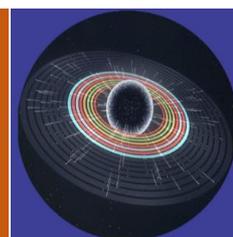


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Editorial

Major Historical Development of Vaccines: a quick View

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Introduction

The development and practical use of vaccines have started a long before in ancient times to cure diseases about 3000 years ago. Historically, evidence suggests the use of smallpox inoculation was primarily used in China about 1000 AD and also practiced in regions of India, Turkey and in the subcontinent of Africa.¹ But, the official birth of vaccinology took place on May 14, 1796, by Edward Jenner. He performed an experiment to immunize a boy against smallpox using cowpox lesions materials and his astonishing results published in 1798 opened new ways of understanding and managing diseases of significant interest to the medical societies worldwide.² Later on, after 80 years of silence, Louis Pasteur propagated the use of the same idea of inoculation to develop different vaccines.

In the last 15 years of the 19th century, the vaccine development by Pasteur made major contribution to resist and fight back against deadly diseases by developing attenuated chicken cholera vaccine (1879), developed live attenuated anthrax (1881) and rabies vaccine (1885).³ The helping hand of Pasteur's works laid the foundation in the development of more live attenuated vaccines in subsequent coming years.

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The 20th century of vaccines development includes the diphtheria toxoid that was developed in 1921 and tetanus that was introduced in 1924; both are incorporated and extensively used in the 1940s. Whole-cell pertussis vaccine that was formaldehyde-treated *B. pertussis* cells was introduced in 1914, while in 1948, whole-cell pertussis vaccine combined with diphtheria and tetanus toxoid (DTP) was developed. Because of the severity of systemic and local reactions, there is a significant reduction in immunization found. So, the replacement of whole-cell pertussis vaccines with acellular pertussis (aP) vaccines in the 1990s done, that was found promising and a new formulation of diphtheria-tetanus-acellular pertussis (DTaP) introduced.⁴

The further development includes was antitoxin to the toxin produced by *Streptococcus pyogenes* causing scarlet fever in 1924 and for tuberculosis (1927), for yellow fever (1936). The development of vaccine taken place against tick-borne encephalitis (1941) and against polio (Salk vaccine) was developed in (1952). The Japanese encephalitis vaccine was prepared in (1954) and for strains of adenovirus-4 and 7 (1957). A disease of family pox virus “chicken pox” was immunized in 1974. The vaccines against pneumonia-causing species, especially against bacteria *Streptococcus pneumoniae*, was developed in 1977 and against meningitis-causing bacteria *Neisseria meningitidis* in 1978. The first vaccine to target the cancer was developed against hepatitis B in 1981. The vaccine against *Hemophilus influenzae* type b (Hib) developed in 1985 The vaccines for Q fever developed in 1989. For hepatitis A, the vaccine was introduced in 1992. The vaccine against varicella was developed in 1995. The vaccine for a spirochete’s disease named as Lyme disease and the first vaccine against the rotavirus was developed in 1998.⁴

In the 21st century, because of the advancement in new technologies and vaccine developing methods especially the applications of genetic engineering and recombinant technology, gene cloning, bacteriophage usage revolutionized the discovery of new vaccines against diseases of significant interest. The first nasal influenza vaccine approved in the U.S. (FluMist) was introduced in 2003 in the USA.⁵ The vaccine against human papillomavirus, which is a cause of cervical cancer developed in 2006. The Influenza virus has many antigenically variable types, interestingly, the first vaccines against quadrivalent (4-strain) of Influenza virus was developed in 2012.⁶ The hand and foot mouth diseases caused by enterovirus 71 tried to tackle by developing a vaccine in 2013.⁷ In 2015, vaccine development against three life-threatening diseases malaria, dengue, and Ebola introduced. The Outbreaks of Ebola virus has significantly affected the public health.⁸ Malaria is affecting from ancient times, while the dengue fever has caused devastating effects in outbreaks. So, the development of the vaccine is a helping hand in controlling these diseases.⁹

So, a continuous and integrated effort needed worldwide to overcome and fight back the violence caused by re-emerging and newly emerging diseases like Tuberculosis, Zika and Ebola virus respectively. Moreover, the combinations of newly discovered compounds in addition to adjuvants are preliminary approaches to look for better therapeutics in the future. The vaccines against diseases like hepatitis C which are not yet being prepared due to microbial significant drifting and shifting mechanisms are still the hot topic in the field of vaccines development.

Author contributions

AAS designed the manuscript. AAS made the literature search and drafted the manuscript. WAS reviewed and edited the manuscript and gave conceptual advice. The final version has been read and approved by all authors.

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Conflict of interest

All authors declare that they have no conflict of interest.

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