



TOPICS IN TOXICOLOGY

INDEPENDENT ASSIGNMENTS

Gulf War Syndrome

Define “syndrome.” What are the symptoms of this syndrome? What group of people are suffering from these symptoms? Provide some historical context. The cause of this set of symptoms is currently unknown. What are the possibilities being investigated? What medical evidence has been gathered thus far? What other evidence (for example from military documents, or site investigations) has been gathered thus far? Do you think the government has a responsibility to solve this problem? Why or why not? If so, what should the government be doing? How might a problem like this be prevented in future military missions?

Thalidomide

This drug was commonly prescribed in the 1950s. (It is mentioned in a popular Billy Joel song.) Draw thalidomide’s chemical structure. Who was it prescribed to and what was it prescribed for? It turned out to be severely toxic. What type of toxicant is it? What problems did it cause? Approximately how many people were affected by the drug? What is known about thalidomide’s mechanism of action? How were these problems discovered? What toxicity testing was done on this drug? Why wasn’t the toxicity discovered before it was approved for use? What was done after the toxicity was discovered? What suggestions can you make for toxicity testing to prevent such a tragedy from ever happening again, and, in general, for drug approval?

Dichlorodiphenyltrichloroethane (DDT)

Some major ecological problems were caused by this chemical. Draw the chemical structure of DDT. Provide some historical context for DDT. (When was it discovered? What was it used for?) What is the mechanism of action of DDT? Define bioaccumulation. Describe the effect of DDT on bird populations. What birds were affected? DDT was ultimately banned in the United States. What was the effect of the ban on the bird populations? Define pesticide. What are the advantages and disadvantages of pesticide use? How do you feel about the use of pesticides in American agriculture?

Aflatoxin

This is a natural toxicant, or toxin. Where does it come from? Draw the chemical structure of aflatoxin. How do humans get exposed to aflatoxin? Animals can also be exposed. How does this happen? What type of toxicity does aflatoxin cause? This is a very potent toxin. Provide some examples of doses needed to elicit aflatoxin toxicity in research animals. Provide some examples of doses commonly found in human food. What laws or regulations are in place to protect the public from aflatoxin? Do you think the laws governing food safety are adequate?

Lead

Lead is a toxic metal detectable in practically all parts of the environment and in all biological systems. What are some common sources of lead exposure? What are some of the chemical forms of lead to which humans are exposed? What portion of the human population is most susceptible? What organ system is most at risk upon lead exposure? What are the biological effects of lead on humans? What kind of studies are performed to determine the effects of lead on humans? At approximately what lead concentration does lead cause toxic effects? What is the estimated concentration of lead in the blood of humans in the United States? What kinds of things can individuals do to protect themselves from excessive lead exposure? Do you think the government has a responsibility to protect the public from lead and other toxic metal exposure?

Domoic Acid

People can get exposed to domoic acid in food. What type of food can become contaminated with this toxin? What organism actually produces the toxin? Within about 24 hours, those exposed display typical symptoms of food poisoning. Describe these. Within about 48 hours, the main target organ becomes impaired, and symptoms related to this are displayed. Describe these. Draw the structure of domoic acid. Describe this toxin’s mechanism of action. What portion of the population is most susceptible to domoic acid poisoning? How is the presence of domoic acid measured? How much resources (time, money, etc.) do you think the government should invest in research regarding a toxin to which a majority of the population would never be exposed?