

Garlic and fluorine combination shows promise as drug therapy

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Could the combination of garlic and fluorine be the future of drug therapeutics?
Credit: University at Albany

There's a lot more to garlic than its distinctive odor and strong, pungent taste.

For centuries, the allium root vegetable has been used as a natural medicine. Athletes at the first Olympics in ancient Greece ate it to enhance their strength and stamina. During World War I and II, soldiers were given [garlic](#) to prevent gangrene. More recently, scientists have found that [compounds](#) in garlic serve as a natural antibiotic to prevent and fight various diseases and illnesses.

Garlic Fluorination

In a new study, Eric Block, a distinguished professor of chemistry at the University at Albany, along with Shaker A. Mousa, vice provost for research at Albany College of Pharmacy and Health Sciences, and seven of their colleagues looked at whether adding the chemical element fluorine into natural garlic-derived compounds would enhance beneficial [biological activity](#).

Fluorine is one of the most reactive elements in the periodic table and widely used in the pharmaceutical industry. For example, several of the top 10 best-selling drugs contain fluorine atoms, including Pfizer's cholesterol-lowering agent Lipitor and Prevacid, a medication used to treat and prevent stomach and intestinal ulcers.

The scientists hypothesized that garlic and fluorine could prove to be a powerful combination.

"Since its discovery, the antibiotic properties found in garlic compounds have been the subject of extensive research," Block said. "Given the great importance of fluorine in medicinal chemistry and chemical biology, we were interested in observing the effect that fluorine substitution would have on the chemical reactivity and biological activity of garlic compounds. Such fluorinated analogs were presently unknown."

To test their hypothesis, the scientists modified several garlic compounds, replacing hydrogen atoms with fluorine atoms. Once completed, they used 10-day-old chick embryo eggs to compare the effectiveness of the [fluorine](#)-modified compounds and unmodified compounds as anti-angiogenesis and antithrombotic agents. Anti-angiogenesis agents are used to fight against cancer by blocking tumor growth, while antithrombotic agents help reduce the formation of blood clots.

Results showed the modified compounds were superior in biological activity and should be considered in the development of future drug therapies.

"Our results show evidence that new pharmaceuticals can involve modifying naturally-formed garlic compounds to enhance their beneficial biological activity," Block said. "This paper represented a pilot study. Future work requires modifying the laboratory procedures to make the new compounds discovered more readily available, and at a lower cost, to facilitate more detailed laboratory, biological and, potentially, clinical study."

More information: Eric Block et al. Fluorinated Analogs of Organosulfur Compounds from Garlic (*Allium sativum*): Synthesis, Chemistry and Anti-Angiogenesis and Antithrombotic Studies, *Molecules* (2017). [DOI: 10.3390/molecules22122081](https://doi.org/10.3390/molecules22122081)

Provided by University at Albany

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