

Changing Ideas About What Is A Safe Blood Lead Level (Info Pack 56)

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This fact sheet is the 10 June 2024 update of the 28 June 2014 LEAD Action News article and Info Pack 56 published on our old site and new site.



What does my blood lead test result mean?

The (November 2012) recommendation of The LEAD Group is that everyone should have a blood lead level below 1 microgram per decilitre and that action be taken to lower blood lead levels that are above 1 microgram per decilitre.

The table below is what I have in mind when I interpret blood lead levels. Rather than following the 2015 Australian government / pathology report advice to take no action if a blood lead level is below or at 5

Blood Lead (2011 - 2018)

CAS Number 7439-92-1

Geometric mean and selected percentiles of blood concentrations (in µg/dL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (Years)	Geometric Mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample Size
Total population	11-12	.973 (.916-1.04)	.930 (.880-.980)	1.52 (1.41-1.61)	2.38 (2.17-2.61)	3.16 (2.77-3.68)	7920
Total population	13-14	.858 (.813-.906)	.830 (.780-.870)	1.32 (1.24-1.42)	2.10 (1.96-2.30)	2.81 (2.49-3.14)	5215
Total population	15-16	.820 (.772-.872)	.780 (.740-.840)	1.32 (1.21-1.42)	2.14 (2.02-2.24)	2.75 (2.50-2.98)	4988
Total population	17-18	.753 (.723-.784)	.730 (.690-.770)	1.22 (1.17-1.27)	1.86 (1.75-1.95)	2.41 (2.24-2.67)	7513
Age 1-5 years	11-12	.970 (.877-1.07)	.950 (.870-1.04)	1.34 (1.20-1.65)	2.26 (1.88-2.65)	2.91 (2.41-3.83)	713
Age 1-5 years	13-14	.782 (.705-.869)	.740 (.680-.800)	1.08 (.940-1.24)	1.58 (1.33-1.90)	2.24 (1.68-2.64)	818
Age 1-5 years	15-16	.758 (.675-.850)	.690 (.610-.790)	1.10 (.950-1.32)	1.86 (1.50-2.65)	2.76 (1.94-3.81)	790
Age 1-5 years	17-18	.670 (.600-.748)	.620 (.540-.740)	.980 (.810-1.18)	1.49 (1.28-1.72)	2.02 (1.67-2.44)	629
Age 6-11 years	11-12	.681 (.623-.744)	.640 (.600-.700)	.930 (.820-1.05)	1.34 (1.14-1.60)	1.89 (1.36-2.94)	1048
Age 6-11 years	13-14	.567 (.529-.607)	.530 (.500-.570)	.760 (.700-.820)	1.13 (1.01-1.23)	1.42 (1.21-1.83)	1075
Age 6-11 years	15-16	.571 (.523-.623)	.550 (.510-.600)	.780 (.720-.830)	1.18 (.970-1.44)	1.59 (1.24-2.24)	1023
Age 6-11 years	17-18	.475 (.456-.494)	.460 (.430-.490)	.650 (.610-.690)	.930 (.840-1.04)	1.19 (1.04-1.40)	833
Age 12-19 years	11-12	.554 (.511-.601)	.530 (.490-.570)	.740 (.660-.830)	1.09 (.960-1.19)	1.31 (1.16-1.65)	1129
Age 12-19 years	13-14	.506 (.464-.551)	.460 (.420-.500)	.670 (.600-.750)	1.13 (.870-1.53)	1.69 (1.27-2.06)	627
Age 12-19 years	15-16	.467 (.433-.504)	.450 (.410-.490)	.680 (.610-.730)	.930 (.820-1.03)	1.17 (.990-1.36)	565
Age 12-19 years	17-18	.411 (.387-.436)	.390 (.370-.410)	.530 (.490-.600)	.830 (.730-.940)	1.09 (.930-1.45)	1030
Age 20+ years	11-12	1.09 (1.03-1.16)	1.05 (1.00-1.12)	1.67 (1.56-1.79)	2.56 (2.33-2.77)	3.36 (2.98-3.93)	5030
Age 20+ years	13-14	.967 (.921-1.02)	.940 (.900-.980)	1.45 (1.37-1.55)	2.26 (2.09-2.49)	3.03 (2.65-3.55)	2695
Age 20+ years	15-16	.920 (.862-.982)	.880 (.810-.960)	1.46 (1.35-1.59)	2.30 (2.15-2.44)	2.89 (2.65-3.07)	2610
Age 20+ years	17-18	.855 (.816-.895)	.850 (.780-.900)	1.34 (1.27-1.43)	2.01 (1.86-2.17)	2.62 (2.41-2.86)	5021

micrograms per decilitre (5µg/dL), I recommend you first compare a blood lead result to the relevant geometric mean in the US population, then decide what blood lead action level to use.

Table Reference: Fifth National Report

on Human Exposure to Environmental Chemicals Biomonitoring Tables: Metals and Metalloids - Blood Lead (2011-2018) table extract [1-5 years, 6-11 years, 12-19 years & 20+ years, Male, Female] - data from US National Health and Nutrition Examination Survey (NHANES), last reviewed 30 April 2024, https://www.cdc.gov/exposurereport/data_tables.html

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How do blood lead test results typically vary over a lifetime?

The following two figures from Pirkle et al 1998 [Exposure of the U.S. Population to Lead, 1991-1994 \[NHANES III\]](#) also provide evidence of typical differences by age, gender and race/ethnicity in mean US blood lead levels in the early 1990s and how blood lead might change over an individual's lifetime with two peaks: one in early childhood (especially high for Black males) and one from late adulthood towards a lifetime peak at death (at least for Hispanic and Non-Hispanic White males, if not Black males). Australians could usefully compare their current blood lead level to these 30 year-old US means and take more serious action to reduce your blood lead level if it is even close to these "bad old days" when leaded petrol vehicle emissions meant everyone was breathing in lead with every breath. Leaded gasoline was phased out in 1996 in the US (and in New Zealand) but in 2002 in Australia.

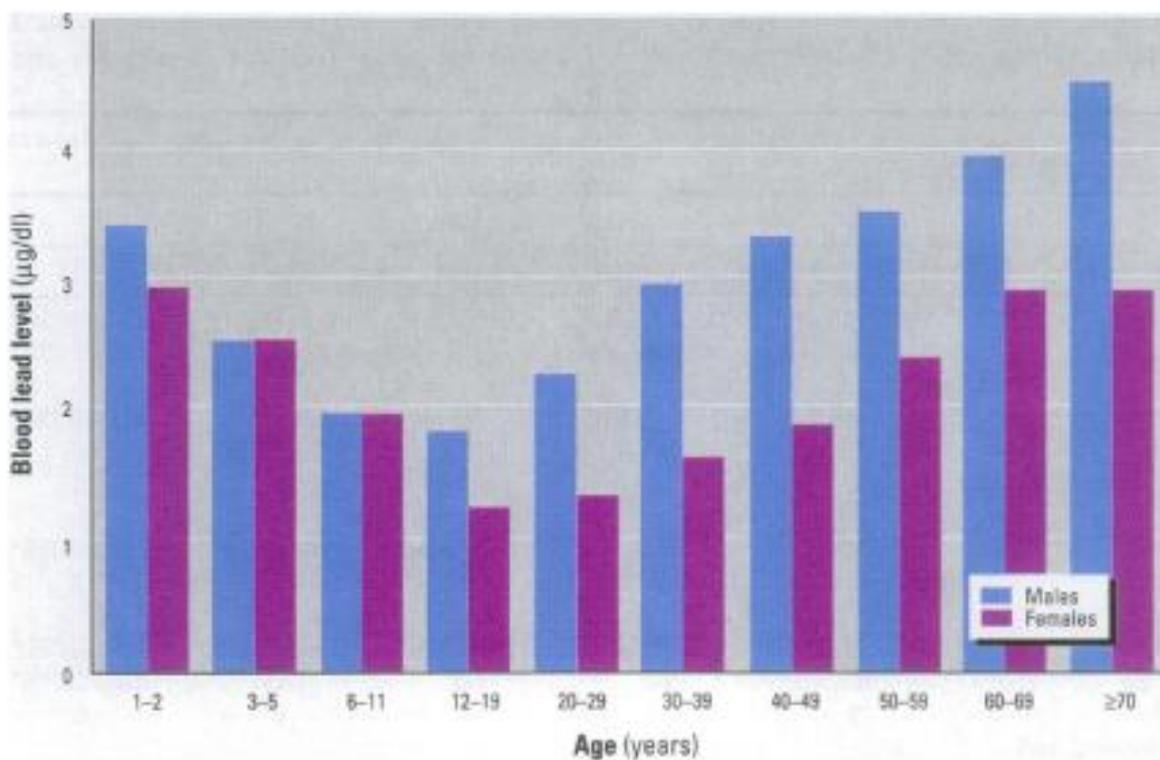


Figure 1. Geometric mean blood lead levels by age category and sex: United States, 1991–1994.

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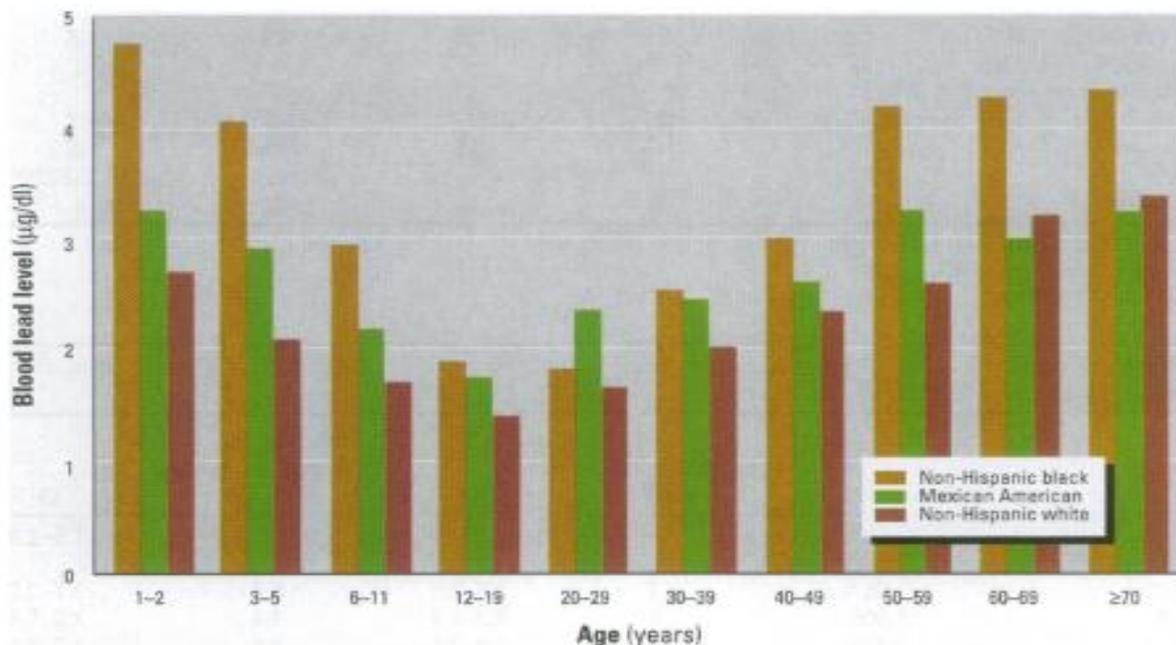


Figure 2. Geometric mean blood lead levels by age category and race/ethnicity: United States, 1991–1994.



Volcano Art Prize (VAP) 2024 Entry
 Artist: Tianyang Zhao, Creative Einstein school, age 10. Title: **Ebony and Ivory**
Lead-Safety Message: United States mean blood lead levels are like the keys of a piano - at every age category the Black population is higher than the White or Hispanic population. Description of Work: Colouring pencils on paper. Reference for Lead-Safety Message: Pirkle et al 1998 [Exposure of the U.S. Population to Lead, 1991-1994 \[NHANES III\]](https://pubmed.ncbi.nlm.nih.gov/10521112/).

<https://volcanoartprize.com/portfolio-item/ebony-and-ivory/>

Your blood lead level today is not only influenced by new lead coming into your body, but also by lead leaching from your bone and teeth stores of lead, back into your bloodstream.

How far behind the US are Australian blood lead test results likely to be?

My best guess, based on the one, the only national blood lead survey ever done in Australia, and my knowledge of the paucity of lead safety policy in Australia compared to the United States, is that typically the mean blood lead level for Australian children is twice the level (or trailing by about 7 years behind) the mean blood lead for US children. Reference: Lead Poisoning Case Management: Australia compared to the USA - LEAD Action News vol 12 no 3 - LANv12n3: [front page] Graph of Geometric mean blood lead level of US and Australian pre-schoolers and leaded petrol phase-out dates, 31st May 2012, <https://www.lead.org.au/lanv12n3/lanv12n3.html>

So if your GP tells you that your blood lead level is "normal" or "acceptable" or any other term denoting that they've seen recent blood lead study results for Australia, please let the doctor know there is no such data available until the government decides to do a blood lead study of all ages with oversampling for Indigenous Australians and newly-arrived immigrants from low to middle income countries, so no one can possibly know what the Australian mean of blood lead levels is by age, gender or race/ethnicity.

What do expert authorities say my blood lead test result should be?

The World Health Organisation (WHO) wrote in [GLOBAL HEALTH RISKS - Mortality and burden of disease attributable to selected major risks](#), 2009 that: "The ideal exposure level for lead is less than 1 µg/dl (1 µg/dL or 1 microgram per decilitre)".

You can find a list of news articles generated by two professors from The LEAD Group's Technical Advisory Board (Professor Mark Taylor and the late great Professor Chris Winder), on the subject of lowering Australian guidelines on blood lead available [here](#).

On 5th March 2013, the Today Tonight Ch 7 Lead Story was broadcast and their fact sheet remains available online (<https://www.lead.org.au/fs/fst84.html>). The Ch 7 news headline "The health of as many as 100,000 children under the age of five is under threat from lead pollution, linked to intellectual and behavioural problems" refers to Professor Taylor's estimate that 100,000 Australian children under 5, probably have a blood lead level above 5 ug/dL.

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What are the health impacts of even low blood lead test results?

There are two media releases that explain the dangers of blood lead levels above 2 micrograms per decilitre in both adults and children:

- [9th December 2010](#) "[Current 'acceptable' blood lead levels too high, Overwhelming body of research supports The LEAD Group's call for a change in national policy](#)" and
- [3rd December 2010](#) "[Radical new policy on prevention of lead poisoning](#)".

The fact sheets referred to in the most recent media release above are online at:

- https://www.lead.org.au/fs/Dangers_of_BPb_Level_Above_2µg_children_20101202.pdf and
- https://www.lead.org.au/fs/Dangers_of_BPb_Level_Above_2µg_Adults_20101202.pdf
- and https://www.lead.org.au/fs/Blood_lead_testing_20090810.pdf is also very useful.

For older research findings on health effects of higher blood lead levels, usually above 10 µg/dL, please refer to https://www.lead.org.au/fs/Health_Impacts_of_Lead_Poisoning.pdf (our most popular fact sheet of all time).

For the most comprehensive analysis of all research on the effects of low-level lead exposure, please see the "[NTP MONOGRAPH ON HEALTH EFFECTS OF LOW-LEVEL LEAD](#)" (June 13, 2012).

The LEAD Group's latest compilation (22 Sept, 2020) of lead health effects research is [Health effects of a blood lead level below 10 µg/dL in both adults and children and even below 1 µg/dL in pregnancy](#)

In their 5th Nov 2012 Letter to the Medical Journal of Australia [Eliminating childhood lead toxicity in Australia: a call to lower the intervention level](#) Professors Mark Taylor, Chris Winder and Bruce Lanphear stated: "...reviews [by the World Health Organization, Germany's Human Biomonitoring Commission and US national agencies such as the Agency for Toxic Substances and Disease Registry, Centers for Disease Control and Prevention, National Toxicology Program and Environmental Protection Agency, as well as Health Canada] indicate that the current [Australian] National Health and Medical Research Council [NHMRC] guideline for lead (previously 10 µg/dL, now 5 µg/dL) is too high and should be revised downwards."

In Germany, since 2009, children up to the age of 14 get action from their doctor and the health department, if the blood lead level exceeds 3.5 µg/dL and the action level for women is 7 µg/dL and for men 9 µg/dL.

In May 2012, US policy on childhood lead poisoning prevention (see [CDC Accepts Advisory Committee Recommendation to Replace "Level of Concern" for Lead Poisoning with New Reference Value](#) stated that the new blood lead action level for children under 5 years of age in the US would be 5 micrograms per decilitre (half the old action level of 10 µg/dL). And on 27th October 2021 (in [CDC Recommended](#)

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[Actions Based on Blood Lead Level](#)) the US Reference value was further moved down from 5 µg/dL to 3.5 µg/dL.

Canada is currently considering making blood lead levels above 1 ug/dL the new action level, so that's what The LEAD Group has asked the federal government to consider for Australians of all ages, so we can lead the world in having the most stringent response level, just like we currently lead the world in the volume of lead exports.

See for instance, the [Health Canada Final Human Health State of the Science Report on Lead](#) states: "Health effects have been associated with BLLs [blood lead levels] as low as 1–2 µg/dL... It is considered appropriate to apply a conservative approach when characterizing risk; accordingly, additional measures to further reduce exposures of Canadians to lead are warranted."

What does Australia need to do to about blood lead testing and results?

Hopefully this information will motivate you to contact your Federal Health Minister to ask the Health Minister why your federal health department has not revised the blood lead action level downwards in Australia since 2015, why we have no idea what average blood lead levels are in Australia or why doctors know so little about lead.

Lowering the blood lead action level, having ongoing national blood lead surveys of all ages, educating doctors as to when blood lead testing should be considered for their patients and collating all blood lead results federally are just four of the plethora of excellent government policy recommendations The LEAD Group has made in our *Model National Lead Safety Policy* (18 July 2023) at <https://leadsafeworld.com/fulldoc-natpol>