

Anthocyanins and colon cancer: Structure is key, says study

By Stephen Daniells

19-Sep-2008 - **The structure of anthocyanins, the antioxidant pigments from a range of fruit and vegetables, is key to the cancer fighting abilities, reports a new study from the US.**

A study published online ahead of print today in the *Journal of Agricultural and Food Chemistry*, reports that certain types of anthocyanins have greater activity against colon cancer than others.

"The chemical structures of anthocyanins do have a significant impact on their biological activity, and data suggest that nonacylated monoglycosylated anthocyanins are more potent inhibitors of colon cancer cell growth proliferation," wrote lead author Pu Jing from The Ohio State University .

The researchers cautioned that more research is necessary to explore the role of anthocyanin structure and the chemo-protective effects.

The study adds to a growing body of science that indicates the potential anti-cancer benefits of the antioxidant compounds most commonly associated with berries. In 2006, researchers from UCLA's Center for Human Nutrition, characterised the phenolic content of six berries and found that, while many different forms of phenolics are present in the berry extracts, anthocyanins are the major contributors toward programmed cell death (*J. Agric. Food Chem.* doi: 10.1021/jf061750g S0021-8561(06)01750-X)

Study details

Jing and co-workers compared the chemo-protective properties of anthocyanin-rich extracts (AREs) from purple corn, chokeberry, bilberry, purple carrot, grape, radish, and elderberry.

Their ability to influence the growth of colon cancer cells (HT29 cell line) in the lab was measured according to the growth inhibition (GI50) scale, based on quantifying the concentration of extract necessary to inhibit the growth of the cancer cells by 50 per cent.

Anthocyanins from purple corn were found to be the most potent, with a GI50 value of 14 micrograms per millilitre. Chokeberry and bilberry shared second spot, followed by purple carrot and grape. The least active with respect to GI50 were the extracts from radish and elderberry with a GI value of 100 micrograms per millilitre.

"Anthocyanins played a major role in AREs' chemoprotection and exerted an additive interaction with the other phenolics present," stated the researchers.

Looking at the structure

When the researchers considered the structure of the anthocyanins present in each of the extracts, they found that anthocyanins were in the non-acylated monoglycosylated form then they had a "greater inhibitory effect on HT-29 cell proliferation", they said.

On the other hand, anthocyanins in the pelargonidin, triglycoside, and/or acylation forms possessed a lower inhibitory effect.

"These findings are in agreement with those of others, suggesting that anthocyanins are the primary anti-proliferative components present in anthocyanin-rich commodities and/or extract," wrote the researchers.

"Thus, evidence is mounting that anthocyanins may play a major role in the chemoprotective action of anthocyanin-rich foods or commodities."

"These findings should be considered for crop selection and the development of anthocyanin-rich functional foods," concluded the researchers.

Cancer stats

Colorectal cancer is the third most diagnosed cancer in the US, according to the American Cancer Society. About 150,000 new cases will be diagnosed in the US this year, says the society, with an almost 50-50 split between men and women.

Source: *Journal of Agricultural and Food Chemistry*

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"Structure-Function Relationships of Anthocyanins from Various Anthocyanin-Rich Extracts on the Inhibition of Colon Cancer Cell Growth"

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