What are vaccines? classify these and discuss DNA vaccines in detail.

Vaccines:

Vaccines are biological preparations that provide immunity against specific diseases. Giving someone a vaccine is called vaccination. Vaccines have been developed for many infections such as flu, ~~the~~ chickenpox, measles and COVID-19.

Classification of Vaccines:

i- Live Attenuated Vaccines
ii- Inactivated or Killed Vaccines
iii- Subunit, Recombinant, or Conjugate Vaccines
iv- Messenger RNA (mRNA) Vaccines
v- DNA Vaccines

DNA Vaccines in Detail:

DNA vaccines use a small, circular piece of DNA called a plasmid that contains genes encoding ~~pathogens from~~ antigens from the pathogen. When injected into the body, the cells take up ~~against~~ plasmid and use

the genetic **instructions** to produce the antigen. The immune system recognizes these antigens as foreign, triggering an immune response that includes both antibody production and cellular immunity.

Advantages of DNA Vaccines:

i- Stability:

DNA vaccines are generally more stable and easier to store compared to some other types of vaccines.

ii- Rapid Development:

They can be developed quickly compared to traditional vaccines.

iii- Strong Immune Response:

They can induce both strong antibody response and ~~cellular~~ cellular immunity, which is important for protecting against various pathogens.

Challenges Regarding DNA Vaccines:

i- Delivery:

Efficient delivery into cells is a significant challenge, often requiring special devices or techniques.

ii- Efficacy:

While promising in animal models, DNA vaccines have shown variable effectiveness in human trials.

iii- Regulatory Approval:

DNA vaccines are still relatively new, and long-term safety data are limited.

Examples of DNA Vaccines:

They have been explored for various diseases including infectious diseases like influenza and COVID-19 and some cancer therapies.

What's the difference between vaccines and antibiotics? How do antibiotics and vaccines contribute to health?

Difference between vaccines and antibiotics:

	Vaccines	Antibiotics
1-	Vaccines are medicines used to prevent infections (both viral and bacterial).	Antibiotics are medicines used to treat bacterial infections.
2-	They are used before exposure to a pathogen.	They are used after an infection has occurred.
3-	Vaccines stimulate the immune system to build-long-term immunity.	Antibiotic do not provide long-term immunity or protection.
4-	They work by introducing a harmless component of a pathogen (such as a protein or an inactivated virus) into the body. This trains the immune system to recognize and	They work by killing bacteria or inhibiting their growth. They target specific features of bacterial cells, such as cell wall synthesis or protein production, which are not present

Vaccines	Antibiotics
respond to the actual pathogen if exposed in the future.	in human cells.
Vaccines are used to protect against a range of diseases, from childhood illnesses like measles and polio to diseases like influenza and COVID-19.	Antibiotics are used to treat various bacterial infections, including strep throat, urinary tract infections and certain types of pneumonia.

Contributions to health:

Vaccines: They help in preventing outbreaks, reducing disease prevalance, and promoting herd immunity, which protects vulnerable populations.

Antibiotics: They help in curing infections, preventing complications, and reducing the spread of diseases.

5:00

"Semiconductors are the Brains of Modern Electronics." Explain in detail what this quotation means.

Definition:

Semiconductors are materials with electrical conductivity between conductors (like copper) and insulators (like glass). This unique property allow them to control electrical current, making it essential for electronic devices.

Explanation of the quotation:

The quotation "Semiconductors are the brains of modern electronics" underscores the fundmental role that semiconductors play in the functioning of modern electronic devices. Here's the detailed explanation: