



Make More of The Green Stuff

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Introduction:

This little eBook aims to provide 'mini literature review' that helps to confirm why you should make sure to 'eat your greens' - especially 'good old' broccoli and its 'Cruciferous vegetable' family members such as brussel sprouts, bok choy and other cabbages...as well as your other veggies like turnips and mustard greens – naturally!

As children we were probably nearly all told that we should eat up our greens. And as children we probably almost all turned up our noses at the dollop of vegetables that it seem obligatory for Mum to deposit on our plate next to the stuff we 'really wanted' to eat! Surely our parents were 'just saying' all that stuff about those yucky veggies being 'good for us' just to try and force us to consume those horrible things?

As time passed then perhaps for some of us we developed our palates and actually discovered that at least some vegetables were not that bad after all. But for many people those childhood habits may have remained well-established – at least in part if not in their entirety. For it is not uncommon for folks to proclaim that they 'have never liked broccoli' or 'can't stand cabbage', or simply 'detest boiled turnip'!

Indeed there is still a widespread pattern of poor vegetable consumption to be found in many peoples dietary habits and they probably hardly ever think back to when their preferences, likes and dislikes first formed. Yet it all too easy to reach for the old exclamation: “I blame the parents”. For when we reach adulthood, and are thinking persons in our own right – who should have picked up at least some 'worldly wisdom' as we traverse life's highways – then we should also have encountered enough positive information and incidentally learning to confirm for ourselves that we should tackle our personal food foibles, and overcome any lingering childish dislikes, in order to be

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sure to chose the healthiest diet for both ourselves and pass on such wisdoms to our own younger family members.

But if you have lacked some solid information to add that extra 'push' to your personal motivation to eat better, or to lend weight to your own 'parental efforts' to persuade your offspring that their vegetable are 'good for them' than this little eBook is here to help! Because, over recent years there has been a regular stream of positive scientific support for the health-benefits of including regular healthy doses of vegetables in our diets. You'll see that in the following summaries of research findings broccoli is truly a star...but do not overlook the many other healthy greens and other vegetables too.

And if you are thinking – but I've never liked broccoli...then remember 'likes and dislikes' are largely a thing of the mind, if you start to think positively about your greens – you'll be surprised how easy it is to begin to change your attitude towards them and you will even begin to discover that (1) they don't taste so bad and (2) Actually they aren't so hard to 'swallow' and (3) Hey, I don't know what all the fuss was about – these veggies are actually pretty nice to eat...usually followed for most people by (4) Hey...where's my greens? I can't eat a meal without veggies!!!!

It's true...'habit-breaking' gurus, those psychologists, physiotherapists and NLP practitioners who help folks overcome 'bad habits' agree that breaking and forming habits is actually quite simple. If you want to develop a good habit then you simply need to repeat a process for a full month – that's right 30 full days – and after that time you will find you have established a 'new better habit'. So you can try this in establishing a new 'vegetable eating habit'. Make sure you include green veggies – particularly broccoli – on at least one, two or even three of your meals a day. And make sure you eat the portion. The process will become progressively easier and most people will find that after four diligent weeks they just won't feel right about eating a plate of food WITHOUT the green side accompaniment! Try it...knowing all the while... that it is true, eating up your vegetables REALLY IS GOOD FOR YOU:

I hope you find the following articles even half as interesting as I did! And don't forget to 'swing by' <http://www.GoNaturalandOrganic.com> from time to time to see what else we've added to the site (be sure to check out the extra resources we've included at the end of this eBook too – they are all just a 'click' away ;-D) – Good health...and Enjoy your greens!

Al G Smith Author & Publisher - <http://www.GoNandO.com> (© Copyright 2008)

1. Vegetables That Prevent May Ultimately Cure Some Cancers

ScienceDaily (Jan. 6, 2004) — COLLEGE STATION - Broccoli, cabbage, turnips and mustard greens. A dose a day keeps most cancers away.

But for those who develop cancer, the same vegetables may ultimately produce the cure. Research at the Texas Agricultural Experiment Station has led to a patent for a new use for derivatives of DIM, or diindolymethane, a natural compound derived from certain vegetables, to treat cancer.

"We took advantage of a natural chemical, that research has shown will prevent cancer, and developed several more analogs," said Dr. Steve Safe, an Experiment Station chemist who has been studying cancer for about 10 years.

Safe's patent has been picked up by Plantacor, a new biotech company headquartered in College Station, and is expected to enter clinical trials soon in collaboration with M.D. Anderson in Houston.

DIM already is commercially available as a natural supplement for cancer prevention and for treating estrogen-related health issues.

"DIM is a potent substance," Safe said. "But we made it even more potent against various tumors."

The first development in this research using chemically altered DIM from broccoli came when the growth of breast cancer cells was inhibited in laboratory studies. Subsequent research showed these compounds also inhibited growth of pancreatic, colon, bladder and ovarian cancer cells in culture, Safe said. Limited trials on lab mice and rats have produced the similar results, he noted.

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Safe said the research began by considering compounds that protect a person from developing cancer. Journal articles of other researchers are stacked on Safe's expansive desk, extolling the scientific evidence that cruciferous vegetables prevent cancer.

His team wondered whether the similar compounds could be developed for treatment of cancer. They looked at the mechanism - how the compounds block cancer cell growth - and found that they target PPAR gamma, a protein that is highly active in fat cells. However, this same PPAR gamma is over-expressed in many tumors and tumor cells and is a potential target for new drugs, he said.

Safe's lab chemically modified "natural" DIM to give a series of compounds that target the PPAR gamma and stop the growth of cancer.

"One of the best parts is that this treatment appears to have minimal or no side effects, in the mice trials; it just stops tumor growth," he said. "The hope now is that the patented chemicals can be developed into useful drugs for clinical trials and then be used for cancer treatment.

"It looks promising in cancer cells and animals at this time. We need future studies in humans to see if it is beneficial with people as well," he added.

Adapted from materials provided by Texas A&M University - Agricultural Communications.
<http://agnews.tamu.edu/>

2. From And For The Heart, My Dear Valentine: Broccoli

ScienceDaily (Jan. 24, 2008) — Wishing your Valentine good heart health on February 14 -- and throughout 2008?

Then consider the food some people love to hate, and hand over a gift bag of broccoli along with that heart-shaped box of chocolates. Researchers in Connecticut are reporting impressive new evidence that eating broccoli may protect against heart disease.

Researchers have known for years that broccoli is a rich source of antioxidants, vitamins, and fiber that may protect against cancer, Dipak K. Das and colleagues note. Other studies also suggest that broccoli may benefit the heart, although scientists do not know how it works.

Das and colleagues now report evidence on that topic from animal studies. They gave broccoli extract to lab rats for one month and measured its effects on the rats' heart muscle. Compared to a control group that ate a regular diet, the broccoli-fed animals had improved heart function and less heart muscle damage when deprived of oxygen. Broccoli's heart-healthy effects are likely due to its high concentrations of certain substances that seem to boost levels of a heart-protective protein called thioredoxin, the researchers note.

The article "Broccoli: A Unique Vegetable That Protects Mammalian Hearts through the Redox Cycling of the Thioredoxin Superfamily" is scheduled for the Jan. 23 issue of ACS' Journal of Agricultural and Food Chemistry.

Adapted from materials provided by American Chemical Society.

<http://portal.acs.org/portal/acs/corg/content>

3. Eat Your Broccoli: Study Finds Strong Anti-Cancer Properties In Cruciferous Veggies

ScienceDaily (May 18, 2007) — It turns out Mom was right – you should eat your broccoli. But what Mom may not have known is why broccoli is so healthy, and how its lesser known, younger offshoot may be a powerful anti-cancer agent.

Researchers at the Linus Pauling Institute at Oregon State University have found that sulforaphane – a compound found in cruciferous vegetables such as broccoli, bok choy and brussels sprouts – has strong anti-cancer properties.

Even more promising results have been found in broccoli sprouts. The tiny, thread-like broccoli sprouts sold at stores next to alfalfa sprouts have more than 50 times the amount of sulforaphane than found in mature broccoli.

Emily Ho, a researcher with the Linus Pauling Institute and an assistant professor in the Department of Nutrition and Exercise Sciences at OSU, will describe these dietary inhibitors for cancer prevention at the conference on “Diet and Optimum Health,” organized by the Linus Pauling Institute. The conference will be held May 16-19 at the Hilton Hotel in Portland. Ho will speak at 10:30 a.m. Friday, May 18.

Ho’s main area of research is on the dietary prevention of prostate cancer. The Asian diet could be a key in this prevention. White males born in the United States have dramatically higher rates of prostate cancer than Asian men. But when Asian men live in the U.S. for five years or more, their rates of prostate cancer rise significantly, Ho says.

Past studies in Ho’s lab have focused on dietary elements in cancer prevention such as green tea and soy.

In her new study, which was published in the Journal of the Society of Experimental Biology and Medicine, Ho and her colleagues at Linus Pauling Institute looked at cruciferous vegetables. While many cruciferous vegetables have sulforaphane, broccoli and broccoli sprouts have the highest amount and thus could be a major player in the prevention of prostate and colon cancer.

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Ho said drugs classified as histone deacetylase (HDAC) inhibitors are being looked at as potentially preventing cancer. She said their research shows that these same effects of inhibiting HDAC might be obtained by consumption of cruciferous vegetables.

“I would say if you’re at all worried about cancer or at high risk of cancer, especially of prostate or colon cancer, then increasing your dietary intake of broccoli and other vegetables could be a good idea,” Ho said.

“It certainly can’t hurt. And drugs can have negative side effects and be difficult to administer.”

While Ho said the research is not at the point where she can make a specific recommendation on how much broccoli or bok choy to eat, she personally tries to have two servings of cruciferous vegetables a day.

In human subjects, just eating some broccoli sprouts on top of a bagel with cream cheese resulted in HDAC inhibition.

“The compound in broccoli may be one of the strongest anti-cancer fighters we have,” Ho said.

Adapted from materials provided by Oregon State University. <http://oregonstate.edu/>

4. Broccoli Could Reverse The Heart Damaging Effects Of Diabetes

ScienceDaily (Aug. 26, 2008) — Researchers have discovered eating broccoli could undo the damage caused by diabetes to heart blood vessels.

Professor Paul Thornalley and his team from the University of Warwick have found a broccoli compound called Sulforaphane. This compound can encourage the body to produce more enzymes to protect the vessels, as well as reduce high levels of molecules which cause significant cell damage.

Past studies have shown that a diet rich in vegetables – particularly brassica vegetables such as broccoli – is linked to decreased risk of heart disease and stroke. People with diabetes have a particularly high risk of heart disease and stroke and other health impairments, such as kidney disease, are linked to damaged blood vessels.

Professor Thornalley, at the University's Warwick Medical School, tested the effects of Sulforaphane on blood vessel cells damaged by high glucose levels (hyperglycaemia).

His team observed a significant reduction of molecules in the body called Reactive Oxygen Species (ROS). Hyperglycaemia can cause levels of ROS to increase three-fold and such high levels can damage human cells. The results of the study showed that Sulforaphane reversed this increase in ROS by 73 per cent.

They also found Sulforaphane activated a protein in the body called nrf2, which protects cells and tissues from oxidative stress by activating protective antioxidant and detoxifying enzymes. The study showed the presence of Sulforaphane in human microvascular cells doubled the activation of nrf2.

Professor Thornalley said: "Our study suggests that compounds such as Sulforaphane from broccoli may help counter processes linked to the development of vascular disease in diabetes. In future, it will be important to test if eating a diet rich in Brassica vegetables has health benefits for diabetic patients. We expect that it will."

The study was funded by the Juvenile Diabetes Research Foundation International, The Wellcome

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Trust and the Biotechnological and Biological Sciences Research Council.

Journal reference:

1. Xue et al. Activation of NF-E2-related factor-2 reverses biochemical dysfunction of endothelial cells induced by hyperglycemia linked to vascular disease. *Diabetes*, 2008; DOI: 10.2337/db06-1003 <http://diabetes.diabetesjournals.org/cgi/content/abstract/57/10/2809>

Adapted from materials provided by University of Warwick. <http://www2.warwick.ac.uk/>

5. Broccoli May Help Boost Aging Immune System

ScienceDaily (Mar. 10, 2008) — Eat your broccoli! That's the advice from UCLA researchers who have found that a chemical in broccoli and other cruciferous vegetables may hold a key to restoring the body's immunity, which declines as we age.

Published in the online edition of the Journal of Allergy and Clinical Immunology, the study findings show that sulforaphane, a chemical in broccoli, switches on a set of antioxidant genes and enzymes in specific immune cells, which then combat the injurious effects of molecules known as free radicals that can damage cells and lead to disease.

Free radicals are byproducts of normal body processes, such as the metabolic conversion of food into energy, and can also enter the body through small particles present in polluted air. A supercharged form of oxygen, these molecules can cause oxidative tissue damage, leading to disease -- for example, triggering the inflammation process that causes clogged arteries. Oxidative damage to body tissues and organs is thought to be one of the major causes of aging.

"The mysteries of aging have always intrigued man," said Dr. Andre Nel, the study's principal investigator and chief of nanomedicine at the David Geffen School of Medicine at UCLA. "While we have known for some time that free radicals are important in aging, most of the past attention has focused on the mechanisms that produce free radicals rather than addressing the pathways used by the body to suppress their production."

A dynamic equilibrium exists in the body between the mechanisms that lead to increased free radical production and those antioxidant pathways that help combat free radicals.

"Our study contributes to the growing understanding of the importance of these antioxidant defense pathways that the body uses to fight free radicals," said Nel, a practicing clinical allergist and immunologist at the Geffen School. "Insight into these processes points to ways in which we may be able to alleviate the effects of aging."

The delicate balance between pro-oxidant and antioxidant forces in the body could determine the outcome of many disease processes that are associated with aging, including cardiovascular disease, degenerative joint diseases and diabetes, as well as the decline in efficiency of the

immune system's ability to protect against infectious agents.

"As we age, the ability of the immune system to fight disease and infections and protect against cancer wears down as a result of the impact of oxygen radicals on the immune system," Nel said.

According to the UCLA study, the ability of aged tissues to reinvigorate their antioxidant defense can play an important role in reversing much of the negative impact of free radicals on the immune system. However, until this current study, the extent to which antioxidant defense can impact the aging process in the immune system was not properly understood.

"Our defense against oxidative stress damage may determine at what rate we age, how it will manifest and how to interfere in those processes," Nel said. "In particular, our study shows that a chemical present in broccoli is capable of stimulating a wide range of antioxidant defense pathways and may be able to interfere with the age-related decline in immune function."

The UCLA team not only found that the direct administration of sulforaphane in broccoli reversed the decline in cellular immune function in old mice, but they witnessed similar results when they took individual immune cells from old mice, treated those cells with the chemical outside the body and then placed the treated cells back into a recipient animal.

In particular, the scientists discovered that dendritic cells, which introduce infectious agents and foreign substances to the immune system, were particularly effective in restoring immune function in aged animals when treated with sulforaphane.

"We found that treating older mice with sulforaphane increased the immune response to the level of younger mice," said Hyon-Jeen Kim, first author and research scientist at the Geffen School.

To investigate how the chemical in broccoli increased the immune system's response, the UCLA group confirmed that sulforaphane interacts with a protein called Nrf2, which serves as a master regulator of the body's overall antioxidant response and is capable of switching on hundreds of antioxidant and rejuvenating genes and enzymes.

Nel said that the chemistry leading to activation of this gene-regulation pathway could be a platform for drug discovery and vaccine development to boost the decline of immune function in elderly people.

"This is a radical new way of thinking in how to increase the immune function of elderly people to possibly protect against viral infections and cancer," Nel said. "We may have uncovered a new mechanism by which to boost vaccine responses by using a nutrient chemical to impact oxidant stress pathways in the immune system."

Kim said that although there is a decline in Nrf2 activity with aging, this pathway remains accessible to chemicals like sulforaphane that are capable of restoring some of the ravages of aging by boosting antioxidant pathways.

The next step is further study to see how these findings would translate to humans. "Dietary antioxidants have been shown to have important effects on immune function, and with further study, we may be adding broccoli and other cruciferous vegetables to that list," Nel said.

For now, Nel suggests including these vegetables as part of a healthy diet. Nel said that these findings offer a window into how the immune system ages. "We may find that combating free radicals is only part of the answer. It may prove to be a more multifaceted process and interplay between pro- and antioxidant forces," he said.

The study was funded by the National Institute on Aging, the UCLA Claude D. Pepper Older Adults Independence Center, and the National Institute of Allergy and Infectious Diseases.

Other study authors included Berenice Barajas and Dr. Meiyang Wang.

Adapted from materials provided by University of California - Los Angeles. <http://www.ucla.edu/>

6. New Broccoli Compound Appears Promising Against Breast Cancer

ScienceDaily (Aug. 19, 2002) — Aug. 18 -- In the future, a "broccoli-pill" a day may help keep breast cancer at bay. Researchers have developed a new compound, designed from a known anticancer agent found in broccoli, that shows promise as a breast cancer preventive.

Apparently less toxic than its natural counterpart, the compound could be marketed for cancer prevention, the researchers say. Their findings were described at the 224th national meeting of the American Chemical Society, the world's largest scientific society.

Tests in animals have shown encouraging results, but no human studies have been done. If tests confirm the findings, the compound could be developed into a once-a-day pill or vitamin component for cancer prevention and perhaps be on the market in seven to ten years, the researchers say.

"It may be easier to take a cancer-prevention pill once a day rather than rely on massive quantities of fruits and vegetables," says Jerry Kosmeder, Ph.D., research assistant professor at the University of Illinois at Chicago and an investigator in the study.

Called oxomate, the synthetic compound works like its natural counterpart, sulforaphane, which was recently identified as a cancer-preventive agent in broccoli and other cruciferous vegetables (such as cabbage and Brussels sprouts). Both compounds boost the body's production of phase II enzymes, which can detoxify cancer-causing chemicals and reduce cancer risk.

But the natural broccoli compound, sulforaphane, can be toxic in high doses, warns Kosmeder. He cites laboratory studies in which the compound, above certain levels, killed cultured animal cells. It is also difficult and expensive to synthesize. These factors make sulforaphane a poor candidate for drug development, he said.

Kosmeder designed oxomate to be less toxic than its parent compound by removing the chemical components that appear to be responsible for this toxicity. In tests on cultured liver cells, oxomate was seven times less toxic than sulforaphane, the researcher said. The synthetic compound is also cheaper and easier to produce, he added.

In tests on female rats, those that were fed oxomate after exposure to cancer-inducing chemicals had up to a 50 percent reduction in the number of breast tumors compared to rats that did not receive the compound, said Kosmeder.

After the initial discovery of sulforaphane as a broccoli component (by researchers at Johns Hopkins University in Baltimore), consumers have been urged to eat more of the vegetable and its close relatives to obtain its cancer-fighting benefit. For those who don't like to eat the familiar green stalks and their bushy flowerets, consumers have a growing number of dietary options, including sprouts, teas and tablets made from natural concentrates.

Kosmeder believes that these variations present a dosing challenge, as not all broccoli-derived products contain the same amount of sulforaphane. This is due to variations in the vegetable's processing, growing conditions and strain, he said.

"Oxomate would give you a definitive benefit; you'd know exactly how much you're getting everyday, its exact benefit and risk," the researcher says.

Oxomate could be taken along with other cancer preventive agents, including nutrients and drugs, in an effort to maximize protection, he said.

Tamoxifen is currently the only FDA approved drug for breast cancer prevention in high-risk women. It works by a different mechanism from oxomate's. Tamoxifen helps a woman who has estrogen-dependent tumors, but may not help those with non-estrogen-dependent tumors, says Kosmeder. A drug based on oxomate would help prevent cancer formation regardless of whether the tumor is estrogen-dependent or non-estrogen-dependent, he says.

If subsequent tests for preventing other types of cancer prove effective, then oxomate might be useful for anyone who is at increased risk of cancer due to exposure to cancer-causing agents, according to Kosmeder. The drug would be particularly beneficial for those at highest risk, such as smokers, he says.

Consumers are still urged to continue eating healthful amounts of fruits and vegetables and to reduce their exposure to cancer risk factors, such as smoking, the researcher says.

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Kosmeder conducted his oxomate studies as part of a research team headed by John M. Pezzuto, Ph.D., head of the department of medicinal chemistry and pharmacognosy at the university and deputy director of its Cancer Center.

#The National Cancer Institute provided funding for this study. The poster on this research, MEDI 98, will be presented at 8:00 p.m., Sunday, Aug. 18, at the Hynes Convention Center, Hall B, during a general poster session, and at 8:00 p.m., Monday, Aug. 19, at the Hynes Convention Center, Hall B, during Sci-Mix).

Jerry Kosmeder, Ph.D., is a research assistant professor in department of medicinal chemistry and pharmacognosy at the University of Illinois at Chicago.

John M. Pezzuto, Ph.D., is head of the department of medicinal chemistry and pharmacognosy at the University of Illinois at Chicago. He is also deputy director of the university's Cancer Center.

Adapted from materials provided by American Chemical Society.

<http://portal.acs.org/portal/acs/corg/content>

7. Maximizing The Anti-Cancer Power Of Broccoli

ScienceDaily (Apr. 5, 2005) — University of Illinois researcher Elizabeth Jeffery has learned how to maximize the cancer-fighting power of broccoli. It involves heating broccoli just enough to eliminate a sulfur-grabbing protein, but not enough to stop the plant from releasing an important cancer-fighting compound called sulforaphane.

The discovery of this sulfur-grabbing protein in the Jeffery lab makes it possible to maximize the amount of the anticarcinogen sulforaphane in broccoli.

Jeffery's research will be published in an upcoming issue of Phytochemistry. She is a professor in the Department of Food Science and Human Nutrition at the U of I.

"As scientists, we learned that sulforaphane is maximized when broccoli has been heated 10 minutes at 140 degrees Fahrenheit," said Jeffery. "For the consumer, who cannot readily hold the temperature as low as 140 degrees, that means the best way to prepare broccoli is to steam it lightly about 3 or 4 minutes--until the broccoli is tough-tender."

Frozen-food manufacturers may use this technology to increase the health benefits of the broccoli they sell, allowing the consumer to heat it without having to worry about the conditions.

Jeffery said that sulforaphane is one of the most powerful anticarcinogens found in food. "It works by increasing the enzymes in your liver that destroy the cancer-inducing chemicals you ingest in food or encounter in the environment."

But the chemistry for triggering the release of sulforaphane is tricky. Sulforaphane is linked to a sugar molecule through a sulfur bond. When the broccoli enzyme breaks off the sugar to release the sulforaphane, a sulfur-grabbing protein can remove the newly exposed sulfur on the sulforaphane and inactivate it.

"Although our gut bacteria may be able to release some of the sulforaphane, we don't have the enzyme to release sulforaphane in our body tissues, so our best bet is to use the enzyme in the broccoli," Jeffery said. "The enzyme in the broccoli does a really good job of breaking that bond. You can break it simply by chopping the broccoli."

Jeffery's team of researchers began by cooking broccoli for different lengths of times at different temperatures to learn the point at which the broccoli enzyme that releases sulforaphane is destroyed.

"And, much to our excitement, after we had heated it for just a little while, we found we had killed off a protein that nobody knew was there. This protein, named the epithiospecifier protein, had been grabbing sulfur and greatly depleting the amount of sulforaphane in a serving of broccoli.

"The protein was very heat-sensitive, and with a little bit of heat, we killed it off and got an almost perfect yield of sulforaphane, the cancer-fighting component," she said.

"It was a serendipitous discovery, and it changed our focus. Instead of worrying about overcooking the broccoli and losing the enzyme that releases the sulforaphane, we focused on heating the broccoli just enough to destroy the sulfur-grabbing protein, but not enough to harm the enzyme that releases sulforaphane from the sugar," said Jeffery.

Other researchers at the University of Illinois who contributed to the study were Nathan Matusheski and Qinyan Qiao.

The study was funded by the United States Department of Agriculture.

Adapted from materials provided by University Of Illinois At Urbana-Champaign / Agricultural, Consumer And Environmental Sciences. <http://aces.illinois.edu/>

8. Compound In Broccoli Could Boost Immune System, Says Study

ScienceDaily (Aug. 23, 2007) — A compound found in broccoli and related vegetables may have more health-boosting tricks up its sleeves, according to a new study led by researchers at the University of California, Berkeley.

Veggie fans can already point to some cancer-fighting properties of 3,3'-diindolymethane (DIM), a chemical produced from the compound indole-3-carbinol when Brassica vegetables such as broccoli, cabbage and kale are chewed and digested. Animal studies have shown that DIM can actually stop the growth of certain cancer cells.

This new study in mice, published online Monday, Aug. 20 in the Journal of Nutritional Biochemistry, shows that DIM may help boost the immune system as well.

"We provide clear evidence that DIM is effective in augmenting the immune response for the mice in the study, and we know that the immune system is important in defending the body against infections of many kinds and cancer," said Leonard Bjeldanes, UC Berkeley professor of toxicology and principal investigator of the study. "This finding bodes well for DIM as a protective agent against major human maladies."

Previous studies led by Bjeldanes and Gary Firestone, UC Berkeley professor of molecular and cell biology, have shown that DIM halts the division of breast cancer cells and inhibits testosterone, the male hormone needed for growth of prostate cancer cells.

In the new study, the researchers found increased blood levels of cytokines, proteins which help regulate the cells of the immune system, in mice that had been fed solutions containing doses of DIM at a concentration of 30 milligrams per kilogram. Specifically, DIM led to a jump in levels of four types of cytokines: interleukin 6, granulocyte colony-stimulating factor, interleukin 12 and interferon-gamma.

"As far as we know, this is the first report to show an immune stimulating effect for DIM," said study lead author Ling Xue, who was a Ph.D. student in Bjeldanes' lab at the time of the study and is now a post-doctoral researcher in molecular and cell biology at UC Berkeley.

In cell cultures, the researchers also found that, compared with a control sample, a 10 micromolar dose of DIM doubled the number of white blood cells, or lymphocytes, which help the body fight infections by killing or engulfing pathogens. (A large plateful of broccoli can yield a 5-10 micromolar dose of DIM.)

When DIM was combined with other agents known to induce the proliferation of lymphocytes, the effects were even greater than any one agent acting alone, with a three- to sixfold increase in the number of white blood cells in the culture.

"It is well-known that the immune system can seek out and destroy tumor cells, and even prevent tumor growth," said Xue. "An important type of T cell, called a T killer cell, can directly kill certain tumor cells, virally infected cells and sometimes parasites. This study provides strong evidence that could help explain how DIM blocks tumor growth in animals."

DIM was also able to induce higher levels of reactive oxygen species (ROS), substances which must be released by macrophages in order to kill some types of bacteria as well as tumor cells. The induction of ROS - three times that of a control culture - after DIM was added to the cell culture signaled the activation of macrophages, the researchers said.

"The effects of DIM were transient, with cytokine and lymphocyte levels going up and then down, which is what you'd expect with an immune response," said Bjeldanes. "Interestingly, to obtain the effects on the immune response, DIM must be given orally, not injected. It could be that the metabolism of the compound changes when it is injected instead of eaten."

To examine the anti-viral properties of DIM, the researchers infected mice with reoviruses, which live in the intestines but are not life-threatening. Mice that had been given oral doses of DIM were significantly more efficient in clearing the virus from their gut - as measured by the level of viruses excreted in their feces - than mice that had not been fed DIM.

"This means that DIM is augmenting the body's ability to defend itself by inhibiting the proliferation of the virus," said Bjeldanes. "Future studies will determine whether DIM has similar effects on pathogenic viruses and bacteria, including those that cause diarrhea."

The discovery of DIM's effects on the immune system helps bolster its reputation as a formidable

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cancer-fighter, the researchers said. "This study shows that there is a whole new universe of cancer regulation related to DIM," said Firestone, who also co-authored the new study. "There are virtually no other agents known that can both directly shut down the growth of cancer cells and enhance the function of the immune system at the same time."

Two co-authors of the study are from Michigan State University's Department of Food Science and Human Nutrition - James Pestka, professor of food science, and Maoxiang Li, a visiting research associate.

DIM is currently under investigation in government-funded clinical trials as a treatment for prostate and cervical cancer.

The University of California has filed patent applications on the use of DIM and its derivatives for immune modulation. Berkeley BioSciences, Inc., a company co-founded by Bjeldanes and Firestone, has licensed the related patent applications from the University of California and is researching and developing immune-enhancing nutritional supplements and therapeutics based on this discovery.

This study was supported by the Department of Defense's Army Breast Cancer Research Program, the National Institutes of Health and a Strategic Partnership Research Grant from the Michigan State University Foundation.

Adapted from materials provided by University of California - Berkeley, via EurekAlert!, a service of AAAS <http://www.berkeley.edu/>

9. Eating Broccoli May Keep Prostate Cancer Away

ScienceDaily (July 2, 2008) — Eating one or more portions of broccoli every week can reduce the risk of prostate cancer, and the risk of localised cancer becoming more aggressive.

For the first time, a research group at the Institute of Food Research led by Professor Richard Mithen has provided an explanation of how eating broccoli might reduce cancer risk based upon studies in men, as opposed to trying to extrapolate from animal models. Prostate cancer is the most common non-skin cancer for males in western countries. The research has provided an insight into why eating broccoli can help men stay healthy.

For the study men who were at risk of developing prostate cancer ate either 400g of broccoli or 400g of peas per week in addition to their normal diet over 12 months. Tissue samples were taken from their prostate gland before the start of the trial and after 6 and 12 months, and the expression of every gene measured using Affymetrix microarray technology.

It was found that there were more changes in gene expression in men who were on the broccoli-rich diet than on the pea diet, and these changes may be associated with the reduction in the risk of developing cancer, that has been reported in epidemiological studies.

Previous studies have suggested that the fifty percent of the population who have a GSTM1 gene gain more benefit from eating broccoli than those who lack this gene. The study showed that the presence of the GSTM1 gene had a profound effect on the changes in gene expression caused by eating broccoli.

This study fills the gap between observational studies and studies with cell and animal models. While observational studies have shown that diets rich in cruciferous vegetables may reduce the risk of prostate cancer and other chronic disease, they do not provide an explanation of how this occurs. Evidence from animal and cell models has sought to provide an explanation, but these studies are usually based on high doses that would not normally be experienced as part of the diet.

The results of the study suggested that relatively low amounts of cruciferous vegetables in the diet -- a few portions per week -- can have large effects on gene expression by changing cell signalling pathways. These signalling pathways are the routes by which information is transmitted through a

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molecular cascade which amplifies the signal to the nucleus of the cell where gene expression occurs.

The Norwich-based team are currently planning a larger study with men with localised prostate cancer, and will compare the activity of standard broccoli with the special variety of high glucosinolate broccoli used in the current study.

Designer studies for health promotion

"Other fruits and vegetables have been shown to also reduce the risk of prostate cancer and are likely to act through other mechanisms," says Professor Mithen.

"Once we understand these, we can provide much better dietary advice in which specific combinations of fruit and vegetable are likely to be particularly beneficial. Until then, eating two or three portions of cruciferous vegetable per week, and maybe a few more if you lack the GSTM1 gene, should be encouraged."

The work was supported by the Biotechnology and Biological Sciences Research Council (BBSRC).

Cruciferous vegetables include broccoli, Brussels sprouts, cauliflower, cabbage, rocket, watercress, garden cress, kale, bok choy, radish, horseradish and wasabi.

The broccoli used in this study is a high glucosinolate variety. The variety was developed at the John Innes Centre in Norwich, and then licensed to Seminis Inc for commercialisation by Plant Bioscience Ltd.

Journal reference:

1. Traka M, Gasper AV, Melchini A, Bacon JR, Needs PW, et al. Broccoli Consumption Interacts with GSTM1 to Perturb Oncogenic Signalling Pathways in the Prostate. PLoS One, 3(7): e2568 DOI: 10.1371/journal.pone.0002568
<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0002568>

Adapted from materials provided by Public Library of Science - <http://www.plos.org/>

10. Extract Of Broccoli Sprouts May Protect Against Bladder Cancer

ScienceDaily (Feb. 29, 2008) — A concentrated extract of freeze dried broccoli sprouts cut development of bladder tumors in an animal model by more than half, according to a report in the March 1 issue of Cancer Research.

This finding reinforces human epidemiologic studies that have suggested that eating cruciferous vegetables like broccoli is associated with reduced risk for bladder cancer, according to the study's senior investigator, Yuesheng Zhang, MD, PhD, professor of oncology at Roswell Park Cancer Institute. "Although this is an animal study, it provides potent evidence that eating vegetables is beneficial in bladder cancer prevention," he said.

There is strong evidence that the protective action of cruciferous vegetables derives at least in part from isothiocyanates (ITCs), a group of phytochemicals with well-known cancer preventive activities. "The bladder is particularly responsive to this group of natural chemicals," Zhang said. "In our experiments, the broccoli sprout ITCs after oral administration were selectively delivered to the bladder tissues through urinary excretion."

Other cruciferous vegetables with ITCs include mature broccoli, cabbage, kale, collard greens and others. Broccoli sprouts have approximately 30 times more ITCs than mature broccoli, and the sprout extract used by the researchers contains approximately 600 times as much.

Although animals that had the most protection against development of bladder cancer were given high doses of the extract, Zhang said humans at increased risk for this cancer likely do not need to eat huge amounts of broccoli sprouts in order to derive protective benefits.

"Epidemiologic studies have shown that dietary ITCs and cruciferous vegetable intake are inversely associated with bladder cancer risk in humans. It is possible that ITC doses much lower than those given to the rats in this study may be adequate for bladder cancer prevention," he said.

Zhang and his colleagues tested the ability of the concentrate to prevent bladder tumors in five groups of rats. The first group acted as a control, while the second group was given only the broccoli extract to test for safety. The remaining three groups were given a chemical, N-butyl-N-(4-

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hydroxybutyl) nitrosamine (BBN) in drinking water, which induces bladder cancer. Two of these groups were given the broccoli extract in diet, beginning two weeks before the carcinogenic chemical was delivered.

In the control group and the group given only the extract, no tumors developed, and there was no toxicity from the extract in the rats.

About 96 percent of animals given only BBN developed an average of almost two tumors each of varying sizes. By comparison, about 74 percent of animals given a low dose of the extract developed cancer, and the number of tumors per rat was 1.39. The group given the high dose of extract had even fewer tumors. About 38 percent of this high-dose group developed cancer, and the average number of tumors per animal was only .46 and, unlike the other animals, the majority were very small in size.

The study was funded by the Vital Vegetables Research Program of Australia and New Zealand, the National Cancer Institute and the Roswell Park Alliance Foundation.

Adapted from materials provided by American Association for Cancer Research, via EurekAlert!, a service of AAAS <http://www.aacr.org/>

12. Worried About Prostate Cancer? Tomato-broccoli Combo Shown To Be Effective

ScienceDaily (Jan. 16, 2007) — A new University of Illinois study shows that tomatoes and broccoli--two vegetables known for their cancer-fighting qualities--are better at shrinking prostate tumors when both are part of the daily diet than when they're eaten alone.

"When tomatoes and broccoli are eaten together, we see an additive effect. We think it's because different bioactive compounds in each food work on different anti-cancer pathways," said University of Illinois food science and human nutrition professor John Erdman.

In a study published in the January 15 issue of *Cancer Research*, Erdman and doctoral candidate Kirstie Canene-Adams fed a diet containing 10 percent tomato powder and 10 percent broccoli powder to laboratory rats that had been implanted with prostate cancer cells. The powders were made from whole foods so the effects of eating the entire vegetable could be compared with consuming individual parts of them as a nutritional supplement.

Other rats in the study received either tomato or broccoli powder alone; or a supplemental dose of lycopene, the red pigment in tomatoes thought to be the effective cancer-preventive agent in tomatoes; or finasteride, a drug prescribed for men with enlarged prostates. Another group of rats was castrated.

After 22 weeks, the tumors were weighed. The tomato/broccoli combo outperformed all other diets in shrinking prostate tumors. Biopsies of tumors were evaluated at The Ohio State University, confirming that tumor cells in the tomato/broccoli-fed rats were not proliferating as rapidly. The only treatment that approached the tomato/broccoli diet's level of effectiveness was castration, said Erdman.

"As nutritionists, it was very exciting to compare this drastic surgery to diet and see that tumor reduction was similar. Older men with slow-growing prostate cancer who have chosen watchful waiting over chemotherapy and radiation should seriously consider altering their diets to include more tomatoes and broccoli," said Canene-Adams.

How much tomato and broccoli should a 55-year-old man concerned about prostate health eat in

order to receive these benefits? The scientists did some conversions.

"To get these effects, men should consume daily 1.4 cups of raw broccoli and 2.5 cups of fresh tomato, or 1 cup of tomato sauce, or ½ cup of tomato paste. I think it's very doable for a man to eat a cup and a half of broccoli per day or put broccoli on a pizza with ½ cup of tomato paste," said Canene-Adams.

Erdman said the study showed that eating whole foods is better than consuming their components. "It's better to eat tomatoes than to take a lycopene supplement," he said. "And cooked tomatoes may be better than raw tomatoes. Chopping and heating make the cancer-fighting constituents of tomatoes and broccoli more bioavailable."

"When tomatoes are cooked, for example, the water is removed and the healthful parts become more concentrated. That doesn't mean you should stay away from fresh produce. The lesson here, I think, is to eat a variety of fruits and vegetables prepared in a variety of ways," Canene-Adams added.

Another recent Erdman study shows that rats fed the tomato carotenoids phytofluene, lycopene, or a diet containing 10 percent tomato powder for four days had significantly reduced testosterone levels. "Most prostate cancer is hormone-sensitive, and reducing testosterone levels may be another way that eating tomatoes reduces prostate cancer growth," Erdman said.

Erdman said the tomato/broccoli study was a natural to be carried out at Illinois because of the pioneering work his colleague Elizabeth Jeffery has done on the cancer-fighting agents found in broccoli and other cruciferous vegetables. Jeffery has discovered sulfur compounds in broccoli that enhance certain enzymes in the human body, which then act to degrade carcinogens.

"For ten years, I've been learning how the phytochemicals in tomatoes affect the progression of prostate cancer. Meanwhile Dr. Jeffery has been investigating the ways in which the healthful effects of broccoli are produced. Teaming up to see how these vegetables worked together just made sense and certainly contributes to our knowledge about dietary treatments for prostate cancer," said Erdman.

Authors of the tomato/broccoli study are Kirstie Canene-Adams, Brian L. Lindshield, Elizabeth H. Jeffery, and John W. Erdman Jr. at the University of Illinois and Shihua Wang and Steven K.

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Clinton of The Ohio State University. The study was funded by the American Institute for Cancer Research and the U.S. Department of Agriculture.

The U of I study of the effects of tomato carotenoids on serum testosterone was published in the December 2006 issue of the Journal of Nutrition. Authors are Jessica K. Campbell, Chad K. Stroud, Manabu T. Nakamura, Mary Ann Lila, and John W. Erdman Jr. Funding was provided by the National Institutes of Health's National Cancer Institute.

Adapted from materials provided by University of Illinois at Urbana-Champaign <http://illinois.edu/>

13. Plant Compound In Diet Associated With Decreased Risk Of Postmenopausal Breast Cancer

ScienceDaily (Mar. 22, 2007) — Postmenopausal women whose diet contains high amounts of lignans, estrogen-like chemical compounds found in plants, may have a reduced risk of breast cancer, according to a study in the March 21 issue of the Journal of the National Cancer Institute.

Lignans, which are found in flaxseed and a variety of fruits, vegetables and whole grains, belong to a family of compounds called phytoestrogens. Because of their hormone-like properties, phytoestrogens can bind to estrogen receptors, and some have suggested they may play a role in preventing breast cancer. Studies of Asian populations have found that women whose diets contain many foods made of soy, which are rich in another type of phytoestrogen, have a lower breast cancer risk.

Marina Touillaud, Ph.D. of the National Institute of Health and Medical Research in France, and colleagues administered a diet history questionnaire to 58,049 postmenopausal French women to examine the association between the consumption of four types of plant lignans and the risk of invasive breast cancer.

After a median follow-up of 7.7 years, 1,469 of the women were diagnosed with breast cancer. Among women with the highest total lignan intake, there were 376 cases of breast cancer per 100,000 person-years compared with 411 cases among women with the lowest intake—corresponding to a 17 percent relative decrease in the risk of breast cancer. The association was limited to breast cancers positive for estrogen and progesterone receptors.

"Although the possible role of plant foods in breast cancer prevention is still debated, increasing dietary lignan intake may be an interesting potential preventative approach. ...In view of the epidemiologic results of this study, the recommendation that women should consume diets that consist largely of fruits, vegetables, and cereals—all foods rich in lignans—should continue," the authors write.

Note: The Journal of the National Cancer Institute is published by Oxford University Press and is not affiliated with the National Cancer Institute. Attribution to the Journal of the National Cancer

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Institute is requested in all news coverage. Visit the Journal online at <http://jnci.oxfordjournals.org/>.

Adapted from materials provided by Journal of the National Cancer Institute

<http://jnci.oxfordjournals.org/>

NOTE: Below, we've also included a couple of interesting summaries about 'best cooking practices' – at first glance (and even second) these studies seems to conflict...which appears to happen a lot in research finding these days. But the underlying message is clear...don't overcook (if you cook at all!) and choose a gentle method like steaming for best, health-property-preserving results!!

14. Boiling Broccoli Ruins Its Anti-cancer Properties, According To Study

ScienceDaily (May 16, 2007) — Researchers at the University of Warwick have found that the standard British cooking habit of boiling vegetables severely damages the anticancer properties of many Brassica vegetables such as broccoli, Brussel sprouts, cauliflower and green cabbage.

Past studies have shown that consumption of Brassica vegetables decreases the risk of cancer. This is because of the high concentration in Brassicas of substances known as glucosinolates which are metabolized to cancer preventive substances known as isothiocyanates. However before this research it was not known how the glucosinolates and isothiocyanates were influenced by storage and cooking of Brassica vegetables.

The researchers, Prof Paul Thornalley from Warwick Medical School at the University of Warwick and Dr Lijiang Song from the University of Warwick's Department of Chemistry bought Brassica vegetables, (broccoli, Brussel sprouts, cauliflower and green cabbage) from a local store and transported them to the laboratory within 30 minutes of purchasing. The effect of cooking on the glucosinolate content of vegetables was then studied by investigating the effects of cooking by boiling, steaming, microwave cooking and stir-fry.

Boiling appeared to have a serious impact on the retention of those important glucosinolate within the vegetables. The loss of total glucosinolate content after boiling for 30 minutes was: broccoli 77%, Brussel sprouts 58%, cauliflower 75% and green cabbage 65%.

The effects of other cooking methods were investigated: steaming for 0–20 min, microwave cooking for 0–3 min and stir-fry cooking for 0–5 min. All three methods gave no significant loss of total glucosinolate analyte contents over these cooking periods.

Domestic storage of the vegetables at ambient temperature and in a domestic refrigerator showed no significant difference with only minor loss of glucosinolate levels over 7 days.

However the researchers found that storage of fresh vegetables at much lower temperatures such as -85°C (much higher than for storage in a refrigerator at $4-8^{\circ}\text{C}$) may cause significant loss of glucosinolates up to 33% by fracture of vegetable material during thawing.

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The researchers found that preparation of Brassica vegetables had caused only minor reductions in glucosinolate except when they were shredded finely which showed a marked decline of glucosinolate levels with a loss of up to 75% over 6 hours after shredding.

Professor Thornalley said: "If you want to get the maximum benefit from your five portions-a-day vegetable consumption, if you are cooking your vegetables boiling is out. You need to consider stir frying steaming or micro-waving them."

Adapted from materials provided by University of Warwick.

15. Culinary Shocker: Cooking Can Preserve, Boost Nutrient Content Of Vegetables

ScienceDaily (Dec. 30, 2007) — In a finding that defies conventional culinary wisdom, researchers in Italy report that cooking vegetables can preserve or even boost their nutritional value in comparison to their raw counterparts, depending on the cooking method used.

Their study is scheduled for the Dec. 26 issue of ACS' Journal of Agricultural and Food Chemistry, a bi-weekly publication.

Nicoletta Pellegrini and colleagues note that although many people maintain that eating raw vegetables is more nutritious than eating cooked ones, a small but growing number of studies suggest that cooking may actually increase the release of some nutrients. However, scientists are seeking more complete data on the nutritional properties of cooked vegetables, the researchers say.

In the new study, the researchers evaluated the effects of three commonly-used Italian cooking practices — boiling, steaming, and frying — on the nutritional content of carrots, zucchini and broccoli. Boiling and steaming maintained the antioxidant compounds of the vegetables, whereas frying caused a significantly higher loss of antioxidants in comparison to the water-based cooking methods, they say. For broccoli, steaming actually increased its content of glucosinolates, a group of plant compounds touted for their cancer-fighting abilities. The findings suggest that it may be possible to select a cooking method for each vegetable that can best preserve or improve its nutritional quality, the researchers say.

Adapted from materials provided by American Chemical Society,

I. Appendix: Additional Useful Health & Wellbeing Resources

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Here are some other health and wellbeing resources that may be relevant to you and warrant an early visit – the links should be 'live' which means that if you are reading this on your PC or laptop whilst connected to the Internet they should appear when you click them (**NOTE:** If you 'click' a link your operating system might well ask you for permission to continue – just click '**Allow**' - we guarantee all the links are to genuine resources).

- 1) Probably the World's Safest Alternative products: Certified organic skin, hair, body care and cosmetic products. The website contains a lot of useful articles as well as a shop with full product and ingredient details. Superb products that genuinely reduce your daily toxic chemical exposure: <http://www.saferalternative.com>
- 2) Yeast infection, Candidiasis, Thrush – a problem for you? Did you know most 'drug therapies' from Doctors and Pharmacists only treat symptoms and may even make things worse? Read about effective holistic therapies and treatments here, that have helped many chronic sufferers overcome their yeast problem for good: <http://www.thrush-symptoms.info>
- 3) Weightloss, Dieting and Body-Building: If you are trying to diet to lose or even gain weight then a range of useful article, reviews and product listings are available at: <http://www.DietingCoach.org>
- 4) An excellent resource to help you radically overhaul your diet, health and wellbeing by adopting an alkalizing lifestyle. Provides comprehensive guides and additional materials all with a full 60-day money-back guarantee: <http://www.happytorecommend.com/alkalize/>

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