

Human Studies: Biochemical Evidence

Evidence of neuropsychiatric changes in those exposed to anticholinesterase agents comes from the early use of these organophosphates (OP's) as drugs, in laboratory studies on people, and in animal models. Although no longer medically prescribed, diisopropyl fluorophosphate (DFP) and tetraethyl pyrophosphate (TEPP) were used successfully for many years to treat glaucoma, abdominal distention, urinary retention, and myasthenia gravis. DFP and TEPP were the earliest OP's found to have insecticidal properties.

Chlorpyrifos and diazinon have been shown to significantly reduce birth weight in urban minority cohorts and to shorten gestation. It also produces abnormal neonatal reflexes in an agricultural cohort. Pesticides may act directly to cause learning disabilities and behavioral problems. Long-term cognitive impairment has been observed in children exposed prenatally to organophosphates. Environmental exposures coupled with high maternal stress may permanently alter the developing hypothalamic-pituitary-adrenal (HPA) axis during pregnancy and contribute to co-morbid psychiatric and medical disorders due to excessive hypothalamic (CRH) release.

Patients with a family history of depression or anxiety are more sensitive to the negative effects of acetylcholine drugs. Therefore, those with a family history of mood disorders may be at a higher risk of long-term effects.

Research Shows

- The most studied OP anticholinesterases, DFP and physostigmine, induce depression or reduce mania in humans.
- Although not as potent as OPs at inhibiting cholinesterase, carbamates (e.g., ficam, sevin, carbaryl, aldicarb) can lead to mood dysregulation as well. Carbamates can cause memory loss, and behavioral problems. Carbamates are associated with sudden unprovoked extreme agitation, anger, rage, and violence.

Summary

A growing body of research supports the association between pesticide exposure and adverse human health effects including depression, ADHD, anxiety, confusion, memory loss, lethargy, pervasive developmental disorders, unprovoked extreme agitation, anger, rage, and violence. Epidemiological evidence suggests that mood changes after acute exposures can continue for many years and that repeated high exposures greatly increase the risk of mood disorders. Given that symptoms may not occur until after a period of repeated exposures, health care providers should consider both acute and chronic exposures when evaluating patients.

References:

References are available in "Healthcare Resource: Links between Pesticide Exposures and Mental Health Effects" which is available online at <http://www.healthandenvironment.org/?module=uploads&func=download&fileId=813>

Mental Health Effects Arising from Pesticide Exposure

A Guide for Healthcare Providers and Mental Health Practitioners



Illustration by Hal Boyer

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Mental Health Effects from Pesticide Exposure

Exposure to pesticides can have multiple human health effects. The connection between the exposure and an associated behavioral change may not be easy to recognize, but the consequences can last for many years. Knowledge about the association between pesticide exposures and psychiatric symptoms comes from case reports, epidemiological evidence, human studies, and animal studies.

Many people are at risk of pesticide exposure. Those who work in agriculture, landscaping, or other settings in which pest problems are treated with chemicals are at risk. Drift from aerial spraying of pesticides puts those living, working, or playing downwind at risk. The spray and runoff can contaminate both surface and ground water. Pest control in urban dwellings can put residents at risk.

For Additional Information

This brochure is adapted from "Healthcare Resource: Links between Pesticide Exposures and Mental Health Effects" which is available online at <http://www.healthandenvironment.org/?module=uploads&func=download&fileid=813>

A Practice Prevention column on Pesticides available online at <http://www.healthandenvironment.org/?module=uploads&func=download&fileid=685> provides accessible information about why pesticides are a concern, how people may be exposed, and ways to reduce the risk of exposure.

Could your patient have psychiatric symptoms that you should be inquiring about?

No matter what the presenting ailment may be, health care providers who care for individuals at risk of pesticide exposure or those with known exposures would do well to inquire about the presence of depression, anxiety, or any of the other symptoms listed in this brochure.

Could pesticide exposure have contributed to your patient's psychiatric symptoms?

Health care providers and mental health practitioners who are treating individuals with depression, anxiety, or any other illness which correlates with the symptoms listed here, should consider the possibility that pesticide exposures may have contributed the patient's presenting complaints.

Asking these questions and looking for the possible connections between pesticide exposures and underlying psychiatric symptoms may lead to better diagnosis and treatment outcomes.

Symptoms of Pesticide Exposure Can Include:

- Depression
- Anxiety
- Irritability
- Feelings of Hostility
- Rage
- Fatigue
- Confusion
- Memory Loss
- Decreased Activity Level
- Poor or Decreased Appetite
- Sleep Disturbances

Persistence of Symptoms

Evidence suggests that mood changes following high pesticide exposures can continue for many years.

Identify and Educate

Taking a brief history may help identify exposures.

Educating patients to avoid future exposures may reduce future harm.