



Tasmania

DEPARTMENT of HEALTH
and HUMAN SERVICES

Community, Population & Rural Health
Population Health

File
Contact: Dr Roscoe Taylor
Phone: 03 6222 7729
Facsimile: 03 6222 7407
E-mail: roscoe.taylor@dhhs.tas.gov.au

22 September 2004

Dr Alison Bleaney
Suncoast Medical Centre
ST HELENS TAS 7216

FAXED

Dear Dr Bleaney

Thank you for your letter of 12 August 2004 providing information on your observations of illness symptoms and health problems in your St Helens medical practice.

We have investigated the matter and attach a report detailing our findings.

I note that you have publicly raised concerns that environmental and health problems may be due to exposure to agricultural and forestry chemicals, for example, via drinking water supplies. Therefore, we have included a broader range of information that may also be of relevance to the general context of your enquiry.

Please note that it has not been possible, on the basis of the information provided, to make an assessment of all of the observations you make. For example, concerns such as "increasing numbers of patients with general malaise and symptoms of fatigue", or "episodic abnormal liver function tests with no cause found" are difficult to quantify and would be difficult to investigate in any meaningful way.

You cite a Departmental report called "Demographic and Health Analysis of the Northern Region" (October 2000) and note that it documents an increase in depression, anxiety and self-reported ill health for the Break O'Day area relative to other shires and council areas in the Northern Region.

As the Northern Region report itself notes, the Break O'Day area also experiences considerable socio-economic disadvantage relative to most other areas in the North, with lower incomes, higher unemployment, and higher proportions of Centrelink recipients and Healthcare Cardholders. In addition, the area has the oldest population distribution with the largest proportion of people aged 65 years and over (14.9%) of the eight council areas studied in the Northern Region.

The links between these socioeconomic determinants and self-reported health status and other measures, such as anxiety and depression, are well documented, and need to be taken into account in interpreting data arising from instruments such as the Tasmanian Healthy Communities Survey 1998, which formed the basis of these aspects of the Department's October 2000 report.

In relation to your observation about "sporadic moderate to severe vomiting and diarrhoea with no cause demonstrated", it is worth noting that across Tasmania over the past 10 – 12 months there has been a very significant increase in the number of reported outbreaks of gastroenteritis associated with norovirus infection – which would not be detected by the standard faecal investigations available in general practice. If you become aware of an outbreak in an institutional setting (such as a nursing home), it would be appreciated if you could notify this to Public & Environmental Health Service on 1800 671 738 as this is a notifiable situation.

By way of further general background, it is also useful to outline the current regulatory processes by which chemical usage is controlled in Tasmania.

In Australia, agricultural chemicals are controlled nationally under the National Registration Scheme for Agricultural and Veterinary Chemicals. This was established when the Commonwealth enacted the *Agricultural and Veterinary Chemicals Code Act 1994*. Chemical products must be registered by the Australian Pesticides and Veterinary Medicines Authority (APVMA) before they can be used in this country and they must be used in accordance with any specific directions or restrictions for that product.

Before an agricultural chemical is approved for use, its suitability and safety are assessed by various experts at a Federal level to ensure that any controls applied are sufficient to prevent harm from occurring during application or after application. In addition, the States have "control of use" legislation that imposes further control should this be needed. In Tasmania, this is the *Agricultural and Veterinary Chemicals (Control of Use) Act 1995* which is administered by the Department of Primary Industries, Water and Environment. Agricultural chemicals are not assessed or approved by the Tasmanian Department of Health and Human Services.

When authorities, such as APVMA, approve products for use, the guidelines and levels that are set incorporate safety margins specifically to protect public health and safety.

In addition, there are safety levels for residual chemicals, especially pesticides, in the national food safety code, the Australia New Zealand Food Standards Code. These are called Minimum Residue Levels (MRL) and they are checked in selected foods every two years.

In relation to drinking water supplies, Tasmanian water authorities "managing or in control of water" are responsible under the Public Health Act 1997 for managing the water in a manner that does not pose a threat to public health, and for notifying the Director of Public Health if they become aware that the quality of the water is, or is likely to become, a threat to public health. Both the Director and Councils possess powers under the Act to take steps to protect public health if a threat becomes evident.

The Australian Drinking Water Guidelines (ADWG) list levels at which action should be taken should chemical contamination of a drinking water supply occur. The ADWG establish both Guideline Values (GV) and Health Values (HV) for pesticides in drinking water supplies.

The ADWG states in relation to Guideline Values: "These values are intended for use by regulatory authorities for surveillance and enforcement purposes; they provide a mechanism to measure compliance with approved label directions.....If a pesticide is detected at or above the Guideline Value, steps should be taken to determine the source and to stop further contamination."

Health Values in the ADWG are described as "intended for use by health authorities in managing the health risks associated with inadvertent exposure, such as a spill or misuse of a pesticide." The Health Values are very conservative and based on a range of safety factors such that, based on present knowledge, consumption of the chemical in water at that level of contamination should not result in a significant risk to the health of the consumer over a lifetime. Any deviation above a Health Value should, however, be a trigger for further action and assessment of the specific health risks associated with that water supply.

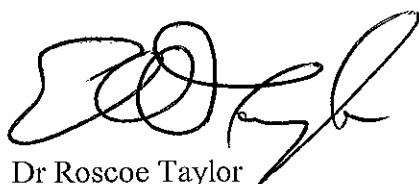
From a public health perspective, the general position remains that pesticide contamination of drinking water is unacceptable, and it is important that human exposures should be minimised as far as practicable.

As you will be aware, the Agricultural, Silvicultural and Veterinary Chemicals Council was recently convened and is currently examining a range of issues to improve water monitoring and reporting practices. In addition, PEHS has for quite some time been preparing a revised Water Quality Guideline in anticipation of the draft new NHMRC Australian Drinking Water Guidelines, which adopt a holistic catchment-to-tap approach to water quality management and which should assist overall progress towards improving water quality management practices in the Break O'Day area, as well as the rest of Tasmania.

At this stage and based on all the above information, I advise that there is no indication for any further epidemiological investigation. However, efforts to minimise human exposures, and monitoring to ensure that this is the case, certainly do remain important from a public health perspective and I look forward to your ongoing support in this regard.

I trust this information is of assistance to you.

Yours sincerely



Dr Roscoe Taylor

**BA, MB BS, DipObs, MRNZCGP, MEnvSc, FAFPHM, Grad Dip Epid.
DIRECTOR PUBLIC HEALTH**

Enc.

REPORT ON ST HELEN'S CONNECTIVE TISSUE DISEASE AND HAEMATOPOIETIC MALIGNANCY INCIDENCE

17 SEPTEMBER 2004

Introduction

Dr Alison Bleaney, Medical Officer of Health in the St Helen's township, contacted the Director of Public Health on 13 August 2004 by fax, detailing her observations regarding clinical cases in her practice. A copy of Dr Bleaney's correspondence is attached to this report. Dr Bleaney raised concern at the rate of connective tissue disease in her local area and the possibility of an increase in haematopoietic malignancy over an 18-month period.

In response to this correspondence, a number of actions were taken:

1. The Director of Public Health discussed Dr Bleaney's approximate overall case-load with her.
2. The Break O'Day Council was contacted to confirm population statistics for the Break O'Day area.
3. The peer-reviewed literature was searched to identify studies of the aetiology and incidence of connective tissue disease and haematopoietic malignancy.
4. Tasmanian Cancer Registry reports were consulted.
5. This summary report was prepared, outlining the results of the investigations.

Methods

To locate studies of connective tissue disease aetiology:

- Textbooks relevant to the field of connective tissue disease medicine were hand searched.
- Medline and Pubmed were searched using the following search terms
 - o Connective tissue disease / rheumatoid arthritis / arthritis / scleroderma / systemic lupus erythematosus / SLE
 - o Aetiology / etiology / cause
 - o Chemical / pesticide / herbicide / exposure / environment*.
- The Arthritis Foundation of Australia website was searched.
- The Australian Institute of Health and Welfare website was searched.
- The world wide web was searched with a general search engine using the above Medline / Pubmed search terms.

To locate studies of haematopoietic malignancy aetiology:

- The Registrar of the Tasmanian Cancer Registry, Menzies Research Institute, was contacted by telephone to discuss registry statistics relating to haematopoietic malignancy in Tasmanian regions.
- Textbooks relevant to the field of haematopoietic malignancy medicine were hand searched.
- Medline and Pubmed were searched using the following search terms
 - o Aetiology / etiology / cause
 - o Myelodysplasia / myelodysplastic syndrome / MDS / lymphoma / leukaemia / myeloma / multiple myeloma / haematopoie* / hematopoie* / cancer / carcinogen* / tumorigenesis / tumour* / malignan* / genotoxi*
 - o Chemical / pesticide / herbicide / exposure / environment*
- The Leukaemia Foundation of Australia website was searched.
- The Australian Institute of Health and Welfare website was searched.
- The World Wide Web was searched with a general search engine using the above Medline / Pubmed search terms.
- The ExToxnet database was then interrogated for data on haematopoietic malignancy.
- The Toxnet (NIH), IRIS (US EPA) and GENETOX (US EPA) databases were then interrogated for data on haematopoietic malignancy.

Assumptions

Dr Bleaney verbally advised the Director of Public Health that there were approximately 2,500 patients in her practice area, although over the years there had accumulated a much larger number of patient files.

The resident population of the St Helen's township area is 800. The population of the Break O'Day region is 5 752 (Break O'Day Council). However, the town has significant tourist throughput and it would also be a potentially difficult exercise to ascertain the duration of residence of patients attending Dr Bleaney's medical practice.

The residential community is generally older than the State average, which itself is older than the Australian population. The median age of Break O'Day residents is 43 years, compared to 36 years for the Tasmanian population (see Appendix). Age – adjustment for the prevalence of various conditions discussed below has not been carried out, but it could be expected that this would have a significant effect as most, if not all, of the conditions reported tend to increase in frequency with age.

RESULTS

Connective Tissue Diseases

In her correspondence, Dr Bleaney states "There are at least 100 patients in our local area with connective tissue diseases – rheumatoid arthritis, SLE, scleroderma (50+ patients between 50 – 70 years)".

- Polyarticular complaints, including osteoarthritis, are among the most frequent in primary care practice, accounting for approximately 10% of all outpatient evaluations in general medical practice (Goroll et al., 2000).
- The population prevalence of rheumatoid arthritis is 3%. The aetiology of rheumatoid arthritis is unknown, however, the HLA DR4 genotype predisposes the host. Immunogenesis is via presentation of a culprit antigen to T-helper cells with subsequent cytokine-mediated synovial neutrophil exudate, which releases cartilage-degrading enzymes, is the pathological process underlying the condition. The culprit antigen is thought to be an infectious organism that is likely to be ubiquitous. The peak onset is the 4th decade (Ledingham et al., 2000). **Using the above statistics, it is expected that approximately 172 of Break O'Day's 5752 residents will have rheumatoid arthritis, and, if Dr Bleaney's patients are representative of the general population, 75 out of 2500 patients will have rheumatoid arthritis.**
- Systemic lupus erythematosus is an autoimmune disease that may affect many organs, especially the skin, musculoskeletal, vascular and renal systems. It occurs predominantly in women of childbearing age, but also affects people in their sixth decade or older. In these patients, female predominance is less marked and renal disease less common. The population prevalence of SLE in Australia is 0.2%. The peak age of diagnosis is 30 – 40 years. The cause(s) of SLE is or are not known, however, racial and HLA associations indicate a genetic predisposition being a major determining factor. Environmental factors that flare SLE are largely unknown, except for UV-B. Other factors such as ingested alfalfa sprouts and chemicals such as hydrazines and hair dye have been implicated. Searches for viral / retroviral disease inducers are inconclusive (Braunwald et al., 2001). Chemical agents known to be associated with autoimmunity, inducing SLE or a SLE-like syndrome include hydralazine, isoniazid, procainamide, phenothiazines, penicillamine, propylthiouracil, quinidine, l-dopa, lithium carbonate trichloroethylene and silicones (Casarett and Doull, 2001). **Using the above statistics, it is expected that (on average) approximately 12 of Break O'Day's 5752 residents will have systemic lupus erythematosus, and, if Dr Bleaney's patients are representative of the general population, 5 of her patients will have systemic lupus erythematosus.**

- Scleroderma (systemic sclerosis) is an enigmatic immune disorder characterised by skin thickening, fibrosis of internal organs, microvasculopathy and the presence of autoantibodies. The cause is unknown and there is no proven therapy. Scleroderma has a worldwide distribution and affects all races. The onset of disease is usually in the 3rd to 5th decade, and incidence increases with age. The annual incidence is estimated to be 14.1 cases per million population. Disease is more common in those with extensive exposure to silica dust (coal and gold miners), polyvinyl chloride, epoxy resins and aromatic hydrocarbons such as benzene and toluene (Braunwald et al., 2001). Other chemical agents known to be associated with scleroderma or scleroderma-like syndrome include tryptophan and silicones (Casarett and Doull, 2001).
- In Australia there has been an increase in the number of people suffering arthritis or rheumatism as long-term conditions, from 5.7% of the population (785,000 people) in 1977-78 to 11.5% (1.96 million) in 1989-90 and up to 12.6% (2.27 million) by 1995 (Arthritis Foundation of Australia, 2001).
- Given falling fertility rates and higher life expectancy, together with the concentration of the condition in older age groups, the proportion of Australians suffering arthritis is likely to continue to rise as the population ages (Arthritis Foundation of Australia, 2001).

In summary, the burden of connective tissue disease in Australia and Tasmania is increasing. Socio-demographic factors are primarily responsible for this increase. The known chemical agents associated with connective tissue disease do not appear to be major contributors to this burden of disease in the St Helen's area.

The number of cases reported in Dr Bleaney's correspondence appears consistent with the estimated burden of disease expected in the Break O'Day area, particularly taking into consideration the fact that a general practitioner's case load is biased towards people with an illness or disease; and also noting the significant differences in the age distribution of the population in that area.

Haematopoietic Malignancy

In her correspondence, Dr Bleaney states "There seem to be an increasing number of patients in the last 18 months with myelodysplasia / lymphoma / leukaemia"

Outcome of general discussion with the Registrar, Tasmanian Cancer Registry, Menzies Research Institute:

According to the Tasmanian Cancer Registry, there is no evidence of an increased incidence of haematopoietic malignancy in the Break O'Day area.

However, there are no reliable data for Myelodysplasia because the disease is not included as a diagnostic category recorded by cancer registries.

In terms of overall cancer rates, there are few differences in cancer incidence and mortality rates between Tasmania's local government areas or between remote and less remote areas. The observed socio-economic differentials in cancer incidence are likely to reflect differences in lifestyle, behavioral and environmental risk factors across socio-economic groups.

Cancer incidence by Local Government Area (LGA) 1996 - 1999

There is little variation in the incidence of cancer across LGAs. The only areas with an incidence of cancer that was statistically significantly different from that in the Tasmanian population as a whole were:

- the Glenorchy LGA, which had a significantly above-average incidence of all cancers in males; and
- the West Tamar LGA, which had a significantly below-average incidence of smoking-related cancers in males.

These differences are likely to reflect differences in the distribution of behavioral, social and environmental risk factors for cancer in these LGAs.

Cancer incidence and mortality by remoteness 1993 - 1999

The incidence of all cancers combined, prostate cancer in males and breast cancer in females are significantly higher in persons living in inner regional parts of Tasmania than in those living in more remote areas. A factor contributing to this difference is likely to be increased case ascertainment through participation in screening testing and programs, in inner regional areas. Cancer mortality in remote and very remote areas is not statistically significantly different to cancer mortality in more accessible areas for either males or females.

Cancer incidence by socio-economic status 1996 - 1999

Tasmanians living in localities of relatively low socio-economic status have significantly higher incidence rates of lung cancer and all smoking-related cancers combined. Males living in localities of relatively high socio-economic status had significantly higher incidence of melanoma.

Outcome of review of the literature:

LEUKAEMIA AND LYMPHOMA

Each year, about 345,000 new cases of cancer are diagnosed in Australia, of which about 270,000 are non-melanocytic skin cancers. Excluding these, there were 77,666 new registrable cancer cases and 34,089 deaths due to cancer in 1996. The most common registrable cancers in 1996 were: colorectal (10,998 new cases), prostate (10,055); breast (9706); melanoma (7761); lung (7621) and; non-Hodgkin's lymphoma (3105). Cancer is therefore a major cause of death in Australia. Males have a 1:3 and females a 1:4 chance of developing cancer in their lifetime.

Table 1: Leukaemia and related blood diseases in Australia in 1997(AIHW)

Disease	Cases diagnosed	Lifetime risk	Age profile (years)
Non-Hodgkin's disease	3137	1 in 75	Mainly over 45
Hodgkin's lymphoma	399	1 in 621	15-30 and over 50
Multiple myeloma	906	1 in 257	89% are over 40
Chronic lymphocytic leukaemia	561	1 in 429	Mainly over 60
Acute lymphocytic leukaemia	281	1 in 1023	Highest risk 2 to 5 years
Acute myeloid leukaemia	654	1 in 362	Increases with age
Chronic myeloid leukaemia	333	1 in 333	Increases with age
Other specified leukaemia	39	1 in 5582	N/A
Unspecified leukaemia	112	N/A	N/A
Total	6466		

The mechanism of neoplastic transformation producing leukaemia is poorly understood but involves a fundamental alteration of DNA conferring heritable malignant characteristics to the transformed cell and its progeny. In animals, leukaemias can be induced by retroviruses which either carry a transforming gene (viral oncogene) or integrate into specific sites in DNA causing activation of cellular proto-oncogenes (Braunwald et al., 2001).

The understanding that certain chemicals and radiation can dysregulate haematopoiesis, resulting in leukaemogenesis, is a relatively recent one. Acute Myeloid Leukaemia (AML) is the dominant leukaemia associated with drug or chemical exposure, followed by myelodysplastic syndrome. The principal class of chemical agents involved in leukaemogenesis are the alkylating agents, used in cancer chemotherapy. These can cause myelodysplastic syndrome and / or AML. They include cyclophosphamide, melphalan, busulfan, chlorambucil, and nitrosurea compounds. Other compounds implicated include azathioprine, procarbazine, doxorubicin, and bleomycin. Of the aromatic hydrocarbons, only benzene has been proven to be leukaemogenic. Treatment with topoisomerase II inhibitors, particularly the epipodophyllotoxins etoposide and teniposide, can induce AML. Exposure to high dose gamma or x-ray radiation is also associated with leukaemogenesis. Other controversial agents include 1,3-butadiene, non-ionizing radiation and cigarette smoking (Casarett and Doull, 2001).

A number of studies assessed the relationship between triazines and lymphoma. An increased rate of non-Hodgkin's lymphoma (NHL) has been repeatedly observed among farmers, but identification of specific exposures that explain this observation has proven difficult (DeRoos et al., 2003). In a study by Schroeder et al. (2001), archival biopsies from 182 non-Hodgkin's lymphoma cases included in a case-control study of men in Iowa and Minnesota (the Factors Affecting Rural Men, or FARM

study) were assayed for t(14;18) using polymerase chain reaction amplification. Associations between agricultural exposures to atrazine (OR 1.7, 95% CI = 1.0-2.8) and t(14;18)-positive non-Hodgkin's lymphoma were demonstrated.

In a study by Hoar Zahm et al. (1993), the role of atrazine in the development of human non-Hodgkin's lymphoma (NHL) was investigated in three case-referent studies conducted in four midwestern states in the United States. A total of 993 white men with NHL and 2918 population-based referents were interviewed concerning their agricultural practices. When the results of the three studies were combined, atrazine use was associated with an odds ratio of 1.4 (95% CI 1.1-1.8) for NHL. However, adjustments for the use of 2,4-dichlorophenoxyacetic acid and organophosphate insecticides reduced the apparent association between NHL and atrazine in all but one State and reduced the associations for the long-term and frequent users in Nebraska. Detailed analyses suggested that there was little or no increase in the risk of NHL attributable to the agricultural use of atrazine. The authors summarize their findings as follows "It has been suggested that pesticides, and herbicides in particular, may be playing a role in the large increase in the occurrence of non-Hodgkins lymphoma that has taken place over the last 15 years in the United States"...."The factors responsible for this increase must be causally associated with NHL and must have an increased prevalence of exposure." "The results presented in this paper suggest that it is unlikely that atrazine exposure explains any appreciable amount of the observed increase in NHL".

Sathiakumar and Delzell in 1997 conducted a review of studies of NHL and triazine exposure. The authors concluded that chance and/or confounding by other agricultural exposures may have produced these weak statistical associations in studies they assessed. A pooled analysis of case-control studies and the combined analysis of retrospective follow-up studies did not demonstrate the types of dose-response or induction time patterns that would be expected if triazines were causal factors in development of NHL.

MYELOMA

Myeloma is a bone marrow cancer that affects males and females in their middle age, with the greatest incidence in the 60 to 70-age range. Recently the incidence of myeloma has been increasing in younger people - aged 35 to 45 years.

The number of myeloma diagnoses has steadily increased over the last decade. Better diagnostic techniques and the higher average age of the general population explain the apparent rising incidence of MM over the last two decades. However, a trend in the past three to four decades towards more frequent myeloma in patients under age 55 raises the possibility of important environmental causative factors.

In 1979, Ichimaru et al. (Ichimaru et al. 1979) concluded that there was a statistically significant increased incidence of MM between 1950 and 1976 among the survivors exposed to radiation dose estimates of more than one Gy after the atomic bombs at Hiroshima and Nagasaki. The increased incidence of MM became apparent about 20 years after radiation exposure. The Life Span Study of Atomic Bomb Survivors by the Radiation Effects Research Foundation has added 12 years of follow-up for the occurrence of MM. A recent re-analysis of the data, using Dosimetry System 1986

dose estimates, re-evaluation of all of the cases included in previous studies and an estimation of the excess absolute risk (EAR), has changed the conclusions about the effect of radiation on the incidence of MM (Preston et al. 1994). The increased EAR for acute lymphocytic leukaemia, acute myelogenous leukaemia and chronic myelogenous leukaemia was confirmed. There was some evidence of an increased risk of lymphoma in males, but not in females. The risk of developing chronic lymphocytic leukaemia and MM was not increased.

Employment in agriculture (predominantly farming) is the occupation most frequently associated with myeloma. Most studies have detected this association (Riedel and Pottern 1992), but a few have not (Brownson and Reif, 1988; Reif et al. 1989). These studies have not been able to identify the aspect of agricultural work, be it contact with animals, grains, dust, fertilisers, pesticides or engines, which increase the risk of farmers for myeloma. Statistical associations have been made between employment as metal workers and an increased risk of myeloma. Small numbers of cases and a lack of information on actual exposures make it difficult to determine whether particular metal dusts or fumes, or other occupational exposures, are responsible for the elevated risks observed.

Reports of increased myeloma mortality in workers employed in rubber manufacturing occur in the literature, but only one of these studies reported a statistically significant increase, and that was in white male union rubber reclaim workers in the U.S. (Delzell and Monson, 1985). A recent evaluation of British rubber reclaim workers did not find an increased risk of myeloma mortality (Sorahan et al. 1989).

An association of an increased risk of myeloma with workers in the wood, leather and textile industries has been found in some studies, but the results are inconsistent, for the association has not been detected by others (Riedel and Pottern 1992).

An increased risk of myeloma has been reported among painters (Faber 1978; Friedman 1986; Bethwaite et al. 1990; Demers, Vaughan et al. 1993). The exposure of painters to chemical compounds is complex, for there are various dyes, pigments and solvents, which are known to be mutagenic, in their environments. The specific agent(s), if there are any, associated with the increased risk of myeloma in painters have not been identified.

The use of hair dye has been associated with an increased risk of myeloma in some studies (Guidotti, Wright et al. 1982; Brown, Everett et al. 1992). Hair colouring agents are known to contain constituents, including aromatic, nitro, and amino compounds, that are carcinogenic or mutagenic in animal or laboratory tests. Again, suspicion has not focused on any specific component of hair dyes.

There have been several case reports of myeloma in subjects exposed to benzene (Aksoy et al. 1984). A cohort analysis of workers (predominantly white males) employed in the manufacture of rubber hydrochloride in pliofilm plants, by a process which includes the dissolution of natural rubber in benzene, detected four deaths from myeloma. The expected number of myeloma deaths in an unexposed normal population of the same age, sex and race, was one. However, three of the workers who developed myeloma in this study had minimal exposure to benzene (one had

worked at the plant for only four days), and there was no trend toward an increasing myeloma incidence with greater exposure (Rinsky et al. 1987). An update of this study has added seven years of follow-up (Paxton et al. 1994). No new cases of myeloma have developed, and the standardised mortality ratio for myeloma is no longer elevated significantly in this benzene-exposed cohort.

Workers in petroleum refining and petroleum production, and those exposed to fuel combustion products (e.g. truck drivers) may also be exposed to benzene, among other petroleum products. A meta-analysis of close to 100 published and unpublished reports of epidemiologic surveys of petroleum industry employees found that the risk of developing myeloma was the same as the risk in the general population (Wong and Raabe, 1989). Two recent large studies of exposure to exhaust fumes have reached different conclusions. In Denmark a historical cohort study compared the cancer-specific mortality of 14,225 exposed truck drivers with an unexposed group of 43,024 unskilled labourers, both followed for 10 years (Hansen, 1993). There were five deaths from myeloma among the truck drivers, where 1.25 was expected. This was an unexpected finding, and the author cautions that although it is statistically significant, it may still be due to chance. In contrast, a study of the cancer risk of 160,230 members of a prepaid health care plan who reported their exposure to engine exhaust during a routine health examination, failed to detect an increased risk of myeloma among exposed workers (Vandeneeden and Friedman, 1993).

MYELOYDYSPLASIA

In myelodysplasia abundant marrow lacks normal maturation of cellular components so that the delivery of mature cells into the peripheral blood is deficient.

Myelodysplastic syndromes (MDS) are clonal haematopoietic stem cell disorders characterised by ineffective and dyspoietic haematopoiesis. There is an increased tendency (in roughly one third of cases) to progress towards secondary leukaemia. The natural history of these disorders is variable and ranges from a chronic condition to a rapid course towards leukaemic progression.

It is difficult to determine the incidence of the myelodysplastic syndrome because the disease is not included as a diagnostic category in most tumour registries. The frequency of myelodysplasia increases with advancing age. In some patients, myelodysplastic syndrome occurs in association with preceding disorders such as malignancy and bone marrow dysfunction. In others, myelodysplasia may follow radiotherapy or chemotherapy.

Although the incidence of MDS is uncertain, it has become clear that MDS is at least as common as acute myelogenous leukaemia (AML) (Steensma and Tefferi 2003).

As discussed above in the leukaemia and lymphoma section, environmental risk factors, such as radiation and certain chemicals (such as benzene), have been linked to MDS. High-dose radiation exposure (such as surviving an atomic bomb blast or nuclear reactor accident) increases the risk of developing MDS. Long-term workplace exposure to benzene and certain chemicals used in the petroleum and rubber industries can increase risk of developing MDS (Casarett and Doull, 2001).

The crude incidence of all leukaemias combined in Tasmania over the period 1980 – 1999 was 10.5 cases / 100,000 population per annum. **On this basis and without adjusting for the age distribution, around 5 cases would be expected occur over 8 years in a population the size of Break O'Day Council (but this figure is likely to understate the actual incidence because of the age distribution in the area). Dr Bleaney's list includes 5 cases of leukaemia, of different types (CML, CLL, AML and ALL).**

Dr Bleaney indicates 6 patients have been diagnosed with myelodysplasia over the past 7 – 8 years (approximately – the earliest case she records appears to be 1997), one of which transformed to AML and is included as a case of leukaemia in the paragraph above.

Because the incidence of MDS has not been recorded at the Cancer Registry and there are no reliable data, it is difficult to assess the significance if any of the small case numbers that have been reported by Dr Bleaney. However, it is important to note that, according to the Tasmanian Cancer Registry, there is no evidence of an increasing incidence of haematopoietic malignancy in the Break O'Day area.

GENERAL COMMENT

The existence and reported frequency of a range of health conditions among people living in the St Helens area that has been reported by Dr Bleaney do not appear to represent a significant departure from the normal range that might be experienced in general practices servicing a population with similar socio-demographics.

REFERENCES

Aksoy, M., S. Erdem, et al. (1984). Some etiologic factors in the etiology of multiple myeloma. A study in 7 patients. *Acta Haematologica* 71: 116-20.

Bethwaite, P. B., N. Pearce, et al. (1990). Cancer risks in painters: study based on the New Zealand Cancer Registry. *Br J Ind Med* 47(11): 742-6.

Braunwald E, Fauci A, Kasper D, Hauser S. *Harrison's Principles of Internal Medicine*, 15th Edition, 2001, McGraw Hill.

Brown, L. M., G. D. Everett, et al. (1992). Hair dye use and multiple myeloma in white men. *American Journal of Public Health* 82: 1673-1674.

Brownson, R. C. and J. S. Reif (1988). A cancer registry-based study of occupational risk for lymphoma, multiple myeloma and leukaemia. *International Journal of Epidemiology* 17: 27-32.

Cancer in Australia 1997. Australian Institute of Health and Welfare (AIHW), www.AIHW.gov.au

Casarett and Doull, *Toxicology*, 6th Edition, 2001, McGraw Hill.

Delzell, E. and R. R. Monson (1985). Mortality among rubber workers. X. Reclaim workers. *American Journal of Industrial Medicine* 7: 307.

Demers, P. A., T. L. Vaughan, et al. (1993). A case-control study of multiple myeloma and occupation. *Am. J Ind. Med.* 23(4): 629-39.

De Roos AJ, Zahm SH, Cantor KP, Weisenburger DD, Holmes FF, Burmeister LF, Blair A. Integrative assessment of multiple pesticides as risk factors for non-Hodgkin's lymphoma among men. *Occup Environ Med.* 2003 Sep;60(9):E11.

Faber, M. (1978). Malignancies in Danish Thorotrast patients. *Health Phys* 35: 153-8.

Friedman, G. D. (1986). Multiple myeloma: Relation to propoxyphene and other drugs, radiation and occupation. *International Journal of Epidemiology* 15: 424-6.

Goroll A, Mulley A. *Primary Care Medicine*, 4th Edition, 2000. Lippincott.

Guidotti, S., W. E. Wright, et al. (1982). Multiple myeloma in cosmetologists. *American Journal of Industrial Medicine* 3: 169-71.

Hansen, E. S. (1993). A follow-up study on the mortality of truck drivers. *American Journal of Industrial Medicine* 23: 811-821.

Hoar Zahm S, Weisenburger DD, Cantor KP, Holmes FF, Blair A. Role of the herbicide atrazine in the development of non-Hodgkin's lymphoma. *Scand J Work Environ Health.* 1993 Apr;19(2):108-14.

Ichimaru, M., T. Ishimaru, et al. (1979). Multiple myeloma among atomic bomb survivors, Hiroshima and Nagasaki. 1950-76. *N Engl J Med* 301: 439-40.

Ledingham J. *Oxford Textbook of Medicine*, 2000, Oxford University Press.

Paxton M, Chinchilli V, Brett S, et al. Leukemia risk associated with benzene exposure in the pliofilm cohort: I. Mortality update and exposure distribution. *Risk Anal.* 1994 Apr;14(2):147-54.

Preston D, Kusumi S, Tomonaga M et al. Cancer incidence in atomic bomb survivors. Part III. Leukemia, lymphoma and multiple myeloma, 1950-1987. *Radiat Res.* 1994 Feb;137(2 Suppl):S68-97.

Reif J, Pearce N, Fraser J. Cancer risks in New Zealand farmers. *Int J Epidemiol.* 1989 Dec;18(4):768-74.

Riedel D, Pottern L. The epidemiology of multiple myeloma. *Hematol Oncol Clin North Am.* 1992 Apr;6(2):225-47.

Rinsky R, Smith A, Hornung R et al. Benzene and leukemia. An epidemiologic risk assessment. *N Engl J Med.* 1987 Apr 23;316(17):1044-50.

Sathiakumar N, Delzell E. A review of epidemiologic studies of triazine herbicides and cancer. *Crit Rev Toxicol.* 1997 Nov;27(6):599-612.

Schroeder JC, Olshan AF, Baric R, Dent GA, Weinberg CR, Yount B, Cerhan JR, Lynch CF, Schuman LM, Tolbert PE, Rothman N, Cantor KP, Blair A. Agricultural risk factors for t(14;18) subtypes of non-Hodgkin's lymphoma. *Epidemiology.* 2001 Nov;12(6):701-9.

Sorahan T, Parkes H, Veys C. Mortality in the British rubber industry 1946-85. *Br J Ind Med.* 1989 Jan; 46(1):1-10.

Steensma DP, Tefferi A. The myelodysplastic syndrome(s): a perspective and review highlighting current controversies. *Leuk Res.* 2003 Feb;27(2):95-120.

The Prevalence Cost and Disease Burden of Arthritis in Australia, Access Economics Report for Arthritis Foundation of Australia, 2001

Wong O, Raabe G. Critical review of cancer epidemiology in petroleum industry employees, with a quantitative meta-analysis by cancer site. *Am J Ind Med.* 1989;15(3):283-310.

APPENDIX:

**AGE STRUCTURE BREAK O'DAY LOCAL GOVERNMENT AREA
POPULATION vs TASMANIA**

