Firearms and lead
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Lead absorption is a notified disease under the Health Act 1956 in New Zealand. Lead (Pb)

“...is a cumulative toxicant that affects multiple body systems, including the neurologic, hematologic, gastrointestinal, cardiovascular and renal systems. Children are particularly vulnerable to the neurotoxic effects of lead, and even relatively low levels of exposure can cause serious and in some cases irreversible neurological damage.”

Lead can affect people of any age and is especially harmful to pregnant women and unborn babies as well as children, who are at greater risk than adults because of their physiology and behaviour.

Lead that is ingested or inhaled travels to the bloodstream and accumulates in bones and teeth, from where it may be released back into the bloodstream.

Lead absorption is an under-recognised public health issue. According to the World Health Organization, there is no known safe level of exposure. In New Zealand a blood lead level greater than or equal to 0.48 micromoles per litre (µmol/l) must be notified to the local medical officer of health.

Among adults, certain occupations and activities involve lead exposure. Lead absorption from lead-based paint on older houses during renovation or painting may be well-known but risks from firearms are less familiar. Notification data for 2014–2017 show that firing ranges were the second most common identified non-occupational source of lead exposure for each year.

Lead exposure from firearms

Lead exposure from firearms can occur through several pathways. Firstly, much ammunition contains lead, and there is also lead in the primer that ignites when a firearm is fired; these sources release fumes and particles close to the face and may be inhaled. Lead particles can be transferred to the mouth and ingested if, after shooting, the shooter smokes tobacco, eats or handles affected equipment, clothing etc. People who make their own ammunition are also exposed when melting and moulding lead. Careful hygiene and protective equipment is required to mitigate these risks.

Secondly, at firing ranges, and indoor ranges in particular, everybody present, including the shooters, spectators and range workers, are exposed to the lead dust and particles produced by shooting, in the air and on surfaces. Workers at firing ranges may be exposed while cleaning or clearing out bullet traps, unless care is taken with hygiene and protective clothing. Clothing taken home and handled by someone else, for example, when laundering, also puts that person at risk.

Thirdly, consuming lead-shot meat is a potential risk.

“Eating meat harvested with lead projectiles increases serum lead levels, and while it has been suggested that the tissue from around the wound channel can be discarded to reduce lead exposure, there are an average of 356 metal fragments in a deer carcass after being shot with a lead projectile from a rifle. This is an impossible number of fragments to pick out by hand, especially because some of these fragments are microscopic.”

Using non-lead ammunition is recommended. We note that in California from 1 July 2019, non-lead ammunition must be used when shooting wildlife.

Lead affects other animals and the environment. Poisoning of wild fowl through ingestion of lead fragments led to Fish & Game New Zealand requiring duck hunters to use non-toxic shot within 200 metres of open water, and to phase out lead shot altogether by 2020. Other environments, such as pasture, have been contaminated. Farm animals have also suffered with lead-contaminated feed from firing ranges.
Children and firearms

Given children's susceptibility to lead, it is concerning that shooting sports continue in some schools and that firearms organisations encourage children to join in shooting and hunting, while retailers continue to market firearms to children. Air rifles, which operate by compressed air or other gas, are overwhelmingly considered a beginner's or child's gun. Plastic shot is available but lead pellets are very frequently used. According to New Zealand Customs Service, in the five years 2012–2016, 130,869 airguns were imported, along with 97,855 rifles and 39,991 shotguns. These imports continue to add to a civilian armoury estimated to be at least 1.5 million firearms.

Research, regulation and education needed

The last New Zealand study of lead exposure at indoor firing ranges (1993) found lead exposure there was a ‘significant problem’.9 Research carried out at the University of Otago, Wellington, in 2016–2018 found widespread denial among firearms community leaders that lead is an issue for shooters’ health. Several informants cited ‘evidence’ from Hayes10 and from a European Conference organised by lead ammunition manufacturers and the World Forum on Shooting Activities11 as proving no issues of concern, and on the contrary, suggesting a conspiracy against firearms and their owners. Shooters' representatives who did accept that lead might be a problem believed that the ventilation systems at indoor firing ranges solved the issue.

Even New Zealand Police seems not to recognise lead as an issue. In its brochure Beginning with airguns Police does not mention lead, and advises:

“To get the most fun out of your airgun, in a safe and responsible way, set up a properly constructed range in your backyard or basement.”

We advise against using an enclosed space such as a basement for a range.

While the science of lead is clear, there are socio-political issues12 to address; in New Zealand, this includes some shooters' denial or minimisation of risks from lead, and resistance to the changes needed to protect themselves and their children. The active involvement in the gun lobby of firearms and ammunition retailers and dealers motivated by profit muddies the scene. Healthy public policy about firearms and lead would mean tighter regulation, inspection and mitigation measures at firing ranges, mandatory advice to firearms owners applying for a licence, and public information campaigns about risk and mitigation measures.

Competing interests:
Nil.

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