

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 Rabbits

1927 BCG (bacillus Galmette-Guerin)

1955 Salk vaccine against poliomyelitis

1960 MMR.....

HPV vaccine



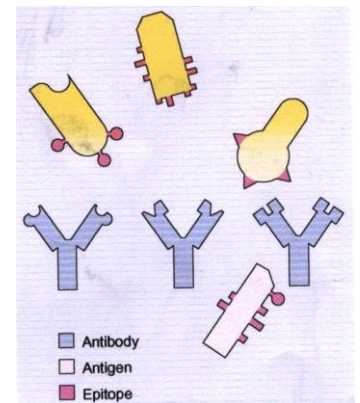
Principles of Vaccination

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

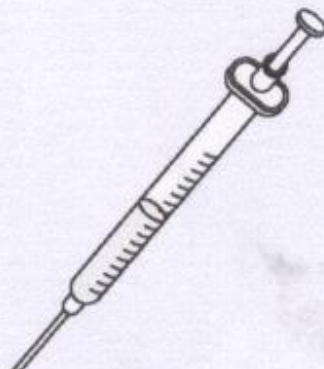
disease



transplacentarily

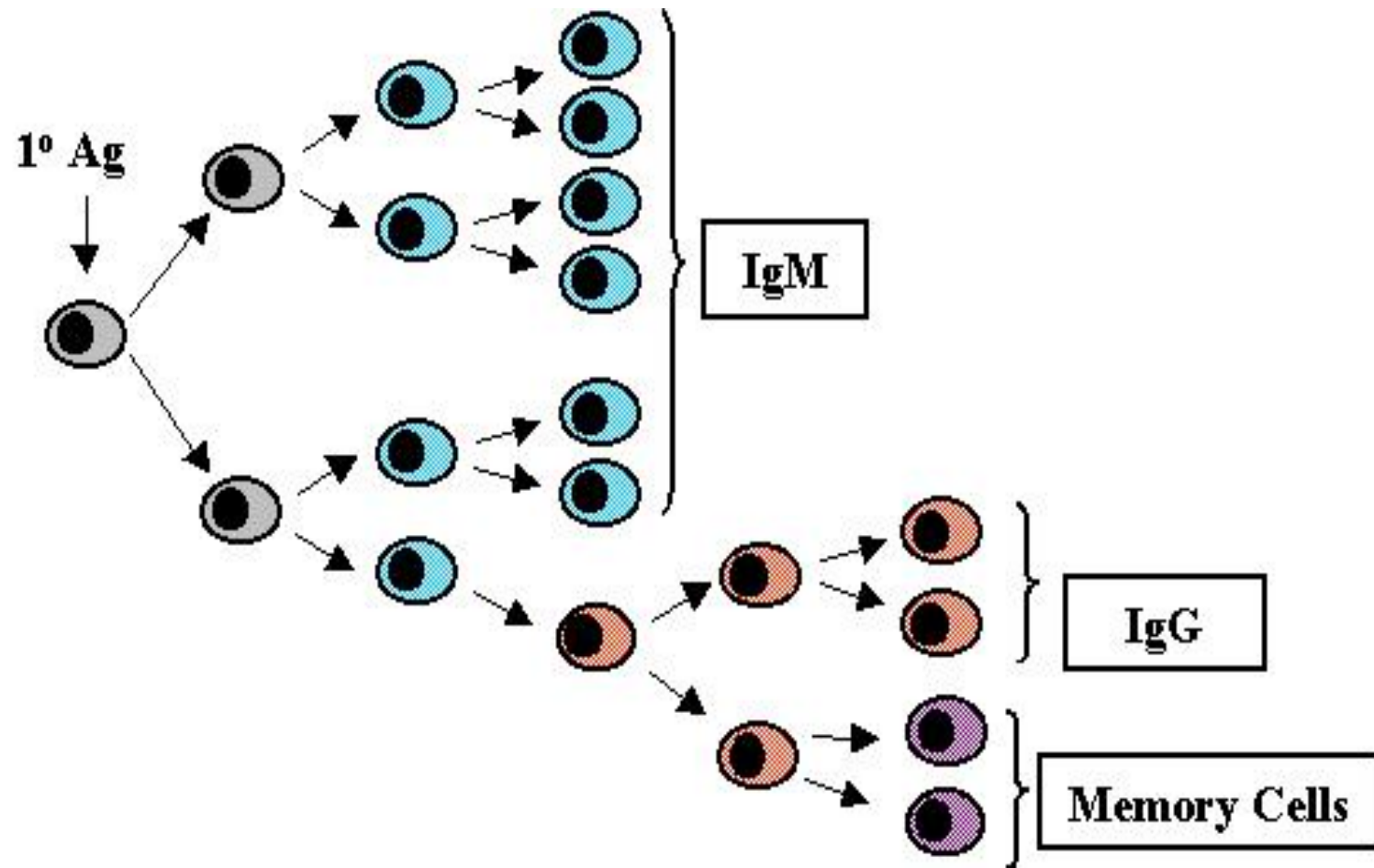
Naturally

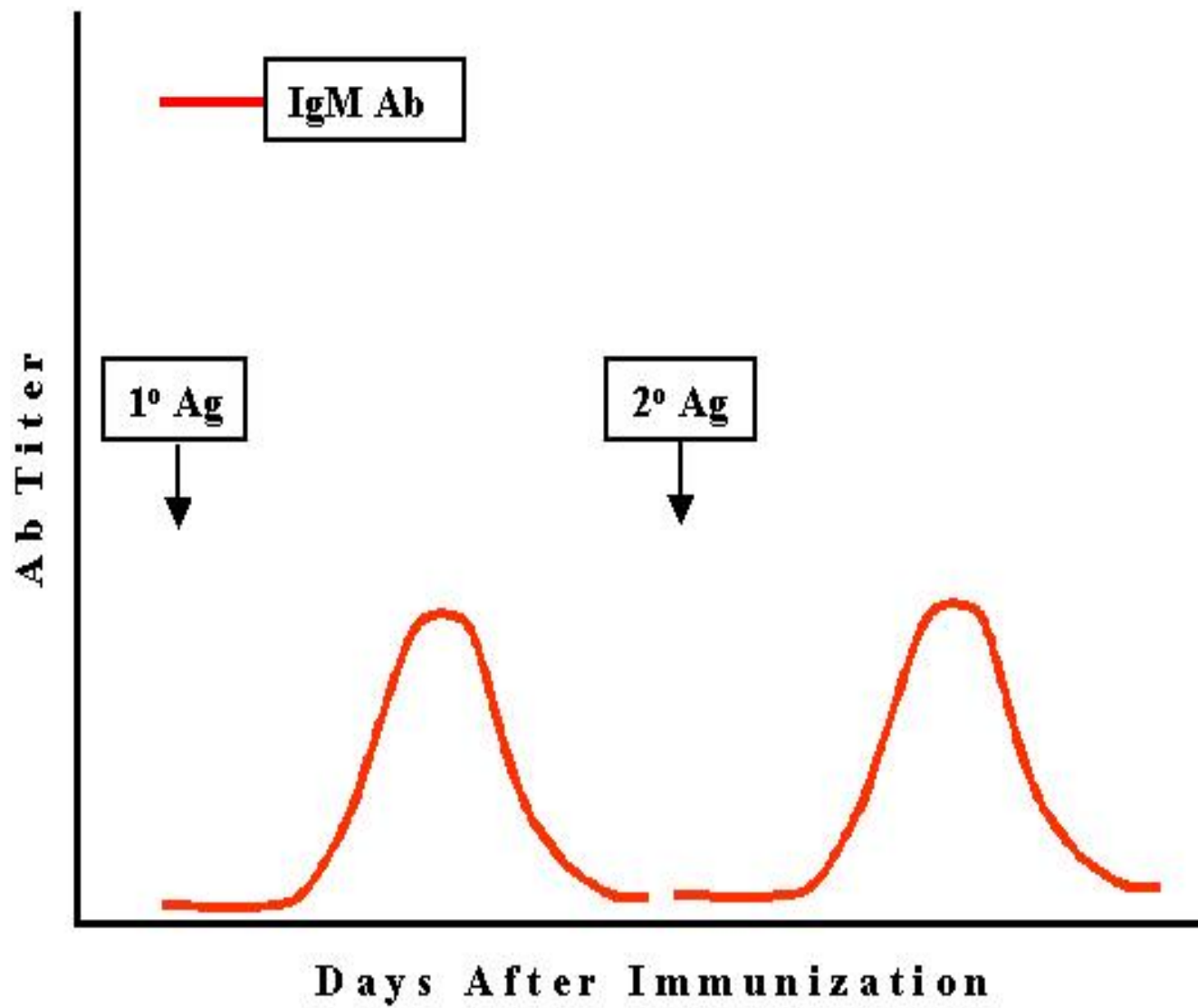
vaccination

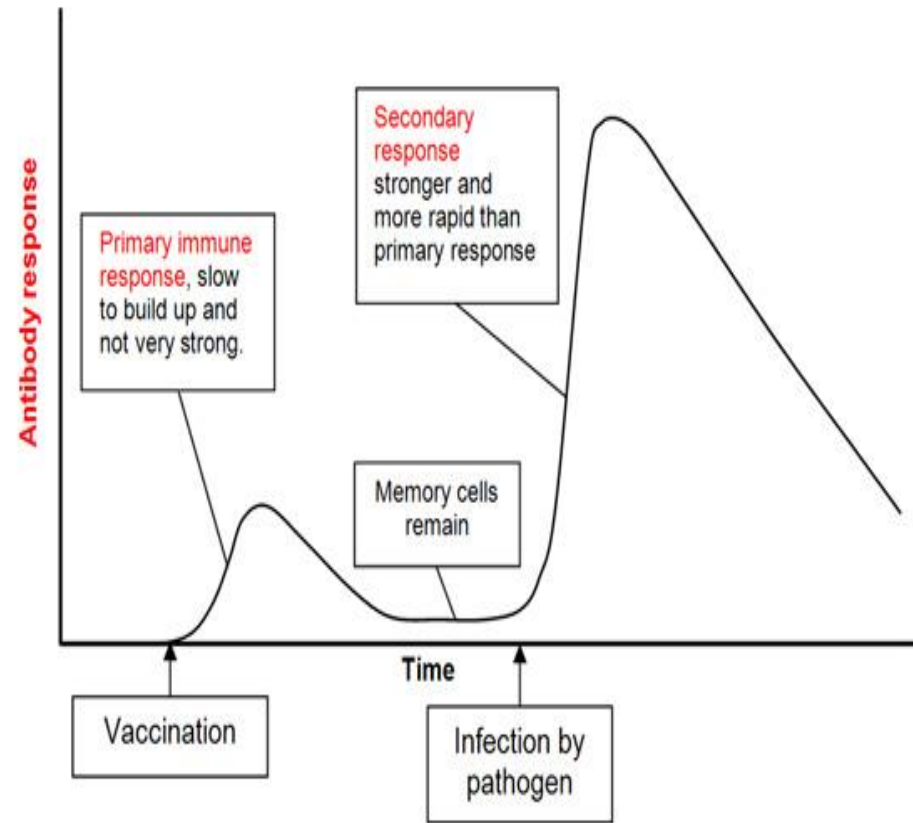
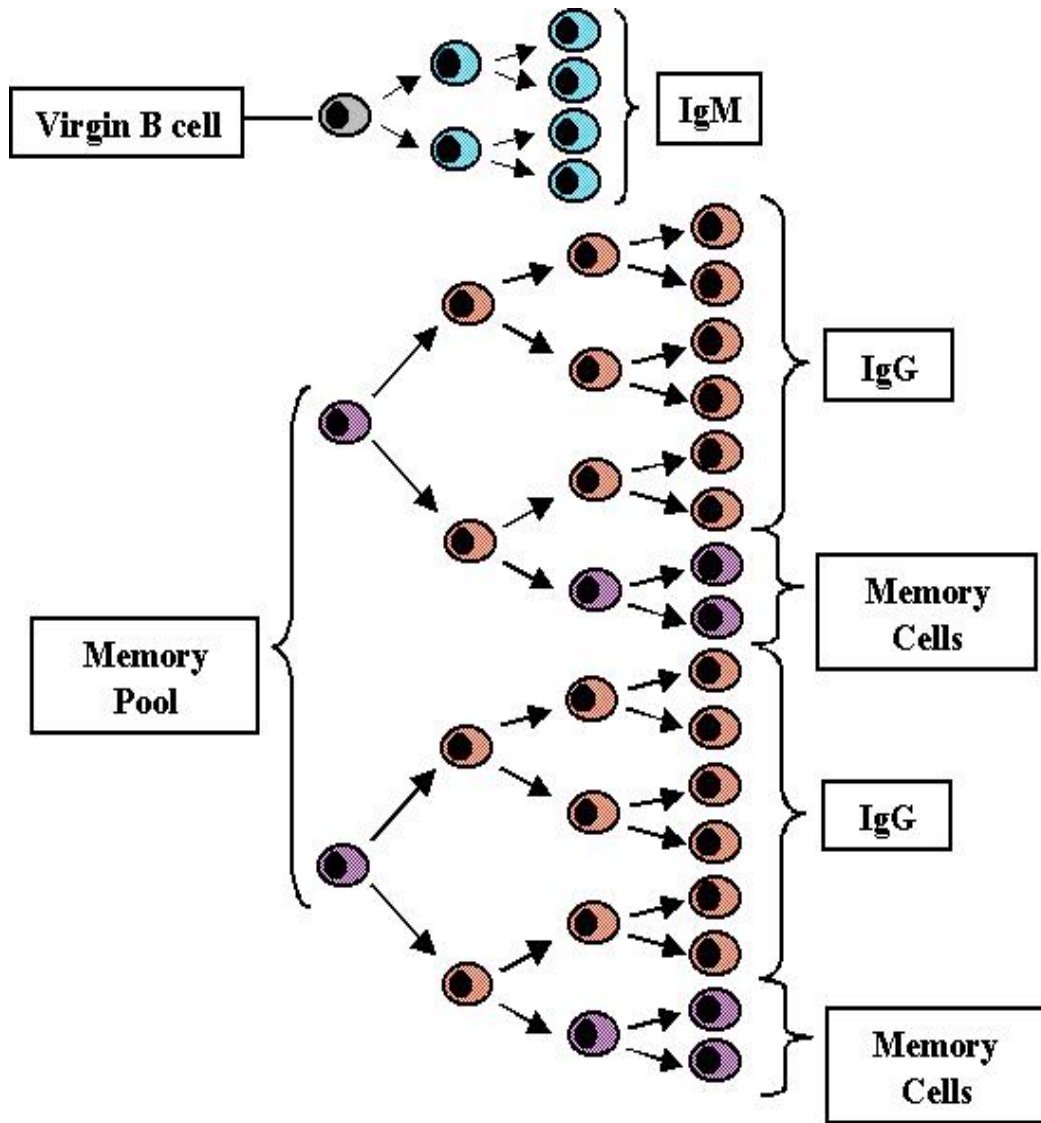


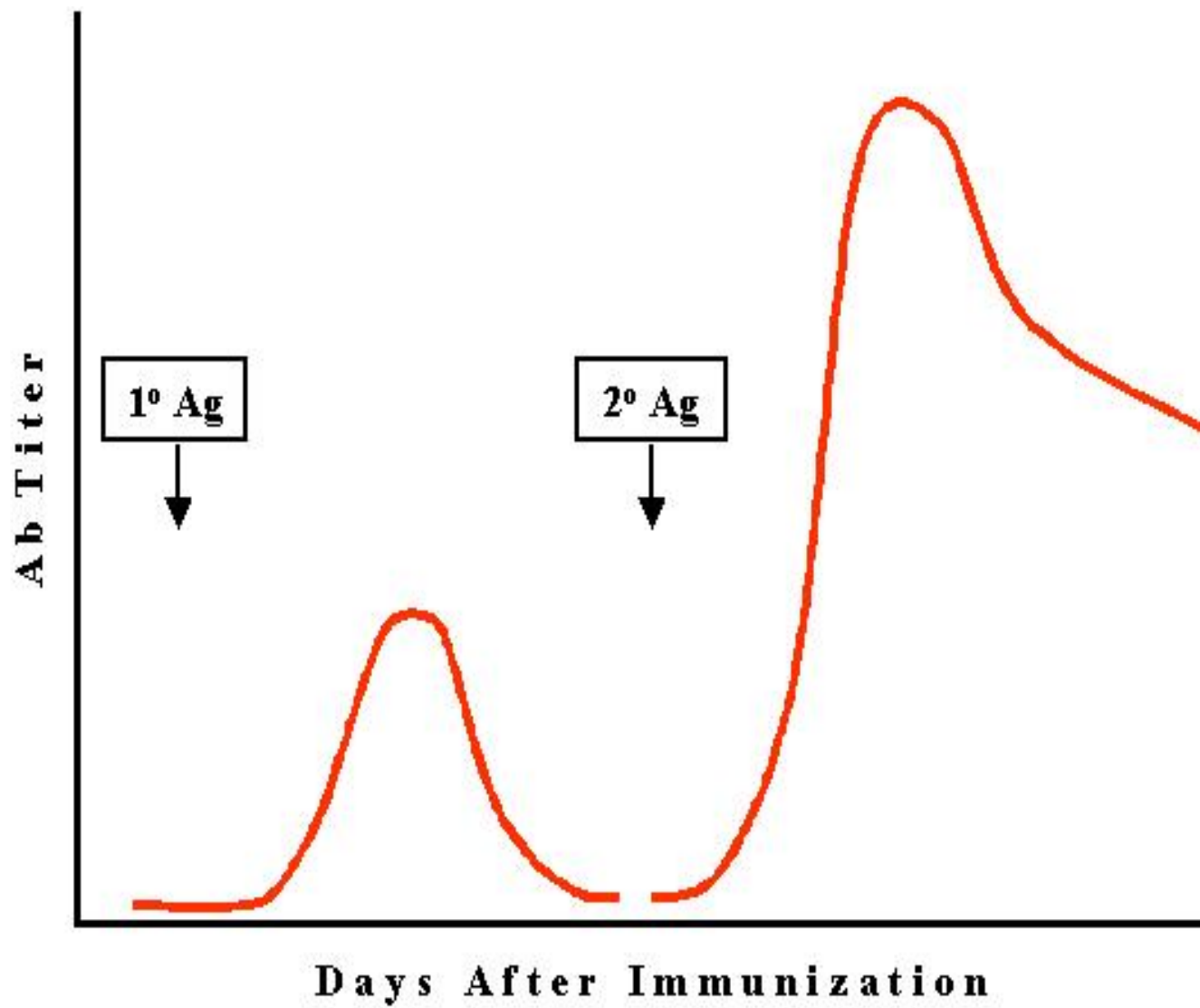
immunisation
immunotherapy
immune sera

Artificially









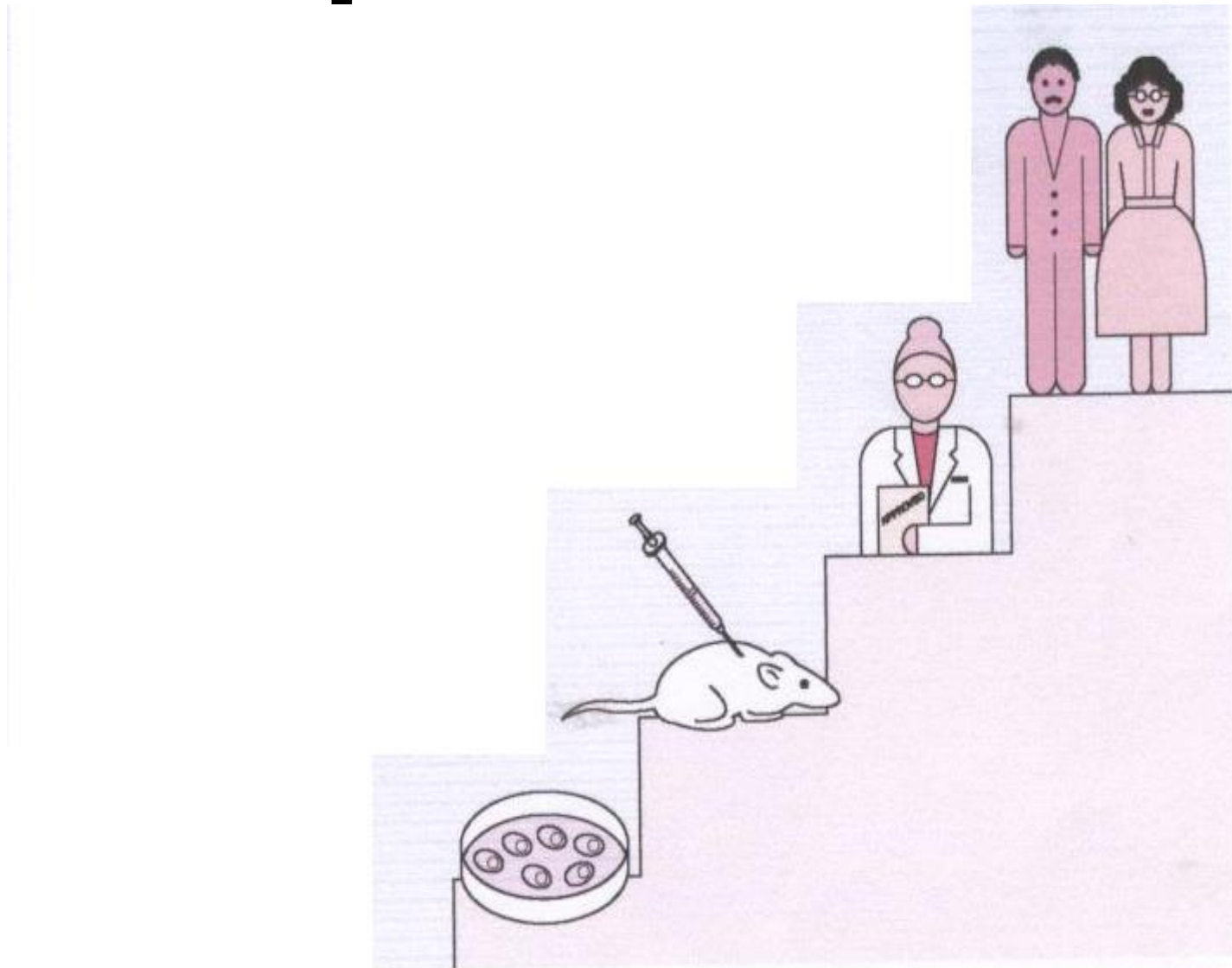
Live Attenuated Vaccines

- **Severe reactions possible**
- **Interference from circulating antibody**
- **Fragile – must be stored and handled carefully**

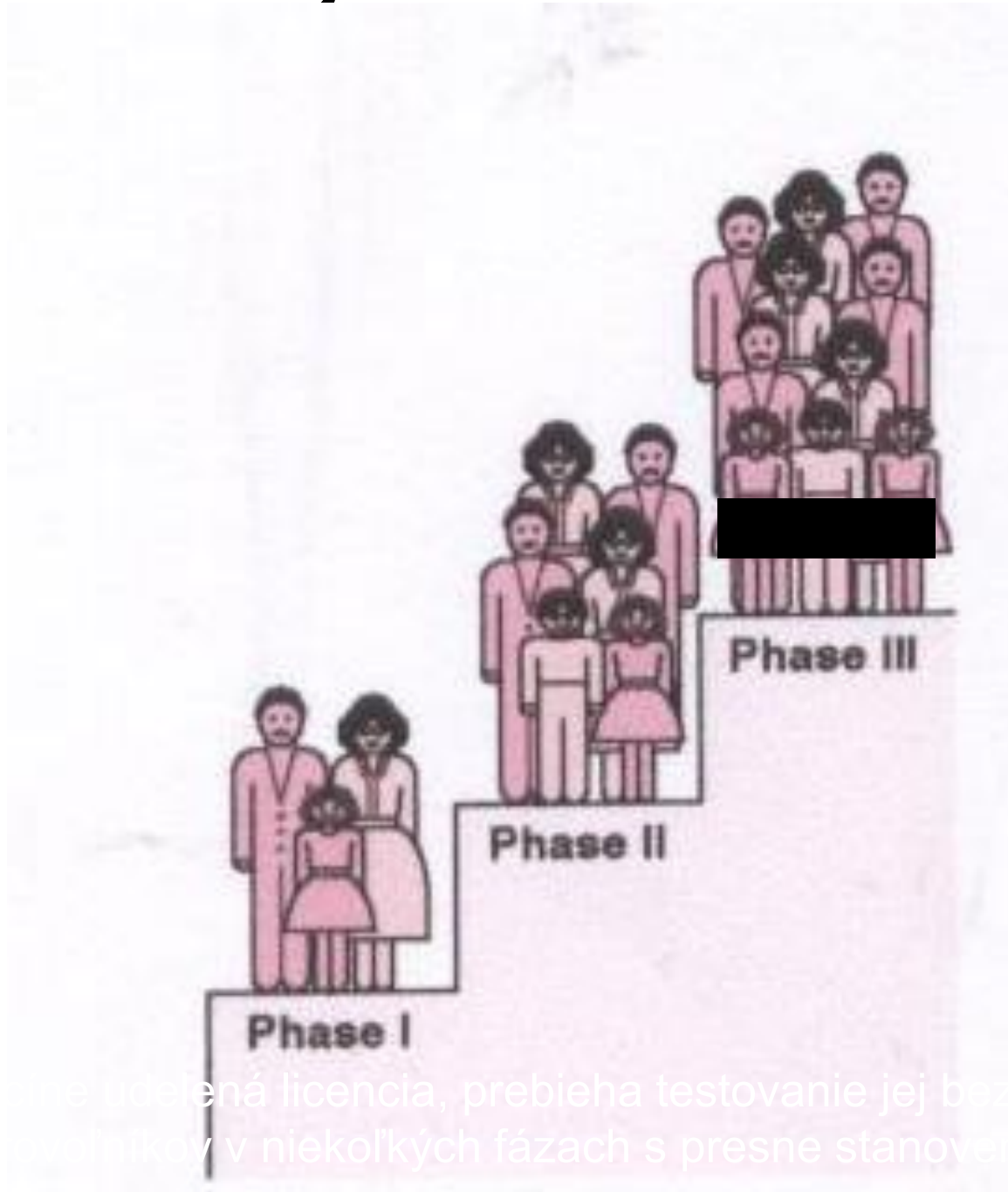
Pure Polysaccharide Vaccines

- **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



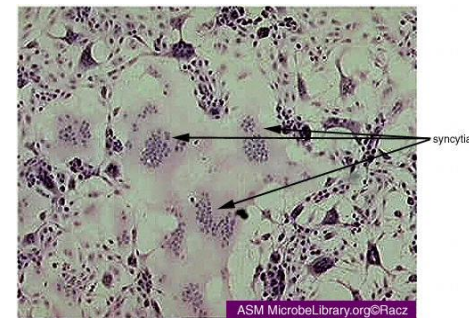
Meningitis – Hib, Streptococcus, Neisseria

- **HiB – polysaccharide-protein conjugate vaccine.** (inactivated tetanospasmin, diphtheria protein, and meningococcal group B outer membrane protein.





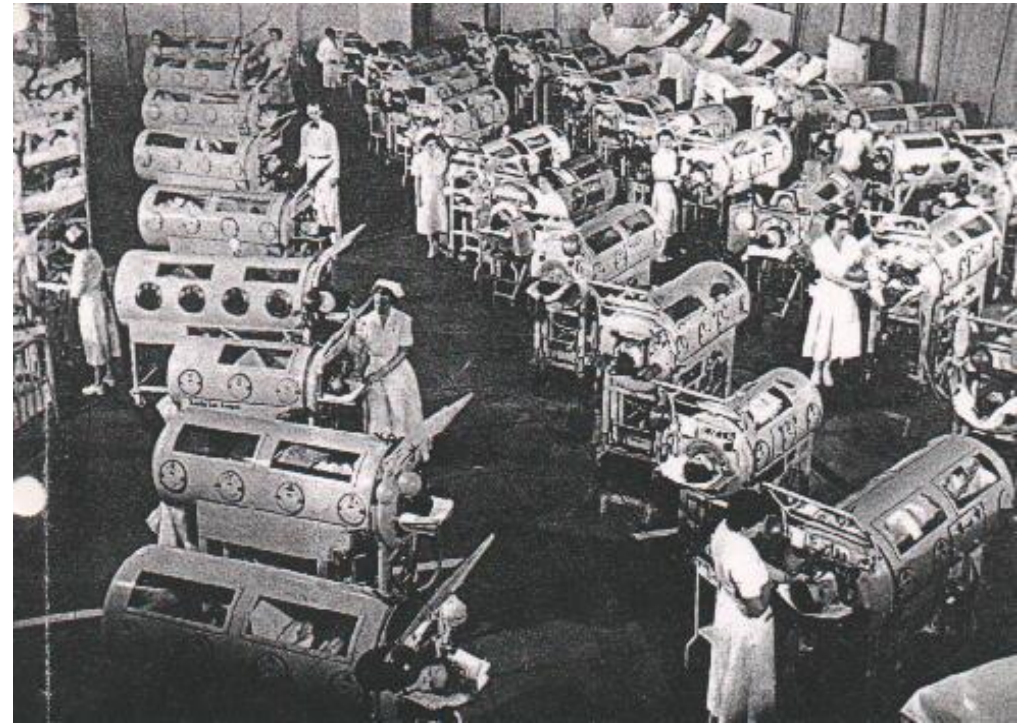
Measels



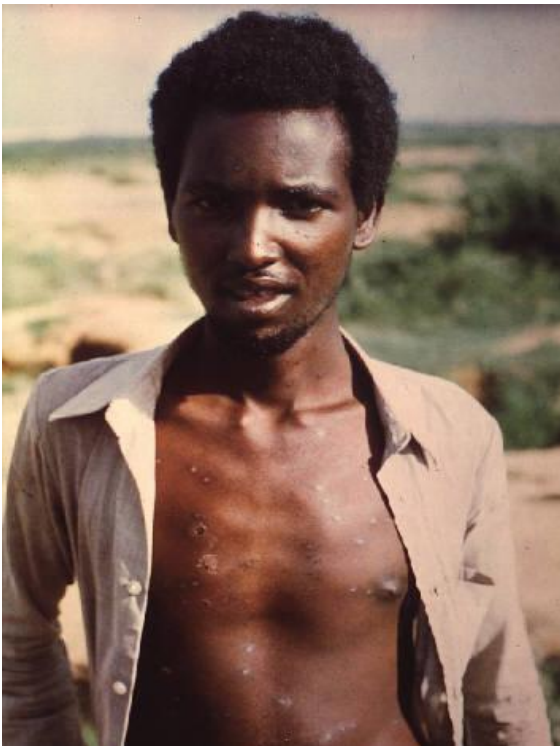
Poliomyelitis



Iron lung – after poliomyelitis

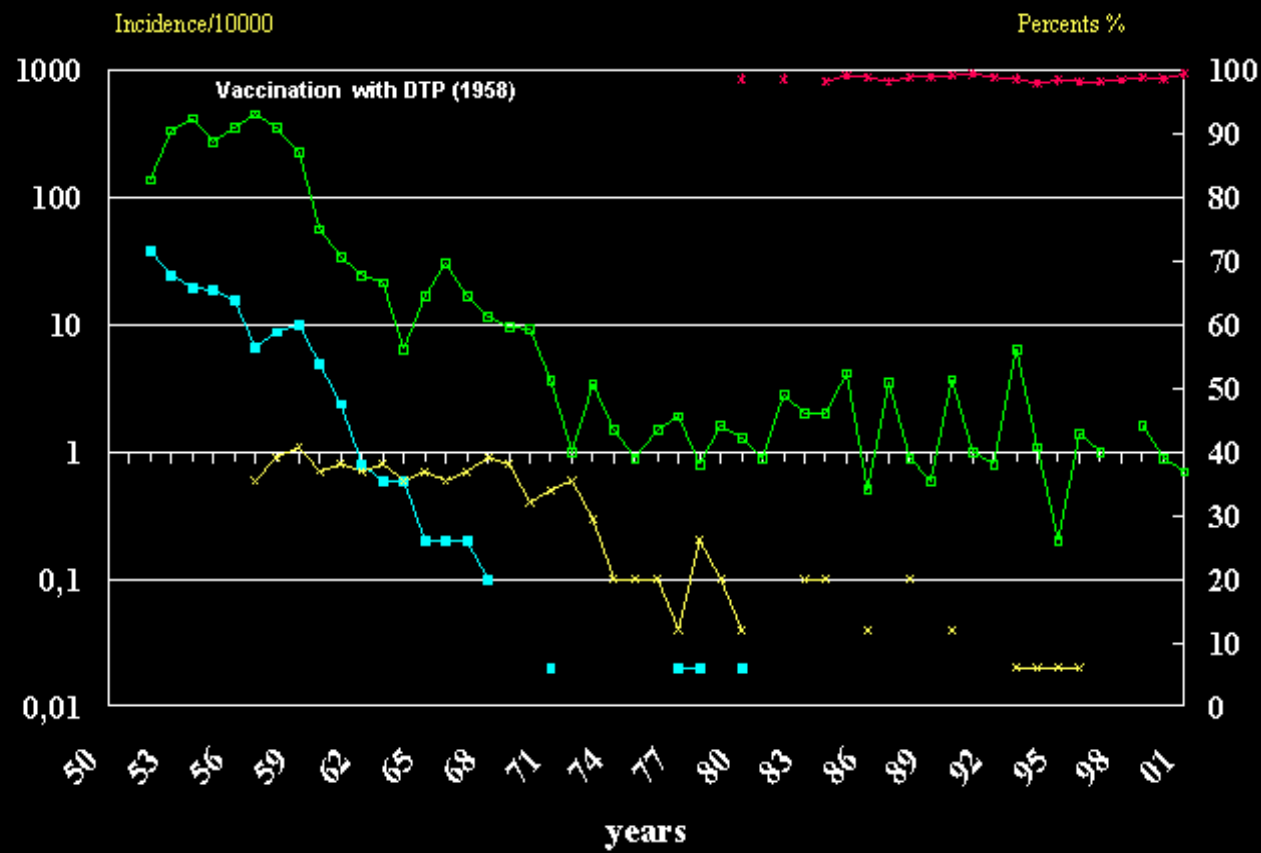


Jenner, Variolisation, Ramses, eradication



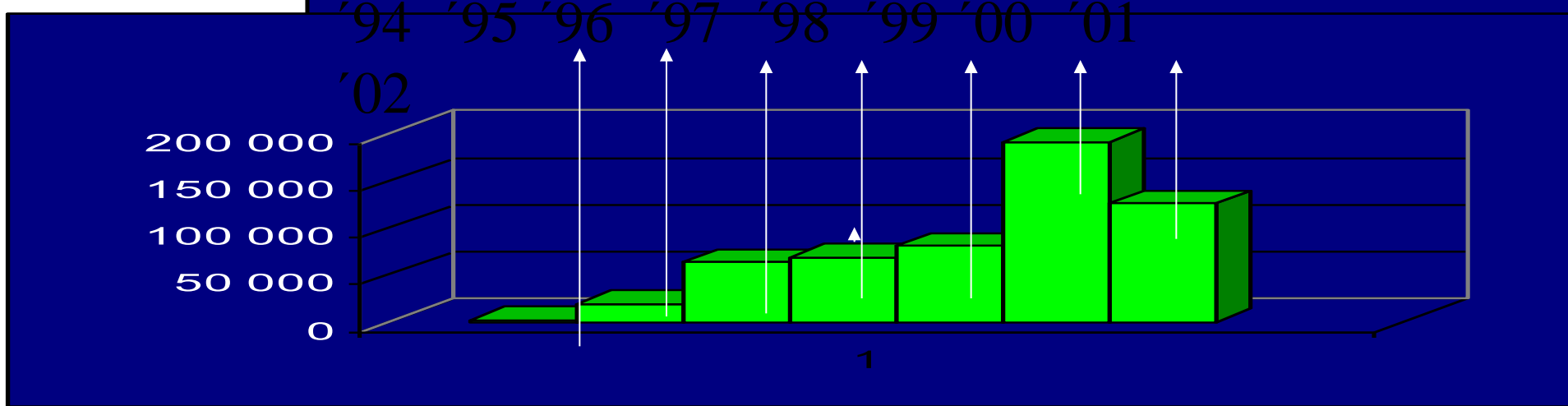
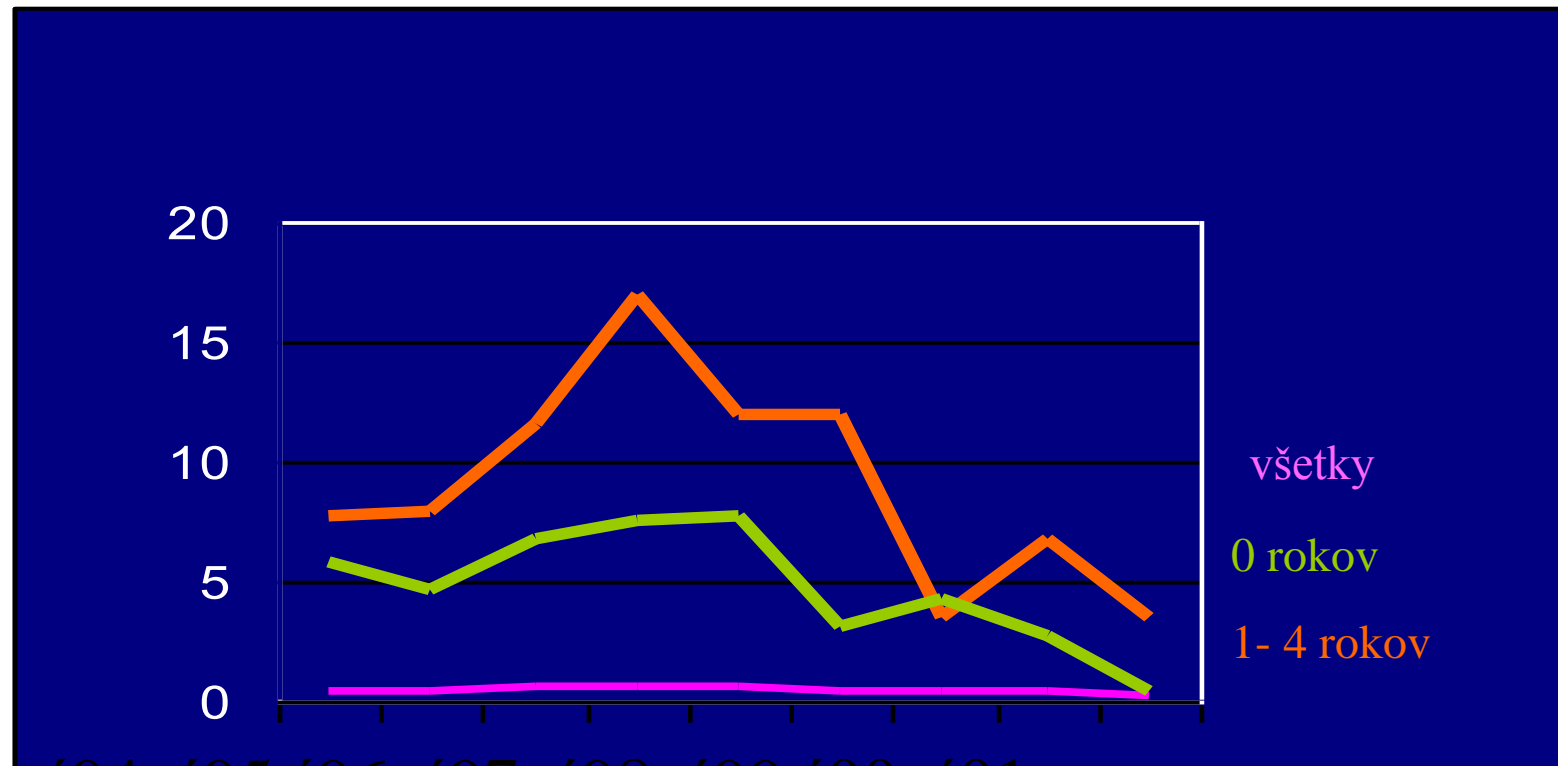
Decrease of morbidity for DTP after introduction of DTP vaccination

Incidence of diphtheria, tetanus and pertussis in Slovak republic in 1952-2001



—x— immunised % —■— Diphtheria —x— Tetanus —■— Pertussis

INCIDENCE of Hib MENINGITIS - decrease influenced by the amount of applicated 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**