

# Occupational Health

Issue 5

December 2008

Welcome to the fifth issue of Occupational Health – a yearly update by the Centre for Public Health Research to keep you informed of our progress, associated news stories, and abstracts of relevant papers and conference presentations.

## SYMPOSIUM ON OCCUPATIONAL HEALTH IN NEW ZEALAND: CHALLENGES & OPPORTUNITIES



Associate director of the Centre for Public Health Research, Associate Professor Jeroen Douwes and Professor Aaron Blair

The Occupational Health in New Zealand: Challenges and Opportunities symposium, hosted by the Centre for Public Health Research (CPHR), was held on the 17-18<sup>th</sup> November 2008 at Te Papa, Wellington. The symposium attracted 150 delegates from a wide range of backgrounds including representatives from research, industry, policy-making, and frontline health practitioners.

The two-day programme covered occupational cancer, respiratory disease, dermatitis, reproductive health, exposure assessment, occupational health in Māori, and

implications for policy. Keynote speakers included Professor Aaron Blair from the US National Cancer Institute in Washington, Professor Hans Kromhout from the University of Utrecht in the Netherlands, and Professor Malcolm Sim from Monash University in Melbourne.

Professor Blair told the symposium that funding for research into occupational health had been steadily decreasing in recent years. “Some believe that occupation is not an important contributor to the cancer burden,” Professor Blair said. “There have been regulatory efforts to control exposure to

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harmful substances in the workplace, so many believe it isn't an issue." More research was needed, however, not less. "We need to improve exposure assessment and also expand the research to cover women and minority groups, which have been largely ignored," he said.

Dr David McLean agrees it is an area that requires more research. "It's been a neglected field, so over the next three years we hope to bring the issues to the attention of policy-makers and advance the understanding of the issues." Dr McLean says the symposium also featured representatives and stakeholders from business and policy-making institutions. "Our

goal is to see research implemented into policy," he says, "so it's important that people from the Department of Labour, the Council of Trade Unions and Business New Zealand are among those who attended."

CPHR plans to hold bi-annual meetings with key people from the occupational health field to continue exploring the issues raised at the symposium. The first meeting is scheduled for April 2009.

Symposium presentations available at <http://publichealth.massey.ac.nz>

## BUILDING RESEARCH IN OCCUPATIONAL HEALTH IN NEW ZEALAND (BROHNZ)

Each year in New Zealand we have about 700-1,000 work-related deaths, and 17,000-20,000 new cases of work-related disease, at an annual cost of \$4.9 billion. Most of these deaths and illnesses are potentially preventable. Research into the causes and prevention of occupational diseases is relatively undeveloped in New Zealand, and capacity building in this area is urgently required. The Massey University Centre for Public Health Research (CPHR) is therefore undertaking a comprehensive multidisciplinary research programme of Building Research in Occupational Health in New Zealand (BROHNZ), with funding support from a Programme Grant of the Health Research Council of New Zealand. The Programme is based at CPHR but involves collaborators from other research groups both within New Zealand and internationally. In addition to conducting specific research projects, BROHNZ will provide training opportunities for new and emerging occupational health researchers.

The long-term aim is to develop a broad programme of research into the causes, management, control and prevention of occupational disease, and to assist in the application of this knowledge to reduce the incidence and impact of these conditions in workers in general, and Māori and Pacific workers in particular.

### Current BROHNZ projects include:

- Occupational asthma in New Zealand sawmill workers;
- Occupational dermatitis in New Zealand cleaners;
- Case-control study of modifiable risk factors for congenital malformations;
- Occupational exposures and occupational health in Maori;
- Workplace exposure to carcinogens in New Zealand.

## OTHER NEWS

### Timber workers study links cancer, respiratory disease to occupational PCP exposure

Researchers at Massey's Centre for Public Health Research investigating the health of former timber workers have found levels of dioxin more than twice that of long-term Paritutu residents and significant prevalence of health effects related to PCP exposure.

The findings of the study Health Outcomes in Former New Zealand Timber Workers Exposed to Pentachlorophenol (PCP) were released by the Department of Labour. The study was funded by the Health Research Council after continued concern that timber workers exposed to PCP were suffering long-term health problems. The PCP used at the time was contaminated by some types of dioxin during manufacture, with the study confirming that the types of dioxin found in the workers fit the profile of the dioxin found in PCP at that time. Dioxin is known to increase the risk of cancer.

Lead investigator Dr Dave McLean, a research fellow of the centre, says the study was comprehensive. The first phase comprised tracking and analysis of health information and the work practices of almost 4000 randomly-selected timber workers

"The group worked in the industry before the late 1980s, when PCP was used. They were selected using industry records and followed to the present day to assess how many had died and how many had developed cancer," Dr McLean says.

The second phase of the research comprised a survey including interviews and clinical examinations of 293 surviving workers.

"We went out and held clinics around the country, inviting people to turn up for a blood test, questionnaire-based interview, a physical and neurological exam.

"Looking at their lifetime work history, and in particular their history of work in the timber industry, we established that about 10 per cent of the former timber workers had heavy exposure to

PCP". "People with heavy exposure to PCP were three times more likely to have respiratory disease. People with more PCP exposure also had increased prevalence of a number of other health conditions, including eczema, thyroid disorders, unexplained persistent fevers, recurrent nausea and diarrhoea, heart palpitations and low libido. Not all of these increased risks were statistically significant, because the number of workers with heavy exposure was quite small."

Dr McLean says that as cumulative exposure increased there was also increased prevalence of neuro-psychological symptoms, including memory loss, depression and tiredness.

"This is an indicator that there may be some damage to the central nervous system, in this case at a level similar to that of people heavily exposed to solvents. The concern is that we're measuring sub-clinical changes but that in people of this age there may be repercussions because they will have reduced capacity to compensate for the effects of ageing".

The third phase of the study included blood testing for dioxin levels in 71 of the exposed workers and 23 non-exposed workers. These, when combined with the results of blood tests undertaken on 23 members of the Sawmill Workers Against Poisons (SWAP) group showed that the exposed workers had much higher dioxin levels than those not exposed.

"Comparisons of the intensity and years of exposure also saw a very clear dose-rate relationship – people who mixed the solutions, handled the timber and cleaned the sludge in the dip tank with the highest levels."

The tests showed that the exposed workers had dioxin levels about the same as those observed in former long-term Paritutu residents while SWAP members had levels around twice that.

The report can be found at <http://www.dol.govt.nz/publication-view.asp?ID=249>

## NOHSAC report identifies flaws in business materials for managing effective OSH systems

The Review of the Key Characteristics that Determine the Efficacy of OHS Instruments was commissioned by the National Occupational Health and Safety Advisory Committee (NOHSAC) in conjunction with the Australian Safety and Compensation Council.

The review analysed the range of resources supplied to businesses, including approved codes of practice and guidance materials. The subsequent report is based on an extensive international literature review, detailed interviews and questionnaires, and an online survey of users in Australia and New Zealand.

The report concludes that New Zealand's current regulatory framework lacks a commitment to providing businesses with codes of practice and guidance materials designed to encourage and help ensure compliance and support best practice. As a result, codes of practice are rarely developed and, when they are, can be out of date and inconsistent with industry practice.

The Department of Labour is the government's lead agency for the Workplace Health and Safety Strategy. NOHSAC Chair, Professor Neil Pearce, says that the department must take urgent action to provide information and education to help employers, employees and other people to improve workplace safety, and to provide additional funding for the development and dissemination of up-to-date and relevant advice for workplaces.

“New Zealand is well placed to set an international example for our occupational health and safety performance,” he says. “We simply need more commitment from the government agencies involved, so that together we can achieve the Workplace Health and Safety Strategy's vision of healthy people in safe and productive workplaces.”

The report is available at [www.nohsac.govt.nz](http://www.nohsac.govt.nz)

## RECENT PUBLICATIONS

### Case-control study of high risk occupations for bladder cancer in New Zealand

Evan Dryson<sup>1,2</sup>, Andrea 't Mannetje<sup>1</sup>, Chris Walls<sup>1,2</sup>, Dave McLean<sup>1</sup>, Fiona McKenzie<sup>1</sup>, Milena Maule<sup>3</sup>, Soo Cheng<sup>1</sup>, Chris Cunningham<sup>4</sup>, Hans Kromhout<sup>5</sup>, Paolo Boffetta<sup>6</sup>, Aaron Blair<sup>7</sup> and Neil Pearce<sup>1</sup>

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We conducted a nationwide case-control study of bladder cancer in adult New Zealanders to identify occupations that may contribute to the risk of bladder cancer in the New Zealand population. A total of 213 incident cases of bladder cancer (age 25–70 years) notified to the New Zealand Cancer Registry during 2003 and 2004, and 471 population controls, were interviewed face-to-face. The questionnaire collected demographic information and a full occupational history. The relative risks for bladder cancer associated with ever being employed in particular occupations and industries were calculated by unconditional logistic regression adjusting for age, sex, smoking and socio-economic status. Estimates were subsequently semi-Bayes adjusted to account for the large number of occupations and industries being considered. An elevated bladder cancer risk was observed for hairdressers (odds ratio (OR) 9.15 95% Confidence Interval (95%CI) 1.60–62.22), and sewing machinists (OR 3.07 95%CI 1.35–6.96). Significantly increased risks were not observed for several other occupations

that have been reported in previous studies, including sales assistants (OR 1.03 95%CI 0.64–1.67), painters and paperhangers (OR 1.42 95%CI 0.56–3.60), sheet metal workers (OR 0.39, 95%CI 0.15–1.00), printing trades workers (OR 1.11 95%CI 0.41–3.05) and truck drivers (OR 1.36 95%CI 0.60–3.09), although the elevated odds ratios for painters, printers and truck drivers are consistent with excesses observed in other studies. Nonsignificantly increased risks were observed for tailors and dressmakers (OR 2.84 95%CI 0.62–13.05), rubber and plastics products machine operators (OR 2.82 95%CI 0.75–10.67), building workers (OR 2.15, 95%CI 0.68–6.73), and female market farmers and crop growers (OR 2.05 95%CI 0.72–5.83). In conclusion, this study has confirmed that hairdressers and sewing machinists are high risk occupations for bladder cancer in New Zealand, and has identified several other occupations and industries of high bladder cancer risk that merit further study. [Int J Cancer 2008; 122(6):1340-6]

### High risk occupations for non-Hodgkin's lymphoma in New Zealand: case-control study

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**Objectives:** Previous studies into occupational risk factors for non-Hodgkin's lymphoma (NHL) in New Zealand have indicated that farmers and meat workers are at increased risk for these neoplasms. A new nationwide case-control study was conducted to assess whether previously observed associations persist and to identify other occupations that may contribute to the risk of NHL in the New Zealand population.

**Methods:** A total of 291 incident cases of NHL (age 25–70 years) notified to the New Zealand Cancer Registry during 2003 and 2004, and 471 population controls, were interviewed face-to-face. The questionnaire collected demographic information and a full occupational history. The relative risk for NHL associated with ever being employed in particular occupations and industries was calculated by unconditional logistic regression adjusting for age, sex, smoking, ethnicity and socioeconomic status. Estimates were subsequently semi-Bayes adjusted to account for the large number of occupations and industries being considered. **Results:** An elevated

NHL risk was observed for field crop and vegetable growers (OR 2.74, 95% CI 1.04 to 7.25) and horticulture and fruit growing (OR 2.28, 95% CI 1.37 to 3.79), particularly for women (OR 3.44, 95% CI 0.62 to 18.9; OR 3.15, 95% CI 1.50 to 6.61). Sheep and dairy farming was not associated with an increased risk of NHL. Meat processors had an elevated risk (OR 1.97, 95% CI 0.97 to 3.97), as did heavy truck drivers (OR 1.98, 95% CI 0.92 to 4.24), workers employed in metal product manufacturing (OR 1.92, 95% CI 1.12 to 3.28) and cleaners (OR 2.11, 95% CI 1.21 to 3.65). After semi-Bayes adjustment the elevated risks for horticulture and fruit growing, metal product manufacturing and cleaners remained statistically significant, representing the most robust findings of this study. **Conclusions:** This study has confirmed that crop farmers and meat workers remain high risk occupations for NHL in New Zealand, and has identified several other occupations and industries of high NHL risk that merit further study. [Occup Environ Med 2008; 65:354-63]

## Leukaemia and occupation: a New Zealand Cancer Registry-based case-control Study

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**Background:** To examine the association between occupation and leukaemia. **Methods:** We interviewed 225 cases (aged 20–75 years) notified to the New Zealand Cancer Registry during 2003–04, and 471 controls randomly selected from the Electoral Roll collecting demographic details, information on potential confounders and a comprehensive employment history. Associations between occupation and leukaemia were analysed using logistic regression adjusted for gender, age, ethnicity and smoking.

**Results:** Elevated odds ratios (ORs) were observed in agricultural sectors including horticulture/fruit growing (OR: 2.62, 95% confidence interval (CI): 1.51, 4.55), plant nurseries (OR: 7.51, 95% CI: 1.85, 30.38) and vegetable growing (OR: 3.14, 95% CI: 1.18, 8.40); and appeared greater in women (ORs: 4.71, 7.75 and 7.98, respectively). Elevated ORs were also observed in market farmers/crop growers (OR: 1.84, 95% CI: 1.12, 3.02), field crop/vegetable growers (OR: 3.98, 95%

CI: 1.46, 10.85), market gardeners (OR: 5.50, 95% CI: 1.59, 19.02), and nursery growers/workers (OR: 4.23, 95% CI: 1.34, 13.35); also greater in women (ORs: 3.48, 7.62, 15.74 and 11.70, respectively). These elevated ORs were predominantly for chronic lymphocytic leukaemia (CLL). Several associations persisted after semi-Bayes adjustment. Elevated ORs were observed in rubber/plastics products machine operators (OR: 3.76, 95% CI: 1.08, 13.08), predominantly in plastic product manufacturing. CLL was also elevated in tailors and dressmakers (OR: 7.01, 95% CI: 1.78, 27.68), cleaners (OR: 2.04, 95% CI: 1.00, 4.14) and builder's labourers (OR: 4.03, 95% CI: 1.30, 12.53). **Conclusions:** These findings suggest increased leukaemia risks associated with certain agricultural, manufacturing, construction and service occupations in New Zealand [Int J Epidemiol 2008 [www.ije.oxfordjournals.org](http://www.ije.oxfordjournals.org)]

## Serum dioxin levels in former New Zealand sawmill workers twenty years after exposure to pentachlorophenol (PCP) ceased

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From the 1950s to the late 1980s pentachlorophenol (PCP) based anti-sapstain fungicides were widely used in the New Zealand timber industry. Workers involved in treatment, or those handling freshly treated timber, experienced significant PCP exposure. Commercial grade PCP contained contaminants including 2,3,7,8-substituted polychlorinated dibenzo-p-dioxin (PCDD) and dibenzofuran (PCDF) congeners. To determine whether PCP exposure had resulted in elevated serum dioxin levels twenty years after its use had ceased we tested 94 former sawmill workers randomly selected from surviving members of a cohort enumerated for a mortality and cancer incidence study. After interviewing these individuals to collect demographic data and a comprehensive work history, they were divided into 71 PCP-exposed and 23 non-exposed individuals on the basis of job title and work tasks performed. We compared age-adjusted

dioxin levels in the exposed and non-exposed groups, examined the effect of PCP exposure duration and intensity, and compared congener profiles with those found in the commercial grade PCP used at the time. Mean levels in exposed workers were elevated when compared with the non-exposed, with levels of 1,2,3,6,7,8-HxCDD, 1,2,3,4,6,7,8-HpCDD and OCDD being two to three times higher. The congener profiles in serum were consistent with those in PCP solutions, and dioxin levels increased with both employment duration and estimated exposure intensity. Serum dioxin levels in former New Zealand sawmill workers remain elevated twenty years after exposure to PCP ceased, and reflect the pattern of past PCP exposure [Chemosphere 2009; 74:962-7]

## Morbidity in Former Sawmill Workers Exposed to Pentachlorophenol (PCP): A Cross-Sectional Study in New Zealand

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**Background:** From 1950 to 1990 pentachlorophenol (PCP) was used widely in the New Zealand sawmill industry, and persistent claims of long-term health effects have been made. **Methods:** We surveyed surviving members of a cohort enumerated to study mortality in sawmill workers employed from 1970 to 1990. Estimates of historical exposure were based on job titles held, using the results of a PCP biomonitoring survey conducted in the 1980s. The survey involved interviews and clinical examinations, with interviewers and examiners blinded to exposure status. **Results:** Of the 293 participants 177 had not been exposed, and of the 116 exposed all but 10% had low or short-term PCP exposure. Nevertheless, a number of significant associations between PCP exposure and the prevalence of various symptoms were observed including associations between: (i) exposure levels and self-reported tuberculosis, pleurisy or

pneumonia ( $P<0.01$ ) and a deficit in cranial nerve function ( $P=0.04$ ); (ii) duration of employment and thyroid disorders ( $P=0.04$ ), and neuropsychological symptoms including often going back to check things ( $P=0.04$ ), low libido ( $P=0.02$ ) and heart palpitations ( $P=0.02$ ), and a strong dose–response trend for frequent mood changes without cause ( $P<0.01$ ); and (iii) cumulative exposure and frequent mood changes without cause ( $P=0.02$ ), low libido ( $P=0.04$ ), and in the overall number of neuropsychological symptoms reported ( $P=0.03$ ). **Conclusions:** PCP exposure was associated with a number of physical and neuropsychological health effects that persisted long after exposure had ceased. [Am J Ind Med 2009. [www.intersciencewiley.com](http://www.intersciencewiley.com)]

## RECENT CONFERENCE PRESENTATIONS

### Occupational risk factors for asthma in the New Zealand population

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**Background:** The proportion of asthma cases attributable to occupational exposures in New Zealand is estimated to range between 15-20%. We report the findings of a population-based survey that obtained information on occupational history, current workplace exposures, and health conditions including asthma.

**Aims:** To examine occupational risk factors for respiratory symptoms in New Zealand.

**Methods:** A random sample of men and women aged 20-64 registered on the 2003 New Zealand electoral roll were invited to take part in a telephone survey. Current asthma was defined as either: (i) woken up by shortness of breath in the last 12 months; (ii) an attack of asthma in the last 12 months; or (iii) currently taking asthma medication. Associations between occupations, occupational stress, and asthma were analysed using logistic regression. Analyses were adjusted for sex, age, and smoking. **Results:** 2,985 interviews were completed. The prevalence of current asthma was 16% in men and 18% in women. Prevalence odds ratios were significantly increased for elementary occupations (Odds Ratio (OR) 1.5; 95% Confidence

Interval (CI) 1.2-1.8), specifically cleaners (OR 1.6; 95% 1.1-2.3) and labourers (OR 1.6; 95% CI 1.2-2.2). There was also an increased risk for printers (OR 2.3; 95% CI 1.1-4.7); bakers (OR 2.0; 95% CI 1.1-3.9); precision trades workers (OR 2.8; 95% CI 1.5-5.2) and metal processing plant operators (OR 2.6; 95% CI 1.3-5.3); as well as teaching professionals (OR 1.3; 95% CI 1.0-1.7) and particularly secondary school teachers (OR 2.0; 95% CI 1.3-3.0). Men and women who reported having a very-to-extremely stressful job were more likely to have current asthma (OR 2.0; 95% CI 1.5-2.5) than those reporting no or mild work-related stress. Further adjustment for deprivation did not significantly alter the results. **Conclusion:** These results confirm previous international findings suggesting that cleaners, printers, and bakers have an increased risk of asthma. Several blue-collar occupations and teachers are also more likely to report asthma symptoms. Finally, work-related stress may be a previously overlooked independent risk factor for occupational asthma [IEA World Congress of Epidemiology, Porto Alegre, Brazil Sept 2008]

### Morbidity in former sawmill workers exposed to pentachlorophenol (PCP): A cross-sectional study in New Zealand

McLean D<sup>1</sup>, Eng A<sup>1</sup>, Dryson E<sup>1,2</sup>, Walls C<sup>1,2</sup>, Wong KC<sup>1</sup>, Cheng S<sup>1</sup>, 't Mannetje A<sup>1</sup>, Ellison-Loschmann L<sup>1</sup>, Slater T<sup>1</sup>, Shoemack P<sup>3</sup>, Pearce N<sup>1</sup>  
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**Background and Aims:** From 1950 to 1990 fungicides containing pentachlorophenol (PCP) were widely used in the New Zealand sawmill industry. Workers who treated or handled wet timber experienced significant exposure, and concern remains about chronic health problems in these workers. We have conducted a cross-sectional morbidity survey in a random sample of surviving members of a cohort enumerated for a mortality study.

**Methods:** Demographic information, lifetime work history including tasks and exposures in sawmills, lifestyle factors and self-reported health and current neuropsychological symptoms were collected by interview. All participants had blood tests and a clinical examination by an occupational physician.

**Results:** Of 293 participants only 116 had been exposed to PCP, mostly at relatively low intensity or duration. Nevertheless, several associations between exposure and prevalence of symptoms were observed. These included associations between: (i) exposure level and risk of chronic respiratory disease ( $p < 0.01$ ) and a deficit in cranial nerve function ( $p = 0.04$ ); (ii) exposure duration and thyroid disorders ( $p = 0.04$ ), and neuropsychological questions including 'often going back to check things' ( $p = 0.04$ ), 'low libido' ( $p = 0.02$ ) and 'having palpitations of the heart' ( $p = 0.02$ ), and a

dose-response trend for 'frequent mood changes without cause' ( $p < 0.01$ ); and (iii) cumulative exposure and 'frequent mood changes without cause' ( $p = 0.02$ ), 'low libido' ( $p = 0.04$ ), and the total number of neuropsychological symptoms reported ( $p = 0.03$ ). Associations were also observed for asthma and eczema, and for 'recurrent nausea and diarrhoea', 'unexplained persistent fevers' or 'sweating for no reason', and 'persistent fatigue'. No cases of chloracne were identified. Few participants had non-fasting glucose outside the reference range of 3-8 mmol/L. While an association between ever having been exposed and excess non-fasting glucose (OR=1.56, 95% CI 0.55 - 4.42, 15 cases) was observed, the small numbers precluded dose-response analyses.

**Discussion and Conclusions:** Notwithstanding the small numbers with high exposure, associations were observed between exposure and chronic respiratory disease, and also 'unexplained persistent fevers', 'recurrent nausea and diarrhoea', 'having palpitations of the heart', 'sweating for no reason', 'reduced libido' and 'frequent mood changes without cause'. Similar findings have been observed in an earlier study of PCP-exposed workers in New Zealand [EPICOH, Costa Rica, June 2008]