

VACCINATION AND A ROLE OF THE PHARMACISTS

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Lecture content



- Definition of terms
- History of vaccination
- Vaccines – types, composition
- Application of vaccines
- Vaccination calendar
- Selected Diseases
- Recommendation
- The Future of Vaccination

Vaccination and Immunization



- Vaccination - the process of introducing the vaccine antigen into the body

- Immunization - creating a specific immune response

Types of vaccines



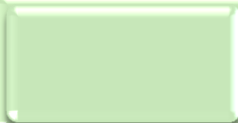
Attenuated



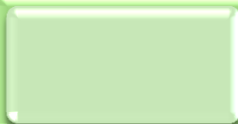
Inactivated



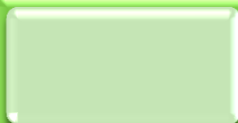
Subunit and split



Conjugated



Toxoid



Recombinant

Types of vaccines (2)

- **Monovalent**
 - against one serotype (Engerix B)
- **Polyvalent**
 - against multiple serotypes of the same species (Pneumo 23, Prevenar 13)

- **Combination vaccines**
 - They contain antigens against 2 or more different infections

Vaccination patterns and immune response

□ Basic

- conventional
- accelerated

□ Vaccination Immune reaction

- 1 dose - attenuated vaccines
- 2 and more doses - toxoid, inactivated, recombinant

The right vaccination technique

Cool Chain

Optical control before application

Suitable place and method of application

Disinfection of the injection site

Suitable needle

Supervision 30min after vaccination

Distance from the next vaccination

Combination of vaccines

Combination of vaccines	Minimum distance between the dosages
2 and more non-viable vaccines	None
Non-viable and viable vaccines	None
2 and more viable vaccines	4 weeks

The vaccines are not mixed in one syringe

Different vaccines are applied at different sites
(eg left and right delta muscles)

Primary side effects

□ Local

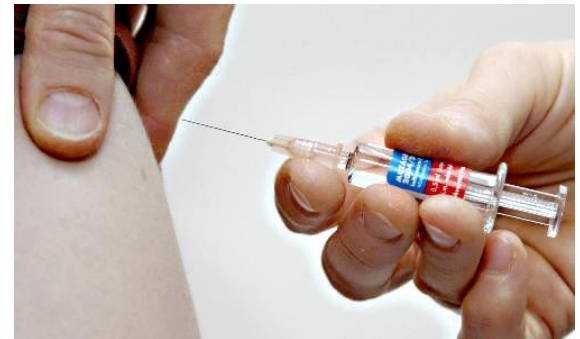
- Redness
- Edema
- Pain

□ Overall

- Elevated temperature
- Fatigue
- Muscle and joint pain

□ Severe side effects

- Allergic reactions - Quincke's edema
- Neurological reactions - encephalopathy, febrile convulsions, neuritis, poliomyelitis



Secondary side effects

- Allergic reaction to egg proteins (vaccines originate from chicken embryos)
 - Influenza vaccine Yellow fever vaccine
- Allergic reaction to antibiotics contained in the vaccine

Contraindication

- Absolute
- Relative
- In general
 - Severe reaction after previous dose
 - Acute disease with moderate to severe course
- Viable vaccines
 - NO - pregnant, onco, immunosupres
- Non-viable vaccines
 - YES – during/after light infections

Vaccination in pregnancy and lactation

- After the first trimester
 - non-viable vaccines, it is safe
- Viable (attenuated) vaccines are contraindicated - fetal lesion and damage
- Lactation is not a contraindication for vaccination



Vaccination of immunocompromised patients

- Individual benefit and risk assessment
- Apply inactivated vaccines
- Verify immune response - possibility of lower immune response
- Viable vaccines are contraindicated

Routine immunization



- Tetanus, diphtheria, coughing cough, Hib infection
- Hepatitis B
- Poliomyelitis
- Measles, rubella, mumps

- Tbc

Vaccination calendar

- Current version according to Decree of the Ministry of Health No. 299/2010
- Rejection of vaccination - misdemeanor
- Vaccination of newborns against Tbc only in indicated cases (tbc in the family, stay in countries with increased incidence of tbc ...)
- Deployment of the primary vaccination - from the child's 9th week
- Introduction of other types of volunteer vaccination

Diphtheria

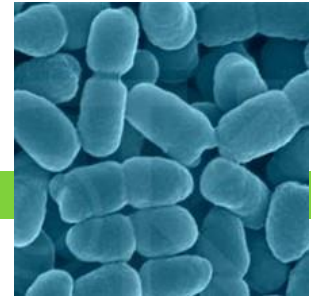


- Origin: *Corynebacterium diphtheriae*
- Symptoms: fever, dizziness, dyspnoea, swallowing disorder, (death), later complications - polyneuritis, myocarditis, nephritis
- Vaccination: Diphtheria anatoxin
 - Combined vaccines DTaP, Boostrix
 - Combination Hexavaccine Infanrix Hexa (at 9th week 0M-1M-2M, up to 18 months of booster age at 5 years of DTaP)
 - Pediacel Pentaxac (without HBV)

KI –epilepsie

i.m.

Coughing cough

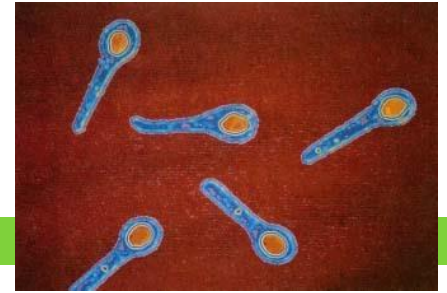


- ❑ Origin: *Bordetella pertussis*
- ❑ Symptoms: fever, irritable cough - early, seizure, fatigue, exhaustion
- ❑ Vaccination: acellular pertussis antigens (pertussis anatoxin, filamentous haemagglutinin, pertactin) - losing action, resistant strains
- ❑ Whole cell vaccine - past use, more AD, better efficacy?
- ❑ Infanrix Hexa 0M-1M-2M-8M-booster 5th year
- ❑ Boostrix Vaccination in adolescents?



KI –epilepsie

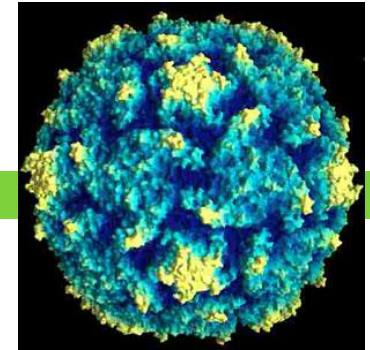
Tetanus



- ❑ Origin: *Clostridium tetani* - production of tetanospasmin
- ❑ Symptoms: trismus, risus sardonius, stiff neck, opisthotonus, muscle spasm, hyperthermia, death
- ❑ Vaccination: tetanus anatoxin - monovalent Tetavax
- ❑ Combined Infanrix Hexa vaccine (Week 9 0M-1M-2M + booster), DTaP at 5 years
- ❑ At the age of 14, monovalent tetanus toxoid, after 10-15 years of single dose booster
- ❑ Even in pregnancy



Poliomyelitis

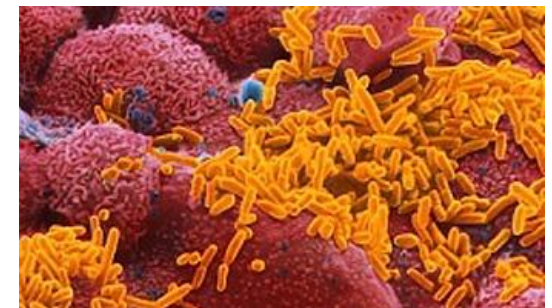


- Origin: Enterovirus viruses
- Symptoms: 1st stage fever, 2nd phase CNS, DK palsy, urinary disorder and defecation
- Vaccination: trivalent inactivated Imovax (IPV) *i.m.*
- Attenuated trivalent vaccine Polio Sabin (OPV) part of hexavaccine Infanrix Hexa (IPV) *p.o.*

KI (pro OPV) – imunodefekty,
epilepsie, HIV,

Invasive haemophilus disease

- Origin: Haemophilus influenzae B
- Symptoms: Disability of children up to 5 years, symptoms of meningitis, convulsions, unconsciousness, death
- Vaccination:
 - Conjugated polysaccharide vaccine component of Infanrix Hexa
 - Monovalent Act-Hib vaccine
- Vaccination in the Czech Republic
 - in 2001



Mumps

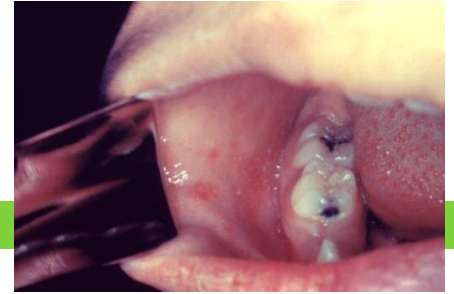


- ❑ Origin: Rubulavirus viruses
- ❑ Symptoms: fatigue, subfebrilia, swelling of the parotid gland, benign course, infection in men - orchitis (up to 25%)
- ❑ Vaccination: monovalent attenuated Pavivac 2 dose (after 15 months of age 0D -6M to 8M)
Trivivac, Priorix (mumps, measles, rubella) 3 doses (after 15 months of age 0D -6M to 8M)
- ❑ Tetravaccine Priorix-Tetra (with varicella)

KI – onko, TBC, imunosuprese, neuro,
gravidita



Measles



- Origin: virus from the genus Morbillivirus
- High virulence
- Symptoms: fever, cough, conjunctivitis, later Koplikov's spots, rash, complications - encephalitis
- Vaccination: Attenuated monovacin Trivivac 2 doses (after 15 months of age 0D -6M to 8M)

KI – onko, TBC, imunosuprese, neuro,
gravidita

S.C.

Rubella

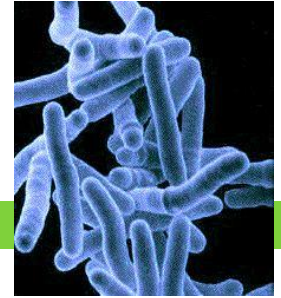


- Origin: virus of the genus Rubellavirus
- Symptoms: non-itching rash on the face and torso, enlarged nodules
- Pregnancy and rubella - placental penetration of the virus, risk of fetal damage (deafness, blindness, heart defects)
- Vaccination: attenuated vaccine part of Trivivac
 - 2 doses (after 15 months of age 0D -6M to 8M)

KI – onko, TBC, imunosuprese, neuro,
gravidita

S.C.

Tbc



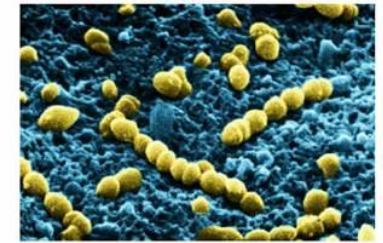
- Origin: Mycobacterium tuberculosis
- Symptoms: Slow developing illness, subfebrilia, fatigue, dry cough, later lung, bone, brain
- Therapy: antituberculotics
- Vaccination: attenuated viable M. bovis BCG vaccine, single dose, vaccinated after hexavaccine administration and tuberculin test at 11-12. age of the child
- The interval of the next vaccination is 8 weeks

KI – AIDS, imunodefekt, TBC,
imunosuprese, gravidita

i.d.

Invasive pneumococcal infection

- Origin: *Streptococcus pneumoniae*
- Symptoms: acute otitis, sinusitis
- Vaccination:
 - Polysaccharide 23valent Pneumo 23 vaccine (2 years of age) 1 dose, booster for 3-5 years
 - Polysaccharide conjugate 13-valent vaccine Prevenar13 (up to 2 years of age) dosing of 2 doses 0M-2M + booster, for children aged 2-6 months 3 doses



Recommended vaccination

- Pneumococcus
- Tick-borne encephalitis
- Flu
- Hepatitis A, B
- Meningococcal meningitis
- HPV
- Poliomyelitis
- Rabies
- Cholera
- Japanese encephalitis
- Plague
- Typhoid

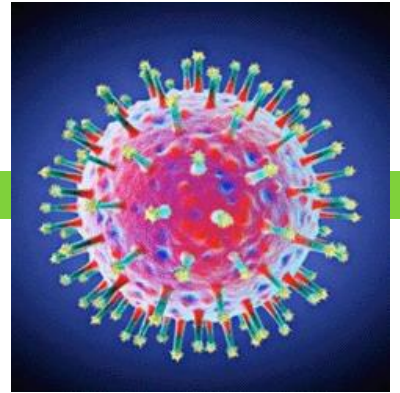
Tick-borne encephalitis

i.m.

- Flaviviral infection
- Transmission of ticks (up to 2% of infected ticks in infested areas)
- Stage 1 of muscular pain, fever, 2nd phase of CNS involvement, polio limbs
- Vaccination with inactivated vaccine FSME Immun, Encepur Basic vaccination scheme 3 doses 0 ... 3M ... 9-12M
- Accelerated Diagram 0-7D-21D ... 9-12M
- Protection period 3-5 years



Flu



- Influenza Virus A, B, C
- Surface glycoprotein antigens haemagglutinins (16 types) neuraminidases (9 types)
- Symptoms: high fever, muscle and joint pain, later complications - bacterial superinfection
- Seasonal character

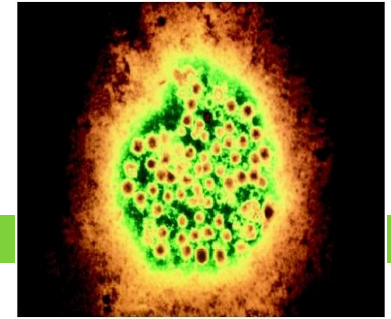
Vaccination against seasonal influenza

- Split Vaccine - Contains fractionated virions without reactive lipids
 - Vaxigrip, Begrivac, IDflu - intradermal application
- Subunit vaccine - contains only haemagglutinins and neuraminidases
 - Influvac, Fluad
- The immunogenicity of the vaccines is the same
 - Increase of immunogenicity by addition of adjuvant - Fluad

i.d.

i.m.

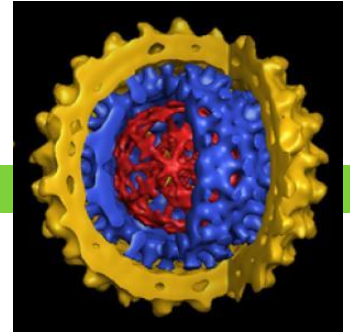
Hepatitis A



- Increasing incidence in children's collectives
- Orally faecal transmission
- Diseases mostly without permanent consequences
- Monovalent vaccine Havrix, Havrix junior, Avaxim
- Basic dose schedule 2 0 ... 6-18M (possibly booster after 5 years)
- The protect is already in 15 days after 1st dose
- Protection period 20 to 30 years



Hepatitis B



- Acute viral inflammation of the liver
- Transfer of infection by blood, sexual intercourse
- The possibility of chronic course (cirrhosis, liver cancer)
- Since 2001, the nationwide vaccination of children (12th)
- Part of Infanrix Hexa 3-4 doses
- Monovalent Engerix vaccine
- Basic dose schedule 3 0 ... 1M ... 6M
- Duration of protection 20 years (permanent? Booster after 10-15 years?)



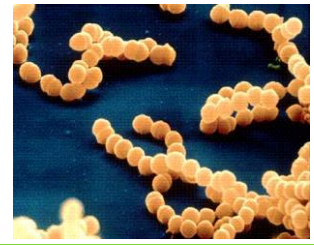
Combinant vaccine Twinrix

- Against hepatitis A and B
- Combined inactivated and recombinant vaccine
Twinrix Adult, Twinrix Junior
- Basic dose schedule 3 0 ... 1M ... 6M
- (Accelerated Diagram 0 ... 7D ... 21D ... 12M)
- Suitable for all travelers, health professionals
- VHA / HBV most commonly imported infectious diseases



i.m.

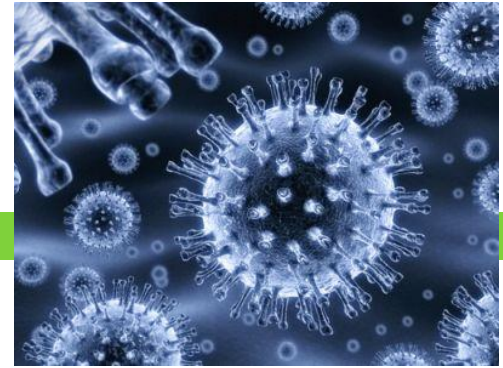
Meningococcal meningitis



- Origin: *Neisseria meningitidis* (strains A, B, C, Y, W135)
- Transfer by droplet method, the highest occurrence of strains B and C in the Czech Republic
- Symptoms: fever, inflammation of the brain, sepsis (up to 10% fatal course) Children up to 4 years, youth 15-20 years
- Vaccination:
 - conjugated polysaccharide vaccines NeisVac Cuc, Menjugate inj, type C (for children under 11 years of age)
 - polysaccharide vaccine Meningococcal A + C Menveo tetravachin, Nimenrix - (pilgrims to Mecca, children from 11)
- Basic vaccination schedule 1 dose, after 5 years of booster Protection period 3/10 years
- Bexsero vaccine - meningitis B, 4 antigens, made by reverse vaccination 5 doses

i.m.

HPV

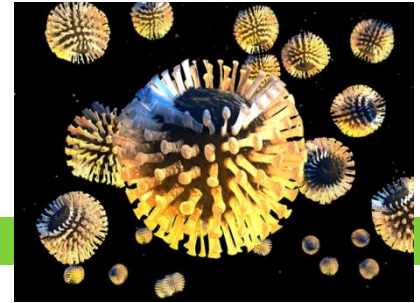


- Origin: DNA papillomaviruses
- Symptoms: warts on the skin, condylomata around the rectum and genitalia, cervical cancer infestation, precancerosis, carcinoma
- Vaccination:
 - Tetravalent recombinant Silgard vaccine (types 6, 11, 16, 18)
 - Bivalent recombinant Cervarix vaccine (types 16, 18) with AS04
 - Gardasil 9 - 9-component vaccine In addition, 31, 33, 45, 52, 58 Dosage of 3 doses of 0M-1M-6M

i.m.

KI – onko, imunosuprese, gravidita

Rotavirus infections



- Origin: RNA viruses of the genus Rotavirus
- Symptoms: diarrhea in children from 6 months to 5 years, fever up to 40 ° C, vomiting, lactose malabsorption
- Vaccination:
 - live human bovine pentavalent Rotateq p.o. dosing in 3 doses of 0M-1M-2M
 - Attenuated monovalent Rotarix p.o. dosing at 2 doses from 6-week 0M-1M

p.o.

Chickenpox



- ❑ Origin: Varicella virus (varicella-zoster virus)
- ❑ Symptoms: After about 15 days of exanthema shedding, itching papules, pustules, vesicles, elevated temperature, fatigue, secondary rash infection
- ❑ In the case of pregnant women the damage of the fetus in I. and III. quarter
- ❑ Vaccination: Varilrix attenuated monovalent vaccine, dose 1 dose for children from six to 12 years, older 2 doses 0T-6T
- ❑ The Priorix-Tetra combination vaccine

KI – onko, gravidita



Recommendations for parents of vaccinated children

- Monitor your child's health for at least 3 days prior to vaccination (elevated temperature, cough, rash, allergy, insect bites, headaches and other pain, diarrhea, loss of appetite, change in child behavior, etc.)
- Monitor the baby's sleep before the day of vaccination

Before vaccination

Recommendations for parents of vaccinated children

After vaccination

- Save yourselves for 2 to 7 days depending on the type of screening. (limitation of physical stress, sun and other stress situations, etc.)
- The light local reaction in the injection site (swelling, redness, pain, etc.) is not dangerous, but leaves itself spontaneously.


Treatment of adverse effects of vaccination



- Fever - Administration of antipyretics
- Local reactions - cooling tiles
- Overall response (total urticaria, Quincke's edema)
i.v. hydrocortisone, calcium chloride
- Local - swelling of the neck Anaphylactic shock - i.v.
hydrocortisone, adrenaline, resuscitation
- Fever - antipyretic



Conclusion

- The benefits of vaccination to eradicate certain diseases are indisputable (despite the occasional questioning of the importance of vaccination)
- Better to treat illnesses in a "weak" form of vaccination than a true infection
- Revise the obligation  voluntary vaccination
- Improve parents' awareness of possible side effects when vaccinating children
- Focus on previously unaffected infectious diseases