Glossary

A basic glossary of vaccinology

Edited by Tom Jefferson

We have prepared a basic glossary to give readers of the *Journal of Epidemiology and Community Health* an understanding of the main terms currently used in vaccinology. Vaccines (products producing active immunity, thereby protecting the body from the disease) have become a major global preventive tool and vaccinology a rapidly expanding branch of science. Inevitably our choice of terms is subjective and many additional terms have been left out because of space constraints. We hope to be able to expand and improve our glossary in future editions and to this end we invite readers to comment on the current version, perhaps using the e-JECH rapid response tool, thus becoming contributors to future versions.

Acellular vaccines: Vaccines composed of purified individual components of the pathogen linked to a mineral carrier. Examples are acellular vaccines against *Bordetella pertussis* infection containing one or more bacterial antigens.

Adjuvants: Substances that, when added to an antigen, enhance immune response. Aluminium salts are the most widely used adjuvants in vaccines and are the only ones registered in the US.

Booster vaccination: Further doses of the vaccine, given after the original (or primary) course to maintain, increase or regain levels of immunity by stimulating immunological memory. Boosting results in a rapid ("secondary") immune response.

Combination (or combined) vaccines: Vaccines administered simultaneously as one preparation to protect against multiple infectious diseases or to prevent morbidity caused by multiple serotypes of the same pathogen. Examples are combined hepatitis A and B vaccines.

Conjugate vaccines: Vaccines containing a covalent bond link between a saccharide (fragment of the capsule of the agent) and a protein (carrier). Conjugation makes it possible to immunise children at an age when they would not be able to mount an adequate response to immunisation with a capsular saccharide alone.

DNA/RNA vaccines: Experimental procedure in which fragments of DNA or RNA encoding genes for key microbial antigens are directly injected into a host leading to the expression of the genes within the host and to a significant immunological response.

Expanded Program of Immunisation (EPI): EPI was established by the World Health Organisation in 1974 with the goal of immunising all children against, measles, tetanus, diphtheria, pertussis, polio and tuberculosis. In many countries other immunisations such as vaccination against hepatitis B have been added to the original programme.

Immunity: The mechanism or state induced by vaccination or natural infection (active protection) or by introduction of foreign antibodies against a pathogen (passive protection). The body's immune system remembers previous encounters with a pathogen and uses antigen specific B cell or T cell memory, or both, to defend itself.

Inactivated vaccine: A vaccine made from viruses or bacteria that have been killed through physical or chemical processes.

Live (attenuated) vaccines: Vaccines in which the virulence (but not immunogenicity) of the wild type organisms is attenuated or neutralised by a variety of methods, including repeated passage in cultures (for example, Bacille Calmette-Guerin) or in hosts (for example, Sabin Polio Type 1 vaccines in non-human primates) or genetic manipulation (for example, *Salmonella typhi* Ty21a).

Live recombinant vaccines (Hybrid live vaccine): Experimental vaccines formed by subunit and live vaccines consisting of a live vaccine strain with a cloned gene from a heterologous pathogen producing a protective antibody response. An example is the expression of a HIV-1 antigen in a recombinant Bacille Calmette-Guerin preparation.

Passive immunity: Protection against disease by a human (or animal) antibody preparation (immunoglobulin). Protection is generally limited and wanes over time. Passive immunity is also conferred by maternal antibodies passing to the fetus before birth.

Recombinant vaccines: Vaccines produced by genetic modification in which DNA sequences are introduced, by plasmids or viral vectors, into a micro-organism or cell line. The introduced DNA translates into antigens of the pathogen, such as HBsAg contained in hepatitis B vaccine.

Split virion vaccines: Vaccines against a viral pathogen in which the viral structure is broken up by a disrupting agent. These vaccines contain both surface and internal antigens. This technique is used in the preparation of some influenza vaccines.

Subunit vaccines: Vaccines against a pathogen consisting of surface antigens only. Examples

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are the influenza subunit virion vaccine containing H and N antigens and pneumococcal subunit vaccine containing capsular polysaccharide antigens.

Surrogate outcomes: The use of outcomes, other than number of cases or complications prevented, to measure the efficacy of a vaccine. For example, a significant rise of antibody titres after immunisation or achievement of a certain serum antibody level (threshold) thought to be protective are surrogate outcomes.

Toxoid vaccines: Vaccines consisting of the inactivated toxin of toxin producing organisms, such as *Clostridium tetani* and *Corynebacterium diphtheriae*. Toxoids are not pathogenic but retain their antigenic properties.

Vaccine: A product that produces active immunity, protecting the body from the disease. Vaccines are currently administered through needle or jet injections, by mouth and by aerosol according to set schedules.

Vaccination: Administration of killed or weakened infectious organisms, or their parts or products, to prevent the disease.

Vaccine efficacy: The ability of the vaccine to prevent cases or complications in a defined population during a defined period in ideal conditions (such as in a randomised controlled trial).

Efficacy is usually calculated from the equation:

$$(1 - \text{relative risk}) \times 100$$

Vaccination efficiency: The ability of a vaccination programme to make best use of scarce resources. Assessment of vaccine efficiency must take into consideration the mixture of costs of setting up the vaccination operation against its benefits compared with an existing intervention or with a do-nothing option.

Vaccine safety surveillance: The monitoring of possible adverse events caused by vaccination. Surveillance can be active (relying on follow up of vaccinated cohorts) or passive (using Vaccine Information Statements, leaflets distributed to the responsible adult each time a vaccine covered by the National Vaccine Injury in the US is administered).

Whole organism vaccines: Vaccines consisting of complete organisms. Bacterial vaccines are called *whole cell* and viral vaccines *whole virion*. Some vaccines against *Bordetella pertussis* are an example of *whole cell* vaccines, and some influenza vaccines of *whole virion* vaccines.

The editor would gratefully receive constructive suggestions to improve the content and layout of the glossary. Readers are invited to comment using the *e*-JECH rapid response tool.

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Further reading

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EMEA's web site and glossary: www.eudra.org