UNIVERSITY OF WYOMING | Research and Economic Development

Lipopolysaccharide (LPS, Endotoxin)

OVERVIEW

Hazard Characteristics

- Pyrogen (causes fever)
- Exacerbates respiratory illnesses
- Can cause allergic skin reactions

Background Information Summary

LPS, also known as endotoxin, is a structural component of the cell wall of gram-negative bacteria. While it occurs naturally in the environment, particularly in homes with household pets, it can produce a strong immune response, especially in susceptible individuals. Humans are the most susceptible species for immune response to LPS.

It is generally acquired in powder form and is considered a pyrogen (substance which causes fever when introduced into the blood).

EXPOSURE AND HAZARD INFORMATION

Exposure Route	Symptoms	Immediate Actions after Exposure
Inhalation	Airway inflammation, progression of asthma, and worsening of other forms of airway disease.	• Remove individual to fresh air • Seek medical attention
Oral/Ingestion	Can be fatal if swallowed Enters bloodstream through intestinal absorption	• Rinse mouth • Contact poison control • Seek medical attention
Eyes	Eye irritation	• Flush with water for at least 15 min • Seek medical attention
Skin	Rash, skin irritation, allergic skin reaction	• Wash affected area with soap and water for at least 15 min • After needle stick remove gloves and “bleed out” the wound under running water for 15 min • Seek medical attention

Health Effects	
Acute	Inflammation, fever, leukopenia, hypotension
Chronic	Some types of LPS are considered reproductive effectors, teratogens, and mutagens

Hazards and Exposure Limits	
Physical Hazards	• Combustible • Incompatible with strong oxidizing agents
Exposure Limits	• No Exposure limits have been set • LD50 = 50mg/kg • Exposure to significantly low amounts can cause lung inflammation and immune response in susceptible individuals

Controls	
Containment, and Engineering and Administrative Controls	• Preparation of LPS including reconstitution, weighing, and diluting should be performed in a chemical fume hood or in a ducted certified BSC over absorbent padding. • Personnel with cuts or scratches should NOT work with LPS • Do not recap needles after injecting animals.
PPE	• Double nitrile gloves, lab coat, lower arm protection over sleeves of lab coat (e.g., sleeve covers or secured gloves) • Splash potential or aerosol generating activities that take place outside of a chemical fume hood require mucous membrane protection (safety goggles, face shield, mask)
Emergency Equipment	Showers and eyewash station must be readily available

MEDICAL SURVEILLANCE

No medical surveillance is required, but individuals working around LPS should be aware of immune response potential and self-monitor.

TRAINING

General training required for any chemical use:

- Review of relevant information including fact sheets, SOPs, and SDS. This review should include training on hazards, symptoms of exposure, PPE, and emergency procedures.
- UW Lab Safety Training Series - New Employee Orientation, Regulated Waster Generator, and Laboratory Safety "Chemical Hygiene & GHS/OSHA

SIGNAGE AND RESTRICTED AREA INFORMATION

Signage must indicate when LPS is actively being handled, and can be removed once procedures are completed.

Cage cards should specify that animals have been treated, and whether bedding or cages are considered contaminated.

ANIMAL METABOLISM OF CHEMICAL

Animals treated parenterally (IV, IP, subcutaneous, IM) will not excrete LPS. These animals and their waste, cages, and bedding are considered non-hazardous.

Animals treated orally may excrete toxin in feces. These animals and their waste, cages, and bedding are considered hazardous.

DISINFECTION AND INACTIVATION

- Disinfect surfaces with a 10% bleach solution for a minimum of 30 minutes, followed with clean water.
- Glassware should be decontaminated with dry heat at 250C for a minimum of 30 minutes.
- Steam autoclave or 1M solution of NaOH can also be used for inactivation.

CAGE/HOUSING MANAGEMENT

- Cage changes for animals treated parenterally does not require a Biosafety Cabinet or special procedures as cages and bedding will not have LPS contamination. Dispose of bedding per protocol for uncontaminated bedding.
- Cage changes for animals treated orally should be done in a Biosafety Cabinet when possible, and an N95 must be worn if a BSC is not available. Bedding must be autoclaved prior to disposal.

WASTE DISPOSAL

- Do not release into waterways or sewar systems as LPS may cause long-term adverse effects in aquatic environments.
- If disposing of in drains liquid waste must first be treated with a bleach solution.
- Contaminated solid waste should be:
    - Autoclaved, then disposed of as non-hazardous waste.

SPILLS/RELEASES

- After any LPS spill evacuate the area and restrict entry for a minimum of 30 minutes to allow dissipation of aerosols.
- Liquid spills: Use absorbent pads to wipe up liquid. Clean spill area with 10% bleach solution for a minimum of 30 minutes followed by clean water. Bag and label spill waste as hazardous.
- Powder: In addition to other PPE a respirator is required for clean-up of powder spills. Bag spill waste, clean area with 10% bleach solution for a minimum of 30 minutes followed by clean water. Bag and label spill waste as hazardous.
- For large spills or assistance/guidance with clean up, call the Regulated Material Management Center (RMMC) 766-3698 or 766-3697.

EMERGENCIES/MEDICAL GUIDANCE FOR EXPOSURES

- For accidental ingestion, contact Poison Control
- In case of medical emergency call 911, or seek attention immediately:
    - During business hours: Ivinson Urgent Care is the occupational health provider, and it is available to assist in the arrangement of medical evaluation and treatment
    - After business hours: Emergency Room or Urgent Care
- Report all accidents, injuries, illnesses or exposures as soon as possible:
  https://www.uwyo.edu/safety/procedures/incident-injury reporting.html

CONTACT INFORMATION

Poison Control: 1-800-222-1222
Chemical Specialist: Kevin Macartney: 307-766-6116
Occupational Health: Bailey Wallace: 307-766-3203

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This document was developed using adapted material from Colorado State University, with modifications to reflect institutional policies and procedures at University of Wyoming.