

RESOLVING PROBLEMS IN ENVIRONMENTAL TOXICOLOGY

The Newcastle Environmental Toxicology Research Unit (NETRU) involves a collaborative group of scientists committed to applied research in environmental health to provide independent, scientifically sound information that will be of value in resolving problems in environmental toxicology. The aim of the unit is to complement other groups working in the field of environmental toxicology and to work closely with the NSW Health Department in pursuing the objectives of the Department's strategic plan on environmental health. It began as the Newcastle part of a submission to the National Health and Medical Research Council for a national research and training centre in environmental toxicology. The submission combined the environmental toxicology groups from the universities of Newcastle, Wollongong and Technology, Sydney. Although Brisbane was the successful applicant, all three NSW institutions have continued their commitment to applied research in environmental toxicology.

The establishment of NETRU was supported by a grant from the NSW Health Department as part of a program to support environmental health research in NSW. The overall mission of NETRU includes carrying out appropriate research on environmentally related health problems, providing education and training on design, measurement, analysis and interpretation of studies on environmental toxicology; participating in the training of public health division staff in environmental toxicology and risk assessment; and undertaking health risk assessment for the Health Department as required.

The environment in general and specifically environmental toxicology are major causes of concern for the community. Concerns include blood lead level in children at Balmain, Broken Hill and Boolaroo (Lake Macquarie); ozone and nitrogen dioxide in Sydney's air; pollen in Tamworth's air; blue green algae in the Darling River; toxic waste sites around Sydney; and pollution of beaches. Added to these are broader issues such as environmental tobacco smoke, sick buildings and problems at the environmental and occupational health interface such as asbestos.

The strongly emotive nature of concerns about environmental toxicity adds to the challenge of the evaluation and management of environmental risk. The complexity of the task is further compounded by the need to use less than perfect measures of exposure and outcome, and often to extrapolate from data demonstrating effects at high exposure to guessing the possible health effects at very low exposure seen in the environment. Since evidence for possible causal associations in environmental toxicology cannot include data from experiments in humans, it is necessary to obtain information from a range of exposed sources including observational studies on exposed populations, laboratory investigations on humans, animals and cells and statistical modelling.

A logical process for management of potential environmental toxicology problems has been recommended by the US Research Council:

1. hazard identification;
2. risk assessment (both qualitative and quantitative);
3. risk management;
4. risk communication.

Research-derived data are required at each step of this process and a broad range of disciplines is required, including chemists, biologists, epidemiologists, statisticians, pharmacologists, medical geographers, health social scientists,

clinicians and health administrators. The quality of study design and analysis, a major concern of epidemiologists and statisticians, is an essential component for obtaining valid information about the above four steps. The emphasis of NETRU is on epidemiological and statistical aspects of environmental toxicology. Occupational health and clinical toxicology are also strongly represented.

Emphasis on epidemiology and statistics is reflected in the activities of NETRU, which include analysis of the Sydney Air Quality study, analysis and follow-up of the Boolaroo Lead Study and investigation of the Tamworth asthma epidemic. Members of the group are involved in other studies which include environmental aspects of asthma, lung function in aluminium smelter workers, cancer in coal miners and the health effects of manganese mining.

Although NETRU is based in the Respiratory Medicine Unit at John Hunter Hospital, the group itself has broader origins: John Stephenson of the Hunter Public Health Unit; David Christie, Environmental and Occupational Health, Newcastle Medical School; Tony Smith, Clinical Pharmacology, Newcastle Medical School; Howard Bridgman, Geography Department, University of Newcastle. To these can be added a number of collaborators from a range of disciplines including paediatrics, behavioural science and biostatistics.

As noted above, NETRU has been set up with assistance from the NSW medical research funding programs of the NSW Health Department. While it has a potential Statewide role, the major activities in the next 12 months will be in the Hunter region. This restriction is due to a combination of limited resources, the presence of active Public Health Units in other regions, and the outstanding opportunity for environmental research in the Hunter region given its mix of urban and rural environments, range of industries and population stability. It is proposed that projects such as the Boolaroo Lead Study may act as a prototype for similar problems in other parts of the State.

Although funding for NETRU was provided in mid-1991, unforeseen events led to delays in recruitment of staff. From late April two staff — John Wlodarczyk, medical statistician, and Rosemary Aldrich, public health medicine registrar — were to take up positions. John has completed a PhD thesis on the analysis of industrial exposure and lung function in aluminium smelter workers and has been the statistician on the Tamworth, Boolaroo and Sydney Air Quality studies. He has the added advantage of a background in economics. Economic analysis plays an important role in decision making about the environment. Rosemary Aldrich is a graduate of Newcastle Medical School and is completing an MPH on health promotion in the Department of Public Health at Sydney University.

The role of NETRU will evolve over the next 12 months. Although activities have been determined by relatively acute problems, it is anticipated that there will be the opportunity to study longer-term research questions, public health interventions and provide a consultancy service in a range of environmental areas. The major limitation on such a role will be resources.

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