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AN OLD ADAGE ABOUT APPLES FINDS SCIENTIFIC BACKING

SEATTLE -- To paraphrase an old adage: Can an apple a day keep colon cancer at bay?

According to a new study presented at the American Association for Cancer Research Third Annual *International Conference on Frontiers in Cancer Prevention Research* here, a class of polyphenols called procyanidins found in apples was shown to significantly reduce the number of precancerous lesions in the colons of laboratory animals.

Other work showed that these polyphenols exerted their anti-cancer influence by altering specific cell signaling pathways leading to apoptosis, or programmed cell death.

"These studies not only offer insights into the mechanisms of the chemopreventive properties of these polyphenols, they also offer proof of their potential to prevent colon cancer," said Francis Raul, Ph.D., the study's lead investigator and Research Director of the French National Institute for Health and Medical Research (INSERM) in Strasbourg, France.

Medical practitioners and creators of old adages have long recognized the health benefits of apples but, in recent years, scientists have been homing in on specific antioxidants like polyphenols concentrated largely in the apple's skin. An antioxidant is one of many chemicals that reduce or prevent oxidation, thus preventing DNA, cell and tissue damage triggered by free radicals in the body.

As part of their study, the French scientists split the polyphenols found in apples into two general categories: polyphenol monomers which include flavonoids (catechins and epicatechins); and polyphenol oligomers/polymers such as the procyanidins (polymers of catechins and epicatechins), also found in abundance in red wine and cocoa (chocolate).

The scientists then exposed cancer cells to each class of polyphenols, followed by tests to determine their effects on certain biochemical markers and tumor growth.

The first class of monomer polyphenols, which included the flavonoids, failed to have any significant effect on biochemical markers or cancer cell growth, at concentrations ranging from 10 to 100 micrograms per milliliter.

But the second class, featuring the procyanidins, performed well on both tests. First, they triggered cell signaling that activated a cascade of chemical reactions resulting in apoptosis, a critical step in halting cancer cell growth and spread.

"This part of the study helped determined a key mechanism by which procyanidins might prevent the growth of cancer cells," said Dr. Raul.

To determine if procyanidins exerted any chemopreventive activity *in vivo*, laboratory rats injected with a known colon carcinogen were subsequently fed a liquid mixture of water and apple-derived procyanidins. After about six weeks on this diet, these rats were found to have about half the number of precancerous lesions in their colons as their counterparts on a regular diet.

Dr. Raul said these experiments revealed a previously unknown way in which polyphenol polymers (procyanidins) worked to destroy cancer cells, suggesting such knowledge might be used to one day combat specific tumor growth, such as colon cancer.

"For now, our work suggests that eating the whole apple, including the skin, might offer some anti-cancer benefits," Dr. Raul said. "That is certainly something we can comfortably do without further study."

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Founded in 1907, the American Association for Cancer Research is a professional society of more than 24,000 laboratory, translational, and clinical scientists engaged in all areas of cancer research in the United States and in more than 60 other countries. AACR's mission is to accelerate the prevention and cure of cancer through research, education, communication, and advocacy. Its principal activities include the publication of five major peer-reviewed scientific journals: *Cancer Research*; *Clinical Cancer Research*; *Molecular Cancer Therapeutics*; *Molecular Cancer Research*; and *Cancer Epidemiology, Biomarkers & Prevention*. AACR's Annual Meetings attract more than 15,000 participants who share new and significant discoveries in the cancer field. Specialty meetings, held throughout the year, focus on the latest developments in all areas of cancer research.



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