Your Health & the Environment

NEWS FROM THE UNIVERSITY OF ROCHESTER
ENVIRONMENTAL HEALTH SCIENCES CENTER • FALL ISSUE 2002

The Health and Environmental Impact of the World Trade Center Disaster

One study will focus on the health of iron workers who contributed to the World Trade Center clean up efforts.

Scientists from New York, New Jersey, Maryland and North Carolina have collaboratively devoted their efforts to address the health concerns of individuals living and/or working in the area of the World Trade Center as well as that of courageous men and women who have been involved in rescue and recovery efforts. Scientists continue to focus their attention on the potential threats to human health and the environment posed by the events of September 11, 2002. To address these issues, funding has been made available through the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health (NIH). These monies are designated to fund research focused on exposure assessment and epidemiology studies, worker training activities related to the environmental health aftermath and to provide community outreach and education for the general public.

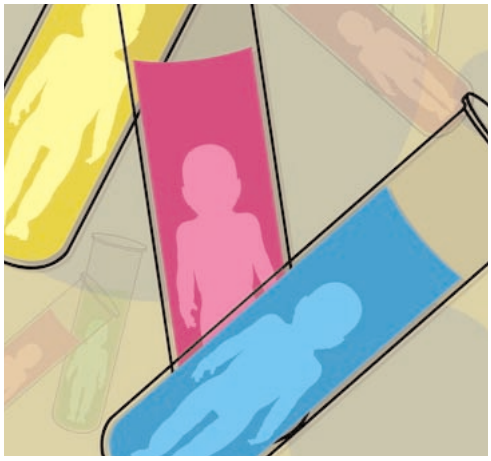
On May 28, 2002, a meeting sponsored by the NIEHS World Trade Center Project, was held to coordinate the involvement of Columbia University, Johns Hopkins University, Mount Sinai Superfund Research Program, New York University, University of Medicine and Dentistry of New Jersey and the University of North Carolina.

The University of Rochester Community Outreach and Education Program, headed by Dr. Dina Markowitz is collaborating with New York University (NYU) on a newsletter: "World Trade Center – The Health and Environmental Impact". The newsletter will be distributed to the residents of the lower Manhattan area to inform them of ongoing research findings. Drs. G. Oberdörster and J. Finkelstein, are analyzing World Trade Center dust collected by scientists from NYU to determine the chemical content of the dust.

The University of Rochester Environmental Health Sciences Center is housed in the Department of Environmental Medicine, and is one of 25 such centers sponsored by the National Institute of Environmental Health Sciences, a component of the National Institutes of Health. Its research programs are designed to expand our knowledge about those environmental factors that influence our health. Some of the work undertaken and reported on in this publication is supported by NIEHS Center Grant ES01247. For more information go to: www2.envmed.rochester.edu/envmed/

Genes, the Environment and Destiny

By Dr. Bernard Weiss



Sometimes the media, with all the attention it devotes to arguments about cloning, and its dramatic stories of cloned goats, mice, cows, monkeys and other animals, might have us believing that who and what we are was already determined at conception by the conjunction of our parental genes. That is why we have to keep reminding ourselves that genes do not prescribe what a person becomes. Genes are actors in a play scripted by our environment; their contribution is essential but not sufficient. Debates about heredity and environment recognize this duality and revolve around about how much to attribute to each. The tenets of these debates are especially important now because of the human genome project and the belief it has spawned that much of human disease will soon be grasped in its fundamentals and conquered. As we New Yorkers say, forget about it!

I was reminded of the inescapable duality of heredity and environment by a recent announcement from the National Institutes of Health (NIH) asking for proposals for a program entitled, "The Fetal Basis of Adult Disease." The announcement placed its request in the context of what is called the Barker Hypothesis. Dr. David Barker, on the basis of data collected in the United Kingdom, proposed a link between birth weight and later health outcomes. The hypothesis was then expanded to the more general proposition that many adult diseases represent the delayed outcome of conditions encountered by the fetus. The National Institute of Environmental Health Sciences, which sponsors the Environmental Health Sciences Center here at the University of Rochester, is especially concerned with exposures to environmental insults experienced by the fetus because of the vast amount of information telling us the fetus and infant can be exquisitely sensitive to chemicals that exert much less profound effects in adults.

Questions of this kind have been pursued by scientists in our Center since its inception in 1975. Dr. Thomas W. Clarkson, its first director, conducted pioneering studies in the 1970s showing the extreme vulnerability of the human fetal brain to methylmercury, findings that became the basis for exposure standards all over the world. More recently, we were able to show that fetal exposure to dioxin, achieved by administering low environmental doses to pregnant rats, led to changes in behavior and brain anatomy in the offspring. Dr. Deborah Cory-Slechta, current director of the Center, is asking the same questions about pesticides and Parkinson's disease.

Research of this kind is tedious, expensive, challenging, and indispensable. We surely don't want, as a society, to learn 50 years later that a chemical in our environment assumed to be benign turned out to be the cause of a devastating degenerative disease. Questions like these are part of our mission: to increase scientific understanding of the health risks posed by contaminants at home, in the workplace, and in the ambient environment.

The Skeleton as a Target for Toxic Agents

by Elizabeth Ryan
Second Yr. Ph.D. Student in the Toxicology Training Program

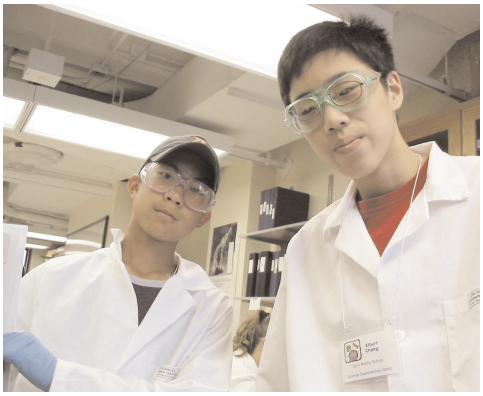
The skeleton is a critical organ system for the viability and vitality of all humans. Osteotoxicology focuses on assessments of how toxicants, especially heavy metals such as lead, adversely influence the metabolism of these mineralized tissues. Adverse impacts of environmental, occupational or foreign agents on skeletal tissue can impose substantial changes in the quality of life.

Environmental toxins may have an adverse effect on the skeletal system by altering molecular events in any of three cell types: osteoblasts, chondrocytes, and osteoclasts. These cells are important for bone and cartilage formation and bone resorption, respectively.

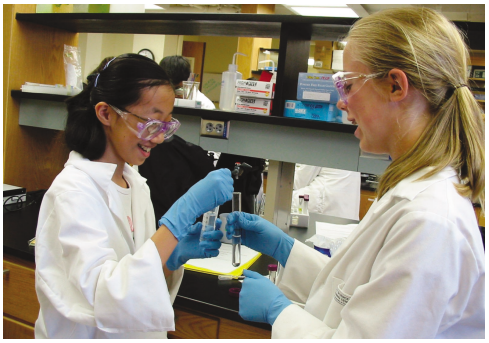
It is possible that environmental agents can alter the genes expressed during bone metabolism, which may also cause an imbalance in cell-cell signaling processes. These two mechanisms of action may be involved in the pathogenesis of metabolic bone diseases. For example, our laboratory identified targets for lead (Pb) in bone cells and reported an association between exposure to Pb and the development of osteoporosis. The fact that bone is a storage depot for Pb in the body underscores the continuous effect of Pb on the microenvironment of the tissue. Furthermore, in women the effects of Pb during lactation and menopause may be magnified because an increase in bone resorption at these time increases the systemic concentrations in blood. Continued on back page

Summer Science Students at Work

The Life Sciences Learning Center (LSLC) hosted seventy eight students for two different summer science camps this past summer. These programs, led by Dr. Dina Markowitz, Director of Community Outreach and Education Programs, and LSLC Director, are held each year for young scientists from throughout the greater Rochester area.



The Summer Science Academy completed its 7th season, with thirty high school students attending this 3-week program from July 8-26. Students hailed from local urban, rural and suburban schools as well as from out of town (including one student from California). The Summer Science Academy provides a challenging, intensive three-week program for high school students with a curriculum composed of both guided and independent lab projects and a twice-weekly bioethics discussion session. Hands-on lab activities gave these students experience with cutting-edge technology, such as DNA fingerprinting and PCR. Each student team also completed an independent experiment that they designed, carried out and presented to participants, faculty and guests at a poster session. Student lab experiments ranged from investigating the effectiveness of various hand cleansers to identifying the amount and types of oral bacteria in dogs, cats and humans. Local high school biology teachers Deirdre Bonnell (Wilson Magnet HS) and Richard Gigliotti (Greece Athena HS) returned, for their 5th and 4th years, respectively, as laboratory instructors. Also, serving as laboratory assistants were two former student participants, Bunny Dugo and Kristy Sutton.



The Science Explorations Camp, a one-week program for students entering grades 7-9, returned for the third season with two sessions held from August 5-16. The theme for this year, "Science Mysteries" offered the 24 campers each week the opportunity to solve a crime – the disappearance of the camp mascot, Blackbeary Bear. Blackbeary's disappearance (a bearnapping) during lunchtime on the first day of camp left a trail of clues – his overturned beach chair and baseball cap with hair and fibers, a half-eaten sandwich and glass of milk and a ransom note written in red lipstick on the whiteboard, among others. Students were aided by two Rochester City police officers as they cordoned off the crime scene and combed the lab for evidence, lifted fingerprints, identified suspects and plotted their course of action. The week brought a different set of clues each day, including ransom notes, photos and videos. A scavenger hunt held in the University of Rochester Carlson science library on the final afternoon of the week unearthed the final set of clues and a puzzle map that led the students to their missing bear – and an ice cream party! Two science teachers also returned to participate in the Science Explorations Camp – Deirdre Bonnel and Kimberly LaCelle (Marion Jr./Sr. High School).

Department News

TOXICOLOGY TRAINING PROGRAM NEWS

- Three of our graduate students recently received their Ph.D's., they are: Huei-ju Ting, Ray Rancourt and Thomas Lee.
- The following students have received their Master's degree since our last newsletter: Chrissy Palermo, Ruth Reeves, and Carissa Filbrandt.

ENVIRONMENTAL HEALTH SCIENCES CENTER NEWS

- We are saddened to inform you of the passing of Dr. George Berg on August 2, 2002 of Lou Gehrig's disease at the age of 83.

  Dr. Berg had a 29 year career at the University of Rochester and rose to the position of Associate Professor in Pharmacology, and Radiation Biology and Biophysics. Dr. Berg retired from the university in 1985 and in 1988 he was named professor emeritus of Environmental Medicine.
- We proudly announce the promotion of Dr. Ned Ballatori to Professor of Environmental Medicine.
- Dr. Debbie Cory-Slechta was session chair at the 8th International Symposium on Neurobehavioral Methods and Effects in Occupational and Environmental Health in Brescia, Italy June 23-26, 2002.
- Our departmental seminar series will start on September 26th with a seminar presented by Dr. Timothy Shafer, Neurotoxicology Division, US EPA, Research Triangle Park, NC.The October seminar will be presented by Dr. Michael Aschner, Wake Forest University School of Medicine,Winston-Salem, NC.

Does Lead Cause Osteoporosis?

Drs. Ed Puzas, Regis O'Keefe, Ed Schwarz, Randy Rosier and James Campbell are the recipients of a four-year NIH Program Project grant in the amount of $3.8 million. The initial work for this grant was started as the result of Pilot Projects received through our environmental Health Sciences Center in the Department of Environmental Medicine.

The research will be conducted to determine if there is a link between lead and osteoporosis and will also explore the possibility that mead may slow down the bone's ability to heal itself after factures.

Dr. Puzas, in research studies over the past four decades, has consistently found that high levels of lead in the bloodstream can have adverse effects on bone growth and development. Previous studies have shown that lead-exposed individuals, especially females, lose bone at a faster rate than normal individuals. As part of the natural aging process, both men and women begin to lose more bone than is replaced and because estrogen is linked to the bone building process, the rate at which women lose bone greatly increases as they enter menopause.

In the 1950's and 1960's, when the "baby boomers" were growing up, exposure to environmental lead was a frequent occurrence, from lead in gasoline and in the plumbing, to paint on the walls and in the soil. By 2005, when the majority of female "baby boomers" begin entering menopause, more women will begin to suffer from osteoporosis at a young age due to high levels of lead exposure in their childhood. Early data indicate that as much as 10% of low bone density (a primary symptom of osteoporosis) may be explained by lead in the skeleton.

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Epidemiological studies suggest that smoking is also a risk factor for osteoporosis and report an increased susceptibility to bone fractures as well as a delay in fracture healing among smokers. Currently, the mechanisms causing the negative effects in bone among smokers are unknown. The poly-aromatic hydrocarbons (PAHs) are the pro-carcinogenic portion of cigarette smoke that may be toxic to bone cells. My research interests are to elucidate the molecular mechanisms involved in mediating the negative effects of cigarette smoke in bone. Future studies will address how toxicants in the environment are involved in the progression of metabolic bone diseases.

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