IARC’s Mission, with a Focus on the IARC Monographs

Kurt Straif, MD PhD MPH

International Agency for Research on Cancer
Lyon, France

Collegium Ramazzini, Carpi, 27 October 2017
IARC: cancer research for cancer prevention

To provide the scientific evidence-base for prevention

“A catalyst to progress”
IARC: two strands intertwined

- Generate data from interdisciplinary research
- Evaluate data through the conduct of independent expert review
  - WHO Classification of Tumours
  - Global Cancer Statistics
  - IARC Monographs
  - Handbooks of Cancer Prevention
  - IARC Working Group Reports
Increase Capacity for Research

• Training linked to research

• Fellowships
  – IARC post-doctoral fellowships; bilateral partnerships
  – Senior Visiting Scientists

• Training courses
  – IARC Summer School in Cancer Epidemiology
  – Other courses in Lyon and regionally
  – E-Learning
WHO Classification of Tumours of the Lung, Pleura, Thymus and Heart

Edited by
Dr William D. Travis, Memorial Sloan Kettering Cancer Center, New York, USA
Dr Elisabeth Brambilla, CHU Grenoble, France
Dr Allen Burke, University of Maryland, Baltimore, USA
Dr Alexander Marx, University of Heidelberg, Mannheim, Germany
Dr Andrew Nicholson, Royal Brompton Hospital, London, UK

Prepared by
157 authors from 29 countries.

Published in March 2015
(10,000 copies)
>6500 copies sold
Global Initiative for Cancer Registry Development - a Coordinated Response

• **Country Leadership**
  
  • Support country led plans to strengthen data that better informs national cancer control programmes.

• **Regional focus**
  
  • Provide regional expertise to identify, advocate and support country needs.
  
  • Development of six interconnected IARC Regional Hubs worldwide to support over 150 countries.

• **Global coordination**
  
  • Increase the effectiveness of capacity building in cancer registration through a coordinated global action plan.

http://gicr.iarc.fr/
Projected global burden of cancer – (2015-2035)

Assuming no change in underlying incidence
Global burden and control of cancer

- Majority of the increase in cancer burden expected in low- and middle-income countries (LMIC)
- No country can treat its way out of the cancer problem
- Prevention probably the single most effective response to these challenges,
- The first step in cancer prevention is to identify the causes of human cancer (Monographs) and what prevents cancer (IARC Handbooks)
“The encyclopaedia of carcinogens”

The IARC Monographs evaluate

- Chemicals
- Complex mixtures
- Occupational exposures
- Physical and biological agents
- Personal habits

Over 1000 agents have been evaluated

- 120 are *carcinogenic to humans* (Group 1)
- 81 are *probably carcinogenic to humans* (Group 2A)
- 299 are *possibly carcinogenic to humans* (Group 2B)

National and international health agencies use the *Monographs*

- As a source of scientific information on known or suspected carcinogens
- As scientific support for their actions to prevent exposure to known or suspected carcinogens

Lorenzo Tomatis
1929-2007
The Lancet Commission on pollution and health

Published: October 19, 2017

Executive Summary

For decades, pollution and its harmful effects on people’s health, the environment, and the planet have been neglected both by Governments and the international development agenda. Yet, pollution is the largest environmental cause of disease and death in the world today, responsible for an estimated 9 million premature deaths.
Diesel engine exhaust: exposure

- Diesel engines are used for on-road and non-road transport (eg, trains, ships) and (heavy) equipment in various industrial sectors (eg, mining, construction), and in electricity generators, particularly in developing countries.
- Emissions from these engines are complex, with varying composition.
- The gas phase consists of carbon monoxide, nitrogen oxides, and volatile organic compounds such as benzene and formaldehyde.
- Particles consist of elemental and organic carbon, ash, sulfate, and metals.
- Polycyclic aromatic hydrocarbons and nitroarenes are distributed over the gas and the particle phase.
Diesel engine exhaust and lung cancer

• In a large US miners study diesel engine exhaust was quantified via estimated elemental carbon as a proxy of exposure.
• Cohort and nested case–control analyses adjusted for tobacco smoking showed positive trends in lung cancer risk with increasing exposure to diesel exhaust, with 2–3-fold increased risk in the highest categories of cumulative or average exposure. (Attfield et al 2012, Silverman et al 2012).
• In US railroad workers exposed to diesel exhaust a 40% increased risk for lung cancer was observed.
• A large cohort study in the US trucking industry reported a 15–40% increased lung cancer risk.
• Findings of above cohort studies were supported by those in other occupational groups and by case–control studies including various occupations involving exposure to diesel-engine exhaust.
The Working Group concluded that there was “sufficient evidence” in experimental animals for the carcinogenicity of whole diesel-engine exhaust, of diesel-engine exhaust particles and of extracts of diesel-engine exhaust particles.
DEE, mechanisms of carcinogenicity

- DEE, DEE particles, DEE condensates, and organic solvent extracts of DEE particles induced in vitro and in vivo, various forms of DNA damage
- Increased expression of genes involved in xenobiotic metabolism, oxidative stress, inflammation, antioxidant response, apoptosis, and cell cycle regulation in mammalian cells was observed.
- Positive genotoxicity biomarkers of exposure and effect were also observed in humans exposed to diesel engine exhaust.

The Working Group concluded that there is "strong evidence" for the ability of whole diesel-engine exhaust to induce cancer in humans through genotoxicity.
Diesel engine exhaust
Overall Evaluation

• There is sufficient evidence for the carcinogenicity in humans of diesel engine exhaust. Diesel engine exhaust causes lung cancer. Also, a positive association between diesel engine exhaust and bladder cancer has been observed.

• There is sufficient evidence for the carcinogenicity in experimental animals of whole diesel engine exhaust.

Overall evaluation

• Diesel engine exhaust is carcinogenic to humans (Group 1).
The IARC Monographs on Air pollution

Carcinogenicity of diesel-engine and gasoline-engine exhausts and some nitroarenes

In June, 2012, 24 experts from seven countries met at the International Agency for Research on Cancer. The most influential epidemiological studies assessing cancer risks associated with diesel-engine exhausts, with 20 years of employment roughly doubling the risk after adjusting for tobacco smoking. When this study

The carcinogenicity of outdoor air pollution News

Carcinogenicity of carbon black, titanium dioxide, and talc

Carcinogenicity of polycyclic aromatic hydrocarbons

Carcinogenicity of household solid fuel combustion and of high-temperature frying
**Glyphosate: a case study**

**IARC Evaluation, March 2015**

**Group 2A Probably carcinogenic to humans**

---

**Cancer in humans (NHL)**

*Limited evidence*
- Studies of real-world exposures (occupational)
- *Glyphosate formulations* in different regions at different times

**Cancer in animals**

*Sufficient evidence*
- Studies of pure *glyphosate*
- Rare cancers in valid studies

**DNA damage & oxidative stress**

*Strong evidence*
- Few studies of real-world exposures (communities)
- Experimental studies of pure *glyphosate*
- Experimental studies of *glyphosate formulations*

---

of non-Hodgkin lymphoma. In male CD-1 mice, *glyphosate* induced a positive trend in the incidence of a rare tumour, renal tubule carcinoma. A
Glyphosate: a case study
the reaction

- Unprecedented, “Orchestrated outcry” from industry
- Demands to Directors of IARC and WHO to withdraw the evaluation
- Lobbying politicians, agencies, WHO & member states
- Paid consultants criticize methods and findings
- Re-evaluation by an industry-funded committee
- Ghost-written scientific papers & press articles
- Legal demands aimed to harass US scientists
- Intimidating letters to international scientists
- Documents leaked to media
- Inquiries by the US Congress

http://governance.iarc.fr/ENG/infocouncils.php
IARC rejects false claims by Reuters

24/10/2017

An article published on 19 October 2017 by Reuters severely distorts the assessment of the IARC Monographs evaluation of glyphosate. IARC addresses a series of fallacious statements made in that article regarding the scientific deliberations of the Monographs Working Groups and reiterates the critical importance of a scientific debate free from vested interests, in the best interest of global public health.