Principles of Vaccination

The word "vaccine" comes from the Latin word vaccinus, which means "pertaining to cows." What do cows have to do with vaccines? The first vaccine was based on the relatively mild cowpox virus, which infected cows as well as people. This vaccine protected people against the related, but much more dangerous, smallpox virus.

- More than 200 years ago (in 1789), Edward Jenner, a country physician practicing in England, noticed that milkmaids rarely suffered from smallpox.
- The milkmaids often did get cowpox, a related but far less serious disease, and those who did never became ill with smallpox.
- In an experiment that laid the foundation for modern vaccines, Jenner took a few drops of fluid from a skin sore of a woman who had cowpox and injected the fluid into the arm of a healthy young boy who had never had cowpox or smallpox.
- Six weeks later, Jenner injected the boy with fluid from a smallpox sore, but the boy remained free of smallpox.

Dr. Edward Jenner



- Dr. Jenner had discovered one of the fundamental principles of immunization.
- He had used a relatively harmless foreign substance to evoke an immune response that protected someone from an infectious disease.
- His discovery would ease the suffering of people around the world and eventually lead to the elimination of smallpox, a disease that killed a million people, mostly children, each year in Europe.
- By the beginning of the 20th century, vaccines were in use for diseases that had nothing to do with cows—rabies, diphtheria, typhoid fever, and plague—but the name stuck.

Remembering an Old Disease

Smallpox



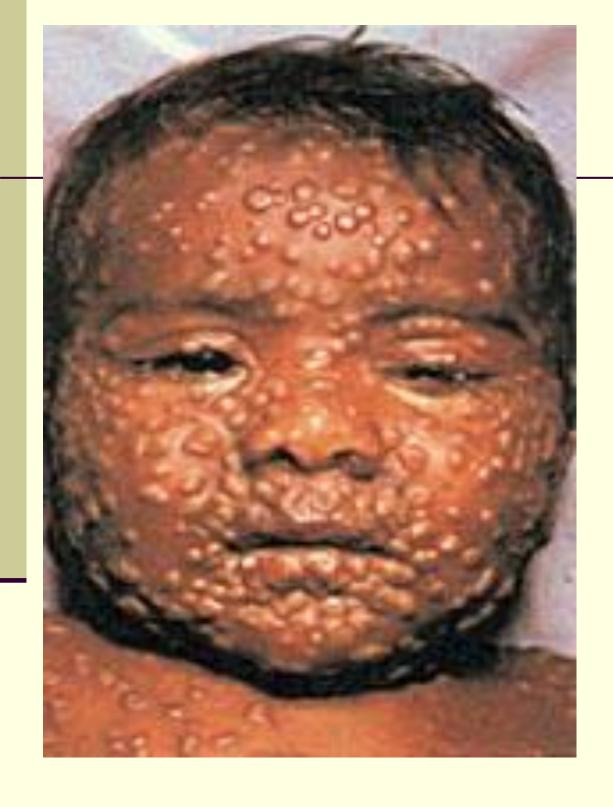


Face lesions on boy with smallpox.

Public Health Images Library (PHIL) ID # 3.

Source: CDC/Cheryl Tyron

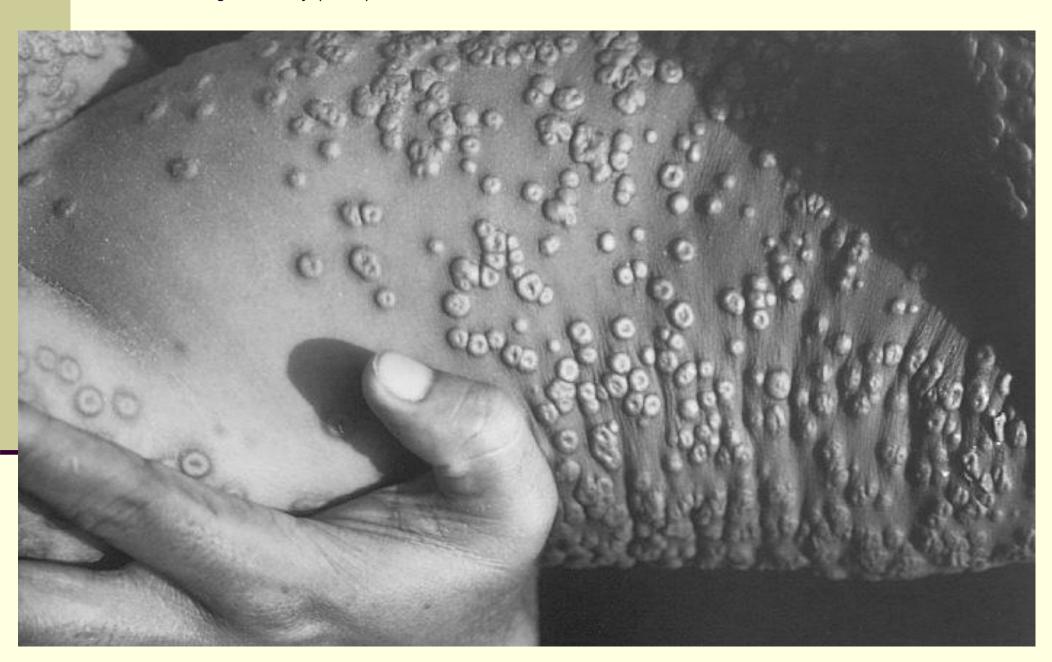




Smallpox recognition card, c.1973, courtesy Dr. Damodar Bhonsule, Panjim, Goa, India.

Smallpox lesions on skin of trunk. Picture taken in Bangladesh, 1973.

Public Health Images Library (PHIL) ID # 284. Source: CDC/James Hicks



Rural vaccinator in United Provinces, British India, c.1930, private collection of Dr. Sanjoy Bhattacharya



MULTIPUNCTURE VACCINATION BY BIFURCATED NEEDLE NEEDLE IS HELD PERPENDICULAR TO THE ARM WRIST OF VACCINATOR RESTS ON THE ARM DROP OF VACCINE IS HELD IN THE FORK OF THE NEEDLE

Variola virus, which causes smallpox, was once the scourge of the world.

This virus passes from person to person through the air.

A smallpox infection results in fever, severe aches and pains, scarring sores that cover the body, blindness in many cases, and, often, death. There is no effective treatment.

Although vaccination and outbreak control eliminated smallpox in the United States by 1949, the disease still struck an estimated 50 million people worldwide each year during the 1950s.

In 1967, the World Health Organization (WHO) launched a massive vaccination campaign to rid the world of smallpox —and succeeded.

The last natural case of smallpox occurred in Somalia in 1977.

Ali Maow Maalin, cook twenty-three of the hospitals in the Somali Merce.

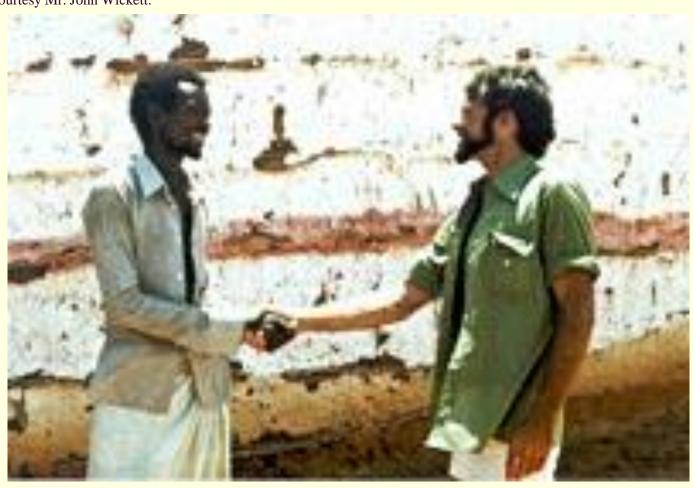
He contracted when he showed the path of the ambulance chauffeur who drove two sick children to camp insulation.

In 1978 was ill photographer Medical School in Birmingham, England. She was killed by a virus that escaped from a neighboring lab.

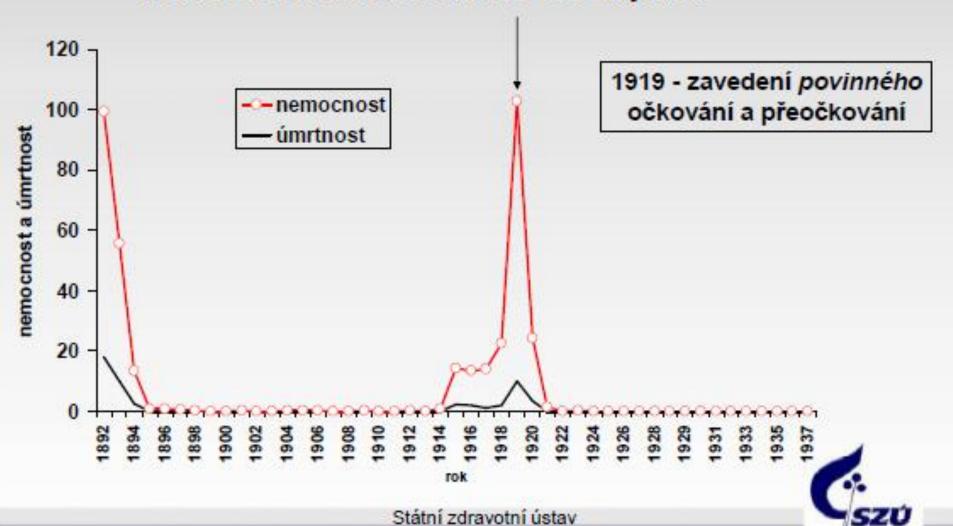


Mr. John Wickett, of the World Health Organization, with **the last person** to have contracted – **and survived** – naturally occurring smallpox in Somalia.

(1977), courtesy Mr. John Wickett.



Variola, České země, 1892-1937, nemocnost a úmrtnost na 100 000 obyvatel



Eradication of smallpox Czech experts

A key figure in the global eradication program smallpox was prof. MUDr. Karel Raska, MD., who drove in the sixties division

Communicative Diseases of the WHO

Secretariat in Geneva.

He promoted the establishment of a new, independent units "Eradication of smallpox" and ensure its initial financial and material support, not only in Geneva, but also in regional offices of WHO.

With its support of the program also attended the 20 Czechoslovak health professionals (14 Czechs and Slovaks 6), mainly epidemiologists.

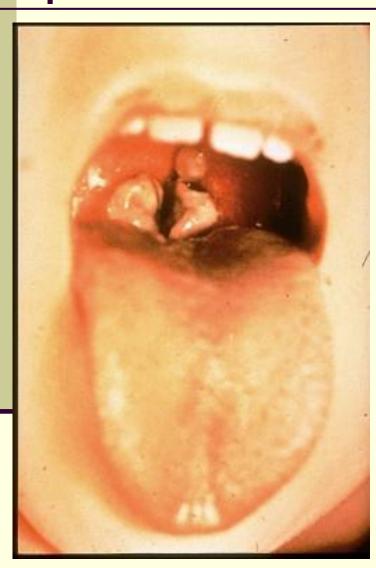
They participated in both the preparation methodology and procedures, thus working directly in infested areas.

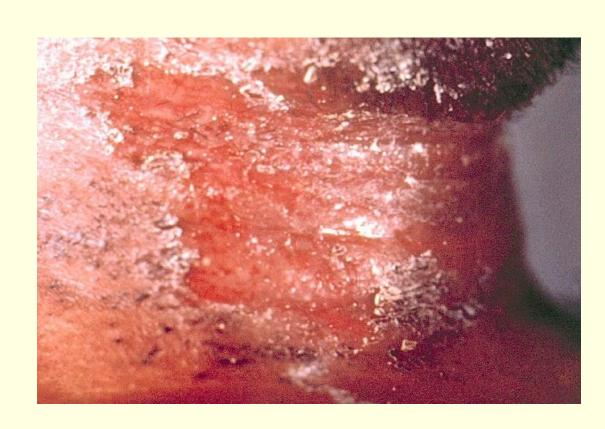
Smallpox eradication was officially announced at the 33rd General Assembly WHO 8. May 1980.

Milestones in the eradication of smallpox

- 1789 Edward Jenner invents a smallpox vaccine.
- **1966** The World Health Organization (WHO) launches a massive global campaign to eradicate smallpox.
- 1972 Smallpox vaccinations are discontinued in the United States.
- 1975 and 1977 The last cases of the two known variants of smallpox occur in the world, in Bangladesh and Somalia.
- 1978 Two people are sickened in a lab accident in England; one dies.
- **1980** The WHO declares smallpox eradicated.
- 1991 Smallpox virus DNA is mapped.
- 1999 The WHO sets this deadline, by which remaining lab stocks of the virus are to be destroyed. The deadline will be postponed again and again.
- 2003 Millions of doses of vaccine are produced to hedge against a biological attack.
- **2011** WHO's decision-making body will meet in May to again vote on whether to kill the remaining live viruses.

Remembering an Old Disease Diphtheria:

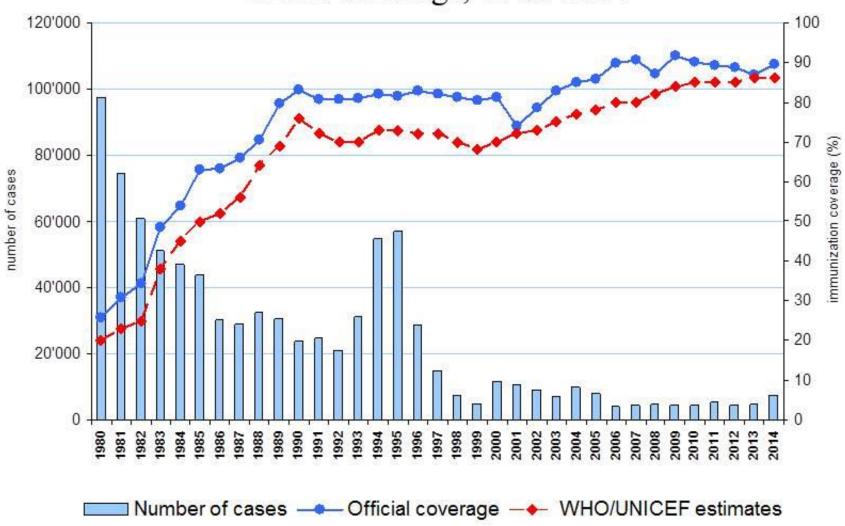






PHIL Photo ID#7323

Diphtheria global annual reported cases and DTP3 coverage, 1980-2014





Source: WHO/IVB database, 2015 194 WHO Member States. Data as of July 2015

Causes and Transmission

Diphtheria is an infection caused by the toxic *Corynebacterium diphtheriae* bacterium.

Diphtheria is spread (transmitted)

from person to person,

usually through respiratory droplets, like from coughing or sneezing.

Rarely, people can get sick from touching open sores (skin lesions) or clothes that touched open sores of someone sick with diphtheria.

A person also can get diphtheria by coming in contact with an object, like a toy, that has the bacteria that cause diphtheria on it.

Symptoms

When the bacteria get into and attach to the lining of the respiratory system, they

produce a poison (toxin) that can cause:

- Weakness
- Sore throat
- Fever
- Swollen glands in the neck (sometimes referred to as "bull neck")

The poison destroys healthy tissues in the respiratory system. PHIL Photo ID#5325

Within two to three days, the dead tissue forms a thick, gray coating that can build up in the throat or nose. This thick gray coating is called a "pseudomembrane."

It can cover tissues in the nose, tonsils, voice box, and throat, making it very hard to breathe and swallow.

The poison may also get into the blood stream and cause damage to the heart, kidneys, and nerves.

Diphtheria once was a major cause of illness and death among children.

This upper airway infection often results in a grayish, thick membrane that grows in the throat and obstructs breathing. Other symptoms include fever, hoarseness, and coughing.

Most diphtheria deaths resulted not from <u>blocked airways</u> but from the paralyzing **toxin** the bacterium secretes, which can cause the heart or other organs to fail.

For clinical purposes, it is convenient to classify diphtheria into a number of manifestations, depending on the site of disease:

- Respiratory diphtheria
 - Nasal diphtheria
 - Pharyngeal and tonsillar diphtheria
 - Laryngeal diphtheria
- Cutaneous diphtheria



The incubation period of diphtheria is 2–5 days (range: 1–10 days).

After:

- the provisional clinical diagnosis is made
- and appropriate cultures are obtained,
- persons with suspected diphtheria should be given:
 - antitoxin and
 - antibiotics in adequate dosage and
 - placed in isolation.

Respiratory support and airway maintenance should also be administered as needed.

In 2014, 7,321 cases of diphtheria were reported worldwide to the World Health Organization, but many more cases likely go unreported.

The case-fatality rate for diphtheria

has changed very little during the last 50 years.

The overall case-fatality rate for diphtheria is 5%–10%,

with higher death rates (up to 20%) among persons younger than 5 and older than 40 years of age.

Before there was treatment for diphtheria, the disease was fatal in up to half of cases.

In the EU/EEA.

The reported number of cases of diphtheria remains low.

During 2009–2013, 102 cases of diphtheria were reported in the EU/EEA with 55 cases of C. diphtheriae. There has been an increase in the number of C. diphtheriae cases reported at EU level since 2011.

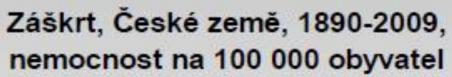
Latvia is the only EU Member State that reports indigenous transmission.

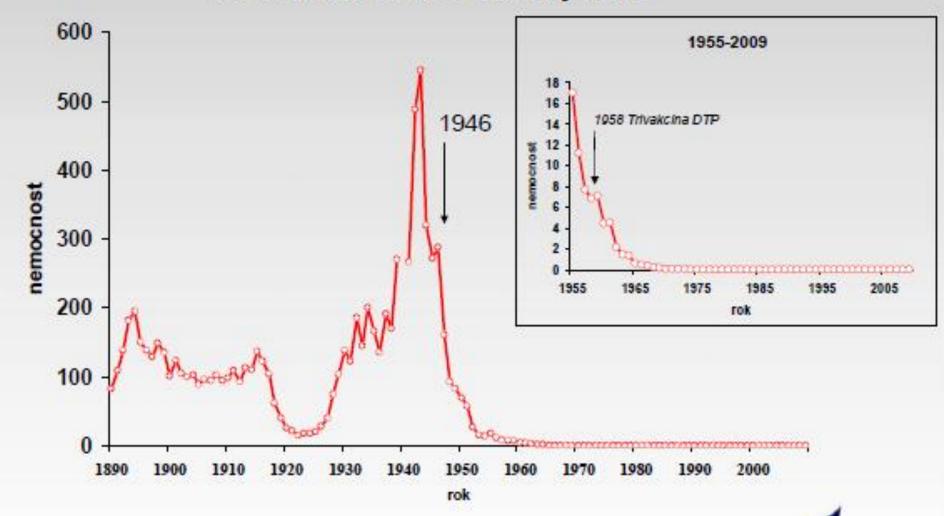
In a recent European study, ten European countries each screened between 968 and 8551 throat swabs from patients with upper respiratory tract infections for C. diphtheriae during 2007–2008.

Six toxigenic strains of C. diphtheriae were identified: two from symptomatic patients in Latvia and four from Lithuania (two cases, two carriers).

Among the toxigenic isolates, the Sankt Petersburg epidemic clone that caused large diphtheria outbreaks in Russia and the NIS* countries in the 1990s was still in circulation.

Carriage rates among household contacts of a laboratory-confirmed case may be as high as 25%.





Státní zdravotní ústav

A case of diphtheria in Spain

15 June 2015

The detection, management and public health response to the first case of diphtheria in Spain in nearly 30 years has highlighted challenges for preparedness against diphtheria in the European Union.

The case is a 6-year-old <u>unvaccinated child.</u> A case of diphtheria in an unvaccinated individual within a highly protected population is not unexpected, because vaccinated people can be asymptomatic carriers of toxigenic C. diphtheriae.

The challenges for diphtheria case management, preparedness and public health response experienced in Spain are shared by many EU Member States. The most urgent critical issue is the shortage of diphtheria antitoxin (DAT) for immediate use when clinicians suspect diphtheria.

DAT must be given as early as possible to be effective, often on the suspicion of diphtheria before a laboratory confirmation.

EU Member States have for a number of years reported difficulties with sourcing and maintaining adequate stockpiles of DAT for emergency use, a problem they share with many countries around the world. EU Member States have on occasion been forced to arrange emergency deliveries of DAT for patients with diphtheria.

Úmrtí na záškrt v Belgii

- 24. březen 2016 | MUDr. Jana Košťálová
- 17. března 2016 zemřelo v Belgii, v Antverpách, na záškrt <u>neočkované 3leté dítě</u> <u>čečenského původu</u>, narozené v Belgii (dívka). Dítě nikde necestovalo, rodiče zřejmě ano.
- První příznaky onemocnění se objevily 6. března, na jednotce intenzivní péče byla dívka hospitalizována 11. března 2016, později se zdravotní stav dítěte zhoršoval.
- Diagnóza záškrtu byla potvrzena 15. března Národním referenčním centrem v Belgii a konfirmována WHO spolupracujícím centrem pro difterii ve Velké Británii.
- Protože Belgie nemá difterický antitoxin, nabídlo ECDC zprostředkovat jeho zajištění.
- Národní institut pro veřejné zdraví a životní prostředí (RIVM) Nizozemska dodal antitoxin 16. března 2016.
- Přes veškerou snahu a podání antitoxinu dítě zemřelo 17. března, příčina úmrtí srdeční selhání (fatální myokarditida) v souvislosti s progresivním průběhem onemocnění.
- Zdravotnické orgány Vlámského regionu nyní posuzují další případná rizika např.: vyšetření kontaktů (rodina, zdravotníci, ošetřující personál, zaměstnanci děti ze školky),
- preventivní profylaxe antibiotiky, očkování, aby se zavedla případná dodatečná opatření pro prevenci a kontrolu.

Remembering an Old Disease Tetanus:

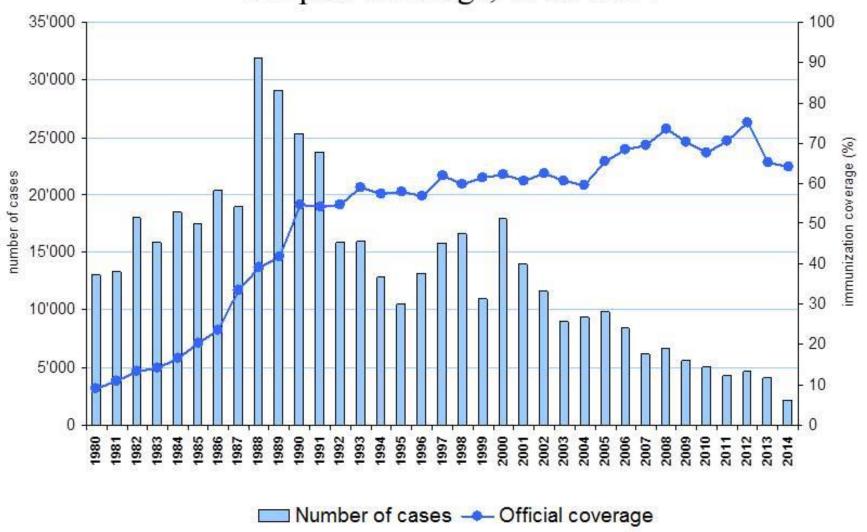








Neonatal tetanus global annual reported cases and TT2plus coverage, 1980-2014





Tetanus disease

Tetanus is a potentially fatal disease characterized by skeletal muscle rigidity and painful convulsive spasms, which are caused by a potent neurotoxin, tetanospasmin, produced by the vegetative form of Clostridium tetani, an anaerobic spore-forming Gram-positive bacillus. C. tetani is a member of the normal intestinal flora of animals, including humans. Tetanus usually occurs following contamination of wounds by soil or animal feces in which the spores of C. tetani can be found.

A newly published article demonstrates that the extracellular matrix proteins called nidogens (or entactins) appear to be the receptor for the tetanus neurotoxin to enter the neuromuscular junction (Bercsenyi K, Schmieg N, Bryson JB, et al: Tetanus toxin entry. Nidogens are therapeutic targets for the prevention of tetanus. Science.

Tetanus disease

Tetanus neurotoxin (TeNT) is among the most poisonous substances on Earth and a major cause of neonatal death in nonvaccinated areas.

TeNT targets the neuromuscular junction (NMJ) with high affinity, yet the nature of the TeNT receptor complex remains unknown.

The presence of nidogens (also known as entactins) at the NMJ is the main determinant for TeNT binding.

Inhibition of the TeNT-nidogen interaction by using small nidogen-derived peptides or genetic ablation of nidogens prevented the binding of TeNT to neurons and protected mice from TeNT-induced spastic paralysis.

Tetanus disease

Tetanus may follow surgical procedures, burns, deep puncture wounds, crush wounds, otitis media, dental infection, animal bites, abortion, and pregnancy. The presence of necrotic tissue and/or foreign bodies increases risk for tetanus because they favor growth of _C. tetani_.

Tetanus can also follow injection of contaminated illicit drugs.

Neonatal tetanus occurs usually in developing countries in infants with infection of the umbilical stump who are born to a non-immune mother. Infants of actively immunized mothers acquire passive immunity that protects them from neonatal tetanus. Tetanus is not directly transmitted from person to person.

Tetanus occurs in people who are inadequately immunized, i.e., people who have not completed the primary series and received appropriate boosters. Recovery from tetanus is not necessarily associated with immunity, and primary immunization is indicated after recovery from tetanus.

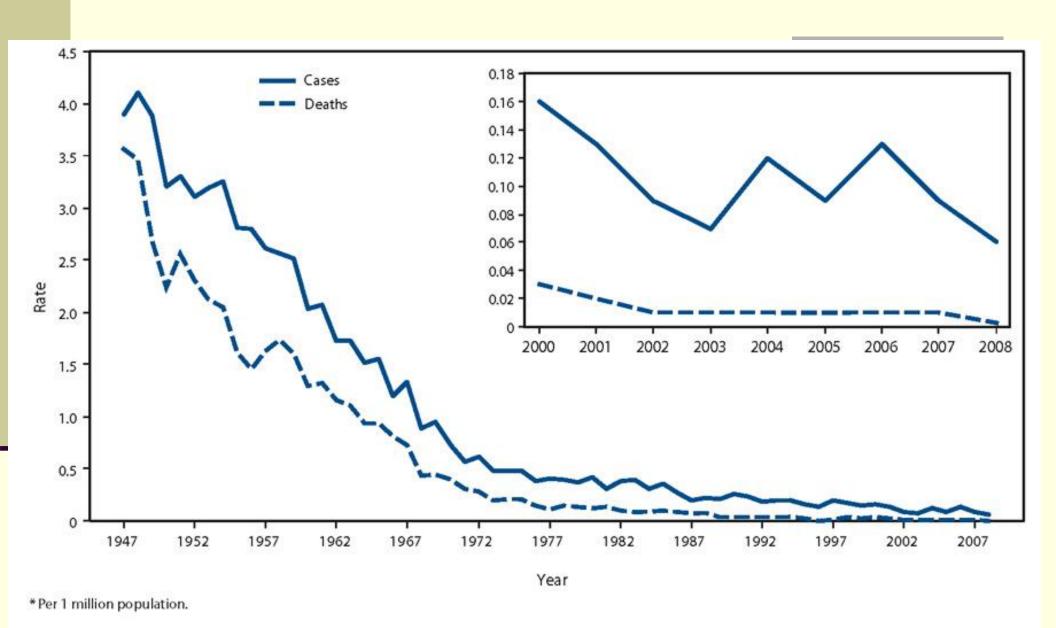
TETANUS DISEASE

The incubation period for symptoms of tetanus to begin can range from one to three weeks. The first symptoms are likely to be headache, irritability, fever, chills, and muscular stiffness of the jaw and neck. As the poison increases and spreads, the body becomes rigid and locked in spasm with head drawn back, legs and feet extended, arms stiff, hands clenched and the jaw unable to open with difficulty in swallowing. The stomach muscles also become rigid and convulsions may occur.

TETANUS DISEASE

In 1948 there were 601 cases of tetanus reported in the U.S., the highest number of cases reported in one year. In 2002 there were 25 cases of tetanus and 3 deaths reported in the U.S. Tetanus is a much more serious problem in underdeveloped countries, especially among newborn babies born in unsanitary conditions whose umbilical cords can become infected with tetanus.

Tetanus—United States, 1947-2008

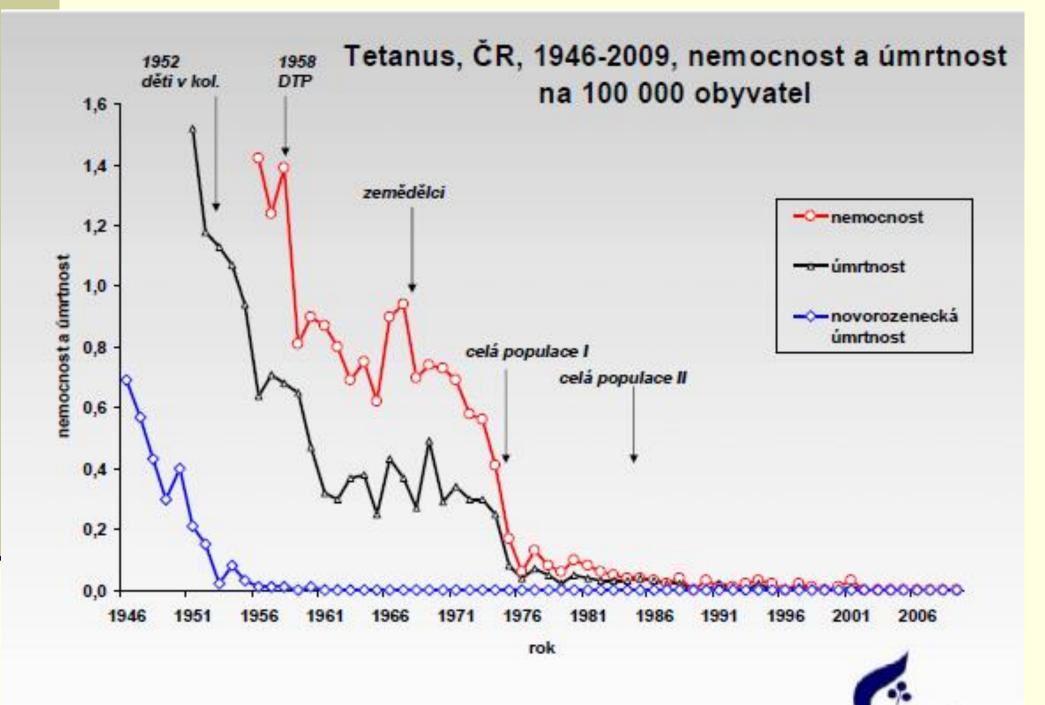


Tetanus disease

The vaccine-preventable disease, tetanus, has been considered eradicated among children in the Central European country of Slovenia for the past 20 years; health officials report a case in an unvaccinated child as reported in local media Fri, 14 Oct 2016.

TETANUS DISEASE

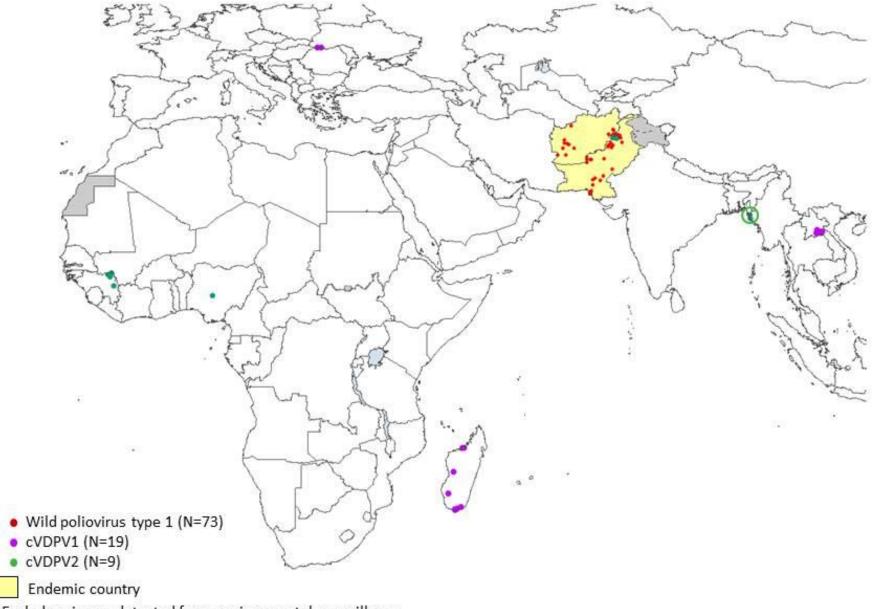
- **TETANUS VACCINE:** The most common reactions reported to occur following DT vaccine include swelling and pain at the injection site; sleepiness; irritability; vomiting; loss of appetite; persistent crying; and fever.
- Paleness, cold skin, collapse, rash, and joint pain have also been reported.
- In 1994 the Institute of Medicine concluded that there is compelling scientific evidence to conclude that tetanus, DT and Td vaccines can cause Guillain-Barre syndrome including death; brachial neuritis; and death from anaphylaxis (shock).



Remembering an Old Disease Poliomyelitis:

The highly infectious poliovirus, the cause of polio, once crippled 13,000 to 20,000 people every year in the United States. In 1 out of 200 cases, this virus attacks the spinal cord, paralyzing limbs or leaving victims unable to breathe on their own. In 1954, the year before the first polio vaccine was introduced, doctors reported more than 18,000 cases of paralyzing polio in the United States. Just 3 years later, vaccination brought that figure down to about 2,500. Today, the disease has been eliminated from the Western Hemisphere, and public health officials hope to soon eradicate it from the globe. In 2001, only 537 cases of polio were reported worldwide, according to WHO.

Wild Poliovirus & cVDPV Cases¹, 2015 01 January – 31 December



¹Excludes viruses detected from environmental surveillance.

Poliomyelitis

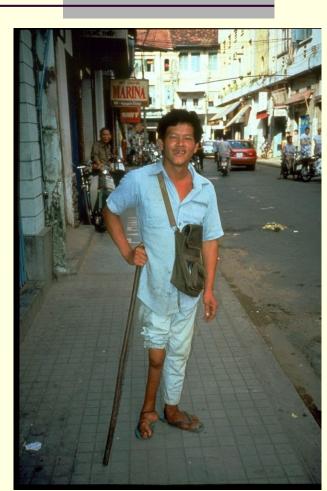
Morbid changes occur mainly in the gray matter of the spinal cord.

The infectious agent:
There are three types of polioviruses
-1, 2 and 3.

Virus excretion: 1 week from the nasopharynx, 6 weeks of stool.

80% of cases are asymptomatic.

- Polio Viruses, which are endemic or epidemic areas
- spreading in a population, we are known as wild polioviruses.
- Among them were for the purpose of preparing live vaccines repeated passaging the virus in cell cultures resulting strain called **vaccinal**.



Polio eradication

In 1988, the forty-first World Health Assembly adopted a resolution for the worldwide eradication of polio, the Global Polio Eradication Initiative (GPEI). Since then, the number of cases has fallen by over 99% from an estimated 350 000 to 416 reported cases in 2013.

In 2014, only three countries in the world remained polio-endemic: Nigeria, Pakistan and Afghanistan.

In 2015 to date, two countries have together reported 37 cases: Pakistan (29 cases) and Afghanistan (eight cases), all due to wild poliovirus type 1.

The <u>last natural circulation of WPV</u>2 was in India in 1999 and the last WPV3 case was detected in Nigeria in November 2012.

Since then, WPV1 has been the only circulating wild type virus.

The last case of endemic paralytic polio in the WHO European Region (i.e. with the source of the infection originating in the Region) was reported in Turkey in November 1998,

and the Region was declared polio-free in June 2002.

The most recent outbreaks linked to importations into the WHO European Region occurred in 2010 in Tajikis tan and in 2013–2014 in Israel where WPV1 was circulating in the environment without causing clinical cases.

The most recent polio outbreaks in what today constitutes EU/EEA were in the Netherlands in 1992, in a religious community opposed to vaccination,

and in 2001, when three polio cases were reported among Roma children in Bulgaria.

On 5 May 2014, WHO declared the international spread of wild poliovirus in 2014 a Public Health Emergency of International Concern (PHEIC) following the confirmed circulation of wild poliovirus in several countries and the documented exportation of wild poliovirus to other countries.

The Polio Eradication and Endgame Strategic Plan 2013–2018 sets out the actions required for a poliofree world by 2018 and beyond.

Outbreak of circulating vaccine-derived poliovirus type 1 (cVDPV1) in Ukraine

2 September 2015

Two cases of paralytic poliomyelitis caused by <u>circulating vaccine-derived poliovirus type 1 (cVDPV1)</u> were confirmed in Ukraine on 28 August 2015.

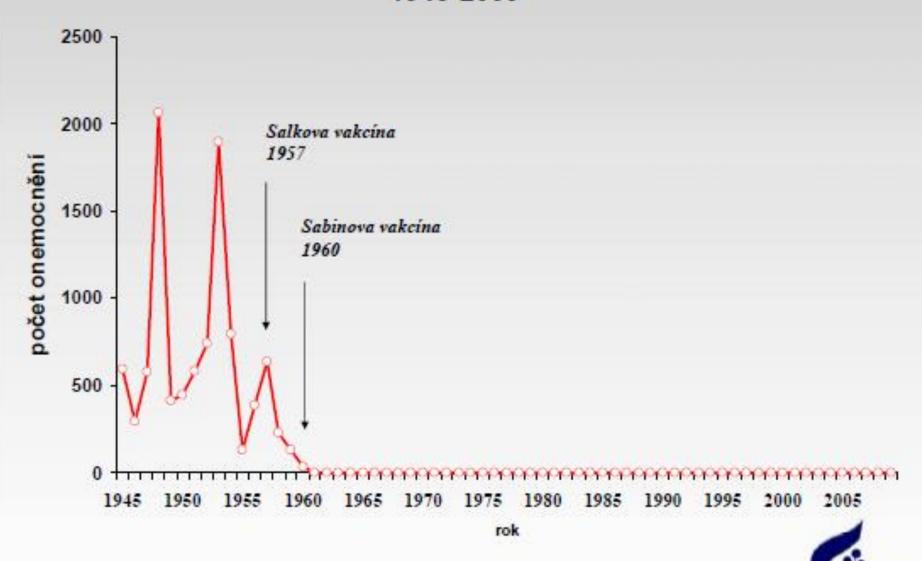
The cases, a 4-year-old child and a 10-month-old infant, had onset of paralysis on 30 June and 7 July respectively and the positive stool samples were collected from 5–10 July 2015.

The genetic similarity between the isolates indicates active transmission of cVDPV1.

Both children are from the Zakarpatskaya oblast [region], in south-western Ukraine, bordering Romania, Hungary, Slovakia and Poland.

Ukraine has been at high risk of vaccine-preventable diseases outbreaks for several years due to persistent low routine vaccination coverage.

Polio (A80), Česká republika, hlášená onemocnění 1945-2009



Pertussis



Pertussis is an acute bacterial infection of the respiratory tract, caused by the bacterium *Bordetella pertussis*. The disease is characterised by a severe cough, which can last two months or even longer.

Humans are the only reservoir. Infected adults usually have only mild symptoms, but can shed bacteria for weeks. Following infection (by inhalation of droplets), susceptible individuals develop symptoms after an incubation period of about 10 days. The typical paroxysmal cough is usually seen in young children. Babies less than six months old may not cough, but they manifest dyspnea and paroxysmal asphyxia and are the most likely to die of the disease unless they receive suitable treatment.

Affected children are also exposed to complications such as pneumonia, atelectasia, weight loss, hernia, seizures, encephalopathy (probably due to hypoxia). Antibiotics may reduce the duration of the disease, especially if administered in its early stages.

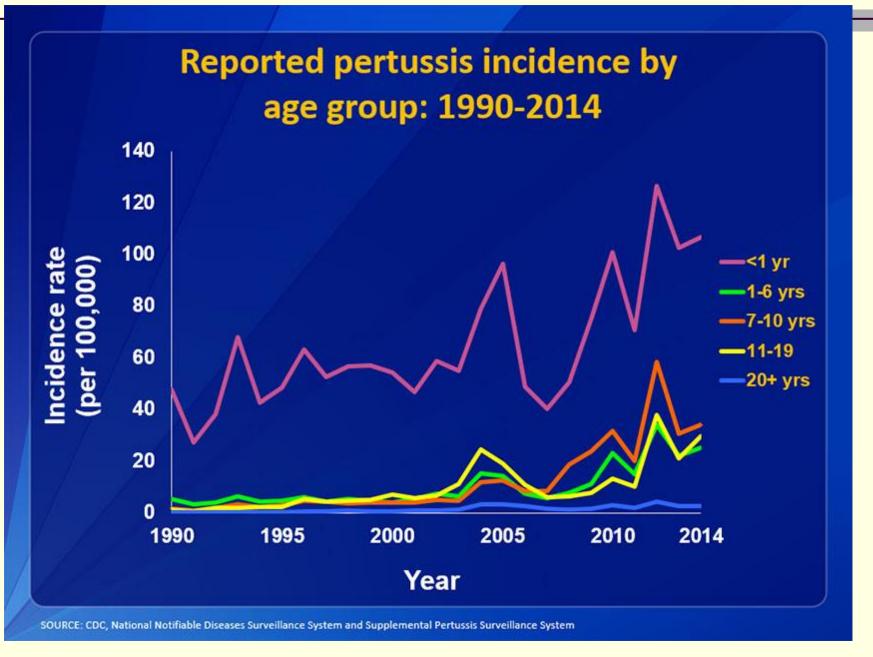
Bordetella pertussis

Sekvenací oblastí genomu *ptxP*, *ptxA*, *prnA* a *fim3* u kmenů *B. pertussis* izolovaných v ČR v období 1967–2010 byly potvrzeny změny alelických variant těchto oblastí.

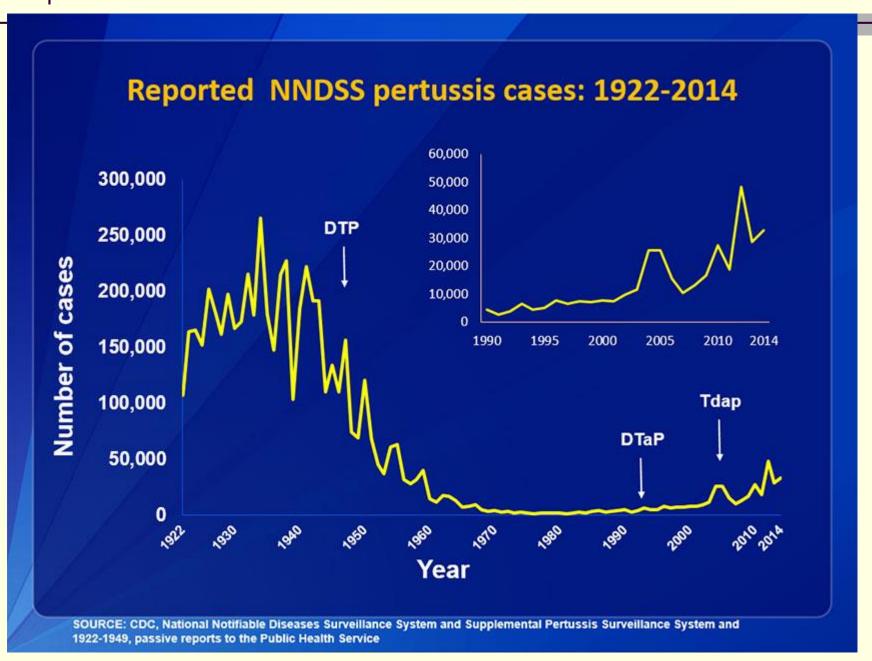
Výskyt kmenů nesoucích nové alelické varianty narůstá po roce 1995 na úkor kmenů nesoucích varianty původní.

Výsledky studie lze interpretovat jako částečný genetický únik patogenních kmenů *B. pertussis* mimo účinnost pertusových vakcín.

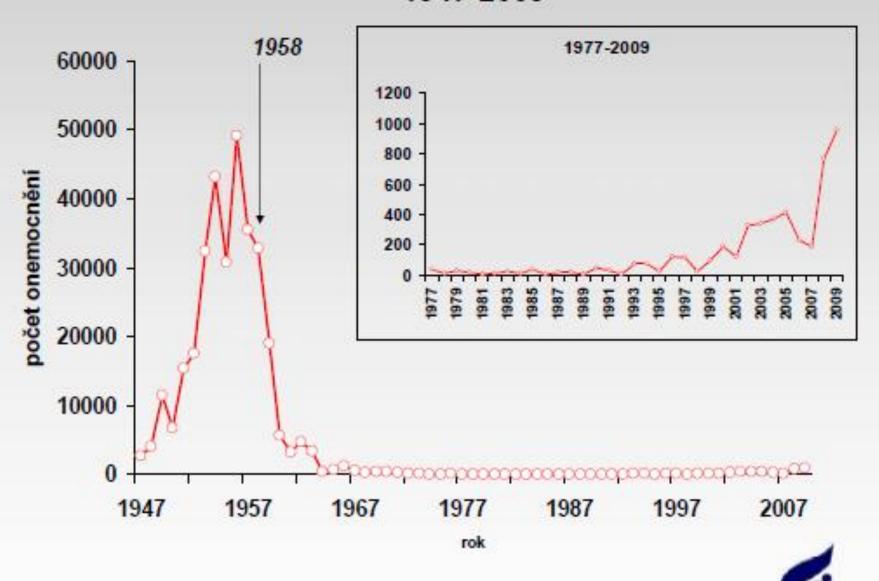
This graph shows reported pertussis incidence (per 100,000 persons) by age group in the <u>United States from 1990–2014.</u> Infants aged <1 year, who are at greatest risk for serious disease and death, continue to have the highest reported rate of pertussis. School-aged children 7 to 10 years continue to contribute a significant proportion of reported pertussis cases.



This graph illustrates the number of pertussis cases reported to CDC from 1922 to 2014. Following the introduction of pertussis vaccines in the 1940s when case counts frequently exceeded 100,000 cases per year, reports declined dramatically to fewer than 10,000 by 1965. During the 1980s pertussis reports began increasing gradually, and by 2014 more than 32,000 cases were reported nationwide.



Dávivý kašel - pertuse (A37.0), Česká republika, 1947-2009



- Doporučení k očkování těhotných žen proti pertusi.
- Členům NIKO budou cestou SZÚ (MUDr. Fabiánová) zaslány podklady a pracovní verze připravovaného doporučení očkování těhotných proti pertusi k připomínkování. Materiál bude projednán na dalším zasedání NIKO.

Measles

During the 12-month period from July 2014 to June 2015, a total of 4 224 cases was reported by 30 EU/EEA countries. Twenty-three countries reported consistently throughout this period.

Germany accounted for 58.2% of the cases reported during this period.

In 10 of the countries reporting consistently, the measles notification rate was less than one case per million population, including six countries which reported zero cases during the 12-month period.

The diagnosis of measles was confirmed by positive laboratory results (serology, virus detection or isolation) in 63.4% of all cases.

Of all cases, 89.2% had a known vaccination status and of these, 83.8% were unvaccinated.

In the target group for routine childhood MMR vaccination (1–4-year-old children), 76.9% of the cases were unvaccinated.

One measles-related death was reported during the period July 2014–June 2015, and eight cases were complicated by acute measles encephalitis.

Since the previous report, outbreaks of measles have been detected in several countries in the WHO European Region: Austria, Belarus, Lithuania, Denmark, Norway, the United Kingdom, France, Sweden and Belgium.

Outside of Europe, measles outbreaks are reported from the Democratic Republic of Congo, Guinea, Sudan, South Sudan, Brazil, Australia, Mali, Algeria, Chile, Peru, Cameroon, Taiwan, Iraq and Malaysia.

SPALNIČKY

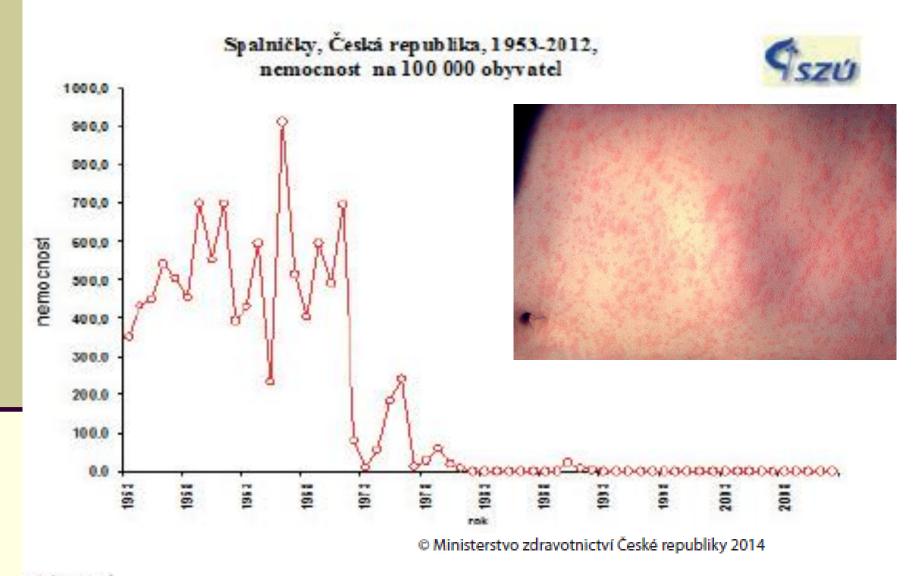
Vysoký výskyt v rozvojových zemích i v Evropě (2015: úmrtí 15 měs. dítěte v Berlíně)

V České republice se spalničky prakticky nevyskytují, v případě ojedinělých onemocnění se jedná v naprosté většině o importovaná onemocnění.

ČR – nejsou podmínky pro plošné epidemie ALE 20% osob ve věku 35 – 44 let nemá protilátky Ohroženi: <u>zdravotníci</u>, mladí dospělí, děti neimunních matek, ojediněle i očkované děti

Graf č. 5 Zvládnutí spalniček očkováním

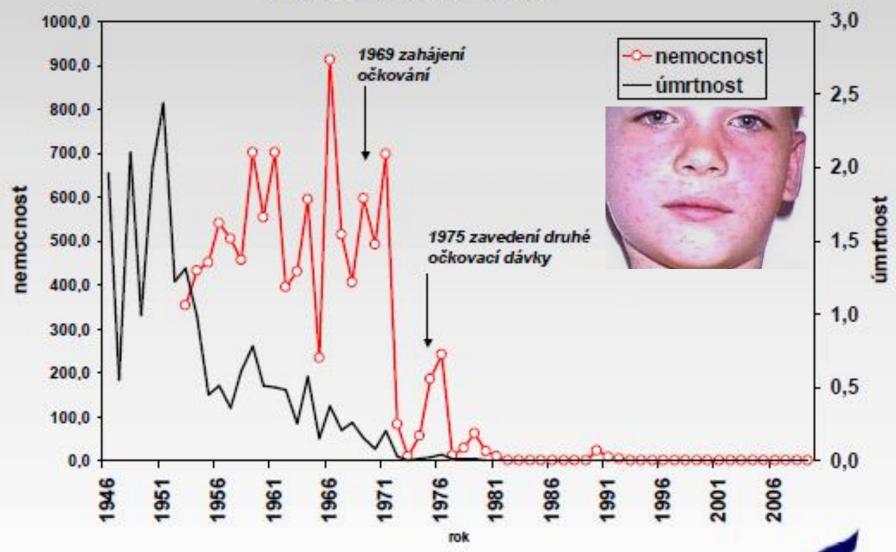
Dokud bylo očkování nepovinné, patřily spalničky mezi nejčastější příčiny smrti u dětí do 5 let. Jednalo se hlavně o navazující zápaly plic, průdušnice, mozku nebo srdečního svalu Jedna dávka očkovací látky se ukázala jako nedostatečná, proto bylo zavedeno očkování druhou dávkou.



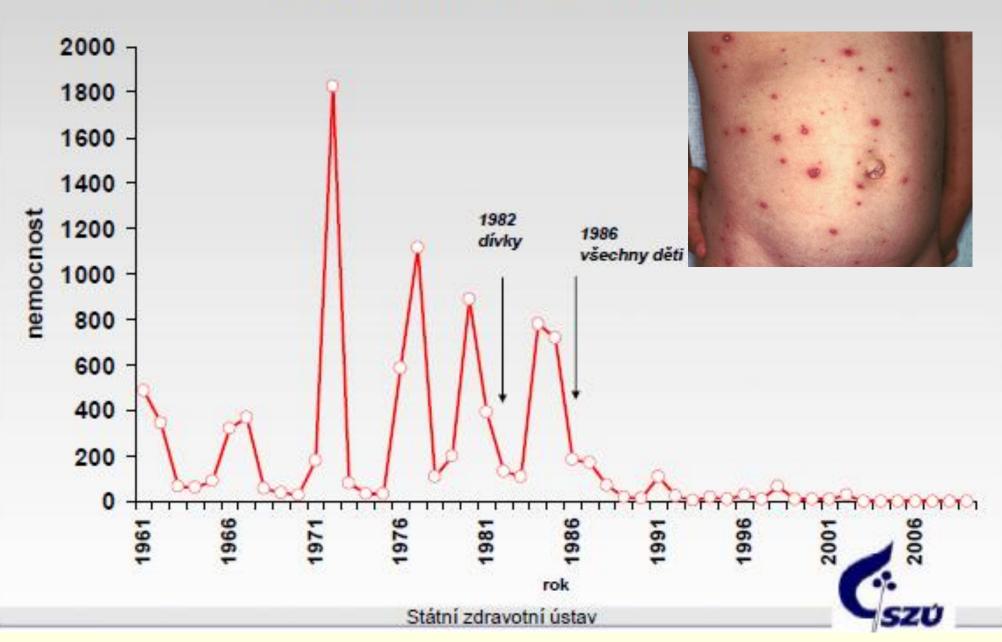
Zdroj: SZÚ

Zdraví 2020 – Národní strategie ochrany a podpory zdraví a prevence nemocí

Spalničky, nemocnost a úmrtnost, ČR, 1953-2009 nemocnost a 1946-2009 úmrtnost na 100 000 obyvatel



Zarděnky, Česká republika, 1961-2009, nemocnost na 100 000 obyvatel



Rubella

- Twenty-eight EU/EEA countries reported a total of 2 808 rubella cases during the period July 2014 to June 2015.
- In 18 of the countries reporting consistently, the rubella notification rate was less than one case per million population, including 11 countries reporting zero cases during the 12-month period.
- Poland accounted for 93.9% of all reported rubella cases in the 12-month period.

The highest number of cases was observed in 5–9- and 1–4-year-olds. 28.5% of the cases were unvaccinated.

- However, this figure needs to be interpreted with caution as only 37 cases were confirmed through laboratory testing.
- No outbreaks of rubella have been detected by epidemic intelligence since the last report.

MUMPS

Mumps is an acute illness caused by the mumps virus. It is characterised by fever and swelling of one or more salivary glands (mumps is the only cause of epidemic infectious parotitis).

Humans are the only reservoirs of the virus, which is transmitted from person to person via droplets and/or saliva. Following infection, the incubation period lasts on average 16–18 days. Salivary glands apart, other organs may be involved and symptoms might include infection in the testicles (in post-pubertal males), prostate gland, thyroid gland, and pancreas. Brain involvement is frequent, but mostly without symptoms. Brain infection is believed to occur in only one in 10 000 cases, but it often leads to death.

Mumps is preventable by a vaccine, which is most often administered in association with anti-rubella and anti-measles vaccines (MMR).

MUMPS - NORWAY: INCREASED INCIDENCE

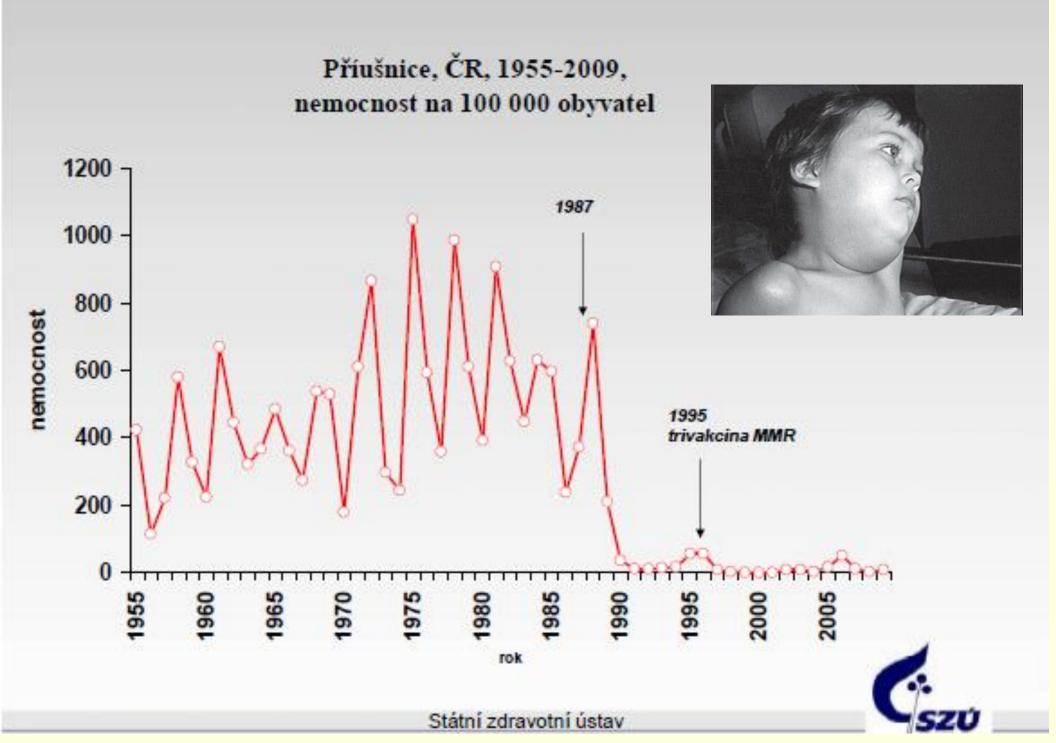
Date: Fri 6 Nov 2015

Around 80 cases of the mumps (called kusma in Norwegian) have been recorded in Norway recently, mostly among college students. The outbreak began in Trondheim, but residents of Oslo, Bergen and elsewhere along the west coast have also fallen ill.

Doctors in Trondheim alerted state officials at the Institute for Public Health (Folkehelseinstituttet) late last week. By then, cases were spreading beyond Trondheim. All students suffering symptoms that can be confused with flu were urged to undergo testing. Dr Karin Ronning of the health institute said the outbreak is believed to have been brought in by foreign students.

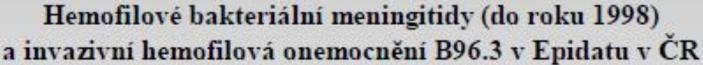
"Since 1969, all children in Norway have been offered vaccination against measles via the Childhood Immunisation Programme. The measles vaccine is given in the form of 2 doses of MMR vaccine at 15 months and at 11 years (Grade 6). If there is an increased risk of infection, the vaccine may be given as early as 9 months, but a booster dose at

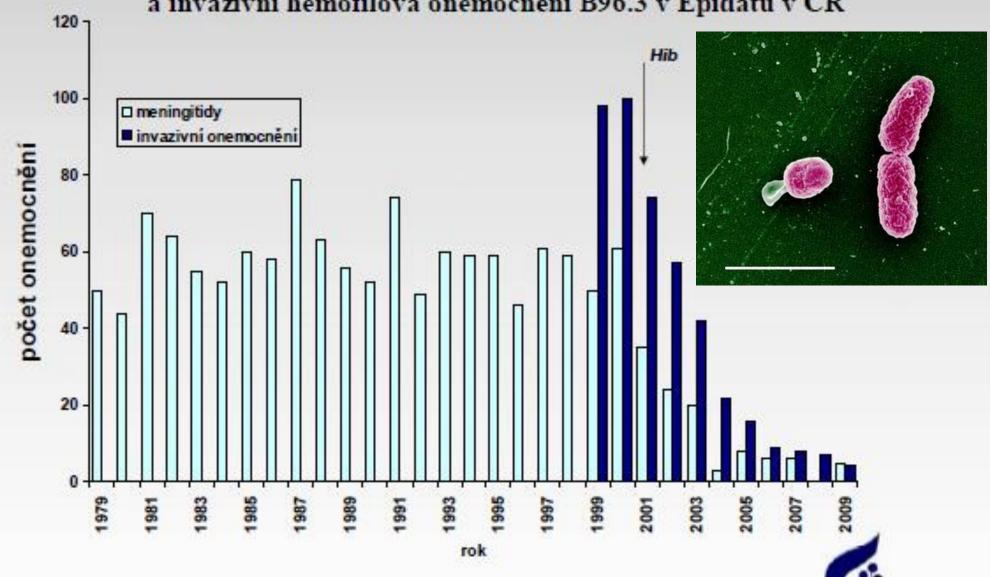
15 months of age is recommended.,



Haemophilus influenzae type b (Hib).

Other familiar diseases that vaccines protect against include chickenpox, hepatitis A and B, and Haemophilus influenzae type b (Hib). Hib causes meningitis, an inflammation of the fluid-filled membranes that surround the brain and spinal cord. Meningitis can be fatal, or it can cause severe disabilities such as deafness or mental retardation. This disease has nearly disappeared among babies and children in the United States since the Hib vaccine became widely used in 1989.





Invasive Haemophilus influenzae disease

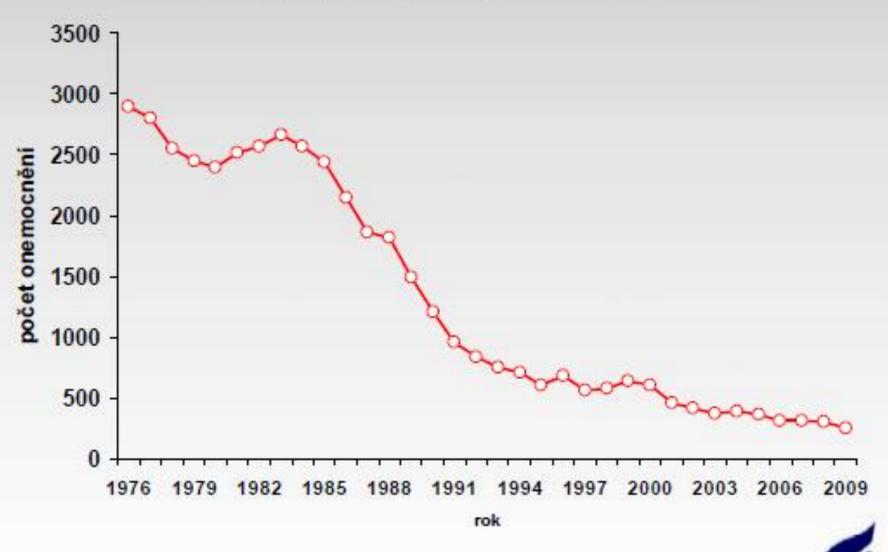
Invasive Haemophilus influenzae disease has become rare; the notification rate in Europe was 0.49 per

100 000 population, with a slightly ascending trend which may be attributed to improved surveillance in most countries.

- Country-specific rates were highest in northern Europe and in the United Kingdom;
- age-specific rates were highest in children under one year and adults aged 65 years or over.
- ☐ The national immunisation schedules of all EU/EEA countries include the Hib vaccine, which has led to a
- progressive reduction of type b serotype infections.
- □ Even though there appears to be a trend towards an increase in disease due to non-capsulated (nontypeable) strains, European data is too scarce to draw conclusions on serotype replacement.
- ☐ Continued monitoring of strains, together with their associated clinical syndromes, is essential for assessing the effect of interventions.

In 2012, 2 545 confirmed cases of invasive Haemophilus influenzae disease (all serotypes) were reported by 27 countries, 24 of which have surveillance systems with national coverage. Belgium, France and Spain reported data from sentinel surveillance and therefore had to be excluded from the notification rates analysis, while no confirmed cases were reported from Malta for 2012.

Akutní hepatitida B (B16), Česká republika, 1976-2009, počet hlášených nových onemocnění



Očkování proti TBC

- Od 1. 11. 2010 platí novela vyhlášky č. 299/2010 Sb., kterou se mění vyhláška č. 537/2006 Sb., o očkování proti infekčním nemocem, podle které je očkování povinné pouze pro děti s těmito indikacemi:
- jeden nebo oba z rodičů nebo sourozenec nebo člen domácnosti, v níž dítě žije, měl/má aktivní tuberkulózu,
- dítě, jeden nebo oba z rodičů nebo sourozenec dítěte nebo člen domácnosti, v níž dítě žije, se narodil nebo souvisle déle než 3 měsíce pobývá/pobýval ve státě s vyšším výskytem TBC než 40 případů na 100 tis. obyvatel (Min. zdravotnictví každoročně uveřejní seznam států s vyšším výskytem tuberkulózy do 30 dnů od aktualizace provedené WHO), seznam států na www.mzcr.cz
- dítě bylo v kontaktu s nemocným tuberkulózou.

TB notifications by country In 2013, 64 844 TB cases were reported in the EU/EEA.

The notification rate was 12.7 per 100 000 population (range 3.4–83.5).

Figure 1: TB notification rate per 100 000 population by country, EU/EEA, 2013

< 5 per 100 000

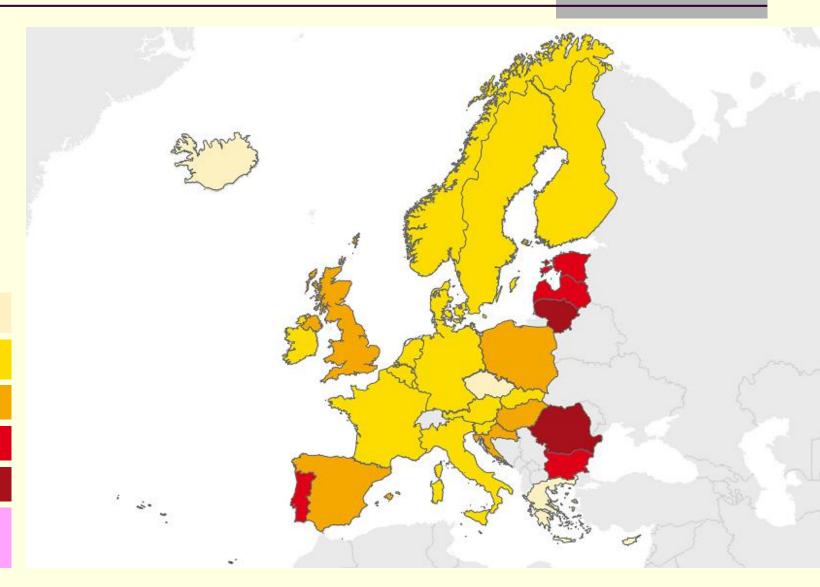
5 to 9 per 100 000

10 to 19 per 100 000

20 to 49 per 100 000

≥ 50 per 100 000

Not included or not reporting



WHO bije na poplach: 4400 lidí denně umírá na tuberkulózu

Světová zdravotnická organizace (WHO) ve středu (28:10.2015) vyzvala k dalšímu boji proti tuberkulóze (TBC), která stále patří k hlavním příčinám úmrtí ve světě a na kterou denně umírá 4400 lidí.

Toto číslo je podle autorů zprávy WHO o to "nepřijatelnější" a smutnější, že v současnosti již lze diagnostikovat a vyléčit téměř všechny nemocné TBC.

Dosavadní úsilí proti TBC umožnilo, aby se úmrtnost na toto onemocnění ve světě od roku 1990 snížila o polovinu. Situace se zlepšila hlavně po roce 2000. Nové diagnostické a léčebné metody umožnily zachránit na 43 miliónů životů. Podle WHO je však třeba pokračovat a zesílit boj proti TBC, který nyní brzdí hlavně nedostatek peněz.

Loni se objevilo 9,6 miliónu nových případů onemocnění. Více než polovina současných případů TBC připadá na Čínu, Indii, Indonésii, Nigérii a Pákistán, upřesnila WHO.

Počty onemocnění v ČR trvale klesají, loni bylo hlášeno 512 případů. Česko tak patří se 4,8 případu na 100 000 obyvatel k zemím s nejnižším výskytem TBC na světě.

Anthrax Pertussis (Whooping Cough) **Cervical Cancer** Pneumococcal **Diphtheria** Poliomyelitis (Polio) Hepatitis A Rabies Hepatitis B Rotavirus Rubella (German Measles) Haemophilus influenzae type b **Human Papillomavirus (HPV)** Shingles (Herpes Zoster) H1N1 Flu (Swine Flu) Smallpox Influenza (Seasonal Flu) **Tetanus** Japanese Encephalitis (JE) **Tuberculosis Me**asles Typhoid Fever Varicella (Chickenpox) Meningococcal Mumps Yellow Fever

Immunity

- Self vs. nonself
- Protection from infectious disease
- Usually indicated by the presence of antibody
- Very specific to a single organism

Principles of Vaccination

- Protection produced by the person's own immune system
- Usually permanent
- Protection transferred from another person or animal
- Temporary protection that wanes with time

Passive Immunisation

- Transfer of antibody produced by one human or other animal to another
- Temporary protection
- Transplacental most important source in infancy

Sources of Passive Immunity

- Almost all blood or blood products
- Homologous pooled human antibody (immune globulin)
- Homologous human hyperimmune globulin
- Heterologous hyperimmune serum (antitoxin)

Monoclonal Antibody

- Derived from a single type, or clone, of antibodyproducing cells (B cells)
- Antibody is specific to a single antigen or closely related group of antigens
- Used for diagnosis and therapy of certain cancers and autoimmune and infectious diseases

Active Immunisation

- A live or inactivated substance (e.g., protein, polysaccharide) capable of producing an immune response
- Protein molecules (immunoglobulin) produced by B lymphocytes to help eliminate an antigen

Contraindications

- Generaly
- Acute illnes
- Reaction after last vaccination
- Anaphylactic reactions
- Recovery time
- Incubation period of some infectious diseases
- Pregnancy
- Immunosupression therapy
- Hemoblastosis and other oncologic disease

Contraindications

- Specific
- Depends on the types of vaccine (exampl.- alergic reaction on the some substances

Apliccation

- Under aseptic conditions!
- .i.m.
- S.C.
- intradermal (epidermis)
- p.o.
- scarification
-

After aplication - 30 min - under oversight!

Reaction after apliccation

- Fysiolocal reaction
- Local
- erythema, swelling, soreness ...
- Generally
- higher temperature, fever, tiredness, hedeache,
- pain of the muscles, joints,
- Indigestion
- Alergic reaction

Vaccination

- Active immunity produced by vaccine
- Immunity and immunologic memory similar to natural infection but without risk of disease

Live Attenuated Vaccines

- Attenuated (weakened) form of the "wild" virus or bacterium
- Must replicate to be effective
- Immune response similar to natural infection
- Usually effective with one dose*

Live Attenuated Vaccines

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

Live Attenuated Vaccines

Viral

measles, mumps, rubella, vaccinia, varicella, yellow fever, intranasal influenza, (oral polio) (rotavirus)

Bacterial

BCG, oral typhoid

Inactivated Vaccines

- Cannot replicate
- Less interference from circulating antibody than live vaccines
- Generally require 3-5 doses
- Immune response mostly humoral
- Antibody titer diminishes with time

Inactivated Vaccines

Viral

polio, hepatitis A, rabies (influenza)

Bacterial

(pertussis) (typhoid) (cholera) (plague)

Inactivated Vaccines

Subunit hepatitis B, influenza,

acellular pertussis,

(Lyme) (HPV)

Toxoid diphtheria, tetanus

Polysaccharide Vaccines

- pneumococcal
- meningococcal
- Salmonella Typhi (Vi)

- Haemophilus influenzae type b
- pneumococcal
- meningococcal

Pure Polysaccharide Vaccines

- Not consistently immunogenic in children <2 years of age
- No booster response
- Antibody with less functional activity
- Immunogenicity improved by conjugation

Immunisation in Czech Republic

Regulary vaccination – (refunding the state)

- (TBC) form 2010 only by indicated group
- Diphteria, Tetanus, Pertussis, Hemophillus influenzae B, Poliomyelitis, Viral hepatitis B (VHB),
- Morbilli, Rubeola, Parotitis epidemica

- Inluenza, Pneumoccus (for specific groups – by low)
- VHB (healths workers)

TBC

only - indication

Di,To	e,P	(a),	
Hib,	VH	B,I	PV

from 13th week 3 times in 1 year (each after 1 months)
4th dosis 6th months after 3th dosis

MMR

1st dosis from 15th months
2nd dosis from 6th to 10th months after 1st dosis

Di,Te,P(a)

5 years

Di,Te,P(a),IPV

10 years

VHB

12 years

Te

25 years, revaccination each after 10 - 15 years

Poznámka: TBC, Di (Diphteria), Tetanus (Te), P (Pertussis), Hib (Haemophilus influenzae b), HB (VHB), IPV (poliomyelitis), MMR (measles, mumps, Rubella).

Očkování před cestou do zahraničí

Povinná očkování proti:

- **žluté zimnici** při cestách do zemí Afriky a Střední a Jižní Ameriky a
- meningokokové meningitidě (A,C, Y, W 135) při cestách do Saudské Arábie.

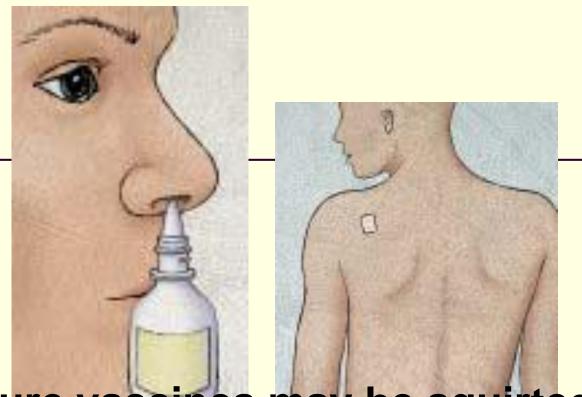
Typhus abdominalis

TYPHIM Vi je vakcína připravená z purifikovaného Vi kapsulárního polysacharidu získaného extrakcí ze *Salmonella typhi*.

Prevence břišního tyfu u dospělých osob a dětí nad 2 roky věku, zvláště lidí cestujících do endemických oblastí, migrujících, zdravotnických pracovníků a vojáků.

- Ochranu zajišťuje jedna dávka vakcíny.
- Přeočkování se provádí každé tři roky, jestliže riziko nákazy tyfem stále trvá.

Nová vakcína proti HPV – Gardasil 9, Vakcína proti Clostridium difficile Vakcína proti autismu ??



Future vaccines may be squirted up the nose, worn as a patch, or eaten at the dinner table.