

# Dietary inorganic nitrate may reduce heart dysfunction caused by powerful anti-cancer drug

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Virginia Commonwealth University researchers have found that nutrient supplementation, like the kind that is found in leafy greens, spinach and lettuce, may reduce the damage to the heart caused by a powerful anti-cancer drug.

Since the 1960s, the anti-cancer drug doxorubicin has remained a top choice for chemotherapy because of its superior efficacy to fight cancer. However, the drug is known to lead to permanent [heart damage](#). Currently, there is no Food and Drug Administration-approved therapy for prevention or treatment of heart damage caused by doxorubicin.

In a study, published online ahead of print on May 16 in the [Journal of the American College of Cardiology](#), using a mouse model the team demonstrated that mice treated with dietary inorganic nitrate had a reduced rate of heart dysfunction caused by doxorubicin. On a molecular level, the dietary nitrate stabilized the mitochondria and protected against free-radical damage to the heart.

"These results may have significant impact in reducing the risk and degree of heart damage in patients who depend on doxorubicin for treatment of cancers. This is because inorganic nitrate is a water-soluble and very inexpensive chemical that could be ideal for long-term oral administration during the course of cancer treatment with doxorubicin," said Rakesh C. Kukreja, Ph.D., principal investigator for the project at

VCU, and the Eric Lipman professor in cardiology in the VCU School of Medicine and the scientific director of the VCU Pauley Heart Center.

According to Kukreja, the nitrate dose used in this study is 400 percent of the World Health Organization Acceptable Daily Intake (WHO-ADI). He said that nitrate can easily be obtained from foods including [leafy green vegetables](#), spinach and lettuces, which have high levels of nitrate, or beverages such as [beet juice](#) that are commercially available and safely used in humans.

Mitochondria are cellular organelles critical for converting oxygen and nutrients into ATP, the key fuel for cellular function. The free radicals generated in the mitochondria of cardiac cells by doxorubicin lead to the breakdown of regular cellular function, resulting in programmed cardiac cell death. Over time, cell death has been linked to decreased heart function or heart failure.

Provided by Virginia Commonwealth University

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