Assessing Environmental Exposures of Children

The discipline of exposure assessment is essential to understanding the relationship between environmental change and health effects. Exposure assessment and in particular the assessment of personal exposure of children to environmental contaminants is challenging and data on a variety of pollutants is limited. This is despite the vulnerability of children to environmental exposures and the difference in their exposure scenarios compared with those of adults. Further, some of the sample types which best represent body burden or environmental exposures, such as blood and toenails, meet with sampling and analytical challenges, ethical dilemmas and parental concerns about the benefits of the research versus the discomfort. The logistics of working with small children and sample collection using sampling devices can also be challenging and surrogates of children’s exposure are being investigated for their usefulness.

Several studies in Western Australia focus on children’s exposure to pollutants from environmental sources including diet. The most comprehensive has made use of maternal exposure as a surrogate of prenatal exposure of 173 pregnant women with blood and urine analysis for metals and persistent organic pollutants currently being finalised. This study is showing that for metals, dietary exposures are the most important and a variety of lifestyle/activity patterns may be increasing maternal to metals exposure, and hence prenatal exposure. This study is currently being followed up with a study of children’s exposure to metals focussing on diet, where biological metals concentrations are being combined with the analysis of composite food samples and 269 individual samples of common solid and liquid food for a variety of metals. Additional studies are underway to characterise children’s exposure to PM10 in mining and urban settings with a focus on metals in personal exposure particulate and biological samples.

Recruitment for these studies is slow with low rates of participation. In addition once recruited, data collection and follow-up can also be problematic both in terms of the nature of data collection and the resultant sample sizes. The analytical challenges are also important to consider when dealing with young children and the capacity to provide samples of sufficient mass and/or volume for the detection of the pollutants of interest. These issues and the results of the studies conducted to date will be provided giving some information on children’s exposure to pollutants in Western Australia.