



## **Reproductive Hazards and the Pregnant Worker**

### **A. INTRODUCTION**

#### **Reproductive Hazards**

The term reproductive hazard refers to agents (radiation, x-rays, chemicals or biologicals) that affect the reproductive health of women or men to have healthy children. Reproductive hazards may have harmful effects on libido, sexual behavior, or sperm or ovum development. They could also affect fertilization and the development of the ovum. While the effects of reproductive hazards may be reversible for the parent, the effects on the fetus or offspring is invariably permanent.

Researchers in academic laboratories can potentially encounter a range of reproductive and developmental hazards. This document is intended to provide some general guidelines on how laboratory workers can protect themselves from these hazards and to provide resources for further information.

#### **Reproductive Toxins**

Reproductive toxins are defined by the OSHA Laboratory Standard as substances that cause chromosomal damage (mutagens) and/or substances with lethal or teratogenic (malformation) effects on fetuses. Teratogens may affect the conceptus at any stage of its development, from fertilization to birth, although damage is most likely during the first 8 to 10 weeks of pregnancy. Mutagens can also affect conceptus development, or prevent fertilization entirely by damaging the egg or sperm. In addition, there are microbiological agents that can cause maternal morbidity, miscarriage, fetal death or birth defects.

Teratogens are chemical and physical agents that interfere with normal embryonic development. Teratogens differ from mutagens in that there must be a developing fetus. Reproductive toxins may produce congenital malformations or death of the fetus without inducing damage to the pregnant woman. In general, you should consider carcinogenic, mutagenic and teratogenic chemicals hazards to reproductive health. Even though OSHA has established hazardous material exposure limits, a developing fetus can suffer adverse effects at lower doses than those considered safe for adults. Thus, you must keep exposures as low as reasonably achievable to minimize reproductive health hazards.

CSUF is committed to providing additional protection for the conceptus, and establish specific procedures to protect pregnant employees and students.

#### **Employees**

Control of employee exposures will occur without economic penalty or loss of job opportunity, including, if necessary, consideration for work assignment changes, consistent

with University personnel policy. Assuring protection from exposures to radiation and/or chemicals for the conceptus requires full cooperation of the employee with the Department of Environment, Health and Safety (EHS). If you wish to take advantage of this policy, contact EHS as soon as possible after determining or contemplating pregnancy, to ensure implementation of these policies.

## Students

Although your labs may not be working with chemicals known to be highly teratogenic (malformation effects on fetuses), it is considered prudent for pregnant women to limit their exposure to all potentially teratogenic chemicals; common examples could be alcohol, prescription/non-prescription drugs, vaccines, or a disease present in the mother. Furthermore, CSUF cannot insure that a pregnant student will not be exposed to chemicals that might be unhealthy for her or her fetus. However, it is expected that all students, including pregnant students, should be able to carry out lab procedures safely by focusing on excellent lab hygiene, always using appropriate PPE, and properly using the chemical fume hood or other engineering control to minimize exposures. Ultimately, the student should certainly be seeking and following proper medical advice from her physician (OB/GYN).

### Protection from Reproductive Hazards in the Lab

1. Become familiar with the potential reproductive hazards used in the lab.
2. Work with chemicals, especially volatile ones, in a chemical fume hood.
3. Store chemicals in sealed containers when they are not in use.
4. Immediately address any chemical spills or contaminated workspaces (e.g. the balance area).
5. Always use personal protective equipment: a lab coat, eye protection, gloves that are resistant to the chemicals being used, and other protective equipment relevant to the hazards being worked with.
6. Wash hands before eating, drinking, or smoking.
7. Notify the PI ahead of time if you are pregnant and particularly toxic reproductive hazards are being used so that extra precautions can be taken.
8. To prevent home contamination:
  - a. change out of contaminated clothing before going home
  - b. store street clothes in a separate area to prevent contamination
  - c. wash contaminated clothes separately from other laundry
  - d. avoid bringing contaminated clothing or other objects home

### Examples of Reproductive Hazards in Everyday Areas

Reproductive hazards are not confined to chemistry or biology laboratories. They are often in use every day – in the home, the office, in the doctor’s office, the art studio, on the stage. While these hazards seem to be everywhere, exposures can be reduced or eliminated.

For example, alcohol is a reproductive hazard, yet you can eliminate your exposure by avoiding its consumption. Heavy metals, such as mercury and lead, can be found in batteries, paint, and ink. Knowledge of the product’s ingredients can allow you to choose an alternative, which contains none of these hazardous substances. Some herbicides and pesticides have been shown to have effects on human reproductive systems. Organic solvents, such as xylene, toluene and carbon tetrachloride, are commonly used in cleaning agents, and paint removers. Read the label to find out what is in the cleaning fluid and change products if necessary.

## B. CHEMICAL AND RADIOLOGICAL REPRODUCTIVE HAZARDS

A thorough list of chemicals known to the State to cause cancer or reproductive toxicity can be found in California’s Office of Environmental Health Hazard Assessment (<https://oehha.ca.gov/proposition-65/proposition-65-list>). This list includes agents that cause fetal developmental toxicity, damage the male/female reproductive cells, or other difficulty with conception. Examples of reproductive toxins commonly found in laboratories include:

1,3-Butadiene	Lead
Ethylene thiourea	Dibromochloropropane
Arsenic	Mercury compounds
Fluorouracil	Ethylene dibromide
Benzene	Polychlorinated biphenols (PCBs)
Halothane	Ethylene glycol monomethyl (and ethyl) ethers
Cadmium	Toluene
Ionizing radiation	Ethylene oxide
Carbon disulfide	Urethane

Please refer to <https://oehha.ca.gov/proposition-65/proposition-65-list> for a thorough listing.

## C. MICROBIOLOGICAL REPRODUCTIVE HAZARDS

Certain microbiological agents can cause miscarriages, fetal death and birth defects. Employees and students can be exposed to these agents via splashes or contact with mucous membranes, needlesticks or ingestion. The following agents are known to be reproductive hazards:

- Cytomegalovirus (CMV). CMV is a known teratogen and congenital infection can cause mental retardation, cerebral palsy, epilepsy, vision and hearing problems especially during the first 20 weeks of fetal development.
- Hepatitis A, B, C. Prenatal infection can cause prematurity and psychomotor retardation.
- Human Immunodeficiency Virus (HIV). HIV can affect fertility. HIV can also be transmitted to the fetus.
- Human Parvovirus (Fifth Disease). Prenatal infection with human parvovirus can cause fetal edema and death. Intrauterine infection may cause fetal anemia.

- *Listeria monocytogenes*. This bacterium is found in a variety of animals including mammals and birds so is of special concern to employees handling animals. Perinatal infections occur transplacentally and can result in abortion, stillbirth, meningitis, endocarditis, or septicemia.
- Rubella virus (German measles). Congenital rubella syndrome (CRS) may occur in infants born to women who had rubella during the first trimester. This can lead to fetal death, spontaneous abortions, congenital malformations of the eyes, ears and heart, mental retardation and/or poor childhood growth. The risk decreases with fetal development.
- *Toxoplasma gondii* (toxoplasmosis). Congenital cases can result in abortion and stillbirth. Live births may result in central nervous system disorders, hydrocephaly, or mental retardation. Transplacental infection is least likely during the first trimester, but these cases are the most severe. Cats can carry this disease and employees conducting experiments with cats may need to take additional precautions.
- Varicella virus (Chicken Pox). Congenital infection can cause limb atrophy, microcephaly, cortical atrophy, motor, sensory and eye problems. Infection during the first trimester can cause miscarriage, muscular atrophy, clubbed foot, CNS disease and cataracts in the fetus.

This list is not all-inclusive and EHS will evaluate work exposures to all infectious materials once an employee or student has declared her pregnancy.

#### **D. DECLARED PREGNANCY**

If you wish the University to be involved in protecting your fetus, and exposures to the fetus kept below the 500 millirems limit if you are a radiation worker, you must declare your actual, suspected, or planned pregnancy by submitting the “Pregnancy Declaration Form” (See Appendix A) to your supervisor and EHS in writing, or by e-mail. The University's responsibility for conceptus protection begins only after receipt of this notice of pregnancy, or intended pregnancy, to your supervisor and EHS. The involvement of supervisors is an essential part of the University's safety management. EHS urges every potentially pregnant employee or student to consider her supervisor's safety responsibilities and freely involve the supervisor in all work-related situations.

#### **E. CONCEPTUS PROTECTION PROGRAM**

Following written or e-mail notice of pregnancy or intended pregnancy to the Biological Safety Officer, Chemical Hygiene Officer, or Radiation Safety Officer (RSO), EHS institutes a Conceptus Protection Program (CPP). The CPP consists of three elements.

##### **1. Confidential Conferences**

Conferences include the employee or student, her supervisor, and EHS specialists. The employee or student is provided a copy of this policy and other pertinent literature on protecting pregnant employees and students from chemical, biological and radiological exposures. Following the conference, EHS sends an assessment report to the employee or student and supervisor relating findings and

recommendations of work involving hazardous materials. In some cases, adjustments should be made in work responsibilities, if practicable, to avoid higher risk operations.

EHS understands that employees and students may choose to maintain their pregnancy status as personally confidential for a time. Any employee or student may still receive safety information about pregnancy and chemical, biological, and radiological exposures at any time from EHS without declaring her pregnancy status.

## 2. EHS Review of Laboratory Safety

EHS will conduct a review of the laboratory or worksite safety plan to ensure that it provides appropriate guidance to protect workers and prevent occupational exposures. EHS inspects the work place to ensure that adequate engineering controls, such as laboratory hoods, are provided, and that safe handling procedures and the use of personal protective equipment are in place. Employees and students have the responsibility of adhering to University safety procedures described in the Chemical Hygiene Plan, Biological Safety Manual and the Radiation Safety Manual.

## 3. Radiation and Chemical Exposure Monitoring

EHS will monitor employee and student exposure levels for radiation and any chemicals of concern, especially those with evidence of reproductive toxicity. The employee or student, and principal investigator, or supervisor, shall receive a copy of the monitoring report. The goal is to keep all exposures as low as reasonably achievable (ALARA).

EHS performs the personnel radiation monitoring through the Radiation Safety section. EHS assigns the radiation worker a monthly fetal monitoring dosimeter and/or places her on a monthly bioassay program, if working with radioactive iodines  $^{125}\text{I}$ ,  $^{131}\text{I}$ , and  $^{123}\text{I}$ , or is doing work with more than 100 mL of tritium ( $^3\text{H}$ ) during a month.

The worker's regular whole body dosimeter, and ring dosimeter (if applicable) will remain on a quarterly exchange cycle and will be used as the dose of record.

## F. ACTION LEVELS

### Radiation Exposures

As part of a revision of regulations in January, 1994, the Nuclear Regulatory Commission (NRC) issued a rule limiting fetal radiation dose received as a result of a pregnant worker's occupational exposure to 500 mrem in the gestation period. For this limit to apply, the regulation requires the woman to declare pregnancy in writing and give the estimated date of conception. If a woman chooses not to declare, or decides to "undeclare" it, the normal occupational dose limit of 5,000 mrem per year would be in effect with the provision to maintain occupational radiation exposure "as low as reasonably achievable" (ALARA).

### **Action Level I:**

Employees or students with exposures greater than 30 millirems in a month. The RSO or designee shall send a written description of the dose report statistics, including the dose history for the previous two monitoring periods, to the person involved with a copy to the Authorized User. EHS asks the individual and their supervisor to review his or her radiation safety procedures and work habits in an effort to maintain all doses as low as reasonably achievable.

### **Action Level II:**

Employees or students with exposures greater than 40 millirems in a month. The RSO shall conduct a direct investigation of the situation, including an interview with the person involved. The RSO prepares a written investigation report, including trends over the past one year (as available) for that person. The RSO provides a copy of the report to the employee or student for review and signature. Conclusions drawn from the investigation provide a basis for confirming or modifying the dose and for establishing corrective actions to undertake.

The supervisor should respond to requests in accordance with Human Resources personnel policies.

EHS accepts doses reported from personnel monitoring badges generally as an uncorrected guide to any conceptus dose. If personnel monitoring results indicate the possibility of a conceptus dose in excess of the 500-millirem limit, a special investigation will result. The investigation will take into full consideration the type and energy of radiation involved, protective shielding that might have mitigated conceptus dose, and shielding afforded by the mother's body. The employee or student and EHS will discuss the investigation results, and a written report provided.

### **Chemical Exposures**

As stated earlier, the goal is to keep all exposures to both radiation and chemicals as low as reasonably achievable. The actions taken in response to a measured chemical exposure depend on the specific circumstances and chemicals involved. However, as a general rule, if any exposure measurements exceed 10% of the threshold limit value (TLV) or permissible exposure limit (PEL) action will be taken to prevent further exposure by instituting engineering controls, improved work practices, personal protective equipment (PPE), or job reassignment.

### **Microbiological Exposures**

There are no action levels for microbiological agents. Many of the agents listed above can be safely handled at Biosafety Level 2 practices and containment (culturing HIV requires Biosafety Level 3 practices). Biosafety Level 2 practices include wearing gloves, lab coats and eye protection, conducting any aerosol generating procedures inside of a biological safety cabinet, decontamination of surfaces, frequent handwashing, and no eating, drinking,

smoking or handling contacts in areas where infectious materials are handled. Please refer to the CSUF Biological Safety Manual for more detailed information. These practices are required to protect the employee and student; however, some procedures conducted in the laboratory may be higher risk for pregnant employees and students and should be evaluated by EHS. In addition, the risks to the fetus from exposure to these pathogens may warrant restriction from use during a pregnancy. EHS in consultation with the employee or student, and their supervisor will determine when restriction or additional personal protective equipment is necessary.

### **Your rights at CSUF**

You have the right to attend any class regardless of your reproductive status. However, it is recommended that you always find out of any potential exposures prior to class so you can make the appropriate decisions.

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## Appendix A to Reproductive Hazards and the Pregnant Worker

### Pregnancy Declaration Form

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I, \_\_\_\_\_, voluntarily declare my pregnancy to California State University, Fullerton, 800 North State College Blvd. Fullerton, CA 92831 on \_\_\_\_\_. I understand I will be working in a laboratory/studio at Fullerton which contains chemicals and or radioactive materials known to the state of California to cause cancer or reproductive toxicity. Access the chemical list website at <https://oehha.ca.gov/proposition-65/proposition-65-list>. I understand exposing a pregnant female to excessive amounts of chemicals listed as teratogens may cause damage to the developing embryo or fetus. Teratogenic chemicals are included in a broader category of chemicals labeled with an "R" in the special information area on chemical warning labels and the Safety Data Sheet(s).

Environmental Health and Safety is the primary source of information on using any chemical at Fullerton. I may obtain a list of chemicals used in my research or instructional lab/studio from the Principal Investigator/Instructor. I understand I may obtain Safety Data Sheets on chemicals used by accessing the EHS Office website <http://ehs.fullerton.edu/>, and accessing Safety Data Sheets on the home page, Services section.

I understand California State University, Fullerton encourages me to provide the list of chemicals used to my health care provider, so I may make the most informed decision throughout my pregnancy while working with chemicals and or radioactive materials.

Note: I may revoke this declaration at any time without explanation by submitting a signed and dated statement requesting the revocation.

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

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### Pregnancy Consultation Form

\_\_\_\_\_ (declared pregnant woman) reviewed the risks of working with chemicals and or radioactive materials through the Reproductive Hazards and the Pregnant Employee/Student program. If working with radiation while pregnant, the declared pregnant woman received a complete copy of the U.S. Nuclear Regulatory Commission Regulatory Guide 8.13, and given the option to participate in a monitoring program for pregnant workers.

Declared Pregnant Woman\* (signature): \_\_\_\_\_ Date: \_\_\_\_\_

Estimated Conception Date: \_\_\_\_\_ Estimated Delivery Date: \_\_\_\_\_

EHS Representative or Radiation Safety Officer (signature): \_\_\_\_\_

\* I understand the radiation exposure limit set by the Nuclear Regulatory Commission for embryo/fetus of the declared pregnant worker is 500 mrem (5 mSV) for the entire gestation period. In line with CSUF's policy of minimizing radiation exposure, I will continue to maintain occupational radiation exposure "as low as reasonably achievable" (ALARA).