

Use of 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP)

Purpose:

To provide guidance for the use of MPTP in the laboratory and animal facility environment. MPTP is used at UW-Madison in animal research for a variety of research applications.

Precautions:

The following information can be used to complete the Safety section of your animal protocol.

1. Chemical hazard agents – (Identify the category of the chemical) :
 - Toxicant/Toxic Agent
2. Containment preparation – (Containment equipment required for the preparation of the chemical): (*Select Fume Hood or Externally-Vented BSC and Other including the information listed for Other*)
 - Fume Hood
 - Externally vented Biosafety Cabinet
 - Other – A written exposure plan must be in place and Selegiline must be available in the event of an exposure. Selegiline supply must be checked monthly to ensure good condition and that it is not expired. Selegiline must be located in an area that is immediately accessible from all areas where MPTP is used. Selegiline can have serious or fatal interactions with common foods and medications; these foods and medications must be discontinued 24 hrs prior to beginning work with MPTP. (Attach appendix 1 for foods of concern.) Before starting any medication or starting work with MPTP, inform your physician that you work with MPTP and may be required to take Selegiline for an exposure.
3. Containment animals – (Containment equipment required for chemical administration and handling animals after exposure to the chemical): (*Select Fume Hood or Externally-Vented BSC and Other including the information listed for Other*)
 - Fume Hood or
 - Externally vented BSC
 - Other: Animals must be chemically or physically restrained prior to MPTP administration.

NOTE: For Rodents: Microisolator or other containment type housing is recommended (disposable caging is recommended).

4. PPE needed - (for handling live animals, carcasses or animal waste/dirty bedding):
(*Select all of the following and include additional information for Other*)
 - Exam gloves – nitrile
 - Exam gloves – latex
 - Safety glasses/goggles
 - Lab coat or disposable gown
 - Other – Two pairs of chemical resistant gloves. Frequent glove changes are recommended. Mucosal protection (N95 respirator) is required when there is a high splash potential or when handling animals outside of a fume hood/ducted BSC. For rodents: a disposable lab coat with Tyvek sleeves. For Primates: A Tyvek jumpsuit.

5. Waste Disposal: (disposal of animal waste/dirty bedding from animals after exposure to the chemical) (*Select both options and include additional information for Other*)
 - Bag animal waste/dirty bedding and place sealed bag in secondary container and place secondary container in regular trash.
 - Other: Signage is required on each individual cage containing the chemical health hazard symbol and “Agent, End date and Disposal method”. Signs are removed when special handling time has ended. *Cage signage available at www.ehs.wisc.edu

6. Carcass disposal: (Select the following)
 - Pick up by EH&S for incineration.

7. Chemical human risk: (Add the following)

MPTP is considered very hazardous and all employees must be properly trained by their PI/Supervisor prior to starting work with MPTP. MPTP is a neurotoxin that causes permanent symptoms of Parkinson's disease. Injection of MPTP causes rapid onset of Parkinsonism, however, MPTP itself is not toxic, and as a lipophilic compound can cross the blood-brain barrier. Once inside the brain, MPTP is metabolized into a toxic cation 1-methyl-4-phenylpyridinium (MPP+) by the enzyme MAO-B of glial cells. MPP+ primarily kills dopamine-producing neurons in a part of the brain called the pars compacta of the substantia nigra. Because MPTP itself is not directly harmful, toxic effects of acute MPTP poisoning can be mitigated by the administration of monoamine oxidase inhibitors (MAOIs) such as selegiline. MAOIs prevent the metabolism of MPTP to MPP+, minimizing toxicity and preventing neural death. Hence, quick treatment of exposures to MPTP with selegiline will prevent the development of Parkinson's symptoms.

References:

“Procedures for Working with MPTP OR MPTP-Treated Animals”, NIH Office of Research Services.

<http://www.ors.od.nih.gov/sr/dohs/safetyresources/pages/publications.aspx>

“1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine SDS”

<http://www.sigmaaldrich.com/catalog/product/sigma/m0896?lang=en®ion=US>