

CHILDHOOD VACCINATION PROGRAMME IN DENMARK

2010



The vaccination programme as of 1 January 2009

Age	Vaccination	Examination
5 weeks		✓
3 months	DTaP/IPV/Hib ¹ + Pn ²	
5 months	DTaP/IPV/Hib + Pn	✓
12 months	DTaP/IPV/Hib + Pn	✓
15 months	MMR ³	
2 years		✓
3 years		✓
4 years	MMR	✓
5 years	DTaP/IPV booster	✓
12 years	MMR ⁴	
12 years (girls only)	HPV ⁵ (3 times)	
Women aged 18+	Rubella ⁶	

1 DTaP/IPV/Hib: Diphtheria – Tetanus – Pertussis (whooping cough) – Polio
– Haemophilus influenzae type b

2 Pneumococcus

3 MMR: Measles – Mumps – Rubella

4 If the child has not received two MMR vaccinations previously

5 HPV: Cervical cancer (human papillomavirus)

6 May be given in the form of an MMR vaccination

The Danish National Board of Health recommends that children in Denmark be vaccinated against the following diseases:

- diphtheria
- tetanus
- pertussis (whooping cough)
- polio
- meningitis and inflammation of the epiglottis (epiglottitis) caused by the bacterium *Haemophilus influenzae* type b (Hib)
- meningitis and other severe diseases caused by the bacterium *Streptococcus pneumoniae* (pneumococcus)
- measles
- mumps
- rubella
- cervical cancer (girls only)

In addition, women who have not received the MMR vaccination are offered vaccination against rubella free of charge, possibly in the form of an MMR vaccine.

The vaccinations are free of charge and voluntary and can be given by general practitioners.

The table shows which vaccinations are recommended and when they should be given.

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Introduction

The health authorities in all countries recommend that children should be vaccinated. The Danish vaccination programme covers vaccination against ten diseases.

If a child follows the Danish vaccination programme, the child is well-protected against these diseases.

Why vaccinate?

Vaccination protects the child from contracting diseases which may be serious and cause permanent injury and, at worst, death.

- Some vaccines protect against diseases which may be potentially fatal for babies, for example pertussis (whooping cough), Hib meningitis and pneumococcal disease. Even if vaccinated, the child may be infected with the bacteria later in life, but the course of the disease will be milder, or the child may not be ill at all.
- Some vaccines protect children against infections which are so contagious that all children would normally become ill during epidemics that would occur every few years without a vaccination programme. Children normally recover from these diseases within a few weeks, but during each epidemic, some children become seriously ill with measles, mumps or polio.

- Some vaccines prevent serious but rare diseases such as tetanus and diphtheria.
- An unvaccinated child will not be protected and may contract the infection later in life, when the course of the disease will be more serious than in childhood.



Child with rubella

Diseases

Diphtheria

Diphtheria is a contagious disease caused by the bacterium *Corynebacterium diphtheriae*.

The disease often begins with a temperature and a severe sore throat/tonsillitis with coating of the throat and swelling of the mucous membrane which may cause asphyxiation.

The bacteria can produce a toxin which spreads to other parts of the body, leading to inflammation of the cardiac muscle and the nervous system. Even under favourable hospital conditions, the disease is potentially fatal.

During the past 50 years, only a few diphtheria cases have been reported in Denmark, but there is still a risk of being infected while abroad.

Tetanus

Tetanus is caused by the bacterium *Clostridium tetani*. The bacteria are mainly found in soil and enter the body, e.g. via contaminated wounds.

The disease does not spread from person to person.

The bacteria produce a toxin which enters the nervous system and causes muscle stiffness and cramps. In the worst case, breathing stops.

Formerly, babies contracted the disease due to contamination of the navel. Today, the disease is mainly seen in elderly unvaccinated persons, with only a few, sometimes fatal cases reported each year.

Pertussis (whooping cough)

Pertussis (whooping cough) is caused by the bacterium *Bordetella pertussis* which spreads via airborne droplets when an infected person coughs or sneezes. The bacteria are very contagious.

The disease begins with symptoms of a normal cold, but one to two weeks later very violent and prolonged coughing fits set in. The coughing is rapid and prevents the child from breathing. After this come deep intakes of breath that produce a heaving, 'whooping' sound. The child will cough up some phlegm, and the attacks may be followed by vomiting. The coughing attacks are very exhausting, and very young children do not have the strength to cough up the phlegm.

Pertussis can be fatal for babies. Due to the risk of infection, children under the age of 1 year who have not had two vaccinations against pertussis may not attend nursery or kindergarten during outbreaks of the disease.

Mild cases of pertussis in older children or adults may resemble a cold or a sore throat. There are indications that babies are often infected by older siblings at home, and anyone with a cold or who coughs should thus be kept away from unvaccinated babies. If a baby has been exposed to infection, preventive antibiotics may be given after consultation with the doctor.

Polio

Polio is caused by the highly contagious *polio virus*.

Symptoms of polio can vary from person to person. Most people display no symptoms, while others get a slight fever and a headache for several days. A small percentage of people suffer symptoms relating to the nervous system and suffer serious paralysis. Paralysis can be limited to individual muscle groups or can be so extensive that the respiratory muscles also become paralysed. Some patients are paralysed for life, while others recover. The disease can be fatal.

No polio cases have been reported in Denmark since 1976, but the disease is still seen in Afghanistan, Pakistan, India, Nigeria and several other African countries. It is expected that the disease can be totally eradicated by the World Health Organization's extensive polio vaccination campaigns.

Meningitis and inflammation of the epiglottis caused by the Hib bacterium

Hib, *Haemophilus influenzae type b*, is a bacterium that can cause serious diseases such as meningitis (inflammation of the membranes of the brain or spinal cord) and inflammation of the epiglottis, particularly in young children.

In a child, meningitis causes high fever, and the child becomes seriously ill. The child can become drowsy and less responsive, and his breathing can be affected. Meningitis and inflammation of the epiglottis can be fatal diseases. Hib infections can cause permanent complications such as hearing loss and brain damage.

Prior to the introduction of the vaccine in Denmark in 1993, a couple of deaths among young children were reported each year because of this disease. The disease is now largely eliminated but will reoccur if vaccination is discontinued.

It is important to note that the Hib vaccine does not protect against other forms of meningitis caused by other bacteria or viruses.

Meningitis and other diseases – caused by pneumococci

Pneumococci are also known as *Streptococcus pneumoniae* bacteria. There are many different types of pneumococcal bacteria.

The disease often manifests itself as acute middle ear infection, sinusitis and pneumonia. The most serious forms of pneumococcal disease occur when the bacteria enter the blood stream and cause blood poisoning (sepsis) and/or meningitis. Serious pneumococcal disease can result in permanent injury such as hearing loss and brain damage and, in rare cases, death.

Small children and older people, including people whose immune systems are generally reduced are particularly prone to contracting diseases caused by pneumococcal bacteria. The risk of contracting serious pneumococcal disease is significantly lower from around the age of 2 years, while children above the age of 4 are very unlikely to contract it. Prior to the introduction of the vaccine, approximately 20 cases of meningitis and approximately 50 other cases of serious pneumococcal disease among children under the age of 2 years were reported in Denmark each year.

Measles

Measles is caused by a highly contagious virus, *morbilli virus*.

The first symptoms of the disease are high fever and a cold.

A red, blotchy rash can also be seen. The disease is often accompanied by middle ear infection and pneumonia.

In rare cases, serious complications can occur, e.g. encephalitis, which can result in permanent brain damage, deafness and, at worst, death.

Prior to the introduction of the MMR vaccination in Denmark in 1987, almost all children got measles. The disease is now rare in Denmark, but recent years have seen epidemics in several areas in Europe with deaths among children.



Child with measles

Mumps

Mumps is caused by the *parotitis virus* which is less contagious than measles.

The virus causes inflammation and swelling of the salivary glands as well as a slight fever and general malaise. Between 1 and 10% of children can develop mild meningitis in connection with mumps. In rare cases, children suffer deafness in one ear after having had mumps.

Mumps can cause inflammation of the testicles in boys at or after puberty. This can result in a temporary or permanent reduction in semen production.



Child with mumps

Rubella (German measles)

In children, rubella is a mild disease caused by the *rubella virus*.

In children, the disease often begins with cold-like symptoms and a slight fever. After approximately 24 hours, the lymph nodes in the neck and the base of the skull can become sore and swollen and the child may have a rash. The rash is blotchy and reddish and disappears after a couple of days.

Rubella can occur without a rash and without any symptoms. Vaccination against rubella is primarily given to prevent pregnant women being infected by children.

A pregnant woman who contracts rubella during the first half of her pregnancy risks giving birth to a child with deformities such as damage to the eyes, ears, brain or heart. As many other viral diseases resemble rubella, an adult woman cannot know whether she has had the disease. All children are therefore offered the MMR vaccination which includes the vaccine against rubella.

Women aged 18 years who have not received the MMR vaccination are offered the vaccination against rubella free of charge. The vaccine may be given in the form of an MMR vaccine.

Cervical cancer

Cervical cancer is caused by *human papillomavirus*, also called HPV. There are many different types of HPV. They are sexually transmitted and can cause rare types of genital cancer too and genital warts.

HPV viruses are very common, especially among young people. Often, people do not have any symptoms, and, in most cases, the HPV infection goes away on its own. In some people, the virus does, however, not disappear and may result in cellular changes which can cause cancer many years later.

Vaccination protects against the two types of HPV which cause most cases of cervical cancer. As the HPV vaccines are new, it is still uncertain how they will impact the number of cases.

Vaccinated women and other women are thus offered screening for any cellular changes in the cervix from the age of 23 years. Through this screening programme, initial stages of the disease can be identified and treated before developing into full-blown cancer.

Other HPV viruses can cause genital warts on or around the genitals. Genital warts are harmless but embarrassing.

Read more at www.stophpv.dk (Danish only).

The vaccines

The table shows when vaccination against the various diseases was introduced in Denmark:

YEAR OF INTRODUCTION	
Diphtheria	1943
Tetanus	1949
Polio	1955
Pertussis (whooping cough)	1961
Measles, mumps, rubella (MMR)	1987
Haemophilus influenzae type b (Hib)	1993
Pneumococcal disease (Pn)	2007
Cervical cancer (HPV)	2009*

*for girls born in 1993, 1994 and 1995 as of 1 October 2008

The vaccinations which have been used for many years have almost eliminated the diseases or have resulted in them occurring in only very few children and adults.

A vaccination programme can be successful only if almost everyone is vaccinated; otherwise the diseases will still be able to spread.

When considering which vaccines to recommend, an assessment is made of whether the contagious disease is so serious that all

children should be vaccinated, whether the vaccine is safe, and whether it can be incorporated into the existing vaccination programme.

How does a vaccine work?

Vaccines can be either 'dead vaccines' containing components of the killed viruses or bacteria, or 'living vaccines' consisting of living, but weakened forms of viruses or bacteria.

When a child is vaccinated, so-called antibodies are produced which protect against the disease in the same way as if the child had had the disease. Later, when the child encounters the virus or bacteria in question, his body can recognise it and the antibodies then combat the microorganism. The child is then said to have become immune.

Can more than one vaccine be given simultaneously?

The aim is to subject children to as few injections as possible. Tests of vaccines have shown that it is possible to vaccinate against several diseases at a time, thereby reducing the number of injections.

Where are the injections given?

It varies from vaccine to vaccine, but young children are normally injected in the thigh and older children in the shoulder.

Can a sick child be vaccinated?

Sick children, e.g. children who have a temperature, are normally not vaccinated. Children with a slight cold can, however, be vaccinated. If one vaccination is postponed, it is not necessary to start a new series of vaccinations.



Side effects

Vaccines generally have few side effects. The side effects from vaccines are 100 to 1,000 times more rare and less serious than the resulting conditions caused by the actual diseases.

During a vaccination programme, most children will, at some point, get a mild reaction, e.g. swelling at the injection site, a slight fever or a rash. This is an expected side effect.

More than 360,000 vaccinations are given annually to children, and approximately 200 cases of side effects are reported each year, mostly local swelling at the injection site, a rash or a fever.

In children, vaccination may also result in irritability, drowsiness, restless sleep, vomiting, diarrhoea and poor appetite. In rare cases, febrile seizures and, in a few children, more serious side effects are reported. The doctor must report serious or unexpected side effects to the Danish Medicines Agency.

Following a legislative amendment passed on 1 July 2003, patients and their relatives can now also report side effects of medicines and vaccines directly to the Danish Medicines Agency. The side effects are reported using a form which is available at pharmacies or via the website: www.dkma.dk -> Pharmacovigilance -> Report a side effect, or if you are reading this online by clicking this hyperlink [Report a side effect](#). Instructions on how to fill in the form are available both at pharmacies and the website. In case of permanent damage, a report must also be submitted to the Danish Patient Insurance Association, and compensation may be awarded.

It is important to note that young children will occasionally contract infections or other illnesses during the vaccination period. If a child appears to be suffering from, for example, a high fever shortly after having been vaccinated, he should be seen by a doctor to determine whether this is due to illness or the vaccine.

Where can you find more information about vaccines?

The vaccinating doctor will be able to inform parents about the vaccinations' effect and any side effects. Often, the child's parents will also have discussed the vaccinations with their health visitor.

More information about the HPV vaccination for cervical cancer is also available at www.stophpv.dk (Danish only).

Diphtheria, tetanus, pertussis, polio and Hib (DTaP/IPV/Hib) vaccine

This vaccine protects against diphtheria, tetanus, pertussis (whooping cough), polio and Haemophilus influenzae b (DTaP/IPV/Hib). It is administered to the child three times, at the age of 3, 5 and 12 months.

The vaccine was introduced in its present form in 2002. The vaccine consists of completely detoxicated components of the diphtheria, tetanus and pertussis bacteria's toxins (toxoids) as well as killed polio virus and components of killed Haemophilus influenzae b bacteria.

The type of pertussis (whooping cough) vaccine introduced in 1997 contains only purified components of the pertussis bacterium and thus results in far fewer side effects than the old vaccine which contained whole pertussis bacteria.

How long is the vaccine effective for?

After having received the three vaccinations, the child is well-protected against diphtheria, tetanus, pertussis and polio until he reaches the age of 5 to 6.

Around the age of 5, the child is given a booster vaccination against diphtheria, tetanus, pertussis and polio. Following this booster vaccination, the child will be protected against diphtheria and tetanus for a further ten years. The protection against pertussis (whooping cough) is likely to be the same. Protection against polio is considered to be permanent.

Following the three vaccinations against *Haemophilus influenzae* b, children are considered to be fully protected and are not given booster vaccinations.

What are the side effects of the DTaP/IPV/Hib vaccine?

The most frequent side effects are redness and tenderness at the injection site. Some children also develop a fever or become unwell during the first couple of days following the vaccination. Febrile seizures can occasionally occur in conjunction with a fever, particularly if the child is so disposed. Every year a few cases of prolonged crying are reported, mostly occurring in connection with the old pertussis vaccine which contained whole killed pertussis bacteria. It is not known what caused this reaction, but after the prolonged crying the children return to normal.

Every year, more than 180,000 vaccinations are given with the DTaP/IPV/Hib vaccine, and almost all children are vaccinated.

Pneumococcal vaccine

The vaccine contains components of the seven subtypes of pneumococcal bacteria which are responsible for approximately 75% of serious pneumococcal disease in children aged 6 months to 2 years in Denmark. In addition, the vaccine prevents a small number of cases of middle ear infection and pneumonia that can occur in children.

The pneumococcal vaccine used for children under the age of 2 is administered a total of three times at 3, 5 and 12 months, i.e. at the same times as the DTaP/IPV/Hib vaccine. The two vaccines must be injected at two different sites.

It is important to note that the pneumococcal vaccine does not protect against all types of pneumococcal bacteria, but against the majority of the subtypes that cause serious diseases in young children. There is thus still a small risk that vaccinated children can contract meningitis caused by pneumococcal bacteria.

How long is the vaccine effective for?

The vaccine is effective until the child reaches the age of 4, after which the risk of serious pneumococcal disease is very small. A booster vaccination is only recommended for children with special illnesses.

What are the side effects?

Following vaccination, up to one half of all children can develop a fever of over 38° C and a small percentage over 39.5° C – febrile seizures can thus occur. In approximately one third of children, tenderness and swelling will develop at the injection site. Hypersensitivity reactions are rarely reported.

Measles, mumps and rubella (MMR) vaccine

The vaccine is administered when the child is 15 months and again at 4 years old (as of 1 April 2008). Older children receive a second MMR vaccination at the age of 12 if they have not previously received two MMR vaccines.

The vaccine consists of living weakened virus that can cause a very mild infection. The vaccine has been used in Denmark since 1987, and more than 100,000 MMR vaccinations are given annually. As more than 10-15% of children have not been vaccinated for a number of years, minor epidemics involving the three diseases can occur.

How long is the vaccine effective for?

After having received two vaccinations, the child is considered to be permanently protected. The body 'remembers' having met these viruses and has produced antibodies that protect against the microorganisms.

What are the side effects?

As the vaccine consists of living weakened virus, the child may develop mild symptoms of the diseases one to two weeks after the vaccination. Most of the side effects involve a fever, a cold or a rash, which are non-contagious. Children with a previous history of febrile seizures may need to have medicine prescribed by a doctor if they develop a fever following the vaccination. In very rare cases, meningitis occurs following vaccination.

During a year in which 100,000 children are vaccinated, 10 to 100 deaths and 50 to 100 meningitis cases could be expected if the same 100,000 children had contracted measles.



Diphtheria, tetanus, pertussis, and polio (DTaP/IPV) booster vaccination

The vaccine contains the same components of the DTaP/IPV vaccine as the DTaP/IPV/Hib vaccine but with weakened components for diphtheria and pertussis (whooping cough).

A booster vaccination against diphtheria and tetanus at the age of 5 is given to ensure long-term protection against both diseases. Following this booster vaccination, the child will be protected for an additional 10 years. Protection against pertussis (whooping cough) is presumed to be for the same period. Protection against polio is considered to be permanent.

A booster vaccination against pertussis (whooping cough) was introduced on 1 September 2003. In addition to protecting the child against pertussis, the pertussis booster vaccination also reduces the risk of infection for babies not yet vaccinated against the disease. A booster vaccination against polio for 5-year-old children was introduced on 1 July 2004.

What are the side effects?

Occasionally, local swelling occurs at the injection site.

HPV vaccine against cervical cancer

Under the childhood vaccination programme, the vaccine is only given to girls. It protects against the two types of HPV responsible for more than 70% of all cases of cervical cancer and against several other forms of genital cancer. The vaccination also protects against the two types of HPV which cause most cases (90%) of genital warts. The HPV vaccine consists of small virus-like particles. It is a preventive vaccine, and it must be given before the person is infected with the virus against which the vaccine protects. The vaccine is thus given at the age of 12 prior to sexual debut.

The vaccine is given three times, and there must be an interval of approximately two months between the first and second vaccination and approximately four months between the second and third vaccination. The vaccination is given free of charge to girls from the age of 12 and until they reach the age of 15. It is also free of charge for girls born in 1993, 1994 and 1995 until the end of 2010.

How long is the vaccine effective for?

The vaccine is expected to be effective for a very long time. But as it is a new vaccine, it is not known for certain. It may be necessary to repeat the vaccination after a number of years.

What are the side effects?

Tenderness, redness and swelling at the injection site are common side effects, and some girls also develop a slight fever. In rare cases, the vaccine causes hypersensitivity reactions. Read more at the website: www.stophpv.dk (Danish only)

Monitoring the vaccination programme

The vaccination programme is constantly being monitored to ensure that it is working as intended.

Any cases reported of the diseases which have been vaccinated against are registered. Moreover, the number of vaccinations performed by doctors are recorded as are the number and nature of the side effects reported. If required, changes are made to the programme.

The Danish vaccination programme works well, and the diseases which children are protected against thus rarely occur in Denmark. This is, however, not a reason to stop vaccinating. In addition to the continued risk of contracting the diseases in Denmark, there is also a risk that Danish children can be infected abroad and bring the infection home with them.

www.sst.dk/english

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