

Overview of Vaccines and Their Characteristics

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Keywords: *Vaccines, Characteristics*

ABSTRACT

To boost up our active immunity there is no shortcut without vaccine. At the present context, vaccines are administering a lot like coronavirus vaccine. From the very beginning vaccines were used for preventing many diseases. With our correct food and exercise additionally, we need to take many vaccines especially for children. After reviewing some articles on vaccine this is clear that vaccines are very effective in our body.

INTRODUCTION

English Physician Edward Jenner 1796 first invented the vaccine of Small pox and opened the chapter of immunology. Till now there is no vaccine of AIDS and hepatitis-C. Antibody is produced within the body in two ways—after affecting diseases and through taking vaccine.

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Characteristics of vaccine

- Cheap and will have no side effect;
- Will be active with a little agent;
- Vaccine will be harmful for pathogen but not for the host;
- Vaccine will be active in whole life;
- This will make defense within the body fast;
- If mother will be vaccinated her children will get that preventive power automatically from the mother.

Table 1. Recommended vaccines

Age	Recommended vaccine	Dose
Within one month of birth	Tuberculosis; Polio	0
6 weeks of age	Diphtheria, Partussis, Tetanus; Polio; Hepatitis-B	I
10 weeks of age	Diphtheria, Partussis, Tetanus; Polio; Hepatitis-B	II
14 weeks of age	Diphtheria, Partussis, Tetanus; Polio; Hepatitis-B	III
9 months of age	Measles	I
16-24 months	Diphtheria, Partussis, Tetanus; Polio	Booster dose both
5-6 years	Diphtheria; Tetanus	I
10-16 years	Tetanus Toxoid	I

Source: World Health Organization, 1974

Types of vaccine

Vaccines are drugs used to give people immunity against certain disease. As vaccines contain bacteria and viruses, the immune system can be trained to recognize them and make antibodies against them when exposed naturally without experiencing symptoms of illness or distress [1].

Attenuated (Weakened)/Live/Inactive:

A live attenuated vaccine induces an immune response similar to a natural infection, but the person cannot pass the virus to others and cannot get the disease caused by the virus.

Killed/Dead:

This vaccine does not elicit as strong immune response as live attenuated vaccines. Inactivated vaccines do not provide lifelong immunity and must be replenished over time, but may have fewer side effects than live attenuated vaccines.

Toxoid:

Toxoid vaccine does not provide lifelong immunity and must be replenished overtime. Toxoid vaccine is used to provide immunity against diphtheria and tetanus.

Typhoid/Subunit/Conjugate/Polysaccharide/Edible:

They can create a very strong immune response in the body. This may be suitable for people with weakened immune systems or long-term health problems. Antigens from the surface of bacteria or viruses are responsible for activating immune response in the body [2]. Subunit vaccines are targeted and do not cause many side effects. These sugar molecules are chemically attached to carrier proteins and function in a manner similar to vaccines.

Autogenous:

Vaccines that are prepared by isolation and destruction of microorganisms in infected individuals and used to provide immunity to the same individual [3].

DNA/Recombinant: viral vector vaccines modify another virus and use it as a vector to protect against the targeted virus. Viral vector vaccines use a modified version of another virus as a vector to provide protection. Several viruses have been used a vector including influenza, Vesicular Stomatitis Virus (VSV), measles virus, and the adenovirus that causes the common cold [4,5]. Adenovirus is one of the viral vectors used in some COVID-19 vaccines being studied in clinical trials.

mRNA vaccines:

mRNA vaccines work by inducing an immune response from synthesized proteins. They induce both cellular and humoral immunity [6].

Polyvalent:

A vaccine that immunizes against more than one strain of an antigen [7].

Reassortment: Manufactured by taking advantage of the natural ability of viruses with segmented genomes to reassort when more than one strain is infecting the host cell [8].

Table 2. Types of vaccines and recommendation for such diseases

Vaccines	Characteristics	Recommendation for diseases
Attenuated (Weakened)/Live/Inactive	It could be active anytime	Influenza; polio; measles; mumps; coryza; tuberculosis
Killed/Dead	In emergency; Preserved in 75% alcohol	Plague; rabies (hydrophobia)
Toxoids	Safe vaccine; preserved in formaldehyde	Hydrophibia; diphtheria; pertussis/whooping cough; tetanus
Typhoid/Subunit/Conjugate/Polysaccharide/Edible [9]	Creates prevention within the body; bacteria kill in phenicol (damage bone marrow); longevity 3-5 years; effective 55-75%	Typhoid fever
Autogenous	More or less safe vaccine; bacteria from infected area	Dermatitis; sinusitis; otitis externa; pharyngitis; laryngitis; mastitis
DNA/Recombinant	Safe vaccine; Recombinant vaccine by the use of plasmid	Influenza; hepatitis-B; HIV; rabies; lymphocytic choriomeningitis; malarial parasites;

		mycoplasma
mRNA	Immune response from synthesized proteins	SARS vaccine; COVID vaccine
Polyvalent	This is dangerous vaccine; number of strains of the same virus	Prevent infection by pneumococcal bacteria
Reassortment	This is dangerous; several strains of the same virus	Human and bovine rotaviruses

Source: [10]

CONCLUSIONS

Vaccines have led to the eradication of several diseases in developed countries including polio and measles, but many of these diseases remain endemic in developing countries where vaccines are not available to the poor. Life expectancy has increased from about 47 years in the developed world to 80 years in the last century [11].

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