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Welcome Message

Dr. Pau-Chung Chen 陳保中教授

Chair of the 2015 International Symposium of Environmental Medicine

Director, Department of Environmental and Occupational Medicine, National Taiwan University Hospital and National Taiwan University College of Medicine

Director and Professor, Institute of Occupational Medicine and Industrial Hygiene, National Taiwan University College of Public Health

Chair, Scientific Committee on Reproductive Hazards in the Workplace (RHICOH), International Commission on Occupational Health (ICOH)

Welcome to the 2015 International Symposium of Environmental Medicine. On behalf of the symposium organizing committee, I am honored and delighted to welcome you in Taipei, Taiwan. This is the second year of Environmental Medicine Collaboration Center, National Taiwan University Hospital holding this symposium. Our center aims to enhance and exchange our knowledge of environmental medicine and improve our health eventually through enhancing exposure science, clinical service and risk communication.

As we know, environmental medicine is a multidisciplinary field involving medicine, environmental science, toxicology, chemistry and others. The scope of this field involves studying the interactions between human health and the environment including biological, chemical, and chemical exposures in air, water and food. The purpose of this symposium today is to learn each other and to pursue future cooperation in this field. We also have our distinguished guests from the United States, the United Kingdom, Germany, the Netherlands, China, Japan and Korea. I deeply appreciate your coming to share with us your unique experience.

Finally, I'd like to thank you for your support and your attendance. Wish you find the conference stimulating, fulfilling and enjoyable and most importantly live healthier and better.

僅代表第二屆環境醫學國際研討會歡迎各位的到來，這是臺大醫院環境醫學中心第二次舉辦環境醫學國際研討會。臺大醫院環境醫學中心旨在藉由環境醫學知識交流、增強暴露分析、臨床醫療服務和風險溝通以期增進大眾健康。

我們都知道環境醫學是一個包含環境科學、毒物學、化學和醫學的跨領域學門，其中涉及的研究範圍包括生物、化學、空氣、水和食物暴露等環境與人類健康的交互作用。本次研討會希望藉由知識與經驗的傳遞，以追求未來在此領域的合作交流。我們邀請了來自美國、英國、德國、荷蘭、中國、日本及韓國的各位貴賓，感謝您遠道而來與我們分享您寶貴的經驗！以及國內各位專家學者撥冗出席，才能促成此次各方的交流和學習。

最後，對各位的參與和支持致上最深的謝意，希望研討會能給您激勵、充實和愉悅的兩天，更重要的是，可以生活的更好、更健康。

臺大醫院環境醫學中心

環境中充斥著各式各樣有害的汙染物，其中的暴露及累積對人體負面影響遠非我們所能想像，為了民眾的健康和提供更便利的醫療服務，臺大醫院於 2014 年成立環境醫學中心 (Environmental Medicine Collaboration Center, 簡稱 EMC^2)，目的在於結合環境暴露檢測與臨床診斷以探討環境因子與疾病的關係，並提升國內環境醫學和預防醫學之研究能量。

環境醫學中心在環境及職業醫學部和小兒部成立環境醫學諮詢門診，提供包含重金屬和塑化劑檢測、不孕症、生育危害和兒童環境健康諮詢等項目。環境醫學中心與臺大醫院毒藥物鑑定暨檢驗中心和臺大公共衛生學院環境職業衛生研究團隊合作，建立量測人體內在或外來化學物質濃度與臨床醫療服務平台。

同時，醫學中心每年都會舉辦環境醫學國際研討會，邀請國內外的專家學者共同分享研究及實務經驗，希望讓國內外關心環境醫學議題的人員都可共襄盛舉。我們每年都會找出相關的事件為主題，希望喚醒大眾對環境醫學議題的關心並增加相關知識，以期達到健康促進和知識傳播的目的！

Environmental Medicine Collaboration Center (EMC^2), National Taiwan University Hospital

Environmental Medicine Collaboration Center, National Taiwan University Hospital was established in 2014 to help people deal with environmental effects on human health in individual patients. We'd like to find out the links between environmental exposures and adverse effects not only for disease diagnosis, treatment but also health prevention as well.

Our clinic services include female infertility, reproductive hazards and children Health. We'd like to provide a comprehensive consultation of environmental toxins, endocrine disruptor, heavy metal and health impact. And our teams include Forensic and Clinical Toxicology Center, National Taiwan University Hospital and Environmental and Occupational Health Research Group, National Taiwan University College of Public Health which provide analytical testing services include metal, phthalate and toxic chemicals.

Meanwhile, Environmental Medicine Collaboration Center holds a conference every year. We'd like to establish a platform for the physicians, environmental medicine professionals to exchange opinions and share achievements of the work. Through the conference, we expect to share environmental and medical issues as well as innovative solutions with the audiences and wish every participant has fruitful results.

International Symposium of Environmental Medicine Program 第二屆環境醫學國際研討會

Day1: Oct 24, 2015 (Saturday)

0900-0920	**Registration 報到**
0920-0930	**Welcome and Opening Remarks 開幕致詞**
	Session One: Environmental Toxins and Health 環境毒物與健康 Moderator: Dr. Chensheng Alex Lu (Associate Professor, Harvard University, United States) 哈佛大學呂陳生副教授
0930-1020	**Dr. Yi-Ping Lin (Associate Professor, Yang Ming University, Taiwan 陽明大學林宜平副教授)** Arsenic, Radiation and Organic Solvents: A History of Environmental Toxins and Health in Taiwan
1020-1040	**Coffee Break (休息)/ Poster Presentations & Discussion**
1040-1130	**Dr. Tony Fletcher (Senior Lecturer, London School of Hygiene & Tropical Medicine, United Kingdom 倫敦大學衛生與熱帶醫學院副教授)** The Epidemiology of Perfluorinated Compounds – Studies in the General Population and Contaminated Communities
1130-1220	**Dr. Ming-Tsang Wu (Professor, Kaohsiung Medical University, Taiwan 高雄醫學大學吳明蒼教授)** Melamine and Kidney Diseases
1220-1320	**Lunch 午餐/ Poster Presentations & Discussion**
	Session Two: Air Pollution and Health Impact 空氣汙染對健康影響 Moderator: Dr. Chun-Yuh Yang (Vice President, Kaohsiung Medical University, Taiwan) 高雄醫學大學楊俊毓副校長
1320-1410	**Dr. Chang-Chuan Chan (Professor, National Taiwan University, Taiwan 臺灣大學詹長權教授)** Health Effects for Residents in the Vicinity of a Petrochemical Complex
1410-1500	**Dr. Hai-Dong Kan (Professor, Fudan University, China 復旦大學闞海東教授)** Ambient Air Pollution and Population Health in China
1500-1520	**Coffee Break (休息)/ Poster Presentations & Discussion**
1520-1610	**Dr. Tsun-Jen Cheng (Professor, National Taiwan University, Taiwan 臺灣大學鄭尊仁教授)** Inhalation Toxicity of Ambient Particles
1610-1700	**Dr. Ta-Chen Su (Associate Professor, National Taiwan University, Taiwan 臺灣大學蘇大成副教授)** Air pollution and Cardiovascular Health: Current and Future Perspectives
1800-2000	**Symposium Banquet (Invited Only)**

Day2: Oct 25, 2015 (Sunday)

0830-0850	**Registration 報到**
	Session Three: Children's Environmental Health 兒童環境健康 Moderator: Dr. Mei-Hwan Wu (Superintendent, National Taiwan University Children's Hospital, Taiwan) 臺大兒童醫院吳美環院長
0850-0940	**Dr. Peter van den Hazel (President, INCHES and HEAL, Netherlands 國際兒童健康環境網絡和歐盟健康與環境聯盟主席)** The Importance of Children's Environmental Health to the World
0940-1030	**Dr. David Bellinger (Professor, Harvard University, United States 哈佛大學教授)** Characterizing the Public Health Impact of Children's Exposures to Environmental Chemicals
1030-1050	**Coffee Break (休息)/ Poster Presentations & Discussion**
1050-1140	**Dr. Joachim Heinrich (Senior Consultant, Ludwig Maximilian University, Germany 慕尼黑大學資深諮詢顧問)** Exposure to Greenness and Health Outcomes
1140-1230	**Dr. Eun-Hee Ha (Professor, Ewha Womans University, Korea 梨花女子大學教授)** Indoor and Outdoor Air Pollution and Children's Health
1230-1330	**Lunch 午餐/ Poster Presentations & Discussion**
	Session Four: Environmental Health Interventions 環境健康行為介入 Moderator: Dr. Hung-Yi Chiou (Vice President, Taipei Medical University, Taiwan) 臺北醫學大學邱弘毅副校長
1330-1420	**Dr. Ching-Chang Lee (Professor, Cheng Kung University, Taiwan 成功大學李俊璋教授)** Developing an Intervention Strategy to Reduce Phthalate Exposure in Taiwanese Girls
1420-1510	**Dr. Chisato Mori (Professor, Chiba University, Japan 千葉大學森千里教授)** Environmental Health Intervention & Preventive Medical Studies on Chemical Exposure Issues
1510-1520	**Poster Awards**

環境毒物與健康

Session One: Environmental Toxins and Health

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Dr. Chensheng (Alex) Lu (United States) 呂陳生副教授
Associate Professor, Department of Environmental Health, Harvard T.H. Chan School of Public Health
Visiting Associate Professor, National Taiwan University College of Public Health
E-mail: cslu@hsph.harvard.edu

Dr. Lu is interested in assessing human exposure to pesticides and its health effects. He is particularly interested in developing innovated biomarkers linking exposure to effects. His recent research effort extends to saving honeybees and other pollinators from the hazards of neonicotinoids, a group of most widely use insecticides in the world. Before joining Harvard, he was an Assistant Professor at Rollins School of Public Health, Emory University, from 2004-2008. He received the doctoral degree from the School of Public Health and Community Medicine at the University of Washington, Seattle WA, in 1996.

Professional Services

Domestic Services

2014	Member, *Post-Vietnam dioxin exposure in Agent Orange-contaminated C-123 aircraft*, Institute of Medicine (IOM) / The National Academies
2013-	Member, Scientific Advisory Board, The Organic Center
2013-2014	Member, *California Department of Pesticide Regulation's Risk Assessment Process for Pesticides*, National Research Council (NRC) / The National Academies
2006-	*Ad hoc* member, Science Review Board, Food Quality Protection Act (FQPA), US Environmental Protection Agency (US EPA)
2004-	*Ad hoc* member, Scientific Advisory Panel, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), US Environmental Protection Agency (US EPA)

International Services

2015-	Visiting Associate Professor, College of Public Health, National Taiwan University, Taiwan
2012-	Academic lecturer, Frontier Lectures in Environmental Sciences, Peking University, China
2009-	Scientific Expert, European Food Safety Authority (EFSA), Italy
2008-	Adjunct Professor, Cyprus International Institute for Environmental and Public Health, Cyprus University of Technology, Cyprus

Honor and Awards

Innovative Faculty Development Award, Radcliffe Institute for Advanced Study, Harvard University (2014)
Joan Daisey Outstanding Young Scientist Award. International Society of Exposure Analysis (2005)

Editorial Board

2008-	Associate Editor, Environmental Health Perspectives (EHP)
2006-2012	Associate Editor, Journal of Exposure Science and Environmental Epidemiology (JESEE)

Dr. Yi-Ping Lin (Taiwan) 林宜平副教授

Associate Professor, Institute of Science, Technology and Society, Yang Ming University

E-mail: yplin3@ym.edu.tw

Dr. Lin received her bachelor and master degree in Psychology from National Taiwan University, a master degree in Bilingual Education from Boston University and later a PhD degree in Health Policy and Management. As an Associate Professor of Institute of Science, Technology and Society in Yang Ming University, her research combines her interdisciplinary knowledge of science and humanity. She is interested in environmental health and social epidemiology research especially by involving and publishing plenty of RCA lawsuit case study in Taiwan. Her vivid and elaborate expression could give us a different perspective of environmental history.

Research Interests

- Gender and Health
- Occupational and Environmental Health
- Risk Management and Communication
- Public Health History
- Social Epidemiology
- Science, Technology and Society
- Medical Anthropology

Education and Degrees

2004	PhD, Health Policy and Management, National Taiwan University
1986	MA, Department of Bilingual Education, Boston University, USA
1983	MSc, Department of Psychology, National Taiwan University, Taiwan
1981	BA, Department of Psychology, National Taiwan Univeristy, Taiwan

Professional Appointments

2011-	Associate Professor, Institute of Science, Technology and Society, Yang Ming University, Taiwan
2008-2011	Assistant Professor, Institute of Science, Technology and Society, Yang Ming University, Taiwan
2006-2008	Project Assistant Professor, Institute of Occupational Medicine and Industrial Hygiene, National Taiwan University College of Public Health, Taiwan
2004-2006	Project Assistant Professor, Department of Public Health, National Taiwan University, Taiwan
2004	Post-Doctoral Fellow, Center of Health Risk Assessment and Policy, National Taiwan

University College of Public Health, Taiwan

2001 Board of Directors, Taiwan Institute of Psychotherapy, Taiwan

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Honors and Awards

2003 The Fifth Antonio T.C. Chong Award for Research in Occupational Health and Safety, American Bureau for Medical Advancement in China (ABMAC) (New York, USA)

2001 Best Oral Presentation by a Young Investigator, The Second Prize Winner, Pan-Pacific Conference of the International Society for Quality of Life Research (Tokyo, Japan)

Teaching Courses and Presentations

- Gender, Medicine and Technoscience
- Environment, Society and Health
- Social Worlds Theory and Research
- Techno-science, Risk and Society

Selected Publications (2011-present)

1. **Lin YP**, Liu SY. Forgotten wars: Malaria eradication in Taiwan 1905-1965. In: Leung KC, Furth C. (eds), Health and Hygiene in Chinese East Asia: Policies and Publics in the Long Twentieth Century. Duke University Press, 2011:183-203.
2. **Yi-Ping Lin.** War against Mosquitoes-Science, Technology and Society Study of Post-War Malaria Eradication in Taiwan. Taiwan: A Radical Quarterly in Social Studies 2011;81: 187-235. (TSSCI)
3. **Yi-Ping Lin.** After the Death of Some Electronic Workers: The Health Risk Controversies of Organic Solvents. Taiwanese Journal for Studies of Science, Technology and Medicine 2011;12:61-112. (TSSCI)
4. Tseng MCM, **Lin YP**, Cheng TJ*. Prevalence and psychiatric co-morbidity of self-reported electromagnetic field sensitivity in Taiwan: A population-based study. Journal of the Formosan Medical Association 2011;110:634-41. (SCI)
5. Mei-Fang Chen, **Yi-Ping Lin**, Tsun-Jen Cheng. Public attitudes toward nanotechnology applications in Taiwan. Technovation 2013;33:88-96 (SCI).
6. Mei-Chih Meg Tseng, **Yi-Ping Lin**, Fu-Chang Hu, Tsun-Jen Cheng. Risks Perception of Electromagnetic Fields in Taiwan: The Influence of Psychopathology and the Degree of Sensitivity to Electromagnetic Fields. Risk Analysis 2013;33(11):2002-2012 (SCI).
7. Mei-Chih Meg Tseng, **Yi-Ping Lin**, Tsun-Jen Cheng. Effects of Psychopathology on the Characteristics of Individuals with Self-reported Electromagnetic Field Hypersensitivity. Taiwanese journal of psychiatry2014;28(1):26-36 (TSSCI).

Arsenic, Radiation and Organic Solvents: A History of Environmental Toxins and Health in Taiwan

Dr. Yi-Ping Lin (Taiwan)

E-mail: yplin3@ym.edu.tw

Associate Professor, Institute of Science, Technology and Society, Yang Ming University

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In this talk, I will use three Taiwanese case studies (arsenic, radiation and organic solvents) to elucidate how the victims, social movements, public health communities, and legal systems have reacted to the controversies of environmental toxins and health in Taiwan.

In the 1960s, an endemic disease in southern Taiwan known as “black foot disease” was proven to be correlated with exposure to arsenic via drinking water in deep wells. Further epidemiological studies indicate that drinking arsenic-rich water over a long period results in various health effects including skin problems, skin cancer, cancers of the bladder, kidney and lung, and increased the risk for diabetes, high blood pressure and reproductive disorders. Currently, the WHO's Guideline Value for arsenic in drinking water is 0.01 mg /liter.

In July, 1992, an extraordinary incident was uncovered by the Taiwanese media: recycled steel accidentally contaminated by discarded cobalt-60 sources was used in the construction of apartment buildings. The radiation contaminated more than 180 buildings (containing about 1,700 apartments), public and private schools, and small businesses in Taipei City and nearby counties. About ten thousand people occupied these buildings for periods ranging from nine to 22 years. Some residents, with the support of scientific evidence, brought the case to the court. In 1997, Taipei’s district court announced the success of 57 residents in claiming national compensation for physical, property, and psychological losses resulting from the intentional negligence of government officers who concealed information about the radiation contamination for nearly a decade. Though many research papers published on the case confirmed the health hazards of long term low dose radiation exposure, there were some papers, supported by the Atomic Energy Council, which indicated that chronic exposure of the whole body to low-dose-rate radiation, even when accumulated to a high annual dose, may be “beneficial” to human health.

In 1994, a Radio Corporation of America (RCA) factory in Taiwan was accused of polluting the groundwater with trichloroethylene, tetrachloroethylene, and many other organic solvents. Subsequently, former RCA workers who had been diagnosed with cancer organized to voice their health concerns about exposure to these environmental and occupational hazards. In 1998, the government supported research on these organic solvents, including animal studies, environmental health-risk assessments, environmental epidemiology, and occupational epidemiology. Though these public health studies did not sufficiently verify a correlation between industrial pollution and human health, some of the former RCA workers brought the case to the court in 2004. Many Taiwanese public health researchers appealed to testify for the plaintiffs at court. On April 17, 2015, the Taipei District Court ordered RCA to pay NT$560 million (US$18.2 million) in damages to 445 former RCA employees. Nevertheless, the ruling was just a temporary victory for the former RCA workers and the many lawyers, activists, scholars, and students who worked together on the long-fought lawsuit. The controversies of environmental toxins and health in Taiwan continue.

砷、輻射和有機溶劑：臺灣的環境毒物與健康歷史

林宜平副教授 (臺灣)

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陽明大學科技與社會研究所副教授

本次的演講，我將用臺灣的案例研究(砷、輻射和有機溶劑)來闡明受害者、社會運動、公共衛生社區和法律體系如何反應臺灣的環境毒物與健康爭議。

1960 年代，臺灣南部的地方性流行疾病，也就是俗稱的「烏腳病」，被證實因飲用含砷的深井水而致病，更多的流行病學研究說明飲用富含砷的水會導致皮膚問題、皮膚癌、膀胱癌、腎臟癌和肺癌，並且增加糖尿病、高血壓和生育系統紊亂的風險等健康影響。目前，世界衛生組織的指南訂定飲用水的砷含量為 0.01 毫克/公升。

1992 年 7 月，一個特別的意外被臺灣媒體揭露：公寓建築使用的回收鋼材不慎被廢棄的鈷 60 污染。這些輻射污染了 180 棟建築物(包含 1,700 戶公寓)，台北市及鄰近城市的公立和私立學校、小型企業。上萬居民在這些建物裡居住 7 到 22 年不等。有些居民在科學證據的支持下，向法院提起訴訟。1997 年，台北地方法院宣布 57 名居民提起的國家賠償勝訴，因政府官員刻意隱瞞和忽略輻射污染消息數十年，導致身體、財產和精神等損害。雖然有些發表的研究論文證實長期低劑量的輻射污染對健康的危害，行政院原子能委員會(Atomic Energy Council)指出慢性暴露低劑量輻射，雖然長時間下來會累積可觀輻射量，但可能對身體健康是「有益的」影響。

1994 年，美國無線電公司(Radio Corporation of America, RCA)在臺灣的工廠被指控使用三氯乙烯(Trichloroethylene)和四氯乙烯(Tetrachloroethylene)等有機溶劑污染地下水。隨後，被診斷罹癌的 RCA 前員工組織起來為這個環境職業暴露危害發聲。1998 年，政府支持有機溶劑的動物實驗、環境健康風險評估、環境流行病學和職業流行病學研究。雖然這些公共衛生研究不夠清楚證明工業污染與人體健康的關聯，部分 RCA 前員工於 2004 年提起訴訟，許多臺灣的公共衛生學者為原告(RCA 的前員工)出席法院作證。2015 年 4 月 17 日，臺北地方法院宣布 RCA 必須支付新台幣 5 億 6 千萬元(約 1,820 萬美金)賠償 RCA 前員工的傷害。然而，裁決對共同參與漫長官司訴訟的 RCA 自救會成員、律師、社會運動參與者、學者和參與的學生來說只是短暫的勝利，環境毒物和健康的爭議在臺灣仍在持續中。

Dr. Tony Fletcher (United Kingdom)
Consultant Epidemiologist, Department of Environmental Change, Centre for Radiation, Chemical and Environmental Hazards, Public Health England
Senior Lecturer, Department of Social and Environmental Health Research, London School of Hygiene & Tropical Medicine
E-mail: Tony.Fletcher@lshtm.ac.uk

Dr. Fletcher works as an Environmental Epidemiologist, part time in London University at London School of Hygiene and Tropical Medicine (LSHTM) and part time for UK Government in the Centre for Radiation Chemical and Environmental Hazards of Public Health England (PHE). He holds an honorary post, Adjunct Research Professor in Environmental Health at Boston University. He was Scientist at IARC, Lyon, and President of the International Society for Environmental Epidemiology (ISEE) 2004 to 2005. During 2006 to 2013, he was part of the C8 Science Panel established to assess the links between Perfluorooctanoic acid (PFOA) contamination and disease. He has over 30 years work in occupational and environmental epidemiology and risk assessment, with experience of studies of risk factors for cancer, respiratory disease, endocrine disruptors and other adverse effects along with genetic and other mechanisms.

Education and Degrees

1987 PhD, Epidemiology, Aston University
1977 MSc, Occupational Health and Safety, Aston University
1976 BA & MA, Natural Sciences, Cambridge University

Professional Appointments

2007- Adjunct Research Professor in Environmental Health in the School of Public Health, Boston University, Massachusetts, USA
2003-2004 Recipient of Senior Visiting Scientist Award at IARC, Lyon, France, in the Unit of Environmental Cancer Epidemiology
1995-1998 Head of Environmental Epidemiology Unit, London School of Hygiene and Tropical Medicine
1988-1989 Research Fellow (epidemiologist) in Institute of Occupational Health, University of Birmingham
1987 Research Fellow (epidemiologist) in the Medical Research Council Environmental Epidemiology Unit, Southampton
1984-1986 Scientist (epidemiologist) in the Unit of Analytical Epidemiology, IARC, Lyon
1983-1984 Research Officer at the Department of Occupational and Environmental Health, Aston University

Editorial and Society Activities

Reviewer of articles for journals including Environmental Health Perspectives, Environmental Research, International Journal of Epidemiology, Lancet, Occupational and Environmental Epidemiology, Epidemiology.

2013-2016 Member of Scientific Council of ANSES - French Agency for Food, Environmental and

Occupational Health & Safety

2006-2013 Member of "C8 Science Panel"

2004-2005 ISEE: President of International Council of International Society for Environmental Epidemiology.

1999 WHO/EURO: Member of WHO working group preparing documents on transport and health for Ministerial Conference on Environment and Health London

1996 WHO/UNECE Convention on Long-range Trans-boundary Air pollution: Expert Working Group on Health effects of ozone and nitrogen oxides in an integrated assessment of air pollution

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Selected Publications (2014 -present)

1. Juliette Legler, **TONY FLETCHER**, Eva Govarts, Miquel Porta, Bruce Blumberg, Jerrold J. Heindel, Leonardo Trasande. Obesity, Diabetes and Associated Costs of Exposure to Endocrine Disrupting Chemicals in the European Union Journal of Clinical Endocrinology & Metabolism; Online March 2015.
2. Tamara S. Galloway, **TONY FLETCHER**, Oliver J. Thomas, Ben P. Lee, Luke C. Pilling, Lorna W. Harries. PFOA and PFOS are associated with reduced expression of the parathyroid hormone 2 receptor (PTH2R) gene in women. Chemosphere, Volume 120, February 2015, Pages 555-562.
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The Epidemiology of Perfluorinated Compounds – Studies in the General Population and Contaminated Communities

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Most epidemiology research on perfluorinated substances (PFAS) has focussed on PFOA and then PFOS. Endocrine disrupting effects with outcomes such as thyroid function, birthweight and obesity, and carcinogenic risks have been of particular interest, with recent reviews focusing on some of these outcomes. On cancers, the International Agency for Research on Cancer (IARC) in a recent monograph classified PFOA as possibly carcinogenic to humans (Category Group 2B). This presentation will summarise evidence on adverse effects of PFOA and how different epidemiology designs can affect results and contribute to the assessment of causality.

Studies in the general population have generally relied on measured serum levels of PFAS to distinguish high and low exposure. Furthermore, these studies have in the main been cross-sectional studies where exposure is measured at the same time as health effects, rather than longitudinal studies where exposure demonstrably precedes effect. Longitudinal studies provide more convincing evidence of causality. Studies of contaminated communities allow populations to be contrasted by external degree of exposure with more confidence. An example of this is the C8 study, a large study of a population in the Mid-Ohio Valley contaminated with PFOA, data were collected on biomarkers of PFAS and health among 69000 volunteers. The C8 Science Panel studies on this large population with substantial and well-characterised PFOA exposure, have provided both important evidence on a range of health effects related to PFOA, and insights into some methodological issues in studying these compounds.

Stable biomarkers of exposure with long half lives are attractive exposure indicators, and key components of the “internal exposome”. Perfluoroalkyl substances (PFAS), principally PFOA and PFOS, have a long half-life in humans, thus serum PFAS is a stable biomarker and is often the exposure measure of choice. The long half-life of PFAS reflects relatively low net excretion, mediated by passage into, then active reabsorption, via kidneys and gut. Individual variation in these reabsorption pathways will thus affect measured serum PFAS levels and this talk will consider the vulnerability to confounding of the use of biomarker levels as markers of exposure.

一般大眾和被污染社區的全氟碳化物流行病學研究

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流行病學研究的全氟碳化物(Perfluorinated substances, PFAS)大多著重於全氟辛酸(PFOA)，其次是全氟辛磺酸(PFOS)。研究 PFAS 暴露和內分泌干擾表現在甲狀腺功能、出生體重、肥胖和癌症風險的探討備受關注。以癌症來說，國際癌症研究所(International Agency for Research on Cancer, IARC)最近將 PFOA 列為有可能令人類致癌的物質(Possibly carcinogenic to humans, 2B)。本次演講將總結 PFOA 的不良影響證據，以及不同的流行病學研究方法設計如何影響結果和因果關係的評估證據。

研究大多量測血清中的 PFAS 濃度以區分一般族群暴露濃度的高低。此外，這些研究大多在同一時間測量這些暴露濃度來判斷健康影響，而非用明確知道暴露前後影響的縱向研究。縱向研究可提供較具說服力的因果關係，研究受污染族群可對比一般族群外在暴露的影響。其中一個例子便是 C8 研究：在俄亥俄中部山谷大規模 PFOA 污染的研究，收集 PFAS 生物標記以及 69,000 名自願者的健康情況。C8 科學小組利用遭受污染的大樣本且有良好表徵的居民研究，提供 PFOA 對健康影響的重要證據，以及研究這些化合物的方法見解。

半衰期較長的穩定暴露生物標記是有吸引力的暴露指標，也是內在暴露體學的關鍵組成。全氟碳化物主要是 PFOA 和 PFOS，在人體內都有相當長的半衰期，血清中的 PFAS 濃度是相當穩定的生物標記，可作為暴露量測的選擇。PFAS 半衰期較長，藉由腎臟和腸道的傳送與主動再吸收，反映相對較低的淨排出。個體的再吸收途徑差異於是影響測量血清 PFAS 高低，本次演講內容也將提及生物體的易感特性，以及僅用暴露濃度做為生物標記可能造成的干擾。

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Prof. Wu is Occupational Medicine Physician and Family Physician who received his PhD from Harvard School of Public Health. He is Professor, Director of Center of Environmental and Occupational Medicine at Kaohsiung Medical University. He is also Director of Occupational Medicine Center at Kaohsiung Municipal Hsiao-Kang Hospital. His interest is to examine the interactive effects of environmental and occupational exposures, genetic susceptibility, biomarkers on the health outcomes and newly-emerging environmental toxins such as melamine.

Research Interests

Community Medicine; Preventive Medicine; Molecular Epidemiology; Environmental Health & Occupational Medicine

Education and Degrees

1997	ScD, Occupational Health, Harvard University
1992	MOH., Occupational Health, Harvard University
1987	MD, Chung Shan Medical& Dental College

Professional Appointments

2007-2010	Director, Center for International Affairs, Kaohsiung Medical University
2006-2007	Director physician, Department of Occupational Medicine, China Medical University & Hospital Attending physician, Department of Family Medicine, China Medical University & Hospital
2004-2006	Director, Center for Labor Safety& Health, Kaohsiung Medical University
2003-2004	Director, Center for International Academic Exchange, Kaohsiung Medical University
2000-2006	Adjunct attending physician, Department of Occupational Medicine, Kaohsiung Medical University Hospital
1996-1997	Adjunct attending physician, Occupational Medicine, Chinese Steel Corporation, Kaohsiung

Awards

Taiwan Harvard Alumni Scholarship (1993); Harvard Alumni Scholarship at Harvard School of Public Health(1994); Orville Redenbacher Scholarship (1994); Chinese Steel Corporation Award (1995); American Bureau for Medical Advancement in China (ABMAC) Award(2000); John M. White Award (2003); Distinguished Research Award, Kaohsiung Medical University (2005, 2008, 2009, 2010)

Selected Publications (recent 5 years)

1. Chien CY, Wu CF, Liu CC, Chen BH, Huang SP, Chou YH, Chang AW, Lee HH, Pan CH, Wu WJ, Shen JT, Chang MY, Huang CH, Shiea J, Hsieh TJ, **Wu MT***: High Melamine Migration in Daily-use Melamine-made Tableware. J Hazard Mater 188: 350-356, 2011.
2. Liu CC (equal contribution), Wu CF (equal contribution), Chen BH, Huang SP, Goggins W, Lee HH, Chou YH, Wu WJ, Huang CH, Shiea J, Lee CH, Wu KY, **Wu MT***: Low exposure to melamine increases the risk of urolithiasis in adults. Kidney Int. 2011 Oct;80(7):746-52.
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8. Lin YT (equal contribution), Tsai MT (equal contribution), Chen YL, Cheng CM, Huang CC, Wu CF, Liu CC, Hsieh TJ, Shiea J, Chen BH, **Wu MT***: Can melamine levels in one-spot overnight urine specimen predict the total previous 24-hours melamine excretion in school children? Clin Chim Acta 420: 128–133, 2013.
9. **Wu MT***, Wu CF, Chen BH, Chen EK, Chen YL, Shiea J, Lee WT, Chao MC, Wu **JR*:** Intake of phthalate-tainted foods alters thyroid functions in Taiwanese children. PLoS One 2013;8(1):e55212.
10. Wu CF, Chen BH, Shiea J, Chen EK, Liu CK, Chao MC, Ho CK, Wu **JR, Wu MT***: Temporal changes of urinary oxidative metabolites of di(2-ethylhexyl)phthalate after the 2011 phthalate incident in Taiwanese children-Findings of a 6-month follow-up. Environ Sci Technol. 47(23):13754-62, 2013.
11. Wu CF, Liu CC, Chou YH, Shiea J, Shen JT, Wang HS, **Wu MT***: Increased detection rate of melamine-containing calcium urolithiasis by using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry technique in clinical practice. Clin Chim Acta 431: 294-298, 2014.
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13. Liu CC, Hsieh HM, Wu CF, Hsieh TJ, Huang SP, Chou YH, Huang CN, Wu WJ, **Wu MT***: Long-term prescription of α-blockers decrease the risk of recurrent urolithiasis needed for surgical intervention-a nationwide population-based study. PLoS One 2015 Apr 13;10(4):e0122494.

Melamine and Kidney Diseases

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The melamine chemical is still ubiquitously present in our environment, even after the 2008 melamine incident in China that caused kidney-related diseases and kidney failure in children due to a large amount of melamine intake. Although our previous study has found the associated between urinary melamine levels and the risk of renal stones in adults, the relationship of environmental melamine exposure with the risk of renal damage in adults has not been explored. In this talk, I will state our recent findings about that link by using one unique occupational population: melamine tableware manufacturing workers. In the meantime, how to prevent against environmental melamine exposure from melamine tableware will be touched, also.

三聚氰胺與腎臟疾病

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高雄醫學大學公共衛生學系教授、高雄醫學大學附設中和醫院家庭醫學科主治醫師、高雄醫學大學環境醫學頂尖研究中心主任

三聚氰胺仍普遍存在於我們的生活環境中，即使在 2008 年中國(乳製品)三聚氰胺(汙染)事件，因大量三聚氰胺暴露，造成(當地)幼童腎病變與腎衰竭的(案件)發生。過去我們的研究團隊已報導尿中三聚氰胺濃度與成人腎結石風險的關聯性，然而環境中三聚氰胺暴露與腎功能損害的風險尚未被探究。這次演講內容，將透過特定職業暴露對象-美耐皿餐具製造工人的研究，說明近期研究成果。同時，演講內容也會提及如何預防美耐皿餐具中三聚氰胺的暴露。

空氣汙染對健康影響

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Dr. Chun-Yuh Yang obtained his PhD degree at Yale University. He is the Vice President of Kaohsiung Medical University. He is an expert in the Environmental epidemiology, particularly in Air pollution epidemiology. Also, he served as an associate editor of Journal of Toxicology and Environmental Health since 2006.

Education and Degrees

1993	PhD, Department of Epidemiology and Public Health, School of Medicine, Yale University
1984	MPH, Graduate Institute of Public Health, School of Medicine, National Taiwan University
1982	BSc, Department of Public Health, School of Medicine, National Taiwan University

Professional Appointments

2012-	Vice president, Office of Vice President, Kaohsiung Medical University.
2012-	Distinguished Professor, Institute of Public Health, Kaohsiung Medical University
2006-2012	Dean, Office of Information Technology, Kaohsiung Medical University
2003-	Joint appointed investigator, Division of Environmental Health and Occupational Health, National Health Research Institute (NHRI)
2001-2006	Dean, College of Health Sciences, Kaohsiung Medical University
2000-2006	Chairman, Institute of Public Health, College of Health Sciences, Kaohsiung Medical University
2000-2001	Acting Dean, College of Health Sciences, Kaohsiung Medical University
1999-2012	Professor, Institute of Public Health, Kaohsiung Medical University
1999-2001	Director of Graduate Studies, Kaohsiung Medical University
1994-1999	Associate professor, Institute of Public Health, Kaohsiung Medical College

Awards

2008	Ho Chin-Tui Outstanding Honorable Award, Ho Chin-Tui Foundation, Taiwan.
2001	Biography included in the 18th edition of Who's Who in the world
2001	Outstanding award for research, Kaohsiung Medical University Alumni Foundation
1997	Cheng Kung-Pei Memorial Award, Taiwan Public Health Association, Taiwan

Editorial Activities

Editorial Board Member, Global Health Perspectives (2013-); Editorial Board Member, Advances in Environmental Research (2012-); Editorial Board Member, Inhalation Toxicology(2008-); Issue Editor, Encyclopedia of Environmental Health (2008-); Associate Editor, Journal of Toxicology and Environmental Health (2006-); Editorial Board Member, Magnesium Research (2003-); Guest Editor, Journal of Toxicology and Environmental Health (2002&2005); Editorial Board Member, Kaohsiung Journal of Medical Sciences (2002-); Editorial Board Member, Taiwan Journal of Public Health (2000-)

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Prof. Chan is Professor, Associate Dean and Director of Global Health Center at National Taiwan University College of Public Health. He serves as a Councilor for International Society for Environmental Epidemiology (ISEE), Chair for International Society for Environmental Epidemiology–Asia Chapter (ISEE-AC) since 2015 and President of the Society for Risk Analysis in Taiwan (TSRA). He is currently involved in cross-country epidemiological studies with an international partner of ESCAPE. His research pertains to major issues of public health concern and environmental pollution.

Education and Degrees

1990	ScD, Air Pollution Control, Harvard School of Public Health
1987	MSc, Industrial Hygiene and Air Pollution Control, Harvard School of Public Health
1982	BA, Chemistry and Biology of Public Health, National Taiwan University, College of Medicine

Professional Appointments

2007-2011	Director of International Health Center in Taiwan, College of Public Health, National Taiwan University
1999-2005	Director of Institute of Occupational Medicine and Industrial Hygiene, College of Public Health, National Taiwan University
1997-1998	Takemi Fellow in International Health, Harvard University
	Fulbright Visiting Scholar
1996-	Professor , Institute of Occupational Medicine and Industrial Hygiene, College of Public Health, National Taiwan University

Society Activities

2015-2017	Councilor, International Society for Environmental Epidemiology (ISEE)
2015-	Chair Elect, International Society for Environmental Epidemiology – Asia Chapter (ISEE-AC)
2014-2016	Steering Committee Member, Association of Pacific Rim Universities (APRU) Global Health Program
2009-	Chairman, Taiwan Chapter of Society for Risk Analysis
2008-2011	Councilor of International Society of Exposure Analysis (ISEA)
2008-	President of Society for Risk Analysis in Taiwan
2003-	Member of Disaster Response and Relief Committee, Taipei County
	Member of the National Health Information Committee, Ministry of Health, Taiwan

2002-	Member of the Comprehensive Preventive Health Care Committee, Ministry of Health, Taiwan
2000-	Member of the National Sustainable Development Committee, Executive Yuan, Taiwan
	Member of the National Environmental Quality Committee and Environmental Impact Assessment Committee, Taiwan Environmental Protection Agency
1996-2000	Member of Environmental Impact Assessment Committee, Taipei City
1994-1997	Member of Technical Committee of Air Pollution Fee, Taiwan Environmental Protection Agency

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Selected Publications (2014-present)

1. Lee JH, Wu CF, Hoek G, de Hoogh K, Beelen R, Brunekreef B, **Chan CC***. Land use regression models for estimating individual NOx and NO_2 exposures in a metropolis with a high density of traffic roads and population. *Science of the Total Environment* 2014;472:1163-1171.
2. Chio CP, Yuan TH, Shie RH, **Chan CC***. Assessing vanadium and arsenic exposures for residents near a petrochemical complex by two-stage dispersion models. *Journal of Hazardous Materials* 2014;271:98-107.
3. Chen SY, **Chan CC***, Lin YL, Hwang JS, Su TC*. Fine particulate matter results in hemodynamic changes in subjects with blunted nocturnal blood pressure dipping. *Environmental Research* 2014;131:1-5.
4. Chen YM, Lin WY, **Chan CC***, The impact of petrochemical industrialisation on life expectancy and per capita income in Taiwan: an 11-year longitudinal study. *BMC Public Health* 2014;14:247.
5. Wu CF, Lin HI, Ho CC, Yang TH, Chen CC, **Chan CC**. Modeling horizontal and vertical variation in intraurban exposure to $PM_{2.5}$ concentrations and compositions. *Environmental Research* 2014;133:96-102.
6. Lin RT , Chien LC, Chen YM, **Chan CC***. Governance matters: an ecological association between governance and child mortality. *International Health* 2014;6:249-257.
7. Chen CH, Chao HJ, **Chan CC**, Chen BY, Guo YL. Current asthma in schoolchildren is related to fungal spores in classrooms. *Chest* 2014;146:123-134.
8. Chen CH, **Chan CC**, Chen BY, Cheng TJ, Guo YL. Effects of particulate air pollution and ozone on lung function in non-asthmatic children. *Environmental Research* 2015;137:40-48.
9. Yuan TH, Shie RH, Chin YY, **Chan CC***. Assessment of the levels of urinary 1-hydroxypyrene and air polycyclic aromatic hydrocarbon in $PM_{2.5}$ for adult exposure to the petrochemical complex emissions. *Environmental Research* 2015;136:219-26
10. Yuan TH, Chio CP, Shie RH, Pien WH, **Chan CC***. The distance-to-source trend in vanadium and arsenic exposures for residents living near a petrochemical complex. *Journal of Exposure Science and Environmental Epidemiology* 2015 (Accepted).
11. Chen SY, Lin YL, Chang, WT, Lee CT, **Chan CC***. Increasing emergency room visits for stroke by elevated levels of fine particulate constituents. *Science of The Total Environment* 2014;473-474:446-450
12. Chen YT, Huang YK, Luvsan ME, Gombojav E, Ochir C, Bulgan J, **Chan CC***. The influence of season and living environment on children's urinary 1-hydroxypyrene levels in Ulaanbaatar, Mongolia. *Environmental Research* 2015;137:170-175

Health Effects for Residents in the Vicinity of a Petrochemical Complex

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Situated on the west coast of central Taiwan, the No. 6 Naphtha Cracking Complex is the largest petrochemical complex in Taiwan. With a total area of 2,603 ha, this facility houses 64 plants within a single complex, including oil refineries, naphtha cracking plants, cogeneration plants, coal-fired power plants, heavy machinery plants, boiler plants, and downstream petrochemical-related plants in Mailiao Township, Yunlin County, Taiwan.

Firstly, we compared life expectancies and personal income between the industrial county (Yunlin County) to one reference county (Yilan County), which had no significant industrial activity that might emit pollutants, in Taiwan. And, we found that residents of the industrialized county had lesser increases in life expectancy over time than did residents in the reference county, with difference means ranging from 0.89 years ($p < 0.05$) to 1.62 years ($p < 0.001$) at different stages, but there were no significant differences in individual income between the two counties.

Secondly, we established a sustainable environmental epidemiological cohort study with a total of 3,230 residents to clarify the comprehensive environmental exposure and health status of residents in Yunlin County. The main findings of health examinations are that the abnormal rates of lung functions, BMI, platelet, BUN, GOT (AST), GPT (ALT), hepatitis C, cholesterol, and LDL-C for residents who lived within 10 km radius from a petrochemical complex were significantly higher than those lived farther from the complex.

Thirdly, we analyzed all cancer incidence rate (ICD-9:140-165, 170-176, 179-208) of the cohort after the operation of the complex (1999-2010), and we found that the all cancer incidence rate of older than 35-year-old female residents lived within 10 km radius from the complex during 2008-2010 was 1.60 times higher than those lived farther from 20 km from the complex (95% CI 1.07-2.39), 1.55 times (95% CI 1.00-2.38) for older than 60-year-old residents, 2.17 times (95% CI 1.16-4.08) for older than 60-year-old female residents after adjusting confounding factors.

Fourthly, we found that emissions from the petrochemical complex can elevate particle-phase PAH concentrations in surrounding areas and increase the urinary 1-OHP levels of adults living nearby, and a distance-to-source gradient in V and As exposures exists for residents living near the petrochemical complex and the two-stage dispersion model can predict such a trend for V when inhalation is the major exposure route. In addition, amino acid and carbohydrate metabolite profiles of residents nearby were linked to exposure to heavy metals and organics emitted from the petrochemical complex and affected human health through PPAR and insulin signaling pathways, with altered physiological stress responses.

石化綜合工業區附近居民的健康影響

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位於臺灣西海岸，六輕工業區是臺灣最大的石化綜合廠，位於雲林縣麥寮鄉，坐擁 2,603 公頃土地，包含煉油廠、石油煉解廠、汽電共生廠、火力發電廠、重型機械廠、鍋爐廠和石油下游廠等 64 個工廠。

首先，我們比較工業縣 (雲林縣)以及另一個沒有明顯工業污染源的參考縣(宜蘭縣)居民的平均餘命和平均收入，我們發現隨著時間推移，工業縣的居民平均餘命較參考縣增加的幅度較低，工業縣與參考縣的平均餘命差距更從 0.89 年($p < 0.05$)隨著時間上升到 1.62 年($p < 0.001$)。但這兩個縣的居民平均收入並無明顯差異。

此外，我們建立了一個持續的環境流行病學研究世代，其中包含 3,230 名居民，以釐清雲林縣居民全面的環境暴露與健康狀態。健康檢查發現距離六輕 10 公里內的居民肺部功能、BMI、尿素氮(BUN)、肝指數 GOT(AST)、GPT (ALT)、C 型肝炎(Hepatitis C)、膽固醇(Cholesterol)和低密度膽固醇(LDL-C)異常狀況明顯高於距離六輕較遠的居民。

再者，我們分析了六輕營運後(1999-2010)的世代族群的癌症發生率(ICD-9:140-165, 170-176, 179-208)，發現在 2008 年至 2010 年間，經過干擾因子調整後，居住在六輕半徑 10 公里內 35 歲以上女性居民的癌症發生率是居住在半徑 20 公里以上的 1.6 倍(95% CI 1.07-2.39)，60 歲以上居民為 1.55 倍(95% CI 1.00-2.38)，而 60 歲以上的女性居民則為 2.17 倍(95% CI 1.16-4.08)。

最後，我們發現六輕的排放物會增加週遭環境中的粒狀多環芳香烴(PAH)的濃度而造成附近成年人尿液中的 1-羥基焦腦油(1-OHP)濃度上升。也發現六輕附近居民的尿中釩(V)和砷(As)濃度與其距離六輕的遠近有著明顯的梯度關係，而當空氣吸入為主要之暴露途徑時，兩階段擴散模式(Two-stage dispersion model)可有效預測釩(V)的趨勢。再者，六輕附近居民的胺基酸和碳水化合物的代謝情形與其暴露到六輕所排放出的重金屬及有機物相關聯，並藉此來改變 PRAR 與胰島素信號等途徑而影響身體健康，且會伴隨著一些生理壓力反應的變化。

Prof. Hai-dong Kan (China) 闞海東教授

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Prof. Kan is Professor and Director of Department of Environmental at Fudan University in Shanghai, China. He received a MD in Preventive Medicine from Shanghai Medical University and a PhD in Environmental Epidemiology from Fudan University. Also, he was Post-Doctoral Fellow of NIEHS in the US. His research focuses in air pollution and health impact and environmental epidemiology. And he is Regional Editor of Environment Health Perspectives journal, Reviewer for journals such as Lancet, JAMA and American Journal of Epidemiology. He was awarded by American Thoracic Society for David Bates Award in 2007 and China Medical Board for Distinguished Professor Award in 2011.

Education and Degrees

2003	PhD, Environmental Epidemiology , Fudan University, Shanghai, China
2000	MSc, Environmental Health Sciences, Fudan University, Shanghai, China
1997	MD, Preventive Medicine, Shanghai Medical University, Shanghai, China

Professional Appointments

2008	Associate Professor, Deputy Director, Department of Environmental Health, School of Public Health, Fudan University
2005-2007	Post-doctoral fellow , Epidemiology Branch , National Institute of Environmental Health Sciences, National Institutes of Health, U.S.A
2001	Visiting fellow at P. Catholic University of Chile
1996	Intern in Medicine, 5th Hospital, Shanghai, China

Awards

China Medical Board (CMB) Distinguished Professorship Award (2011), Shanghai Municipality, Science & Technology Progress Award (2009), Chinese Preventive Medicine Association, Science & Technology Progress Award (2009), Shanghai Medical Association, Science & Technology Progress Award (2009), Meiji Life Science Award (2008), American Thoracic Society, David Bates Award (2007), Shanghai Municipality, Science & Technology Progress Award (2005), Shanghai Medical Association, Science & Technology Progress Award (2005) , Science & Technology Commission of Shanghai Municipality, Rising Star Award for Young Investigators (2004)

Editorial and Society Activities

Regional Editor: Environment Health Perspectives; Editorial Board member: Epidemiology

Editorial Advisory Board member: Atmospheric Environment

Member: China National Consultative Committee of Environment and Health, International Society of Environmental Epidemiology, Chinese Medical Association, Chinese Preventive Medicine Association, Chinese Society of Particuology

Reviewer for journals: Lancet, JAMA, American Journal of Epidemiology, Environmental Health Perspective, Epidemiology, Environmental Science and Technology, Atmospheric Environment, Stroke, Environmental Research, Journal of Environmental Management, BMC Public Health, International Journal of Health Geographics, Journal of Applied Microbiology, Advance in Atmospheric Science, Inhalation Toxicology

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Selected Publications (2014 -present)

1. Chen R, Zhao Z, Sun Q, Lin Z, Zhao A, Wang C, Xia Y, Xu X, **Kan H*** (2015). Size-fractionated particulate air pollution and circulating biomarkers of inflammation, coagulation and vasoconstriction in a panel of young adults. ***Epidemiology***, 26(3):328-36.
2. Zhao A, Chen R, Wang C, Zhao Z, Yang C, Lu J, Chen X, **Kan H*** (2015). Associations between size-fractionated particulate air pollution and blood pressure in a panel of type II diabetes mellitus patients. ***Environ Int***, 80: 19-25.
3. Cai J, Chen R, Wang W, Xu X, Ha S, **Kan H*** (2015). Does ambient CO have protective effect for COPD patient? ***Environ Res***, 136: 21–26.
4. Wang C, Chen R, Zhao Z, Cai J, Lu J, Ha S, Xu X, Chen X, **Kan H*** (2015). Particulate air pollution and circulating biomarkers among type 2 diabetic mellitus patients: the roles of particle size and time windows of exposure. ***Environ Res***, 140: 112–118.
5. Dai J, Chen R, Meng X, Yang C, Zhao Z, **Kan H*** (2015). Ambient air pollution, temperature and out-of-hospital coronary deaths in Shanghai, China. ***Environ Pollut***, 203: 116–21.
6. GBD 2013 Mortality and Causes of Death Collaborators (2015). Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. ***Lancet***. 385(9963):117-71.
7. **Kan H*** (2014). Globalisation and environmental health in China. *Lancet*, 384(9945): 721-723.
8. Chen R, Cai J, Meng X, Kim H, Honda Y, Guo L, Samoli E, Yang X, **Kan H*** (2014). Ozone and daily mortality in 21 cities of East Asia: how does season modify the association? *Am J Epidemiol*, 180(7):729-36.
9. Chen R, Li T, Cai J, Yan M, Zhao Z, **Kan H*** (2014). Extreme temperatures and out-of-hospital coronary deaths in 6 large Chinese cities. *J Epidemiol Community Health*, 68:1119-1124.
10. Yang C, Chen A, Chen R, Qi Y, Ye J, Li S, Li W, Liang Z, Liang Q, Guo D, **Kan H***, Chen X* (2014). Acute effect of ambient air pollution on heart failure in Guangzhou, China. Int J Cardiol, 177: 436–441.
11. Ma W, Chen R, **Kan H*** (2014). Temperature-related mortality in 17 large Chinese cities: how heat and cold affect mortality in China. *Environ Res*, 134: 127-133.
12. Gordon SB, Bruce NG, Grigg J, Hibberd PL, Kurmi OP, Lam KH, Mortimer K, Asante KP, Balakrishnan K, Balmes J, Bar-Zeev N, Bates MN, Breysse PN, Buist S, Chen Z, Havens D, Jack D, Jindal S, **Kan H**, Mehta S, Moschovis P, Naeher L, Patel A, Perez-Padilla R, Pope D, Rylance J, Semple S, Martin WJ (2014). Respiratory risks from household air pollution in low and middle income countries. Lancet Respir Med, 2(10):823-60.
13. Tang D *, Wang C, Nie J, Chen R, Niu Q, **Kan H***, Chen C, Perera F (2014). Health Benefits of Improving Air Quality in Taiyuan, China. *Environ Int*, 73: 235–242.
14. Cai J, Zhao A, Zhao J, Chen R, Wang W, Ha S, Xu X, **Kan H*** (2014). Acute Effects of Air Pollution on Asthma Hospitalization in Shanghai, China. *Environ Pollu*, 191C:139-144.
15. Wang C, Chen R, Kuang X, Duan X*, **Kan H*** (2014). Temperature and daily mortality in Suzhou, China: a time series analysis. *Sci Total Environ*, 466-467C: 985-990.

Ambient Air Pollution and Population Health in China

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As the largest developing country, China has been changing rapidly over the last three decades and its economic expansion is largely driven by the use of fossil fuels, which leads to a dramatic increase in emissions of ambient air pollutants. China is now facing the worst air pollution problem in the world. A number of epidemiological studies on air pollution and population health have been conducted in China, using time-series, case-crossover, cross-sectional, cohort, panel or intervention designs. The increased health risks observed among Chinese population are somewhat lower in magnitude, per amount of pollution, than the risks found in developed countries. However, the importance of these increased health risks is greater than that in developed countries, because the levels of air pollution in China are very high in general and Chinese population accounts for more than one fourth of the world's totals. Future research will need to clarify the lifetime course of air pollution effects with full control of potential confounders (e.g., prospective cohort studies), examine the relevance of cumulative exposures, disentangle effects of multiple pollutants, investigate gene–environment interactions and other factors that may modify air pollution health effects, and identify pathophysiologic links between air pollution and health hazards for the Chinese population.

中國的環境空氣污染與人群健康

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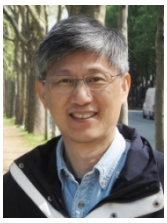
作為最大的發展中國家，中國在過去三十年裡一直迅速變化，它的經濟擴張來自化石燃料的使用，這導致大氣污染排放量的顯著增加。中國正面臨世界上最嚴重的空氣污染問題，一些對空氣污染與人群健康的流行病學研究已在中國進行，利用時間序列(Time-Series) 、病例交叉(Case-Crossover)、橫斷式(Cross-Sectional) 、世代(Cohort) 、追蹤(Panel)或介入(Intervention)的研究設計。觀察到的中國人民健康風險增加程度比其他已開發國家少，單位污染量較低。然而，健康風險增加的重要性卻較這些已開發國家要大上許多，因為中國的空氣污染普遍非常嚴重，而中國佔了全世界四分之一以上的人口。未來的研究需要控制潛在混雜因素(例如：前瞻性世代研究)釐清空氣污染全面影響程度，檢視累積暴露、理清多種污染的影響、研究基因與環境的交互作用、或是其他可能的空污健康影響因子，並且確認中國人口在空氣污染與健康危害之間的病理生理關聯。



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Professor, Institute of Occupational Medicine and Industrial Hygiene, National Taiwan University College of Public Health

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Prof. Cheng received his MSc in Public Health and PhD in Cancer Biology from Harvard University. He was Occupational Medicine Resident at Harvard School of Public Health and Internal Medicine Resident at Brown University Memorial Hospital in the US. He has served as Director for the Department of Occupational Safety and Hygiene at National Taiwan University Hospital in 1996-1997 and Director for the Institute of Occupational Medicine and Industrial Hygiene at National Taiwan University in 2005-2011. His research interests include environmental and occupational Medicine, molecular epidemiology and inhalation toxicology.

Research Interests

Occupational and environmental medicine; Inhalation toxicology; Air pollution and health; Nanotechnology and health; PVC workers and liver cancer

Education and Degrees

1995	ScD, Cancer Biology, Harvard School of Public Health, USA
1984	MPH, Harvard School of Public Health, USA
1980	MD, Taipei Medical College, Taiwan

Professional Appointments

2006-	Visiting Staff, Environmental and Occupational Medicine, National Taiwan University Hospital
2005-2011	Director, Institute of Occupational Medicine and Industrial Hygiene, National Taiwan University College of Public Health
2004-	Professor, Division of Environmental and Occupational Medicine, National Taiwan University College of Medicine
2002-	Professor, Institute of Occupational Medicine and Industrial Hygiene, National Taiwan University College of Public Health
2000-2005	Director, Occupational Hygiene Section, Environmental Protection and Occupational Safety and Hygiene Center, National Taiwan University
1996-2002	Associate Professor, Institute of Occupational Medicine and Industrial Hygiene, National Taiwan University College of Public Health
1996-1997	Director, Department of Occupational Safety and Hygiene, National Taiwan University Hospital
1995-2006	Visiting Staff, Internal Medicine, National Taiwan University Hospital
1991-1992	Occupational Medicine Resident, Harvard School of Public Health, USA
1988-1991	Internal Medicine Resident, Brown University Memorial Hospital of Rhode Island, USA

Society Activities

2008-2011	Associate Editor, Environmental Health Perspectives
2004-2007	Editorial board, Inhalation Toxicology
2003-2008	Editorial review board, Environmental Health Perspectives
2001-	Editorial board, Institute of Occupational Safety and Health Journal
2001-2013	Editorial board, Taiwan Journal of Public Health

Selected Publications (2014-present)

1. Chen TT, Chuang KJ, Chiang LL, Chen CC, Yeh CT, Wang LS, Clive G., Tim J., Kelly B., Lee CN, Chuang HC *, **Cheng TJ *.** Characterization of the interactions between protein and carbon black. Journal of Hazardous Materials. 2014;264:127-135.
2. Juang YM, Lai BH, Chien HJ, Ho M, **Cheng TJ**, Lai CC. Changes in protein expression in rat bronchoalveolar lavage fluid after exposure to zinc oxide nanoparticles: an iTRAQ proteomic approach. Rapid Commun Mass Spectrom 2014;28:974-80.
3. Liu WT, Bien MY, Chuang K J, Chang TY, Jones T, BeruBe K, Lalev G, Tsai DH, Chuang HC *, **Cheng TJ** and Taiwan CardioPulmonary Research Group. Physicochemical and biological characterization of single-walled and double-walled carbon nanotubes in biological media. J Hazard Mater 2014;280C:216-225.
4. Jung CC, Tsai YS, Chang CC, **Cheng TJ**, Chang CW, Liu PY, Chiu YJ, Su HJ. Allergen exposure induces adipose tissue inflammation and insulin resistance. Int Immunopharmacol 2014;23:104-112.
5. Chuang HC, Juan HT, Chang CN, Yan YH, Yuan TH, Wang JS, Chen HC, Hwang YH, Lee CH, **Cheng TJ *.** Cardiopulmonary toxicity of pulmonary exposure to occupationally relevant zinc oxide nanoparticles. Nanotoxicology. 2014; 8:593-604.
6. Chen WL, Lin CY, Yan YH, Cheng KT, **Cheng TJ *.** Alterations in rat pulmonary phosphatidylcholines after chronic exposure to ambient fine particulate matter. Mol Biosyst 2014;10:3163-9.
7. Yan YH, C CKC, Wang JS, Tung CL, Li YR, Lo K, **Cheng TJ *.** Subchronic effects of inhaled ambient particulate matter on glucose homeostasis and target organ damage in a type 1 diabetic rat model. Toxicol Appl Pharmacol 2014;281:211-220.
8. Chen CH, Chan CC, Chen BY, **Cheng TJ**, Leon Guo Y. Effects of particulate air pollution and ozone on lung function in non-asthmatic children. Environ Res 2014;137C:40-48.
9. Meg Tseng MC, Lin YP, **Cheng TJ*.** Effects of Psychopathology on the Characteristics of Individuals with Self-reported Electromagnetic Field Hypersensitivity. Taiwanese Journal of Psychiatry 2014;28:27-37.
10. Shih TJ, Lin YP, **Cheng TJ**. Public perception of nanotechnology and its policy in Taiwan. Chinese Journal of Communication Research, 2015. (Accepted, in Chinese)
11. Chuang HC, Chen LC, Lei YC, Wu KY, Feng PH, **Cheng TJ*.** Surface area as a dose metric for carbon black nanoparticles: A study of oxidative stress, DNA single-strand breakage and inflammation in rats. Atmospheric Environment 2015; 106: 329-334.
12. Huang KL, Lee YH, Chen HI, Liao HS, Chiang BL, **Cheng TJ*.** Zinc oxide nanoparticles induce eosinophilic airway inflammation in mice. Journal of Hazardous Materials 2015; 297: 304-312.

Inhalation Toxicities of Ambient Particles

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Ambient particles have been reported in epidemiological studies to be associated with the mortality and morbidity from respiratory and cardiovascular diseases. However, the causal relationship and underlying mechanisms were unclear.

We have conducted a serial inhalation studies to answer the questions.To expose the animals with real-world ambient particles, the state of the art particle concentrator was used to generate particles. We first investigated if ambient particles caused acute hemodynamic changes. Blood pressure and electrocardiogram were recorded continuously before, during and after the exposure. We found that acute exposure to ambient particles caused the alterations of blood pressure, heart rate and heart rate variability. This system was also used to investigate the toxicity of particles during Asian dust event. Again, we found an increase of systemic and lung inflammation, heart rate, and blood pressure during the dust event. These studies have demonstrated that acute exposure to ambient particles may affect the autonomic function of the cardiovascular system.

In addition to acute toxicity, we are interested in the health effects from chronic exposure to ambient particles. The association of PM with the development of diabetes and subsequent cardiovascular diseases has been reported. We constructed a non-concentrated ambient particle exposure system, Taipei Air Pollution Exposure System (TAPES). The system is easy to operate and maintain for chronic exposure as compared to the particle concentrator. Hyperglycemic rats were induced and exposed to ambient particles for three months. The average concentration of ambient particles during the three months of exposure period was around 13 $\mu g/m^3$. We found emphysematous changes of lung, increased wall thickness of aorta, myocardial inflammation, and advanced glomerulosclerosis and proximal tubule changes. There were biochemical changes including increased HbA1c, fibrinogen and systemic inflammation. In the healthy rats, we also observed increased wall thickness, focal myocarditis, systemic inflammation and increased insulin resistance. Thus, PM exposure may induce the macro-and micro-vascular complications in the diabetics through chronic hyperglycemia and systemic inflammation.

Furthermore, findings in healthy animals support the hypothesis that diabetes may be caused by PM through insulin resistance. Our results not only provided evidence of causal relationship to support the epidemiological studies, but also provided directions for future epidemiological studies. It is also noted that the average concentration of PM2.5 during exposure was lower than the current national standard and close to WHO guideline. Therefore, our results have important policy implication in air pollution control.

大氣微粒的吸入性毒性

鄭尊仁教授 (臺灣)

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臺灣大學公共衛生學院職業醫學與工業衛生研究所教授

流行病學研究已揭露大氣微粒對呼吸系統及心血管疾病的發病率與死亡率的關係，然而，因果關係和潛在的機制並不清楚，對此我們進行了連續性的研究設計來回答這個問題。

為了讓動物暴露在真實世界環境中的空氣微粒，我們使用微粒濃縮器(Art particle concentrator)製造大氣微粒。首先，我們先調查是否大氣微粒引起急性血液動力的改變。連續記錄下血壓和心電圖在暴露前、暴露中及暴露後的狀態，我們發現急性暴露於大氣微粒會導致血壓、心跳和心律變動的變化，這個系統也可用在調查亞洲塵暴期間的毒性研究。再者，我們發現塵暴期間全身和肺部的發炎情況增加，心跳、血壓變高，這些研究說明，急性暴露於環境中的微粒可能導致心血管系統的自主功能。

除了急性毒性外，我們感興趣的還有慢性暴露於環境微粒對健康的影響。PM 與糖尿病和心血管疾病發展的關係已經被報導，我們建造了一個非微粒濃縮暴露系統(Non-concentrated ambient particle exposure system) － 臺北空氣污染暴露系統(Taipei Air Pollution Exposure System, TAPES)。對於慢性暴露研究，這個系統比起微粒濃縮器的操作和維護容易。高血糖大鼠被誘導暴露於環境微粒中三個月，這段時間周圍的環境微粒平均濃度約為 13 微克/立方米，我們發現肺氣腫、主動脈壁增厚、心肌炎、腎絲球硬化和近端小管改變，生化的變化包含糖化血色素(HbA1c)、纖維蛋白原(Fibrinoge)和全身發炎反應；而健康的大鼠，我們也觀察到血管壁增厚、局部性心肌炎、系統性發炎和胰島素阻抗增加等情況。因此，對糖尿病患者 PM 暴露可能藉由慢性高血糖和全身性發炎誘發宏觀及微觀的心血管併發症。再者，在健康大鼠身上發現支持 PM 可能導致胰島素阻抗而造成糖尿病的假說。我們的結果不僅提供因果關係的證據來支持流行病學研究，還提供今後的流行病學研究的方向。同時還注意到，本研究的 PM2.5 暴露平均濃度小於目前國家標準，而接近世界衛生組織(WHO)的準則。因此，我們的研究結果在空氣污染控制上有重要的政策含意。

Dr. Ta-Chen Su (Taiwan) 蘇大成醫師

Attending Cardiologist and Clinical Associate Professor, Department of Internal Medicine and Cardiovascular Center, National Taiwan University Hospital

Associate Professor, National Taiwan University College of Medicine

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Dr. Su is Clinical Associate Professor at National Taiwan University College of Medicine and Attending Cardiologist of Department of Internal Medicine at National Taiwan University Hospital. He has 23 years of experience in academic research and teaching in the fields of cardiovascular disease, vascular biology, dyslipidemia, and occupational and environmental health. His recent research has focused on environmental and cardiovascular health, particularly the health effects of air pollution and endocrine disrupting chemicals in various susceptible populations. He also served as a committee member in Taiwan Society of Cardiology and Taiwan Society of Hypertension and scientific committee member of Asia-Pacific Society of Atherosclerosis and Vascular Disease (APSAVD).

Education and Degrees

1998-2005	PhD, Institute of Occupational Medicine and Industrial Hygiene, National Taiwan University College of Public Health
1985-1990	MD, National Cheng Kung University
1979-1983	BA, National Taiwan University College of Public Health

Professional Appointments

2012-	Clinical Associate Professor, Department of Internal Medicine, National Taiwan University College of Medicine
2004-2005	Visiting physician, Center for Occupational and Environmental Health, UC Irvine, USA
1995-1996	Physician, Aeronautical medical center, Civil Aeronautics Administration, Ministry of Transportation and Communication
1990-1993	Internal Medicine Resident, National Cheng Kung University Hospital

Society Activities

Committee: Preventive cardiology in Taiwan Society of Cardiology, Taiwan Society of Hypertension, Asia-Pacific Society of Atherosclerosis and Vascular Disease (APSAVD , 2012-)

Selected Publications (2014-present)

1. Wang J, Ning X, Yang L, Lu H, Tu J, Jin W, Zhang W, **Su TC***. Trends of hypertension prevalence, awareness, treatment and control in rural areas of northern China during 1991-2011. J Hum Hypertens. 2014;28:25-31.
2. Cheng Y, Du CL, Hwang JJ, Chen IS, Chen MF, **Su TC***. Working hours, sleep duration and the risk of acute coronary heart disease: a case-control study of middle-aged men in Taiwan. Int J Cardiol. 2014;

171:419-22.

3. Chen SY, Chan CC, Lin YL, Hwang JS, **Su TC***. Fine particulate matter results in hemodynamic changes in subjects with blunted nocturnal blood pressure dipping. Environ Res. 2014 May; 131:1-5.
4. Lin LY, Wen LL, **Su TC**, Chen PC, Lin CY. Negative association between serum perfluorooctane sulfate concentration and bone mineral density in U.S. premenopausal women: NHANES, 2005 to 2008. J Clin Endocrinol Metab. 2014 June; 99:2173-80.
5. Wang J, Ning X*, Yang L, Tu J, Gu H, Zhan C, Zhang W, **Su TC***. Sex differences in trends of incidence and mortality of first-ever stroke in rural Tianjin, China, from 1992 to 2012. Stroke 2014 June; 45:1626-1631
6. Tsao TM, Tsai MJ*, Wang YN, Lin HL, Wu CH, Hwang JS, Hsu SHJ, Chao H, Chuang KJ, Chou CCK, **Su TC***. The health effects of a forest environment on subclinical cardiovascular disease and health-related quality of life. PLoS One 2014 Jul 28;9(7):e103231.
7. Hsiao SM, **Su TC**, Chen CH, Chang TC, Lin HH. Autonomic dysfunction and arterial stiffness in female overactive bladder patients and antimuscarinics related effects. Maturitas. 2014 Sep;79(1):65-9.
8. Cheng Y, **Su TC**, Hwang JJ. Authors' responses concerning working hours, sleep duration and cardiovascular risk. Int J Cardiol. 2014 Sep;176(1):293-4.
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15. **Su TC**, Hwang JJ, Chen YC, Chan CC. Carotid intima-media thickness and long-term exposure to traffic-related air pollution in middle-aged residents of Taiwan: A cross-sectional study. Environ Health Perspect 2015; March 20 Epub.
16. Chien KL, Hsu HC, Chen PC, Lin HJ, **Su TC**, Chen MF, Lee YT. Total 25-hydroxyvitamin D concentration as a predictor for all-cause death and cardiovascular event risk among ethnic Chinese adults: a cohort study in a Taiwan community. PLoS One. 2015 Mar 25;10(3):e0123097.

Air Pollution and Cardiovascular Health: Current and Future Perspectives

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More and more evidences indicated environmental pollutions are important risk factors affecting cardiovascular diseases (CVDs). Among these, urban air pollution shared the greatest contribution on human health, which is not only confined to illness but also involves a higher impact on CVDs morbidity and mortality.

The mechanisms linking air pollution and cardiovascular diseases are proposed in the scientific statement from the American Heart Association by Brook et al., and our previous studies may add support for these mechanisms. We have provided evidence that exposure to air pollution may decrease pulse pressure in the general population. Short- term exposure to $PM_{2.5}$ contributes to pulse pressure narrowing along with cardiac and vasomotor dysfunctions in office workers with non-dipper of blood pressure at night. Moreover, in middle-aged adults, the carotid intima-media thickness (CIMT) and inflammation indices in terms of blood leukocyte and monocyte are associated with the individual's exposure to air pollution of $PM_{2.5}$ absorbent, PM_{10}, NO_2, and NO_x as derived from long-term air pollution exposure estimated by land-use regression models of the European Study of Cohorts for Air Pollution Effects. These studies provide supporting evidence of an increased risk of subclinical cardiovascular health following long-term air pollution exposure in Asia.

In searching for which kind of natural environments may benefit our health, we have demonstrated the potential favorable health effects on subclinical CVD in terms of CIMT and subjective HRQOL in workers living in forest environment compared to those of living in urban city. In addition, we also found a significant effect on activation of natural killer cell after a 3-day's short-term stay in forest (XiTou).

Air quality in Asia has deteriorated significantly in recent decades because of rapid industrialization, urbanization, and motorization. How to cope with these issues and critical conditions, searching for possible solutions are anticipated.

空氣污染與心血管健康：現況與未來展望

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越來越多的證據顯示環境污染是影響心血管疾病的重要因素。其中，都市空氣污染對人體健康的影響最大，不僅是一般疾病，還會導致較高的心血管疾病發病率和死亡率。

美國心臟學會布魯克(Brook)等人提出的科學聲明顯示空氣污染與心血管疾病的連結機制，我們之前的研究結果也支持此項作用機制。我們的研究顯示一般大眾在空氣污染暴露下可能導致脈搏壓(收縮壓與舒張壓的差距)降低，短期暴露在 $PM_{2.5}$ 下的上班族會造成脈搏壓變小、心臟和血管收縮功能障礙、晚間非杓型(non-dipper) [註一]血壓等影響。再者，利用歐洲空氣污染世代追蹤研究(European Study of Cohorts for Air Pollution Effects, ESCAPE)所發展的土地利用迴歸模式(Land-use Regression Model)研究顯示，中年成人的頸動脈內膜-中層厚度(CIMT) [註二]、炎症指標(Inflammation Indices)、白血球細胞、單核細胞和長期暴露空氣污染物如 $PM_{2.5}$ (粒徑小於 2.5 μm 的細懸浮微粒)、PM_{10}、NO_2 與 NOx 有相關性！

尋找哪種自然環境對健康可能有幫助，我們比對住在森林中和一般城市的工作者，證明了潛在有利的健康效果如亞臨床心血管疾病、頸動脈內膜-中層厚度和主觀健康相關生活品質(Health-Related Quality of Life，HRQOL)。此外，我們的研究發現在溪頭森林區短暫停留三天對於自然殺手細胞(Natural Killer Cell)的激活有顯著效果！

亞洲的空氣品質近年來因為快速的工業化、都市化和機動化而顯著惡化，預期尋求可能的解決之道來處理這個議題和嚴峻的條件！

註一：一般人的血壓到了夜間會下降，血壓波動呈現杓型，非杓型(non-dipper)即無明顯夜間血壓降低的情況。

註二：頸動脈內膜-中層厚度(CIMT)指的是頸動脈管壁的內膜加上中層的厚度，以高解析的超音波測量，經常被應用於流行病學與臨床研究。可代表早期動脈粥狀硬化的程度，與心血管或腦血管疾病有很高的相關性。

兒童環境健康

Session Three: Children's Environmental Health

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Prof. Mei-Hwan Wu (Taiwan) 吳美環院長
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Dr. Mei-Hwan Wu is Superintendent of National Taiwan University Children's Hospital. She obtained her MD and PhD at the National Taiwan University in Taiwan and also completed her EMBA from National Taiwan University. She is an expert in the cardiac electrophysiology, from cellular to cardiac catheterization theater. She is a pioneer in pediatric transcatheter arrhythmia therapy. Besides, her research foci cover widely the spectrum of congenital heart disease and acquired heart disease in children.

Research Interests

- Clinical aspects of arrhythmias, including the mechanism (particularly the unique mechanism in complex CHD, such as AV node-to-AV node tachycardia), the ablation technique, and the outcome assessment
- Cellular electrophysiology, including the maturation the cardiac ionic channels, the age-related difference of pharmacological reaction such as cisapride, quinidine, lidocaine, etc
- Genetic alteration underlying the QT syndrome
- Clinical scenario from congenital heart disease and long QT gene polymorphism
- Population study for the congenital heart disease
- Cardiologic aspects of Kawasaki disease, particularly assessment and intervention for CV risk
- Cardiologic aspects of Marfan syndrome, the intervention and the pharmacological risk reduction trial
- System dynamic modeling for medical economic analysis

Education and Degrees

1986-1992 PhD, National Taiwan University
1973-1980 MD, National Taiwan University

Professional Appointments

2012-2014 President, Asian Pacific Pediatric Cardiac Society
2011-2014 President, Taiwan Pediatric Association
2000-2003 Chief Editor of the Pediatrics and Neonatology

Publications

More than 300 papers in peer reviewed journals.

Dr. Peter van den Hazel (Netherlands)
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Dr. Hazel received his MD from University of Amsterdam. He is Co-Founder of International Coordinator of International Network for Children's Health, Environment and Safety (INCHES). He is also President of Health and Environment Alliance (HEAL) since 2012. He has received advanced training in management of non-profit organizations, epidemiology, medical statistics, radiation safety, corporate environmental care, and project management. He has coordinated several EU-funded projects, such as PINCHE, CHEST and Climate TRAP.

Education and Degrees

2010-	Public Health Advisor HazMat
1986-1989	MPH: degree in Environmental Medicine, Dutch Institute of Preventive Medicine (TNO- PG)
1985	General Practitioner (House Physician); degree University of Amsterdam
1982	Medical Doctor, University of Amsterdam
1972	Gymnasium (Cartesius Lyceum, Amsterdam) Diploma

Professional Appointments

2010-2012	Vice-president, Health and Environment Alliance (HEAL)
2009-2012	Project coordinator for Climate TRAP-EU funded project on Climate change and public health
2008-2010	Contract at Radboud University for PHEEDUNET project as Scientific coordinator
2007-2010	Project coordinator for PRONET – EU funded project
2005-	President EUPHA section Environment Related Diseases
2004-	Co-chair Healthy Environments for Children Alliance, (secretariat at WHO)
2003-2006	Project leader for CHEST (Children's Health, Environment and Safety training)
2001-2003	President International Society of Doctors for the Environment
1998-	Chair of the Board of International Network on Children's Health, Environment and Safety (INCHES)
1988-1998	President, Dutch Association of Environmental Medicine
1986-	Environmental Health Specialist, working for Combined Municipal Health Services in Gelderland, the Netherlands
1982-1984	District medical officer, Commonwealth of Dominica

International Service

2000-2001	INCHES coordinator for UN Special Session on children (Prep Com meetings)

1998-2001	NGO representative at European Roundtable on Children's Environmental Health
1998	Founder, International Network on Children's Health, Environment and Safety (INCHES)
1997	Member, WHO Working Group on Epidemiological Approaches to Assessment of Health Consequences of Accidents and Disasters
1992	Committee member Dutch Platform Brasil UNCED
1989-1991	Committee member FOZ (Financiëel Overzicht Zorg (Financial Health Care Committee)) of KNMG (Royal Dutch Medical Society)

Selected publications

1. Athos, photos and poems, Uitg. Luyten, 1981 (poetry)
2. **van den Hazel P**, van Loenhout J, Slottje P, Jongeneel R. The PRONET project: pollution reduction options network to enhance implementation of successful transport and indoor environment practices in Europe. Int. J. Environment and Health, Vol. 2, Nos. 3/4, 2008. 293-303.
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4. **van den Hazel, P**. Liu, Hai-Ying, Bartonova, A. Information materials for external users and dissemination plan. HENVINET OR 37/2010. Norwegian Institute for Air Research. 2010
5. Zuurbier M, Hoek G, Oldenwening M, Lenters V, Meliefste K, **Van den Hazel P**, Brunekreef B. Commuters' exposure to particulate matter air pollution is affected by mode of transport, fuel type, and route. Environ Health Perspect. 2010; 118: 783-789.
6. Zuurbier M, Hoek G, Oldenwening M, Meliefste K, **Van den Hazel P**, Brunekreef B. Respiratory effects of commuters' exposure to air pollution in traffic. Epidemiology. 2011; 22(2): 219-227
7. Zuurbier M, Hoek G, Oldenwening M, Meliefste K, Krop E, **Van den Hazel P**, Brunekreef B. In-traffic air pollution exposure and CC16, blood coagulation, and inflammation markers in healthy adults.Environ Health Perspect. 2011 Oct;119(10):1384-9. Epub 2011 Jun 10.
8. **Hazel, P van den**, Stauffer A. Children and Environmental Health. Chapter in IMPROVING THE QUALITY OF CHILDHOOD IN EUROPE 2012, VOLUME 3
9. Keune H, Ludlow D, **van den Hazel P**, Randall S, Bartonova A. A healthy turn in urban climate change policies; European city workshop proposes health indicators as policy integrators. Environ Health. 2012 Jun 28;11 Suppl 1:S14.
10. Bartonova A, Koppe JG, Fucic A, Gutleb AC, **van den Hazel** P, Keune H. The Health and Environment Network and its achievements. Environ Health. 2012 Jun 28;11 Suppl 1:S1.
11. Grossberndt S, **van den Hazel P**, Bartonova A. Application of social media in the environment and health professional community. Environ Health. 2012 Jun 28;11 Suppl 1:S16.
12. **van den Hazel P**, Keune H, Randall S, Yang A, Ludlow D, Bartonova A. The challenge of social networking in the field of environment and health. Environ Health. 2012 Jun 28;11 Suppl 1:S15.
13. Böse-O'Reilly S, Lob-Corzilius T, **van den Hazel P**. Klimawandel und Gesundheitssysteme in Europa. Pädiatrische Allergologie in Klinik und Praxis. 15. Jg./Nr. 3. 2012. 31-34.
14. Mark J Nieuwenhuijsen, et al. Positive health effects of the natural outdoor environment in typical populations in different regions in Europe (PHENOTYPE): a study programme protocol. BMJ Open2014;4:e004951

The Importance of Children's Environmental Health to the World

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President of Health and Environment Alliance (HEAL) and International Network for Children's Health, Environment and Safety (INCHES)

Children are the litmus test for the future. Will the future turn acid or not? One cannot have a healthy population of children on a sick planet.The exposures of children are increasing every year. Air pollution in Asia, food related issues in Latin America, noise and more chemical compounds in Europe, heavy metals in different hot spots, endocrine disruptors everywhere. More scientific knowledge emerges that environmental stressors may lead to adverse epigenetic changes, resulting in multigenerational and transgenerational effects. Currently we are burdening generations to be born after the year 2050.

Exposure to environmental stressors and occupational risks have life-long implication on developmental processes in children. Dietary deficiency or oversupply and psychological stress are covariates in studies on developmental stressor exposure. Exposome studies aim at integrating assessment of the totality of hazards. Further, epigenomics are an important study area as mechanism for effects on health by environmental stressors.

Relevant exposure levels and new technology testing have to be identified to pinpoint outcome assessments. Focus on vulnerable windows of exposure, e.g. in the preconceptional period, and mechanisms leading to genome effects, resulting in transgenerational effects are needed for a new characterization of risk factors and their interactions on humans. In the preconception period a variety of possible mechanisms are leading to effects. Validity of animal models, tissue specificity and biomarker development are needed in research to make scientific progress.

Children are the vulnerable group that are incapable to change their changing exposure. They depend on adults for protecting their health. The policy makers, the producers, society at large have to make protective decisions. They have to become responsible for future generations. Information-sharing between academic research and decision-making world is essential to provide a public health and scientific perspective. Children's environmental health is a global problem with regional differences: epidemic obesity versus malnourishment, mega-cities with air pollution versus rural exposure to persistent pesticides. Complex environmental exposures need to be interpreted by experts, to prevent misunderstandings, to support appropriate discussion on possible societal implications, to overcome challenges and to steer towards appropriate interventions to promote children's health.

兒童環境健康對世界的重要性

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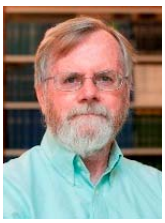
歐盟健康與環境聯盟(Health and Environment Alliance, HEAL)以及國際兒童健康環境網絡(International Network for Children's Health, Environment and Safety, INCHES)主席

兒童是未來世界的酸鹼試劑，知道未來的世界是否變成酸性？**一個生病的星球無法孕育出健康的孩童。**亞洲的空氣污染、拉丁美洲的食物問題、歐洲的噪音和化合物暴露、重金屬和內分泌干擾物的污染隨處可見。越來越多的科學知識證實了環境壓力可能導致不良的表觀遺傳(Epigenetic)變化，導致多代及跨代的影響，目前，我們正背負著 2050 年後出生孩童們的健康！

環境壓力及職業風險暴露對兒童發展過程影響是終生的。飲食不足、過剩或是心理壓力都是兒童發展暴露研究的共同影響因子。暴露體研究(Exposome study)係量測個體自受孕開始到生命最終所接觸的總暴露，用以描繪環境因子與疾病的關係，另外，表徵基因體學(Epigenomics)是環境壓力對健康影響的重要機制研究領域。

相關的暴露基準及新技術測試需要確定之後方能做出結果評估。專注於脆弱的暴露窗口，例如孕前、基因影響和跨世代作用機制等研究來了解這些風險因子對人體健康的作用。目前我們已了解懷孕前許多機制會有健康的影響，促進科學研究發展需要有效的動物模型、組織特異性、生物標誌性。

兒童是脆弱的族群，他們無法改變生活的暴露環境，所以依賴大人們守護他們的健康。決策者、生產者以及整個社會必須制定保護的政策，替未來的世代負責。學術與政策制訂機構間以科學或是公共衛生角度的資訊交流是不可或缺的。兒童環境健康是全球的問題然而有存在著區域間的差異性：肥胖以及營養不良、巨型都市的空氣污染以及農村長效性農藥暴露。複雜的環境暴露需仰賴專家來解釋，以防誤解，並支持合適的社會影響討論，克服挑戰，施行合適的介入措施以促進兒童的健康！



Prof. David Bellinger (United States)
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Senior Research Associate in Neurology and Senior Associate in Psychology, Children's Hospital Boston
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Prof. Bellinger is Professor of Neurology at Harvard Medical School and Professor of Environmental Health at Harvard School of Public Health. He is also a Senior Research Associate in Neurology and a Senior Associate in Psychiatry at the Children's Hospital Boston. He edited a textbook entitled Human Development Neurotoxicology. And he is currently President of the International Society for Children's Health and the Environment. He has served as a member of several committees of EPA, CDC, and ATSDR, as well as served as an advisor to the WHO's Joint Expert Committee on Food Safety and chairperson to WHO's Guidelines on the Prevention and Management of Lead Poisoning.

Education and Degrees

1987	MSc, Epidemiology, Harvard School of Public Health
1977	PhD , Psychology, Cornell University
1971	BA , Williams College

Professional Appointments

2010-	President, International Society for Child Health and the Environment
1994-2003	Associate Professor of Neurology (Psychology), Harvard Medical School
1991-2000	Director of Research, Behavioral Pediatrics Fellowship Program, Children's Hospital Boston
1978-1979	Public Health Service Postdoctoral Fellow, Department of Psychology, Boston University

Awards and Honors

2013	Environmental Health Perspectives, Reviewer of the Year
2013	Bernstein Lecturer, Department of Psychiatry, Boston Children's Hospital
2011	M.I.N.D. Institute Distinguished Lecturer, University of California-Davis
1985-1990	National Institute of Environmental Health Sciences Research Career Development Award

Committee and Editorial Service

Committee: Member, Biology and Medicine Panel, Research Grants Council, University Grants Committee, Hong Kong (2014-), Member, WHO Expert Advisory Panel on Food Safety, World Health Organization (2011-), WHO Guidelines on the Prevention and Management of Lead Poisoning, World Health Organization (Chairperson) (2011-), Consultant, European Food Safety Authority, Use of the Benchmark Dose Approach in Risk Assessment (2009), Committee on Clinical Investigation (Institutional Review Board), Children's Hospital Boston (2007-2011), WHO/International Programme on Chemical Safety (1997)
Editorial Positions: Medicine (2014), Editor-in-Chief, Toxics (2012-), Environmental Health Perspectives

(2011-), Environmental Health (2010-), Nutrition and Dietary Supplements (2009-), Clinical Epidemiology and Risk Assessment (2008-), Open Environmental Sciences (2008-), Neurotoxicology (2007-), Neurotoxicology and Teratology (2005-), Neurotoxicology and Teratology (2001-2004), Neurotoxicology and Teratology (1995-2001)

Selected Publications (2014-present)

1. Stein CR, Savitz DA, **Bellinger DC**. Perfluorooctanoate exposure in a highly exposed community and parent and teacher reports of behavior in 6-12 year old children. Paediatric and Perinatal Epidemiology 2014; 28:146-156.
2. Maserejian NN, Shrader P, Trachtenberg FL, Hauser R, **Bellinger DC**, Tavares M. Dental sealants and flowable composite restorations and psychosocial, neuropsychological, and physical development in children. Pediatric Dentistry 2014; 36:68-75.
3. **Bellinger DC**, Rivkin MJ, DeMaso D, Robertson RL, Stopp C, Dunbar-Masterson, Wypij D, Newburger JW. Adolescents with tetralogy of Fallot: Neuropsychological assessment and structural brain imaging. Cardiology in the Young 2014;11:1-10.
4. Manji KP, McDonald CM, Kupka R, Bosch RJ, Kisenge R, Aboud S, **Bellinger DC**, Fawzi WW, Duggan CP. Effect of multivitamin supplementation on the neurodevelopment of HIV-exposed Tanzanian infants: A randomized, double-blind, placebo-controlled clinical trial. Journal of Tropical Pediatrics 2014;60:279-286.
5. Fortenberry GZ, Meeker JD, Sanchez BN, **Bellinger D**, Peterson K, Schnaas L, Solano-Gonzalez M, Ettinger AS, Hernandez-Avila M, Hu H, Tellez-Rojo M. Paraoxonase polymorphisms and attention/hyperactivity in school-age children from Mexico City. Environmental Research 2014; 132: 342-349.
6. Cheng HH, Wypij D, Laussen PC, **Bellinger DC**, Stopp CD, Soul JS, Newburger JW, Kussman BD. Cerebral blood flow velocity and neurodevelopmental outcome in infants undergoing surgery for congenital heart disease. Annals of Thoracic Surgery 2014; 98: 125-132.
7. Oulhote Y, Mergler D, Barbeau B, **Bellinger DC**, Bouffard T, Brodeur ME, Saint-Amour D, Legrand M, Sauvé S, Bouchard MF. Neurobehavioral function in school-age children exposed to manganese in drinking water. Environmental Health Perspectives 2014; 122:1343-1350.
8. Karwowski MP, Just AC, **Bellinger DC**, Jim R, Hatley EL, Ettinger AS, Hu H, Wright RO. Maternal iron metabolism gene variants modify umbilical cord blood lead levels by gene-environment interaction: a birth cohort study. Environmental Health 2014;13(1):77
9. Cassidy AR, White MT, DeMaso DR, Newburger JW, **Bellinger DC**. Executive function in children and adolescents with severe congenital heart disease. Journal of the International Neuropsychological Society 2014; 9:1-16.
10. Choi AL, Zhang Y, Sun G, **Bellinger D**, Wang K, Yang XJ, Li JS, Zheng Q, Fu Y, Grandjean P. Association of cognitive deficits with prenatal exposure to fluoride in Chinese children: A pilot study. Neurotoxicology and Teratology 2015; 47: 96-101.
11. Panigrahy A, Schmithorst VJ, Wisnowski JL, Watson CG, **Bellinger DC**, Newburger JW, Rivkin MJ. Relationship of white matter network topology and cognitive outcome in adolescents with d-transposition of the great arteries. Neuroimage Clinical 2015; 7: 438-48.

Characterizing the Public Health Impact of Children's Exposures to Environmental Chemicals

Prof. David Bellinger (United States)

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Efforts to estimate the societal burden of children's exposures to neurotoxic environmental chemicals tend to focus on the monetary or health costs associated with specific outcomes, e.g., diseases such Attention Deficit Hyperactivity Disorder and Intellectual Disability (i.e., an intelligence score that is reduced to <70). In this presentation, I argue that such approaches substantially underestimate the public health impact of early-life exposures to these chemicals. Two major limitations are discussed.

The first is the need to consider "subclinical" toxicity as well as clinical toxicity. Because of the high prevalence of some exposures, even a small effect size associated with it can result in a surprisingly large impact on the population level. This is illustrated by comparing the total population IQ losses associated with chemical exposures (lead, methylmercury, organophospate pesticides), to those associated with major pediatric health conditions and events. The second limitation is the failure to design, analyze, and interpret studies of neurotoxicity in terms of an explicitly developmental perspective. The major elements of such a perspective are discussed and illustrated. These include the concept of "developmental cascades," whereby early-life neurotoxicant exposure sets in motion a process that unfolds over time, including epigenetic expressions that are initially silent, and alters the normal aging process; the concept that co-exposures and contextual characteristics influence the expression of neurotoxicity; and the concept that early-life neurotoxicant exposure acts as an effect modifier, limiting the way in which a child can respond to future neurodevelopmental challenges.

兒童暴露環境化學物的公共衛生影響描繪

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評估兒童暴露於環境神經毒性化學物質的社會負擔，往往把重點放在如醫療費用等具體結果，如疾病，注意力不足過動症(ADHD)和智力障礙（即智商低於 70 ）。我認為這樣的做法持續低估了早期暴露於這些化學品的公共衛生影響，在這次演講中，將討論兩個主要限制。

首先，除了臨床毒性外，需要考慮「亞臨床」毒性。因為某些暴露的高盛行率，即便只有很少的劑量，也會對人體產生出乎意料的顯著影響，兒童主要健康狀況和事件可藉由暴露化學物質(鉛、甲基汞、有機磷殺蟲劑等等)降低智力影響等關係得知。第二個限制則是在明確的前瞻性研究下，設計、分析和解釋神經毒性研究的失敗。主要的前瞻性元素將進行討論與說明。這些主要元素包含發展串聯(Developmental Cascades)，意思是起初表觀遺傳(Epigenetic)靜默，但由於早期神經毒性暴露，隨著時間推移而改變正常老化過程；共同暴露和脈絡特徵的概念會影響神經毒理的表現；並且早期的神經毒物暴露扮演修飾因子(Effect modifier)，限制兒童未來的神經發育！

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Dr. Heinrich is the Unit Head of population studies and Senior Consultant at Ludwig-Maximilians-University since 2015. He is also an Epidemiologist and Director of the Institute of Epidemiology at Helmholtz Zentrum München (German Research Center for Environmental Health). He has authored more than 700 publications and has been involved in numerous national and international epidemiological research projects examining common chronic diseases especially the relationship between air pollution and respiratory health. He has coordinated several international projects such as ENRIECO, ESCAPE and INTARESE.

Research Interests

Long-term and short-term effects of ambient air pollution on several health parameters; Measurement and monitoring of ambient air pollution and assessment of exposure to ambient air pollution; Determinants of asthma and allergies (including indoor biocontaminants, dietary factors, life-style related factors) ; Longitudinal data analysis

Education and Degrees

1982-1986 Postgraduate Training in Biomathematics and statistics in medicine, Berlin, Germany
1982 PhD in Epidemiology, Medical School Erfurt
1970-1974 Study of Mathematics, Friedrich-Schiller University of Jena, Jena

Professional Appointments

2011-2015 Director of Institute of Epidemiology I, Helmholtz Zentrum München, Neuherberg/Munich
1992-2011 Group leader, Helmholtz Zentrum München, Institute of Epidemiology, Neuherberg/Munich
1990-1992 Scientist, University of Wuppertal
1983-1989 Group leader, Department of Preventive Cardiology, Medical School Erfurt
1974-1983 Scientist, Medical School Erfurt

Membership and Editorial Activities

Member of several Review Panels for German Ministries such as the BMBF, the German Research Foundation, the EU, the Welcome trust, several national research funding institutions, WHO and other funding agencies; Associate editor and member of editorial boards of several scientific journals; Reviewer for numerous scientific journals such as New England Journal of Medicine, The Lancet, Environmental Health Perspectives, European Respiratory Journal, JACI, Allergy, etc; Member of steering committee of several national and international scientific research projects and consortia; International ranking of worldwide leading researchers on asthma on rank 16; top 10 ranking in air pollution epidemiology authors (Zell et al J Occup Med Toxicol. 2010; 5: 5.)

Selected Publications (2014 -present)

1. Tiesler CM, **Heinrich J**. Prenatal nicotine exposure and child behavioural problems. Eur Child Adolesc Psychiatry. 2014 Oct;23(10):913-29.
2. Cai Y, et al. Cross-sectional associations between air pollution and chronic bronchitis: an ESCAPE meta-analysis across five cohorts. Thorax. 2014 Aug 11. pii: thoraxjnl-2013-204352.
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5. Vimaleswaran KS, et al. Association of vitamin D status with arterial blood pressure and hypertension risk: a mendelian randomisation study. Lancet Diabetes Endocrinol. 2014 Sep;2(9):719-29.
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9. Fuertes E, Markevych I, von Berg A, Bauer CP, Berdel D, Koletzko S, Sugiri D, **Heinrich J**. Greenness and allergies: evidence of differential associations in two areas in Germany. J Epidemiol Community Health. 2014 Aug;68(8):787-90.
10. **Heinrich J**, Koletzko B, Koletzko S. Timing and diversity of complementary food introduction for prevention of allergic diseases. How early and how much? Expert Rev Clin Immunol. 2014 Jun;10(6):701-4.
11. Wang M, et al. Performance of multi-city land use regression models for nitrogen dioxide and fine particles. Environ Health Perspect. 2014 Aug;122(8):843-9.
12. Cousminer DL, et al. Genome-wide association study of sexual maturation in males and females highlights a role for body mass and menarche loci in male puberty. Hum Mol Genet. 2014 Aug 15;23(16):4452-64.
13. Park SL, et al. Pleiotropic associations of risk variants identified for other cancers with lung cancer risk: the PAGE and TRICL consortia. J Natl Cancer Inst. 2014 Apr;106(4):dju061.
14. Bousquet J, et al. Birth cohorts in asthma and allergic diseases: report of a NIAID/NHLBI/MeDALL joint workshop. J Allergy Clin Immunol. 2014 Jun;133(6):1535-46.
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Exposure to Greenness and Health Outcomes

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Exposure to nature and in particular to green vegetation is intuitively suggested to have beneficial effects on human health since centuries. New technologies such as data from geographical information systems (GIS) and satellite images substantially improved the assessment of exposure to greenness and allowed to describe the association between these exposures and health outcomes. This review will summarize the current knowledge on empirical associations between exposure to greenness and a broad spectrum of health indicators and will explore potential underlying mechanisms.

A small number of epidemiological studies consistently showed a lower total mortality and in particular due to cardio-vascular causes with increasing exposure to greenness in the residential area. Also cardio-vascular morbidity is lower in subjects highly exposed to greenness. The most consistent finding is related to higher birth weights in the exposed populations. Even sensitivity analyses showed consistently that those babies born to underprivileged families have a stronger benefit in terms of higher birth weights compared to babies from families with a higher socio-economic background. Less consistent are the effects of higher exposure to greenness for being small for gestational age or preterm birth. Several studies reported that more neighborhood greenness or easy access to green space was associated with less psychiatric morbidity in adults. The epidemiological studies are different in design (most cross-sectional, a few cohort studies, some register based ecological studies), in methods to assess exposure to greenness (objective measures, questionnaire based data, access to green space, vegetation intensity by NDVI, canopy cover, etc.), the intensity of adjustments for potential confounders, and the climatic conditions. Despite these strong methodological differences, the consistency of some findings is even more surprising.

The mechanisms for these empirical associations are not clear so far. Several speculations and hypothesis are in discussion. The oldest attempt to explain these associations is based on Ulrich's psychoevolutionary theory, which suggests that exposure to nature decreases stress. Other explanations are related to a committing reduced exposure to noise, ambient air pollution, and heat waves. There is some data supporting this speculation, but the evidence is not strong. Physical activity (and consequently normal body weight) might be increased if green parks are close to the residential addresses. Apart of these explanations, the potential of residual confounding, even if the associations were adjusted for educational level and income, is substantial. Finally publication bias cannot be ruled out. It is always a problem if a recent emerging risk was described. However the value of these recent study findings is enormous, because of the quantification of the health benefits and the motivation to city planners to increase green space areas in particular in metropolitan areas.

接觸綠地的健康成效

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德國慕尼黑大學資深顧問、赫慕尼黑姆霍茨中心(德國環境健康研究中心)流行病學所所長

幾個世紀以來，直觀的認為接觸自然特別是綠色植物對人體健康有助益，新科技如地理資訊系統(Geographical Information Systems, GIS)、衛星影像改善接觸綠色植物的量測和研究健康效益之間的關係。這次的研究回顧會歸納目前的知識經驗連結廣泛的健康指標，探討潛在的底層機制。

少部分的流行病學研究一致顯示接觸住家附近的綠色植物越多，死亡率越低，特別是心血管方面的因素；而腦心血管的發病率也因接觸較多的綠色植物而降低。較一致的研究發現，多接觸綠色植物的族群，嬰兒出生體重較重；即便敏感性分析(Sensitivity Analyses)也是一致的，比起家庭較富裕的小孩，來自貧困家庭的小孩在出生體重上受益較多；較不一致的研究顯示多接觸綠色植物會有早產的現象。許多研究報告顯示較容易接近綠色植物或是社區有綠地會降低成人的精神疾病。這些流行病學研究在設計方法上不盡相同，大多是橫斷面研究(Cross-Sectional)，有些是世代研究(Cohort Studies)，有些則是採用生態研究(Ecological Studies)。而接觸綠色植物多寡的量測方法包含問卷資料、客觀度量，並用常態化差異植生指標(NDVI)、林冠被覆度(Canopy Cover)等等方式了解接觸綠地和植被的強度，並調整潛在干擾因子以及氣候因素。即便這些方法學上的差異，呈現結果的一致性依舊令人驚訝。

這些機制的實證關聯尚不明確，許多猜測和假設仍在討論中，最早試圖解釋的是 Ulrich 的心理演化理論(Psychoevolutionary theory)，這說明接觸自然能降低壓力。其他的解釋則與減低噪音、空氣污染和心跳有關。有些數據支持這猜測，但是證據不夠強烈。若公園綠地在住家附近，則體能活動(體重)會增加。除了這些解釋，調整潛在干擾因子如教育水準和收入，影響依舊不可小覷。這些論文研究的偏差無法被排除，最近的新興風險闡述這個事實，然而，最近的這些研究價值無比珍貴，來自對健康效益量化和城市規畫者增加綠地的動機增加，特別是在大都會區！

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Prof. Ha received a MD from Ewha Womans University, a MSc in Public Health from Seoul National University and a PhD in Occupational and Environmental Medicine from Catholic University. She is Professor of Preventive Medicine at Ewha Womans University and Director of Center for Mothers and Children's Environmental Health (MOCEH). She was Visiting Scholar at Harvard School of Public Health in 1999-2000. She has also served for WHO's Children's Health and the Environment (CEH) and International Collaboration on Air Pollution and Pregnancy Outcomes (ICAPPO) as an advisor.

Education and Degrees

1997	PhD, Graduate School of Catholic University
1992	MSc, Graduate School of Seoul National University
1987	MD, College of Medicine, Ewha Womans University

Professional Appointments

1999-2000	Visiting Scholar, Environmental Epidemiology, Harvard School of Public Health, USA
1994-	Professor, Department of Preventive Medicine, Ewha Womans University School of Medicine
1993-1994	Assistant Professor, Department of Preventive Medicine, Dongguk University School of Medicine
1991-1993	Director Dept. of Health Management, Korean Industrial Health Association
1988-1991	Residency, Preventive Medicine, Ewha Womans University Medical Center
1987-1988	Internship, Severance Hospital, Yonsei University College of Medicine

Awards

2009	Presidential awards, Korea Ministry of Environment
2004	Prizes for distinguished scientific and technological papers, Korean Federation of Science and Technology Societies

Selected Publications (2014-present)

1. Kwon JH, Kim E, Chang MH, Park EA, Hong YC, Ha M, Park H, Kim Y, Park C, Ha EH. Indoor total volatile organic compounds exposure at 6 months and atopic dermatitis prevalence at 3 years in children. Pediatr Allergy Immunol. 2015 Apr 13.
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13. Lee WK, Lee HA, Hwang SS, Kim H, Lim YH, Hong YC, Ha EH, Park H. A time series study on the effects of cold temperature on road traffic injuries in Seoul, Korea. Environ Res. 2014 Jul;132:290-6.
14. Eum JH, Cheong HK, Ha EH, Ha M, Kim Y, Hong YC, Park H, Chang N. Maternal blood manganese level and birth weight: a MOCEH birth cohort study. Environ Health. 2014 Apr 29;13(1):31.
15. Kim E, Park H, Hong YC, Ha M, Kim Y, Kim BN, Kim Y, Roh YM, Lee BE, Ryu JM,Kim BM, Ha EH. Prenatal exposure to PM_{10} and NO_2 and children's neurodevelopment from birth to 24 months of age: mothers and Children's Environmental Health (MOCEH) study. Sci Total Environ. 2014 May 15;481:439-45.
16. Park B, Shin A, Jung-Choi K, Ha E, Cheong HK, Kim HJ, Park KH, Jang S, MoonBI, Ha M. Correlation of breast cancer incidence with the number of motorvehicles and consumption of gasoline in Korea. Asian Pac J Cancer Prev.2014; 15(7):2959-64
17. Lee BE, Park H, Hong YC, Ha M, Kim Y, Chang N, Kim BN, Kim YJ, Yu SD, Ha EH. Prenatal bisphenol A and birth outcomes: MOCEH (Mothers and Children's Environmental Health) study. Int J Hyg Environ Health. 2014 Mar;217(2-3):328-34.

Indoor and Outdoor Air Pollution and Children's Health: Evidences from a Birth Cohort Study (MOCEH) in South Korea

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There have been some evidences that exposure to air pollution might be negatively associated with children's health. In this study, we investigated the association between Indoor and outdoor air pollution and children's health. This study is a part of MOCEH (Mothers and Children's Environmental Health) study which is an on-going, prospective birth cohort study in South Korea.

In Methods, to estimate exposure to outdoor air pollution, average PM_{10} of 1,129 mother-child pairs during entire pregnancy and early childhood were estimated using inverse distance weighting (IDW) method. TVOC, HCHO, and formaldehyde of 360 mothers during mid-pregnancy and late pregnancy and 257 newborns at 6 months were measured by personal air samplers to investigate their exposure level of indoor air pollution. Child weights were measured at birth and each visits of children at 6, 12, 24, 36, and 60 months of age to obtain the information of their growth development and the measured weights were transformed to weight for age z-scores. Neurodevelopmental assessments were conducted using the Korean Bayley Scale of Infant Development II (K-BSID-II) at ages of 6, 12 and 24 months. Korean version of the International Study on Allergies and Asthma in Childhood (ISAAC) was used to investigate the development of allergic diseases in children at 6, 12, 24, and 36 months of age.

Main results of the study are (1) The children who had lived in constantly higher level of PM_{10} (>50 $\mu g/m^3$) from pregnancy to 24 months of age were 0.438 lower in weight z-scores (1,114 g lower in weight) at 60 months than children who had lived in lower level of PM_{10} (≤50 $\mu g/m^3$) during the same period. Among the children whose birth weight was lower than 3.3kg, higher postnatal exposure to PM_{10} (>50 $\mu g/m^3$) significantly lowered their weight. (2) There were negative associations between maternal exposure to PM_{10} and MDI (β=−2.83; p= 0.003) and PDI (β=−3.00; p = 0.002) throughout the first 24 months of life as determined by the generalized estimating equation (GEE) model. In a multiple linear regression model, there were significant effects of prenatal air pollution exposure on MDI (β=−4.60; p = 0.001) and PDI (β=−7.24; p=0.001) at 6 months, but no significant association was found at 12 and 24 months of age. (3) Newborn's birth weight was adversely associated with prenatal TVOC exposure (β=-45.89, p=0.04). In the high TVOC exposure group (≥75th), the adjusted mean birth weight was approximately 300g lower than that in the low exposure group (<75th). (4)The average exposure concentration of TVOCs at 6 months was 174.7 ± 115.1 $\mu g/m^3$. An increased risk of atopic dermatitis was observed in the high TVOCs exposure group at 6 months, (OR = 3.116, 95% Cl 1.041-9.323). Risk of atopic dermatitis was increased when the family bought new furniture within 1 year. (5)The average exposure concentration of formaldehyde at 6 months was 116.5 ± 77.2 $\mu g/m^3$. The risk of upper respiratory illness at 6 months and chronic cough at 36 months was higher in high formaldehyde expos group (≥75th) than the others (<75th).

In conclusion, these results suggest that both indoor and outdoor air pollution are associated with adverse effects on children's development and health. Furthermore, the exposure may have an impact on their health from fetal period as well as early childhood. Further follow-up in the study will be needed to investigate whether the effect will be shown continuously or disappear at certain age.

* This study was supported by MOCEH (Mothers and Children's Environmental Health) project of the National Institute of Environmental Research, Republic of Korea.

室內及室外空氣污染及兒童健康：南韓 MOCEH 出生世代研究證據

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有一些證據顯示，暴露於空氣污染中對兒童健康有不良影響。在研究中，我們將針對室內和室外空氣汙染以及兒童健康的關係做調查。MOCEH(Mothers and Children's Environmental Health)是南韓一個正在進行的前瞻性世代研究，本研究設計源自部分的 MOCEH 研究。

室外空氣污染的部分，是利用反距離權重法(Inverse distance weighting, IDW)測量 1129 位配對母子在孕程和兒童早期暴露的平均 PM_{10} 濃度；室內空氣污染則是利用個人空氣採樣器，量測 360 位懷孕中晚期母親和 257 位六個月大的新生兒，他們生活中室內空氣樣本的總揮發性有機物(Total Volatile Organic Compounds, TVOC)和甲醛濃度。並且在小孩出生時、六個月、一歲、二歲、三歲和五歲大時量測體重生長的資訊，再依據年齡轉換為 Z 分數(Z-scores)；在小孩六個月大、一歲和二歲大時利用韓國貝氏嬰兒發展量表 II (Korean Bayley Scale of Infant Development II, K-BSID-II) 評估神經發育；同時在小孩六個月大、一歲、二歲和三歲大時，以韓國版的國際孩童過敏氣喘研究組織(ISAAC)的問卷了解過敏性疾病的情況。

研究主要的結果有五點：(1)從懷孕期開始到小孩兩歲，若持續生活在高劑量 PM_{10}(>50 $\mu g/m^3$)環境下，五歲時這些孩童的體重 Z 分數比生活在低劑量 PM_{10}(≤50 $\mu g/m^3$)孩童低 0.438(體重少了 1,114g)。若孩童出生時體重小於 3.3 公斤，出生後高劑量 PM_{10}(>50 $\mu g/m^3$)的環境暴露，會顯著降低其體重生長。(2)利用廣義估計方程式（Generalized estimating equation, GEE），得到母親暴露於 PM_{10} 與兒童兩歲內的心智發展指數(Mental Development Index, MDI) (β=−2.83; p= 0.003)、動作發展指數(Psychomotor Development Index, PDI) (β=−3.00; p = 0.002)呈現負相關。利用多變項線性迴歸模式(Multiple linear regression model)發現，產前空氣污染暴露對六個月大嬰兒的 MDI (β=−4.60; p = 0.001)和 PDI (β=−7.24; p=0.001)有影響，但與一歲及兩歲大的孩童的發展則沒有明顯關聯。(3)新生兒的出生重量與懷孕期間暴露的總揮發性有機物 (TVOC) (β=-45.89, p=0.04)有負向的影響。暴露的總揮發性有機物濃度較高族群(≥75th)，調整後的出生重量比起暴露量較低的族群，少了將近 300 公克。(4) 六個月大孩童暴露的總揮發性有機物(TVOC)的平均濃度是 174.7 ± 115.1 $\mu g/m^3$，另外，觀察到這個年紀的孩童，總揮發性有機物(TVOC)暴露較高的族群出現異位性皮膚炎(Atopic dermatitis)的危險性增加(OR = 3.116, 95% CI 1.041-9.323)。若是家庭一年內購買新家具，異位性皮膚炎的風險也會增加。(5)六個月大的孩童平均暴露的甲醛濃度為 116.5 ± 77.2 $\mu g/m^3$。而暴露甲醛濃度高(≥75th)的族群，比起其他族群，在六個月大時罹患上呼吸道疾病和三歲時罹患慢性咳嗽的危險性增高。

總結來說，這些結果顯示不論是室內或是室外的空氣污染均會對兒童健康和發展產生不利影響。此外，這些暴露對健康的影響，可能從胎兒時期直至兒童早期！後續的研究將需要了解這些影響是否會持續或是在某個年紀後便會消失。

* 這篇研究由南韓國家環境研究所 MOCEH 計畫贊助(Mothers and Children's Environmental Health)

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Prof. Hung-Yi Chiou is Vice President of Taipei Medical University. He received his PhD in the department of Epidemiology at National Taiwan University. He has gained considerable administrative experience. Except of his contribution for college and societies, he also won a lot of research awards. His research interests include Public Health, Preventive Medicine, Cancer Epidemiology, Vascular Diseases Epidemiology and Biostatistics.

Research Interests

Public Health, Preventive Medicine, Cancer Epidemiology, Vascular Diseases Epidemiology ,Biostatistics

Education and Degrees

1991-1996 PhD, Graduate Institute of Epidemiology, National Taiwan University, Taiwan
1987-1989 MSc, Institute of Public Health, National Taiwan University, Taiwan
1981-1985 BA, National Taiwan University College of Public Health, Taiwan

Honor and Awards

Research Grant Award, Taipei Medical University, 2009, 2011, 2012, 2013
Excellent Research Award, Taipei Medical University, 2006, 2011, 2013
Research Achievement Award, Taipei Medical University, 2011
Best Paper Award, Taipei Medical University, 2011
Teaching Excellence Award, Taipei Medical University, 2010
NSC Outstanding Undergraduate Project Research Innovation Award, 2000, 2006, 2007, 2010
Research Award, National Science Council, 1995, 1997, 1998, 2001 – present
Excellent thesis Award, Taiwan Public Health Association, 1996

Professional Appointments

2012- Vice President, Taipei Medical University
2011- President, Taiwan International Classification of Functioning, Disability and Health (ICF) Association
2010-2013 President, Taiwan Public Health Association
2010- Honorary Treasurer, Asia-Pacific Academic Consortium for Public Health
2002-2008 President, Taiwan Epidemiology Association

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Prof. Lee is Distinguished Professor, Director of Environmental Protection, Safety and Health Center and also Director of Environmental Trace Toxic substances Research Center at National Cheng Kung University. Also, he served as Government Official in Environmental Protection Agency and President for Taiwan Society of Indoor Environmental Quality. He received his PhD in Environmental Engineering from National Taiwan University. His research focuses on air pollution control, endocrine disruptor, analysis of environmental and occupational trace pollutants and risk assessment of toxic substances.

Research Interests

Air pollution control; Risk assessment and management of toxic substances; Endocrine disruptor exposure and health outcomes; Sampling and analysis of environmental and occupational trace pollutants; Environmental and Occupational Health

Education and Degrees

1987-1992	PhD, Graduate Institute of Environmental Engineering, National Taiwan University
1980-1982	MSc, Environmental Engineering, National Taiwan University
1976-1980	BA, Department of Public Health, National Taiwan University

Professional Appointments

1999-	Director, Research Center of Environmental Trace Toxic Substances
1996-1999	Director, Department of Environmental and Occupational Health
1991-1993	Lecturer, Department of Environmental and Occupational Health
1987-1988	Section Chief, Environmental Protection Administration, Taiwan
1986-1987	Section Chief , Environmental Protection Bureau, Department of Health, Taiwan

Society/Committee Activities

2010-	Member, Sustainability Group, National Policy Foundation
2011-	Environmental Impact Assessment Committee, Tainan City Government
2009-	Member, Environmental Impact Assessment Review Committee, Environmental Protection Administration, Taiwan
2004-	Advisor, Taipei City Government
2012-	President, Taiwan Society of Indoor Environmental Quality

Honors

2010	Excellent Award in Industry-Academy Cooperation, National Cheng Kung University

2009	Excellent Faculty of Industry-Academy Cooperation Award, National Cheng Kung University
2000	Best Risk Assessment Experimental Science Presentation

Selected Publications (2013-present)

1. Jer-Pei Fong, Fang-Jin Lee, I-Syuan Lu, Shi-Nian Uang, **Ching-Chang Lee***, Relationship between urinary concentrations of di(2-ethylhexyl) phthalate (DEHP) metabolites and reproductive hormones in polyvinyl chloride production workers, Occup Environ Med, vol 72, Pages 346–353, 2015
2. Chung-Yu Chen, Yen-Yin Chou, Shio-Jean Lin, **Ching-Chang Lee ***, Developing an intervention strategy to reduce phthalate exposure in Taiwanese girls, Science of the Total Environment, Vol 517, Pages 125–131, 2015
3. **Ching-Chang Lee**, Ling-Ying Jiang, Yi-Ling Kuo, Chung-Yu Chen, Chia-Yi Hsieh, Chung-Feng Hung, Colin S. Chen, Chien-Jung Tien, Characteristics of nonylphenol and bisphenol A accumulation by fish and implications for ecological and human health, Science of the Total Environment, Vol 502, Pages 417–425, January 2015
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7. Li-Ping Huang, **Ching-Chang Lee (equally contribution with Li-Ping Huang),** Jer-Pei Fan, Po-Hsiu Kuo, Tung-Sheng Shih, Ping-Chi Hsu, Urinary metabolites of di(2-ethylhexyl) phthalate relation to sperm motility, reactive oxygen species generation,and apoptosis in polyvinyl chloride workers, Int Arch Occup Environ Health, Aug 2013
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10. Jung-Wei Chang, Horng-Yih Ou, Hsiu-Ling Chen, Huey-Jen Su, **Ching-Chang Lee***, Hyperuricemia After Exposure to Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans Near a Highly Contaminated Area, Epidemiology, 24(4):582-589, July, 2013
11. Chung-Yu Chen, Chien-Jung Tien, Yih-Min Sun, Chia-Yi Hsieh, **Ching-Chang Lee (corresponding author)**, Influence of water quality parameters on occurrence of polybrominated diphenyl ether in sediment and sediment to biota accumulation, Chemosphere, Chemosphere, 90(9):2420-2427, Mar 2013

Developing an Intervention Strategy to Reduce Phthalate Exposure in Taiwanese Girls

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Children in Taiwan seem to be exposed to higher concentrations of phthalates than do children in Western countries. The present study developed intervention strategies to effectively reduce the body burden of phthalates in prepubescent girls.

We hypothesized that the intervention strategies we designed would effectively reduce the concentration of urinary phthalate metabolites and that modified behaviors would be correlated with decreases in the concentrations of specific urinary phthalate metabolites. We invited 30 girls 4–13 years old (median:9.7 years) who had higher total scores in the previous study to participate the present study. To reduce their phthalate-exposure sources, we developed seven intervention strategies: handwashing, not using plastic containers, not eating food with a plastic bag/plastic-wrap cover, not microwaving food, not taking nutrition supplements, and reducing use of cosmetics/personal care products.

Pre- and post-intervention urine samples were collected during a one-week study. HPLC-MS/MS was used to analyze urinary phthalate metabolites. The dominant urinary phthalate metabolite was mono-n-butyl phthalate (MBP), followed by mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP), and mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP).

Post intervention concentrations of eight urinary phthalate metabolites were significantly lower. Girls in the high frequency handwashing group had significantly lower urinary MBP ($p = 0.009$) and mono-methyl phthalate (MMP) ($p = 0.07$) than did girls in the low-frequency handwashing group. Girls who drank fewer beverages from plastic cups had significantly lower urinary MBP ($p = 0.016$), MEHHP ($p = 0.038$), and MECPP ($p =0.012$). Girls who used less shampoo and shower gel also had marginally significantly lower urinary MBP ($p = 0.06$) and mono-ethyl phthalate (MEP) ($p = 0.06$). The intervention strategies that we set up in this study were effective for reducing exposure to phthalates in children. Handwashing and drinking fewer beverages from plastic cups were the most effective strategies for reducing phthalate metabolites in urine, especially MBP and di(2-ethylhexyl) phthalate (DEHP) metabolites. Education and voluntary self-restraint were useful for reducing the body burden of phthalates.

發展行為介入策略以減少臺灣女童塑化劑暴露

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臺灣孩童的塑化劑暴露濃度似乎比西方國家來得高，目前的研究在於發展行為介入策略以有效減少青春期前的女童體內的塑化劑濃度。

研究假設行為介入策略可以有效減少尿液中塑化劑代謝物的濃度，並且改變的行為可以減低特定塑化劑的尿液代謝物濃度。參與研究對象挑選自前期研究中塑化劑暴露分數較高的30位4-13歲(中位數：9.7歲)的女童，為了減少她們的塑化劑暴露來源，我們發展七種行為介入策略：洗手、不使用塑膠容器、不吃塑膠袋裝/覆蓋保鮮膜的食物、不吃微波食物、不吃營養補充品、減少化妝品(保養品)/個人護理用品(沐浴乳、洗髮精)使用。

在為期一週的研究期間內，採集行為介入前後的尿液樣本。我們利用液相層析/串聯式質譜儀(HPLC-MS/MS)來定量分析尿液中塑化劑代謝物。尿液中主要的塑化劑代謝物是鄰苯二甲酸單丁酯(Mono-n-butyl phthalate, MBP)、其次是MBP的二階代謝物Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP) 和Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP)。

在行為介入後，八種尿液中塑化劑的代謝物明顯降低。在勤洗手的族群中，尿液中的MBP濃度($p = 0.009$)和mono-methyl phthalate (MMP) ($p = 0.07$)濃度明顯較不常洗手的族群低;較少喝塑膠杯裝飲料的族群尿液中的MBP ($p = 0.016$)、MEHHP ($p = 0.038$)和 MECPP ($p = 0.012$)也較低；使用較少洗髮乳和沐浴乳的族群也比常使用族群的MBP ($p = 0.06$)和單乙基酯(Mono-ethyl phthalate，MEP) ($p = 0.06$)略低。本實驗的行為介入策略能有效減低兒童的塑化劑暴露，其中以洗手和少喝塑膠杯裝飲品減少尿液中塑化劑代謝物最有效，特別是MBP和鄰苯二甲酸二（2-乙基己基）酯(DEHP)，而教育和自我約束對於減少塑化劑暴露很有幫助。

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Professor, Department of Bioenvironmental Medicine, Graduate School of Medicine, Chiba University

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Prof. Mori received a MD from Asahikawa Medical College and a PhD from Kyoto University. He spent one year as a Visiting Instructor at University of Manitoba in Canada and two years as a Visiting Associate in Laboratories of Reproductive and Developmental Toxicology of NIEHS in the US. He is Professor at Chiba University, Director for Center for Preventive Medical Sciences since 2008, Adjunct Professor at University of Minnesota in the US and Inje University in Korea. His research interests include environmental medicine and the health impact of exposure in children .He has published several books in the field of environmental medicine.

Education and Degrees

1989	PhD, Kyoto University
1984	MD, Asahikawa Medical College

Professional Appointments

2009-	Adjunct Professor, College of Medicine, Inje University, Korea
2006-	Adjunct Professor, Division of Environmental Health Sciences, University of Minnesota, School of Public Health, USA
2000-2001	Professor, Department of Anatomy and Cell Biology, School of Medicine, Chiba University, Japan
1992-2000	Associate Professor, Department of Anatomy and Developmental Biology, Faculty of Medicine, Kyoto University, Kyoto, Japan
1990-1992	Visiting Associate, Gamete Biology Section, Laboratories of Reproductive and Developmental Toxicology, National Institute of Environmental Health Sciences, National Institutes of Health, Research Triangle Park, North Carolina, U.S.A.
1989	Visiting Instructor, Department of Physiology, Faculty of Medicine, University of Manitoba, Winnipeg, Manitoba, Canada

Awards

Young Investigator Award of the Japanese Association of Anatomists (1995)

Selected Publications (2013-present)

1. Sugiura S, Aoki Y, Toyooka T, Shiga T, Otsuki K, Aikawa E, Oyama T, Kitoh K, Sakaida C, Tanaka Y, Ishizaki T, Omori Y, Kiguchi Y, Tanaka A, Kote A, Nakanishi K, Matsushita Y, Suzuki T, **Mori C**, Takahashi K and Nishikawa S: Characteristics of low back pain in adolescent patients with early-stage spondylolysis evaluated using a detailed visual analogue scale. Spine, 40: E29-E34, 2015

2. **Mori C**, Kakuta K, Matsuno Y, Todaka E, Watanabe M, Hanazato M, Kawashiro Y and Fukata H: Polychlorinated biphenyls levels in the blood of Japanese individuals ranging from infants to over 80 years of age. Environmental Science and Pollution Research, 21: 6434-6439, 2014
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8. Nakamoto M, Miyaso H, Komiyama M, Matsuno Y and **Mori C**: Changes in expression levels of oxidative stress-related genes in mouse epididymides by neonatal exposure to low-dose decabromodiphenyl ether. Reproductive Medicine and Biology, 13.3: 127-134, 2014
9. Ochiai S, Shimojo N, Yuka I, Watanabe M, Matsuno Y, Suzuki S, Kohno Y and **Mori C**: A pilot study for foetal exposure to multiple persistent organic pollutants and the development of infant atopic dermatitis in modern Japanese society. Chemosphere, 94: 48-52, 2014
10. Ogawa Y, Itoh M, Hirai S, Suna S, Naito M, Qu N, Terayama H, Ikeda A, Miyaso H, Matsuno Y, Komiyama M and **Mori C**: Cadmium exposure increases susceptibility to testicular autoimmunity in mice. J Appl Toxicol, 33: 652-60, 2013
11. Kitaoka M, Hirai S, Terayama H, Naito M, Qu N, Hatayama N, Miyaso H, Matsuno Y, Komiyama M, Itoh M and **Mori C**: Effects on the local immunity in the testis by exposure to di-(2-ethylhexyl) phthalate (DEHP) in mice. J Reprod Dev, 59: 485-90, 2013
12. Nakaoka H, Todaka E, Seto H, Saito I, Hanazato M, Watanabe M, and **Mori C**: Correlating the symptoms of sick-building syndrome to indoor VOCs concentration levels and odour. Indoor and Built Environment, 23(6): 804-813, 2013
13. Ochiai S, Shimojo N, Morita Y, Tomiita M, Arima T, Inoue Y, Nakaya M, Uehara N, Sato Y, **Mori C**, Suzuki Y and Kohno Y: Cytokine biomarker candidates in breast milk associated with the development of atopic dermatitis in 6-month-old infants. International Archives of Allergy and Immunology, 160: 401-408, 2013
14. Nakaoka H, Todaka E, Hanazato M, Saito I, Seto H, Chemiless Town Project Consortium and **Mori C**: Total odor threshold ratio can be a new method to evaluate indoor air quality. Jpn. J. Clin. Ecol., 20: 115-122, 2013

Environmental Health Intervention and Preventive Medical Studies on Chemical Exposure Issues

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It has been concerned the adverse health effect (e.g. allergic disease, congenital anomaly and neurological developmental disorders) by uncountable chemicals in the environment including indoor air and foods to susceptible children. Here, our studies about environmental health intervention and preventive medical trails on chemical exposure issues will be presented. There are two topics on reducing chemical exposure to prevent children's health; (1) health examination approach on reducing internal exposure of persistent organic pollutants (POPs) such as PCBs/dioxins by food chain and (2) town planning trial to prevent sick building syndrome by indoor chemical exposure.

(1) Health examination approach on reducing internal exposure of POPs:

Our previous studies revealed that human fetuses and their mothers were exposed to several POPs including polychlorinated biphenyls (PCBs) (Mori, 2004; Fukata et al, 2005). As blood PCB level is associated with other major organochlorines in blood, we reported that PCBs can represent POPs contamination in humans (Mori et al, 2009). Moreover, we proposed to establish the health examination system using PCBs data to know the POPs contamination level in future mothers in order to prevent possible adverse effects on the next generation (Mori and Todaka, 2009). In Japan, it has been reported that food is the major source of exposure to POPs. Our previous studies revealed that colestimide (fiber; a medication prescribed for hyperlipidemia) and dietary fiber intake were effective to reduce PCBs/dioxins levels in human body. It is important to know how PCB contamination levels are affected by eating habits to reduce the contamination level effectively. Our recent studies will be also presented to find a preventive intervention method to reduce human exposure to PCBs/dioxins by analyzing data on the correlation between the results from questionnaire and the PCB contamination level in the blood samples in our Chiba birth cohort.

(2) Town planning trial to prevent sick building syndrome by indoor chemical exposure "Chemiless Town project":

There has been a concern about the adverse health effects of various indoor air chemicals from building materials on humans. To prevent the adverse health effects of indoor air pollution, a model town with fewer chemicals called "Chemiless Town" was constructed in the campus of Chiba University in 2007, and the "Chemiless Town Project" was started based on the concept of environmental preventive medicine (EPM). EPM is an advanced concept of public health that attempts to prevent adverse health effects caused by environmental pollution through improvements to the environment.
We carried out the following in cooperation with about 20 house building related companies:
1. Developed a prototype of a house that prevents adverse health effects such as the sick building syndrome (SBS) by periodically measuring volatile organic compounds (VOCs) in indoor air and conducting human sensory tests with healthy volunteers at laboratory sites in Chemiless Town.
2. Developed an online questionnaire to check one's sensitivity to chemicals.
3. Proposed guidelines for indoor air quality to the public.
We successfully resulted in house and classroom prototypes that reduced VOCs in indoor air for the prevention of SBS. We also proposed ΣVOCs (Sum of VOCs) as an evaluation index for indoor air quality and a "Chemiless standard for assessment" to ensure air in which people can stay comfortably, in which "S" represents the standard value for sensitive people (250 μg/m^3 of ΣVOCs) and "A" the standard for non-sensitive people (400 μg/m^3 of ΣVOCs). ΣVOC is important to evaluate indoor air quality because there are countless VOCs in indoor air and it is very difficult to determine cause-and-effect relationships between these substances and human health.

化學物質的環境健康行為介入與預防醫學研究

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易感兒童因為環境中無數的化學物質包含室內空氣和食物，而可能導致不良的健康影響，如過敏性疾病、先天性異常和神經發育障礙。在這裡，我們將呈現化學品暴露在環境健康介入和預防醫學的研究。以下有兩個主軸以減少化學品暴露增進兒童健康：(1) 健康檢查探討以減少持久性有機污染物(POPs)如多氯聯苯(PCBs)和戴奧辛經由食物鏈而暴露和(2)藉由減少室內化學品暴露的城市設計以防止病態大樓症候群(Sick Building Syndrome)。

（1） 健康檢查探討以減少持久性有機污染物暴露：

我們之前的研究顯示人類胎兒和母親暴露在好幾種持久性有機污染物，其中包含多氯聯苯(Mori，2004；Fukata et al, 2005)。血液中的多氯聯苯濃度與主要的有機污染物相關，因此建議以多氯聯苯數據來代表體內有機污染物濃度(Mori et al, 2009)。再者，我們提出健康檢查系統的建立，利用多氯聯苯資料來了解持久性有機污染物對未來世代是否會有不良的健康影響(Mori and Todaka, 2009)。在日本，研究顯示食物是主要的持久性有機污染物來源。我們之前的研究揭露 colestimide (一種纖維；降血脂藥物)和多攝取膳食纖維可以有效降低人體多氯聯苯/戴奧辛濃度。了解飲食習慣如何有效減少多氯聯苯污染濃度相當重要，我們最近的研究利用千葉出生世代血液樣本的多氯聯苯污染濃度和問卷資料結果，呈現預防性的介入方法以減少人體暴露多氯聯苯/戴奧辛。

（2）藉由減少室內化學品暴露的城市設計以防止病態大樓症候群的「無化學城鎮計劃」(Chemiless Town Project)：各種室內建材中的化學品對健康的不良影響已被大家關注，為了預防室內空氣污染對健康的負面影響，一個示範的無化學城鎮(Chemiless Town)於 2007 年在千葉大學校區建造，而無化學城鎮計劃的概念始於環境預防醫學(EPM)。環境預防醫學是公共衛生中利用改善環境以預防環境污染導致健康負面影響的先進概念。我們與 20 家建築相關公司進行合作：

1. 發展可以預防不良健康影響(如病態大樓症候群，SBS)的房子原型，利用定期測量室內有機揮發物(VOCs)，以及找來健康的志願者到無化學城鎮中進行人體感測實驗。
2. 發展線上問卷測試人對化學品的敏感性。
3. 擬議大眾室內空氣品質標準。

我們成功地建立良好的房屋及教室原型，減少室內有機揮發物防止病態大樓症候群。我們同時提出利用有機揮發物的總量(ΣVOCs)來做為室內空氣品質和無化學標準評估的評量指標，以確保人可以舒適地生活。其中 S 代表易感族群的 VOCs 濃度(250 μg/m^3 of ΣVOCs)；A 代表非易感族群的 VOCs 濃度(400 μg/m^3 of ΣVOCs)。有機揮發物的總量是評量室內空氣品質的重要指標，因為室內的有機揮發物相當多，而判定這些物質對人體健康之間的關係非常困難。