# New research confirms that Beethoven had lead poisoning—but it didn't kill him

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To this day, no one knows for certain what caused the liver and kidney disease that led to Ludwig van Beethoven's untimely death. However, a new letter to the editor in the journal *Clinical Chemistry* rules out one popular theory, showing that the composer was exposed to lead levels that were high—but not high enough to kill him.

Over the course of his lifetime, Beethoven experienced a slew of health problems, including gastrointestinal issues and hearing loss, in addition to his liver and kidney disease. High lead levels are commonly associated with all of these conditions—and are also associated with other traits of Beethoven's, such as his infamous temper, memory lapses, and chronic clumsiness.

So when researchers analyzed a lock of hair in 2000 that was thought to be Beethoven's and found that it contained extremely high lead levels, the natural conclusion for some was that lead poisoning caused the composer's health issues and death. However, further studies eventually found that that lock of hair belonged to a woman, not Beethoven.

Then in 2023, several locks of Beethoven's hair were authenticated as part of a landmark study that reported the sequencing of the composer's genome. A group of laboratory medicine experts led by Nader Rifai, Ph.D., of Harvard Medical School, have now performed a toxin analysis on two of these locks, which are known as the Bermann and Halm-Thayer Locks. Rifai's group analyzed the locks for lead using two

different versions of a highly accurate testing technique known as mass spectrometry.

What they found was that the Bermann Lock has a lead concentration 64 times the normal amount, while the Halm-Thayer Lock has a lead concentration 95 times greater than the normal amount. From this, the researchers were able to estimate that Beethoven's blood lead concentration would have been 69 to 71 μg/dL. This is several times higher than a normal blood lead level for adults, but not high enough to be considered the sole cause of his death.

"While the concentrations determined are not supportive of the notion that lead exposure caused Beethoven's death, it may have contributed to the documented ailments that plagued him most of his life," said Rifai. "We believe this is an important piece of a complex puzzle and will enable historians, physicians, and scientists to better understand the medical history of the great composer."

**More information:** Nader Rifai et al, High Lead Levels in 2 Independent and Authenticated Locks of Beethoven's Hair, *Clinical Chemistry* (2024). DOI: 10.1093/clinchem/hvae054

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