BC HealthFiles

Child Immunization Series - Number 50f
August 2003

Childhood Vaccines: Questions and Answers

Best advice from the Public Health Nurses of British Columbia

Getting your child immunized against diseases is a safe, effective and healthy choice to make.

Many parents are concerned about the side effects of vaccinations, wonder if these vaccines are safe, and if their children really need them. These concerns stop parents from getting their children the long life protection they need against many common childhood diseases – diseases that can cause serious illness and sometimes even death.

This special BC HealthFile has been developed by the public health nurses of British Columbia for parents with questions about getting their infants immunized. It presents the current information available about childhood immunizations.

Q: I hear that vaccine-preventable diseases have been almost completely eliminated in Canada. If this is so, why does my child need vaccinations?

A: Vaccine-preventable diseases continue to break out in Canada. Children and adults still need to get their "shots".

It is true that vaccines have helped us to reduce most vaccine-preventable diseases to very low levels in Canada. However, many of these diseases are still quite common, even epidemic, in other parts of the world. Travelers bring these diseases back into Canada without knowing it, and spread them to other Canadians. If we are not protected by vaccinations, these diseases can quickly spread through our population, causing epidemics here.

Children should still be vaccinated, for two reasons:

- **To protect the children**. Even if you think their chances of getting any of these diseases are small, these diseases are still out there, and can still infect anyone who is not protected; and
- **To protect people around them**. A small number of people cannot be vaccinated (because of severe allergic reactions to vaccine components, for example), and a small number of people do not respond to vaccines. For these people who cannot be vaccinated, their only hope of protection is that the other people around them **are** immune, and cannot catch these diseases and then pass them along to people who can't get vaccinated [(1)].

Q: Diseases were already starting to disappear before vaccines were introduced, because of better hygiene and sanitation. How do we know that vaccines had anything to do with reducing illness?

A: It is true that hygiene and sanitation have indeed helped reduce the overall incidence of disease. However, the evidence shows a clear link between the introduction of vaccines and huge reductions in those diseases for which the vaccines were given.

Improved economic and living conditions have no doubt helped reduce the overall amount of disease. Better nutrition and the development of antibiotics and other treatments have increased survival rates among the sick. Less crowded living conditions have made it harder for diseases to spread, and lower birth rates have meant there are fewer children to catch diseases.

But when you look at the actual incidence of disease over the years, there is no doubt that vaccines have had a significant *direct* impact, even in modern times.

For example, there were periodic peaks and valleys in the reported incidence of measles from 1920 to the present, but the real, permanent drop happened when measles vaccine started to be used in 1963[(2)]. Haemophilus influenza b (Hib) vaccine is another good example. Hib used to be the major cause of meningitis in young children, before vaccines that can be used for infants were finally developed. The number of Hib cases in Canada went down from about 2,000 cases per year in 1988 to only 26 cases in 1996[(2)].

Since sanitation is no better now than it was in 1988, it is hard to attribute the almost total disappearance of Hib disease in children in recent years to anything except the vaccine.

We can also see what happened in other countries after vaccination levels dropped off. Three countries – Great Britain, Sweden, and Japan – cut back the use of pertussis (whooping cough) vaccine because of allegations about the vaccine [3]. The effect was dramatic and immediate. In Great Britain, a drop in pertussis vaccination in 1974 was followed by an epidemic of more than 100,000 cases of pertussis and 36 deaths by 1978. In Japan, around the same time, a drop in vaccination rates from 70% to only 20 - 40% led to an increase in pertussis from 393 cases and no deaths in 1974 to 13,000 cases and 41 deaths in 1979. In Sweden, after a similar drop in immunization rates, the rate of pertussis per 100,000 children 0-6 years of age went up from 700 cases in 1981 to 3,200 in 1985

It seems clear from these experiences that not only would diseases NOT be disappearing without vaccines, but if we were to stop vaccinating, these diseases would come back. It is no surprise that all three of these countries took steps to increase their vaccination rates again, after seeing these huge increases in pertussis.

Q: Can you catch the illness from the vaccine itself?

A: In very rare instances, a person has contracted a disease from the weakened virus in a live virus vaccine. However, this is MUCH less likely to happen than getting the disease from the wild or natural virus.

A live virus vaccine contains an “attenuated” or weakened form of the virus that causes the disease. Live, attenuated virus vaccines work by multiplying in the body, where they stimulate the person’s immune system [4]. If the person’s immune system is severely compromised, the vaccine virus can over-multiply and cause disease. This can happen in people with HIV infection or AIDS, in people who have been getting treatment for cancer (i.e. radiation therapy or chemotherapy), and in people who have had an organ or bone marrow transplant and are taking anti-rejection drugs. This does not happen in persons whose immune systems are working properly. In healthy persons, the vaccine virus multiplies and in doing so stimulates the body's immune system *without* making the person sick. Persons with compromised immune systems are NEVER knowingly given a vaccine with a live virus.

Oral polio vaccine is a weakened, live virus vaccine, which can cause disease in a person vaccinated with it, although the risk of this is very low. The risk of vaccine-associated paralysis from oral polio is 1 case per 4 million doses of vaccine distributed. This compares to the 1 out of 100 risk of paralysis from polio infection. Even though the risk of vaccine-associated paralysis was very small, BC stopped using oral polio vaccine in 1994. It was replaced with inactivated (killed) polio vaccine. Another example: following measles immunization, the risk of subacute sclerosing panencephalitis (a degenerative disease of the brain) is estimated to be about 10 times less than the risk of getting it from the actual measles disease (less than one case per 1 million doses of measles vaccine compared to about 9 cases per 1 million cases of measles disease).

There are two other basic types of vaccine:

- Inactivated or killed vaccines (like inactivated polio vaccine or killed pertussis vaccine); and
- Purified protein vaccines (such as diphtheria and tetanus toxoids, Hib vaccines, and hepatitis B vaccine).

Inactivated, killed vaccines and purified protein vaccines do not have any living organisms in them. These vaccines stimulate the immune system without causing any infection [4].

Q: Is it true that the risks from the side effects of the vaccine are greater than the risks of the disease?

A: No. The risks from the side effects of the vaccine are much less than the risks of the disease.

To help put this in perspective, consider the risks from actually catching these vaccine-preventable diseases [2, 5]:

Pertussis

Pertussis (whooping cough) is a very serious childhood illness. About 1 infant out of every 170 who gets pertussis will die from it. In Canada, even though most infants get pertussis vaccine, this disease still kills 1 to 3 infants every year. The same number suffer severe brain damage. There is no proof that pertussis vaccine causes brain damage.

Measles

Measles causes encephalitis (swelling of the brain) in about 1 out of 1000 cases. One out of 3 of these cases will die, and another 1 out of 3 will survive but be left with brain damage. This same type of encephalitis happens in only about 1 out of 1,000,000

measles vaccinations. This is so rare that it is not even clear if it is the vaccine or some other infection that causes it.

Mumps

For every 10 children that get the mumps, 1 of them will get meningitis, which can cause permanent brain damage. However, only 1 out of every 800,000 children who get the mumps *vaccine* get meningitis. Since mumps is still an active disease in our society, your child is at much greater risk from meningitis if they do NOT get the mumps vaccine.

Rubella

If a woman becomes infected during her first 20 weeks of pregnancy, the chances are high (4 out of 5) that the fetus will also be infected, and will be born with a number of health problems, many of them permanent.

Q: Is vaccination safer when a child is older, rather than starting at 2 months of age?

A: There is no evidence that side effects from vaccination are more common in younger infants, or that vaccination is safer when the child is older.

The purpose of starting some vaccinations at 2 months of age is to protect the baby against serious diseases as early in life as possible. Pertussis and Haemophilus b (Hib) disease, for example, are very serious. Complications and deaths from pertussis happen most often to babies less than 6 months old. Babies respond to vaccination at a very young age [(4)].

Q: Is it true that it's better to be naturally infected with childhood diseases than to just get vaccinated against them?

A: No. The risks from natural infection are much greater than the risks from the vaccines.

The down side of vaccinations is the inconvenience of having to get several "shots", and occasional – normally very mild – side effects. But the risks of a child getting even one natural infection are a lot greater. For example:

- About 6 out of 10 children who get Hib infection will develop meningitis, and 1 out of 20 of these children (who get meningitis) will die. In other words, about 1 out of every 35 children who get Hib infection will die.
- 1 out of every 20,000 children who get mumps will become deaf.
- Natural measles infection can cause encephalitis in 1 out of 1000 cases, which can result in permanent brain damage.

These are high prices to pay for not getting your child immunized.

Q: Is it true that if a child catches these childhood diseases, they will actually stimulate the child's immune system and lead to better overall health?

A: No. Natural infections do not stimulate the immune system and do not lead to better health.

Natural infection with measles, for example, does not stimulate your overall immune system. It only gives you immunity to measles. The same is true of other infectious diseases. There is no scientific evidence that being infected with measles or any other disease helps the natural, healthy development of your immune system[(4)]. In fact, when a child gets the measles, that infection will suppress many *other* parts of your child's immune system for several months. During this time, your child will be more susceptible to a number of other infections. This suppression of the immune system caused by measles actually leads to the high rate of other infections that can complicate measles[(4)].

Q: Is it true that giving a child multiple vaccinations for different diseases at the same time increases the risk of harmful side effects, and can overload the child's immune system?

A: No. There is no evidence of this.

Children are exposed to many foreign antigens every day. Antigens are things like viruses and bacteria that your immune system reacts to. Many of these bacteria live in your mouth and nose all the time. Just eating food brings other, new bacteria into your body, exposing your immune system to still more antigens.

An infection like the "flu" exposes a child to 4 to 10 antigens, and a case of "strep throat" to 25 to 50 antigens.

A 1994 report from the Institute of Medicine, *Adverse Events Associated with Childhood Vaccines*[6], says "In the face of these normal events, it seems unlikely that the number of separate antigens contained in childhood vaccines would represent an appreciable added burden on the immune system that would be immunosuppressive" (p. 63). Indeed, available scientific data show that simultaneous vaccination with multiple vaccines has no adverse effect on the normal childhood immune system. Studies have shown that the recommended vaccines are just as effective given together as they are when given one at a time, and that these combinations carry no greater risk for adverse side effects. As a result, the Canadian National Advisory Committee on Immunization (NACI) recommends that all routine childhood vaccines be given at the same time, when they are due. Researchers are trying to combine even more vaccines into a single "shot" – for example, including chickenpox with the MMR vaccine. This has all the advantages of single vaccines, but needs fewer shots, which your child will appreciate!

Q: Does pertussis (whooping cough) vaccine cause brain damage?

A: This question has been studied very intensively over the years, and there is no evidence that pertussis vaccine causes brain damage.

Doctors have not been able to identify any way that pertussis vaccine could cause brain damage[6]. A review of all the scientific evidence by the Institute of Medicine in the United States (1991) found no evidence that pertussis vaccine causes brain damage[6]. An even more comprehensive study of this issue, the National Childhood Encephalopathy Study (NCES) (1981), also did not find a single case of permanent brain damage that was the result of any vaccination[7]. The NCES was a case control study that included 1,182 cases of serious acute neurologic (brain) illnesses in infants and children ages 2 to 35 months in England, Scotland, and Wales between July 1976 and June 1979.

Vaccinations are very common in the first 6 months of most babies' lives. Brain abnormalities, on the other hand, are very uncommon, and are often not recognized in the first 6 months of life. Most babies who have malformations of the brain or who suffer brain damage before birth or during labour and delivery appear normal for the first few months of their life, because their brain is not fully developed yet. Many of these babies are 4 to 6 months or older before it becomes clear that something is wrong with their development. A diagnosis of cerebral palsy, mental retardation, or developmental delay can usually not be made until the baby is several months old. However, by this time the baby has probably already received one or more vaccinations, sometimes with minor side effects such as fever, crying and fussiness. Since the infant appeared to be normal until after the vaccine was given, the parents may think their baby's impairment was caused by an earlier vaccination [1].

Q: Does DPT-Polio-Hib vaccination (Diphtheria, Pertussis, Tetanus, Polio and Haemophilus Influenzae Type B vaccine) cause Sudden Infant Death Syndrome (SIDS)?

A: No. In fact, babies who get the DPT Polio-Hib vaccine are *less* likely to die of Sudden Infant Death Syndrome (SIDS).

Several population-based studies have found no connection between DPT-Polio-Hib vaccination and SIDS. In fact, all of the studies found that babies who were immunized were **less** likely to die of SIDS than babies who were **not** vaccinated [6].

Q: Does MMR vaccine (used against measles, mumps, & rubella) cause inflammatory bowel disease (IBD) or Crohn's Disease?

A: MMR vaccine does *not* cause inflammatory bowel disease or Crohn's Disease.

There is no evidence that measles vaccine causes IBD or Crohn's Disease. In fact, several studies have **NOT** been able to show a possible association between the measles vaccine and IBD or Crohn's Disease. One study looked at every case of measles in pregnant women admitted to a Copenhagen hospital from 1915 to1966. None of the children of the 25 women identified in this study had developed Crohn's Disease [8]. Several research groups using sensitive and specific tests (polymerase chain reaction, or PCR) found no evidence of measles virus in the stomach and bowel tissues of patients with Crohn's Disease or ulcerative colitis [9, 10, 11].

Q: Does MMR vaccine cause autism?

A: MMR vaccine does NOT cause autism.

Autism is usually first suspected by parents when their child is about a year old, and starts to have trouble speaking. Therefore, autism that is first noticed a few weeks after MMR vaccination (which

is first given at 1 year of age) is sometimes blamed on the vaccine, even though this is an unrelated occurrence.

In 1998, from a case series of 12 consecutively referred patients, Wakefield and colleagues of the Inflammatory Bowel Disease Study Group (IBDSG), Royal Free Hospital, England, allege an association between the development of autism and MMR vaccination[12]. Parents thought that changes in their children's behaviour were the result of MMR vaccination. The authors suggest that ileal-lymphoid-nodular hyperplasia (ILNH), a non-specific colitis, causes a vitamin and nutrient malabsorption and increased gut permeability to protein, leading to the development of autism. This study has several major shortcomings however, including: a failure to detect vaccine virus in the bowel, brain or any other tissue in the cases; recall bias of parental reporting; use of a highly select patient population; and lack of controls. These study limitations make it impossible to draw any definite conclusion that MMR vaccination causes autism.

In an effort to improve upon the shortcomings of this case-series, the IBDSG added 48 more cases to the original 12, and added 42 controls[13]. However, this study suffers many of the same problems that the first study did: selection bias in cases and in controls; cases and controls differ in their baseline characteristics; no control for confounding; no measures of association; and again no measles virus found in bowel tissue.

A number of population-based studies have also looked at associations between MMR vaccination and autism. Re-analysis of a population-based study by Gillberg et al found no significant difference in the number of autism cases after MMR vaccine was introduced [14].

A well-designed and conducted population-based study by Taylor et al looked at the MMR vaccination status of 498 autistic children[15]. A steady increase in cases of autism was noted over time by year of birth.

However, there was no sudden increase in cases, or any change in the trend, after MMR vaccination was introduced. As well, surveillance of adverse events in MMR-vaccinated children in Finland by Patja et al since 1982 found that adverse events were rare, and found no reports of inflammatory bowel disease or autism[16].

Q: Does hepatitis B vaccine cause multiple sclerosis (MS)?

A: Hepatitis B vaccine does NOT cause multiple sclerosis (MS).

There is no scientific evidence that hepatitis B vaccination causes MS or other demyelinating diseases.

Because multiple sclerosis has an immunologic component whose precise mechanisms are not known, it has been suggested that something which stimulates the immune system (like a vaccine) might trigger a response that results in an auto-immune disease.

However, an important "negative" study by Ascherio et al (2001) of a large population of women, studied for many years, provides solid evidence that there was no relationship between getting hepatitis B vaccine and developing multiple sclerosis[17]. The study's design controlled for the effects of recall bias by carefully confirming the immunization dates as well as the dates when multiple sclerosis was diagnosed.

Similarly, the study by Confavreux et al (2001) shows that giving vaccines for hepatitis B, influenza, and tetanus did not make the clinical course of multiple sclerosis worse in patients who had already been diagnosed with MS[18].

Moreover, hundreds of millions of persons worldwide have been immunized without developing MS (or any other auto-immune disease). This fact alone provides important evidence against any link between MS and vaccines.

Q: I have heard that vaccines are contaminated with agents that can transmit infectious diseases. Is that true?

A: No. Vaccines are NOT contaminated with agents that can transmit infectious diseases.

Manufacturers must test cell lines used in the production of vaccines for many different infectious agents.

The following have been suggested by some as potential infectious agents:

(a) <u>Reverse transcriptase (RT):</u>

Reverse transcriptase (RT) is an enzyme that allows retroviruses to reproduce. RT cannot infect humans or animals, and it has not been shown to cause any adverse health effects in

people. Using a highly sensitive polymerase chain reaction (PCR) based assay, RT activity has been detected in minute quantities in vaccines manufactured with chick embryo fibroblasts[19]. The source of the enzyme is thought to be a partial viral genome coding for RT, believed to be integrated into chick cells hundreds or even thousands of years ago. Avian retroviruses that produce this RT are not known to affect humans. While the human immunodeficiency virus (HIV) is a retrovirus, the RT activity detected in vaccines is definitely not derived from HIV. Furthermore, the presence of RT does not confirm the presence of a retrovirus.

Measles, mumps, influenza, and yellow fever vaccines are some vaccines that have evidence of RT. The presence of RT activity does not mean there is a retrovirus present that could cause infection or illness in humans. In fact, investigations of the vaccines and the chick cells from which they were produced, conducted by the Centers for Disease Control and Prevention in Atlanta (CDC), the U.S. Food and Drug Administration (FDA), and others, have found no evidence of an infectious, transmissible retrovirus[19].

(b) <u>Simian virus 40 (SV 40):</u>

SV40 is a polyomavirus. It is not related to HIV or simian immunodeficiency virus (SIV), the virus that causes AIDS in monkeys. Limited evidence suggests that SV40 can infect humans, but there is no evidence that it causes human health problems.

In the early 1960s, Simian virus 40 was discovered in some lots of inactivated (injectable) polio vaccine and some experimental lots of oral polio vaccine. The polio vaccine in those lots had been manufactured in kidney cells from simians (monkeys) infected with SV40[16]. The control methods used at that time did not identify this agent. The formalin inactivation process used to kill the poliovirus was found to not inactivate the SV40 completely. In 1961, however, manufacturers were required to test for SV40, using modified methods and different cell cultures; and lots testing positive for SV40 were not released. A few years later, the source of monkeys used for production was changed to animals that are not infected with SV40.

People who got the polio vaccine between 1954 and 1962 may have received a dose that contained SV40. As many as 10 to 30 million persons in the U.S. could have received SV40-contaminated injectable polio vaccine. The participants of several clinical trials (approximately 10,000 persons) may have received oral polio vaccine that was contaminated with SV40. However, studies in the U.S. have shown no increased rates of cancer in persons who would have received polio vaccine between 1954 and 1962. Moreover, there is no evidence that polio vaccine given after the early 1960s contained SV40.[20]

Q: Isn't it true that if an outbreak happens, most people who have been vaccinated will get the disease anyway?

A: No. When an outbreak happens, most people who have been vaccinated will NOT get the disease.

In an outbreak, it sometimes seems like more people who have been vaccinated get the disease than those who were not vaccinated. This is because of two things:

- First, no vaccine works 100 per cent of the time – not everyone who gets their "shots" develops complete immunity. Most routine childhood vaccines prevent infection in about 9 out of 10 people.
- Second, in Canada, there are many more people who have their childhood vaccinations than do not. In most parts of Canada, about 9 out of 10 people have had all or most of their childhood "shots".

The following imaginary example shows how these two things work together to result in outbreaks in which more people who have been vaccinated get sick than those who were not vaccinated:

A school has 100 students. None have ever had measles. Five of the students are **not** vaccinated.

The other 95 have had 1 dose of measles vaccine. One day, the entire student body is exposed to measles. As you would expect, all 5 students who were *not* vaccinated get the measles. But, since 1 dose of measles vaccine only works in 9 out of 10 people, some students who *did* get the measles vaccine will *also* get the measles. In this case, 10 students who *were* vaccinated got the measles too, because they

were the 10 students out of the almost 100 students who got the vaccine but did *not* develop immunity to measles after all. So, 15 students got the measles, and 10 of those – 2 out of 3 cases – were vaccinated.

This doesn't prove the vaccine did not work. What it really shows is that:

- Only a few (about 1 out of 10) students who got their shots got the measles, even though they were *all* exposed to the measles, and
- Every student (5 out of 5) who did **NOT** have their shots **DID** get the measles.

If only half the students (50 students) had their measles shots, there would have been about 55 cases of measles!

Q: I hear there are "hot lots" of vaccine that have been associated with bad reactions and deaths. Should parents try to find the numbers of these lots and not allow their children to receive vaccines from them?

A: No. The idea that there are "hot lots" of vaccine is not true.

Some people think, wrongly, that the more adverse reports a vaccine lot is associated with, the more dangerous the vaccine in that lot is. They think that by getting a list of the number of reports per lot, a parent can tell which vaccine lots to avoid. This is misleading, because vaccine lots are not the same size and some are used for a much longer time than others. Naturally, a larger lot will be associated with more adverse events than a smaller lot[4].

So just because lot A has been associated with more adverse events than lot B, that does not necessarily mean that lot B is safer than lot A. If the number and type of reports for a particular vaccine lot ***do*** suggest that it is associated with more serious adverse reactions than are expected by chance, the Vaccine Division, Biologics and Radiopharmaceutical Evaluation Centre, Health Canada, will review the information right away, and remove the vaccine from the market if any problems are found.

Q: Do vaccinations cause cancer?

A: No. Vaccinations do NOT cause cancer.

There is no scientific evidence that vaccinations cause cancer. On the other hand, vaccinations can sometimes *prevent* cancer. Persons who get hepatitis B virus are over 40 times more likely to develop cancer of the liver than those who are not infected[1]. Because the hepatitis B vaccine stops you from getting hepatitis B, this, in turn, prevents liver cancer.

Q: Do some vaccines contain bovine-source (cow) materials from countries that have cases of BSE (Bovine Spongiform Encephalopathy), and can this cause mad cow disease?

A: A few vaccines contain bovine-source materials from BSE associated countries, but they can not cause mad cow disease.

Bovine (cow) derived materials are used to produce some vaccines. These bovine materials include fetal calf serum, lactose, casein, and polysorbate.

There is no evidence that new-variant Creutzfeldt-Jakob Disease (vCJD -- the human form of BSE) can be transmitted by vaccines. Not one case of vaccine-related vCJD has ever been reported anywhere in the world. The risk of transmitting vCJD from vaccines containing bovine-derived materials is only theoretical. Studies in the UK have not shown a connection between vaccines and any vCJD cases. At an FDA meeting in the US in July 2000, the theoretical risk of vaccine-related vCJD was estimated at "1 in 40 billion doses of vaccine". This means the risk would be one case of vCJD every 5,000 years if the entire child population of the US was vaccinated with a vaccine containing bovine-source material[21].

The cases of vCJD observed worldwide so far are not linked in any way to the use of bovine-source materials in vaccines. Dr. David Salisbury (head of the UK's immunization program) in the October 2000 issue of "Vaccine" noted that the way that vCJD cases are distributed does not justify having concerns about bovine-source vaccines[22]. These vaccines are used all over the world, but almost all cases of vCJD have happened in the UK. The age of those people who get vCJD also does not indicate a link with vaccination. According to Dr. Salisbury, human exposure to the BSE agent by any route – including eating beef – has probably been minimal until about 1983 because of the long incubation period of BSE (minimum 3 years, average about 5 years) and because of the small numbers of cattle infected in this period. However, nearly all people who have got vCJD were born well before 1983, and thus could not have got the disease from vaccination.

Q: I have heard that breast-feeding and good nutrition can prevent childhood diseases, so childhood vaccinations are not needed.

A: It is true that breast-feeding and good nutrition help prevent childhood diseases, but only while the baby is actually breast-feeding. Vaccination on the other hand gives your baby permanent immunity to many serious childhood diseases.

Everyone knows that breast-feeding is one of the best things you can do for your baby. However, breast-feeding is **not** an alternative to infant vaccination. It is true that babies who are breast fed generally have lower rates of many infections, including viral respiratory infections, ear infections and diarrhea. It is also true that breast-feeding provides some *temporary* protection against many infections when certain antibodies are present in the mother's milk (for example, if the mother has herself been immunized against common childhood diseases). However, the protection a baby gets while breast-feeding is not complete, and can be overcome if the baby is exposed to a large amount of a disease-causing organism. Also, this temporary protection goes away quickly as soon as breast-feeding stops[23]. Good nutrition helps the baby – or anyone else – fight infection and function normally. Infections are worse for anyone with poor nutrition.

Q: Does thimerosal, a component of the hepatitis B vaccine, cause autism or other neurodevelopmental disorders?

A: No. There is no evidence that this is true.

The preservative thimerosal has been used as an additive to vaccines since the 1930s because it prevents bacterial and fungal contamination, particularly in multi-dose vials. None of the vaccines that are routinely given to infants and young children in B.C. contain thimerosal.

The only childhood vaccine that used to contain thimerosal was hepatitis B vaccine. The vaccine manufacturer changed the vaccine formulation. Hepatitis B vaccine is now thimerosal-free. The old formulation of hepatitis B vaccine contained 12.5 micrograms of thimerosal in a pediatric (child's) dose, and therefore, it contained 6.25 micrograms of ethyl mercury. The daily exposure limits were set by the FDA, EPA and WHO, and based on the assumption that this exposure will continue *on a daily basis* for long periods of time. Therefore, a single dose of 6.25 micrograms – that used to be given at two, four and six months – even though it was above these daily limits, was not considered to pose a health risk to infants. The federal guidelines were not designed for intermittent exposures. Based on current theoretical assumptions, the amount of mercury exposure through a routine hepatitis B infant immunization program was well below even the most conservative, acceptable limits.

Recently in British Columbia, there has been concern expressed regarding exposure to thimerosal and a link to autism. Much of this concern in Canada and the US is based on a report by Bernard et al[25]. This report suggests the likelihood of a causal relationship and similarities in the symptoms of autism and mercury poisoning. However, a special CDC Atlanta Committee on Immunization Safety recently concluded that there is no conclusive data indicating any vaccine or vaccine-additive increases in the risk of developing autism or any other behavioral disorder.

The US Institute of Medicine Report[26], released in May 2004, updates two earlier Institute of Medicine (IOM) reports published in 2001 on possible links between autism and the MMR vaccine and thimerosal. The IOM re-affirmed its position that neither thimerosal nor MMR vaccine is associated with autism. It reviewed five large epidemiological studies conducted in the US, the UK, Denmark and Sweden since 2001, which consistently provided evidence of no association between thimerosal-containing vaccine and autism. Note: The Institute of Medicine is a private, nonprofit institution that provides health policy advice under a congressional charter granted to the National Academy of Sciences.

Conclusion:

As these questions and answers show, the benefits of immunizations far outweigh the small risk that they may present. Deciding not to have your child immunized will put your child at greater risk of catching preventable diseases, which can be serious and sometimes even life-threatening.
The public health nurses of British Columbia strongly recommend that children be immunized.

More BC HealthFiles on childhood immunization:

#50a Your Baby's Immune System and Vaccines

#50b The Benefits of Vaccinating Your Child

#50c Childhood Vaccines are Safe

#50d Childhood Vaccines: What is in the Vaccines and Why

#50e Getting Ready for Your Child's Shots

Internet Resources:

There are a number of websites that provide information on childhood vaccines.

In Canada:

- Canadian Immunization Awareness Program
  www.immunize.cpha.ca
- Canadian Paediatric Society: Caring For Kids
  www.caringforkids.cps.ca/index.htm
- Canadian Health Network
  www.canadian-health-network.ca
- Health Canada
  www.hc-sc.gc.ca

For more information, you may also want to read *Your Child's Best Shot: A Parent's Guide to Vaccination (3rd edition)* - a publication of the Canadian Paediatric Society, 2006. This is available at: www.cps.ca/english/publications/Bookstore/YourChildsBestShot.htm.

BC Centre for Disease Control
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In the U.S.A.:

- The National Network for Immunization Information – provides scientifically valid information related to immunization
  www.immunizationinfo.org
- US Department of Health and Human Services, National Vaccine Program Office
  www.hhs.gov/nvpo/
- Center for Disease Control and Prevention, National Immunization Program
  www.cdc.gov/nip/default.htm

For more BC HealthFile topics visit www.bchealthguide.org/healthfiles/index.stm, or visit your local public health unit.

Call the BC NurseLine to speak to a registered nurse, available 24-hours every day:

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- In BC, call toll-free 1-866-215-4700
- Deaf and hearing-impaired, call 1-866-889-4700
- Pharmacist available 5pm to 9am every day
- Translation services in over 130 languages upon request.

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