Do you have chronic diseases?

Specify which: \_\_\_\_\_



**Form 2. "Voluntary consent to vaccination against coronavirus infection (COVID-19)"**

for vaccination \_\_\_\_\_  
(name of vaccine)

(this voluntary consent was drawn up in accordance with the order of the Ministry of Health of the Republic of Uzbekistan "On the preparation and conduct of mass vaccination processes against coronavirus infection" No. 31 dated February 15, 2021)

I, \_\_\_\_\_ (FULL NAME)

residing at the address : \_\_\_\_\_  
(actual residential address)

born in \_\_\_\_\_, I hereby confirm that I have been informed by the doctor:

- that preventive vaccination is the injection of a medical immunobiological preparation into the human body to create specific immunity to coronavirus infection (COVID-19). The vaccine was obtained in a biotechnological way, which does not use the SARS-CoV-2 virus pathogenic for humans. The drug consists of two components: component I and component II;
- about the need for preventive vaccination, 2 stages of vaccination and contraindications to its implementation;
- possible post-vaccination complications (general: a short flu-like syndrome characterized by chills, fever, arthralgia, myalgia, asthenia, general malaise, headache and local: pain at the injection site, hyperemia, swelling), which can develop on the first or second day after vaccinations and are allowed within 3 consecutive days;
- on the need for a mandatory medical examination before the vaccination stages (and, if necessary, a medical examination);
- on compliance with the instructions of medical workers.

I had the opportunity to ask any questions and I received exhaustive answers to all questions.

Having received full information about the need for prophylactic vaccination \_\_\_\_\_ to prevent coronavirus infection caused by the SARS-CoV-2 virus, possible vaccination reactions and post-vaccination complications, I confirm that I understand the meaning of all terms and voluntarily agree to vaccinate \_\_\_\_\_ to prevent coronavirus infection caused by the SARS-CoV-2 virus.

I, the undersigned \_\_\_\_\_  
(Full Name)

\_\_\_\_\_  
(voluntarily agree)

for vaccination \_\_\_\_\_, for the prevention of coronavirus infection caused by the SARS-CoV-2 virus).

Date: \_\_\_\_\_  
(signature)

Doctor: \_\_\_\_\_ Date: \_\_\_\_\_  
(last name, first name, patronymic) (signature)

This informed consent is signed in duplicate.

Before vaccination, the general practitioner, infectious disease specialist examines the athlete, conducts thermometry, takes anamnesis (including epidemiological), measures saturation, heart rate, blood pressure, auscultation of the respiratory and cardiovascular systems, examination of the pharynx and fills out the Examination Form before vaccination against COVID-19 (Form 3 ). The doctor warns the athlete about possible post-vaccination complications and gives him a memo with informational material (Form 4).

**Form 3. Doctor's Examination Before Vaccination Against COVID-19**

1. Date of inspection
2. Full name of the patient
3. Date of birth
4. Body temperature
5. General condition (Not) satisfactory
6. Lungs (underline as appropriate) Breathing is vesicular, hard  
Wheezing: none (dry scattered, moist, crepitant)
7. Respiratory rate
8. Saturation
9. Heart (underline as appropriate) Tones: clear, muffled, deaf.  
Rhythm: regular, arrhythmic



10. Heart rate, blood pressure
11. Have you been in contact with infectious patients? (underline as appropriate) Yes, no
12. Have you had COVID-19? (underline as appropriate) Yes, no
13. Flu shot? / Pneumococcus? (underline as appropriate) Yes, no
14. Reaction to previous vaccines (describe) Yes, no
15. Allergic reactions (underline as appropriate) No, yes (describe which ones)

#### **Form 4. Patient's reminder about vaccination against COVID-19 with the " \_\_\_\_\_ " vaccine**

Dear athlete! Your good health is our main goal! And in order to fully realize our potential in achieving the main goal, we ask you to follow some (basic and important) rules that will help us in our work:

After vaccination, on the first or second day, short-term general (a short flu-like syndrome characterized by chills, fever, arthralgia, myalgia, asthenia, general malaise, headache) and local (soreness at the injection site, hyperemia, swelling) reactions can show up. Less common are nausea, dyspepsia, loss of appetite, and sometimes an increase in regional lymph nodes, perhaps the development of allergic reactions.

It is recommended not to wet the injection site for 3 days after vaccination, not to visit a sauna, a bath, not to take alcohol, to avoid excessive physical exertion. With redness, swelling, soreness of the vaccination site, take antihistamines. With an increase in body temperature after vaccination - non-steroidal anti-inflammatory drugs.

#### **"Gam-COVID- Vac " - a combined vector vaccine for the prevention of coronavirus infection caused by a virus SARS-CoV-2**

Vaccination is carried out in two stages:

I component (day, month, year) \_\_\_\_\_

II component (day, month, year) \_\_\_\_\_

Possible side effects:

After vaccination on the first or second day, short-term general (a short flu-like syndrome characterized by chills, fever, arthralgia, myalgia, asthenia, general malaise, headache) and local (soreness at the injection site, hyperemia, puffiness) reactions can show up. Less common are nausea, dyspepsia, decreased appetite, and sometimes an increase in regional lymph nodes, perhaps the development of allergic reactions.

It is recommended not to wet the injection site for 3 days after vaccination, not to visit a sauna, a bath, not to take alcohol, to avoid excessive physical exertion.

With redness, swelling, soreness of the vaccination site, take antihistamines. With an increase in body temperature after vaccination - non-steroidal anti-inflammatory drugs.

If the condition worsens after 3 days, immediately inform the local doctor at the clinic at the place of residence. For life-threatening symptoms, call an ambulance.

The results of the athlete's examination, as well as permission to administer the vaccine or withdrawal from vaccination due to the presence of contraindications for vaccination, must be recorded by the doctor in the medical records.

Vaccination against COVID-19 is carried out by health workers trained in the organization and technique of vaccination, as well as emergency procedures in case of post-vaccination complications.

To ensure the proper temperature regime of storage (not lower than 18°C) in a medical organization, it is necessary to have serviceable freezing equipment that can hold a stock of medical immunobiological drugs, as well as the required number of thermal containers and ice packs for them for the departure of mobile medical teams and in case of emergencies associated with the exit from building freezing equipment, in case of power failures.

Before vaccination, the vial with component I or II must be removed from the freezer and kept at room temperature until completely thawed. After thawing, it is allowed to store an opened 3.0 ml vial for no more than two hours at room temperature. Storage of the thawed drug in 0.5 ml vials is not allowed. Not allowed: the presence of ice residues in the vial, repeated freezing of the vial with the solution and shaking the vial!

To withdraw each dose of vaccine from the multi-dose vial a sterile syringe with a sterile needle is used. Do not leave the needle in the cap of the vial to take subsequent doses of the vaccine. The vaccine is injected intramuscularly into the deltoid muscle (the upper third of the outer surface of the shoulder), if it is impossible to administer it into the deltoid muscle, the drug is injected into the vastus lateral muscle of the thigh. The injection of the drug intravenously is strictly prohibited.

After vaccination, the packages of used vaccines are stored and at the end of the working day they are transferred to the responsible employee for removal from the drug movement monitoring system (DMMS).

The vaccine "Sputnik" is registered according to a special registration procedure, in connection with which it is necessary to notify the Ministry of Health and the Department of Sanitary and Epidemiological Surveillance of the Republic of Uzbekistan about each fact of using the drug by transferring information and entering it in the registration log.



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