Immunology of vaccination
Principles of Vaccination

Prevention of Vaccine-Preventable Diseases
Principles of Vaccination

Immunity
• Self vs. nonself
• Protection from infectious disease
• Usually indicated by the presence of antibody
• Very specific to a single organism
IMMUNIZATION - VACCINATION....A LONG STORY

One of the most effective «weapons» in medicine

10th century in Central Asia Smallpox ➔ Africa - Europe

1798 Edward Jenner immunizes first time against smallpox

1885 Louis Pasteur prepares the 1st vaccine against Rabies

1927 BCG (bacillus Galmette-Guerin)

1955 Salk vaccine against poliomyelitis

1960 MMR.....

HPV vaccine
Principles of Vaccination

Antigen
• A live or inactivated substance (e.g., protein, polysaccharide) capable of producing an immune response

Antibody
• Protein molecules (immunoglobulin) produced by B lymphocytes to help eliminate an antigen
immunization

• prevent or lessen the serious symptoms of disease

• by blocking the spread of a bacterium, bacterial toxin, virus, or other microbe to its target organ

• or by acting rapidly at the site of infection.
Way to get immunised

actively

Aktívna imunita

Pasívna imunita

passively

transplacentarly

Naturally

vaccination

immunisation

immunotherapy

immune sera

Artificially
Live Attenuated Vaccines

• Severe reactions possible

• Interference from circulating antibody

• Fragile – must be stored and handled carefully
Pure Polysaccharide Vaccines

• Not consistently immunogenic in children younger than 2 years of age
• No booster response
• Antibody with less functional activity
• Immunogenicity improved by conjugation
Fases of new vaccines development – laboratory, preclinical
Field, clinical study

Po udelení štandardnej licencie, prebieha testovanie jej bezpečnosti a účinnosti v niektorých fázach s presne stanovenými podmienkami.
Meningitis – Hib, 
Streptococcus, Neisseria

• HiB – polysaccharide-protein conjugate vaccine. (inactivated 
etanospasmin, diphteria protein, and meningococcal group B outer 
membrane protein.)
Measels
Poliomyelitis
Iron lung – after poliomyelitis
Jenner, Variolisation, Ramses, eradication
Decrease of morbidity for DTP after introduction of DTP vaccination
INCIDENCE of Hib MENINGITIS - decrease influenced by the amount of applied vaccines
Antivaccination activity

• Vaccination mostly in child population
• very sensitive topic, period of discovery of many diseases and handicapes in children
• demagogical arguments,
• not causal connection,
• medialisation, not medically graduated people, usually educated in other vague topics – ecology, homeopathy.....
• Dangerous – more people affected by vaccination preventable diseases in USA and Germany then for bioterroristic threat