



Environmental and health effects of toxic elements, metal ions, and minerals

SHORT COURSE ON Medical Geology

Health and the Environment

1-4 December 2003

**Venue: Geoscience Australia
Canberra, Australia**

Jointly Sponsored by:

U.S. Armed Forces Institute of Pathology (AFIP)

U.S. Geological Survey (USGS)

International Union of Geological Sciences (IUGS)

**Commission on Geological Sciences for Environmental Planning
(COGEOENVIRONMENT)**

International Working Group on Medical Geology (IWGMG)

United Nations Educational, Scientific, and Cultural Organization (UNESCO)

University of Canberra (UC)

CRC for Landscape Environments and Mineral Exploration (CRC LEME)

Geoscience Australia (GA)

Homepage address <http://home.swipnet.se/medicalgeology/>

Course information <http://crcleme.org.au>



Armed Forces Institute
of Pathology



United Nations Educational, Scientific and Cultural Organization.



Who should attend?

The Short Course is intended for geologists, ecologists, chemists, biologists, occupational and environmental scientists, medical professionals, toxicologists, epidemiologists, pathologists and any other public health, environmental and geo-sciences professional with an interest in the effect of toxic metal ion species on environmental and human health. An important aim of the Short Course is to provide the opportunity for forming contacts and cross-discipline networks between professionals working in different disciplines but working towards common understanding of health problems.

Short Course Scope and Purpose:

Medical Geology is an emerging discipline that examines links between geological materials and processes, and the incidence and spatial/temporal distributions of human (and other animal) diseases. A large body of evidence points to significant health effects resulting from our interactions with the natural world since the beginnings of human civilization, around 10,000 years ago. While the connections between the physical environment and human disease have long been recognized, momentum has been building in recent years to solidify and formalize the study of such interactions.

Metal ions occur naturally in rocks, soils, gases, and waters in both harmless and harmful forms and concentrations. Metals are important in environmental health and on the study of human diseases (pathology) because of their potential toxic effect(s) to one or more organs. Exposure to toxic metal ions may occur via three principle routes: percutaneous absorption, ingestion, or inhalation. Dermal toxicity results from local tissue responses through direct contact of the metal with skin, or alternatively, may represent a manifestation of systemic toxicity following ingestion or inhalation. Allergic contact dermatitis induced by nickel (Ni) is an example of a local tissue response. The adverse skin reactions resulting from chronic ingestion or inhalation of arsenical compounds exemplify systemic toxicity. A variety of toxic pathology responses in human tissues and organs (i.e., skin, liver, heart, kidney) associated with both acute and chronic exposures to metals have been described.

New techniques such as remote sensing and optical emission atomic spectroscopy are enabling researchers to dissect and quantify aspects of environmental health with greater clarity. In partnership with public health professionals, geoscientists today are beginning to understand the role of earth materials and systems in the spread of infectious diseases such as Lyme disease and West Nile virus fever. Analytical characterization of naturally-occurring trace elements and toxic organic compounds in ground water is helping to explain patterns of diseases such as arseniasis and fluorosis in China, and Balkan Endemic Nephropathy - a condition leading to death from kidney failure. Satellite remote sensing techniques are being used to monitor the movement of huge dust clouds moving across continents and oceans that carry pathogenic microbes, kill coral, and may cause asthma. Connections between earthquakes and outbreaks of the respiratory disease Valley Fever are being elucidated. Anthropogenic sources of contaminated drinking water and air pollution, such as pesticides, endocrine disruptors, PM10, and radionuclides are also being identified with greater refinement. Modern analytical and remote sensing techniques offer promise of developing innovative solutions to prevent or minimize exposure to potentially deleterious natural materials and geological processes.

The aim of this Short Course is to share some of the most recent information on the relationship between toxic metal ions, trace elements, and their impact on the environmental and public health issues. The scientific topics of the Short Course will include environmental toxicology, environmental pathology, geochemistry, geoenvironmental epidemiology, extent, patterns and consequences of exposures to toxic metal ions, and modern methods of analysis. Areas of interest include metal ions in the general environment, biological risk assessment studies, modern trends in metal analysis, and updates on the geology, toxicology and pathology of metal ion exposures.

This Short Course will provide examples where both deficiencies of trace elements as well as toxic exposures of metals may be involved in physiological changes and the development of human diseases. An overview of clinico-pathological aspects of toxic metal exposures including discussions of essentiality and clinical manifestations will be presented.

The Short Course will comprise 3 days of workshop presentations/discussions and 1 day (4/12/2003) for a field trip to examine occurrences of natural and man-induced contamination of natural materials.

Objectives:

At the completion of this Short Course, the attendees will be able to:

1. know and gain information on the type of evidence available about geological sources and processes, environmental health, toxicology, and pathological manifestations of exposures of toxic metal species;
2. know and gain information about geochemical processes, natural and anthropogenic sources, speciation, modes of occurrence; to assess the impact of trace elements and toxic metal ion species on human and environmental health; and,
3. have an elementary understanding of environmental toxicology, geoenvironmental epidemiology, medical geology and issues associated with assessment and environmental as applied to the study of toxic metal species and trace elements.

Short Course Leaders:

Dr. José A. Centeno, U.S. Armed Forces Institute of Pathology, Washington, DC.

Dr Robert B. Finkelman, U.S. Geological Survey, Reston, VA.

Dr. Olle Selinus, Geological Survey of Sweden.

Dr. Florabel G. Mullick, U.S. Armed Forces Institute of Pathology, Washington, DC.

It is proposed that the short course will also include local speakers.

About the Speakers:

Dr. Jose A. Centeno is a Senior Research Scientist and Chief of the Division of Biophysical Toxicology and the Education and Research Branch at the Department of Environmental and Toxicologic Pathology, U.S. Armed Forces Institute of Pathology (AFIP) in Washington, D.C. Dr. Centeno received his BS and MS in chemistry from the University of Puerto Rico at Mayaguez in 1979 and 1981, respectively; and a PhD in Physical Chemistry from Michigan State University in 1987. He has presented over 100 invited seminars and lectures at universities, government laboratories and industry on various topics of environmental toxicology, biomedical research, and human health issues of trace elements and toxic metals. He has served on the organizing and scientific committees of several international conferences, including as General Chairman of the 6th *International Symposium on Metal Ions in Biology and Medicine* (May 7-10, 2000). He has served on several international environmental and human health committees including the Working Group for the International Agency for Research on Cancer, the U.S. TOSCA-Interagency Testing Committee and IGCP Project #454 Working Group on Medical Geology, a project conducted under the auspices of UNESCO. Over the last decade, he has focused attention on environmental and health impacts of trace elements, toxic metal and metalloids, and conducted research and training activities in Mexico, China, Taiwan, New Zealand, Japan and Lithuania.

Dr. Robert B. Finkelman is currently the coordinator of coal quality activities at the U.S. Geological Survey (USGS) in Reston, VA. He received his PhD in Chemistry from the University of Maryland in 1980, his MS in Geochemistry from George Washington University in 1970, and his BA in Geology from the City College of New York in 1965. For the past 25 years, Dr. Finkelman has been involved with coal quality issues both at Exxon Production Research Company and later, the USGS. Over the last decade, he has focused attention on health impacts of geologic materials and conducted research in Yugoslavia, Romania, China, Taiwan, New Zealand, Japan and Lithuania.. Among his 370 publications are several papers dealing with human health impacts of coal, mercury and arsenic in coal.

Dr. Florabel G. Mullick is the Principal Deputy Director of the Armed Forces Institute of Pathology (AFIP) and member of the U.S. federal Senior Executive Service. Dr. Mullick is also the Director for the Center for Advanced Pathology and Chair of the AFIP Department of Environmental and Toxicology Pathology. Dr. Mullick is a physician executive and managing scientist responsible for the development of an international computer database of both human and animal lesions resulting from toxic drugs and chemicals. Dr. Mullick received her Doctor of Medicine degree from the School of Medicine in Puerto Rico, her pathology training at University Hospital in Puerto Rico, Children's Hospital in Washington, D.C., and Georgetown University Hospital in Washington, D.C. She is a Diplomate of the American Board of Pathology in Anatomic Pathology and Secretary of the International Academy of Pathology. Over the last decade, Dr. Mullick has focused her research efforts on the study of human health effects of toxic drugs and toxic trace metals with particular emphasis on liver diseases and pediatric pathology cases.

Dr. Olle Selinus is a Ph.D. geologist working with the Geological Survey of Sweden (GSS). During the 1960s and 1970s he worked in mineral exploration with a mining company and at the GSS. Since the beginning of the 1980s, Dr. Selinus research work has been focused on environmental geochemistry and geostatistical methods, including research on medical geology. He has served as the organizer of several international conferences in this field and has published over 40 manuscripts. As Head of the Geochemical Division at GSS, Dr. Selinus is in charge of GSS international affairs. He serves as officer of COGEOENVIRONMENT and as chairman of its international Working Group on Medical Geology, and co-chairman of the IGCP project #454 Medical Geology.

International Speakers contact details:

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Accommodation Information

The venue at Geoscience Australia (GA) is 8 km from the centre of Canberra. The nearest accommodation to the venue (approx. 1 km from GA) is in the suburb of Narrabundah as follows: (not in any order of precedence):

Hotel Heritage; 02-62952944; www.hotelheritage.com.au

Comfort Inn Garden City; 02 6295 3322; www.gardencityinn.com.au

Crestwood Gardens Motor Inn; 02 6295 2099; www.crestwoodgardens.citysearch.com.au

Best Western Sundown Motel Resort; 02 6239 0333; www.sundownvillage.com.au

Information on Canberra Accommodation can be found at www.canberratourism.com.au

Registration

The course participation fee \$220 includes: admission to the Short Course, documentation, and morning and afternoon coffee/tea and a light lunch . The additional fee (\$55) for the Field Trip on 4/12/03 includes transportation, and lunch.

<http://crcleme.org.au>

Contacts for Further information.

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SHORT COURSE ON MEDICAL GEOLOGY HEALTH AND THE ENVIRONMENT

Surname

First Name

Title/Position

Organization

Mailing Address

Postal Code

Country

Telephone

Fax

E-mail

I am interested in: (X relevant items)

1. Attending the Course [] Registration fee \$220

2. Participating in the Field Trip [] Additional Fee \$55

3. Presenting an Oral paper []

4. Presenting a Poster paper []