



### 3.0 Steps in Tertiary Prevention of Lead Poisoning

"Tertiary prevention aims to soften the impact of an ongoing illness or injury that has lasting effects. This is done by helping people manage long-term, often-complex health problems and injuries (e.g. chronic diseases, permanent impairments) in order to improve as much as possible their ability to function, their quality of life and their life expectancy" ([Institute for Work & Health 2015](#)).

Further to this, [Sample \(2022\)](#) states that "tertiary prevention reduces the morbidity associated with lead intoxication through chelation of lead from the blood and soft tissues" in individuals who have been exposed to or poisoned by lead.

Tertiary Prevention of Lead Poisoning is thus concerned with preventing the lead which is already in a person's body from causing further morbidity and mortality if left in the body.

Aside from the Secondary Lead Exposure Prevention measures noted in 2.4 and 2.5 (above), very high blood lead levels may require treatment and/or nutritional or other interventions for the individual at the time of the lead exposure. It is likely that treatment and other interventions are beneficial at any time later in life, even after lead exposure has been eliminated or the person has moved away from the lead source or area (region or country) where they were exposed to lead. These treatments include any measures which research indicates are useful in Tertiary Lead Poisoning Prevention (see 3.2, below) and would be called Tertiary Lead Poisoning Prevention measures.

The results of isotopic fingerprinting (as discussed earlier in xii and 2.4), could be used to identify groups of people who may benefit from Tertiary Lead Poisoning Prevention, even if they were never tested nor diagnosed with an elevated blood lead level.

The health impacts linked to elevated blood lead levels or the combination of elevated blood lead levels and other factors such as COVID-19 infection or the synergistic impacts of the combination of lead and mercury, or lead and other toxic exposures, will continue to expand as further research is conducted (see v, above).

In a study *Combined Effects in Toxicology – a Rapid Systematic Testing Procedure: Cadmium, Mercury, and Lead* ([Schubert et al 1978](#)), male rats were injected with a lead dose that caused a 1% death rate (LD1) - that is, the lead dose that when injected into 100 male rats, on its own, killed one of the rats. When an LD1 of lead was injected in combination with an LD1 of mercury, all of the rats died, resulting in a "lethal dose 100" (LD100) causing a 100% death rate. Thus, LD1 lead + LD1 mercury = LD100 lead AND



2023 Volcano Art Prize Entry. Artist: Gordon Ma

Title: Reptilian Eye

Lead-Safety Message: Lead poisoning causes cataract blindness in humans and possibly in reptiles too. Don't leave lead sinkers behind when you go fishing!

School: Creative Einstein

Age: 10

Description of Work: Colouring pencils on paper.

<https://volcanoartprize.com/portfolio-item/reptilian-eye/>



mercury synergistic effect.

### 3.1 Carry out or fund further research to discover if there are links between elevated blood lead levels at any age and the development of certain adverse health effects in later life

Lead exposure earlier in life is already strongly linked to developmental and fertility problems, gestational issues, such as ASD and ADHD, as well as many of the health problems which we normally associate with ageing, such as:

- Early death
- Hypertension, heart disease, heart attack, stroke
- Joint pain
- Alzheimer's disease and dementia
- Hearing loss
- Balance problems
- Cataracts
- Osteoporosis (researching whether it is better to leave lead in the bones or attempt to decrease bone lead levels)
- Reduced sperm count
- Loss of libido
- Parkinson's Disease, tremors
- Dental caries
- Renal problems

There is some evidence that ASD, stunted growth, writing ability, delayed onset of puberty, risk of teenage pregnancy, preeclampsia, schizophrenia, depression, and anxiety are also associated with lead exposure.

“Animal studies have demonstrated that the effects of various metals on brain development could be mediated through dysregulation in neurotransmission, and alterations in frontal and subcortical brain structures, several of which have also been implicated in ASD” ([Arora et al 2017](#)).

A study by [Szmajewicz et al \(2011\)](#) that included over 60,000 women found that “women who experience intense menopausal symptoms like hot flashes and night sweats ... may be protected from heart disease, stroke and even death years after the Change” ([Park](#)



2023 Volcano Art Prize Entry. Artist: Mudgee Region Action Group  
Title: Stop Bowdens Lead Mine  
Lead-Safety Message: Open cut lead mines hurt our health, environment and tourism. Help stop Bowdens mine. Bowdens intends to mine 130,000 tonnes of lead and build a large tailings dam across a fault line potentially creating a major acid mine drainage risk downstream. It's time to take action!  
Description of Work: Scanned flyers collaged together in Powerpoint.

<https://volcanoartprize.com/portfolio-item/stop-bowdens-lead-mine/>

2011). Is this an example of tertiary lead poisoning prevention? Could it be that the hot flushes/flushes and night sweats are associated with higher blood lead levels and/or play a role in reducing blood lead levels which thus reduce the risk of hypertension, stroke and heart disease? Further, do night sweats, or sweating in general (e.g., during exercise or in hot weather), play the same role? Studies which ask participants to log their sweating events as well as logging showering the sweat off their skin (to prevent reabsorption of the lead in it) may show that sweating is advantageous in reducing blood lead levels.

Due to the impacts of both lead exposure and COVID-19 infection/s on heart health, the National Blood Lead Surveillance System data will be used to determine if there's a correlation between high blood lead levels and dying from COVID-19 or from a heart attack following a COVID-19 infection ([Raisi-Estabragh 2022](#)).

Governments will fund research into these health effects and other diseases associated with ageing that are linked to lead exposure either in utero or later in life. For example, research the following hypotheses:

- That all-cause mortality is increased when both lead exposure and other exposures/diseases associated with all-cause mortality occur in the same individual, due to synergistic effects.
- That associations can be found between vitamin D and calcium metabolism in darker skinned people.
- That many health ailments treated using Ayurvedic medicines which include metal, bone or horn *bhasma* ingredients are actually caused or exacerbated by these ingredients.

Discovery of such links would be a step in reducing or eliminating a source of significant morbidity.



2023 Volcano Art Prize Entry. Artist: Gordon Ma

Title: Bioluminescent Blue Fungi and Bluebird

Lead-Safety Message: Earth is home to so many beautiful plants, animals and fungi, let's stop burning fossil fuels and make the world lead-safe so we can maintain biodiversity.

School: Creative Einstein

Age: 10

Description of Work: Colouring pencils on paper.

<https://volcanoartprize.com/portfolio->

[item/bioluminescent-blue-fungi-and-bluebird/](https://volcanoartprize.com/portfolio-item/bioluminescent-blue-fungi-and-bluebird/)



### 3.2 Carry out or fund research to test whether certain intervention protocols succeed in reducing the risk of development of associated adverse health effects

Once further lead exposure has been prevented (by source identification and removal), and/or a combination of nutritional intervention, chelation therapy or other treatments has successfully reduced blood lead levels, these individuals could form the basis of research cohorts.

Longitudinal controlled studies are needed to determine whether such interventions will avert anticipated adverse health outcomes, such as the risk of the development of ASD in children born to mothers who have been exposed to even low levels of lead prior to pregnancy or during windows of development and have (research cohort) or have not (control cohort) reduced their blood lead levels prior to conception.

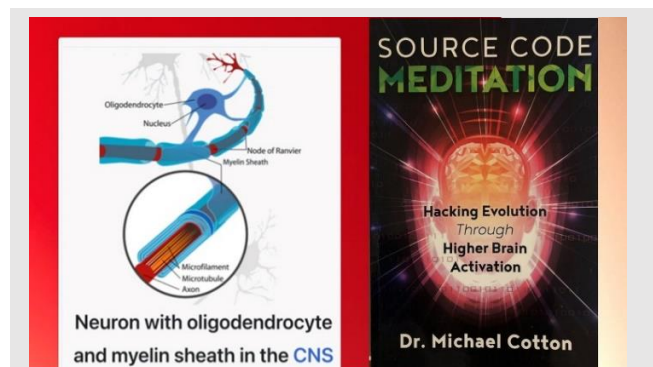
Further studies could be done to compare outcomes resulting from a one-time lead exposure versus chronic low-level exposure throughout childhood, or the working life, and so on.

Research is needed on whether treatment or other interventions prevent any of the associated adverse effects that are linked with lead, including: infertility and sub-fertility, preeclampsia, sub-optimal foetal and childhood development, and hypertension (causing stroke or heart attack), osteoporosis and balance problems leading to bone fractures, in later life, of persons who have ever been found to have an elevated blood lead level.

For example, a longitudinal controlled study could determine whether persons with known elevated blood lead levels, where cohorts undergo one of a variety of combinations of nutritional intervention and treatment, improve their morbidity and mortality, compared to matched controls who received no nutritional intervention or treatment.

Test the hypothesis that older adults treated for lead poisoning will be at reduced risk of all-cause mortality compared to matched controls who had similar bone lead XRF (x-ray fluorescence) and blood lead results but were not treated for lead poisoning.

Pre-conception women could be recruited for research into whether interventions that reduce blood lead levels also reduce the lead concentration in their



2023 Volcano Art Prize Entry. Artist: Elizabeth O'Brien

Title: Lead Myelin Meditation

Lead-Safety Message: Can lead-induced damage to myelin (which slows thinking and reaction time) be reversed by practicing Source Code Meditation? [Lead Safety Policy](#) proposes research!!

Description of Work: Microsoft Powerpoint collage of iPhone photos & a screenshot from <https://en.wikipedia.org/wiki/Myelin>

<https://volcanoartprize.com/portfolio-item/lead-myelin-meditation/>



cord blood at birth and in breast milk, and then compared to controls who are not given any interventions.

Similarly, breast milk in milk banks could be analysed for lead, then a cohort of women with the highest breast milk lead levels could be tested for blood lead and split into control and study groups, in order to then compare those who are given interventions to those who are not to determine whether breast milk lead levels fall in relation to falling blood lead levels.

This Tertiary Lead Poisoning Prevention research could include seeking to counter the effects of lead poisoning through dietary changes, chelation treatment, supplements, saunas, training which aims to detoxify the pre-frontal cortex (such as Source Code Meditation) and improve the functioning of neural pathways and/or exercise.

Research to test the hypothesis that people who are treated for lead poisoning prior to conception that have a history of leaded-fuel sniffing (or have other risk factors for lead exposure) and are at risk of parenting children with foetal alcohol syndrome, will have children that grow up to be less delinquent/aggressive/violent than those whose parents were not treated for lead poisoning.

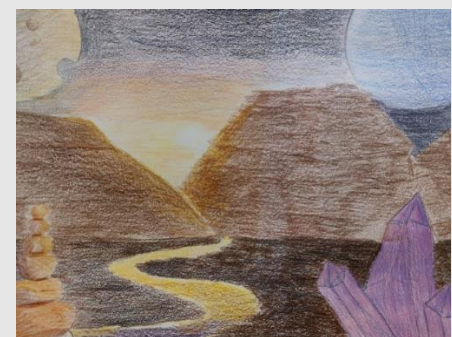
Given that higher blood lead levels are associated with hearing and balance problems and cataracts, all of which increase the risk of falls, and that lead is released from their store in bones when bones are fractured, and:

*One in three adults aged 50 and over dies within 12 months [Katsoulis et al 2017] of suffering a hip fracture. Older adults have a five-to-eight times higher risk of dying within the first three months [Haentjens et al 2010] of a hip fracture compared to those without a hip fracture. This increased risk of death remains for almost ten years [Abrahamsen et al 2009]. (Brennan-Olsen 2018)*

Test the hypothesis that older adults treated for lead poisoning will be at reduced risk for fractures and if they have fractures, they will recover and have reduced risk of death, compared to matched controls who had similar bone lead XRF and blood lead results, but were not treated for lead poisoning.

In countries like Australia, lead mining royalties could be used to fund this Tertiary Lead Poisoning Prevention research, not only in Australia, but also in countries that have imported Australian lead.

A country that is unable to do its own research, should request such research be carried out by the World Health Organisation or funded by philanthropic



2023 Volcano Art Prize Entry. Artist: Joshua Fatsea

Title: Only Volcanoes on Earth Spew Lead.

Lead-Safety Message: On Earth volcanoes spew lead dust and fumes because lead is in Earth's core but other planets and moons in our solar system are lead-free as far as we know.

School: Creative Einstein

Age: 10

Description of Work: Colouring pencils on paper.

[https://volcanoartprize.com/portfolio](https://volcanoartprize.com/portfolio-item/only-volcanoes-on-earth-)

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organisations or other countries.

### 3.3 Require independent research of detoxification claims and immediately inform health professionals and the public of research findings

Detoxification remedies and protocols, apart from chelation therapy, in many cases do not have scientifically proven efficacy for their safety in use by children, reduction of blood lead levels, or improvement in health outcomes or reduction of health impacts from lead exposure.

The manufacturers of any treatment which claims to detoxify the body by any means will be required by government to fund independent research into the veracity of their detoxification claims including the treatments' ability to both reduce blood lead levels and reduce adverse health impacts of lead poisoning. Examples of unproven treatments that require independent evaluation include:

- Saunas
- Transdermal chelation via foot pads or patches
- Supplements
- Exercise plus liquid-only diets
- Liver cleanse
- Colloidal silver
- Epsom salts, trisalts and similar salts (ingested or in baths)
- Zeolite
- Mega-dose vitamin C, such as LivOn Lypo-Spheric™ Vitamin C
- 7,8-Dihydroxyflavone ([Zhang et al 2018](#))

It is only when health professionals and the public are immediately informed of and kept abreast of the results of such research that they can adequately manage the lead already in patients in a way that minimises the future adverse health effects and does no harm.

### 3.4 Promote the utilisation of all known ways of overcoming lead-associated health and behavioural problems

Examples include:



2023 Volcano Art Prize Entry. Artist: Mavis Zhou

Title: Black Birds On Black Trees

Lead-Safety Message: Many birds and other wildlife starve after Australia's bushfires which are now more extensive, more frequent and increasingly burn all night due to climate change-induced hot dry periods. Indigenous fire management practices and renewable energy farms are needed urgently.

School: Creative Einstein

Age: 6

Description of Work: Colouring pencils on paper

<https://volcanoartprize.com/portfolio-item/black-birds-on-black-trees/>



- Maintenance of bone strength through appropriate dietary vitamin D and calcium (and/or supplementation) and weight-bearing exercises
- Physical exercise, cessation of smoking, weight-reduction to reduce hypertension
- Occupational therapy to improve handwriting and fine motor control
- Physiotherapy designed to increase neuroplasticity following stroke
- Learning languages, physical activity, music therapy, jigsaw puzzles, crosswords, word games, social interaction and other stimulation to maintain neural pathways to slow the progression of dementia and brain ageing
- Sound healing, meditation and mindfulness practices to decrease stress, anxiety and depression and in the case of Source Code Meditation or the Indigenous concept of connecting with Country (*The Dreaming Path: Indigenous Thinking to Change Your Life* by Dr Paul Callaghan with Uncle Paul Gordon 2022), to overcome lead's impacts on the pre-frontal cortex, such as impulse control and criminal behaviour
- Use of other chelating agents traditionally utilised in cases of extremely elevated blood lead levels

### 3.5 Incorporate any learnings from the above steps in Tertiary Lead Poisoning Prevention into educational materials and media campaigns

All learnings from steps taken to this point in Tertiary Lead Poisoning Prevention will be incorporated into lead education and media campaigns (including social media) funded by government and carried out by government and a range of NGOs (see xiii, above).

For example, government funding will be provided to NGOs along with government-developed information (which in some cases may have been derived by an NGO or research organisation) about successful blood lead reduction protocols or products so that this information can be disseminated via relevant websites, for example, The LEAD Group, Heart Foundation, and similar (see the full list at Addendum 1, below).

Public awareness campaigns will be evaluated to ensure return on investment, including by repeat blood lead surveys after education/awareness campaigns in targeted sub-populations and, where relevant, the provision of lead testing kits with instructions for environmental sampling, comments and interpretation of the results (see vii, above).



2023 Volcano Art Prize Entry. Artist: Drishti Jonchhe

Title: Three Layer Cake

Lead-Safety Message: Not all sweets are innocent. Sugar and sweets are sometimes recalled due to lead contamination. Both lead and sugar cause tooth decay.

School: Creative Einstein

Age: 7

Description of Work: Colouring pencils on paper

<https://volcanoartprize.com/portfolio-item/three-layer-cake/>