

Autopsies reveal how meth hurts the heart

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Use of the illegal stimulant methamphetamine causes build-up of tough protein fibers in heart muscle, which may help explain the development of enlarged hearts and heart failure in users, according to preliminary research presented at the American Heart Association's Basic Cardiovascular Sciences 2019 Scientific Sessions.

Methamphetamine, also known as meth, is an extremely addictive and commonly abused [stimulant drug](#), with 1.6 million Americans reporting using the drug in 2017.

Previous autopsy reports of some meth users have documented injury to heart cells, scarring of [heart muscle](#) and enlargement of the heart. The current studies were designed to systematically compare autopsy results in meth users and non-users and look for the mechanisms by which the drug might create heart problems.

"Our goal is to discover a fundamental mechanism of methamphetamine toxicity in order to find a way to treat heart muscle diseases associated with illicit methamphetamine use," said Md. Shenuarin Bhuiyan, Ph.D., senior author of the study and assistant professor in the department of pathology and translational pathobiology at the Louisiana State University Health Sciences Center-Shreveport.

Researchers used heart samples obtained at autopsy from 32 chronic meth users (mostly Caucasian men, average age 38 years) who died from meth overdose or from gunshot wounds, hanging, blunt force injury, stab wounds or sudden heart or lung problems. These were compared with samples from five non-substance users who also died suddenly from gunshot, hanging, blunt force injury or [blood clots](#) in the lungs. Meth used was established by medical history and the results of toxicology reports.

In comparison to samples from non-users, samples from the heart's main pumping chamber (left ventricle) in meth users showed:

Increased deposits of collagen (stiff protein fibers) around the blood vessels.

Accumulation of collagen throughout the spaces between heart muscle cells. "Regardless of the cause of death, we found methamphetamine has profound harmful effects on the cardiovascular system and results in irreversible damage to the heart, raising the risk of a heart attack, sudden [cardiac arrest](#) and heart failure," said Chowdhury S. Abdullah, Ph.D., co-lead author of the study and a postdoctoral fellow in Dr. Bhuiyan's laboratory. "Rehabilitation centers for methamphetamine users should routinely monitor heart function and look for signs of [heart failure](#), since early detection of [heart problems](#) could prevent further deterioration of the heart muscle. Monitoring should continue even after people have quit using the drug."

The researchers found similarly increased collagen deposits in mice exposed to meth compared to those who were not. The studies on mice also indicated that methamphetamine may lead to structural changes in heart muscle by inhibiting a specific receptor in the heart, suggesting a possible mechanism to prevent meth-induced heart damage in the future.

The study is limited by using only autopsy samples, so researchers could not determine how the structural differences they documented in methamphetamine users might specifically affect blood tests and [heart](#) function.

"We need to further study cardiac function and biochemical blood parameters in [methamphetamine](#) users and compare them to those in other substance users and in non-substance users," Bhuiyan said.

Provided by American Heart Association

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