



For more information about the Organization of Teratology Information Specialists or to find a service in your area, call (866) 626-6847 or visit us online at: www.OTISpregnancy.org.

Chemotherapy and Pregnancy

This sheet talks about the risks that exposure to chemotherapy can have during pregnancy. With each pregnancy, all women have a 3% to 5% chance of having a baby with a birth defect. This information should not take the place of medical care and advice from your health care provider.

What is chemotherapy?

Chemotherapy is a term that describes the use of drugs to treat various types of cancer. It is one of the most widely used methods to treat cancer. Other types of cancer treatment include surgery and radiation. Surgery and radiation treat cancer *locally*. When a chemotherapeutic drug is given orally or intravenously, it enters the bloodstream and circulates throughout the body. Different combinations of the above three methods are used to improve cancer treatment.

How does chemotherapy work?

Cancer cells are different from normal cells in your body. These abnormal cells multiply and grow rapidly, potentially spreading to other areas of your body. Chemotherapy interferes with cancer cell growth. Each drug has its own specific use, potency, and side effects.

Will I be able to become pregnant after having chemotherapy?

When chemotherapeutic drugs interfere with the division of cancer cells, they also interfere with the division of normal cells, including those in the reproduction system. This may affect a woman's ability to become pregnant. For most women, reproductive function may return to normal within months after chemotherapy has been completed. For some it may take several years. The degree of effect that these agents have on reproductive function varies from one drug to another. Some agents inhibit reproductive function completely and others have only a limited effect. In general, younger women are more likely to regain reproductive function than older women.

I had chemotherapy as a child. I am now pregnant. Will my previous exposure to these drugs cause birth defects in my baby?

Probably not. So far there are no studies that indicate that exposure to chemotherapeutic agents in childhood increases the risk for birth defects in the children of women who later become pregnant.

If I need chemotherapy in early pregnancy, can it cause birth defects?

Yes, it can. While there have been case reports of health babies born to women who underwent chemotherapy during the first trimester, there is a potential risk for birth defects. The risk for birth defects to occur is greatest when the fetus is exposed to chemotherapy during the first trimester of pregnancy. This is because the first trimester is when many of the internal and external structures of the fetus are formed, and it is a period of rapid cell growth. Since chemotherapeutic drugs interfere with cell growth and division, the fetus is most vulnerable during this period of time. Exposure to chemotherapeutic drugs during the first trimester may also increase the risk for miscarriage. Therefore, whenever possible, chemotherapy is avoided during the first trimester of pregnancy.

Are there any risks from chemotherapy later in pregnancy?

The risk for birth defects is less when chemotherapy is administered in the second or third trimester. With a few exceptions (such as the brain and the reproductive system), most fetal organ system development is completed by the beginning of the second trimester. However, exposure to chemotherapeutic drugs in the second and third trimester has been associated with a greater risk for premature birth, low birth weight, and a temporary reduction in some of the baby's blood cells.

Are some chemotherapeutic drugs safer than others?

Yes. When the infants of women who underwent chemotherapy during pregnancy were examined, maternal treatment with certain drugs showed a stronger link with an increase in birth defects than others. Although no chemotherapeutic drug can be considered totally safe for use in pregnancy, certain drugs may be less likely to cause birth defects. In addition to the specific chemotherapeutic drug used for maternal therapy, factors such as the number of different medications used at the same time, how often and how long the medications are used, and when in pregnancy the medications are taken may also influence the outcome. Please call OTIS at 1-866-626-6847 to speak with an information specialist about your specific treatment.

If I undergo chemotherapy while I am pregnant, can it have delayed adverse effects on my baby?

Since there are some theoretical concerns that delayed adverse effects could potentially occur following prenatal exposure to chemotherapeutic drugs, more research needs to be done in this area. Therefore, it is recommended that babies be monitored for normal growth and development during pregnancy and after delivery.

Is it safe to breastfeed my baby while I am having chemotherapy?

No, breastfeeding is not recommended while women are receiving chemotherapy. Although it is not known how much of these medications are secreted in breast milk, there could be serious side effects in the nursing infant. These side effects could include suppression of the immune system and an increased risk for cancer.

If the father of my child has undergone chemotherapy will this affect my pregnancy?

Men who are facing cancer treatments may wish to consider sperm banking (freezing and storing) before treatment. Sperm production is frequently affected during cancer treatment. Although sperm production may return to normal after chemotherapy, it is not guaranteed. In addition, damage to the structure of chromosomes in sperm may occur. It is believed that most of the damage is not permanent, but some studies have detected higher than normal levels of abnormal sperm for years after the end of chemotherapy. Although the data are limited, if sperm production

resumes, it appears that a man's treatment with chemotherapeutic agents prior to conception does not increase the risk of birth defects in future children.

April 2008.

Copyright by OTIS.

Reproduced by permission.



References:

- Abeloff MD, ed. 2000. Clinical oncology. 2nd ed. New York, NY: Churchill Livingstone.
- Aviles A, et al. 1991. Growth and development of children of mothers treated with chemotherapy during pregnancy: Current status of 43 children. *Amer J Hematol* 36:243-248.
- Aviles A and Niz J. 1988. Long-term follow-up of children born to mothers with acute leukemia during pregnancy. *Med Ped Oncol* 16:3-6.
- Balmer CM and Valley AW. 2002. Cancer treatment and chemotherapy. In Dipiro JT, editor. *Pharmacotherapy: A pathophysiologic approach*. 5th ed. New York, NY: McGraw-Hill Companies, Inc. p 2217.
- Berry J, et al. 1999. Management of breast cancer during pregnancy using a standardized protocol. *J Clin Oncol* 17:855-861.
- Blatt J, et al. 1980. Pregnancy outcome following cancer chemotherapy. *Am J Med* 69:828-832.
- Cardonick E and Iacobucci A. 2004. Use of chemotherapy during human pregnancy. *Lancet Oncol* 5:283-291.
- Chapman RM, et al. 1979. Cyclical combination chemotherapy and gonadal function. *Lancet* 1:285-289.
- Doll DC, et al. 1989. Antineoplastic agents and pregnancy. *Sem Oncol* 16:337-346.
- Gabbe SG, Niebyl JR, Simpson JL, eds. 2002. *Obstetrics: normal and problem pregnancies*. 4th ed. New York, NY: Churchill Livingstone.
- Green DM, et al. 2003. Pregnancy outcome of partners of male survivors of childhood cancer: a report from the childhood cancer survivor study. *J Clin Oncol* 21(4):716-721.
- Gilliland J and Weinstein L. 1983. The effects of cancer chemotherapeutic agents on the developing fetus. *Obstet Gynecol Survey* 38:6-13.
- Lipshultz SE, et al. 1991. Late cardiac effects of doxorubicin therapy for acute lymphoblastic leukemia in childhood. *New Engl J Med* 324:808-814.
- Mertens AC, et al. 2001. Late mortality experience in five-year survivors of childhood and adolescent cancer: The childhood cancer survivor study. *J Clin Oncol* 19(13):3163-3172.
- Meyer-Wittkopf M, et al. 2001. Fetal cardiac effects of doxorubicin therapy for carcinoma of the breast during pregnancy: case report and review of the literature. *Ultras Obstet Gynecol* 18:62-66.
- Morris ID. 2002. Sperm DNA damage and cancer treatment. *Int J Androl* 25:255-261.
- Nicholson HO. 1986. Cytotoxic drugs in pregnancy. *J Ob/Gyn Br Comm* 75:307-312.
- Roboz J, et al. 1979. Does doxorubicin cross the placenta? *Lancet* 2:1382-1383.
- Sausville EA and Longo DL. 2001. Principles of cancer treatment. In Braunwald E, editor. *Harrison's Principles of Internal Medicine*. 15th ed. New York, NY: McGraw-Hill Companies, Inc. p 546.
- Steinherz LJ, et al. 1991. Cardiac toxicity 4 to 20 years after completing anthracycline therapy. *JAMA* 226:1672-1677.

Other Resources/Websites:

2003. Hodgkin's lymphoma during pregnancy. [online]. Available: http://www.cancer.gov/cancerinfo/pdq/treatment/hodgkins-during-pregnancy#Section_1 [2003, July 21].
- Welt CK and Taylor AE. 2003. Ovarian failure due to anticancer drugs and radiation. [online]. Available: http://www.uptodateonline.com/application/topic.asp?r=/application/topic.asp&file=r_endo_f/3003&type=A&selectedTitle=11-276&app=utdol [2003, July 21].
2003. Detailed guide: cancer (general) chemotherapy. [online]. Available: http://www.cancer.org/docroot/CRI/content/CRI_2_4_4x_Chemotherapy_72.asp?sitearea=CRI [2003, July 21].
- Motherisk <http://www.motherisk.org/cancer/index.php3>
- Cancer in Pregnancy Registry, Jefferson Medical College, Dr. Elyce Cardonic <http://www.jefferson.edu/obgyn/info/cp.cfm>

If you have questions about the information on this fact sheet or other exposures during pregnancy, call OTIS at 1-866-626-6847.