

## Has anything changed since the 2011 IARC classification of EMF?

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*Background.* In 2011, The IARC Working Group of the Monograph Programme classified exposure to EMF as 2B (possible carcinogen for humans).

*Methods/Approach.* Survey of the scientific and grey literature. Since 2011, more epidemiological studies have been published (CEPHALO, CERENAT, ...) as well as experimental studies (NTP Program of the NIEHS, Ramazzini study on EMF).

*Results.* The evidence for carcinogenicity is now stronger, supporting the need for a future re-evaluation of the carcinogenicity of exposure to EMF. Special focus is warranted on persons exposed when children or adolescents.

*Conclusions.* There is an exceedingly urgent need for the results of MOBI-KIDS to be published in a peer-reviewed journal. The results have been in the hands of the investigators, at a minimum since January 13, 2017 (final report submitted to the EU). Only then, should a re-evaluation be requested from the upcoming IARC Director and exposure to EMF should be a Group 2A (probable carcinogen for humans) and if the results of the MOBI-Kids study are positive a Group 1 (human carcinogen).

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Dr. Sasco graduated with an MD '78 from the University of Bordeaux, and got specialized degrees (Occupational Medicine '77 from the University of Bordeaux, Public Health, Hygiene and Social Medicine '78 from the University of Toulouse and HDR, Epidemiology for Cancer Prevention '96 from the University of Lyon. She holds an MPH'79, SM Bio-Epi'80, DrPH'86 from the Harvard School of Public Health before becoming Teaching Fellow of Harvard University. She worked 22 years at IARC-WHO, being for 9 years IARC Unit Chief, Epidemiology for Cancer Prevention and for 2 years WHO Acting Chief, Programme for Cancer Control

## The UN declarations on ENDTB and NCDs: We need to be more active in incorporating primary prevention of occupational and environmental exposures

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*Background.* In 2018, the United Nations (UN) promoted the two global initiatives of #endTB - Stop tuberculosis (TB), and #beatNCDs - Combat Non-communicable diseases (NCDs), since despite commitments, progress in these areas has been globally uneven. This effort has prompted two UN high-level-meetings (HLMs), on September 26th and 27th for heads of state and NGOs to focus on TB (first such HLM ever) and NCDs (third such HLM).

*Methods/Approach.* The text of two Declarations was prepared by WHO Independent High-Level Commissions and discussed on June 4th and July 5th at UN Public Hearings where NGOs proposed language for inclusion. In both initiatives, occupational and environmental exposures were largely neglected. Yet large numbers of workers in the health sector and silica-exposed occupations such as mining are at high risk for TB. And with regard to NCDs, occupational and environmental hazards such as asbestos, solvents, pesticides, cause increased risk of cancer, cardiovascular, respiratory, neurological and metabolic diseases, especially in LMICs. Pregnant mothers, children and the elderly are also at risk in workplaces as well as in communities.

*Results.* International organizations including ICOH, the International Occupational Hygiene Association, Occupational Knowledge International and the Collegium Ramazzini endorsed the inclusion of statements on primary prevention in these UN Declarations, but relatively late in the process.

*Conclusions.* The Declarations are only the beginning. Primary prevention of occupational/environmental exposures is as important as treatment, prophylaxis, education and lifestyle intervention and needs to be more strongly represented in these global policy areas. Occupational and environmental organizations need to interact more closely with WHO and international NGOs in the domains of TB and NCDs. The time has come to end neglect of occupational and environmental exposures, acknowledge that these exposures are major risk factors, mobilize the necessary funding, and make pollution prevention a core component of the NCD agenda.

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## Eight years, two states, ten villages, and five thousand children: Nigeria lead poisoning project resilience and ownership

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*Background.* This is an update on the 2010 lead poisoning outbreak in Zamfara State, Nigeria, a crisis that exemplifies a growing pattern of health emergencies related to extractive industries in low and middle-income countries. The Nigerian crisis is directly linked to artisanal small-scale gold mining (ASGM) and resulted in the deaths of >400 children. In 2015, a second ASGM-related lead poisoning outbreak was discovered in Niger State, Nigeria. In both states, collaborative efforts between Médecins Sans Frontières (MSF), TerraGraphics International Foundation (TIFO), other international actors, and multiple levels of Nigerian government included medical, environmental, and safer mining efforts.

*Methods/Approach.* Four Remedial Effectiveness Evaluations (REEs) were implemented between 2010–2016 in Zamfara and an additional REE was done in 2017–2018 in Zamfara and Niger. REEs assessed project resilience and supported Nigerian capacity to assume project ownership and respond to future crises. All REEs were based on United States Superfund protocols. Two international lead poisoning conferences have been hosted in partnership with the Nigerian Federal Government.

*Results.* REEs identified para-occupational exposures and recontamination in some villages. Lessons learned during REEs and project implementation in Zamfara State were vital in the Niger State response and supporting local leadership in both states to develop Institutional Controls Programs (ICPs) to prevent, monitor, and address recontamination issues. The 2018 international conference resulted in significant federal action towards assuming project ownership, identifying capacity building needs, and developing a national platform to address lead poisoning in ASGM.

*Conclusions.* Instability, climate change, and global demand for metals have fueled the shift from subsistence agriculture to subsistence mining. Interdisciplinary Nigerian response teams have built unprecedented experience in addressing environmental, medical, and occupational issues related to extractive industries. Federal recognition of subsistence mining as a legitimate industry and support of local ICPs are critical steps towards achieving long-term project sustainability.

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Dr. Margrit von Braun is co-founder of TerraGraphics International Foundation, working with NGOs, universities, and governments to address environmental health problems in vulnerable communities in low and middle-income countries. Dr. von Braun is Dean/Professor Emerita at University of Idaho. She has dedicated her career to addressing environmental health inequalities around the world. Trained as an environmental engineer, Dr. von Braun's specialties are in risk assessment and pollution characterization.

## Legislative provisions for managing hazardous chemicals in workplaces in Malaysia

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*Background.* Enforcement, engineering and education are considered the mainstay of managing hazards in the workplace. Specific legislation to control chemical hazards in workplaces are enacted and enforced in most parts of the world including Malaysia.

*Methods/Approach.* A detailed review of existing legislation promulgated to manage chemicals hazardous to health in workplaces in Malaysia was conducted. Requirements under Acts, regulations and codes of practice addressing these chemicals were reviewed.

*Results.* In Malaysia specific legislation to manage chemicals in workplaces came about with the promulgation of the Factories and Machinery (Lead), (Asbestos Process) and (Mineral Dust) Regulations in 1984, 1986 and 1989 respectively. Noting that the Factories and Machinery Act 1967 was very prescriptive, limited in scope and heavily dependent on enforcement by the government, the Occupational Safety and Health Act (OSHA) was enacted in 1994. The key features OSHA 1994 are self-regulation, consultative approach, employee participation and covering a broad range of working population. Major regulations governing the management of hazardous chemicals were promulgated under this Act. These included the OSH (Use and Standards of Exposure to Chemicals Hazardous to Health) (USECHH) Regulations 2000 and the OSH (Classification, Packaging and Labeling of Hazardous Chemicals) (CPL) Regulations 1997. With the adoption of the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals (GHS) worldwide Malaysia took proactive measures to implement the GHS by promulgating OSH (Classification, Labeling and Safety Data Sheet of Hazardous Chemicals) Regulations in 2013 to replace the CPL Regulations. These regulations are supported by codes of practice and guidelines. Compliance with regulations, especially in small and medium enterprises, is still weak. Compensation for impairment arising from occupational poisonings from hazardous chemicals is provided for under the Employees Social Security Act 1969.

*Conclusions.* Self-regulation does not seem to have worked and there is still a need for stronger enforcement.

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## New lessons from old hazards: the re-emergence of coal workers' pneumoconiosis and silicosis

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*Background.* Coal workers' pneumoconiosis (CWP) is on the rise in many parts of the world. It was considered eradicated in Queensland, Australia for more than thirty years, but since late 2015 many new confirmed cases of CWP have been identified. In response, the Queensland Department of Natural Resources and Mines initiated a review of its respiratory surveillance program.

*Methods/Approach.* Our process and quality review included review of samples of completed medical forms, chest x-rays (CXR) and spirometry. We also surveyed the Medical Advisers about spirometry equipment and training. Digital CXRs from coal miners with at least 10 years of coal mining experience were classified independently by two NIOSH-certified B-Readers and classified according to the ILO Classification. Spirometry was reviewed by two independent readers and compared with ATS/ERS criteria.

*Results.* The health scheme had become focused on fitness for work, rather than respiratory surveillance. The medical form was poorly designed and inadequately completed. Eighteen of the 258 CXRs had opacities consistent with simple pneumoconiosis and of these, only two of the original radiology reports identified abnormalities consistent with pneumoconiosis. Twenty percent of the CXRs had quality issues. 40% of the 260 spirometry tests had not been performed to ATS/ERS standards. Only one of the 30 spirometry tests considered by the reviewers to have abnormalities had been identified in the original medical reports. There was inadequate knowledge of the spirometry equipment, poor quality control processes and inadequate training.

*Conclusions.* This review illustrates the dangers of complacency in workplace medical monitoring, based on a false belief that CWP had been eradicated. While effective dust control should be the main focus of prevention, medical monitoring has an important role, but needs to be suitably designed and undertaken with sufficient attention to training and quality control. These findings have important implications for other industries and other countries.

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## Markers of inflammation and respiratory symptoms in nanocomposites handling workers

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**Background.** Thousands of researchers and workers worldwide are employed in nanocomposites manufacturing, yet little is known about their respiratory health, which is the main goal of this study.

**Methods.** Aerosol exposures were characterized using several real time and integrated instruments, as well as elemental analysis. Twenty employees (41.8±11.4 years old), working in nanocomposite materials research for an average of 17.8±10.0 years were examined pre-shift and post-shift using spirometry and fractional exhaled nitric oxide (FeNO); in parallel with 21 controls (42.7±11.5 years old). Pro-inflammatory leukotrienes (LT), namely LTB<sub>4</sub>, LTC<sub>4</sub>, LTD<sub>4</sub>, and LTE<sub>4</sub>, tumor necrosis factor (TNF), interleukins (IL-4, IL-5, IL-9, IL-10, IL-13), and anti-inflammatory lipoxins (LXA<sub>4</sub> and LXB<sub>4</sub>) were analyzed in their exhaled breath condensate (EBC).

**Results.** Mass concentration in the workshops ranged from 0.120 mg/m<sup>3</sup> to 1.840 mg/m<sup>3</sup> during welding, smelting and machining processes, median particle number concentration from 4.8x10<sup>4</sup> particles/cm<sup>3</sup> to 5.4x10<sup>5</sup> particles/cm<sup>3</sup>. The proportion of nanoparticles was 40-95%. Chronic bronchitis was more frequent in the researchers (p<0.05). A significant decrease in %FEV<sub>1</sub> and FEV<sub>1</sub>/FVC was found post-shift 2.5hour work (p<0.05) and the samples after were higher for LTB<sub>4</sub> (p<0.001), LTE<sub>4</sub> (p<0.01) and TNF (p<0.001) compared to controls. Multiple regression analysis confirmed association between production of nanocomposites and LTB<sub>4</sub> (p<0.001), LTE<sub>4</sub> (p<0.05), and TNF (p<0.001), in addition to only pre-shift LTD<sub>4</sub> and LXB<sub>4</sub> (both p<0.05).

**Conclusions.** Spirometry documented post-shift lung impairment. Among the EBC biomolecular markers investigated, LTB<sub>4</sub> and TNF were the most robust markers of biological effects in this cohort of workers.

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