Request for an Investigation/Review in Response to Notice of Investigation TOXIC ENCEPHALOPATHY
Author: Kathleen Henry 2 April 2004

36 Commonwealth Department of Veterans’ Affairs Australian Gulf War Veterans’ Health Study 2003.


38 Annual Report of the Department of Veterans' Affairs > Outcome 5–Defence Force Services

39 F111 Deseal/Reseal Board of Inquiry Volume 1, Appendix 5, Health Effects

40 Defence MEDIA RELEASE 07/09/2001 MSPA 345/01 AIR FORCE TO PUT PEOPLE FIRST FOLLOWING INQUIRY

41 Senate Foreign Affairs, Defence and Trade Legislation Committee – Budget Suplementary Estimates 2002 – 2003; November 2002 Answers to questions on notice from Department of Veterans’ Affairs

42 General Entry Qualified Entry Aircraft Surface Finisher (Spray Painter) (ASURFIN)


44 Abstract ‘Living in a citadel’: the participation of mentally ill war veterans in Australian society Dr Kristy Muir Australian Social Policy Conference, 9-11 July 2003


47 DEF(AUST)206E Handbook of Liquid Fuels, Lubricants and Allied Products.

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[Acute toxicity of trichloroethylene. Description of a case series at the
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Prognosis in chronic toxic encephalopathy. A two-year follow-up study in 26
house painters with occupational encephalopathy. Bruhn P, Arlien-Søeborg P,

Long-term follow-up of psychological distress, social functioning, and coping
style in treated and untreated patients with solvent-induced chronic toxic encephalopathy.

Chronic toxic encephalopathy: social consequences and experiences from a
rehabilitation program. Abjörnsson G, Orbaek P, Hagstadius S Rehabil Nurs 1998 Jan-
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Prospective clinical and psychometric investigation of patients with chronic toxic
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Health 1988 Feb 14:37-44
Niklasson M, Arlinger S, Ledin T, Moller C, Odkvist L, Flodin U, Tham R Department of Otorhinolaryngology, Head and Neck Surgery, Faculto of Health Sciences, University Hospital, Linkoping, Sweden. PMID:9728772, UI: 98396973


19 Chronic Organic Solvent Neurotoxicity: Diagnostic Criteria was written by Dr Evan Dryson, OSH Departmental Medical Practitioner in conjunction with Associate Professor Jenni Ogden, Department of Psychology, Auckland University. Published by: Occupational Safety and Health Service, Department of Labour Wellington, New Zealand. Issued September 1992 Reprinted March 1998 ISBN 0-477-03510-8 OSH 2400 BFO


Appendix of References

3  Chronic toxic encephalopathy in a painter exposed to mixed solvents.  
4  Psychological test performance during experimental challenge to toluene and n-butyl acetate in cases of solvent-induced toxic encephalopathy.  
5  From: Chemical Hazards Handbook  Section: 2 Chemicals and Chemistry - Toxicity - Toxic effects - Nervous system
6  Organic Solvent Neurotoxicity  Extract from  
   (Lond.)
7  NIOSH Report - CURRENT INTELLIGENCE BULLETIN 48 Organic Solvent Neurotoxicity  March 31, 1987
9  Toxic Encephalopathy Due to Chronic Toluene Abuse : Report of a Case With Magnetic Resonance Imaging DR. PURUSHOTTAM DIXIT, DR. S R NADIMPALLI, DR. ROBERT P CAVALLINO. Department of Radiology, Illinois Masonic Medical Center, 836 Wellington Avenue, Chicago, IL 60657-5193. USA. Vol - Issue 9 No_02 May 1999
10 British Medical Journal Volume 322:1775-1780 June 21, 1990 Number 25 An outbreak of toxic encephalopathy caused by eating mussels contaminated with domoic acid  
   TM Perl, L Bedard, T Kosatsky, JC Hockin, EC Todd, and RS Remis
11 MR in Trichloroethane Poisoning  Montserrat del Amo, Juan Berenguer, Teresa Pujol, and J. M. Mercader
12 Interaction between smoking and glutathione S-transferase polymorphisms in solvent-induced chronic toxic encephalopathy.  
On the basis of the evidence presented, I believe that there is sufficient sound medical-scientific evidence of the cause and effects of Toxic Encephalopathy. I also believe that there is sound evidence of a causal link to use in the Defence Force and that it can be reasonably attributable to activities and duties performed while undertaking Defence Service, and that it is in fact, a direct result of some of those duties and activities. Therefore, I believe an Investigation into a Statement of Principles on Toxic Encephalopathy could be justified.
CLOSING STATEMENT

As outlined above, there are significant amounts of research data available on Toxic Encephalopathy, its causes, symptoms and long term effects. The World Health Organisation recognised occupational solvent exposure and its effects as early as 1985. The Report of the F111 Deseal/Reseal Board of Inquiry Volume 1, Chapter 2 confirms the Australian Defence Force did not introduce the safety precautions to serving members until recent years. Workplace Health and Safety and Occupational Medicine did not keep pace with the World Health Organisation guidelines and the result has been a large number of exposed serving and ex-servicemen suffering for many years from the effects of undiagnosed Toxic Encephalopathy. While researching this disease, I realise there are many hundreds of men who have been seeking help knowing something is wrong with their brain, knowing that it is because of chemical exposure in their particular branch of the ADF, but not understanding what the problem is and not receiving treatment or recognition for their conditions. This has resulted in the complete breakdown in relationships, social isolation, loss of their ability to work and provide an income for their families, and loss of esteem and worth. All these burdens have been encumbered upon these men in addition to the symptoms suffered by this disease.

The injustice is that there is and always was a preventative solution to the effects of chronic occupational chemical and solvent exposure – ventilators and adequate protective clothing, and limiting the exposure time by staff rotation. These men and their families have to live with the consequences of inadequate Workplace Health and Safety Procedures within their ADF working environment, as confirmed by the F111 Deseal/Reseal Board of Inquiry, because there is no cure and the effects are irreversible.

I believe there is sufficient evidence that the ADF has exposed members to toxic contaminants during their military career. The Report of the F111 Deseal/Reseal Board of Inquiry confirmed that the health symptoms currently being experienced by workers on the various Deseal/Reseal programs are ‘reasonably attributable’ to exposure to chemicals used in the maintenance processes conducted on F-111 fuel tanks. However, the uncontrolled use of toxic chemicals has been service wide and continues, and these men, selected above their peers, tested for aptitude and intelligence for suitability for a career in the military, have now lost the very thing that placed them above their peers.
Additional toxic chemicals and solvents still in use by the RAAF are listed in DEF(AUST)206E Handbook of Liquid Fuels, Lubricants and Allied Products. 47

The recently released Final Report of the Expert Panel to Review SAS Veterans’ Health Concerns provides a causal link of chemical and solvent exposures to members of the SAS during both training and active service. The unprotected exposure to lead and coloured smokes was also common within other regiments of the Army, but no scientific studies are available to quantify this statement.

**Other Related Factors for Solvent Exposed personnel**

Mental Health is already recognised by DVA as having sufficient medical-scientific evidence of a causal link to military service. The DVA commissioned a study on the Pathways to Care in Veterans Recently Compensated for a Mental Health Condition. 48 This care predominately addresses Post Traumatic Stress Disorder for members of the ADF who have served in active duty. Many of the symptoms suffered by members within the F111 Deseal/Reseal group include the defined symptoms of PTSD.

The limitation of the study is that it excludes neurotoxic disorders and the limitation of the SOP for Post Traumatic Stress Disorder (PTSD) is that it excludes assistance to members who undertook military service but did not go to war or who were not placed in an immediate life threatening situation.

In their research, Drs Waddington A, Ampelas JF, Mauriac F, Bronchard M, Zeltner L, Mallat V Encephale express The feeling of deep distress, the feeling of being trapped, the loss of control, the collapse of basic beliefs, the feeling that one's life is in jeopardy, that the physical integrity is (really or in one's imagination) threatened, the feeling of helplessness, are quite as much clues for a possible PTSD which hides behind others clinical manifestations either psychological or somatic.

[Post-traumatic stress disorder (PTSD): the syndrome with multiple faces] 49

Many members who are suffering from the long term effects of toxic chemical and solvent exposure as a function of their duties in the F111 Deseal/Reseal and Spray Seal programs at RAAF Amberley, with the resultant neurotoxic effects, because of the lack of preventative procedures and appropriate medical care, are also suffering the effects of PTSD. Lack of recognition (including treatment and compensation) from medical authorities, DVA and MCRS of the toxic chemical and solvent exposure and the resultant symptoms of Toxic Encephalopathy, together with their associated medical disorders, for so long, has in itself created a PTSD condition which only adds to their symptoms and inhibits mental, social and relationship improvement.
Is there Service Documentation proving the use of named chemicals or solvents

- A random search of The Australian Defence Force Australian Air Publication 7004.007CD Australian Defence Aviation Authorised Spares System (ADAASS) dated 1 March 2004 confirmed that the following chemicals identified in the F111 Board of Inquiry are still in use within the RAAF and are the recognised approved chemicals for performance of certain tasks associated with aircraft maintenance.

  - Toluene – Listed on Page 1823 for use on Hercules C130 E & H Model Aircraft for use by Surface Finishers
  - Turco – Listed on Page 1823 for use on Hercules C130 E & H Model Aircraft for use by Surface Finishers
  - Xylene – Listed on Page 1823 for use on Hercules C130 E & H Model Aircraft for use by Surface Finishers
  - Toluene – Listed for use on PC3 Orion Fire Control System
  - Trichlorethylene – Listed for use on Blackhawk A25A S-70A-9 for use by Avionics Technicians
• Drs Abjörnsson G, Orbaek P, Hagstadius S report *Their psychiatric symptoms, measured during a structured interview by a nurse, decreased significantly immediately after the treatment period but increased again after 6 months.*

*Chronic toxic encephalopathy: social consequences and experiences from a rehabilitation program.* \(^{34}\)

• Dr Evan Dryson and Associate Professor Jenni Ogden published *Workers with significant impairment will find it hard to both find and cope with a different job. Retirement on medical grounds may be the only option.*

*Chronic Organic Solvent Neurotoxicity: Diagnostic Criteria.* \(^{19}\)

• Drs Orbaek P, Lindgren M further report *These toxic encephalopathy patients improved subjectively when exposure stopped. Psychometrically they performed very close to the initial testing, which excluded progressive brain disease or subacute pharmacological solvent intoxication.*

*Prospective clinical and psychometric investigation of patients with chronic toxic encephalopathy induced by solvents* \(^{35}\)

• Dr J. Donald Millar reports *The investigators concluded that these changes may indicate irreversible brain reactions to organic solvent exposure.*

*NOISH Report - CURRENT INTELLIGENCE BULLETIN 48 Organic Solvent Neurotoxicity* \(^{5}\)

**Is there evidence of recognised acknowledgement of Chemical and Solvent Exposure to members of the Australian Defence Force?**

Various Studies and Reports indicate that several government authorities recognize and accept that members of the Australian Defence Forces have been exposed to toxic substances during the course of duty, whether during wartime, peacekeeping functions, hazardous service or, of particular importance, in general military service.

The following lists some of the Studies and Reports which refer to these exposures.

• *Commonwealth Department of Veterans’ Affairs Australian Gulf War Veterans’ Health Study 2003.* \(^{36}\)

• *Cancer Incidence Study 2003: Australian Veterans of the Korean War 02-DEC-03* \(^{37}\)

• *Annual Report of the Department of Veterans’ Affairs 2002-2003 > Outcome 5–Defence Force Services* \(^{38}\)
What is the Prognosis for persons with Toxic Encephalopathy?

Several studies have been undertaken to ascertain the longevity and permanency or progression of damage to the brain of solvent exposed workers. The studies have revealed:

- Drs Dryson EW, Ogden JA investigation reports *The largely irreversible nature of Type 2 CTE is confirmed. The study results suggest that severity of effect and partial recovery are not dose related but multifactorial, with individual susceptibility probably important. Concomitant depression may also adversely influence recovery.* Organic solvent induced chronic toxic encephalopathy: extent of recovery, and associated factors, following cessation of exposure.  

- Drs Edling C, Ekberg K, Ahlborg G, Alexandersson R, Barregård L, Ekenvall L, Nilsson L, Svensson BG research findings note *There was no support for the view that a solvent induced toxic encephalopathy is a progressive disease comparable with presenile dementia such as Alzheimer's disease or Pick's disease. If a worker was removed from exposure when he presented symptoms without signs of impairment in intellectual function, recovery was seen in most cases.* Long-term follow up of workers exposed to solvents

- Drs Bruhn P, Arlien-Søborg P, Gyldensted C, Christensen EL state *Long-term exposure to organic solvents may lead to a chronic brain syndrome. Once intellectual impairment and/or cerebral atrophy had developed, reversibility is not observed. Nor is further progression to be expected if exposure is stopped. Occupational exposure to organic solvents should be maximally restricted as it represents a risk of inducing invalidating brain syndromes.* Prognosis in chronic toxic encephalopathy. A two-year follow-up study in 26 house painters with occupational encephalopathy

- Drs Abjörnsson G, Pålsson B, Bergendorf U, Karlson B, Osterberg K, Seger L, Orbaek P report *TE patients continued to live with increased psychological distress and used predominantly emotionally focused strategies to cope with their problems. This can be a cause for concern in family life and can also make gainful work impossible.* Long-term follow-up of psychological distress, social functioning, and coping style in treated and untreated patients with solvent-induced chronic toxic encephalopathy.
• Drs Pistelli A, Masini E, Caramelli L, Botti P, Peruzzi S, Zorn AM, Mannaioni PF report The identification of the solvent metabolic pathway allowed to clarify the pathogenesis of hepatorenal dysfunction observed during acute intoxications. Together with gastrointestinal decontamination and cardiac arrhythmia control we have studied the effect of drugs supposed to act as blockers of trichloroethylene metabolism.

[Acute toxicity of trichloroethylene. Description of a case series at the Autonomous Service of Toxicology of Florence during the 1977-1988 period]^{28}

• Dr Frumkin H noted This report describes a case of olivopontocerebellar atrophy, a form of multiple system atrophy, developing in an adult after over 30 years of occupational exposure to carbon disulfide. The patient presented with the insidious onset of balance problems, impotence, and irritability, without tremor, cogwheel rigidity, bradykinesia, or changes in facial expression.

Multiple system atrophy following chronic carbon disulfide exposure.^{29}

What tests are conducted for the recognised diagnosis of Toxic Encephalopathy?

Chronic Organic Solvent Neurotoxicity: Diagnostic Criteria was published by Occupational Safety and Health Service, Department of Labour Wellington, New Zealand. This document suggests the following tests may be conducted to assist in the clinical determination of Toxic Encephalopathy, and gives an outline of each testing procedure and expected outcome.

• Clinical Neurological Examination
• Neurophysiological Tests including
  Nerve Conduction Studies
  Electroencephalography
  Evoked Potentials
  Electroneuromyography
  Visual Contrast Sensitivity
• Neuroimaging including
  Computerised Tomography (CT)
  Magnetic Resonance Imaging (MRI)
  Cere tec Scanning
• Neuropsychological Testing
• Clinical Assessment
  Screening Questionnaire
  Clinical Examination
• Neuropsychological Testing

Extracted from Chronic Organic Solvent Neurotoxicity: Diagnostic Criteria was written by Dr Evan Dryson, OSH Departmental Medical Practitioner in conjunction with Associate Professor Jenni Ogden, Department of Psychology, Auckland University. Published by: Occupational Safety and Health Service, Department of Labour Wellington, New Zealand. Issued September 1992 Reprinted March 1998 ISBN 0-477-03510-8  OSH 2400 BFO (Footnote 20)
Inflammation in the CNS: balance between immunological privilege and immune responses.  

- **Drs Eskandari F, Sternberg EM report** Many lines of research have established the numerous routes by which the immune and central nervous systems (CNS) communicate. The CNS signals the immune system via hormonal and neuronal pathways and the immune system signals the CNS through similar routes via immune mediators and cytokines. The primary hormonal pathway by which the CNS regulates the immune system is the hypothalamic-pituitary-adrenal (HPA) axis, through the hormones of the neuroendocrine stress response. **Neural-immune interactions in health and disease.**

- **Dr McKenna KE states** Recent work on the central nervous system control of penile erection is reviewed. Penile erection is completely dependent on commands from the central nervous system. **Central control of penile erection.**

- **Dr A Halaris states** The endocrine system is also intricately involved in the brain and in the periphery organs. Integration of these systems is a function of the nervous system that ultimately produces a vast array of cognitive, emotional, physiological, and behavioral responses. Therefore, it is not surprising that a disturbance in even a single system will lead to dysfunction in one or more phases of the sexual response cycle. **Neurochemical aspects of the sexual response cycle.**

- **Dr JM Langman reports** The many variables which affect the absorption, metabolism and clearance of xylene include exercise, alcohol intake, cigarette smoking, co-exposure to other solvents, gender, and gastrointestinal, hepatic and renal pathology. Xylene in high concentrations acts as a narcotic, inducing neuropsychological and neurophysiological dysfunction. Respiratory tract symptoms are also frequent. More chronic, occupational exposure has been associated with anemia, thrombocytopenia, leukopenia, chest pain with ECG abnormalities, dyspnea and cyanosis, in addition to CNS symptoms. Concomitant exposure to xylene and other solvents, including toluene, affected hematological parameters, liver size, liver enzymes, auditory memory, visual abstraction, and vibration threshold in the toes. Normal metabolic pathways were altered and significant increases in some serum bile acids may reflect early liver damage. **Xylene: its toxicity, measurement of exposure levels, absorption, metabolism and clearance.**
Other Important Implications of Toxic Encephalopathy Research

Further investigations of research into Toxic Encephalopathy have revealed the following conditions which should not be excluded or negated when looking at the effects of chronic solvent exposure and the resultant Toxic Encephalopathy:

- **Drs Rabin BS, Cohen S, Ganguli R, Lysle DT, Cunnick JE** state *We believe that any questions regarding whether the CNS can alter immune system functions no longer remain. It can conclusively be stated that the immune system is susceptible to influences of the CNS.*  
  **Bidirectional interaction between the central nervous system and the immune system.**

- **Drs Becher B, Prat A, Antel JP** Glia state *the CNS is usually viewed as the target or victim of the immune assault, because such immune responses are thought to be initiated and regulated within the systemic immune compartment. The CNS-endogenous cells may themselves, however, initiate, regulate and sustain an immune response. We consider the immune regulatory functions within the CNS in terms of events occurring within the CNS parenchyma (microglia, astroglia) and at the vascular interface. These regulatory functions involve antigen presentation to T cells and polarization of the cytokine response of these cells. Such responses may contribute not only to the overall tissue injury in primary immune disorders but also in a wide range of traumatic, ischemic and degenerative processes.*  
  **Brain-immune connection: immuno-regulatory properties of CNS-resident cells.**

- **Dr Matyszak MK** states *Inflammatory components play an important part in many diseases of the central nervous system (CNS). Recent evidence suggests that this may also be true of diseases which were previously considered as purely neuro-degenerative. However, it is also clear that inflammatory responses in the CNS differ in many ways from responses in non-CNS tissues. Some of these differences have been demonstrated by the use of animal models. For example, when bacteria are injected into the brain parenchyma, they induce a typical acute inflammatory response. However, unlike in other tissues, bacteria which are not cleared from the brain parenchyma remain undetected by the immune system. Some bacteria, such as bacillus Calmette-Guérin, can persist in the brain parenchyma for months sequestered in microglia and perivascular macrophages. When an animal with an intraparenchymal bacteria deposit is later sensitised peripherally, an immune response is evoked at the site of the deposits. The lesions induced in the CNS parenchyma are T-cell mediated and show characteristics typical of a delayed-type hypersensitivity response. The lesions produce a breakdown of the blood-brain barrier and demyelination. These immune responses are similar to those described for multiple sclerosis lesions. The responses to bacteria are unique to the brain parenchyma.*
Drs Lindgren M, Osterberg K, Orbaek P, Rosén I J state: Markedly lower P300 amplitudes and in the relatively complex dual-task setting, subjects with 2A and 2B type toxic encephalopathy showed lower signal detection when tested using quantitative EEG and event-related potentials from an odd-ball and a dual-task paradigm. 

**Solvent-induced toxic encephalopathy: electrophysiological data in relation to neuropsychological findings.**

Drs Ledin T, Jansson E, Möller C, Odkvist LM noted patients with chronic toxic encephalopathy have impaired equilibrium, as demonstrated by dynamic posturography testing. 

**Chronic toxic encephalopathy investigated using dynamic posturography.**

Persson R, Osterberg K, Karlson B, Orbaek P reported the expected relationship between anxiety and cognitive vigilance is absent in TE cases. This indicates that the neuropsychological performance decrement in TE cases is not primarily related to elevated mental distress, but is probably dominated by the effects of organic brain impairment. 

**Influence of personality traits on neuropsychological test performance in toxic encephalopathy cases and healthy referent subjects.**

Drs Muttray A, Randerath W, Rühle KH, Gajsar H, Gerhardt P, Greulich W, Konietzko J reported a rare cause of the sleep apnoea syndrome is prolonged and marked occupational exposure to organic solvents. 

**Obstructive sleep apnea syndrome caused by occupational exposure to solvents.**

Dr Evan Dryson and Associate Professor Jenni Ogden published symptoms consistent with chronic solvent neurotoxicity include: Fatigue, sleep disturbances, irritability, anxiety, loss of appetite, alcohol intolerance, memory and concentration difficulties. There is often impairment of frontal lobe function, resulting in problems with planning, organisation and abstract thinking. 

**Chronic Organic Solvent Neurotoxicity: Diagnostic Criteria.**

Drs Orbaek P, Lindgren M, Olivecrona H, Haeger-Aronsen B patients with solvent induced chronic toxic encephalopathy have no severe loss of brain substance. 

**Computed tomography and psychometric test performances in patients with solvent induced chronic toxic encephalopathy and healthy controls.**
function (sensory and motor nerve conduction velocities and electromyographic abnormalities) that persisted for months to years following cessation of exposure.

- Epidemiologic studies have also shown statistically significant increases in neurobehavioral effects in workers chronically exposed to organic solvents. These effects include disorders characterized by reversible subjective symptoms (fatigability, irritability, and memory impairment), sustained changes in personality or mood (emotional instability and diminished impulse control and motivation), and impaired intellectual function (decreased concentration ability, memory, and learning ability).

- Among organic solvent abusers, the most severe disorders reported are characterized by irreversible deterioration in intellect and memory (dementia) accompanied by structural CNS damage.

- Chronic neurotoxicity in workers exposed to organic solvents over a period of months to years includes (1) peripheral neuropathies such as axonal degeneration seen in workers exposed to hexacarbon solvents (e.g., n-hexane, methyl n-butyl ketone), (2) Type 1 CNS symptoms such as fatigability irritability, and memory impairment, and (3) Type 2 mild toxic encephalopathy, including sustained personality or mood changes such as emotional instability, diminished impulse control and motivation, and impairment in intellectual function manifested by diminished concentration, memory, and learning capacity. Epidemiologic studies have demonstrated correlations of workplace solvent exposures with the types of solvent-related CNS dysfunctions noted above and changes in neurophysiologic parameters such as nerve conduction velocities.

Other Symptoms listed through Abstracts and Reports

Solvent exposed workers with diagnosed Toxic Encephalopathy have been shown to present additional symptoms as suggested in the following reports.

- Drs Niklasson M, Arlinger S, Ledin T, Moller C, Odkvist L, Flodin U, Tham R reported A previous report on vestibular pathology and the present investigation on hearing deficits suggest that long-term exposure to solvents causes disturbances of the central pathways in the otovestibular system. Audiological disturbances caused by long-term exposure to industrial solvents. Relation to the diagnosis of toxic encephalopathy. 13

- Drs Donoghue AM, Dryson EW, Wynn-Williams G studies reported Contrast sensitivity is abnormal in some cases of occupational organic-solvent-induced chronic toxic encephalopathy. Intermediate spatial frequency channel neurones in the visual system may be more vulnerable to solvent toxicity than those of low or high spatial frequency. Contrast sensitivity in organic-solvent-induced chronic toxic encephalopathy. 14
Environmental Personal Abuse.

I have not researched Abstracts for personal abuse of Solvents and Chemicals. I have viewed case studies of individuals who have presented for medical treatment of acute exposures. These case studies reveal severe symptoms of rigors, coma and death. I footnote and attach these studies for information only.

Other Acceleration Effects

Additional factors which may exacerbate or accelerate the effects of toxic solvent exposure and therefore increase the severity of Toxic Encephalopathy have also been studied.

- Doctors Ahmadi, Jonsson, Flodin and Soderkvist reported *We suggest that the GSTM1 null genotype in smokers is a possible risk for solvent-induced CTE.* In their Abstract *Interaction between smoking and glutathione S-transferase polymorphisms in solvent induced chronic toxic encephalopathy.*

- Dr J. Donald Millar states *The investigators noted that concomitant physical exercise increased the xylene uptake and may have potentiated the above-mentioned CNS effects.* NIOSH Report - CURRENT INTELLIGENCE BULLETIN 48 Organic Solvent Neurotoxicity March 31, 1987.

What are the symptoms of Toxic Encephalopathy

Several papers have been written and many studies undertaken to confirm the link between stated symptoms and Toxic Encephalopathy. These findings have been summarized in the NIOSH Report - CURRENT INTELLIGENCE BULLETIN 48 Organic Solvent Neurotoxicity March 31, 1987 and are listed below.

- The acute neurotoxic effects of organic solvent exposure in workers and laboratory animals are narcosis, anesthesia, central nervous system (CNS) depression, respiratory arrest, unconsciousness, and death.

- Acute experimental exposures of human volunteers to one or several organic solvents have impaired psychomotor function as measured by reaction time, manual dexterity, coordination, or body balance.

- Chronic animal studies with a limited number of organic solvents support the evidence for peripheral neuropathy and mild toxic encephalopathy in solvent-exposed workers.

- Epidemiologic studies of various groups of solvent-exposed workers have demonstrated statistically significant chronic changes in peripheral nerve
The definition of the severity of the illness as outlined in NIOSH Report - CURRENT INTELLIGENCE BULLETIN 48 Organic Solvent Neurotoxicity March 31, 1987 (Footnote 5) is:

- **Type 1 – Organic Affective Syndrome**
  Characterised by fatigue, memory impairment, irritability, difficulty in concentrating, and mild mood disturbance. It is reversible on removal from exposure.

- **Type 2A and Type 2B – Mild Chronic Toxic Encephalopathy**
  Symptoms of neurotoxicity and abnormalities of performance on neuropsychological testing. In addition to the Type 1 conditions, they also exhibit
  Type 2A: sustained personality or mood change, and
  Type 2B: impairment in intellectual function.

- **Type 3 – Severe Chronic Toxic Encephalopathy**
  Global deterioration in intellectual and memory functions (dementia). This condition is usually irreversible.

It is the Type 1 and 2 disorders which are most likely among solvent-exposed workers.


### What is the cause of Toxic Encephalopathy?

Toxic Encephalopathy has been defined as being caused by:
- occupational chemical and solvent exposure, or
- environmental personal abuse.

### Occupational Chemical and Solvent Exposure

The research I have undertaken is based on Toxic Encephalopathy caused by Occupational Chemical and Solvent Exposure. The Abstracts and Peer Reviewed Articles I have referenced involve among other chemicals and solvents:
- Painters solvents
- Toluene and n-butyl acetate
- Heavy Metals
- Solvents, defined as aliphatic hydrocarbons, cyclic hydrocarbons, aromatic hydrocarbons, halogenated hydrocarbons, ketones, amines, esters, alcohols, aldehydes, and ethers.
- 1,1,1-trichloroethane
Is Toxic Encephalopathy recognised as a disease in Australia?

The main diseases classification used worldwide is the International Classification of Diseases (ICD-9). Toxic Encephalitis is listed under

6. DISEASES OF THE NERVOUS SYSTEM AND SENSE ORGANS (320-389)
INFLAMMATORY DISEASES OF THE CENTRAL NERVOUS SYSTEM (320-326)
323.7 Toxic encephalitis
   Code first underlying cause, as:
   Carbon tetrachloride (982.1)
   Hydroxygunioline derivatives (961.3)
   Lead (984.0-984.9)
   Mercury (985.0)
   Thallium (985.8)
323.8 Other causes of encephalitis
323.9 Unspecified cause of encephalitis

Also

349 OTHER AND UNSPECIFIED DISORDERS OF THE NERVOUS SYSTEM
349.82 Toxic encephalopathy
   Use additional E code to identify cause

This ICD is recognised and used by the scientific and medical authorities of Australia, therefore, it is considered a valid disease.

Toxic Encephalopathy is defined in three categories:

Categories of solvent-induced CNS disorders

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<tr>
<td>Minimal</td>
<td>Organic Affective syndrome</td>
<td>Type 1</td>
</tr>
<tr>
<td>Moderate</td>
<td>Mild chronic toxic encephalopathy</td>
<td>Types 2A or 2B</td>
</tr>
<tr>
<td>Pronounced</td>
<td>Severe chronic toxic encephalopathy</td>
<td>Type 3</td>
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Extracted from NIOSH Report - CURRENT INTELLIGENCE BULLETIN 48 Organic Solvent Neurotoxicity March 31, 1987 (Footnote 5)
DESCRIPTION OF LITERARY SEARCHES CONDUCTED.

I broke down my research into several criteria:

- Is Toxic Encephalopathy recognised as a disease in Australia
- What is the cause of Toxic Encephalopathy
- What are the symptoms of Toxic Encephalopathy
- What tests are conducted for the recognised diagnosis of Toxic Encephalopathy
- What is the Prognosis for persons with Toxic Encephalopathy
- Is there evidence of recognised acknowledgement of Chemical and Solvent Exposure to members of the Australian Defence Force
- Is there Service Documentation proving the use of named solvents

I began my search using the Internet. I searched in Australia specific as well as internationally. I read over 700 Journal Letters, Articles, Case Studies, Reports, Abstracts, Peer Reviewed Letters, personal anecdotal web pages, Support Foundations, Law pages, Medline, Medscape and Entrez, and Advertisers of Natural Remedies on the following topics:

- Neurotoxicity
- Chemical and Solvent Exposure
- Toxic Encephalopathy
- Solvent Exposure + ADF

I have limited my research to Abstract, Peer Reviewed Articles and Government Documentation as directed by the Submission Guidelines and have endeavoured to ensure the articles are not more than five years old. However, some important reference documentation:


are the benchmark for this subject and cannot be excluded as these organizations are recognised as the global authority for definition of this disease.

I have also contacted a Professor of Toxicology at University of New South Wales, Research Scientists at Department of Epidemiology & Preventive Medicine at Monash University, and a local BioMedical Research Laboratory for assistance in clarification and understanding of some medical information.
REQUEST FOR AN INVESTIGATION/REVIEW  
IN RESPONSE TO  
NOTICE OF INVESTIGATION  

TOXIC ENCEPHALOPATHY  

INTRODUCTION  

Since 1986, I have watched the physical and mental deterioration of my husband. He is a Group 1 affected member of the RAAF F111 Deseal/Reseal Programs conducted at Amberley from 1977 to 1999. During my efforts to try to get recognition from DVA for his diseases and illnesses, I found that the RMA is seeking submissions for a Statement of Principles for Toxic Encephalopathy. As I have been researching my husband’s symptoms for many years, I realized that I had already come across Toxic Encephalopathy in the past and had set aside information regarding the disease.

In preparing this submission I decided on the format addressing the criteria as outlined in your Submission Guidelines rather than present this as a Scientific Research Paper.

Having completed a library search on over 700 documents, it is concluded that there is sound medical and scientific evidence that Toxic Encephalopathy may be associated with the neurocognitive dysfunction suffered by workers as shown in the Report of the F111 Deseal/Reseal Board of Inquiry. Therefore, I have proceeded with research and the submission of this Request for an Investigation for a Statement of Principles for Toxic Encephalopathy.

PURPOSE OF THIS SUBMISSION  

The purpose of this submission is to qualify the recognition, symptoms, testing procedures, and causal factors of Toxic Encephalopathy and to provide sound evidence that exposure can be related to relevant military service in Veterans, Peacekeeping Forces, hazardous service and general service within the Australian Defence Forces. The Board of Inquiry into F111 (Fuel Tank) Deseal/Reseal and Spray Seal Programs appears to provide the most thorough Defence Study on chemical and solvent exposure and provides:

- Ample evidence of chemical and solvent use within the RAAF over many years,
- Confirmation of exposure of personnel to these chemicals, and
- Evidence of the long-term ongoing effects of exposure on these personnel.