



Michigan Society
for Medical Research

BioFocus

A Newsletter Exploring Science & Biomedical Research Issues For School Educators

Vol. 1, Issue 26, Spring 2010

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.

www.mismr.org

Heavy Breathing



Asthma inhaler.

By Doug Hagley, BA, MFA

Catrina walked out of a school assembly at 2PM and asked a security guard to call an ambulance. She felt like she was choking, or, as she later put it, "like a fish out of water." Catrina had been treated for asthma for years, but attacks were unpredictable. This time she didn't have her asthma inhaler with her. Luckily the ambulance arrived quickly and the hospital was nearby, otherwise she might not have made it.

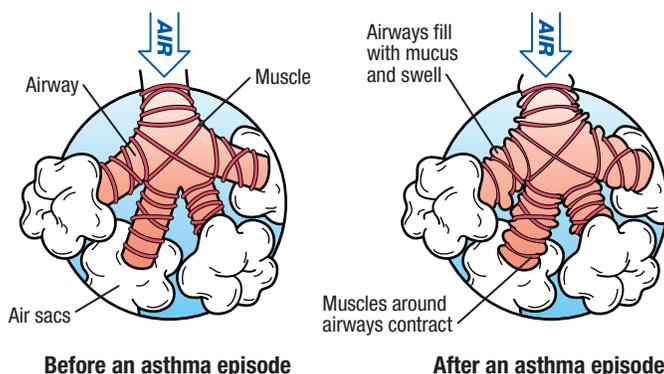
There is an asthma epidemic. The World Health Organization (WHO) estimates there are roughly 300,000,000 cases of asthma (and 250,000 deaths) worldwide, with a disproportionate number of diagnoses — 34,000,000 — reported in the United States. Asthma rates increased 75% from 1980-1994, and the number of cases is expected to grow by more than 100 million by 2025.

In Michigan one out of every ten youngsters under the age of 18 is currently diagnosed with asthma. That means there are 2 or 3 students with asthma in every classroom in the state. And because they may not take their medication (some feel there is a stigma attached to using it; their parents may not be able to afford their prescriptions), asthma emergencies are the third highest cause of hospitalization among teens, resulting in over 14 million missed school days every year.

Asthma is a chronic inflammation of the airways characterized by wheezing, chest tightness, shortness of breath and coughing. Muscles around the airways contract, excess mucus is produced and tissues swell. Until an attack is triggered by something in the environment, however, asthma usually goes unnoticed. Asthma triggers

include more than 350 known irritants like household dust, animal dander, pollen and mold, smoke, air pollution, and viral infections. Emotional stress like anger or fear, or even cold air or strenuous exercise can also trigger an attack.

There are two approaches to treating — though not curing — asthma: anti-inflammatory drugs are taken daily to prevent asthma attacks (inhaled corticosteroids, leukotriene modifiers, and others); and fast-acting bronchodilators to treat acute asthma attacks by relaxing the muscles around the airways.



Source: Wikipedia

Continued on page 2...

Heavy Breathing... *Continued from page 1*

The foundation of asthma treatment was laid by Otto Loew's discovery in frogs of naturally occurring nerve transmitters that act on receptors in the lungs. Corticosteroid inhalers were developed in the 1990s through research with guinea pigs. Oral medications were introduced as a result of later studies of guinea pigs and monkeys that led to the understanding of leukotriene receptor antagonists. The ability to manipulate the genome of mice has made them a common model for studying inflammation and developing new anti-inflammatory drugs.



Work-related asthma annually costs billions in medical costs and lost productivity.

The annual cost of asthma in the United States has been estimated at \$19.7 billion, including both direct medical costs (including 500,000 hospitalizations) and lost productivity. In Michigan the total cost is over \$394 million a year. The average asthma hospital stay in Michigan costs almost \$12,000. A treatment for asthma, Advair, is the fifth-largest selling prescription drug in the U.S., with annual sales of \$3.6 billion.

Given the costs of this disease, work-related asthma has become the focus of intense study. Michigan has three Centers for Disease Control-funded projects that support study of asthma (and other health issues) in the workplace: the Sentinel Event Notification System for Occupational Risks (SENSOR); the Fatality Assessment and Control Evaluation (FACE); and Asthma Fatality Surveillance.

Work-related asthma is triggered by exposure to cleaning solvents, chlorine in water treatment plants, wheat flour in bakeries or any of hundreds of other substances. Because Michigan is a major manufacturing state, exposure to asthma triggers on the job is often high.



Asthma is a predictable epidemic every year for school children when school starts in the fall.

Dr. Kenneth Rosenman (Michigan State University Department of Medicine) and Douglas Kalinowski of the Michigan Department of Energy, Labor and Economic Growth estimate in *Tracking Work-Related Asthma in Michigan* that there are 65,000–97,000 people in the state with work-related asthma, 86% of them new-onset, nine of whom have died since 2003.

Work isn't the only place where asthma is a factor. Predictable epidemics of asthma attacks occur in children every year when school starts in the fall, and later in the winter for adults. The number of hospital admissions for asthma among children 5–15 increases 3–4 times in early September each year. This seems to be due to seasonal rhinovirus infection, seasonal allergens and the stress of returning to school.

Above the age of 50, the greatest number of asthma episodes requiring hospitalization occurs during December and January.

Ironically, students' access to asthma medication may be reduced when school begins. The American Lung Association has found that under the guise of "zero tolerance" drug rules, three-quarters of schoolteachers and administrators do not allow children to keep their asthma inhalers in their desks or pockets. This even though there is no evidence that inhalers are mood altering or create any sort of "high." Immediate access to asthma medication can be critical. Michigan law allows children to carry inhalers if prescribed by a doctor.

Gender, age, race and socio-economic status all affect both the frequency and severity of asthma. Before puberty asthma attacks are more common in boys than girls; the trend reverses at puberty. Adult women have more severe attacks, more hospital admissions (19.3/10,000 vs. 16.6/10,000 for men) and longer hospital stays than adult men. Hormonal influences have been suggested: post-menopausal hormone replacement is associated with increased asthma episodes, while use of oral contraceptives may reduce airway hypersensitivity.

Continued on page 3...



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 e-mail stories to: mismr@umich.edu

www.mismr.org

Fast Facts...

Asthma is a chronic inflammation of the airways characterized by wheezing, chest tightness, shortness of breath and coughing.

Asthma triggers include more than 350 known environmental irritants, emotional stress, cold air or strenuous exercise.

Gender, age, race and socio-economic status all affect the frequency and severity of asthma.

Two approaches to treating asthma are anti-inflammatory drugs and fast-acting bronchodilators.

Animals that have played an important role in the research for asthma treatments include frogs, guinea pigs, monkeys and mice.

The World Health Organization estimates there are roughly 300,000,000 cases of asthma (and 250,000 deaths) worldwide.

The annual cost of asthma in the United States has been estimated at \$19.7 billion, including medical costs and lost productivity.



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

MISMR
P.O. Box 3237
Ann Arbor, MI 48106-3237
e-mail: mismr@umich.edu

www.mismr.org

Heavy Breathing... *Continued from page 2*

Four times as many black people as white people are hospitalized for asthma. The highest levels of asthma in Michigan are in Detroit, where a strong correlation between socio-economic status and race complicates interpretation of the data. Poor air quality and exposure to allergens may be more common features of urban areas. Hospitalization for asthma attacks is also more likely to occur in the absence of ongoing preventive treatment.

Children in lower socio-economic families are more severely affected by asthma, though whether the incidence of asthma is actually higher, or lack of access to care results in more severe episodes is not known. The rate for children in the Medicare program — an indicator of socio-economic status, was over 240 per 10,000 (in 2005).

Children whose parents show high levels of stress and difficulty parenting, as may be the case among below-poverty level families, are at greater risk for asthma.

For many years, it was believed that asthma was a psychosomatic illness. This idea fell out of fashion as the notion arose that anxiety and depression were a result of asthma-associated fears rather than a precursor. But new research is taking a second look at the role of psychological stressors as asthma triggers. A study of 18,000 adults found that childhood adversity — physical abuse, death of a parent, family violence — and resulting depression and anxiety, correlate strongly with asthma in adulthood.

Chronic stress and mental disorders are associated with changes in stress hormone pathways and immune responses, suggesting a possible mechanism by which stress may exacerbate asthma.

The opportunities for asthma research are expanding, and Michigan's universities are at the forefront. Stuart Batterman, PhD, runs a lab at the University of Michigan devoted to the health effects — including asthma — of occupational, indoor and environmental settings. Other UM researchers are looking at asthma among the elderly (Alan Baptist, MD, allergy and immunology) and asthma education for urban teens (Christine Joseph, PhD, epidemiology). At Michigan State, Dr. Kenneth Rosenman's work with Michigan OSHA is linking asthma to particular triggers in the workplace.

References

- Rosenman, K.D., and Kalinowski, D.J. *Tracking Work-Related Asthma in Michigan, 2008 Annual Report*. Michigan State University and Michigan Occupational Safety & Health Administration, June 9, 2009.
- Sears, Malcolm R. "Epidemiology of asthma exacerbations," *Journal of Allergy and Clinical Immunology*, Vol 122, Issue 4, pp 662-668. (October 2008)
- Wasilevich, E.A., Lyon-Callo, S., and Wasilevich, M.J. "Hospitalization for Asthma." *Epidemiology of Asthma in Michigan*. Bureau of Epidemiology, Michigan Department of Community Health, 2009.