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Mortality and Cancer Incidence in New Zealand Meat Workers

**A thesis presented in partial fulfilment of the requirements for the
degree of**

Doctor of Philosophy

In Epidemiology

At Massey University, Wellington, New Zealand

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June 2003

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99/94 Work related risk of cancer in meat workers

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Abstract

Background:

Several studies have suggested increased risks of cancers of the lung and lymphohaematopoietic tissue associated with work in the meat industry. The evidence for lung cancer is reasonably consistent, although few studies have controlled for smoking. Increased risks of lymphohaematopoietic cancers have been found consistently in case-control studies, including several conducted in New Zealand, but not in cohort studies. This project aimed to ascertain whether there is an increased risk of these cancers in workers employed in the New Zealand meat processing industry, and to identify what exposures are associated with any increased risks.

Methods:

Two cohorts, 4,064 individuals assembled from union records and 6,647 individuals assembled from company records, were followed from 1988 until 2000. Exposure status was assigned according to a job-exposure matrix. The observed number of deaths and cancer registrations was compared with expected numbers using five-year age-specific rates for the New Zealand population. Subgroup analyses evaluated the effect of duration of exposure to selected agents.

Results:

Vital status was determined for 93% (union) and 92% (company) of the total possible person-years. In the union cohort, mortality from all causes (SMR 0.86) and all cancers (SMR 0.88) were reduced, with no elevation observed for the cancers of *a priori* interest. Mortality from all causes (SMR 1.12) and all cancers (SMR 1.12) were elevated in the company cohort, with a significant excess of lung cancer (SMR 1.79) and an excess of non-Hodgkin's lymphoma (SMR 1.45). Subgroup analyses showed significant trends of increasing risk with duration of exposure to biological material.

Conclusions:

The union cohort exhibited a strong healthy worker effect, with no increase in mortality or cancer incidence. By contrast, excess risks for all cause and cancer mortality and incidence, and for lung and lymphohaematopoietic cancers, were observed in the company cohort. This is unlikely to be due to confounding by smoking, and the strong dose response relationship suggests the effect is related to occupational exposures.

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Abbreviations

ATLL	Adult T-cell leukaemia/lymphoma
BIV	Bovine immunodeficiency virus
BPSV	Bovine popular stomatitis virus
BLV	Bovine leucosis virus
BSE	Bovine spongiform encephalopathy
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
CTS	Carpal tunnel syndrome
CWD	Chronic wasting disease of deer
GaLV	Gibbon ape leukaemia virus
HIV	Human immunodeficiency virus
HPV	Human papilloma virus
HTLV	Human T-cell lymphotropic virus
IARC	International Agency for Research on Cancer
ICD	International classification of diseases
IRD	Inland Revenue Department
JEM	Job-exposure matrix
JSRV	Jaagsiekte sheep retrovirus
MOR	Mortality odds ratio
MPMV	Mason-Pfizer monkey retrovirus
MRL	Maximum residue level
MTB	mercaptobenzothiazole
NHI	National Health Index (number)

NIOSH	US National Institute for Occupational Safety and Health
NMDS	National Minimum Data Set
NZHIS	New Zealand Health Information Service
ODTS	Organic dust toxic syndrome
OR	Odds ratio
PAH	Polycyclic aromatic hydrocarbons
PC LTAS	Life Table Analysis System for personal computer
PCPV	Pseudocowpoxvirus
PCR	Polymerase chain reaction
PIR	Proportionate incidence ratio
PMR	Proportionate mortality ratio
PPCS	Primary Producers Cooperative Society
PPVO	Parapoxvirus orf
PVNZ	Parapoxvirus of red deer in New Zealand
RR	Relative risk
SIR	Standardised incidence ratio
SMR	Standardised mortality ratio
SRV	Simian retrovirus
STLV	Simian T-cell lymphotropic virus
TCMTB	2-(thiocyanomethylthio) benzothiazole
TDE	Transmissible degenerative encephalopathies
TSFE	Time since first employed
vCJD	New variant Creutzfeldt-Jakob Disease
WHO	World Health Organisation
WINZ	Work and Income New Zealand