Bromo-Deoxyuridine

Standard Operating Procedure

Revision Date: 02/13/2024

# This standard operating procedure (SOP) outlines the handling and use of BrdU. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling BrdU. All laboratory workers must read and understand the [*Laboratory Emergencies SOP*](https://ehs.umich.edu/wp-content/uploads/2022/05/LaboratoryEmergencyProceduresSOP.docx) prior to commencing any work in a laboratory.

# Description [Provide additional information as it pertains to your research protocol]

BrdU is commonly used in research to detect replicating cells in living tissues. Bromodeoxyuridine (5-bromo-2'-deoxyuridine, BrdU) is a synthetic nucleoside that is an analogue of thymidine. BrdU can be incorporated into the newly synthesized DNA of replicating cells (during the S phase of the cell cycle), substituting for thymidine during DNA replication. Antibodies specific for BrdU can then be used to detect the incorporated chemical thus indicating cells that were actively replicating their DNA. Binding of the antibody requires denaturation of the DNA, usually by exposing the cells to acid or heat. Because BrdU can replace thymidine during DNA replication, it can cause mutations, and its use is therefore potentially a health hazard.

## Process [Write the steps for using the chemical in your research protocol]

# Potential Hazards [Provide additional information as it pertains to your research protocol]

* BrdU is cytotoxic.
* BrdU can cause heritable genetic damage, harm to the fetus, reproductive disorders and may alter genetic material.
* Possible routes of exposure to BrdU include inhalation, ingestion, and dermal absorption.
* Target Organs: Immune system
* While the exact metabolism and elimination of BrdU is unknown, BrdU that is not immediately taken up by replicating cells most likely is eliminated within a relatively short time. Most BrdU research involves sacrificing the animals within a short time period after administration to analyze BrdU incorporation.

BrdU can cause mutations in DNA and appropriate precautions should be taken to avoid exposure. Pregnant and lactating women should avoid exposure to BrdU and animals that have been administered BrdU or use additional PPE. As BrdU exposure can impair the immune system; immunocompromised individuals should also use extreme caution when handling BrdU.

# Engineering Controls [Provide additional information as it pertains to your research protocol]

Aerosols may be produced during any open handling of dry powder and during open or pressurized manipulations of suspensions. BrdU must be weighed, prepared and reconstituted in a fume hood.

Care should be taken to avoid exposures to bedding dust when handling animals that have been administered BrdU.

# Work Practice Controls [Provide additional information as it pertains to your research protocol]

* All tasks having potential for occupational BrdU exposure, i.e. mixing of doses, dose preparation, administering of injections, etc., should only be conducted by research personnel that have been authorized and properly trained by the LD for BrdU safe handling.
* LDs will develop and implement standard operating procedures (SOPs) for training staff on the preparation and administration of BrdU with minimal potential for exposure.
* Areas where the material are prepared and/or administered should be cleaned immediately following each task utilizing a 5% to 10% bleach/water solution
* Animals receiving BrdU through the water supplied in water bottles may be housed in standard SPF animal facilities.

# Personal Protective Equipment [Provide additional information as it pertains to your research protocol]

* Standard nitrile laboratory gloves and a fully buttoned lab coat with sleeves extending to the wrists must be worn when handling BrdU. When handling suspensions or solutions, choose a glove that is protective against the solvent. If gloves are splashed or come in contact with BrdU, change them as soon as possible.
* If splashes may occur, wear goggles or a face shield. Otherwise, wear standard laboratory safety glasses.
* Double nitrile gloves must be worn when administering to animals or working with needles.
* In cases where the arms or torso may be exposed to liquid suspensions or dry particles, wear Tyvek sleeves and/or gowns (or other air-tight non-woven textile).
* The animal facility may have additional requirements for housing areas see facility signs for requirements.
* All water containing BrdU that is administering to animal via drinking water must be labeled.

# Transportation and Storage [Provide additional information as it pertains to your research protocol]

* Place BrdU into syringes or small vials prior to transport to the animal facility.
* BrdU used in drinking water must be diluted in labs before transport to the animal facility.
* Place prepared BrdU in a labeled secondary container for transport to the animal facility.
* Following administration dispose of all containers that contain BrdU, (e.g., vials, syringes) from the animal facility in receptacles provided.

# Waste Disposal [Provide additional information as it pertains to your research protocol]

* All needles will be disposed of in sharps container – do not recap or bend needles.
* All gloves and containers used in these procedures must be collected for disposal through Environment, Health & Safety (EHS) HazMat (3-4568).
* All water that is not consumed by the animals must be collected, labeled and submitted for disposal as a hazardous material. Additionally, all cages whose bedding becomes wet with BrdU water (i.e., cage floods, drips, etc.) must also be treated as a potential hazard. The wet bedding should be collected and labeled for disposal by EHS HazMat.

Because most spent, unused, and expired chemicals/materials are considered hazardous wastes, they must be properly disposed of. **Do not dispose of chemical wastes by dumping them down a sink, flushing in a toilet or discarding in regular trash containers, unless authorized by EHS Hazardous Materials Management (HMM).**  Contact EHS-HMM at (734) 763-4568 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to the EHS [Hazardous Waste](http://ehs.umich.edu/haz-waste/) Web page for more information.

# Emergency Reporting

Report all emergencies, suspicious activity, injuries, spills, and fires to the University of Michigan Police (DPSS) by calling 911 or texting 377911. Register with the [University of Michigan Emergency Alert System](http://dpss.umich.edu/emergency-management/alert/) via Wolverine Access.

# Training of Personnel

All personnel are required to complete the ***General Laboratory Safety Training*** session (**BLS025w** *or equivalent*) via the [EHS My LINC](http://ehs.umich.edu/education/) Web page. Furthermore, all personnel shall read and fully adhere to this SOP when handling the chemical.

# Certification

I have read and understand the above SOP. I have received approval from my Lab Director to perform this procedure. I agree to contact my Lab Director if I plan to modify this procedure.

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### Major Revisions (Tracking purposes only -- Do not print as part of SOP)

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| Date | Revision |
| 09-13-18 | EHS name and logo were added, updated the formatting, and revised the content under Exposure/Unintended Content (AKJ). |
| 03-04-19 | Reviewed and updated. |
| 05-17-23  | Reviewed and updated (IWT) |
| 02-13-24 | Reviewed and updated (IWT) |