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ADSORPTION PROPERTIES OF ALUMINUM HYDROXIDE NANOPARTICLES OBTAINED BY ELECTROSPARK METHOD *)

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The method of enhancing the body's immune response by introducing the original preparation of antigens (vaccines) of microbial cells with so-called adjuvants (substances that enhance the immune response) - from the side of action - was introduced more than a century ago. Since then, studies have been conducted to determine the immunogenicity of vaccines and serums, conducted to search for alternative adjuvants. However, the only permitted adjuvant in the composition of a vaccine intended to protect people remains aluminum (salts, hydroxides and phosphates). The mechanism of action of adjuvants is complex and not fully understood. It is known that the antigen (AG) from the vaccine attaches to the adjuvant. This leads to the fact that the AG is better distributed throughout the body and, possibly, increases the time of interaction of the cell with the introduced AG. Also, when exposed to AG with nanoparticles, the molecular weight of the resulting complex increases [1]. This improves the recognition of AG by antigen-presenting (dendritic) cells. A quantitative characteristic that allows quantitatively assessing the processes described - adsorption.

In this work, hydroxide particles are subjected to ($Al(OH)_3$) were obtained using a high-voltage spark discharge in liquids with metal (aluminum inclusions in the interelectrode space). - hydroxide enters two crystalline phases Bayerite and Gibbsite, the characteristic size of which is from 5 to 100 nm.

To test the adsorption of recombinant atoxic pneumolysin (raPly) on aluminum hydroxide nanoparticles, raPly was used at a dose of 125 μg with the addition of $Al(OH)_3$ nanoparticles at a dose of 1250 μg (the AG/$Al(OH)_3$ ratio was 1:10) and sorption was carried out for 12 hours at a temperature of 4°C. After overnight sorption, the experimental preparation was centrifuged at 3000 rpm for 15 minutes and the resulting supernatant was studied in a sandwich ELISA. raPly at a concentration of 25 μg/ml was used as a positive control. $Al(OH)_3$ nanoparticles without the addition of raPly were used as a negative control. Analysis of the supernatant showed that the percentage of raPly that remained free in the solution was 33%, and the percentage of sorbed recombinant antigen on aluminum nanoparticles was 67%.

Preliminary experimental results demonstrate the fundamental possibility of using $Al(OH)_3$ nanoparticles created under the influence of discharge for the sorption of recombinant proteins and allow us to move on to studies of the immunogenicity of recombinant antigens in animals in the future.

References

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