

FEATURE // LEAD POISONING



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LEAD POISONING AND THE SHOOTER

BY MARK PASSAMANEK (Republished with permission from *FrontSite* magazine)

I have been shooting and hunting since I was 10 years old. I compete in several different shooting disciplines with long guns and handguns, I am a life time member of the NRA, a member of several shooting organizations and clubs, and a staunch advocate of the safe and proper use of firearms. I am always willing to help new shooters get involved and feel comfortable in the shooting sports. I work professionally as a mechanical engineer in the field of forensic engineering and have performed a wide array of testing on firearms and ammunition.

The topic of lead poisoning, like many others, often elicits opinions based on people's

"feelings" and "what I heard from...." This makes it difficult to sort through and pick out the truth. I have researched the subject, done some testing, and consulted doctors who were experts on lead poisoning. Here is what I found out.

Lead is one of the most prominent metals on the earth. Its symbol is Pb, atomic number 82 and atomic weight 207.19. Lead has many uses, including solder, pipes, paint, gasoline, batteries and ammunition. Lead is very resistant to corrosion, to the extent that some Roman lead pipe systems are still *in use* today.

Lead is called a systemic poison in the medical fields. It is typified as acute or chronic. Acute lead

poisoning is rare and often connected to drug abuse. Chronic lead poisoning is more common and is associated with long-term exposure, as a function of absorption over time, and is affected by a person's age, diet and metabolic rate. Obvious symptoms will manifest themselves long before serious health problems occur. Lead can be absorbed through ingestion (eating) which results in only a 30 percent uptake opportunity, as most ingested lead is passed through the system unchanged. Lead also is absorbed through

breathing, which has an uptake rate of about 40 percent. While lead can be absorbed through the skin, this normally occurs only with lead found in gasoline. Once lead is absorbed, it is transported to soft tissues where the half-life is about a month, then to bone tissue where the reservoir volume is high. Over 90 percent of lead found in bone mass is insoluble and does not present a major hazard.

Lead affects practically all systems within the body. Lead at high levels (at or above 80 micrograms per deciliter [80 µg/dl] of blood) can cause convulsions, coma, and even death. Lower levels of lead can cause adverse health effects on the central nervous system, kidney, and blood cells. Blood lead levels as low as 10 µg/dl can impair mental and physical development. The most sensitive group to the effects of lead poisoning are children one to six years of age. Symptoms for severe poisoning include temporary and/or permanent memory loss or other nervous system dysfunction such as shaking, vomiting, nausea, dizziness and other various issues depending on the intake path. The absolute worst symptom is birth defects in children. If inhaled, lung cancer is also a definite possibility.

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First, let's talk about handling ammo. Loaded ammo with jacketed bullets pose no concern when handling. Hollow points with exposed lead must be handled a tad more cautiously but represent no big threat. Lead bullets, including .22s (even if coated) should be handled very carefully. Once you pick them up, handle or shoot them, you should wash your hands before you eat, smoke or drink. Handling soft, .22 cal. bullets is worse than handling hard-cast centerfire type lead slugs. I know a fellow who hunted with .22s for years and carried the lead bullets in his left front (pants) pocket. He has since discontinued the practice and been treated for lead poisoning in that area of his groin.

Second, when cleaning guns, the residue on the gun and in the bore will contain lead. When we use solvents, we increase the risk of introducing lead into the bloodstream by handling firearms, especially if we have cuts on our hands. Be careful and wash your hands very well.

Reloading of lead bullets has the same risk as handling lead ammo. I am not a caster so I am not very knowledgeable about good practices. However, I have used lead particulate measuring instrumentation at friends' houses who cast, and found that the lead levels of the air they breath is almost perfectly clean. Even the exhaust air is not too bad. For reloaders, the dust from the tumbling media has high levels of lead and separation should be done outdoors or with a vacuum. Dust from media could easily be one of the largest contributors to lead poisoning.

Using the restroom after reloading or shooting is also a risk. The skin in this area is thin and easily allows absorption of lead. Ingestion and absorption can all but be eliminated if we wash our hands after shooting or touching lead. To repeat: When you are engaged in these activities, do not eat, smoke, drink, use the restroom or touch sensitive areas until after you have thoroughly washed your hands.

Now to shooting. Yes, there are lead compounds (not pure lead) in the primers. These compounds will have a lead-poisoning effect

but it is not as serious as pure lead. There are a number of different ways in which lead dust and fumes originate at ranges. These include primers using lead styphnate as a detonator, and the vaporization and splintering of the projectile as it passes through the barrel after being fired as well as vaporization of the base of the bullet. Studies by researchers from the National Institute for Occupational Safety and Health (NIOSH) measured air lead levels in the breathing zones of 90 persons firing .38-caliber revolvers. Shooters firing lead bullets had mean lead exposures of 110 µg/m³ (110 micrograms per cubic meter of air), calculated as an 8 hour time-weighted average (TWA). Eighty-nine percent of the recorded exposures exceeded the Occupational Safety and Health Administration (OSHA) permissible exposure level (PEL) of 50 µg/m³ for occupational exposure to lead (Lee 1986).

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Although most indoor firing ranges are not subject to OSHA standards, lead exposures can be maintained below levels of concern with proper ventilation and filtering. So the question raised in the study is—Was the lead due to the primers or the bullets, and what percentage of each?

FMJ ammo and lead slugs both introduce substantial amounts of airborne lead vapors (the absolute worst form) into the air. FMJ bullets with exposed lead bases can be vaporized by the hot gases. How many of you have looked at the base of a fired lead or jacketed bullet? The granular and sometimes fractured appearance indicates gas cutting. Only TMJ (total metal jacket) or plated bullets eliminate lead vapors.

I have conducted tests using instrumentation to measure the lead levels using the following

components: FMJ, lead, plated, all-copper bullets with both lead compound based and lead-free primers. The contribution of airborne lead from the primers was minimal. I figured that the lead exposure from lead-based primers in a semi-ventilated, 8'x8' room would require the firing (and inhaling) of the gases from about 460,000 primers in order to place someone over the exposure limit. That is about 12,000 rounds per year over 40 years. The lead level using lead slugs was 50 times that of plated and copper slugs with leaded primers. FMJs had about 20 times the level of lead vapor. These results were only from inhaling the lead vapors. With plated or copper slugs, the difference between lead and no-lead primers was almost insignificant. The levels were less than 10 percent of the EPA exposure limits for 1000 hours of airborne exposure. (You will get more lead than that from drinking water.) Remember that the smoke you

see from shooting lead bullets is mostly burned lube and only 5-30 percent is lead vapor.

It is true that lead on healthy hands will be absorbed very little. But lead on the eyes, mouth and other sensitive areas is absorbed readily. That is why it is so important to wash your hands after any shooting activities. I have been an active shooter for more than 10 years and when I have had my lead levels checked, they have never been even slightly abnormal. I shoot at an indoor range once a week, but I use plated bullets and my club has a very good exhaust system. Lead stays in your system for approximately 40 years, so it is a "lifetime" exposure accumulation that you are concerned with. For this reason regular blood tests are recommended.

For those of you who shoot a lot indoors, i.e. more than 200 rounds a month, consider

using lead safe, plated or FMJ bullets and be extra cautious. Jacketed bullets with the lead base exposed are no better for airborne lead than lead bullets, and some are actually worse. Be observant of the amount of dust during range *cleanup* and how much ends up on your clothes and shoes. If you have infants at home, consider using dedicated range shoes that are kept away from them.

A side note: Why do children like to eat lead based paints? Lead is sweet to the tongue. How many of you have had a sweet, acrid taste in the back of your throat/mouth while shooting at an indoor range? That is lead!

There are different methods for ridding the body of lead. Natural methods include certain herbal blends and Vitamin C. A diet high in iron and calcium is also good, but these processes are slow. The fastest way is using a product called EDTA (Ethylene-Diamine-Tetra-Acetic Acid), applied intravenously, that consists mostly of distilled water and a few additives (Vitamin C, Magnesium, Heparin, among others). This process is known as chelation therapy.

Chelation therapy grew out of German industrial research in the 1920s where they were looking for a way to cleanse water of minerals used in the electroplating and metal-etching industries. Later, in the 1950s in Detroit, a physician named Dr. Clark, who was treating lead-poisoned auto workers, found that chelation with EDTA not only removed lead, but also freed many of his auto-worker patients from their symptoms of cardiovascular disease! EDTA has the ability to bind with metals in the blood and soft tissues and allows the body to excrete them, thus detoxifying the patient. However, chelation therapy is also expensive.

Finally, the exposure limits for adults are: CDC Adults: < 10 µg/dL, OSHA Adults: 40 µg/dL, Life Threatening Adults: 80 µg/dL. The limits are 10% less for children.

I hope this has answered some of your questions about lead exposure and left you better informed. ☺