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Chulabhorn Research Institute

INTERNATIONAL CENTRE FOR ENVIRONMENTAL AND INDUSTRIAL TOXICOLOGY (ICEIT)

CRI's ICEIT has been designated as a
"UNEP Centre of Excellence for Environmental and Industrial Toxicology".

The 9th Princess Chulabhorn International Science Congress
"THE CHALLENGES OF ONE HEALTH: THE ROLES OF BIOSCIENCES AND CHEMISTRY"
Shangri-La Hotel, Bangkok, Thailand
December 15 - 18, 2025

On December 15th, 2025, His Majesty King Maha Vajiralongkorn Phra Vajiraklaochaoyuhua and Her Majesty Queen Suthida Bajrasudhabimalalakshana presided over the opening of the 9th Princess Chulabhorn International Science Congress, an event organized to commemorate the sixth cycle (72 years) birthday anniversary of His Majesty King Maha Vajiralongkorn Phra Vajiraklaochaoyuhua, and attended by scientists and invited speakers from over 25 countries.

The Congress was held on the topic of "The Challenges of One Health: The Roles of Biosciences and Chemistry". One Health is a concept that is increasingly important in science and emphasizes the close, and often complex, relationship between human health, animal health, and the environment. Presently, this concept is being used to develop new knowledge in an integrated manner that involves multiple disciplines, such as medicine, veterinary science, and public health. The One Health concept stresses the importance of promoting human health, animal health, and environmental health together, because a problem with one aspect may eventually cause a problem with the others. Thus, environmental factors may lead to the development of diseases both in humans and in animals.

The congress brought together approximately 750 participants from 25 countries, who shared their expertise and research findings. The Congress program included 7 keynote and plenary lectures, 12 symposia, and 2 roundtable discussions, with 59 invited speakers from 16 countries. There were also 32 platform and 138 poster presentations that highlighted research conducted by the congress participants.

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The 9th Princess Chulabhorn International Science Congress "The Challenges of One Health: The Roles of Biosciences and Chemistry", Shangri-La Hotel, Bangkok, December 15-18, 2025

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The Keynote Lecture was given by **Professor Dr. Her Royal Highness Princess Chulabhorn Mahidol** on the topic of **"From Environment Exposures to Disease Manifestation: The Lasting Impacts of Arsenic"**, highlighting the serious global health risks associated with arsenic contamination, particularly through drinking water. Early exposure, including in utero, can cause biological changes in the fetus, affecting gene expression linked to cell death, inflammation, and stress responses. Studies in Thailand and Vietnam show similar patterns, suggesting a connection to disease development. These effects may persist into childhood, with signs of exposure seen up to nine years of age. Experimental research indicates a possible link between arsenic and inflammation or cancer. Long-term monitoring using gene biomarkers could support early detection and intervention, improving health outcomes in affected populations.

Dr. Tedros Adhanom Ghebreyesus, the Director-General of the World Health Organization, Geneva, Switzerland, gave his special remarks for the conference by VDO presentation.

Dr. Tedros started by making the alarming statement that, "If our planet were a patient, it would be in the intensive care unit". He highlighted climate-related threats such as disease outbreaks and environmental degradation. Dr. Tedros stressed the importance of the One Health approach in addressing these challenges and reaffirmed WHO's commitment to supporting countries in turning this approach into concrete actions for the health of people, animals, and the planet.

The 6 Plenary Lectures included: "*One Health Innovations: Predicting and Preempting Spillover Infections*" by Julie L. Gerberding (Foundation for the National Institutes of Health, U.S.A.); "*AMR in 2024: We Still Have an Awareness Problem*" by Helen W. Boucher (Tufts University, U.S.A.); "*Drug Development and Regulatory Sciences: Turning Crises into Opportunities - A Valuable Perspective*" by Ram Sasisekharan (Massachusetts Institute of Technology, U.S.A.); "*The Two Sides of Precision Medicine: Proteomic Enablement of Biomarkers and Therapeutics*" by Jennifer van Eyk (Cedars-Sinai Medical Center, U.S.A.); "*Programmable Therapeutics for Genetic Diseases*" by John M. Essigmann (Massachusetts Institute of Technology, U.S.A.); and "*The Lessons Learned from COVID-19*" by George F. Gao (Chinese Academy of Sciences, P.R. China).

In addition, there were 12 symposia, 2 roundtable discussions on "*Regulatory Innovation*" and "*AMR Policy Impacting South and Southeast Asia*"; and 2 Special platform sessions on "One Health" and "Cancers" that provided more detailed coverage of various aspects of One Health. Also important is the oral and poster sessions during which 175 scientists from Thailand and abroad presented the results of their research work in various areas related to One Health.

The 9th Princess Chulabhorn International Science Congress provided an important platform for showcasing research findings in the integrated areas of medicine, veterinary science, and public health according to the One Health concept, which will be an important holistic approach to the prevention and mitigation of environmental health problems, both now and in the future.

The Princess Chulabhorn Gold Medal Award of Appreciation 2024

Professor Dr. Her Royal Highness Princess Chulabhorn Mahidol has established the "**Princess Chulabhorn Gold Medal Award of Appreciation"** in recognition of persons or organizations that have provided outstanding academic contributions for the development and prestige of the Chulabhorn Research Institute.

Recipients of the Princess Chulabhorn Gold Medal Award of Appreciation 2024 (in alphabetical order)**:**

- **Dr. Norbert Frank** (Germany)
- **Dr. Curtis C. Harris** (U.S.A.)
- **Professor Leonard Ritter** (Canada)
- **Professor Martin van den Berg** (The Netherlands)
- ***Thanphuying*** **Putrie Viravaidya** (Thailand)
- **Dr. Xin Wei Wang** (U.S.A.)

From left to right: **Dr. Norbert Frank** (Germany), **Professor Martin van den Berg** (The Netherlands), **Professor Dr. HRH Princess Chulabhorn (**Thailand), **Dr. Xin Wei Wang** (U.S.A.) and ***Thanphuying*** **Putrie Viravaidya** (Thailand)

Not present: **Dr. Curtis C. Harris** (U.S.A.) and **Professor Leonard Ritter** (Canada)

Dr. Norbert Frank, *German Cancer Research Center, Heidelberg, Germany*

Dr. Frank is a distinguished scientist in the fields of chemistry and pharmacological research, having made significant contributions to cancer research and chemoprevention throughout his career. Dr. Frank took up a position as a scientific collaborator at the German Cancer Research Center in Heidelberg, at the Institute of Toxicology and Chemotherapy. His research focused on nitrosamine-induced carcinogenesis. Dr. Frank has published over 100 scientific articles and book chapters and received the prestigious PHOENIX Award for Pharmaceutical Sciences in 2003. Through his dedicated work and international collaborations, Dr. Frank has made significant contributions to cancer prevention and the exploration of natural substances for cancer prevention, and his contributions have had lasting impacts, including on research, capacity building of young scientists, and sustainable development in the Asia-Pacific region.

For more than twenty years, Dr. Frank is an important member of the international teaching faculty of the capacity building program established by Professor Dr. HRH Princess Chulabhorn, that provides training to participants from governmental, academic and research agencies and institutions from developing countries of the Asia-Pacific region.

Dr. Curtis C. Harris, *Chief of the Laboratory of Human Carcinogenesis, and Head of the Molecular Genetics and Carcinogenesis Section, Center for Cancer Research, US National Cancer Institute, U.S.A.*

Dr. Harris has received numerous honors throughout his distinguished career, including the Charles Heidelberger Award from the International Society of Gastroenterological Carcinogenesis, the Distinguished Service Medal, the NCI Outstanding Mentor Award in 2007 and 2013, the AACR-Princess Takamatsu Award, and the AACR-American Cancer Society Award for Research Excellence in Cancer Epidemiology and Prevention. He is an elected Fellow for the Academy of the American Association of Cancer Research, serves as an honorary member for the Japanese Cancer Association, and is a Fellow at the American Society of Clinical Investigation. Dr. Harris has published more than 800 journal articles and 142 book chapters, has been awarded more than 30 patents owned by the U.S. Government, and has served as Editor-in-Chief for the journal of Carcinogenesis for more than 30 years. Dr. Harris' scientific interests and accomplishments span molecular genetics and epigenetics of human cancer to molecular epidemiology of human cancer risk and mechanistic biomarkers of cancer diagnosis, prognosis and therapeutic outcome.

Dr. Harris is also a longstanding lead scientist of the Thailand Initiative on Genomics and Expression Research for Liver Cancer or TIGER-LC - a collaboration between the Chulabhorn Research Institute and the Laboratory of Human Carcinogenesis of the US National Cancer Institute and Georgetown University Medical Center, for research on liver cancer in Thailand - work with significant impact for the country for the past 15 years.

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The Princess Chulabhorn Gold Medal Award of Appreciation 2024

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Professor Leonard Ritter, Emeritus Professor in Toxicology, University of Guelph, Canada

Professor Ritter was an expert advisor and member of the Joint WHO/FAO Expert Committee on Food Additives, Consultant and Principle Author of a report on Persistent Organic Pollutants developed through WHO's International Program on Chemical Safety, a member of the Expert Panel on the Safety of Use of Hormones in Food Production convened by the World Trade Organization, an invited expert panelist for the Health Canada/ Canadian Food Inspection Agency Joint Expert Consultation on the Safety of Genetically Modified Foods, Chair of the Health Canada Pest Management Regulatory Agency 2,4-D Science Advisory Panel, invited advisor to the Health Canada consultation on the derivation and application of uncertainty factors in health risk assessment, and appointed Professor Emeritus in toxicology at the University of Guelph in 2011.

Professor Ritter has been involved with teaching and training at the Chulabhorn Research Institute and the Chulabhorn Graduate Institute for more than twenty years, teaching principles and design of toxicity testing, hazard assessment and risk perception to students in Bangkok. He has been an important member of the international teaching faculty of the capacity building program established by Professor Dr. HRH Princess Chulabhorn, that provides training to participants from governmental, academic and research agencies and institutions from developing countries of the Asia-Pacific region.

Professor Martin van den Berg, Emeritus Professor in Toxicology, University of Utrecht, The Netherlands

Professor van den Berg's research encompassed toxicokinetics, metabolism, reproductive effects, complex mixtures, and interactive effects of persistent halogenated organic pollutants. He investigated the interactions between xenobiotics and phytochemicals on steroid hormone synthesis, metabolism, and their correlation with hormone-dependent tumors. He also developed *in vitro* assays to detect effects of endocrine disruptors. Professor van den Berg served as the Deputy Director of the Institute of Risk Assessment Sciences at the University of Utrecht in The Netherlands and head of the Toxicology and Pharmacology Division. In 2006, he was bestowed an honorary doctorate from the University of Umea in Sweden in recognition of his research on mixture toxicity of dioxin-like compounds, polychlorinated biphenyls, and brominated flame retardants. He was the president of the Dutch Society of Toxicology from 2010-2012. Professor van den Berg has published more than 400 articles and has served as Editor-in-Chief, Associate Editor or Editorial Board Member for many toxicological journals.

Professor van den Berg is an important member of the international teaching faculty of the capacity building program established by Professor Dr. HRH Princess Chulabhorn, that provides training to participants from governmental, academic and research agencies and institutions from developing countries of the Asia-Pacific region. He was also instrumental in the establishment of a dual-degree program between the Chulabhorn Research Institute/Chulabhorn Graduate Institute and Utrecht University.

***Thanphuying* Putrie Viravaidya**, Deputy Director, Senior Royals Division, Bureau of the Royal Household, Thailand

Thanphuying Putrie worked at Khon Kaen University, the Office of the Education Council, and was appointed to the Office of His Majesty's Principal Private Secretary. She was appointed by His Majesty the King as Deputy Principal Private Secretary, and at present she is Deputy Director of the Senior Royals Division of the Bureau of the Royal Household. Throughout her service for over 52 years, *Thanphuying* Putrie has been awarded the trust of the Palace and holds key positions overseeing myriad activities, for example Chair of the Mae Fah Luang Foundation under Royal Patronage, Director of the Office of Coordination for the Anandamahidol Foundation, Vice Chair of the Foundation for the Sirindhorn International Environmental Park, Chair of the King Rama IV Foundation under Royal Patronage, and Chair of the King Vajiravudh Memorial Foundation under Royal Patronage.

Since the establishment of the Chulabhorn Research Institute in 1987 and the organization of the first Princess Chulabhorn International Science Congress, *Thanphuying* Putrie has been instrumental to the success of the Congress, which has always been referred to among the scientific community that attend it as one that offers excellence in academics, scientific programme, and culture and arts for the attendees. *Thanphuying* Putrie has provided tireless service to HRH Princess Chulabhorn Mahidol, President of the Chulabhorn Research Institute. Her efforts in promoting arts and culture of Thailand and her service to the Royal Family in improving the quality of life of the Thai people through scientific events such as the Princess Congress, contributes to the recognition of the Chulabhorn Research Institute in the international arena.

Dr. Xin Wei Wang, Deputy Director and Senior Investigator, Center for Cancer Research, US National Cancer Institute, U.S.A.

Dr. Wang advances early detection, diagnosis, and treatment of liver cancer, integrating multi-omics approaches, including genomics, transcriptomics, metabolomics, epigenomics, and microbiomics, to explore tumor heterogeneity and its underlying mechanisms, and identify functional biomarkers that improve early detection, prognosis, and personalized treatment. He serves as co-Director of the CCR Liver Cancer Program, Acting co-Chief of the Laboratory of Human Carcinogenesis, and is a member of the NIH Board of Scientific Directors and Clinical Directors. Dr. Wang has published over 290 scientific articles, many of which are in top-tier journals, such as Cell, Nature, NEJM, and Science. His recent Cell study introduced a paradigm-shifting method for liver cancer detection. His numerous accolades include NIH and NCI Director's Awards, twice the Blue Faery Award, and an honorary professorship of Fudan University.

He co-leads the NCI-CLARITY study and the TIGER-LC or Thailand Initiative in Genomics and Expression Research for Liver Cancer consortium, which is an ongoing major collaborative effort between the Laboratory of Human Carcinogenesis of the National Cancer Institute, and the Chulabhorn Research Institute. Since 2009, this long-standing research partnership has focused on uncovering the genetic and environmental drivers of liver cancer, particularly hepatocellular carcinoma and cholangiocarcinoma.

Arsenic Toxicity: Environmental Exposure and Human Health

Arsenic, a naturally occurring metalloid, has become a major environmental toxicant due to its extensive distribution and release through human activities. Industrial processes, agricultural applications, and natural geological phenomena have contributed to widespread contamination of water, soil, and air, posing significant threats to both ecosystems and human health.

Among its various chemical forms, inorganic arsenic (iAs) is the most toxic. Groundwater contamination remains the predominant route of exposure, especially in regions such as West Bengal and Bangladesh, where arsenic concentrations often exceed 50 parts per billion. Additional exposure sources include metal smelting, fossil fuel combustion, and the use of arsenic-based pesticides and herbicides.

Arsenic metabolism occurs primarily in the liver, where it undergoes methylation facilitated by the enzyme arsenic methyltransferase (AS3MT), in the presence of S-adenosylmethionine and glutathione. This process converts arsenic into monomethylarsonic acid (MMA) and dimethylarsinic acid (DMA), which are subsequently excreted in urine. Methylation is a key detoxification mechanism, and genetic polymorphisms in AS3MT can significantly influence individual susceptibility to arsenic toxicity. Cellular uptake and intracellular conversion are mediated by transport proteins such as aquaglyceroporins, particularly AQP9, and phosphate transporters.

Arsenic exerts its toxic effects through several molecular mechanisms. It induces oxidative stress by generating reactive oxygen species (ROS) and reactive nitrogen species (RNS), which lead to lipid peroxidation, protein oxidation, and DNA damage. It also causes genotoxicity and epigenetic alterations by disrupting DNA repair pathways, including nucleotide excision repair and base excision repair, and by modifying DNA methylation patterns and gene expression related to cell proliferation and apoptosis. Furthermore, arsenic interferes with critical signal transduction pathways such as MAPK, ERK, and Nrf2-ARE, contributing to carcinogenesis and cellular dysfunction. Chronic exposure affects both the central and peripheral nervous systems, impairing cognitive function, reducing neurofilament protein expression, and altering neurotransmitter systems. Developmental exposure can result in epigenetic reprogramming and long-term behavioral deficits.

The clinical manifestations of arsenic toxicity affect multiple organ systems. Dermatological effects include hyperpigmentation, keratosis, and skin cancers. Respiratory and cardiovascular complications involve pulmonary dysfunction, hypertension, and atherosclerosis. Reproductive toxicity is evident in impaired spermatogenesis and altered androgen receptor activity. Neurological consequences include an increased risk of neurodegenerative diseases such as Alzheimer's, Parkinson's, and amyotrophic lateral sclerosis (ALS).

Insights from animal models and *in vitro* studies have revealed dose-dependent effects of arsenic on oxidative stress markers, such as manganese superoxide dismutase (MnSOD) and the glutathione redox ratio (GSH:GSSG), as well as on apoptotic proteins including caspases and AKT. Heat shock proteins, notably Hsp27 through Hsp90, are also affected. These molecular biomarkers are essential for assessing exposure levels and guiding therapeutic strategies.

In conclusion, arsenic toxicity represents a complex interplay between environmental exposure, biochemical transformation, and molecular disruption. A comprehensive understanding of its mechanistic pathways is vital for developing effective mitigation strategies, enhancing public health surveillance, and advancing therapeutic interventions. Future research should prioritize investigations into genetic susceptibility, transgenerational effects, and integrative models that bridge experimental findings with human pathology.

Source: Journal of Hazardous Materials Letters, Vol. 5, Article 100090, November 2024.

Advancing Groundwater Risk Analysis with Multiple Data Imputation

Groundwater is a critical source of drinking water for millions of people worldwide, yet its quality is increasingly threatened by inorganic contaminants originating from natural geological formations, agricultural activities, and industrial processes. Exposure to metals such as arsenic, chromium, and lead, as well as anions like nitrate and fluoride, poses both carcinogenic and noncarcinogenic health risks. Traditionally, risk assessments and treatment strategies have focused on individual pollutants. However, recent evidence suggests that co-occurrence of multiple contaminants can lead to additive or even antagonistic health effects and complicate treatment processes. Despite this, comprehensive analyses of pollutant mixtures remain rare, largely due to the sparseness and incompleteness of historical water quality datasets. These gaps hinder accurate risk evaluation and informed decision-making for water treatment technologies.

To address this challenge, this study explores the use of advanced multiple imputation techniques, AMELIA and MICE, to fill missing data in groundwater quality records. By leveraging machine learning-based imputation, the research aims to reduce uncertainty, improve understanding of contaminant co-occurrence, and guide resource allocation for monitoring and treatment. The approach was applied to datasets from Arizona and North Carolina, two states with contrasting hydrogeological conditions, to evaluate

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Mobile Phone Usage and Brain Tumor Risk: A Meta-Analytic Review

In recent years, concerns have grown regarding the potential link between mobile phone use and brain tumor development due to exposure to radiofrequency electromagnetic radiation (RF-EMR).

With the rise of smartphones and wireless technologies like Bluetooth, mobile phone usage has become more frequent and varied, extending beyond voice calls to activities such as streaming, messaging, and app use. These changes have made RF-EMR exposure patterns more complex and harder to measure accurately. Traditional proxies, like years of use or call duration, are now considered too crude. Accurate exposure assessment should consider site-specific absorption, cumulative exposure time, and device power output, all of which vary by phone model, usage habits, and technology.

The present study synthesizes findings from 19 case-control and 5 cohort studies to clarify the relationship between cellphone use and brain tumor risk by conducting meta-analyses using both conventional and refined exposure metrics. It highlights the need for more precise methods to assess RF-EMR exposure in light of evolving mobile technology and usage behaviors.

Key findings reveal that ipsilateral users (those using phones on the same side as the tumor) and individuals with over 10 years of phone use show statistically significant increased odds of developing certain brain tumors, particularly glioma, meningioma, and malignant tumors. For example, ipsilateral use was associated with a 40% increased risk, and cumulative use over 896 hours showed a 59% increased risk. However, regular users overall did not show a significant increase in risk compared to non-users.

Cohort studies, while methodologically stronger in establishing causality, yielded statistically inconclusive results. Only acoustic neuroma showed a modest increase in risk, though confidence intervals included unity, indicating uncertainty.

In conclusion, while the overall evidence remains mixed, this meta-analysis suggests that longer duration of use, especially on the ipsilateral side, and higher cumulative hours of use are associated with increased risks for specific brain tumor types like glioma, meningioma, and malignant tumors.

Future research must adapt to changing mobile phone use patterns, including continuous use and the growing adoption of WPAN technologies like Bluetooth. It is crucial to employ more accurate RF-EMR exposure assessments (ideally based on site-specific, time-integral of specific absorption rate or at least cumulative hours of use), ensure longer observation spans given tumor latency, adequate account for age as a confounder, and adjust for potential biases like selection and recall bias to avoid underestimation.

Source: Environmental Health, Vol. 23, Article 82, October 2024.

Advancing Groundwater Risk Analysis with Multiple Data Imputation

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its effectiveness in predicting pollutant distributions and informing treatment strategies.

AMELIA and MICE are two methods for imputing missing data. AMELIA uses a Bayesian approach with expectation-maximization and boot-strapping to create multiple complete datasets, assuming a multivariate normal distribution, fast and effective for large datasets. MICE, on the other hand, imputes data iteratively using regression models for each variable, offering flexibility for mixed data types but requiring more computation and sometimes overestimating values.

The researchers found that both AMELIA and MICE generated data that were accurate to within a 5%-10% significance level. Furthermore, field data indicated that 75–80% of samples contained no contaminants above regulatory limits, but imputed data reduced this figure to only 15-55%, revealing a 2-5-fold increase in locations likely to exceed health-based standards and identifying sites with 2-6 co-occurring pollutants above safe levels. Linking imputed data to sampling locations helps pinpoint "hotspots" and optimize resource allocation for further sampling and analysis. This suggests groundwater remediation methods should focus on mixtures of pollutants.

Imputation significantly expanded usable data, enabling better understanding of pollutant co-occurrence and its impact on treatment choices. For example, arsenic removal becomes more complex when iron, silica, phosphate, or vanadate are present, affecting adsorption efficiency and costs. Similarly, nitrate removal via ion exchange is influenced by competing anions, increasing operational expenses.

In summary, multiple imputation reduces uncertainty in sparse groundwater datasets, enabling agencies to identify high-risk areas and prioritize sampling and treatment strategies effectively. Although challenges remain, such as predicting extreme values and validating results with real-world data, this approach offers a practical framework for resource-limited agencies to improve monitoring and protect public health.

Future directions include field validation in regions with significant data gaps, refining algorithms to better handle extremes, and integrating additional data sources like geological and land-use information to enhance accuracy. Expanding these methods across diverse regions will test generalizability and uncover local challenges. Emphasizing targeted sampling and interdisciplinary collaboration will be critical for improving model reliability and informing sound environmental management and policy decisions.

Source: Environmental Science & Technology, Vol. 58, Issue 46, Pages 20513-20524, November 2024.

IARC: Cancer Incidence in Five Continents Vol. XII

Cancer Incidence in Five Continents Volume XII (CI5-XII) is published as IARC Scientific Publication No. 169.

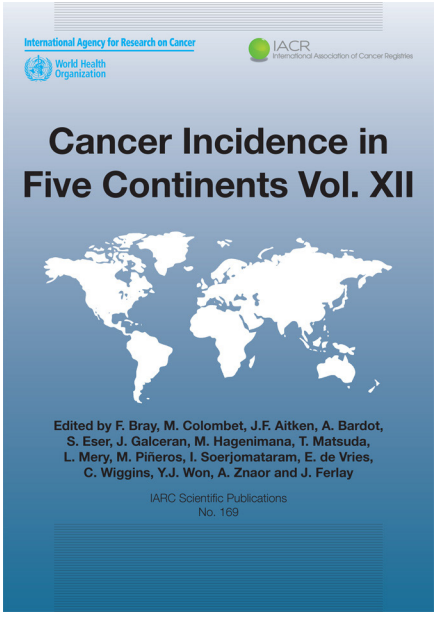
The main objective of the **Cancer Incidence in Five Continents (CI5) series**, published by the International Agency for Research on Cancer (IARC) and the International Association of Cancer Registries (IACR), is to present comparable data on cancer incidence for all countries around the world for which high-quality data have been made available by population-based cancer registries.

CI5 is an invaluable source of information about the global burden and distribution of cancer, and Volume XII has a wider coverage than ever, presenting high-quality standardized data for cancers diagnosed during the period 2013-2017 from 460 cancer registries in 65 countries.

CI5-XII is a vital tool for epidemiologists, public health professionals, and researchers. It helps in understanding geographic and temporal variations in cancer incidence and supports planning and evaluation of cancer control programs.

The publication is freely available in PDF format from the IARC Publications website and also through the CI5-XII web portal - https://ci5.iarc.fr/ci5-xii/.

Source: International Agency for Research on Cancer, Cancer Incidence in Five Continents, Vol. XII (IARC Scientific Publication No. 169), December 2024.



Incense Use and Risk of Chronic Limb-Threatening Ischemia (CLTI)

Chronic limb-threatening ischemia (CLTI) represents the most severe clinical manifestation of peripheral arterial disease (PAD), characterized by ischemic rest pain, nonhealing ulcers, and gangrene. Patients with CLTI usually require surgical intervention of either revascularization or lower limb amputation (LEA) and are at high risk of morbidity and mortality.

PAD is widely recognized as the third most common cardiovascular disease after coronary artery disease and stroke. With a five-year mortality rate exceeding 50%, CLTI poses a significant public health burden. While classical risk factors such as diabetes, hypertension, hyperlipidemia, and smoking are well-established, emerging evidence implicates indoor air pollution. including incense smoke, as a potential contributor to atherosclerotic disease progression.

This prospective cohort study aimed to examine the relationship between prolonged domestic exposure to incense smoke and the risk of developing CLTI among middle-aged and older Chinese adults in Singapore. The analysis was based on data from the Singapore Chinese Health Study (SCHS), a population-based cohort comprising 63,257 individuals aged 45 to 74 years, recruited between 1993 and 1998.

The results showed that 76.9% of participants were current incense users, with 92.6% reporting daily use and 84.0% having used incense for over 40 years. Over a mean follow-up of 18.8 years, 1,097 incident CLTI cases were documented. Current incense users had a 22% higher risk of developing CLTI compared to never/former users.

The association was strongest among individuals with daily incense use exceeding 40 years. Stratified analyses revealed consistent risk estimates across sex, smoking status, diabetes, and hypertension, suggesting an independent effect of incense exposure.

Preclinical studies suggest that incense smoke induces oxidative stress, inflammation, and endothelial dysfunction. Animal and cell culture models have shown that incense exposure can impair vascular function more severely than tobacco or candle smoke.

Despite growing awareness of its health risks, incense burning remains a widespread practice globally for religious, cultural, and aromatic purposes. Given the high prevalence and long duration of use, especially in Asian populations, the findings underscore the need for increased public education on the potential vascular risks of chronic incense exposure.

In conclusion, long-term daily exposure to incense smoke at home is associated with an increased risk of CLTI. Given the widespread cultural practice of incense burning, these findings underscore the need for public health interventions aimed at mitigating indoor air pollution and raising awareness of its vascular implications.

Source: Environmental Health Perspectives, Vol. 133, Issue 1, Article EHP16598, January 2025.

CALENDAR OF EVENTS

International Training Courses at Chulabhorn Research Institute, Year 2025

	Training Course	Date	Duration	Closing Date
1	Environmental Immunotoxicology and Reproductive Toxicology	November 2025	5 work days	August 2025
2	Environmental Health Risk Assessment and Management of Toxic Chemicals	December 2025	6 work days	October 2025

Course Coordinator: *Khunying* Mathuros Ruchirawat, Ph.D.

Course Description:

Environmental Immunotoxicology and Reproductive Toxicology (November 2025)

The course consists of 2 parts. The first part provides an overview of blood cells and the mammalian immune system, including a detailed description of all three arms of the immune response, how toxic chemicals can impact normal immune system homeostasis to result in adverse health outcomes, cellular/functional methodologies for determining the potential immunotoxicity of a given chemical, and how immunotoxicology relates to other scientific fields such as drug development and risk assessment. The second part provides an introduction to hormonally active agents and their mechanisms of action; routes of exposure, bioaccumulation, distribution and metabolism; effects on reproduction and development in humans and animals; and methods for studying changes in gene expression.

Requirement: Participants should have an understanding of the fundamental principles of toxicology, and some basic knowledge on the biology of the immune and reproductive systems.

Environmental Health Risk Assessment and Management of Toxic Chemicals (December 2025)

The course is an integration of science and policy, and covers the principals of human health and environmental risk assessment; the risk assessment paradigm; the risk assessment and management processes, which start from identification of the hazard, assessment methods, the mode of action and human relevance framework, the inherent uncertainties in each step, and the relationship between risk assessment and risk management, as well as the need for open, transparent and participatory acceptance procedures and credible communication methods. Emphasis will be placed on potential adverse health effects of human exposure to environmental hazards. The course also teaches the application of risk assessment methods to various problems and describes the policy context in which decisions to manage environmental health risks are made. The applications of environmental impact assessment procedures for identifying and assessing risk are also covered. Importantly, the course teaches the practical application of risk assessment methods to various problems using case studies relevant to problems faced in developing countries.

Requirements: Participants should hold a bachelor's degree in chemistry, biological sciences or medicine and have at least two years of work experience and responsibilities related to the assessment of risk from exposure to chemicals.

Fellowships:

A limited number of fellowships are available that will cover round-trip airfare, accommodation (on site) and meals, training materials, and health insurance.

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Calendar

More information and application:

Please visit - https://www.cri.or.th/academic-activities-en/activity-calendar/

The ICEIT NEWSLETTER is published quarterly by the International Centre for Environmental and Industrial Toxicology of the Chulabhorn Research Institute. It is intended to be a source of information to create awareness of the problems caused by chemicals. However, the contents and views expressed in this newsletter do not necessarily represent the policies of ICEIT.

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