Nitrous oxide [1]

(1) Alice,

I am wondering about the direct effects nitrous oxide has on the brain, and if it is a fallacy that it kills brain cells.

Sincerely,
Hippi crack

(2) Dear Alice,

What are the health dangers of inhaling nitrous oxide? I have heard people say that it "kills brain cells," but no one seems to know how, to what extent, and what the resulting effects are. Since nitrous oxide is commonly administered as anesthesia, is there a safe way to consume it for recreational use? If the user controls her oxygen intake, do the harmful effects (if any) still occur?

Signed,
Balloon-head

Answer

Dear Hippi crack and Balloon-head,

Nitrous oxide has been around for about 150 years and has a long medical history as a mild anesthetic. More popularly known as "laughing gas," or "whippets" (when the gas is inhaled from a whipped cream dispenser), nitrous oxide is a colorless, sweet-smelling gas that causes giddiness, a dreamy or floating sensation, and a pain-free state. It's used most often for minor oral surgery and dental work, although it has become a popular recreational drug, especially among teens. While a substance with “laughing” in its name might not seem serious, nitrous oxide can pose serious risks to your brain and body when it’s used outside of a medical setting.

When a health care provider uses nitrous oxide, it’s controlled and monitored to make its use as safe as possible. However, when inhaled directly from a balloon or canister, nitrous oxide dramatically changes the amount of oxygen available to the brain and can cause suffocation, which in turn can cause someone to pass out quite quickly. In fact, most deaths from inhaling

nitrous oxide are due to traumatic head injuries from passing out (It's also good to note that this is the case with most inhalants, such as some glues or paints, that limit oxygen supply). But, other than the risk of passing out, what's all this business about "killing brain cells?" Well, studies of nitrous oxide users have found that it can possibly have two not-so-great effects:

- **Apoptosis,** which is the death of brain cells, can occur, particularly in the regions responsible for learning and memory. Infants and the elderly are at an especially high risk for apoptosis if exposed to nitrous oxide, but it can happen to anyone using high levels of the gas.
- **Myeloneuropathy** is when the material covering the neurons (called myelin) in the brain gets damaged. This can slow down or halt brain functions, because nitrous oxide affects the body's ability to use vitamin B_{12} (a vitamin essential for myelin).

Both apoptosis and myeloneuropathy can lead to long-term problems with thinking and learning that can be hard to bounce back from. Additionally, myeloneuropathy can cause weakness, movement problems, bladder control issues, and dementia. One study of nitrous oxide users found that only one-fourth of patients who had been using nitrous oxide were able to fully recover from these effects, even after intensive vitamin B_{12} treatment.

The brain isn't the only part of the body affected. In recreational and clinical uses, nitrous oxide has led to increased risk of heart attacks, issues with bone marrow production, and intense nausea. Using any inhalant — especially ones that are pressurized in a canister — also poses the risk of damaging the throat or vocal cords because of the sudden burst of cold air. And, just like many drugs, nitrous oxide can be addictive, leading to issues with tolerance (where a user would have to inhale more and more to feel the same high) and withdrawal symptoms (such as irritability and apathy).

Given all the risks, laughing gas may not be a laughing matter; there doesn't seem to be a safe way to use it recreationally. And, despite it being widely available in whipped cream canisters, it's also good to know that recreational use of nitrous oxide is illegal. For more information about nitrous oxide and other inhalants, check out the National Institute on Drug Abuse (NIDA) [2] website.

Alice!
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