MICHIGAN STATE UNIVERSITY EXTENSION

Get Cholinesterase Test Now[1]

Howard J. Doss[2]

Farmers and anyone working with organophosphate and carbamate pesticides should get a baseline cholinesterase blood test now so their physician can determine if a summertime illness is the result of exposure to these pesticides.

It is important that the test be taken before handling organophosphate and carbamate pesticides to ensure that cholinesterase levels will not be affected by a recent exposure to these chemicals.

Have a blood test for baseline cholinesterase before working with organophosphate and carbamate pesticides.

Figure 1.

WHAT IS CHOLINESTERASE?

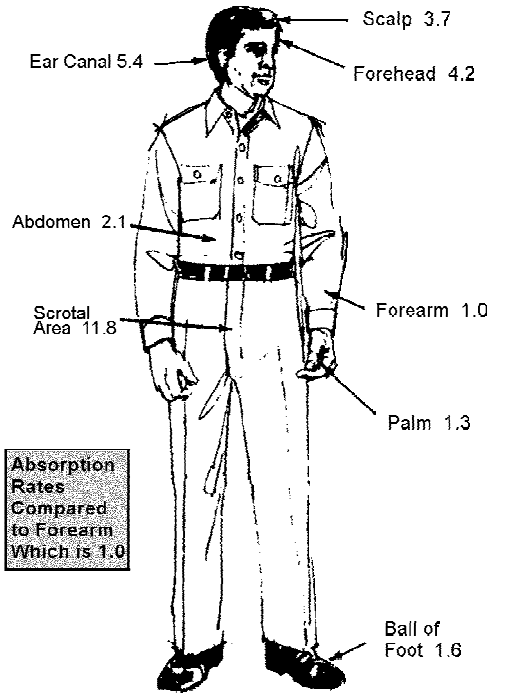
Cholinesterase is an enzyme that is needed for the proper function of the human body's nervous system. Like humans, vertebrates and insects (pests that are controlled with organophosphates and carbamates) also have this same type of enzyme. Pesticides in the organophosphate and carbamate chemical class contain a cholinesterase inhibitor, which makes them effective in controlling insects and other vertebrates (pests). Unfortunately, when people breathe in these pesticides or it gets on their skin, they are subjected to the same negative effect.

WHAT IS THE FUNCTION OF CHOLINESTERASE IN THE BODY?

The nervous system of the human body, as well as other vertebrates and insects, uses electrical switching centers to make the system work. These nerve endings are constantly sending signals carried in a chemical called acetylcholine. When the signal completes its function, cholinesterase in the body breaks down the acetylcholine, terminating that function of the electrical signal so that part of the body is ready for the next electrical command. If the body's cholinesterase level is decreased because of exposure to organophosphates or carbamates, the cholinesterase fails to function properly, causing the body's nervous system to become "jammed up" with unnecessary commands. The result of this jamming is that the nervous system is constantly stimulated with commands instructing it to perform certain functions, but not necessarily in the proper sequence or at the right time.

1. This document is part of the Safety News Series, Agricultural Engineering Department, Michigan State University Extension, East Lansing, Michigan, 48824-1323. Publication date: March 1994.

2. Howard J. Doss, Safety Leader, Agricultural Engineering Department, Michigan State University, East Lansing, MI 48824-1323. Reviewed by the MSU Extension Pesticide Education Coordinator.



Dermal absorption rates are higher for some parts of the body than others.

Figure 2.

The health effects of this jamming from cholinesterase inhibition can include headaches, dizziness, nausea, restlessness, anxiety, mental confusion, shortness of breath, diarrhea, convulsions, coma, and death.

WHY SHOULD YOU HAVE A CHOLINESTERASE TEST NOW?

For the typical Michigan farmer, all pesticide application equipment has been stored for several months, an indication that the farmer has not been exposed to any pesticides since it was last used. This break from handling pesticides has given the body time to remake any cholinesterase destroyed by previous exposures to organophosphates or carbamates.

During this absence from pesticides, the body's cholinesterase levels have returned to normal, so a physician can determine a baseline through a blood test. This summer, if you develop symptoms indicating that you have an illness that could be the result of exposure to an organophosphate or carbamate pesticide, your physician can compare your current cholinesterase levels with baseline levels taken before the spraying season began. This comparison provides the physician with information that can confirm or refute pesticide exposure as the cause of the illness.

According to Kenneth Rosenman, MD, a Board Certified Internal and Occupational/Environmental Medicine specialist for Michigan State University, a baseline reading before and periodic testing of cholinesterase throughout the spray season is also useful to determine if work practices and protective equipment are adequate.

Rosenman points out that a 20 percent decrease of cholinesterase from baseline levels is an indication that a farmer needs to review his or her work practices to minimize any potential health effects. Symptoms typically don't occur until more than a 50 percent decrease from baseline, with severe poisoning occurring at a 90 percent decrease. At a 50 percent decrease from the baseline the applicator should be removed from jobs involving these pesticides until cholinesterase levels recover.

Illustrations courtesy of *Fundamentals of Machine Operatron, Agricultural Safety*, 1987, Deere & Company, Moline, Illinois.