

## **ANNEX 4**

### **AIR POLLUTION AND CHILDHOOD CANCER**

**Prof. Roy Harrison**

The WHO Report concluded that the epidemiological evidence is insufficient to infer a causal relationship between ambient air pollution and childhood cancer. However, it recognised that some studies had shown a link between childhood cancer and air pollution from traffic, but overall the weight of evidence was insufficient. It is suggested that future studies might help to clarify the matter, particularly if using improved exposure assessment and assessing exposure during different periods from the time of conception to the time of diagnosis.

The literature review revealed 10 additional papers. Of these, five deal with potential cancer risk through biomarkers of exposure and early effect, four are epidemiological studies and one (Raaschou-Nielsen and Reynolds, 2006) is a mini-review. Of those papers dealing with potential cancer risk, two describe a study of school children living in Bangkok, Thailand, in comparison to a group living in a rural area. Two consider children living in parts of the Czech Republic with differing levels of pollutant exposure, and one considers children living in Silesia, Poland. Three of the studies used urinary 1-hydroxypyrene and PAH-DNA adducts in lymphocytes as biomarkers of exposure, while the others depended upon air quality data. Biomarkers of effect included DNA strand breaks and DNA repair capacity, chromosome aberrations and the frequency of micronuclei in peripheral blood lymphocytes. All studies showed greater effects in the children with higher exposures and two concluded that the children were at a higher risk of developing adverse health outcomes, including cancers. This evidence is, however, very indirect, and does not give a definite indication of a health risk.

There are four further epidemiological studies reported. Three are spatial studies. One considered residential traffic density and cancer incidence in Amsterdam, finding no clear evidence for an association between residence

along major roads and the incidence of cancer in adults, but indicating a possible association with acute lymphocytic leukaemia in children (SIR 2.5, CI:0.8, 5.9). The other spatial analysis papers are from Knox (2005; 2006). These are part of a series of papers by this author in which various methods of spatial analysis have been applied to birth and death address data for all children born between 1955 and 1980 in Great Britain and dying from leukaemia or other cancers during those years. Knox concludes a causal link with 1,3-butadiene exposure but this work has been previously reviewed by COMEAP who expressed doubt over the findings (<http://www.advisorybodies.doh.gov.uk/comeap/minsagenda/24feb06minutes.htm>). A case control study in Taiwan studied the relationships between petrochemical exposure and leukaemia in 0-19 and 20-29 year age groups. A statistically significant association was found in the older group but not in the 0-19 year age group. In 2005 the Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC) published a statement giving the findings of its review of the possible associations between childhood leukaemia and residence near sources of traffic exhaust and petrol fumes. Like other reviews conducted in this field, the COC concluded that the available evidence was insufficient to conclude that there was an association between risk of childhood leukaemia and proximity to petrol stations, garages and road traffic. The Committee went further to recommend that “*future studies should investigate leukaemia on a subtype basis (ALL, ANLL)<sup>1</sup> rather than leukaemia as a whole, and any evaluation of genetic susceptibility should include the examination of a comprehensive range of Phase I and II enzymes involved in the metabolism of compounds deriving from traffic*”. A mini-review (Raaschou-Nielsen and Reynolds, 2006) which included some of the more recent evidence came to a conclusion very consistent with that of the WHO report “*The weight of the epidemiological evidence indicates no increased risk for childhood cancer associated with exposure to traffic-related residential air pollution. Nevertheless, the limited*

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<sup>1</sup> Acute Lymphoblastic Leukaemia (ALL); Acute Non-Lymphoblastic leukaemia (ANLL) also termed Acute Myeloid Leukaemia (AML).

number of studies, the methodological limitations of both positive and negative studies and the absence of consistency in the results obviate a firm conclusion of no effects. In particular, non-differential misclassification of exposure might have masked true, weak associations". This well summarises the current state of knowledge in this field.

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