US researchers claim beer and coffee can slash prostate cancer risk

Wednesday, 9 December 2009

Drinking beer and coffee may cut the risk of developing aggressive prostate cancer, according to two studies.

In the first study, scientists recorded the coffee consumption of almost 50,000 men taking part in a major US health study. Over a period of 20 years, 4,975 of the men developed prostate cancer.

The study found men who drank the most coffee had a 60pc lower risk of aggressive prostate cancer than those who drank no coffee.

Study leader Dr Kathryn Wilson, from Harvard Medical School in Boston, US, said: "Coffee has effects on insulin and glucose metabolism as well as sex hormone levels, all of which play a role in prostate cancer. It was plausible that there may be an association between coffee and prostate cancer."

The results were presented yesterday at the American Association for Cancer Research meeting "Frontiers in Cancer Prevention Research" in Houston, Texas.

Helen Rippon, head of research management at The Prostate Cancer Charity, said: "Coffee is one of the most popular drinks in the world and so it is important that we fully understand any impact drinking it has on health.

"The research evidence so far on the relationship between caffeinated drinks and prostate cancer has been quite mixed, and has largely focused on the risk of developing the disease and the role that drinks like tea and coffee might have in cancer prevention. This large-scale study looked instead at whether coffee drinking might influence the aggressiveness of prostate cancer in men who do develop the disease.

"We would not recommend that men cultivate a heavy coffee drinking habit on the back of this research, not least because a high caffeine intake can cause other health problems."

There was more good news in battling the disease from the second study, which suggested that men may now have another excuse to go to the pub.

Research suggests that a compound in beer may also prevent prostate cancer.

Tests showed that the ingredient, xanthohumol, blocked a biological pathway that allows prostate cancer to be fuelled by the male hormone testosterone.

The disease is commonly treated with drugs that act in a similar way.

Previous studies have already suggested that xanthohumol may block the female hormone oestrogen's ability to stimulate breast cancer. Scientists now believe it may have a similar effect in men.

Biochemical and Molecular Actions of Nutrients

The Chalcone Xanthohumol Inhibits Triglyceride and Apolipoprotein B Secretion in HepG2 Cells[1,2]

Adele Casaschi, Geoffrey K. Maiyoh, Brent K. Rubio, Rachel W. Li, Khosrow Adeli* and Andre G. Theriault[3]

Division of Medical Technology, John A. Burns School of Medicine, University of Hawaii at Manoa, Honolulu, Hawaii; and * Department of Laboratory Medicine, The Hospital for Sick Children, Toronto, Canada

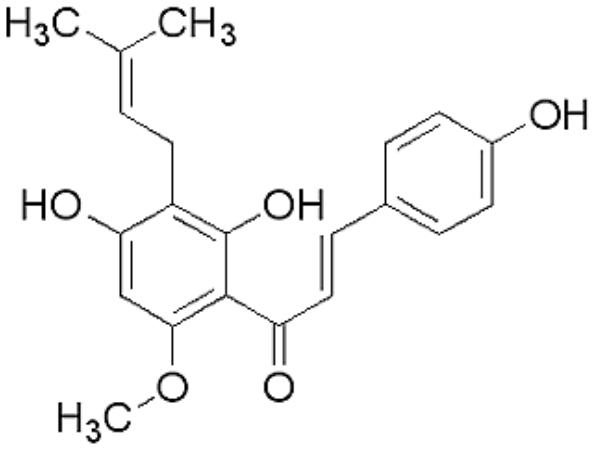
Xanthohumol
from Hop (humulus lupulus)

Xanthohumol is a prenylated chalcone found naturally in Hop (humulus lupulus). This prenylated flavonoid has been shown to be a potent bioactive compound. Xanthohumol has been shown to have antiproliferative and cytotoxic effects in human cancer cell lines.[1,2] It has also been displayed to inhibit diacylglycerol acetyltransferase (DGAT)[3] and human P450 enzymes. Xanthohumol inhibits the expression of HIF-1α and VEGF under hypoxic conditions.

Higher antioxidant activity is reported for prenylchalcones than for prenylflavanones in the Cu^{2+}-mediated oxidation of LDL, suggesting a relation between structure and function.[4] Also, many chalcones suppress tumor promotion more effectively than flavonoids themselves.[5]

Quantities of xanthohumol found in Hop are too small to have any biological effects under normal consumption amounts.

Product Number: X0379



Molecular Formula: $C_{21}H_{22}O_5$
Molecular Weight: 354.40

Preparation Instructions
Soluble in DMSO at 25 mg/ml. Also soluble in ethanol at 10 mg/ml.

Storage Conditions
Store at 2-8 °C. Under these conditions the product is stable for at least 2 years.

References
Miranda, C.L. et. al., Antiproliferative and cytotoxic effects of prenylated flavonoids from hops (Humulus lupulus) in human cancer cell lines. Food Chem. Toxicol. 37, 271-285, (1999)

Delmulle, L. et. al., Antiproliferative properties of prenylated flavonoids from hops (Humulus lupulus L.) in human prostate cancer cell lines. Phytomedicine 13, 732-734, (2006)

Tabata, N. et. al., Xanthohumols, diacylglycerol acyltransferase inhibitors, from Humulus lupulus. Phytochemistry 46, 683-687, (1997)

Miranda, C.L., et. al., Antioxidant and prooxidant actions of prenylated and nonprenylated chalcones and flavanones in vitro. J. Agric. Food Chem 48, 3876-3884, (2000)

Dimmock, J. R., et. al., Bioactivities of chalcones. Curr. Med. Chem. 6, 1125-1149, (1999)

Phytochemistry
Volume 65, Issue 10, May 2004, Pages 1317-1330

Abstract
A method for quantitation of six prenylflavonoids (xanthohumol, isoxanthohumol, desmethylxanthohumol, 6- and 8-prenylnaringenins and 6-geranylnaringenin) in hops and beer by HPLC–tandem mass spectrometry has been developed. The method allows direct analysis of beer and crude methanolic extracts of hops. After HPLC separation, prenylflavonoids were detected by positive ion multiple-reaction monitoring using a triple-quadrupole mass spectrometer equipped with a heated nebulizer–atmospheric pressure chemical ionization interface. The accuracy and precision were evaluated by replicate analyses of (spiked) samples. Thirteen commercial beers were analysed with the method. Isoxanthohumol, formed by isomerization of xanthohumol during the brewing process, was the most abundant flavonoid in hopped beers, ranging from 0.04 to 3.44 mg/l.

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Chapter eight Biosynthesis of terpenophenolic metabolit...
Recent Advances in Phytochemistry

Chapter eight Biosynthesis of terpenophenolic metabolites in hop and cannabis
Recent Advances in Phytochemistry, Volume 40, 2006, Pages 179-210
Jonathan E. Page, Jana Nagel

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Beer constituents as potential cancer chemopreventive a...
European Journal of Cancer

Beer constituents as potential cancer chemopreventive agents
European Journal of Cancer, Volume 41, Issue 13, September 2005, Pages 1941-1954
Clarissa Gerhäuser

Abstract
Beer is a complex alcoholic beverage made from barley (malt), hop, water and yeast. Phenolic constituents of beer are derived from malt (70–80%) and hop (20–30%). Structural classes include simple phenols, benzoic- and cinnamic acid derivatives, coumarins, catechins, di-, tri- and oligomeric proanthocyanidins, (prenylated) chalcones and flavonoids as well as alpha- and iso-alpha-acids derived from hop. Compounds belonging to different structural classes have distinct profiles of biological activity in in vitro test systems, and in combination might lead to enhanced effects. Scientific evidence has accumulated over the past 10 years pointing to the cancer preventive potential of selected hop-derived beer constituents, i.e., prenylflavonoids including xanthohumol and isoxanthohumol, and hop bitter acids. Chemopreventive activities observed with these compounds relevant to inhibition of carcinogenesis at the initiation, promotion and progression phases, as well as results from in vivo studies on metabolism, bioavailability and efficacy are summarised in this review.

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Xanthohumols, diacylglycerol acyltransferase inhibitors...
Phytochemistry

Xanthohumols, diacylglycerol acyltransferase inhibitors, from Humulus lupulus
Phytochemistry, Volume 46, Issue 4, October 1997, Pages 683-687
Noriko Tabata, Minako Ito, Hiroshi Tomoda, Satoshi Ōmura

Abstract
Two inhibitors of diacylglycerol acyltransferase (DGAT) were isolated from hops of Humulus lupulus (L.). The structure elucidation and DGAT inhibitory activities were studied.

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Microbial transformation of xanthohumol
Phytochemistry

Microbial transformation of xanthohumol
Phytochemistry, Volume 62, Issue 5, March 2003, Pages 673-677
Wimal H. M. W. Herath, Daneel Ferreira, Ikhlas A. Khan

Abstract
Microbial transformation of xanthohumol using the culture broth of Pichia membranifaciens afforded three metabolites, (E)-2″-(2‴-hydroxyisopropyl)-dihydrofurano[2″,3″:4′,3′]-2′, 4-dihydroxy-6′-methoxychalcone, (2S)-2″-(2‴-hydroxyisopropyl)-dihydrofurano [2″,3″:7,8]-4′-hydroxy-5-methoxyflavanone and (E)-2″-(2‴-hydroxyisopropyl)-dihydrofurano[2″,3″:2′,3′]-4′-hydroxy-5-methoxychalcone.

Molecules of Interest
Xanthohumol and related prenylflavonoids from hops and beer: to your good health!

References and further reading may be available for this article. To view references and further reading you must purchase this article.

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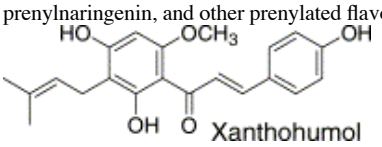
accepted 26 April 2004.
Available online 28 May 2004.

Abstract
Xanthohumol (3′-[3,3-dimethyl allyl]-2′,4′,4-trihydroxy-6′-methoxychalcone) is the principal prenylated flavonoid of the female inflorescences of the hop plant (‘hops'), an ingredient of beer. Human exposure to xanthohumol and related prenylflavonoids, such as 8-prenylnaringenin and isoxanthohumol, is primarily through beer consumption. Xanthohumol has been characterized a ‘broad-spectrum' cancer chemopreventive agent in in vitro studies, while 8-prenylnaringenin enjoys fame as the most potent phytoestrogen known to date. These biological activities suggest that prenylflavonoids from hops have potential for application in cancer prevention programs and in prevention or treatment of (post-)menopausal ‘hot flashes' and osteoporosis. Xanthohumol and 8-prenylnaringenin are metabolized into many flavonoid derivatives with modified 3,3-dimethyl allyl (prenyl) moieties. Xanthohumol is formed in lupulin glands by a specialized branch of flavonoid biosynthesis that involves prenylation and O-methylation of the polyketide intermediate chalconaringenin. Although a lupulin gland-specific chalcone synthase is known, the aromatic prenyltransferase and O-methyltransferase participating in xanthohumol have not been identified. The prenylflavonoid pathway is a possible target for breeding or biotechnological modification of hops with the aim of increasing xanthohumol levels for beer brewing and 8-prenylnaringenin levels for pharmaceutical production.

Graphical Abstract
This review provides an overview of the chemistry, biological activities, and biotechnological aspects of xanthohumol, 8-prenylnaringenin, and other prenylated flavonoids from hops, Humulus lupulus L.



Author Keywords: Xanthohumol; 8-Prenylnaringenin; Prenylflavonoids; Flavonoids; Hops; Humulus lupulus; Beer; Antioxidant; Cancer chemoprevention; Phytoestrogen; Breast enhancement

Article Outline

Prostate cancer could be averted thanks to hops compound

This news may provide vital insights in preventing prostate cancer. **A study claims that the natural compound xanthohumol could obstruct the consequences of the male hormone testosterone, thereby assisting in averting prostate cancer.**

Xanthohumol is apparently resulted from hops and supposedly fits in with the class of flavonoids that are discovered in several plants, fruit, vegetables and spices. Numerous studies have supposedly illustrated that xanthohumol could obstruct the effects of estrogen by attaching to its receptor, which could result in the prevention of breast cancer.

As testosterone receptors perform in the same way as estrogen, by binding, then invigorating hormone-dependent impacts like gene expression and cell growth. The study authors inspected whether xanthohumol might not only obstruct the effects of estrogen, but also the male hormone androgen.

“We hope that one day we can demonstrate that xanthohumol prevents prostate cancer development, first in animal models and then in humans, but we are just at the beginning,” commented **Clarissa Gerhauser, Ph.D., group leader of cancer chemoprevention in the Division of Epigenomics and Cancer Risk Factors at the German Cancer Research Center, in Heidelberg, Germany.**

Gerhauser and colleagues apparently stirred hormone-dependent prostate cancer cells with testosterone, which supposedly resulted in a huge emission of prostate specific antigen (PSA). PSA is said to be applied for screening and premature discovery of prostate cancer in men. Cells were then believed to be treated with testosterone and xanthohumol and the consequences were checked.

Gerhauser mentioned, “Xanthohumol prevented the receptor from translocating to the cell nucleus, thus inhibiting its potential to stimulate the secretion of PSA and other hormone-dependent effects.”

Molecular modeling outcomes apparently exhibited that xanthohumol could straightaway attach to the androgen receptor structure. The

experts then proposed that this compound could have advantageous consequences in animals. When they gauged the anti-androgenic potential of xanthohumol in a rat model, they apparently discovered that even though xanthohumol could not avert a surge in prostate weight following testosterone treatment, it could lessen testosterone-increased seminal vesicle weight.

Gerhauser concluded by mentioning that although prostate weights were not changed, xanthohumol still reduced the effects of hormone signaling, such as gene expression, measured in the prostate tissue.

The findings of the study were presented at the American Association for Cancer Research Frontiers in Cancer Prevention Research Conference in Houston.

Posted on Wednesday, December 9th, 2009 at 9:04 pm and is filed under Cancer.

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