Case-control study of modifiable risk factors for Motor Neuron Disease

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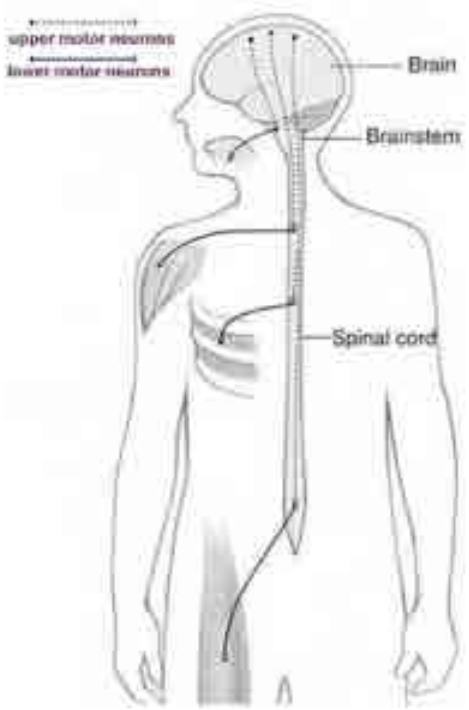
Motor Neurone Diseases

A spectrum of neurodegenerative disorders characterised by progressive muscular paralysis due to degeneration of motor neurones in the primary motor cortex, brainstem and spinal cord.

Common forms include:

- **ALS** - Amyotrophic Lateral Sclerosis
- **PLS** - Primary Lateral Sclerosis
- **PBP** - Progressive Bulbar Palsy
- **PMA** - Progressive Muscular Atrophy



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Motor Neurone Diseases

Disease begins in one part of the body and spreads to adjacent regions until the entire body is involved.

Weakness and wasting of muscles causes increasing loss of mobility in the limbs, and difficulties with speech, swallowing and breathing.

Death due to respiratory failure and other pulmonary complications on average after about 3 years.

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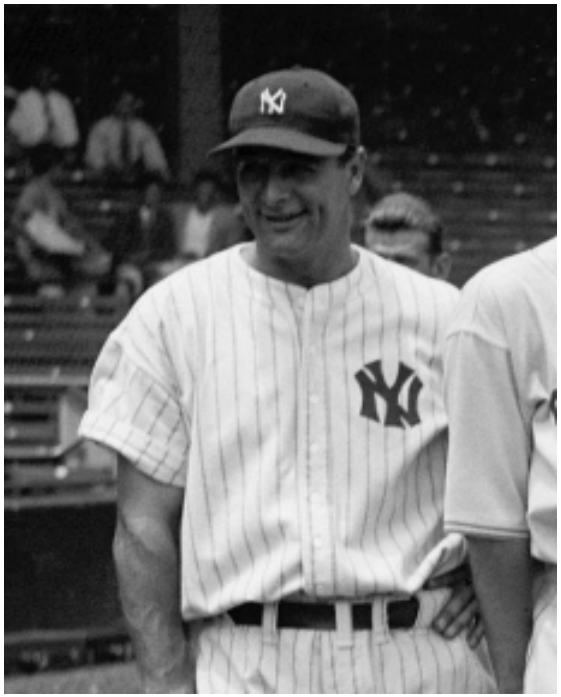
Motor Neurone Diseases

Sensory function and intellectual ability are generally unaffected until the late stages of the disease.

No cure or standard treatment for MND, and although palliative care has improved there is no treatment that will significantly alter its course.

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Background and Epidemiology

- 300 cases in NZ at any one time (7/100,000 pa)
- 100 new cases each year (2/100,000 pa)
- Highest incidence at age 50-70 years
- Incidence in men about double that in women

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Background and Epidemiology

- Ageing population in NZ.
- Some evidence of increasing incidence in New Zealand.
- Aetiology is largely unknown (some genetic polymorphisms and increasing age are known risk factors).
- Only 5-10% of cases are familial, the remainder are of the “sporadic” or randomly occurring form.

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Potential Environmental Causes

A role for environmental causes is suggested by:

- Lack of evidence of a strong genetic component.
- Differences in incidence by geographical region.
- Increases in incidence observed in some regions (incl. NZ) over a relatively short period.
- Higher incidence in males than females.
- (Inconsistent) associations observed in epidemiological studies.

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Associations Observed in Previous Studies

Occupational Exposures:

- Agricultural chemicals
- Electromagnetic fields
- Welding
- Electrical occupations
- Electric shock
- Various metals
- Organic solvents
- Methyl bromide fumigants???

Other risk factors:

- Smoking
- Military service
- Rural vs. urban residence
- History of head injury

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Time is up for Methyl Bromide

Posted on 22 April 2010.

Tags: Centreport, environment, Health and safety, Methyl bromide, motor neuron disease, Picton, Port of Tauranga, Port of Wellington, Ports, shipping

The Maritime Union is backing rallies in New Zealand ports over the next week to end the use of methyl bromide.

Maritime Union of New Zealand General Secretary Joe Fleetwood says maritime workers want to see the toxic gas taken out of use.

“The time is up for methyl bromide and New Zealand needs to be moving into line with where the world is going.”

Methyl bromide is used in ports and aboard ships to fumigate logs for pests but most of New Zealand’s major trading partners will accept other treatments.

Methyl bromide also harms the ozone layer, and is being phased out internationally under the Montreal Protocol.

Mr Fleetwood says the deaths of six port workers in Nelson from motor neuron disease has led to ongoing debate about possible links with methyl bromide

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MND Study Aims

The overall aim of this research is to find what causes this disease.

Specific study hypotheses include:

1. That known personal and lifestyle risk factors are associated with MND in New Zealand, including:

- Smoking
- increasing age
- family history of MND
- education level attained
- participation in sports with a risk of head injuries

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Study Aims

2. That known or suspected occupational exposures (of both the study participants and of their parents) are associated with MND in New Zealand, including:

- electrical injury/electrical occupations/EMFs
- veterinarians,
- radio/dental/MD/x-ray/laboratory technician,
- cutting/cooling or lubricating oils,
- antifreeze or coolants,
- agricultural chemicals,
- welding and/or soldering,
- metals including lead, aluminium and iron,
- organic solvents

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Study Aims

3. That known or suspected environmental exposures are associated with MND in New Zealand, including:

- fumigants such as methyl bromide
- other agricultural chemicals
- rural or urban residence

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The MND Case-Control Study

- A New Zealand population based Case-Control study
- Use MNDANZ register to identify prevalent and incident cases over 2.5 years – up to 550 cases.
- Two controls per case randomly selected from the Electoral Roll
- Interview by Research Nurse
- Standard questionnaire to obtain information on:
  - demographic details
  - residential history
  - lifestyle factors
  - main occupation of parents
  - complete occupational history

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The MND Case-Control Study

- Multiple logistic regression, adjusting for potential confounders, to estimate odds ratios for each risk factor while controlling for the others.
- Occupational exposure determined through use of NZJEM, and also EMF and Chemical JEMs from INTEROCC study.
- EPA (HSNO) data on location of use of specific chemicals linked to information on residence.

MND Study Investigators

Dr David McLean - Senior Research Officer at CPHR
Dr Andrea 't Mannetje - Senior Research Officer at CPHR
Wendyl D'Souza - specialist in Neurology at St Vincent's Hospital in Melbourne, and Senior Lecturer in Neuro-epidemiology at the University of Melbourne, Faculty of Medicine, Dentistry and Health Sciences.
Dr Melanie McConnell - Cell Survival Research Group Leader at the Malaghan Institute of Medical Research. Current research includes a study aiming to identify specific targets of the stress response protein SIRT1 that are relevant to the survival of neurons in individuals with motor neurone disease.
Leonard van den Berg - Professor of Neurology at the University Medical Centre Utrecht and Director of the Netherlands ALS Centre. Principal Investigator in the PAN Study.
Hans Kromhout - Professor in Environmental Epidemiology, Utrecht University, The Netherlands.
Neil Pearce - Professor of Epidemiology and Biostatistics at the London School of Hygiene and Tropical Medicine (and former CPHR Director).
Jeroen Douwes – Professor and Director of CPHR.