

IACUC Policy #:	540
Policy Title:	<i>Animal Research Using Carcinogens and Other Hazardous Substances</i>
Date Approved:	September 21, 2017
Date Reviewed:	November 18, 2020

Purpose:

The Occupational Safety and Health Administration (OSHA) regulates certain carcinogens, mutagens, and reproductive toxins as “particularly hazardous substances¹.” The regulation requires that personnel with potential exposures to such agents be informed of the hazards of these compounds, and protected from exposure risk.

A chemical is considered a carcinogen if it is included on any of these lists:

- OSHA-regulated carcinogens as listed in Subpart Z of the OSHA standards²
- The National Toxicology Program (NTP) most recent edition of *The Annual Report of Carcinogens*, in the category “known to be carcinogens”³
- The International Agency for Research on Cancer (IARC) most recent edition of Group 1 chemicals (carcinogenic to humans); Groups 2A and 2B (reasonably anticipated to be carcinogens) that cause significant tumor incidence in experimental animals under specified conditions are also included⁴

The SIUC Institutional Animal Care and Use Committee (IACUC), in consultation with the SIUC Center for Environmental Health and Safety (CEHS) has established this standard operating procedure for working with animals exposed to particularly hazardous substances. Such substances can include tamoxifen, cisplatin, paclitaxel, bromodeoxyuridine, doxorubicin, and other declared or suspect carcinogens from the authorities listed above.

Tamoxifen is an antiestrogen drug widely used in the treatment of hormone-dependent breast cancer in postmenopausal women, and is sometimes used as a prophylactic treatment for women who have a high risk of breast cancer⁵. Certain tamoxifen metabolites are found in plasma after exposure to tamoxifen, and may be reasonably expected to be present in animal bedding when the animals have been exposed to tamoxifen.

Cisplatin is a platinum-based antineoplastic agent used to treat sarcoma, small cell lung cancer, lymphoma, and other cancers in humans⁶. It is classified as possible carcinogen and mutagen, and is associated with cardiac arrhythmias.

Paclitaxel is a potent antineoplastic taxane drug, classified as a teratogen, and can cause long-lasting harmful effects to aquatic life⁷.

Bromodeoxyuridine (BrDU) is a synthetic thymidine analogue used to identify actively growing cells. It is classified as cytotoxic, mutagenic, and teratogenic⁸.

Doxorubicin is an antineoplastic anthracycline drug classified as a suspect carcinogen. When administered to animals, it may be excreted into bedding for up to four days after administration⁹.

Policy:

Laboratory Work

All laboratory personnel working with carcinogens must receive annual chemical safety training, and must receive drug-specific training for handling the particularly hazardous substance. Training must be documented in the employees' training records.

The two greatest risk factors for preparation and administration of carcinogens are usually the generation of aerosols, and unintentional parenteral exposure.

Personnel mixing solutions of carcinogens, preparing doses, and administering injections must wear appropriate personal protective equipment: a lab coat, safety glasses or goggles, nitrile gloves. Feet and legs must be completely covered. Activities involving carcinogen preparation must be performed in a chemical fume hood.

Pregnant women, or women who intend to become pregnant, should not work with particularly hazardous substances.

Needles used for injection or gavage must be disposed in a sharps container immediately following use.

Spills of powdered carcinogen compounds, or liquid solutions, should be wiped up and the paper towels placed in a red bag with a biohazard sticker on it. The spill area should be decontaminated with a 20% solution of household bleach, or a 70% solution of ethanol or isopropanol, followed by washing the area with soap and water; the contaminated paper towels should also be placed in the red bag. Red bags should be placed in the freezer, and a biowaste pickup request should be filed electronically with CEHS.

Areas in which carcinogens are prepared or administered should be immediately cleaned with 20% solution of household bleach, or a 70% solution of ethanol or isopropanol following each task, with contaminated paper towels disposed as described above.

Animal Husbandry

Cages of animals who have been exposed to carcinogens must be clearly labeled with a sticker indicating the possible presence of a carcinogen. Current literature indicates that many carcinogens and their metabolites can be excreted in feces and in urine, so may be present in soiled animal bedding.

Personnel changing cages of animals exposed to carcinogens must do so in a vented dump station, collecting the dirty bedding in a red biohazard bag. The red bag should then be labeled

with a biohazard sticker and put in the Vivarium freezer, for incineration by CEHS. Personnel must wear appropriate personal protective equipment: lab coat, safety glasses or goggles, face covering/respirator, and nitrile gloves.

Following euthanasia, animal carcasses which have been exposed to carcinogens must be placed in red biohazard bags, appropriately labeled, put in the freezer, and incinerated by CEHS.

I. References

1. Occupational Safety and Health Administration, Toxic and Hazardous Substances, 29 CFR 1910.1450 [Chemical Hazards and Toxic Substances - Overview | Occupational Safety and Health Administration \(osha.gov\)](#)
2. 1910 Subpart Z – Toxic and Hazardous Substances, [1910 Subpart Z - Toxic and Hazardous Substances | Occupational Safety and Health Administration \(osha.gov\)](#)
3. National Toxicology Program, The Annual Report on Carcinogens, <https://ntp.niehs.nih.gov/whatwestudy/assessments/cancer/roc/index.html>
4. International Agency for Research on Cancer, [Agents Classified by the IARC Monographs, Volumes 1–134 – IARC Monographs on the Identification of Carcinogenic Hazards to Humans \(who.int\)](#)
5. Report on Carcinogens, 14th Edition, National Toxicology Program, Tamoxifen <https://ntp.niehs.nih.gov/ntp/roc/content/profiles/tamoxifen.pdf>
6. Tel Aviv University, Standard Operating Procedure for the use of Cisplatin in Animals, https://safety.m.tau.ac.il/sites/safety.tau.ac.il/files/media_server/safety/S.O.P.%20for%20Cisplatin%20in%20animals.pdf
7. Tel Aviv University, Standard Operating Procedure for Paclitaxel (Taxol) in Animals, https://safety.m.tau.ac.il/sites/safety.tau.ac.il/files/media_server/safety/S.O.P.%20for%20Paclitaxel%20in%20animals.pdf
8. University of Southern California, Safety Guideline: Bromodeoxyuridine <https://ehs.usc.edu/files/SOP-Bromo-Deoxyuridine.pdf>
9. University of Toronto, Work with Doxorubicin and Treated Animals, <https://ehs.utoronto.ca/wp-content/uploads/2015/10/Doxorubicin.pdf>