



# Workplace Reproductive Health Hazards by John T. Jankovic



We know that some substances, as well as certain conditions in the workplace, can affect the ability of parents to have healthy children, or to have children at all. These we will call **reproductive hazards**.

Substances that we call reproductive hazards are not always man-made/industrial chemicals: some are found naturally in the environment and some are even drugs made from plants. Reproductive hazards may not even be chemicals; they may be physical conditions like heat, vibration, noise, and radiation. Some of the reproductive hazards found at work can also be found at home or in public places.

What we will call **reproductive health effects** include: (1) delay or prevention of pregnancy; (2) termination of pregnancy; (3) decreased physical or mental health of the baby; (4) malformations.

Much is not known about what are reproductive hazards. Therefore, your awareness and knowledge are one of the best defenses in keeping risks small. This pamphlet will discuss who is at risk, when is risk greatest, what may be risky, and sources for help when you have questions.



## MALE OR FEMALE, WHO'S AT RISK

Many people believe that males are not affected by reproductive hazards and many employers don't realize that male workers, as well as female workers, need reproductive health protection at work.

In a general way both males and females can be similarly affected by reproductive hazards. The sperm in males and the eggs in females can be targets. Male and female sex hormone production and regulation can also be targets. Of course there are also a number of ways females can be affected that are different than for males. Some ways involve differences in the way our bodies react, but mainly it is because the female is carrying the child. Even when the reproductive hazard is to the child the male could carry home the substance and transfer it to the mother or child. Reproductive hazards can be dangerous for both sexes or specific for one sex. In some cases parental exposures that involve things like genetic changes can later be passed to a newly conceived child long after the exposure to the parents occurred.

Whether an individual (man, woman, child) is affected depends on how much and for how long they are exposed to the reproductive hazard, when and how they are exposed, and their own personal characteristics. In other words **not everyone that is exposed gets the damage.**

## WHAT MAY PUT ME AT RISK?

### PHYSICAL AGENTS

**Ionizing radiation:** Both males and females are believed to be susceptible to reproductive health effects from ionizing radiation. For men the testes are the target while for women it is the unborn child. **The risks associated with the usual occupational exposures are believed to be minimal.** Dose, time into the pregnancy, and personal factors are critical elements of exposure and the resulting level of risk.

**Nonionizing radiation:** Both males and females are believed to be susceptible to reproductive health effects from nonionizing radiation. There are several occupational uses of nonionizing radiation. Two major ones are radiofrequency/microwave heating and ultrasound cleaning and mixing. For radiofrequency/microwave the chance for harm is related to the heating of tissues. **Staying within occupational exposure limits are believed to be protective of the unborn child.**

For men there is at least one study showing reduced sperm counts in a worker group. **Ultrasound energies** in cleaning tanks are great enough to produce cavitation (formation and collapse of air bubbles in the liquid) which **can be hazardous to the unborn child**, but it's unlikely that continuous direct contact with the mother's body would happen.

**Visual Display Terminals (VDT's):** VDT's are sources of ionizing and nonionizing radiation. The risks for spontaneous abortion and birth defects have been studied for years. Although controversial, the general conclusion is that **for normal use, women do not need to stop using VDT's during pregnancy.**

**Physical work:** Employment outside the home does not automatically increase the risk of a bad pregnancy. However, **strenuous work may place some women at high risk for preterm labor.** Job modification may be needed for health, safety, and comfort during the last three months of pregnancy. The American Medical Association Advisory Panel on Reproductive Hazards in the Workplace has published guidelines on how far into pregnancy various job tasks can be performed by low-risk women.

**Heat:** In animal studies, excessive heat clearly can cause birth defects. **Internal body temperatures in pregnant women greater than 102 degrees F increases the risks for birth defects. For men both long term and short term heat exposures can lower the numbers of sperm cells and their mobility resulting in lowered fertility.** Occupational guidelines developed by the National Institute for Occupational Safety and Health can guard against internal body temperature elevation above 100 degrees F, if they are followed.

**Noise:** Sound is easily transmitted to the unborn child. Animal studies suggest that loud noise of high or low frequency increases the risk of fetal loss and growth retardation. Human studies have not provided certain results so that current information is not good enough to set a noise exposure limit for the unborn child. **It has been recommended that pregnant women avoid occupational noise exposures over 85 decibels,** the level at which employees are placed in a hearing conservation program.

## CHEMICAL AGENTS

The Occupational Safety and Health Act has been interpreted by the courts to include protection from reproductive as well as other injuries caused by toxic substances. While only three chemicals (lead, dibromochloropropane, ethylene oxide) have specific limits to exposure based in part on potential reproductive health, there are clear links between reproductive effects and mercury, glycol ethers, and some pharmaceuticals.



The Registry of Toxic Effects of Chemical Substances (RTECS), published by the National Institute for Occupational Safety and Health, is a list of substances for which there is some information relating to possible health risks from overexposure. In April of 1999 there were more than 145,000 substances on this list. Of these, 6,000 substances (4%) are listed as “reproductive effectors”. Of the 6,000 reproductive effectors, 1,000 (0.7% overall) have human data. These substances include general industrial and domestic chemicals, metals, solvents, agricultural chemicals (pesticides/fungicides/herbicides), disinfectants, gases, and pharmaceuticals. Some are man-made while others occur naturally.

## WHEN SHOULD I SEEK OUTSIDE HELP?

The list of possible reproductive hazards is too large to list here, but if you work with or around industrial chemicals, drugs, hormones, or agricultural chemicals in any form (dust, liquid, gas) **you should ask questions about the potential for reproductive risk.**

Your role in this whole process is similar to that of a patient, that is, others are going to provide you with some information. **You are the decision maker.** You take information from knowledgeable people, combine it with your information and concerns and come up with your idea of risk. You decide whether the level of risk is ok or needs to be reduced or eliminated. You should seek outside help anytime you don't have enough information to form an idea about an acceptable level of risk.

Male or female, **you should not wait until your family is started to ask these questions** since your ability to father or conceive could be affected. Also, some effects that happen now can still be transferred later.

## **SOME QUESTIONS I SHOULD ASK?**

### **THINGS ABOUT THE SUBSTANCE**

Is what I am working with or around **known to be a reproductive hazard** (you could start by looking at the Material Safety Data Sheet)?

Does the substance have **male or female effects**, or both?

What are **the effects** (this important to go with timing of exposure)?

Is the substance a **solid, liquid, or gas**?

### **THINGS ABOUT THE ENVIRONMENT**

Is it likely that I will be in **contact with the substance** (you probably are the best source for this information)?

How much **will I be exposed** to (you may need assistance to determine how much)?

**When and how long** will I be exposed (establish the time frame of exposure)?

**How will I be exposed** (breathing/touching)?

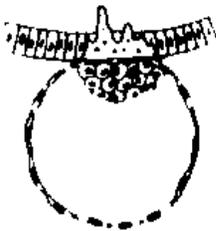
With the answers to these questions, you can begin to get some idea of your risk, great or small.

## WHO CAN I ASK?

Some others are available to help you get an idea of this risk. Your **personal physician** should be able to help you make risk decisions once you provide information on the substance. For information about the substance and the environment, the **plant safety and health** people or the State and Federal safety and health workers should be able to assist you. **The National Institute for Occupational Safety and Health** (NIOSH) provides information on workplace hazards through a hotline. For assistance call 1-800-356-4674 or visit the NIOSH homepage at <http://www.cdc.gov/niosh>.

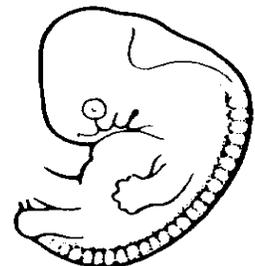
## WHEN AM I MOST AT RISK?

While pregnancy is often the trigger used by employers to provide protection from reproductive hazards, we know that both men and women are susceptible to some types of reproductive effects **at any time** during their normal reproductive life. However, the unborn child has different susceptibilities as pregnancy progresses.



During the first couple of weeks after conception, death of the embryo is the most likely outcome from overexposures to reproductive hazards. Since the woman is not aware of the pregnancy at that time, the loss usually goes unnoticed.

Beginning around the third week of pregnancy and continuing through the tenth week or so, the embryo is rapidly forming distinct body parts. It is during this period that overexposures may result in major birth defects like malformation of the limbs. Some pregnancies may progress several weeks into this period before the pregnancy is known by the mother.





The rest of the pregnancy is called the “fetal” period. During this time the unborn child (fetus) is not as likely to develop visible malformations from overexposures. The effects are more likely to result in reduced capacities, such as lower IQ. Low birth weight and shortened term are other examples of risks.

After birth, during the “neonatal period” the child remains susceptible to some reproductive hazards. Exposures can happen when the substances are brought home on the clothes of the parents. If the mother is exposed to a substance that gets into the breast milk while at work, she can transfer the substance to the child during feeding.

The drug thalidomide is a good example to point out some of the important things just discussed above. Thalidomide, developed in England, was used as a sedative and was believed to be very safe until reports of malformed children born to mothers who received the drug during pregnancy began to appear. Absence or deformity of the limbs was the principal effect. Limb development begins around the middle of the third week and continues through about the seventh or eighth week. First important point: The damage could be done before the woman knew she was pregnant. **Controlling reproductive hazards only after pregnancy becomes known may be too late for some substances.** Second important point: Thalidomide is only a reproductive hazard during the time that limbs and major organs are being formed. **Substances may have specific times when they are particularly hazardous.** Third important point: The effects of the drug on adults were well known. The effects on the unborn child were not. **What is a safe exposure for an adult is not necessarily safe for the unborn child.**

## SUMMARY

Statistics from 1994 indicate that about 7% of live births are of low birth weight and about 10% are preterm. Both of these situations are risk factors for infant death. Major birth defects occur in about 3% of live births and about 16% of pregnancies result in miscarriage. Over the last 30 years or so sperm counts have decreased 30 to 40%. The causes for much of this are unknown.

**Hundreds of substances with known reproductive effects exist.** Exposure limits to these substances are most frequently based on acute health effects or cancer risk and rarely on reproductive effects. Most of the substances listed in the Registry of Toxic Effects of Chemical Substances have not been assessed for their reproductive hazard. In 1991, the Government Accounting Office, the investigative arm of Congress issued a report titled “Reproductive and Developmental Toxicants: **Regulatory Actions Provide Uncertain Protection.**” This has changed little, if at all, partly because testing can’t keep up with the number of new chemicals being developed.

The goal of this pamphlet then is to inform you about the uncertainty of reproductive health risks at work and to provide you with some ways to get information about your work that may **help you make decisions about your own reproductive health protection.**

## SOME ADDITIONAL READING AND RESOURCES

NIOSH pamphlet “The Effects of Workplace Hazards on Female Reproductive Health” at <http://www.cdc.gov/niosh/99-104.html>

NIOSH pamphlet “The Effects of Workplace Hazards on Male Reproductive Health” at <http://www.cdc.gov/niosh/malerepro.html>

Proposition 65 List: California maintains an updated list of “chemicals known to cause cancer or reproductive toxicity” at <http://www.oehha.ca.gov/prop65/pdf/zip/8991stA.pdf>

**The National Toxicology Programs Center for the Evaluation of Risks to Human Reproduction at <http://cerhr.niehs.nih.gov/>**

**Occupational and Environmental Reproductive Hazards: A guide for Clinicians, edited by Maureen Paul, M.D., M.P.H., Williams and Wilkins, 428 East Preston St., Baltimore, Maryland 21202, 1993.**

**Reproductive Hazards of the Workplace, Linda M. Frazier, M.D., M.P.H. and Marvin L. Hage, M.D., Van Nostrand Reinhold, 115 Fifth Avenue, New York, NY 10003, 1998.**