

Karmanos Cancer Center
Agency for Toxic Substances and Disease
Registry
Blue Cross Blue Shield of Michigan
Environmental Cancer Program:
Arsenic, Asbestos and Radon

R

20
mA:492
msec:500
mAs:307
Thk:3 mm
Sensation 64
Orient: 166°,4°,0°

Michael R. Harbut, MD, MPH
Karmanos Cancer Center

Kimbumba Rwandese Refugee Camp

Goma, Zaire. August, 1994

Peak Mortality Rate: 7,000/day



Cholera, Dysentery, Measles, Meningitis and HIV



US Sector Death Rate: 30% of Remainder of Camp

Source: Centers for Disease Control and Prevention









President's Cancer Panel Report released May 6, 2010

- The true burden of environmentally induced cancer has been grossly underestimated
- The grievous harm from this group of carcinogens has not been addressed adequately
- The public remains unaware of many common environmental carcinogens such as naturally occurring radon
- Children are far more vulnerable to environmental toxins and radiation than adult

Reuben, S. for the Presidents Cancer Panel. 2008–2009 Annual Report. Reducing Environmental Cancer Risk: What We Can Do Now

Cancer Burden

From Occupational and Environmental Exposures

- 1977 - Higginson & Muir assert that 80% of cancers have an occupational or environmental origin, including tobacco use & diet
- 2003 - NCI/NIEHS publication notes that 66% of cancers can be linked to occupational and environmental causes, including tobacco use & diet
- 2006 - WHO estimates environmental factors, NOT including tobacco use and diet, in developed countries contribute to 30% of lung cancers

Higginson, J., Muir, C. (1977). Determination of the importance of environmental factors in human cancer: the role of epidemiology. *Bulletin du Cancer* 64(3) 365-384.

Cancer and the environment: What you need to know, what you can do (2003). NIH Publication No.03-2039

Pruss-Ustun, A., Corvalan, C. (2006). Preventing disease through healthy environments. Towards an estimate of the environmental burden of disease. *Publications of the World Health Organization*.

2005 Michigan Cancer Incidence

Age-Adjusted, All Races, Both Sexes per 100,000

- Colon & Rectal = 49 Nat'l Ave. = 48
- Lung & Bronchus = 74 " " = 68
- Kidney & Renal Pelvis = 15 " " = 15

CDC National Program of Cancer Registries

Lung Cancer: Early detection

- Leading cause of cancer deaths
- Five year survival rate is 15%
- 15% of patients are asymptomatic at diagnosis
- Majority of lung cancers are diagnosed at late stages

Chandy, G., Maguire, D. & Aronow, W. (2009). Lung cancer: the importance of early intervention. *Comprehensive Therapy* 35(1) 18-23.

McWilliams, A., Lam, B., & Sutedja T. (2009). Early proximal lung cancer diagnosis and treatment. *The European Respiratory Journal* 33(3) 656-665.

Lung Cancer: Early detection

- Significant surgical advances have reduced operational mortality rate
- If detected during asymptomatic stage, 5-year survival rate approaches 67%

Chandy, G., Maguire, D. & Aronow, W. (2009). Lung cancer: the importance of early intervention. *Comprehensive Therapy* 35(1) 18-23.

Ghosal, Kloeer & Lewis, 2009. A review of novel biological tools used in screening for the early detection of lung cancer. *Postgraduate Medical Journal* 85(1005) 358-363.

Arsenic in Drinking Water

Chronic effects:

- Skin lesions
- Neurological effects
- Hypertension
- Peripheral vascular disease
- Diabetes
- Malignancies

Yoshida, T., Yamauchi, H., & Sun G.H. (2004) Chronic health effects in people exposed to arsenic via the drinking water: dose–response relationships in review. *Toxicology & Applied Pharmacology* 198(3) 243-252.

Arsenic in Drinking Water

- Among pregnant women arsenic exposure may be associated with an increased risk of gestational diabetes
- Long-term exposure has been linked to cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate.

Ettinger, A., Zota, A., Amarasiriwardena, C., et al. (2009). Maternal arsenic exposure and impaired glucose tolerance during pregnancy. *Environmental Health Perspectives* 117(7) 1059-1064.

EPA Fact Sheet: Drinking Water Standard for Arsenic. Last updated 9/13/06. Retrieved from website 7/22/09.
http://www.epa.gov/safewater/arsenic/regulations_factsheet.html

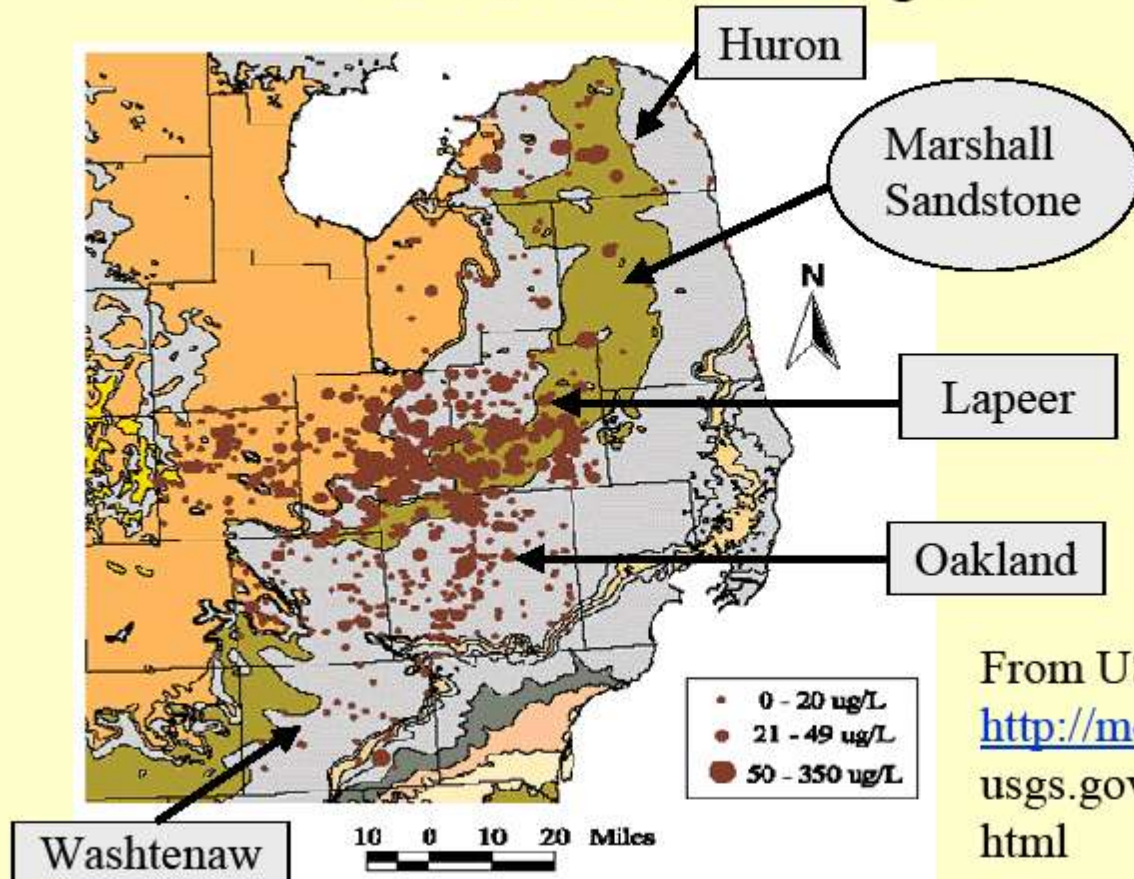
Arsenic in Drinking Water

- Current EPA standard is 10 parts per billion (10 μ g/L), effective 2/22/02. All community water systems had to be in compliance by 1/23/06.
- Higher levels of arsenic are found in ground water sources than in surface sources

Arsenic in Drinking Water

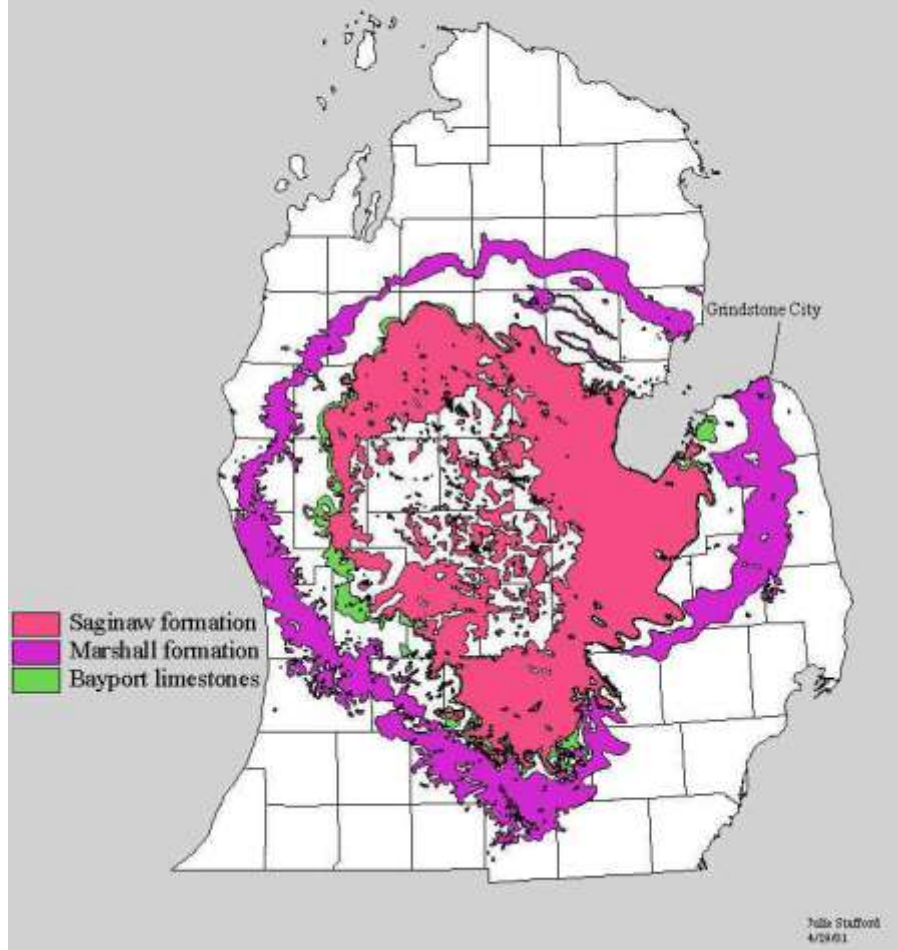
- Many homes in Southeastern Michigan rely on private well groundwater sources for their drinking water.
- Arsenic identified in SE Mich. aquifers with levels frequently exceeding $10\mu\text{g}/\text{L}$
- Estimated 230,000 people in this region exposed to arsenic in well water $\geq 10\mu\text{g}/\text{L}$

Arsenic in SE Michigan



From USGS:
<http://mcmweb.er.usgs.gov/mdwi/data.html>

Marshall Formation and Bayport Limestone



Asbestos Deaths

- The cumulative total number of asbestos related deaths in the United States has been estimated to exceed 200,000 by the year 2030.

Nicholson, W., Perkel, G., Selikoff, I. (1982). Occupational exposure to asbestos: Population at risk and projected mortality—1980-2030. *American Journal of Industrial Medicine* 3(3) 259-311.

Average Years of Potential Life Lost for 25-64 year old worker in an At-Risk Occupation

- Construction workers = 5.7 years
- Machinists = 8.0 years
- Managers; Administrators = 7.2 years
- Plumbers = 4.7 years
- Electricians = 4.3 years

Mazurek, J.M., Wood, J.M. (2008, December 12). Asbestos related years of potential life lost before age 65 years—United States, 1968-2005. *Morbidity and Mortality Weekly* 57(49) 1321-1325.

Asbestos

- Asbestos exposure causes other neoplasms in addition to lung cancer and mesothelioma
- Workers with asbestos exposure, but no asbestosis, are at increased risk of bronchiogenic carcinoma

Banks, D., Runhua, S., McLarty, J., et al. (2009). American College of Chest Physicians consensus statement on the respiratory health effects of asbestos. *Chest* 135(6) 1619-1627.

Mesothelioma

- CDC reports total number of malignant mesothelioma deaths increased 8.9% from 1999-2005
- Some mesothelioma deaths may be misdiagnosed as a less specific neoplasm, falsely reducing actual mortality numbers

Syamlal, G., Sharp, D. (2009). Malignant mesothelioma mortality—United States, 1999-2005. *Morbidity and Mortality Weekly* 58(18) 393-396.

Asbestos and GI Cancers

- Elevated incidence of small intestine cancer in men with exposure levels as low as 4 fibers/ml for ≥ 25 years.
- Elevated incidence of esophageal cancer in men with exposure levels of 80 fibers/ml.
- Significantly elevated incidence of peritoneal mesothelioma, independent of exposure level

Clin, B., Morlais, F., Dubois, B., et al. (2009). Occupational asbestos exposure and digestive cancers- a cohort study. *Alimentary Pharmacology and Therapeutics* 30(4) 364-374.

Asbestos Use

- U.S. use of asbestos in industry and construction peaked in early 70's & declined precipitously in the 1980's
- In 1985 EPA estimated 31,000 schools and >700,000 public & commercial buildings contained friable asbestos-containing material
- Asbestos mortality manifests several decades after initial exposure

Kilburn, K (2008). Asbestos and other fibers. In A. Schechter (Ed.), *Wallace/Maxcy-Rosenau-Last Public Health and Preventive Medicine* (15th edition) (pp. 567-581). McGraw Hill Companies.

Asbestos

- Non-neoplastic, long latency asbestos-related diseases may develop in people living near asbestos-contaminated geographical sites or buildings
- These patients still require notification, assessment and follow-up for progression and neoplastic risk

Candura, S., Binarelli, A., Ragno, G., Scafo, F. (2008). Two cases of asbestosis and one case of rounded atelectasis due to non-occupational asbestos exposure. *Monaldi Archives for Chest Disease* 69(1) 35-38.

Asbestos-Related Disease and Taconite

- Taconite, used in steel production and road patching material, shown to cause pleural and pericardial plaques and asbestosis
- Probable etiology of patient's intractable pleural pain identified by novel imaging technique revealing rib erosions associated with these plaques

Harbut, M., Endress, C., Graff, J. et al. (2009). Clinical presentation of asbestosis with intractable pleural pain in the adult child of a taconite miner and radiographic demonstration of the probable pathology causing the pain. *International Journal of Occupational and Environmental Health* 15(3) 267-271.

Nonmalignant Asbestos-Related Disease

(post-diagnosis management)

- Notify patient and appropriate authority, as required by law
- Conduct functional impairment assessment
- Discuss tertiary prevention including smoking cessation, immunizations & management of concurrent diseases
- Monitor by radiographic imaging, PFT and periodic colonoscopy for colon cancer
- Develop management plan for symptomatic disease

American Thoracic Society Statement (2004). Diagnosis and initial management of nonmalignant diseases related to asbestos. *American Journal of Respiratory and Critical Care Medicine* 170(6) 691-715.

Radon

- Odorless, colorless, tasteless degradation product of Uranium.
- 21,000 US Lung Cancer Deaths/year

Why an Abestos/Arsenic/Radon Program?

- To elevate the standard of care pertaining to the diagnosis and treatment of patients with exposure to asbestos, arsenic and radon
- For physicians that are unfamiliar with the symptoms resulting from exposure to these substances, tools to assist in diagnosing
- Attempts to diagnose these illnesses, patients are often subject to many, and often needless, tests that do not always lead to a diagnosis. Not only is this frustrating to the physician, but it is a burden on the patient

“I’ve begun to incorporate what I’ve learned into my practice. I found the program valuable and would definitely encourage other physicians to participate.”

--James Golden, MD

Novi Internal Medicine and Pediatrics

**“VERY timely program.
I’ve already had the opportunity to
utilize information from the
arsenic module in my practice.”**

--K. Fitzgibbons, MD

Infinity Primary Care/
Livonia Family Practice

How Does the Program Work?

- Primary care physicians, pediatricians, pulmonologists, oncologists enroll online.
- Four 1-1.5 hour courses (all with CME) are completed on line reviewing dx/tx of diseases of environment in general and also specifically, arsenic, asbestos and radon.
- You may contact Cynthia Noraian at Karmanos (noraianc@karmanos.org) to double check your status.

How Does the Program Work? Part II

- Blue Cross/Blue Shield will compensate physicians for their time with an incentive payment.
- Upon completion, physicians will be mailed a 3-question patient Flow Sheet, referral information, reviewed websites suitable for patient education, and a coupon for discounted radon kits.

How Do You Get Into the Program?

Enroll (at no charge) by accessing the Karmanos website:

www.karmanos.org

Click on the “**Education**” tab,

and select “**Environmental Cancer Program**” from the drop down list

Hyperlinks to Physician Information, Registration Forms, the Case Study Modules, all Patient Education Information and anything else that you might need to know are on the 2nd page.

What else should be known?

- An appropriate certificate attesting to your participation in the Environmental Cancer Program will be issued.
- There will be opportunities for physicians and patients to participate in research. We've already reported a marker for mesothelioma in the NEJM and did validation studies on a second. Our work with arsenic has been credited with changing the Federal drinking water standard.
- Mike Harbut's e-mail: harbutm@karmanos.org

Next Webinar

Patient Registry

November 4, 2010

12:00pm – 1:00pm

Presented By:

Lynda McMillian

Practice Transformation Institute