MIRZO ULUG‘BEK NOMIDAGI
O‘ZBEKISTON MILLIY UNIVERSITETI
JIZZAX FILIALI

KOMPYUTER ILMLARI VA MUHANDISLIK TEXNOLOGIYALARI

XALQARO ILMIY-TEXNIK ANJUMAN MATERIALLARI TO‘PLAMI

2-QISM

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O‘ZBEKISTON RESPUBLIKASI OLIY TA’LIM, FAN VA INNOVATSIYALAR VAZIRLIGI

MIRZO ULUG‘BEK NOMIDAGI O‘ZBEKISTON MILLIY UNIVERSITETINING JIZZAX FILIALI

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mavzusidagi Xalqaro ilmiy-texnik anjuman materiallari to‘plami

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JIZZAX-2025

Kompyuter ilmlari va muhandislik texnologiyalari. Xalqaro ilmiy-texnik anjuman materiallari to‘plami – Jizzax: O‘zMU Jizzax filiali, 2025-yil 26-27-sentabr. 368-bet.

Xalqaro miqyosidagi ilmiy-texnik anjuman materiallarida zamonaviy kompyuter ilmlari va muhandislik texnologiyalari sohasidagi innovatsion tadqiqotlar aks etgan.

Globallashuv sharoitida davlatimizni yanada barqaror va jadal sur’atlar bilan rivojlantirish bo‘yicha amalga oshirilayotgan islohotlar samarasini yaxshilash sohasidagi ilmiy-tadqiqot ishlariga alohida e’tibor qaratilgan. Zero iqtisodiyotning, ijtimoiy sohalarni qamrab olgan modernizatsiya jarayonlari, hayotning barcha sohalarini liberallashtirishni talab qilmoqda.

Ushbu ilmiy ma’ruza tezislari to‘plamida mamlakatimiz va xorijlik turli yo‘nalishlarda faoliyat olib borayotgan mutaxassislar, olimlar, professor-o‘qituvchilar, ilmiy tadqiqot institutlari va markazlarining ilmiy xodimlari, tadqiqotchilari, magistr va talabalarning ilmiy-tadqiqot ishlari natijalari mujassamlashgan.

Mazkur to‘plamga kiritilgan ma’ruza tezislarining mazmuni, undagi statistik ma’lumotlar va me’yoriy hujjatlarning to‘g‘riligi hamda tanqidiy fikr-mulohazalar, keltirilgan takliflarga mualliflarning o‘zlari mas’uldirlar.

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VACCINES: THE FUTURE OF BIOTECHNOLOGY

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Annotation: This thesis discusses the pivotal role of vaccines as one of the greatest achievements of modern medicine, emphasizing their contribution to the prevention of infectious diseases, enhancement of global public health, and potential application against cancer and autoimmune disorders. It highlights the evolution of vaccine technologies from traditional approaches to advanced biotechnological methods, such as genetic engineering, recombinant DNA, and mRNA platforms. The study provides a systematic overview of vaccine types—including whole-microbe, subunit, and nucleic acid vaccines—and explains their mechanisms of action. Furthermore, it explores additional vaccine components such as preservatives, stabilizers, surfactants, residuals, diluents, and adjuvants, with particular attention to their safety and effectiveness. Overall, the thesis demonstrates how vaccines not only safeguard human health but also represent a promising future direction in biotechnology.

Keywords: Vaccines; Biotechnology; Infectious diseases; mRNA vaccines; Genetic engineering; Recombinant DNA; Subunit vaccines; Viral vector vaccines; Vaccine components; Adjuvants.

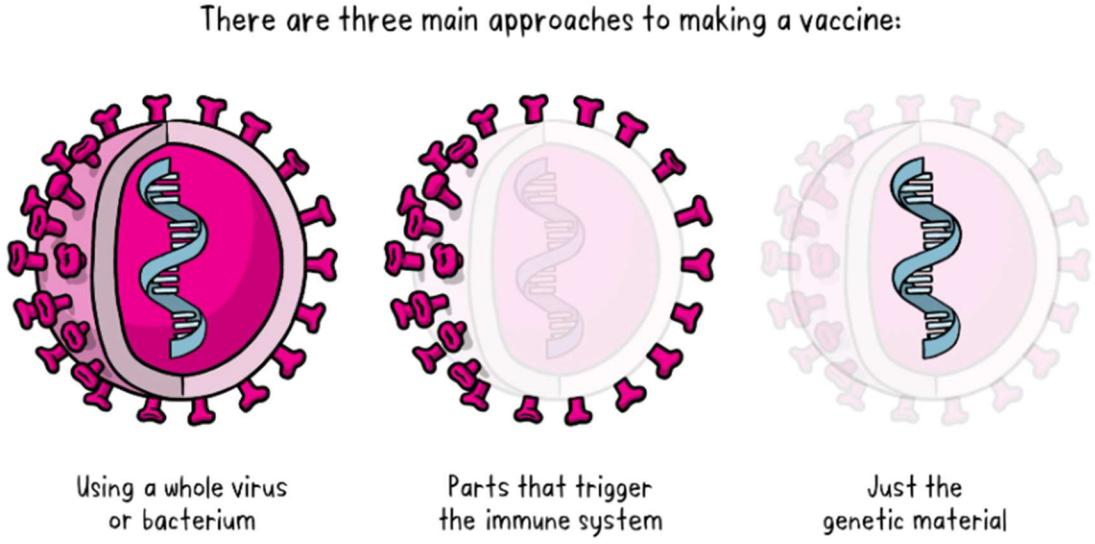
Vaccines are among the greatest achievements of modern medicine, playing a crucial role in preventing infectious diseases, controlling their spread, and advancing global public health systems [1]. Since the late 18th century, when E.Jenner first introduced the smallpox vaccine, vaccine technologies have developed rapidly, and today they are considered not only for combating infectious diseases but also as a promising tool in controlling certain types of cancer and autoimmune disorders [4].

As a result of advances in biotechnology, vaccine development has expanded from traditional methods to include genetic engineering, recombinant DNA technologies, and modern platforms based on mRNA [2]. Therefore, vaccines today represent not only a cornerstone of medicine but also one of the innovative directions shaping the future of the entire field of biotechnology. Currently, there are several types of vaccines.

Active components: antigens or their blueprint (DNA or RNA). Vaccines contain antigens or the blueprint for making the antigens. An antigen generates an immune response and may be a small part of the disease-causing organism, like a protein or sugar, or it may be the whole organism in a weakened or inactive form. In place of an antigen, vaccines may also contain genetic material (DNA or RNA) that instructs the body to make specific antigens. Although DNA or RNA vaccines are relatively new, the technology behind them, including their mechanism of action, has been researched for several decades. mRNA (messenger RNA) vaccines have safely protected millions against severe disease and death due to COVID-19. mRNA vaccines are held to the same standards of safety, efficacy and quality as all vaccines.

Different ways to design a vaccine. There are three main approaches to designing a vaccine. Their differences lie in whether they use a whole virus or bacterium; just the parts of the germ that triggers the immune system; or just the genetic material that provides the instructions for making specific proteins and not the whole virus.

The whole-microbe approach

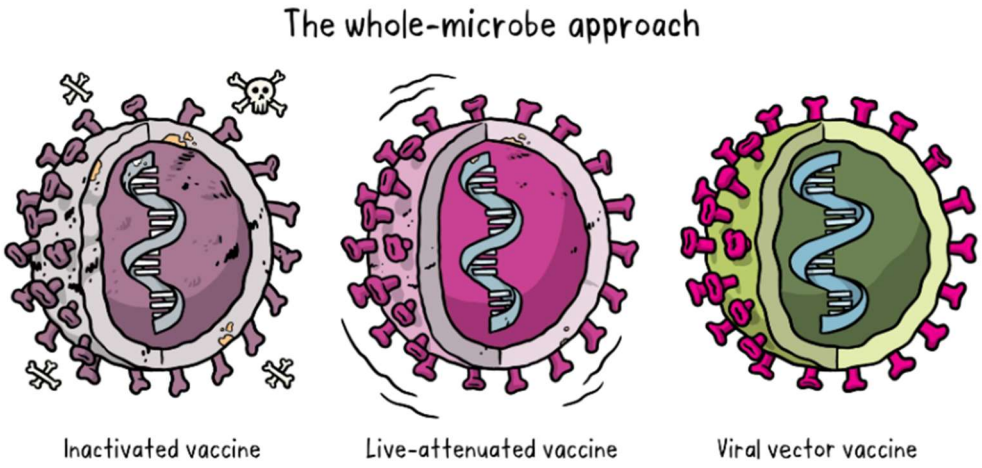


Inactivated vaccine - The first way to make a vaccine is to take the disease-carrying virus or bacterium, or one very similar to it, and inactivate or kill it using

chemicals, heat or radiation. This approach uses technology that's been proven to work in people – this is the way the flu and polio vaccines are made – and vaccines can be manufactured on a reasonable scale.

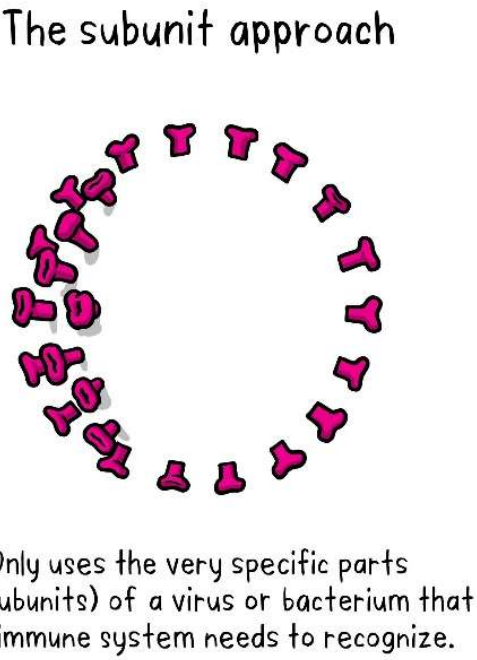
However, it requires special laboratory facilities to grow the virus or bacterium safely, can have a relatively long production time, and will likely require two or three doses to be administered.

Live-attenuated vaccine - A live-attenuated vaccine uses a living but weakened version of the virus or one that's very similar. The measles, mumps and rubella (MMR) vaccine and the chickenpox and shingles vaccine are examples of this type of vaccine. This approach uses similar technology to the inactivated vaccine and can be manufactured at scale. However, vaccines like this may not be suitable for people with compromised immune systems.



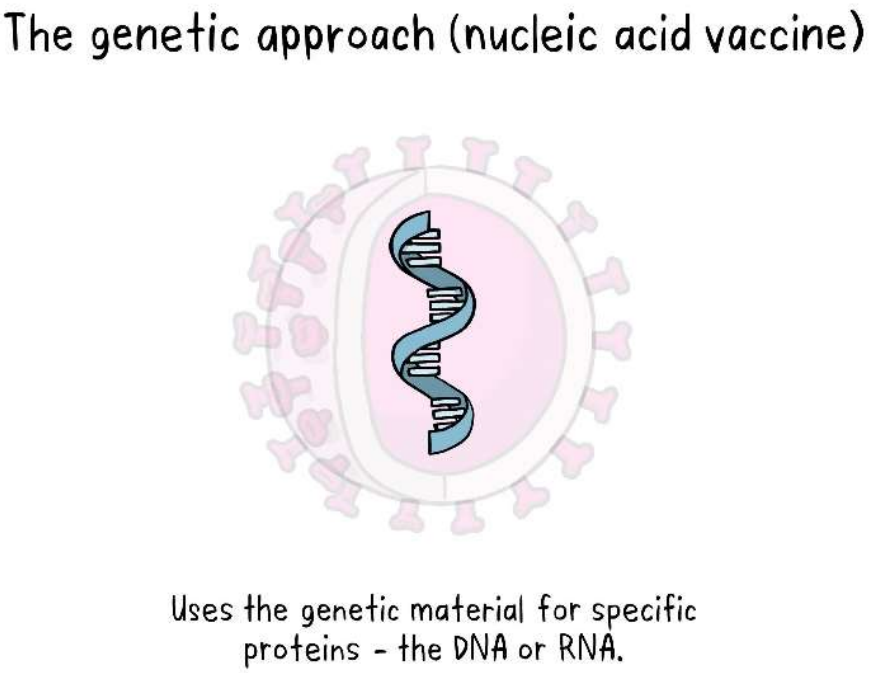
Viral vector vaccine - This type of vaccine uses a safe virus to deliver specific sub-parts – called proteins – of the germ of interest so that it can trigger an immune response without causing disease. To do this, the instructions for making particular parts of the pathogen of interest are inserted into a safe virus. The safe virus then serves as a platform or vector to deliver the protein into the body. The protein triggers the immune response. The Ebola vaccine is a viral vector vaccine, and this type can be developed rapidly.

The subunit approach - A subunit vaccine uses only the specific parts (the subunits) of a virus or bacterium that the immune system needs to recognize. It doesn't contain the whole microbe or use a safe virus as a vector. These subunits may be proteins or sugars, or a combination of both. The subunits can come directly from the germ or produced recombinantly, using genetic engineering. Because subunit vaccines do not use whole viruses or bacteria, they can safely help the body build protection without causing disease.



Most of the vaccines on the childhood schedule are subunit vaccines, protecting people from diseases such as whooping cough, tetanus, diphtheria and meningococcal meningitis.

The genetic approach (nucleic acid vaccine). Unlike vaccine approaches that use either a weakened or dead whole microbe or parts of one, a nucleic acid vaccine just uses a section of genetic material that provides the instructions for specific proteins, not the whole microbe. DNA and RNA are the instructions our cells use to make proteins. In our cells, DNA is first turned into messenger RNA, which is then used as the blueprint to make specific proteins.



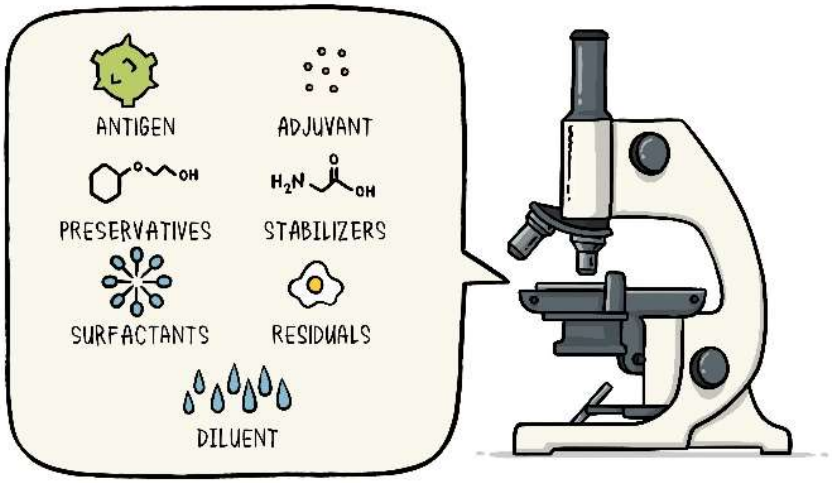
Other ingredients in a vaccine. Aside from antigens or their genetic material, vaccines also contain other ingredients to help keep them safe and effective. These

ingredients are included in most vaccines and have been used for decades in billions of doses.

Preservatives. Preservatives prevent the vaccine from becoming contaminated once the vial has been opened, if it will be used for vaccinating more than one person. Some vaccines don't have preservatives because they are stored in one-dose vials and are discarded after the single dose is administered. The most commonly used preservative is 2-phenoxyethanol. It has been used for many years in a number of vaccines, is used in a range of baby care products and is safe for use in vaccines, as it has little toxicity in humans. Another preservative used in some vaccines is thiomersal (also known as thimerosal), which is present in multi-dose vials. Thiomersal prevents germs from contaminating the vaccine vial every time a dose is taken. Thiomersal contains ethylmercury, a type of mercury that is rapidly cleared from the body. Thiomersal has been used safely for decades, and studies from many countries have found no evidence of harm. There is no link between thiomersal and autism.

Stabilizers. Stabilizers prevent chemical reactions from occurring within the vaccine and keep the vaccine components from sticking to the vaccine vial.

Stabilizers can be sugars (lactose, sucrose), amino acids (glycine), gelatin, and proteins (recombinant human albumin, derived from yeast).



Surfactants. Surfactants keep all the ingredients in the vaccine blended together. They prevent settling and clumping of elements that are in the liquid form of the vaccine. They are also often used in foods like ice cream.

Residuals. Residuals are tiny amounts of various substances used during manufacturing or production of vaccines that are not active ingredients in the completed vaccine. Substances will vary depending on the manufacturing process used and may include egg proteins, yeast or antibiotics. Residual traces of these substances which may be present in a vaccine are in such small quantities that they need to be measured as parts per million or parts per billion.

Diluent. A diluent is a liquid used to dilute a vaccine to the correct concentration immediately prior to use. The most commonly used diluent is sterile water.

Adjuvant. Some vaccines also contain adjuvants. An adjuvant improves the immune response to the vaccine, sometimes by keeping the vaccine at the injection site for a little longer or by stimulating local immune cells [3].

The adjuvant may be a tiny amount of aluminium salts (like aluminium phosphate, aluminium hydroxide or potassium aluminium sulphate). Aluminium has been used in vaccines for many years. The amount of aluminium in vaccines is very small—much less than the aluminium we get from food and water. Even after receiving all their childhood vaccines, children still get far less aluminium than from their everyday diet. Extensive evidence shows that aluminium in vaccines does not cause any long-term health problems, including autism.

Conclusion. In conclusion, vaccines remain an indispensable tool in safeguarding public health and preventing the spread of infectious diseases. Their development, driven by advancements in biotechnology, has expanded beyond conventional methods, offering safer, faster, and more effective solutions. The integration of innovative approaches, such as mRNA and viral vector platforms, illustrates how biotechnology continues to reshape vaccine science. Beyond their active components, the additional ingredients in vaccines have been proven safe and necessary for maintaining quality and efficacy. Ultimately, vaccines stand as both a cornerstone of modern medicine and a vital pathway toward the future of biotechnology, holding immense potential for addressing emerging global health challenges.

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QANDLI DIABET EXPERIMENTAL MODELIDA MAXSAR (CARTHAMUS TINCTORIUS L) EKSTRAKTINING GIPOGLYKEMIK TA'SIRINI O'RGANISH

G'anijonov Dilyorbek Mamirjon o'g'li,
O'ralov Abdumannon Iskandarovich,
Mustafaqulov Muhammadjon Abduvaliyevich
O'zbekiston Milliy universiteti Jizzax filiali

Annotatsiya: Qandli diabetda hujayralarning shikastlanish mexanizmlaridan biri oksidativ stress bo'lib, erkin radikallarning ko'payishi va antioksidant tizimining faolligini kamayishi bilan bog'liq. Ushbu ishda maxsar gullarining ekstrakti atioksidant