

# Ancient Chinese remedy shows potential in preventing breast cancer

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A derivative of the sweet wormwood plant used since ancient times to fight malaria and shown to precisely target and kill cancer cells may someday aid in stopping breast cancer before it gets a toehold. In a new study, two University of Washington bioengineers found that the substance, artemisinin, appeared to prevent the onset of breast cancer in rats that had been given a cancer-causing agent. The study appears in the latest issue of the journal *Cancer Letters*.

"Based on earlier studies, artemisinin is selectively toxic to cancer cells and is effective orally," according to Henry Lai, research professor in the Department of Bioengineering, who conducted the study with fellow UW bioengineer Narendra P. Singh, a research associate professor in the department. "With the results of this study, it's an attractive candidate for cancer prevention."

The properties that make artemisinin an effective antimalarial agent also appear responsible for its anti-cancer clout. When artemisinin comes into contact with iron, a chemical reaction ensues that spawns free radicals – highly reactive chemicals that, when formed inside a cell, attack the cell membrane and other structures, killing the cell. The malaria parasite can't eliminate iron in the blood cells it eats, and stores it. Artemisinin makes that stored iron toxic to the parasite.

The same appears to be true for cancer. Because they multiply so rapidly, most cancer cells have a high rate of iron uptake. Their surfaces have large numbers of receptors, which transport iron into the cells. That

appears to allow the artemisinin to selectively target and kill the cancer cells, based on their higher iron content. In the latest study, the researchers administered to rats a single oral dose of 7,12-dimethylbenz[a]anthracene, a substance known to induce multiple breast tumors. Half of the rats then were fed regular food, while the other half were fed food with 0.02 percent artemisinin added. For 40 weeks, researchers monitored each group for the formation of breast tumors.

Among the rats that didn't get artemisinin, 96 percent developed tumors. In comparison, 57 percent of the artemisinin-fed rats developed tumors.

In addition, the researchers report, tumors that did develop in the artemisinin-fed rats were both "significantly fewer and smaller in size when compared with controls."

The reason for artemisinin's apparent preventative effect may be twofold, the researchers said. The substance may kill precancerous cells, which also tend to use more iron than ordinary cells, before those cells develop into a tumor.

Artemisinin also may impede angiogenesis, or a tumor's ability to grow networks of blood vessels that allow it to enlarge. Because artemisinin is widely used in Asia and Africa as an anti-malarial, it has a track record of being relatively safe and causing no known side effects, Lai said.

"The present data indicate that it may be a potent cancer-chemoprevention agent.

"Additional studies are needed to investigate whether the breast cancer prevention property of artemisinin can be generalized to other types of cancer."

Source: University of Washington

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