

Fatty acid metabolite inhibits tumor growth in mice

By Sara Mishamandani

According to a recent NIEHS-funded [study](http://www.ncbi.nlm.nih.gov/pubmed/23553837), (<http://www.ncbi.nlm.nih.gov/pubmed/23553837>) a product from the metabolism of omega-3 fatty acid helps combat cancer, by cutting off the oxygen supply and nutrients that fuel tumor growth. With this finding, a team of University of California, Davis (UC Davis) scientists provides more evidence about how omega-3 fatty acids, which are commonly found in certain fish and plant oils, may be used to fight cancer.

“Our investigation opens up a new understanding of the pathways by which omega-3 fatty acids exert their biologic effect,” said Guodong Zhang, Ph.D., lead author of the study. Zhang is a postdoctoral researcher in the laboratory of Bruce Hammock, Ph.D., NIEHS Superfund Research Program center director at UC Davis.

Fatty acids and tumor growth

Zhang explained that tumors grow and spread by disrupting the normal process of angiogenesis, the formation of new blood vessels in the body. He and his colleagues determined that the metabolite epoxydocosapentaenoic acid (EDP) inhibits angiogenesis, which reduces the growth and spread of tumors in mice. It also blocks angiogenesis by a different mechanism than many current anti-cancer drugs.

EDP is produced in the human body from the omega-3 fatty acid docosahexaenoic acid (DHA), which is found in cold-water oceanic fish oils and various supplements and pharmaceuticals. EDP is also increasingly made industrially.

“As far as we know, EDPs are the first signaling lipids that have been discovered to have such potent anti-cancer effects,” said Zhang. “Researchers may be able to use EDPs as structural targets to develop stable analogs as anti-cancer agents.”

Researchers also found that a metabolite of arachidonic acid (ARA), an omega-6 fatty acid, has the opposite effect of EDP. The ARA metabolite slightly increases angiogenesis and tumor progression in mice. ARA in the human body usually comes from dietary animal sources, such as meat, eggs, and dairy. This increase in angiogenesis encourages wound healing and tissue repair.

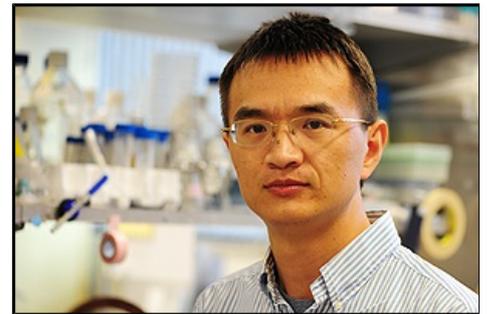
Cancer treatment and nutrition

Based on the study findings, inhibiting the enzyme soluble epoxide hydrolase (sEH) stabilizes and increases levels of DHA-derived EDPs. Researchers found that coadministering a low-dose sEH inhibitor with EDPs stabilized EDP in circulating blood, leading to dramatic inhibition of tumor growth and metastasis. Current anti-cancer drugs sorafenib and regorafenib are FDA-approved kinase inhibitors, which also inhibit sEH.

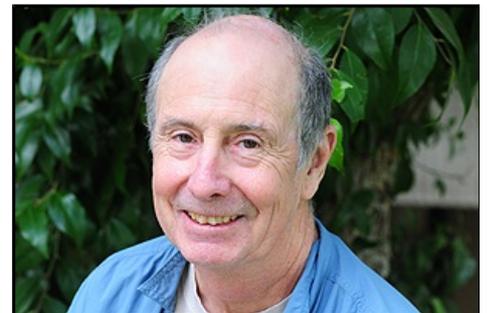
“It may be possible to improve the efficacy of these anti-cancer drugs by combining them with a diet high in omega-3 and low in omega-6 fatty acids,” Hammock said.

(Sara Mishamandani is a research and communication specialist for MDB Inc., a contractor for the NIEHS Superfund Research Program and Division of Extramural Research and Training.)

Citation: Zhang G, Panigrahy D, Mahakian LM, Yang J, Liu JY, Stephen Lee KS, Wettersten HI, Ulu A, Hu X, Tam S, Hwang SH, Ingham ES, Kieran MW, Weiss RH, Ferrara KW, Hammock DB. (<http://www.ncbi.nlm.nih.gov/pubmed/23553837>) 2013. Epoxy metabolites of docosahexaenoic acid (DHA) inhibit angiogenesis, tumor growth, and metastasis. Proc Natl Acad Sci USA; doi:10.1073/pnas.1304321110 [Online 3 April 2013].



Zhang studies how blood vessels form during tumor growth and metastasis. (Photo courtesy of Guodong Zhang)



Hammock is also a distinguished professor in the Department of Entomology at UC Davis. (Photo courtesy of Bruce Hammock)

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