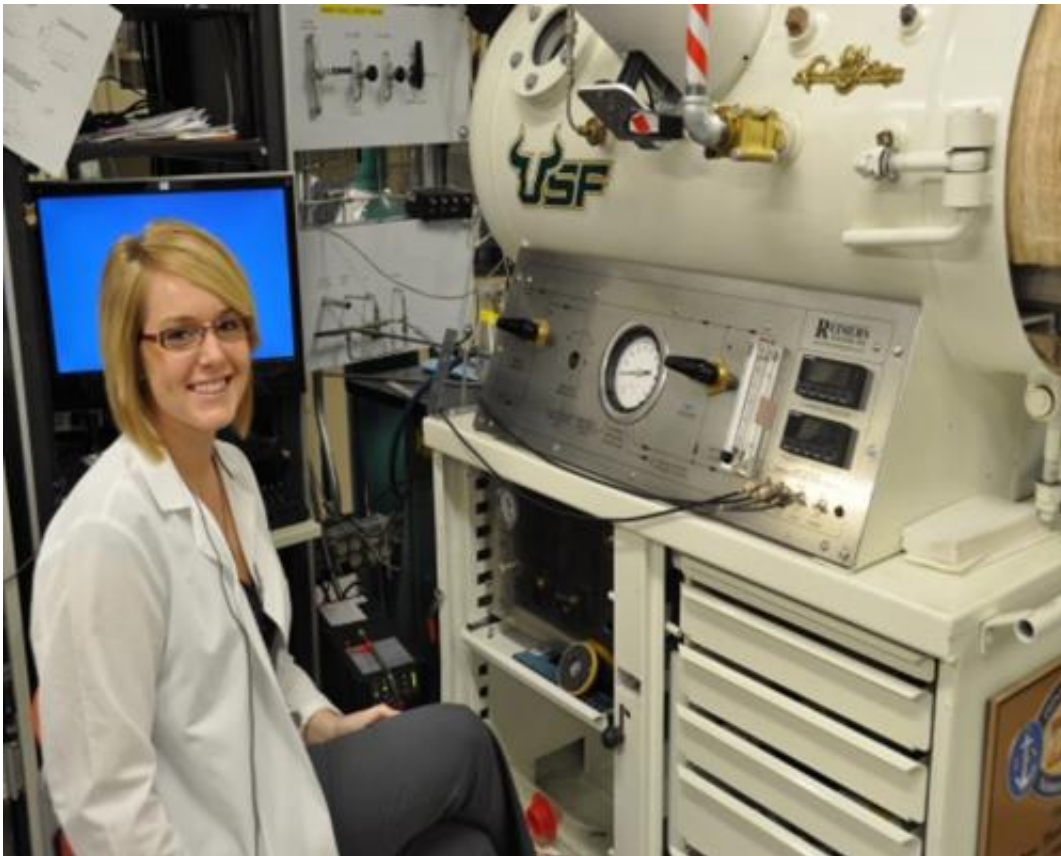


# Nontoxic cancer therapy proves effective against metastatic cancer

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Study lead author Angela Poff, University of South Florida, is in the Hyperbaric Biomedical Research Laboratory. Credit: University of South Florida

A combination of nontoxic dietary and hyperbaric oxygen therapies effectively increased survival time in a mouse model of aggressive metastatic cancer, a research team from the Hyperbaric Biomedical

Research Laboratory at the University of South Florida has found.

The study, "The [Ketogenic Diet](#) and Hyperbaric Oxygen Therapy Prolong Survival in Mice with Systemic Metastatic Cancer," was published online today in *PLOS ONE*.

Led by Dominic D'Agostino, PhD, principal investigator in the Department of [Molecular Pharmacology](#) and Physiology at the USF Health Morsani College of Medicine, the research shows the effects of combining two nontoxic adjuvant cancer therapies, the ketogenic diet and hyperbaric oxygen therapy, in a mouse model of late-stage, metastatic cancer.

"Our study demonstrates the potential of these cost-effective, nontoxic therapies to contribute to current cancer [treatment regimens](#) and significantly improve the outcome of patients with advanced metastatic cancer," D'Agostino said.

Metastasis, the spreading of cancer from the primary tumor to distant spots, is responsible for over 90 percent of cancer-related deaths in humans. A lack of available therapies effective against metastatic disease remains the largest obstacle in finding a cure for cancer.

In the study, mice with advanced [metastatic cancer](#) were fed either a standard [high carbohydrate diet](#) or carbohydrate-restricted ketogenic diet. Mice on both diets also received hyperbaric oxygen therapy, which uses a special chamber to increase the amount of oxygen in the tissues.

The ketogenic diet forces a physiological shift in substrate utilization from glucose to fatty acids and ketone bodies for energy. Normal healthy cells readily adapt to using ketone bodies for fuel, but cancer cells lack this metabolic flexibility, and thus become selectively vulnerable to reduced glucose availability. Solid tumors also have areas

of low oxygen, which promotes tumor growth and metastatic spread.

Hyperbaric oxygen therapy involves breathing 100 percent oxygen at elevated barometric pressure, saturating the tumors with oxygen. When administered properly, both the ketogenic diet and hyperbaric oxygen therapy are non-toxic and may even protect healthy tissues while simultaneously damaging [cancer cells](#), D'Agostino said.

While both therapies slowed disease progression independently, animals receiving the combined ketogenic diet and hyperbaric [oxygen therapy](#) lived 78 percent longer than mice fed a standard high-carbohydrate diet.

The research, funded by a charitable donation from Scivation, was inspired by the research of Professor Thomas Seyfried of Boston College. Dr. Seyfried has advanced the theory that cancer is a metabolic disease, inspiring the development of metabolic strategies to treat and prevent cancer.

D'Agostino's team is currently collaborating with Dr. Seyfried and other scientists to secure funding and develop protocols for establishing human clinical trials.

**More information:** "The Ketogenic Diet and Hyperbaric Oxygen Therapy Act Synergistically to Prolong Survival in Mice with Systemic Metastatic Cancer;" A.M. Poff, C. Ari, T.N. Seyfried and D.P. D'Agostino; *PLOS ONE*, June 5, 2013:  
[dx.plos.org/10.1371/journal.pone.0065522](http://dx.plos.org/10.1371/journal.pone.0065522)

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