

Carbon monoxide may cause long-lasting heart damage

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Lack of oxygen isn't the only way that carbon monoxide (CO) damages the heart, say researchers at Rhode Island Hospital.

According to the findings of a new study, published in the January issue of *Academic Emergency Medicine*, CO also causes direct damage to the heart muscle, separate from the effects of oxygen deprivation, which reduces the heart's pumping capacity and permanently impairs cardiac function.

“These findings suggest that heart damage caused by carbon monoxide may have long-lasting effects even after its been eliminated from the blood, making the diagnosis of carbon monoxide poisoning even more critical,” said lead author Selim Suner, M.D., M.S., director of emergency preparedness and disaster medicine at Rhode Island Hospital.

“While this research puts us one step in the right direction, there is still much more we need to know about the underlying mechanisms if we hope to someday develop targeted treatments,” added Suner, who's also an associate professor of emergency medicine, surgery and engineering at The Warren Alpert Medical School of Brown University.

The study is the first to show that CO's effect on heart muscle is unrelated to oxygen deprivation in the recovery phase, even when all CO is out of the system.

When inhaled, CO – the leading cause of accidental poisoning deaths

across the country – displaces oxygen in the blood and deprives organs such as the heart, brain and other vital organs of life-sustaining oxygen. Based on previous studies, researchers have speculated that there may be other mechanisms besides oxygen deprivation that lead to CO-related heart damage, although these have not been clearly defined.

In the study, Suner and colleagues examined an animal model in which blood and other systemic factors were eliminated in order to determine the direct effects of CO on cardiac function in the recovery phase. This model used three groups: a control group; a nitrogen control group designed to induce oxygen deprivation; and a group exposed to a combination of CO and oxygen, which best simulates the environmental conditions of CO poisoning. The pressure generated in the left ventricle of the heart was used as an indicator of heart function.

Left ventricular-generated pressure was decreased in both the nitrogen control and CO groups compared to the control group. However, the group exposed to CO did not recover cardiac function – including blood pressure – to the extent that the nitrogen control group did after treatment with 100 percent oxygen. These findings suggest that CO has an independent toxic effect on the heart separate from oxygen deprivation.

Known as the “invisible killer,” CO exposure is responsible for an estimated 15,000 emergency department visits and 500 unintentional deaths each year. It is an odorless, colorless gas produced by common household appliances that burn fuel, such as gasoline, oil and wood. When not properly ventilated or used incorrectly, CO emitted by these appliances can build up to dangerous levels. CO poisoning can be very difficult to diagnose, since its symptoms resemble those of the flu and other common illnesses. Pregnant women, children and the elderly are most susceptible to CO poisoning.

Source: Lifespan

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