



“The Environmental Burden of Disease” International Expert Workshop

REPORT

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Amazone Centre, 1210 Brussels

Programme and organisation by WECF, the Netherlands.

Chaired by Prof. Dr. Jacqueline Cramer (Sustainable Entrepreneurship, Utrecht University).

This workshop is part of the WECF project on Eco Efficiency and is held in the framework of the Lisbon Agenda and the review of the EU Sustainable Development Strategy (SDS).

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Report by Maria Buitenkamp (Ecostrategy)

Editing: Marie Kranendonk, Irma Thijssen (also photography), Jasmine Osorio (WECF).

Women in Europe for a Common Future (WECF)

Biltstraat 445, Utrecht (The Netherlands), T +31 30 2310300 - E wecf@wecf.org - I www.wecf.org

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Summary

Women in Europe for a Common Future (WECF) is a network of more than 70 organisations working to improve the protection of human health and the environment. Our international network consists of members and partners in Western and Eastern Europe, the Caucasus, and Central Asia. Activities range from practical health and environment issues in partnership projects to advocacy projects, bringing issues to international fora.

WECF has a growing concern about the environmental burden of disease (EBD). WECF focuses in the first place on the health effects on new generations: effects can be transferred from mother to child. WECF also recognizes that the health of the population contributes to a healthy workforce, a key element in a competitive Europe.

To learn more about the environmental impact on health, WECF organised an International Expert Workshop on the EBD in Brussels on 13th of April, chaired by **Prof. Jacqueline Cramer (Sustainable Entrepreneurship, Utrecht University)**.

Marie Kranendonk, president of WECF, argued that policymakers still base policies on the assumption that the proven causal relationship between health and environment is only 2 to 6 %, but that methods of assessment are not suited to the current complexity of contamination and effects. A multi-causality approach, combined with studies on effects of mixtures of substances, human bio-monitoring, and progressive cohort studies, amongst other things, will result in completely different percentages.

Professor Dr. Nic van Larebeke, Cancer Specialist from Ghent University, showed some problems of epidemiological studies that lead to an underestimation of cancer risks, including low sensitivity for relative risks smaller than 1.5 to 2, negative confounding; a follow up time which is too short compared to latency of cancer; and inaccuracies in assessing exposure, including exposure to air pollutants through food. He also showed how important the timing of the dose exposure is: early exposure is far more important than later in life, and exposure in the womb is extremely important. "Small" environmental causes can be very important. 25% of all cell divisions and mutations occur before birth. A person who has more mutations from early life will be more vulnerable. We need to give more attention to these very early affects.

According to **Professor Dominique Belpomme, Oncologist, University of Paris, Chairman of ARTAC, European Georges Pompidou Hospital**, two out of three or even three out of four cancers are caused by the environment. 25% is caused by smoking. For fatal cancers, the first step occurs during pregnancy. But there is societal refusal to accept the scientific proof. In Europe, environmental factors cause 1/3 of diseases among children and adolescents. There is a 1% yearly increase of incidence of child cancers in Europe and in the USA. Leukaemia in children has doubled over the past 20 years. Congenital malformations of the reproductive tract have tripled in agricultural areas polluted by pesticides. Asthma increased over the last 15-20 years. Carcinogenesis needs a critical number of mutations (3-6). A mutation is always induced by environmental factors. Lifestyle, apart from smoking, is a necessary but not sufficient factor for carcinogenesis.

Philippe Irigaray, PhD, Biochemist from CNRS-ARTAC added that a certain dose intensity is not required, but multiple repetition of doses, i.e. duration of exposure, is important to induce carcinogenesis. His research was done in cooperation with Boston University. The conclusion is that complementary action of lifestyle and environmental factors are accountable for co-carcinogenesis promotion probably in a 50-50 ratio. Smoking and environmental factors are accountable for mutations in a 25-75 ratio respectively. This leads to the hypothesis that one out of two cancers is caused by environmental factors. These results will be published by Belpomme D., Irigaray P. et al. "Increased cancer incidence: the environmental impact on carcinogenesis."

The **Paris Appeal** is an international declaration on diseases due to chemical pollution. It has been signed by, amongst others, the Standing Committee of European Doctors (representing around 2 million doctors), more than 1000 scientists from all over the world, and several medicine Nobel Prize winners.

Dr. Ludwine Casteleyn, leader of the Human Biomonitoring Expert Group working for the EU Commission, and adviser to the Flemish Government, pointed out that human biomonitoring can be confronting; makes the issues more personal and brings them closer to politicians and the public. But member states need to take a consistent approach. The question is: should it be a European or an international approach?

In the debate it was pointed out that the Commission should ensure that leading scientists are involved in these issues. The working group in January with **Professor Brunekreef** and others on air pollution is a good example. Also in the thematic strategy on pesticides the precautionary principle is needed. In the REACH debate NGOs proposed that uncertainties need to be communicated to policymakers. Impact assessments are not including health impacts, per se. Meta-analysis needs to be promoted instead of repeating studies.

Professor Dr. Nic van Larebeke from Ghent University presented some examples of low dose mechanisms. For example, low doses of radiation are relatively more efficient when mutation frequency is compared to exposure intensity. This is due to an increase in repair capacity at higher doses. Another example is from Columbia University who found, unexpectedly, that irradiation of 10% or 100% of cell nuclei has the same result. This is explained by communication between cells. The BPA hormone (Bisphenol A, a xenoestrogen) increases cell proliferation in prostate cancer only in low doses. The possible explanation is that in higher doses the effect of binding to specific receptors might disappear.

John A. Newby from the University of Liverpool presented the study “Environmental Influences in Cancer Aetiology”, done with **Dr. C. Vyvyan Howard from the University of Ulster**. Their findings are that the environment is implicated in the majority of cancers, building on several recent studies, for example a cohort study of identical twins. His findings support the idea of conceptual shifts in toxicology as put forward by **John Peterson Myers, Ph.D.**, who points to the relevance of low level contamination; impacts of ‘background’ levels; the sensitivity of the prenatal and youth phase; long latencies being common rather than an exception; and the effect of mixtures being stronger than the sum of the single chemicals.

John Newby explained that there are critically sensitive periods during organogenesis and environmental exposure to chemicals may have differing or no adverse effects on a developing foetus, depending on precise time of exposure. Several examples related to testicular cancer were presented. He also concluded that the mixture of xenochemicals in environments consisting of tens of thousands of congeners, enantiomers and metabolites, is beyond the current ability of toxicologists to analyse. Elucidating cause/effect relationships by epidemiology to specific environmental contaminants is improbable. Therefore, we should not wait for an unobtainable certainty before action is taken

Professor Klea Katsouyanni, Department of Hygiene and Epidemiology, University of Athens Medical School, explained how conceptual shifts took place in the effects of air pollution on health. From about 1970 to 1990, the prevailing opinion among scientists and decision makers was that current air pollution levels did not have important adverse health effects. Since roughly 1990, it became evident that the current, relatively lower, air pollution levels (mainly ambient particles) had adverse, short-term and long-term health effects including an increase in mortality. The findings came mainly from epidemiological studies. Recently, experimental findings support the epidemiology. These results had an impact on setting guidelines and standards, in the U.S. (Environmental Protection Agency (EPA), the European Union, and the World Health Organisation (WHO). However, the EU is still reluctant to impose stricter and legally binding measures on fine particulate matter (PM), despite adequate recognition of the health effects.

Fintan Hurley from the Institute of Occupational Medicine (IOM) in Edinburgh (UK), underlined the importance of the paradigm shifts in our understanding of air pollution and health. Firstly, health effects are not restricted to air pollution episodes but rather occur at 'normal' levels of air pollution ('daily variations' in air pollution). Second, long term effects are more serious than accumulated short term effects. He explained the usefulness of the CAFE (Clean Air For Europe) approach. Health Impact Assessment in CAFE was part of a Cost-Benefit Analysis of policy options and scenarios. This included a high level peer review done by a group of U.S. scientists. The Cost-Benefit Analysis showed that benefits of a 20% reduction in PM_{2.5} across the EU-25 outweigh the cost by a factor 6 - 23. Despite the evidence, the final recommendations from the European Commission on regulating PM are not adequate. Apart from scientific uncertainties, additional uncertainties were 'created' by opponents of regulation. This was referred to as 'manufactured uncertainty'.

Dr. Med. Stephan Böse O'Reilly of the German Network – Children's Health and Environment, is working on the financial burden to the German health care system caused by environmental hazards for children in Germany. He gave a first presentation of ongoing work with, primarily, Dr. Andreas Gerber (Institute of Health Economics) at the University of Cologne. They looked especially at environmental tobacco smoke and traffic accidents. 25% pregnant women smoke and 50% of children are exposed to tobacco smoke at home. The estimated annual health costs for German children in million Euros for the smoke connected diseases are: asthma bronchiale 490, otitis media (ear infection) 90, lower respiratory tract infections 389, preterms 1,157 and low birth weight 84 million euro per year. Traffic accidents with children cost 1,022 million Euro per year. They recently calculated that the costs of environment-related asthma and PM10 could be 100 million Euros. Other diseases such as Sudden Infant Death Syndrome (SIDS), cancer, and developmental disorders were not taken into account. Therefore this study presents a very conservative estimation. Could it be that up to 10 % of all the health costs for children per year are related to the environment?

Discussion and conclusions

Finally, the WECF draft recommendations were discussed. They will later be finalised under the responsibility of WECF.

WECF concluded from the workshop:

A new paradigm - or conceptual shift - is evolving in science in the field of environmental effects on health. Low doses and multiple causes have been underestimated in the past. The new paradigm is based on a multi-causality approach and research that looks at complex interactions from multiple exposures and long-term effects of low dose contaminations, taking into account vulnerable periods, and shows a much stronger relation between environmental factors and health effects.

Although it is difficult to get hard proof of the health effects of environmental pollution and of the low-dose and long-term effects, and there is a lot of discussion on how to estimate the health costs, we should draw the attention of politicians and policymakers on the EBD. We should ask them to go beyond the uncertainties, not to wait for more proof, but to choose for the precautionary principle and to be cognizant of manufactured uncertainties from interest groups like industry. There are urgent measures to be taken. Because we believe that a healthy Europe is a prerequisite for long-term competitiveness.

Scientists and NGO's should try to inform and convince the scientific community, policy makers, the general public and also industry. We should offer them scientific data; formulate clear, consistent, and convincing messages and adapt them to the particular audience; emphasise effects on children and other vulnerable groups; not just focus on the problems but also propose solutions; show the costs and benefits of the environmental health.

WECF will use the recommendations and conclusions as input for the scheduled High-Level Roundtable with European politicians and policymakers in the autumn of 2006.