

# Risks from lead ammunition

To the Editor — Recent research linked lead hunting ammunition to tissue lead levels in Amazonian wildlife and highlighted health risks to subsistence-hunting communities. We discuss the global nature of such risks and the need for a switch to non-toxic alternatives.

Chronic exposure to lead adversely affects blood pressure and kidney function in adults, and causes neurological damage and permanently impaired IQ in children<sup>1</sup>. Elevated blood lead levels in indigenous people of the Peruvian Amazon were once attributed to effects of oil-exploration activities, but communities with and without exposure to oil exploration were found to have similarly elevated lead levels<sup>2</sup>. Using lead isotope ratios, Cartró-Sabaté and colleagues<sup>3</sup> recently reported that while oil-sourced lead could be locally important, lead in liver samples from wild-shot Amazonian wildlife, an important food source for indigenous people, was mainly derived from ammunition used for hunting. This is readily explained: lead ammunition used for hunting fragments upon impact, leaving tiny lead particles widely dispersed in the meat of the shot animal. Even after projectiles and large fragments thereof have been removed, elevated lead concentrations have been found in the edible tissues of wild-shot game animals worldwide<sup>4</sup>. Lead from these can be absorbed into the blood of consumers. In subsistence and other hunting communities, elevated blood lead concentrations have been found to

be correlated with the frequency of game consumption<sup>5</sup>.

Wild game meat is both eaten locally and traded internationally. In the European Union (EU), Commission Regulation (EC) 1881/2006 sets maximum levels of lead for meat from domestic livestock and poultry, but there are no such limits for game meat. Why this is the case is not well documented. It might be because lead projectiles were mistakenly believed to remain intact and therefore present little risk to consumers who can remove them from food at the table. It might also have been thought that few people in the EU eat wild game frequently, although it is now estimated that about 5 million people (1% of the EU's population), largely from the hunting community, do so<sup>4</sup>. Across the world, subsistence hunters and their families are also at risk, as indicated by the results of Cartró-Sabaté et al.<sup>3</sup>.

Alternative ammunition that does not have lead's toxic effects is widely available and effective<sup>6–8</sup>. Steel shot, the most commonly used alternative to lead shot, was first introduced half a century ago. To protect wild birds that ingest spent lead gunshot pellets, Denmark banned all use of lead shot in 1996, and from July 2019 California state banned the use of all lead ammunition for hunting<sup>9</sup>. While several multilateral environmental agreements resolve to reduce or remove associated risks to wild birds<sup>10</sup>, measures to protect people who eat lead-shot game are sparse and

only advisory<sup>11</sup>. The global nature of risks to people from lead ammunition, ranging from urban areas to some of the most remote and otherwise pristine regions on Earth, highlights the need for national and global policies to protect human health. This will require the replacement of lead ammunition with non-toxic alternatives. □

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