



**Use of  
Auto-Injectors  
by Civilian Emergency  
Medical Personnel to  
Treat Civilians  
Exposed to Nerve  
Agent©**

**USE OF AUTO-INJECTORS BY CIVILIAN EMERGENCY  
MEDICAL PERSONNEL TO TREAT CIVILIANS  
EXPOSED TO NERVE AGENT<sup>©</sup>**

**INSTRUCTOR'S GUIDE**

E. D. Copenhaver  
Oak Ridge National Laboratory\*  
Oak Ridge, Tennessee 37831

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## Preface

This **Instructor's Guide** has been developed for use in a Federal Emergency Management Agency training course on **Use of Auto-Injectors by Civilian Emergency Medical Personnel to Treat Civilians Exposed to Nerve Agent** for the CSEPP (Chemical Stockpile Emergency Preparedness Program). The course is largely based on the detailed literature provided by the manufacturer of the auto-injectors, developed in concert with the federal Food and Drug Administration. You will also find specific references to related materials already developed for the CSEPP that may be useful in learning about the use of auto-injectors. It is likely that this course may be taught at the same time as or as a module of the Agent Characteristics and Toxicity First Aid and Special Treatment (ACT FAST) Course.

Much of this material is derived directly from user pamphlets from Survival Technology, Inc. Additional materials and review were provided by Fred Sidell, MD, U.S. Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD; Charles Geis, U. S. Army Defense Ammunition Center & School, Savanna, IL; Phyllis G. Thompson and Robert Norville, FEMA; and Annetta P. Watson and Kathy S. Gant, ORNL. One or more of the illustrations were produced by Cinetel Productions, Knoxville, TN, as a part of the animation for the **Chemical Stockpile Agent Characteristics and Effects** videotape.<sup>1</sup> Lori Warneke has managed the production of this Instructor's Guide and all related training materials for this course.

# USE OF AUTO-INJECTORS BY CIVILIAN EMERGENCY MEDICAL PERSONNEL TO TREAT CIVILIANS EXPOSED TO NERVE AGENT

## INSTRUCTOR'S GUIDE

### LEARNING OBJECTIVES

The objectives of the training module are to allow the participants to:

- Identify the antidotes to be administered in the event of nerve agent exposure,
- Identify the conditions under which antidote auto-injectors should be used,
- Demonstrate the use of the antidote auto-injectors, and
- Recognize adverse reactions to the use of the antidotes.

### TARGET AUDIENCES

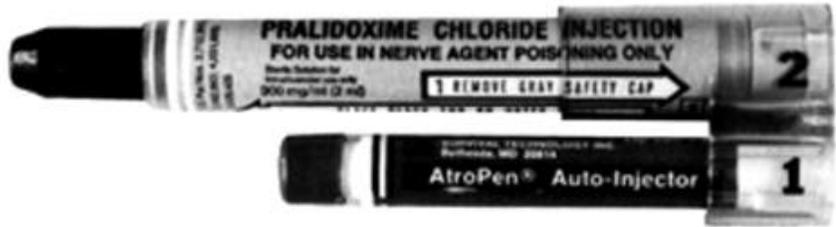
Training materials have been designed to prepare personnel to use atropine and 2-PAM Chloride (2-PAM Cl) auto-injectors. Only emergency medical personnel in States or countries allowing the use of auto-injectors by such personnel are targeted for this training. The laws and regulations of each affected State will have to be reviewed to determine if this training is needed by the emergency medical personnel. This document has been prepared to assist the trainer in preparing these persons to perform job functions related to auto-injection.

### STRATEGY

This unit can be used for read-and-review self study, for formal classroom review, or for step-by-step detailed demonstration of the skills needed for auto-injection use. The following sections provide handouts, vu-graphs or slides, and review questions.

If you are using these materials in a stand-alone environment, as opposed to teaching them as a part of the Agent Characteristics and Toxicity First Aid and Special Treatment (ACT FAST) or Chemical Awareness courses, you should use the video on **Chemical Stockpile Agent Characteristics and Effects**<sup>7</sup> as a part of your training. It is particularly important to use the sequence showing how the nerve agent affects the body and how the antidotes work to counter the effects and to rid the body of the nerve agent.

If demonstration of skills is desired, trainees may practice with auto-injector training kits.<sup>1</sup> The Review Questions can be used as a self-study review or as



examination questions on the knowledge base of this unit. It is recommended that a minimum grade of 85% on these review questions be required for any personnel to be permitted to administer auto-injectors to others.

## STUDY GUIDE

The Study Guide summarizes the major elements of information required to fulfill the learning objectives. The study guide content is listed below.

### Study Guide Content

**Learning Objectives**  
**What Auto-Injectors Are**  
**Background**  
**What Auto-Injectors Contain**  
**How The Antidotes Work**  
**Who Can Use Auto-Injectors**  
**How And When To Use Auto-Injectors**  
**Signs and Symptoms of Nerve Agent Exposure**  
**Treatment for Exposure to Nerve Agents**  
**Directions for Use**  
**Precautions**  
**Adverse Reactions**  
**Overdosage**  
**Obtaining And Caring For Auto-Injectors**  
**References**

## HANDOUTS

Because it is basically a step-by-step listing of what to do, the information on use of the auto-injectors has been developed as a single-page handout that describes these steps. The information is also given in a wall-chart and pocket-card form, and the steps are covered by vu-graphs or slides that can be used alone or in the Chemical Awareness or ACT FAST Courses to cover auto-injection.

## WHEN TO USE AUTO-INJECTORS

### Use only after the following events have occurred:

- Emergency medical personnel have donned personal protective equipment subsequent to recognizing existence of chemical agent hazard in area
- Some or all of signs and symptoms of nerve agent poisoning listed are present:
  - unexplained runny nose
  - tightness of chest with difficulty in breathing
  - pinpointed pupils of the eye (miosis)
  - blurred vision
  - drooling, excessive sweating
  - nausea, vomiting, and abdominal cramps
  - involuntary urination and defecation
  - jerking, twitching, and staggering
  - headache, drowsiness, coma, convulsions
  - stoppage of breathing



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### Treatment

- Depending on severity of signs or symptoms, immediately administer one (1) atropine auto-injector (2 mg), followed by one (1) 2-PAM Cl auto-injector (600 mg).
- Atropine should be given first; followed immediately by 2-PAM Cl.
- If nerve agent signs or symptoms are still present after 5–10 minutes (depending on severity), repeat injections.
- If signs or symptoms still exist after an additional 10 minutes, repeat injections for a third time.
- If signs or symptoms remain after the third set of injections, **do not** give any more antidotes but seek medical help immediately.

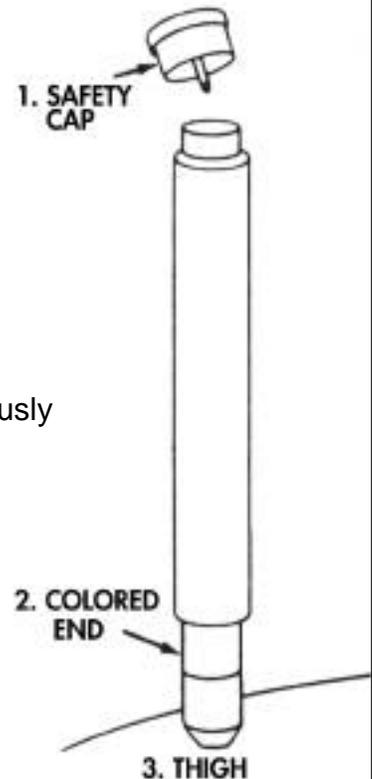
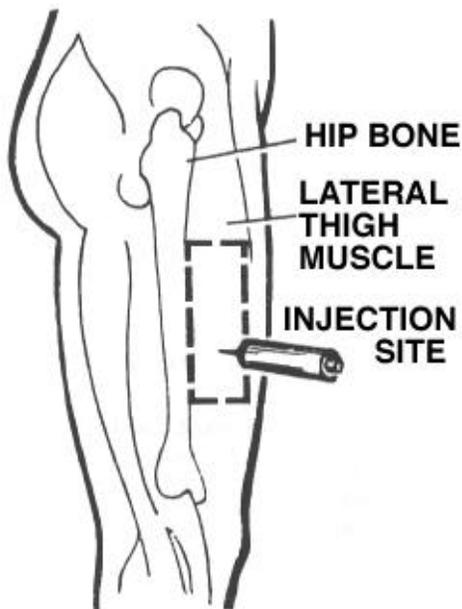
### If severe signs and symptoms are present:

- In case of very severe exposure, all three auto-injector kits (atropine and 2-PAM Cl) should be administered in rapid succession; then medical help should be sought.
- Remove secretions, maintain patient's airway and, if necessary, use artificial ventilation.
- Morphine, theophylline, aminophylline, or succinylcholine should not be used with 2-PAM Cl. Tranquilizers of the reserpine or phenothiazine type are to be avoided.
- 2-PAM Cl is most effective if administered immediately after exposure. Generally, little is accomplished if the drug is given more than 6 hours after termination of exposure.

## HOW TO USE AUTO-INJECTORS

The recommended procedure is to inject the contents of the auto-injector into the muscles of an anterolateral thigh (through pocket). Proceed as follows:

1. Remove safety cap (**yellow** on atropine; **gray** on 2-PAM Cl; both in clip on Mark I.). Do not touch the colored end of the injector after removing the safety cap, since the injector can and will function into the fingers or hand if any pressure is applied to this end of the injector.
2. Hold injector as you would a pen. Place colored end (**green** on atropine, **black** on 2-PAM Cl) on thickest part of thigh and press hard until injector functions. Pressure automatically activates the spring, which plunges the needle into the muscle and simultaneously forces fluid through it into the muscle tissues.
3. Hold firmly in place for ten seconds, then remove. Massage the area of injection.



4. After each auto-injector has been activated, the empty container should be disposed of properly. It cannot be refilled nor can the protruding needle be retracted. It should be disposed of in a "sharps" container in accordance with rules for handling medical wastes and possible blood-borne pathogens. Dosage should be noted on a triage tag or written on the chest or forehead of the patient.

**IMPORTANT: Physicians and/or other medical personnel assisting evacuated victims of nerve agent exposure should avoid exposing themselves to cross-contamination by ensuring they do not come in contact with the patients' clothing.**

## **VU-GRAPHS OR SLIDES**

A short set of vu-graphs or slides are included for use in this unit. Full size copies are included in Appendix B for use in making vu-graphs, and color slides are enclosed.

## REVIEW QUESTIONS

Assess understanding of the material presented in this training by completing the following questions.

### Multiple Choice

1. The initial treatment for nerve agent exposure is:
  - a. use of atropine only as an antidote
  - b. use of 2-PAM chloride only as an antidote
  - c. use of organophosphate and 2-PAM CI as a two-part antidote
  - d. use of atropine and 2-PAM CI as a two-part antidote
  
2. Which antidote stops the effect of nerve agent by effectively antagonizing the actions of the nerve agent at certain nerve receptors?
  - a. 2-PAM CI
  - b. atropine
  - c. acetylcholine
  - d. organophosphate
  
3. 2-PAM CI restores normal functions at the nerve synapse by:
  - a. adding organophosphate to system
  - b. reactivating cholinesterase
  - c. removing oxime from system
  - d. sedating the nervous system
  
4. The antidotes should be given
  - a. prior to anticipated exposures for pre-protection
  - b. following exposure to relieve or counter effects
  - c. both a. and b.
  - d. none of the above

5. Which antidote should be administered first?
- acetylcholine
  - organophosphate
  - 2-PAM Cl
  - atropine
6. Auto-injectors facilitate timely treatment by providing
- the only safe way to give the antidotes
  - better type of antidotes included in auto-injectors
  - pre-measured, controlled dose rapidly administered
  - none of the above
7. The standard pre-measured adult dose of atropine antidote contained in the auto-injector is
- 10 mg
  - 2 g
  - 600 mg
  - 2 mg
8. The standard pre-measured adult dose of 2-PAM Cl contained in the auto-injector is
- 10 mg
  - 2 g
  - 600 mg
  - 2 mg
9. The first step emergency medical personnel should take before using an antidote auto-injector is
- check blood pressure of patient
  - place personal protective equipment on patient
  - check temperature of patient
  - don personal protective equipment

- 10.** How many auto-injector injections can be administered by emergency medical personnel before seeking other medical help?
- a. 3 each of atropine and 2-PAM CI over 30-minute period, except for very severe exposures
  - b. only 1 each of atropine and 2-PAM CI
  - c. 2 of atropine and 1 of 2-PAM CI over 30-minute period
  - d. 1 of atropine and 2 of 2-PAM CI
- 11.** The favored body location for auto-injection of the antidote is
- a. thigh
  - b. hip
  - c. shoulder
  - d. none of the above
- 12.** Which end of the auto-injector contains a spring-loaded needle?
- a. the end with the safety cap
  - b. neither; there is no spring-loaded needle
  - c. the colored end
  - d. both; so the injector can be used twice
- 13.** Which auto-injector is color-coded green and yellow?
- a. acetylcholine
  - b. atropine
  - c. 2-PAM CI
  - d. none of the above
- 14.** Once the safety cap is removed on the auto-injector, you should
- a. grip the injector like a pen
  - b. touch the colored end of the injector
  - c. use the injector more than once
  - d. bend the needle after it has been used

15. Once the injector has been inserted into the thigh, you should hold it firmly in place for
- 40 seconds
  - 1 minute
  - 20 seconds
  - 10 seconds
16. The area of injection should be
- bandaged
  - massaged
  - inspected for bruises
  - none of the above
17. After auto-injector has been activated, it should be
- saved for re-filling
  - retracted before disposal
  - disposed of in a sharps container
  - hooked onto patient's collar or pocket
18. Dosage should be noted
- on a triage tag and attached to patient
  - written on the chest of patient
  - written on the forehead of patient
  - all of the above
19. In cases of very severe exposures, administer
- 3 injectors each of atropine and 2-PAM CI over a 30-minute period
  - 3 injectors each of atropine and 2-PAM CI in rapid succession
  - 3 injectors of atropine and 1 of 2-PAM CI in rapid succession
  - none of the above

- 20.** In cases of severe exposures, signs and symptoms may include
- a. respiratory failure
  - b. coma
  - c. bluish discoloration of skin (cyanosis)
  - d. all of the above

## REFERENCES FOR TRAINING COURSE MATERIALS

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## **APPENDIX A. ANSWER KEY FOR REVIEW QUESTIONS**

## ANSWER KEY TO REVIEW QUESTIONS

### Multiple Choice

1. The initial treatment for nerve agent exposure is:
  - d. use of atropine and 2-PAM Cl as a two-part antidote
  
2. Which antidote stops the effect of nerve agent by effectively antagonizing the actions of the nerve agent at certain nerve receptors?
  - b. atropine
  
3. 2-PAM Cl restores normal functions at the nerve synapse by:
  - b. reactivating cholinesterase
  
4. The antidotes should be given
  - b. following exposure to relieve or counter effects
  
5. Which antidote should be administered first?
  - d. atropine
  
6. Auto-injectors facilitate timely treatment by providing
  - c. pre-measured, controlled dose rapidly administered
  
7. The standard pre-measured adult dose of atropine antidote contained in the auto-injector is
  - d. 2 mg
  
8. The standard pre-measured adult dose of 2-PAM Cl contained in the auto-injector is
  - c. 600 mg
  
9. The first step emergency medical personnel should take before using an antidote auto-injector is
  - d. don personal protective equipment

10. How many auto-injector injections can be administered by emergency medical personnel before seeking other medical help?
  - a. 3 each of atropine and 2-PAM CI over 30-minute period, except for very severe exposures
11. The favored body location for auto-injection of the antidote is
  - a. thigh
12. Which end of the auto-injector contains a spring-loaded needle?
  - c. the colored end
13. Which auto-injector is color-coded green and yellow?
  - b. atropine
14. Once the safety cap is removed on the autoinjector, you should
  - a. grip the injector like a pen
15. Once the injector has been inserted into the thigh, you should hold it firmly in place for
  - d. 10 seconds
16. The area of injection should be
  - b. massaged
17. After auto-injector has been activated, it should be
  - c. disposed of in a sharps container
18. Dosage should be noted
  - d. all of the above
19. In cases of very severe exposures, administer
  - b. 3 injectors each of atropine and 2-PAM CI in rapid succession
20. In cases of severe exposures, signs and symptoms may include
  - d. all of the above

## **APPENDIX B. VU-GRAPHS**

