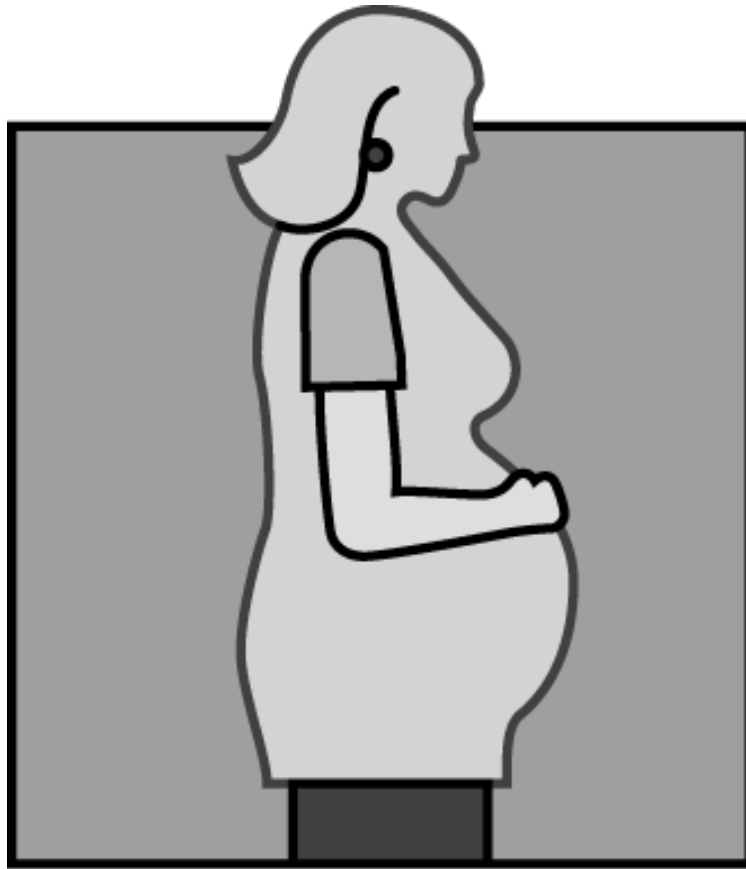


# Immunization & Pregnancy



**The Success of Immunization**

One of medical science’s great achievements has been the development and widespread use of vaccines to prevent communicable disease infections. Vaccines played a critical role in the eradication of smallpox and the elimination of wild polio from the Western Hemisphere. Other diseases that may disappear from Canada shortly, largely due to the success of universal vaccination programs, include *Haemophilus influenzae type b* meningitis and measles. However, vaccines do not come without risk. Potential vaccine use should be accompanied by a thoughtful weighing of the benefits of protection with the possible (often theoretical) risks of adverse reactions. For pregnant women and women who want to become pregnant possible risks to fetal development must be weighed against the benefits of avoiding infection during pregnancy.

**Immunization and Pregnancy**

Generally, live-virus vaccines are contraindicated for pregnant women because of the theoretical risk of transmission of the weakened vaccine virus to the fetus (*Canadian Immunization Guide (CIG), 2002*). Inactivated vaccines are generally safer because they do not replicate in the body but simply provoke an immune response. The circumstances surrounding the need for vaccination also influence the decision to immunize a pregnant woman. Situations that pose increased risk to the pregnant woman such as international travel or high risk activities such as intravenous drug use should influence the decision to immunize.

**Immunization and Breastfeeding**

Lactating mothers who have not received the recommended immunizations may safely be given routinely used vaccines postpartum. Breastfeeding does not adversely affect immunization of the infant and may improve the immune response to some vaccines. Breastfed infants should receive all recommended vaccinations at the usual times (*CIG, 2002*).

**Vaccines in Pregnancy**

The following table may be used as a general guide:

	VACCINE	PREGNANCY NOT CONSIDERED A CONTRAINDICATION	CONTRAINDICATED DURING PREGNANCY
<b>R O U T I N E</b>	Measles*		4
	Mumps*		4
	Rubella*		4
	Diphtheria	4	
	Tetanus	4	
	Polio (inactivated)	4	
	Hepatitis A	4	
	Hepatitis B	4	
	Influenza	4	
	Varicella*		4

\*Live, attenuated vaccine

## Measles

- Measles (Rubeola) causes a rash, high fever, runny nose and watery eyes. Symptoms are more common and severe for infants and adults. Complications of measles include pneumonia, encephalitis, middle ear infections, seizures and convulsions (*Toronto Public Health (TPH) Fact Sheet, Information about Measles (Rubeola), 2003*).
- Measles encephalitis occurs in approximately 1 per 1,000 reported cases and may result in permanent brain damage. In Canada, death is estimated to occur once in 3000 cases (*CIG, 2002*).
- Measles is spread through contact with droplets from the nose and throat of an infected person. Less commonly, particles from an infected person can stay in the air for long periods and infect others in the same room or in neighbouring rooms (*TPH Fact Sheet, Information about Measles (Rubeola), 2003*).
- If an unvaccinated person comes into contact with someone who has measles they can receive measles vaccine within 72 hours of exposure to prevent infection. Also, immunoglobulin, (a blood product containing antibodies that help prevent infection), can reduce the risk of infection if received within six days of exposure to an infected person. **This is usually given to people at increased risk of severe complications from measles such as infants and pregnant woman** (*TPH Fact Sheet, Information about Measles (Rubeola), 2003*).
- **Pregnant woman with measles can have premature delivery of their baby and miscarriages but measles does not cause birth defects.** (*TPH Fact Sheet, Information about Measles (Rubeola), 2003*).
- Measles vaccine is a live, weakened vaccine given in combination with mumps and rubella after the first birthday and between the ages of 4 and 6 years. People born before 1957 are considered protected from measles. Most adults born after 1970 had one shot of measles vaccine as an infant. They should get a second shot, especially if they are students at post-secondary institutions, military recruits or health care workers or if they will be travelling to areas where they may be exposed to measles such as most developing countries (*TPH Fact Sheet, Information about Measles (Rubeola), 2003*).
- **Although measles does not infect the unborn baby or cause birth defects, it is recommended that pregnant women not receive the Measles, Mumps and Rubella (MMR) vaccine** (*Your Child's Best Shot, 2002*).
- **Woman should not become pregnant for 1 month following vaccination with MMR vaccine to allow immunity to develop** (*Your Child's Best Shot, 2002*).
- Children of a woman who is pregnant may be vaccinated; viruses contained in the MMR vaccine do not spread from person to person (*Your Child's Best Shot, 2002*).

## Mumps

- Mumps causes fever, headache, earache and painful swelling of the glands in the mouth and neck. It can cause temporary or permanent deafness and swelling of the ovaries in women and testes in men, in rare instances leading to sterility (*Immunize for Good Health, Protect your Kids, 2000*).
- Complications from mumps include meningitis and encephalitis. Mumps encephalitis occurs more frequently in adults and can lead to permanent

brain damage. Mumps is spread by droplet, airborne transmission or by direct contact with the saliva of an infected person (*Your Child's Best Shot, 2002*).

- **Mumps infection during the first trimester of pregnancy may increase the rate of spontaneous abortion** (*CIG, 2002*).
- **There is no risk of birth defects if a woman is infected with mumps while she is pregnant** (*Your Child's Best Shot, 2002*).
- Mumps vaccine is a live, weakened vaccine given with measles and rubella after the first birthday. A second dose is given between the ages of 4 and 6 years (*Your Child's Best Shot, 2002*).
- **MMR is contraindicated for pregnant women because it is a live vaccine although mumps does not infect the fetus or cause birth defects** (*Your Child's Best Shot, 2002*).
- **Women of child bearing age who are vaccinated should avoid pregnancy for 1 month following vaccination with MMR to allow immunity to develop** (*Your Child's Best Shot, 2002*).
- Children of a woman who is pregnant may be vaccinated; the mumps virus in the vaccine does not spread from person to person (*Your Child's Best Shot, 2002*).

## Rubella

- Rubella (German measles) causes fever, rash, swelling of the neck glands and swelling and pain in the joints (*Immunize for Good Health, Protect your Kids, 2000*).
- It is usually a mild illness in children but more severe in teenagers and adults. It is spread by droplet, airborne transmission or by direct contact with the saliva of an infected person. Complications of rubella include joint pain, a temporary decrease in the number of platelets, congenital rubella syndrome and encephalitis. Encephalitis occurs in about 1 in 6000 cases of rubella. Permanent brain damage is uncommon after infection with rubella (*Your Child's Best Shot, 2002*).
- Rubella vaccine is a live, weakened vaccine given with measles and mumps after the first birthday. A second dose is given between the ages of 4 and 6 years of age (*Your Child's Best Shot, 2002*).
- In educational institutions emphasis should be placed on immunization of susceptible female staff and students of childbearing age because of their relatively high risk of exposure. **In addition, MMR vaccine should be given to rubella-susceptible health care workers of either sex who may, through frequent contact, expose pregnant women to rubella** (*CIG, 2002*).
- **The major goal of vaccination is the prevention of rubella infection in pregnancy, in order to prevent congenital rubella syndrome (CRS). This syndrome can result in miscarriage, stillbirth and fetal malformations, including congenital heart disease, cataracts, deafness and physical and cognitive delays. The risk of fetal damage after maternal infection is particularly high in the earliest months after conception (85% in the first trimester). This risk decreases during pregnancy and is very uncommon after the 20<sup>th</sup> week of pregnancy. Infected infants who appear unaffected by this virus at birth may later show eye, ear or brain damage. Congenital infection may become chronic and give rise to such problems as**

**diabetes mellitus later in life. An average of three cases of CRS have been reported in Canada annually in recent years (CIG, 2002).**

- **Serologic testing for rubella antibody should be a routine procedure during prenatal care for those without written evidence of immunity or prior immunization (CIG, 2002).**
- One dose of rubella vaccine should be given to all female adolescents and women of childbearing age unless they have proof of immunity, which is either a record of prior immunization or laboratory evidence of detectable antibody. It would be preferable to use MMR vaccine since a high proportion of woman susceptible to rubella are likely also susceptible to measles (CIG, 2002).
- Every effort should be made to immunize foreign born adolescents and women from countries where rubella vaccine is in limited use as soon as possible after entry to Canada or, for women who are pregnant upon presentation, immediately postpartum (CIG, 2002).
- **Women of childbearing age should be advised to avoid pregnancy for 1 month after vaccination to allow immunity to develop (Your Child's Best Shot, 2002).**
- **It is recommended that pregnant women not receive the MMR vaccine because it is a live vaccine. However, no fetal damage has been reported when the vaccine has been given unknowingly to pregnant women or to those who became pregnant shortly after immunization. Therefore, rubella vaccination of a woman who is pregnant or who becomes pregnant within 1 month should not be a reason to consider termination of pregnancy (CIG, 2002).**
- **Since up to one third of cases of CRS occur in second and subsequent pregnancies, it is essential that all women found to be susceptible during pregnancy receive rubella vaccine in the immediate postpartum period or as soon as practical after delivery. Every effort should be made to immunize before hospital discharge (CIG, 2002).**
- **It is safe to administer vaccine to those in contact with susceptible pregnant women or immunocompromised persons (CIG, 2002).**
- **Lactating mothers can continue to breastfeed after rubella immunization. Although vaccine virus has been detected in breast milk and transmission can occur, no illness has been reported in infants (CIG, 2002).**

## Diphtheria

- Diphtheria is a very serious bacterial infection that can cause breathing problems, heart failure, paralysis and in rare instances death (*Immunize for Good Health, Protect your Kids, 2000*).
- It is spread by droplets during close contact with an infected person. One to two cases have been reported annually in recent years (CIG, 2002).
- Although diphtheria is rare in Canada, recently the Newly Independent States of the Soviet Union experienced an epidemic. From 1990 to 1999 more than 150,000 cases of diphtheria occurred with 5000 deaths due to difficulties with public health service and lack of vaccination (*Centres for Disease Control and Prevention Website, 2003*).
- Diphtheria vaccine is an inactivated toxoid given in combination with tetanus, polio, pertussis and *Haemophilus influenzae type B* in early infancy and at 18 months. A booster dose of diphtheria, pertussis, tetanus

and polio is recommended in childhood between 4 and 6 years of age and a dose containing diphtheria, tetanus and pertussis is recommended in adolescence. All adults require maintenance of immunity to diphtheria preferably combined with tetanus every 10 years (*Your Child's Best Shot, 2002*).

- The vaccine prevents disease caused by diphtheria but does not prevent the persistence of diphtheria bacteria in the population (*Your Child's Best Shot, 2002*).
- People recovering from diphtheria should be vaccinated since diphtheria infection does not always provide immunity (*CIG, 2002*).
- Recent serosurveys of healthy adult populations in Canada indicate that approximately 20% of those surveyed do not have protective levels of antibody to diphtheria. The actual level of susceptibility in the general adult population may be even higher (*CIG, 2002*).

## Tetanus

- Tetanus causes painful muscle spasms, breathing failure and death (*Immunize for Good Health, Protect your Kids, 2000*).
- It is caused by a bacteria that forms spores in the soil that can infect wounds. The bacteria produces a toxin that causes the muscle spasms seen when individuals are infected (*CIG, 2002*).
- Its occurrence in nature cannot be controlled. One to seven cases of tetanus are reported annually in Canada with an average of five (*CIG, 2002*).
- The tetanus vaccine is an inactivated toxoid given in combination with diphtheria, polio, pertussis and *Haemophilus influenzae type B* in early infancy and at 18 months. A booster dose of diphtheria, pertussis, tetanus and polio is recommended in childhood between 4 and 6 years of age and a dose containing diphtheria, tetanus and pertussis is recommended in adolescence. All adults require maintenance of immunity to tetanus preferably combined with diphtheria toxoid every 10 years (*Your Child's Best Shot, 2002*).
- Active immunization against tetanus should be undertaken for those who have recovered from the disease because infection does not confer protective immunity (*CIG, 2002*).
- **There is no evidence that tetanus vaccine causes abnormal prenatal development, but it is prudent to wait until after the second trimester of pregnancy to administer a routinely required dose, to minimize any concern about the theoretic possibility of a relation with any observed birth defect (*CIG, 2002*).**
- **In the event of a tetanus-prone wound during pregnancy, if the primary immunization of the woman was incomplete or uncertain, a booster of tetanus-diphtheria toxoid and tetanus immune globulin should be given (*CIG, 2002*).**
- Neonatal tetanus may occur in infants born to unimmunized mothers under unhygienic conditions usually seen in developing countries. These mothers do not have tetanus antibodies to pass to the fetus. The umbilical stump can get infected because of improper cord care (*Vaccinating Your Child, 2000*).

## Polio

- Polio can cause paralysis, inflammation of the brain and death. People get polio from drinking water or eating food with the polio virus in it (*Immunize for Good Health, Protect your Kids, 2000*).
- The last reported case in Canada was in 1988. The spread of this virus has been diminished because of high immunization rates (*CIG, 2002*).
- Inactivated polio vaccine is recommended for routine use in Canada (*CIG, 2002*).
- Inactivated polio vaccine is given in combination with diphtheria, pertussis, tetanus and *Haemophilus influenzae type B* in early infancy and childhood. Adolescents and adults who get their shots in childhood do not require boosters to enhance prior immunizations (*CIG, 2002*).
- For unimmunized adults and those at increased risk of polio such as travellers, unimmunized parents/child care workers, laboratory workers handling specimens that contain polioviruses or health care workers in close contact with individuals infected with this virus, a series of immunization with the polio vaccine is recommended (*CIG, 2002*).
- Routine immunization against poliomyelitis of adults living in Canada is not considered necessary. Most adults are already immune and have a very low risk of exposure to wild polioviruses in the Americas (*CIG, 2002*).  
**Inactivated polio vaccine is not contraindicated in pregnancy, but its administration should be delayed until after the first trimester if possible, to minimize any theoretical risk. If risk of exposure is imminent (due to travel where wild polio is circulating for example), inactivated polio vaccine should be given (*CIG, 2002*).**

## Hepatitis A

- Hepatitis A causes fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, jaundice and in rare cases death. The virus is excreted in feces and can be spread by contaminated hands, water and food; especially uncooked shellfish (*Your Child's Best Shot, CIG, 2002*).
- Infection usually causes illness in adults and school aged children but is often asymptomatic in younger children. The severity of the illness increases with age (*CIG, 2002*).
- Hepatitis A is the most frequent vaccine-preventable disease in travellers. All travellers to intermediate or highly endemic areas should receive the vaccine prior to departure (*Statement on Hepatitis A Vaccines for Travellers, 2001 and Control of Communicable Disease Manual, 2000*).
- Hepatitis A vaccine is inactivated and 6 are licensed for use in Canada, two of these are combined with hepatitis B vaccine. The schedule varies depending on the vaccine and the age of the recipient (*CIG, 2002*).
- **The safety of hepatitis A virus vaccine given during pregnancy has not been studied in clinical trials. Since the vaccine is prepared from inactivated virus, however, the risk to the developing fetus is likely to be extremely low. Therefore, it may be given to pregnant women when indicated and can be used safely in breastfeeding women (*CIG, 2002*).**

## Hepatitis B

- Hepatitis B is a virus that can cause serious liver problems including liver failure and cancer and can be fatal (*Immunize for Good Health, Protect your Kids, 2000*).
- Hepatitis B infection is usually associated with exposure to infected blood or other bodily fluids. Sexual contact and injection drug use are common means of transmission of the hepatitis B virus. **Also, newborns of infected mothers are at high risk of becoming infected at birth. The highest risk period of transmission from an infected mother after her child is born is the first 5 years of a child's life** (*CIG, 2002*).
- **Sudden, severe hepatitis and death may occur in pregnant women and in infants born to infected mothers** (*CIG, 2002*).
- The hepatitis B vaccines currently used in Canada are prepared by recombinant (formed by recombination) gene technology. These vaccines cannot cause hepatitis B infection because there are no whole virus particles in the vaccine (*Your Child's Best Shot, 2002*).
- There are 2 hepatitis B vaccines licensed in Canada and 2 additional vaccines that are combined with the hepatitis A vaccine. The schedule varies depending on the vaccine and the age of the recipient (*CIG, 2002*).
- **All pregnant women should be routinely screened for hepatitis B surface antigen (HbsAg) at the first prenatal visit, to prevent infection in infants. If testing was not done during pregnancy, it should be done on an urgent basis at the time of delivery. If the mother's hepatitis B virus status is not available within 12 hours of delivery, serious consideration should be given to administering the vaccine and hepatitis B immune globulin (HBIG) to the baby while the results are pending, especially if there is any suspicion that the mother could be infected. If the mother is ultimately shown to have hepatitis B virus infection, a series of vaccine should also be given to the infant, the initial dose within 12 hours of birth, the second and third dose at 1 and 6 months after the first. Should the mother's infection be recognized during breastfeeding, the infant's hepatitis B virus status should be assessed urgently and if negative vaccine and HBIG should be immediately initiated** (*CIG, 2002*).
- **A pregnant woman who has no markers of acute or chronic hepatitis B virus infection but who is at high risk of acquiring the disease should be offered the vaccine at the first opportunity and tested for antibody response. Repeat testing before delivery may be considered in uninfected and unimmunized women with continuing high risk behaviour** (*CIG, 2002*).
- **Hepatitis B vaccine can be used safely in pregnancy and during breastfeeding for women in whom immunization is recommended. Since acute hepatitis B in a pregnant woman may result in severe disease for the mother and chronic infection of the infant, it should not be withheld when indicated. Although data are not available on the safety of these vaccines for the fetus, the risk is expected to be negligible since the vaccines consist of noninfectious subunits** (*CIG, 2002*).

## Influenza

- Influenza causes epidemics of flu, bronchitis and pneumonia every year in the late fall and winter (*CIG, 2002*).
- Influenza can cause mild to life threatening illness and is particularly serious for the elderly and those with chronic medical conditions (*CIG, 2002*).
- Influenza is spread from person to person through contaminated respiratory droplets or by touching surfaces contaminated with the virus and then touching the virus-laden fingers to one's mouth, nose or eyes (*Your Child's Best Shot, 2002*).
- The annual incidence of influenza varies widely and it is difficult to predict the impact of a particular virus strain on disease (*CIG, 2002*).
- Health experts conservatively estimate there are between 1,500 and 7,500 influenza related deaths in Canada per year (*Canadian Nurse, 2001*).
- Inactivated influenza vaccine is given as one injection to adults during each flu season but children less than 9 years of age with no prior history of influenza vaccination require 2 doses at least 4 weeks apart the first time they receive this vaccine (*CIG, 2002*).
- **Influenza vaccine is considered safe for pregnant women at all stages of pregnancy, and for breastfeeding mothers (*CIG, 2002*).**
- **Immunization is recommended for pregnant and breastfeeding mothers who are characterized by any of the following conditions: those at high risk of influenza-related complications, those capable of transmitting influenza to individuals at high risk of complications, those who provide essential community services and those healthy adults who wish to protect themselves from influenza (*CIG, 2002*).**
- **Any pregnant woman who wishes to decrease her risk of developing influenza may be safely immunized (*CIG, 2002*).**
- **The degree of illness due to influenza in Canadian women who are pregnant has not been established, and the preventable fraction of illness that could be achieved through the use of the vaccine in this population is unknown. The National Advisory Committee on Immunization (a national expert panel of doctors) concludes that there is insufficient evidence at this time to recommend the routine immunization of otherwise healthy Canadian women who are pregnant during the influenza season (*National Advisory Committee on Immunization, Statement on Influenza Vaccination for the 2003-2004 Season, 2003*).**

## Varicella

- Varicella is a virus that can cause scarring of the skin, pneumonia, inflammation of the brain and in rare cases death (*Immunize for Good Health, Protect your Kids, 2000*).
- It is spread easily through coughing, sneezing, or contact with infected saliva or blister fluid (*TPH Fact Sheet, Information about Vaccines against Chickenpox and Shingles, 2004*).
- In the decade from 1987 to 1996, 53 people died from chickenpox complications in Canada, 14 were children less than 10 years of age and 39 were over the age of 15 (*National Advisory Committee on Immunization, Statement on Recommended Use of Varicella Virus Vaccine, 1999*).
- Individuals from the tropics are less likely to acquire immunity in childhood and have higher rates of susceptibility as adults, especially if from rural

areas (*National Advisory Committee on Immunization (NACI), NACI Update to Statement on Varicella Vaccine, 2002*).

- The vaccine is a live weakened vaccine given as 1 dose to children 12 months to 12 years and as 2 doses to individuals 13 years of age and older (*CIG, 2002*).
- **Women of childbearing age should be asked about a prior history of chickenpox disease. Those without a history should be offered serologic testing for evidence of immunity, as most will be immune. Susceptible women should be offered the vaccine. Pregnant women without a history of chickenpox should be offered prenatal screening and if they are susceptible, postpartum immunization (*CIG, 2002*).**
- **Most pregnant woman raised in Canada are immune to chickenpox. There is a small chance (one to two infants infected out of 100) that an unborn baby may get the virus if the mother becomes infected during the first seven months of pregnancy. If this happens the baby could get congenital varicella syndrome which can cause low birth weight, skin scarring, underdeveloped arms and legs, vision problems and possibly death (*TPH Fact Sheet, Information about Vaccines against Chickenpox and Shingles, 2004*).**
- **If a pregnant woman becomes ill with chickenpox five days before she delivers and up to two days after birth, a severe infection can develop in the infant that sometimes causes death (*TPH Fact Sheet, Information about Vaccines against Chickenpox and Shingles, 2004*).**
- **There is insufficient data to support the notion that varicella causes more severe illness in pregnant women than other adults (*National Advisory Committee on Immunization, Statement on Recommended use of Varicella Virus Vaccine, 1999*).**
- **Varicella vaccine should not be given to pregnant women because the effects on fetal development are unknown. Women of child bearing age who are vaccinated should avoid pregnancy for 1 month following vaccination (*CIG, 2002*).**
- **To date, there is no data to suggest that live chickenpox vaccine accidentally given during pregnancy is harmful to the fetus (*National Advisory Committee on Immunization, Statement on Recommended use of Varicella Virus Vaccine, 1999*).**
- **Breastfeeding can continue if the mother or child is immunized (*CIG, 2002*).**
- **Chickenpox vaccine may be given to people in households with a newborn (*CIG, 2002*).**

## Immune Globulin

Immune Globulin is a blood product taken from selected recipients with high levels of antibodies to specific diseases. The length of time that passively acquired antibody persists depends on the concentration and quantity of blood product received. Pregnancy is not a contraindication to the use of immune globulins. If administration of an immune globulin becomes necessary, it can interfere with the immune response to live viral vaccines so sufficient time must be given between receiving an immune globulin and a live vaccine. There is no data to indicate that immune globulin administration interferes with the response to inactivated vaccines or vaccines against toxins. There is no known risk to the fetus from passive immunization of pregnant women with immune globulin preparations (*CIG, 1998, 2002*).

### Measles

- Immune globulin can be given to prevent or modify measles in susceptible persons within 6 days after exposure. To prevent disease, it should be given as soon as possible after exposure, preferably within 3 days. When clinical measles does not develop in a person given immune globulin, measles vaccine should be given 5 months later, provided the individual is 1 year of age or older and there are no contraindications to the vaccine preparations (*CIG, 2002*).
- **Immune globulin is recommended for pregnant women if they are exposed to measles if they have not had measles or the measles vaccine** (*Your Child's Best Shot, 2002*).

### Rubella

- **Immune globulin given soon after exposure to rubella may modify or suppress symptoms but is not certain to prevent infection, including congenital infection of the fetus. Therefore, the routine use of immune globulin in susceptible women exposed to rubella early in pregnancy is not recommended** (*CIG, 2002*).
- **Anti-Rho (Rhogam) immune globulin may interfere with response to rubella vaccine. Rubella susceptible women who receive Rhogam postpartum should either be given rubella vaccine at the same time and tested 3 months later for rubella immunity, or should be immunized with rubella vaccine 3 months postpartum with follow-up ensured** (*CIG, 2002*).

### Hepatitis A

- Hepatitis A vaccine is the preferable method of pre-exposure prevention against hepatitis A disease (*CIG, 2002*). Because immune globulin is unlikely to be more effective than hepatitis A vaccine, the vaccine without immune globulin is the preferred method of post-exposure protection against the disease (*Supplementary Statement on Hepatitis A Vaccine, 2000*). Immune globulin will provide protection against hepatitis A when administered before exposure or in the 14 days after exposure. It may be indicated if the vaccine is unavailable or unaffordable, as well as for infants less than one, immunocompromised people who may not respond to the vaccine and people for whom the vaccine is contraindicated (*CIG, 2002*).

**Hepatitis B  
Immune  
Globulin**

- **Infants born to a mother with an acute or chronic case of hepatitis B should be given hepatitis B immune globulin (HBIG) and started on a course of hepatitis B vaccine. It is important that HBIG be given within the first few hours of birth, since its benefit decreases sharply after 48 hours (CIG, 2002).**

**Varicella-  
zoster  
Immune  
Globulin**

- **Varicella-zoster immune globulin (VZIG) should be given to susceptible pregnant women exposed to a confirmed case of chickenpox. Passive immunization with VZIG is recommended providing significant exposure has occurred. There is no evidence that VZIG will prevent or alter disease in the fetus. VZIG is also recommended when there is significant exposure in newborn infants of mothers who develop varicella during the 5 days before or 48 hours after delivery. As well, VZIG is recommended when there is significant exposure in hospitalized premature infants exposed during the first weeks of life. Exposed infants less than 28 weeks gestational age should receive VZIG regardless of maternal immune status. Exposed infants between 29 and 37 weeks gestational age should receive VZIG if the mother was not immune. VZIG is of benefit if administered within 96 hours after the exposure. Protection is believed to last for 3 to 4 weeks (CIG, 2002).**

**Tetanus  
Immune  
Globulin**

- **Some individuals with immune deficiencies may not respond adequately to tetanus vaccine. Therefore, tetanus immune globulin (TIG) should be used in addition to the tetanus vaccine if a wound occurs that is not clean regardless of the time elapsed since the last booster (CIG, 2002).**
- **In the event of a tetanus-prone wound during pregnancy, if the primary immunization of the woman was incomplete or uncertain, a booster of tetanus-diphtheria toxoid and tetanus immune globulin should be given (CIG, 2002).**

**Diphtheria  
Antitoxin  
(equine)**

- **Diphtheria antitoxin is derived from animal antisera, usually horses that are hyper-immunized. This preparation is available on an emergency basis for treatment of the disease. It is not recommended for prevention of disease in close, unimmunized contacts of diphtheria cases. This is due to the substantial risk of allergic reaction to horse serum and no evidence of additional benefit from the antitoxin for contacts who have received antimicrobial treatment (CIG, 2002).**

## References

Canadian Immunization Guide, Health Canada, 2002.

Centre for Disease Control and Prevention (2003). What Would Happen If We Stopped Vaccinations? Retrieved Dec. 2003 from <http://www.cdc.gov/nip/publications/fs/gen/WhatIfStop.htm#Diphtheria>

Chin, James. Control of Communicable Diseases Manual. American Public Health Association, 2000.

More Vaccinations could Prevent Deaths Among the Elderly. The Canadian Nurse, 2001, 97 (9), 11.

National Advisory Committee on Immunization (NACI). Statement on Hepatitis A Vaccines for Travellers, January 2001, 27, 1-10.

National Advisory Committee on Immunization (NACI). Statement on Influenza Vaccination for the 2003-2004 Season, August 15, 2003, 29, 1-20.

National Advisory Committee on Immunization (NACI). Statement on the Recommended Use of Varicella Virus Vaccine, May 1999, 25, 1-16.

National Advisory Committee on Immunization (NACI). Update to Statement on Varicella Vaccine, February 15, 2002, 28, 1-7.

S., Humiston & C., Good. Vaccinating Your Child. Questions and Answers for the Concerned Parent, Peachtree Publishers, 2000.

National Advisory Committee on Immunization (NACI). Supplementary Statement on Hepatitis A Vaccine, July, 2000, 26, 1-7.

Toronto Public Health. Immunize For Good Health, Protect Your Kids, 2000.

Toronto Public Health. Fact Sheet: Information about Vaccines against Chickenpox and Shingles, 2004.

Toronto Public Health. Fact Sheet: Information about Measles (Rubeola), 2003.

Your Child's Best Shot, Canadian Paediatric Society, 2002.