Antioxidants can protect against omega 6 damage—or promote it

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Given omega 6 fatty acid's reputation for promoting cancer—at least in animal studies—researchers are examining the role that antioxidants play in blocking the harmful effects of this culprit, found in many cooking oils. After all, antioxidants are supposed to prevent DNA damage. But employing antioxidants could backfire, say researchers at Georgetown Lombardi Comprehensive Cancer Center.

In their study, being reported at the AACR Annual Meeting 2015, researchers found that vitamin E actually increased specific damage linked to omega 6 fatty acids. The vitamin promoted the formation of an "adduct," a structure that links a chemical to DNA, and which may cause mutations.

On the other hand, in the setting of omega 6, the antioxidant green tea polyphenol reduced formation of another commonly found "adduct" from omega-6 fatty acid—suggesting it may have beneficial health effects.

The third antioxidant tested, alpha-lipoic acid—found in spinach and broccoli and proven to have anti-cancer properties—had no effect on either of the two adducts studied.

The study was designed to understand why omega 6 polyunsaturated fatty acids promote liver cancer, while their cousin, omega 3, helps prevent cancer.

Researchers examined formation of DNA-damaging adducts in liver cells treated with omega 6. One of those adducts, ϒ-OHPdG, is well known, but the research team discovered a second one—DHHedA.

"This study revealed that DHHedA is a novel type of DNA damage, found in the tissues of rodents and humans, that is caused by omega 6 polyunsaturated fatty acid," says the study's lead author, Fung-Lung Chung, PhD, a professor of oncology at Georgetown Lombardi and professor of biochemistry and molecular & cellular biology at Georgetown University Medical Center.

In rats engineered to develop liver cancer, green tea polyphenols reduced formation of ϒ-OHPdG adducts, and vitamin E increased production of DHHedA adducts.

Researchers also discovered that although alpha-lipoic acid had no effect on either adduct, rats who ate the antioxidant had a significantly longer lifespan, compared with rats treated with the other antioxidants. "The precise reason why this happened is not yet known," says Chung.

"Our findings are beginning to shed light on why omega 6 fatty acids are believed to have negative health effects," Chung says, "but we have a long way to go before we can make definitive health claims on these antioxidants."

He added, "Not all antioxidants are created equal. They all have different properties, and they play different roles in various tissues. What we find in liver cancer may not hold true for other cancers."

Provided by Georgetown University Medical Center

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