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Pathology 438
Spring 2015

Final Examination

A. Environmental Toxicants: Pesticides/Insecticides: organophosphates

Organophosphate (OP) compounds are a diverse group of chemicals used in both domestic and industrial settings. OPs include insecticides, nerve gases, ophthalmic agents, and antihelmintics. Organic phosphate insecticides include malathion, parathion, diazinon, fenthion, dichlorvos, chlorpyrifos, and Ethiopia. Exposure to OPs is possible via intentional and unintentional contaminated food sources. In addition, massive organophosphate intoxication from suicidal and accidental events led to the discovery of the mechanism of their action. No clinical effects of chronic low-level organophosphate exposure from a food source have been shown, however, advancements in risk assessment and preparedness are ongoing.

Organophosphates can be absorbed cutaneously, ingested, inhaled, or injected. The toxicokinectics or primary mechanism of action of OP pesticides is inhibition of acetylcholinesterase (AChE) which breaks down acetylcholine (ACh) into choline and acetic acid. ACh is found in the CNS, the PNS, the NMS junction, and the RBCs. Once AChE becomes inactivated, ACh accumulates throughout the nervous system resulting in overstimulation of muscarinic and nicotinic receptors. Clinical effects are manifest via activation of the autonomic and central nervous system and nicotinic receptors in skeletal muscle. Toxicodynamic effects of OP exposure/toxicity are manifold. The muscarinic effects include bradycardia, hypotension, severe respiratory distress, nausea, vomiting, and blurred vision to name a few. The nicotinic effects include but are not limited to, muscle fascinations, cramping, and weakness. The CNS effects include anxiety, restlessness, confusion, ataxia, tremors, and seizures.

Katz, Kenneth D. *Organophosphate Toxicity.* January 27, 2015.
Medscape. *emedicine.medscape.com*

B. Food Toxicants: Sulfur dioxide (SO2)

Sulfur dioxide is added to wine for protection from oxidation and microbial spoilage. Sulfur dioxide is highly reactive and roughly half the compound is bound up immediately after addition. The remainder of the SO2 is free SO2 with a very small portion remaining as molecular. The molecular SO2 is what gives protection to microbes. The quantity of sulfur dioxide added depends on pH of the wine, temperature of the wine, condition of the fruit at crush, and the type of wine being produced. Current scientific evidence links short term exposure to an array of adverse effects including bronchioconstriction and increased asthma symptoms. Although sulfites don't cause a true allergic reaction, sulphide sensitive people may experience a flushed face, rash, red itchy skin, headaches, anxiety, distress, weakness, vomiting.

It's one of the just efficient additives used in winemaking, however, due to health concerns and a recent growth of consumer interest in wine with less additives, it's use is a huge field of debate and discussion of reduction in its use and/or alternatives are a hot topic. Methods to minimize its

use include a chemical and physical component. On the chemical side, phenolic compounds also have an antiseptic and antioxidant properties that SO2 has. However, a high concentration is needed in order to achieve its antiseptic properties. Another one is dimethyl dicarbonate (DMDC) which has been preposed to replace SO2 in winemaking. It's very effective against the yeast but not so much the bacteria. On the physical side, ultrasound has been considered as a promising alternative to conventional thermal treatments. It has a very high antiseptic quality, as well as a good ability to preserve wines.

Luiz. *The use (or not) of sulfur dioxide in wine making.* January 9, 2013. thewinehub.com

Pozo-Bayon, Angeles. *Wine features related to safety and consumer health: an integrated perspective.* Instituto de Fermentaciones Industriales (CSIC). digital.csis.es

C. Drug-Nutrient Interactions: Anticonvulsants

Anticonvulsant drugs help control seizures. Phenytoin (Dilantin), phenobarbital and primidone may cause diarrhea and a decrease in appetite. This can decrease the availability of many nutrients. These drugs also increase the use of vitamin D in the body. This means that less vitamin D is available for its critical function such as calcium absorption. Some anticonvulsants also interact with vitamin B9, folic acid. When drug therapy is started, folic acid levels decrease. My suggestion is supplementation with vitamin D and either folic acid alone (which should be monitored by a doctor) or a vitamin B complex.

Bobroff, Linda B. *Food/Drug and Drug/Nutrient Interactions: What you should know about your medications.* May, 2009. University of Florida. edis.ifas.ufl.edu.

Personal Care Products: lipstick: lead acetate.

Lead is a mineral that occurs naturally in the earth. There are traces of lead in the food we eat and the water we drink, however, usually the traces are much too small to be detected in our bodies. But if exposures are too high, lead can cause serious problems. How we are exposed also plays a big role.

There is lead acetate in hair dyes, lipsticks, and some shampoos. According to the federal laws enforced by the FDA, cosmetic companies are responsible for ensuring the safety of their products. Unless there is a color additive, the FDA does not require ingredients in beauty aids to be approved before going on the market. Every time we apply lipstick to our lips and then re-apply during then day , we are ingesting lead and even more importantly/harmful is lead getting into your bloodstream through the skin of your lips. Lead is a proven neurotoxin that can cause learning, language, and behavioral problems. The state of California recognizes lead acetate as a developmental and reproductive toxicant. There are a number of natural and organic mineral makeups available today. Lead acetate can and should be avoided with all of the "green" options.