

An apple peel a day might keep cancer at bay

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Rui Hai Liu, Cornell associate professor of food science, analyzed the peel from 230 pounds of red delicious apples. Credit: Robert Barker/Cornell University Photography

An apple a day keeps the doctor away? Or, what appears to be more accurate: An apple peel a day might help keep cancer at bay, according to a new Cornell study.

Cornell researchers have identified a dozen compounds -- triterpenoids -- in apple peel that either inhibit or kill cancer cells in laboratory cultures. Three of the compounds have not previously been described in

the literature.

"We found that several compounds have potent anti-proliferative activities against human liver, colon and breast cancer cells and may be partially responsible for the anti-cancer activities of whole apples," says Rui Hai Liu, Cornell associate professor of food science. Liu is affiliated with Cornell's Institute of Comparative and Environmental Toxicology and is senior author of the study, which is online and published this month in the *Journal of Agricultural and Food Chemistry*.

In previous Cornell studies, apples had been found not only to fight cancer cells in the laboratory but also to reduce the number and size of mammary tumors in rats. The Cornell researchers now think that the triterpenoids may be doing much of the anti-cancer work.

"Some compounds were more potent and acted differently against the various cancer cell lines, but they all show very potent anti-cancer activities and should be studied further," said Liu.

With co-author Xiangjiu He, a Cornell postdoctoral researcher, Liu analyzed the peel from 230 pounds of red delicious apples from the Cornell Orchard and isolated their individual compounds. After identifying the structures of the promising compounds in the peel, the researchers tested the pure compounds against cancer cell growth in the laboratory. In the past, Liu has also identified compounds called phytochemicals -- mainly flavonoids and phenolic acids -- in apples and other foods that appear to have anti-cancer properties as well, including inhibiting tumor growth in human breast cancer cells.

"We believe that a recommendation that consumers to eat five to 12 servings of a wide variety of fruits and vegetables daily is appropriate to reduce the risks of chronic diseases, including cancer, and to meet nutrient requirements for optimum health," said Liu.

Source: Cornell University

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