



Environmental Health and Safety Office

Fact Sheet

Laboratory Safety and Health During Pregnancy

Introduction

Pregnant women should avoid unnecessary exposure to chemicals at home—and while at work. Since the beginning of the 20th century, thousands of new synthetic chemicals have been developed, and only a small portion of these chemicals have been adequately studied to determine whether they pose a risk of cancer or birth defects. Therefore, it is particularly advisable to limit any unnecessary chemical exposure during pregnancy.

Certain chemicals are known or suspected to harm fetuses or the reproductive health of adults. The first trimester of pregnancy is a period of high susceptibility and often a woman does not know that she is pregnant during part of this period. Individuals of childbearing potential are warned to be especially cautious when working with such reproductive toxins. These individuals must use appropriate protective apparel to prevent skin contact, injection, or inhalation of these toxic or infectious substances.

While the BSU *Chemical Hygiene* (laboratory safety) *Plans* are designed to protect all laboratory workers from exposure to chemical, biological, radiological, and physical hazards—particular care, practices, or enhanced procedures may be advisable for pregnant employees in some laboratory settings.

Pregnant women and those intending to become pregnant should seek advice from knowledgeable sources before working with substances that are suspected to be reproductive toxins. These sources include, but are not limited to, their health care provider, their Laboratory Supervisor or Principal Investigator, Material Safety Data Sheets (MSDS), and the BSU Environmental Health and Safety office. Supervisors and the EHS Office should always be notified of any orders from the employee's health care provider, and of any incidents of exposure or spills involving these, or other substances or hazardous materials.

By using prudent work practices, most laboratory workers who are pregnant or planning pregnancy can work safely in research laboratories without exposing themselves or the fetus to potentially harmful chemicals.

Reproductive Hazards in the Laboratory

Basic laboratory chemical hygiene practices for everyone (such as wearing protective gloves and washing hands frequently), as established in the BSU *Chemical Hygiene Plan*, are always important when working with hazardous materials-including chemicals, biologic agents, and radiation. These practices are even more important for women who work in laboratories while they are pregnant or attempting to become pregnant. Some university laboratories may contain a number of dangerous chemicals or other agents, some of which may harm the reproductive system or pose a hazard to a developing fetus if exposure is not adequately controlled.

Reproductive toxins are chemicals which affect the reproductive system, including mutagens (those which cause chromosomal damage) and embryotoxins. Embryotoxins (or fetotoxins) may be lethal to the fertilized egg, embryo or fetus, may be teratogenic (able to cause fetal malformations), may retard growth, or may cause post-natal functional deficiencies. Other reproductive toxins may cause sterility or may affect sperm motility. Radiation, some chemicals, certain drugs (legal and illegal), cigarettes, some viruses, and alcohol are other examples of reproductive hazards.



Some chemicals may cross the placenta, exposing the fetus. A developing fetus may be more sensitive to some chemicals than its pregnant mother, particularly during the first twelve weeks of pregnancy, when the mother may not know she is pregnant. Proper handling of chemicals and use of protective equipment is especially important to reduce fetal exposure to chemicals.

A few examples of known or suspected reproductive toxins include: anesthetic gases, arsenic and certain arsenic compounds, benzene, cadmium and certain cadmium compounds, carbon disulfide, ethylene glycol monomethyl and ethyl ethers, ethylene oxide, lead compounds, organic mercury compounds, toluene, vinyl chloride, xylene, and formamide. It should also be noted that some substances may cause adverse reproductive effects in males, including 1,2-dibromo-3-chloropropane, cadmium, mercury, boron, lead, and some pesticides. A more complete, though still partial, list of known or likely reproductive toxins is provided in **Table 1** accompanying this Fact Sheet (*source-Ohio State University*). Adequate protection from exposure to the vast majority of those constituents is already provided through the protective precautions established in the BSU *Chemical Hygiene Plan*.

Infectious agents that pose minimal risk to otherwise healthy individuals also pose a higher risk to pregnant women or their babies due to changes in immune response as a result of pregnancy. It may take up to 6 weeks after the end of pregnancy for the maternal immune system to return to normal. For example, pregnant women exposed to *Listeria* have a much higher chance of developing listeriosis. Also, many common infectious agents pose significant risks to the developing fetus. The most commonly cited examples of infectious agents/diseases is abbreviated by the acronym TORCH: toxoplasmosis, other infections (e.g. Hepatitis B, syphilis, Varicella-Zoster, HIV, Parvovirus B19, *Listeria*, *E. coli* and group B streptococci), Rubella, Cytomegalovirus, and Herpes simplex. Exposure to live vaccine material is another source of potential exposure to pregnant women.

A zoonotic disease is one that can be transmitted from animals to humans. Almost any of the zoonotic disease agents that can infect healthy people pose more of a risk of infection for people who are pregnant. If you have questions regarding the species you are working

with, or any potential exposure risks, please inquire with your Department, or contact the BSU EHS Office to investigate.

Pregnant employees who work with radiation should inform the Principal Investigator, or their supervisor, as soon as they know they are pregnant in order to further minimize radiation exposure. This notification is best provided in writing and should be immediately forwarded to the BSU Radiation Safety Officer. The *BSU Radiation Safety Plan* addresses additional precautions for pregnant employees.

Reproductive Health and Pregnancy Safety: Resources

Pregnant laboratory workers should discuss the work they perform and the hazardous materials they handle with their personal health care provider to determine what, if any, work restrictions are needed. In some cases, certain chemicals may need to be substituted for other reagents in the laboratory-alternate work assignments established-or- certain activities curtailed -for the duration of the pregnancy. Any restrictions requested by the physician should be promptly discussed with the laboratory's Principal Investigator, Laboratory Supervisor, or the BSU Chemical Hygiene Officer.

There are several campus resources available to assist your personal physician in making these evaluations, including the EHS Office and physicians at the BSU Health Center (285-8431). However, normally the supervisor or Principal Investigator of the laboratory in which you work will have the most complete and immediate knowledge of any substances or conditions in their laboratory that may present a particular exposure risk during pregnancy. If you provide the EHS Office with a list of the specific chemicals you use, microbiological specimens you handle, or physical exposures (radioactive sources, nanoparticles, etc.), and provide the Health Center with the name of your obstetrician or health care provider, we can help evaluate appropriate exposure-control measures.

Specific federal and state regulations apply to pregnant workers' exposure to radiation. If you work with radiation-producing machines or radioactive materials, the BSU Radiation Safety Officer (Saiful Islam, 285-8086) can provide information on exposure precautions and regulatory limits during pregnancy.

Faculty members and laboratory supervisors are responsible for training and instructing laboratory personnel in the appropriate ways to protect themselves from hazards in the laboratory. Students, employees, guests and visitors are responsible for learning about the hazards in the workplace, using personal protective equipment, and following proper work practices. This instruction must be protective of pregnant employees--as well as other laboratory workers.

Standard Precautions

Women who are pregnant or attempting to become pregnant should follow all protocols under the *BSU Chemical Hygiene Plan* and strictly apply the following standard exposure-control practices whenever they are working in a campus laboratory. These same precautions will help protect men from chemical exposures that might affect the male reproductive system and will help prevent contaminants being brought home to spouses on clothing.

1. Prevent accidental chemical ingestion or contamination by practicing basic hygiene in the laboratory. Never eat, drink, chew gum, apply cosmetics, or make other hand-to-mouth contact in the laboratory. Always wash your hands with soap and water after handling chemicals and when leaving the laboratory.
2. Always handle volatile chemicals at least six inches inside a properly operating chemical fume hood with the sash placed between you and the material. Biosafety cabinets should be used when designated for the biological work being performed. Radiation sources should be handled only as directed. Normally, the recommended radiation exposure for pregnant workers is limited to one-tenth (1/10th) that allowable for employees who are not pregnant.
3. Wear appropriate personal protective equipment including a laboratory coat, closed-toe shoes, disposable impermeable gloves, and safety glasses (or goggles when using liquids). The specific protective equipment worn should be tailored to the task that is being performed. For example, face shields, rubber aprons, and heavy-duty gloves should be used for strong corrosives. For assistance in selecting the proper personal protective equipment, refer to the appropriate Material Safety Data Sheet, the *Chemical Hygiene Plan* for the particular laboratory or procedure, or contact the BSU Environmental Health and Safety Office (285-2807).
4. Take a fresh look at the safety precautions spelled out in your laboratory's *Chemical Hygiene Plan*. The procedures and equipment established in the Plan were developed to also provide adequate protection, in most circumstances, to persons who are or may be pregnant.
5. Discuss any concerns you, or your health care provider, may have about potentially hazardous laboratory operations or conditions with your Principal Investigator (PI), Supervisor, or Department Head. If your concerns are not adequately addressed, contact the BSU Environmental Health and Safety Office.

Special Precautions for Pregnant Laboratory Workers

Please remember that particular reproductive risks and hazards may exist within certain BSU laboratory facilities and that you are a critical component in safeguarding your reproductive health--this applies to both men and women. In addition, laboratory workers who are pregnant or attempting to become pregnant need to take extra precautions to promote the best possible outcome of the pregnancy. The following guidelines are highly recommended to protect you and the developing embryo or fetus:

1. Consult with your personal physician about your work conditions and activities in order to plan a safe course of action pre-conception, during pregnancy, and post-partum. Any restrictions placed by the physician should be immediately brought to the attention of the Principal Investigator, Laboratory Supervisor, or Department Head; and, if necessary, the BSU EHS Office.
2. Clear communication and cooperation among the laboratory worker, the Principal Investigator or Laboratory Supervisor, and the BSU EHS Office are necessary to conduct a thorough hazard assessment of laboratory operations and conditions, which may otherwise put the developing embryo or fetus at risk. In cases where a pregnancy is planned, the laboratory worker should initiate the hazard assessment prior to conception because certain chemical exposures may affect fertility success or critical fetal development in the earliest stages. At a minimum, the hazard

assessment should include a review of those chemicals present in the laboratory that may be reproductive toxins and other fundamental risks such as working with or around infectious or radioactive materials.

3. In addition, this same group (worker, supervisor and safety personnel) may need to work together in developing a plan and finding creative solutions to ensure a safe work environment during the pregnancy. In some cases, work activities and conditions may need to be modified - such as working in a separate laboratory, substituting extremely hazardous reagents with less harmful ones, or focusing on a different aspect of research (e.g. theoretical instead of synthetic).
4. For the health of the developing embryo or fetus, the pregnant individual and laboratory coworkers must strictly adhere to the safety guidelines in the BSU *Chemical Hygiene Plan*.

Remember, it is **always** important to follow proper laboratory safety practices to prevent unsafe chemical exposures. For women of childbearing age, it is particularly important because fetal damage from chemical exposure may occur prior to a woman realizing she is pregnant. If you would like further assistance in establishing safe chemical handling practices in your laboratory, contact the BSU EHS Office.

Any laboratory worker or student safety concerns should first be discussed with the Laboratory Supervisor or Principal Investigator. If you feel that your concerns are not adequately recognized, evaluated, or addressed, please contact the Department Head or the BSU Environmental Health and Safety Office (765-285-2807).

Associated Document: *Table 1—Partial List of Reproductive Toxins (OSU); or Table 11, Appendix 3, of the BSU Chemical Hygiene Plan*