



Mining: All About Airborne Hazards Q&A

During the webinar, the following question related to radiation safety was asked. Please email info@radiationsafety.ca if you wish to discuss this further or any have any other follow up question arising from the presentation.

Q: When there is more than one risk factor in the workplace are the risks additive or are they multiplied together?

A: With stochastic effects such as cancer, we talk about increased cases in populations as a result of exposure. Getting cancer is combination of many factors. The result of being exposed to more than one risk factor could be additive or multiplicative. They could also be greater than additive but less than multiplicative, called sub-multiplicative.

Synergy is when the effects of two or more causes leads to a result which is greater than if the effects were added together. Antagonism is when the effects of two or more causes leads to a result which is smaller than if the effects were added together.

When discussing risk for cancer, the concept synergistic carcinogens is well established. Co-carcinogens also exist. These are agents, often chemicals, which are not carcinogenic themselves, but enhance the effect of a carcinogen. For example, a chemical which lowers the ability of the liver to clear a carcinogen from the body will increase the effect of that carcinogen.

One examples of synergy of carcinogens is between cigarette smoking and exposure to radon gas with respect to lung cancer. There are more lung cancers in populations of people who smoke and exposed to elevated levels of radon gas than would be expected from adding the numbers of people who get lung cancer in populations who only smoke or are only exposed to elevated levels of radon gas. Smoking and drinking alcohol are also synergistic with respect to several cancers. Both are known carcinogens, but there are more cancers in populations of people who both smoke and drink than if you added together the numbers for those who just smoke or those who just drink alcohol.