



COLUMBIA UNIVERSITY  
ENVIRONMENTAL HEALTH AND SAFETY  
Post Exposure **PRINT & GO** Sheet

Diphtheria Toxin post exposure guidance

Created: 8/5/2016

Revised: 1/14/2019

<https://research.columbia.edu/sites/default/files/content/EHS/Homepage/diphtheriaPrintAndGo.pdf>

**What are print and go sheets?**

Following an occupational exposure to the agent identified above, this information sheet identifies the immediate “first aid” actions that should be taken. A medical evaluation should be sought immediately following the exposure. The guidance sheet provides information that medical personnel can reference but does not provide individualized medical care or treatment. This sheet should be printed and taken to the medical provider. Also, display your Columbia University ID card while visiting the medical provider.

**Background**

Diphtheria toxin (DT) is a potent lethal toxin in humans. The minimum lethal dose is 100 ng/kg (6-10 ug). Diphtheria toxin is a single protein with two parts: one that allows entry into host cells and the other prevents the host cell from making proteins. The toxin binds to a cell-surface receptor to gain entry into the cell. Inside the cell, the protein prevents the cell from making new proteins.

**Medical surveillance - Pre-exposures:**

Documented Tdap vaccination or Td booster within prior 10 years (or written declination) is recommended prior to working with Diphtheria toxin (DT).

**Medical surveillance - Post-exposures:**

If exposure occurs Mon. to Fri., 8:00 am - 4:00 pm: Employees from CUIMC, Morningside and Manhattanville campuses go to the Workforce Health and Safety (WHS) clinic located at Harkness Pavilion 1 South 176 Fort Washington Ave (212-305-7590). CUIMC students go to Student Health Services at 60 Haven Avenue (212-305-3400). Morningside students go to Columbia Health in the John Jay Building (212-854-7426). For after-hours exposure, go to the New York Presbyterian Hospital or Mount Sinai St. Luke's Hospital (212-523-3335) Emergency Room (ER). Give this sheet to the physician so they understand that you may have just been exposed to pertussis toxin, and this is a medical emergency.

**SUBCUTANEOUS EXPOSURE**

If injected, remove gloves. Wash with soap for 10 min. and express the wound under running water.

**ORAL EXPOSURE**

If swallowed, wash out mouth with water, provided person is conscious.

**INHALATION EXPOSURE**

If inhaled, remove to fresh air. If breathing becomes difficult call 911.

**DERMAL EXPOSURE**

In case of skin contact, wash the skin thoroughly with soap and water for 10 min. Rinse with copious amounts of water. Remove contaminated clothing and shoes.

**EYE EXPOSURE**

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

All PT exposures should receive immediate medical evaluation. An estimate of the amount of PT exposure (milligram, microgram, nanogram) should be made.



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**Physician information:**

*Symptoms:* DT can cause cranial, motor and sensory nerve palsies, myocarditis, and endocarditis. Methods for identifying exposure include fever, headache, and malaise. Skin contact causes rash. There have been reports of rapid onset local pain after percutaneous exposure to toxin, and such an occurrence would indicate a significant exposure. Onset of symptoms following significant toxin exposure would typically be delayed by days to weeks, and are due to the inhibition of protein synthesis. The physician shall assess the severity of the exposure, and take appropriate actions to include consultation with CDC. Treatment with immune globulin may be considered in the absence of symptoms in case of an especially severe or large exposure.

*Standard treatment:* Td booster is the typical treatment for exposures to DT.

*Antitoxin therapy:* In case of unprotected, accidental exposure to toxin, or exposure to toxin that exceeds the protective capacity of neutralizing antibodies in immunized individuals, treatment with hyperimmune antiserum (antitoxin) has been shown to reduce mortality from 7 to 2.5 percent. Antibodies only neutralize toxin before its entry into cells, so rapid treatment is essential. Because the antitoxin is produced in horses, up to 10 percent of treated individuals may develop serum sickness. Contraindications/Precautions in the use of equine immune globulin include a history of prior exposure to horse serum, prior history of serum sickness, or a history of asthma or hay fever, especially when near horses. Although diphtheria antitoxin is no longer licensed by the FDA in the United States, a European-licensed product is available from the National Immunization Program of the CDC as part of an investigational new drug (IND) protocol by calling **404-639-8200**. CDC Emergency Operations Center can also be contacted after hours at **(770) 488-7100**. Typically it is only released by CDC to treat *Corynebacterium diphtheria* infections. It has not been titrated experimentally based on the quantity of toxin exposure or prior immunization status. Release of antitoxin will be made by CDC on a case by case basis. The physician treating the exposed patient should call CDC to discuss the case. If a decision is made to release the antitoxin, the IRB at CDC has preauthorized release to expedite treatment. There will be paperwork that needs to be completed for the FDA post treatment. The CDC website for diphtheria toxin requests and forms is:

<http://www.cdc.gov/diphtheria/dat.html>

The emergency room should draw at least ten milliliters of serum and hold it for possible toxin assay. This must be done before any treatment with antitoxin. Any patient seen and released should be given information about the potential for delayed onset of symptoms/toxicity. Any symptoms would be reason for emergent reevaluation.

Diphtheria toxin catalyzes the ADP-ribosylation (and inactivation) of the elongation factor eEF-2 that is essential to protein synthesis. This is reversible by giving high doses of nicotinamide. Nicotinamide is a water-soluble vitamin and is part of the vitamin B group. However this is an experimental treatment with no clinical trials having been performed.

**Next steps:**

If evaluated at the ER, follow up with respective campus provider next business day. Complete an Accident Report Form there. Notify supervisor of incident.

**Contact information:**

ICM Veterinarian On Call - (917) 232-5319. Environmental Health & Safety (EH&S) - Ask for a Biosafety Officer. Mon. - Fri: 9 am - 5 pm. Medical Center - (212) 305-6780. Public Safety can contact a Biosafety Officer after business hours. CUIMC - (212) 305-7979. Morningside - (212) 854-5555. Morningside - (212) 854-5555