



Michigan Society
for Medical Research

BioFocus

A Newsletter Exploring Science & Biomedical Research Issues For School Educators

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Our Mission

The Michigan Society for Medical Research (MISMR) is a nonprofit educational organization that supports biomedical research and testing and the judicious use of animals in research, education and testing in the interests of human and animal welfare. Established in 1981, MISMR is made up of the state's leading research universities, teaching hospitals, pharmaceutical companies, voluntary health organizations and hundreds of scientists, educators and students who understand and support the importance of animal research and testing in advancing health care and treatment.

MISMR Educational Projects & Activities

ANNUAL ESSAY CONTEST

Every year MISMR sponsors an essay contest open to all Michigan high school students. Students from well over 500 schools in the state have annually participated in the contest to address the benefits of biomedical research. Prizes are awarded.

SPEAKERS BUREAU

MISMR volunteers visit K-12 schools and civic community groups through out Michigan each year to educate the public about biomedical research and to dispel commonly held myths.

ANNUAL SYMPOSIUM

MISMR's popular annual meetings have often proved to be "standing room only", typically attracting local and national educators and researchers with interactive training workshops and presentations promoting biomedical research.

WE WANT TO HEAR FROM YOU!

We want to include your stories, comments or questions relating to animals in your classroom in upcoming editions of *BioFocus*. Please email stories to: mismr@umich.edu

BioFocus

BioFocus is published by the Michigan Society for Medical Research. Please send your questions, comments, and suggestions to:

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The Big "C"

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Cancer, the big "C", neoplasia, and tumors: all words that are scary stuff for us mortals. People often talk about finding "a cure for cancer." Unfortunately, while all cancers have certain features in common, cancer can arise in any tissue in the body, and so is not a single disease, but a very diverse and complex family of diseases with individual causes and treatments. Cancer can be defined as unregulated cell growth forming masses (tumors) or life-threatening increases in circulating blood cells (leukemias).

Agents that cause cancer are called carcinogens, whether they come from inside the body or from outside. Carcinogens include some chemicals, e.g., benzene, and chemical mixtures like cigarette smoke; physical agents like inhaled asbestos fibers; certain



Cigarette smoke is a carcinogen.



Asbestos fibers are a carcinogen.

wavelengths of energy, e.g., ultraviolet solar radiation and x-rays; infections, especially certain viruses that can cause lymphoma or liver cancer; and rarely even parasites, including a worm that causes esophageal cancer in dogs.

Some agents cause cancer by chronic (repeated, long-term) organ damage necessitating a sustained increase in cell division to repair the damage. This increase in reparative cell division unfortunately also increases the chance for mutations in cells that can then divide and grow out of control. The most effective carcinogens, called complete carcinogens, both increase cell division and cause genetic mutations. Solar ultraviolet rays and tobacco smoke are complete carcinogens. Combining potent carcinogens like tobacco smoke with other inhaled carcinogens, like oak sawdust or asbestos, has a synergistic effect; together they are more dangerous than simply the added risks.

Hormones, including those normally produced by our bodies (especially estrogen and testosterone) are also carcinogens for hormonally-responsive tissues, like the breast and prostate gland. This is just one reason why hormones (anabolic steroids) taken to improve sports performance are so dangerous. Increasing hormone exposure in the form of drugs should always be under the advice of a doctor. Another major risk factor for many cancers is obesity. Unfortunately, if you live long enough you will probably get some sort of cancer, whether a life threatening type or one that is easily treated in its early stages. In autopsy studies of men in their 70s who had died from other causes, approximately 80% also had prostate cancer at the time they died; they died with it, but they didn't die from it. Cancer seems a poor reward for living a long life, but as life expectancy has increased, so has the incidence of cancer.

Cancer develops when genetic mutations accumulate, speeding up cell division while inhibiting programmed cell death. Programmed cell death is an important process to regulate tissue size and shape and to remove defective cells. When genes that control programmed cell death, also called tumor suppressor genes, mutate to an inactive form, defective cells do not die as they should. Meanwhile, additional mutations cause other cancer genes to be much more active than normal, which causes the defective cells to replicate out of control. The process has been compared to a car with bad brakes and a stuck accelerator.

Everything necessary to cause many cancers is present in normal people. So why do we say that certain things cause cancer? That's because they increase

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