

Listen to Your Body

Smoking May Damage Your Knees

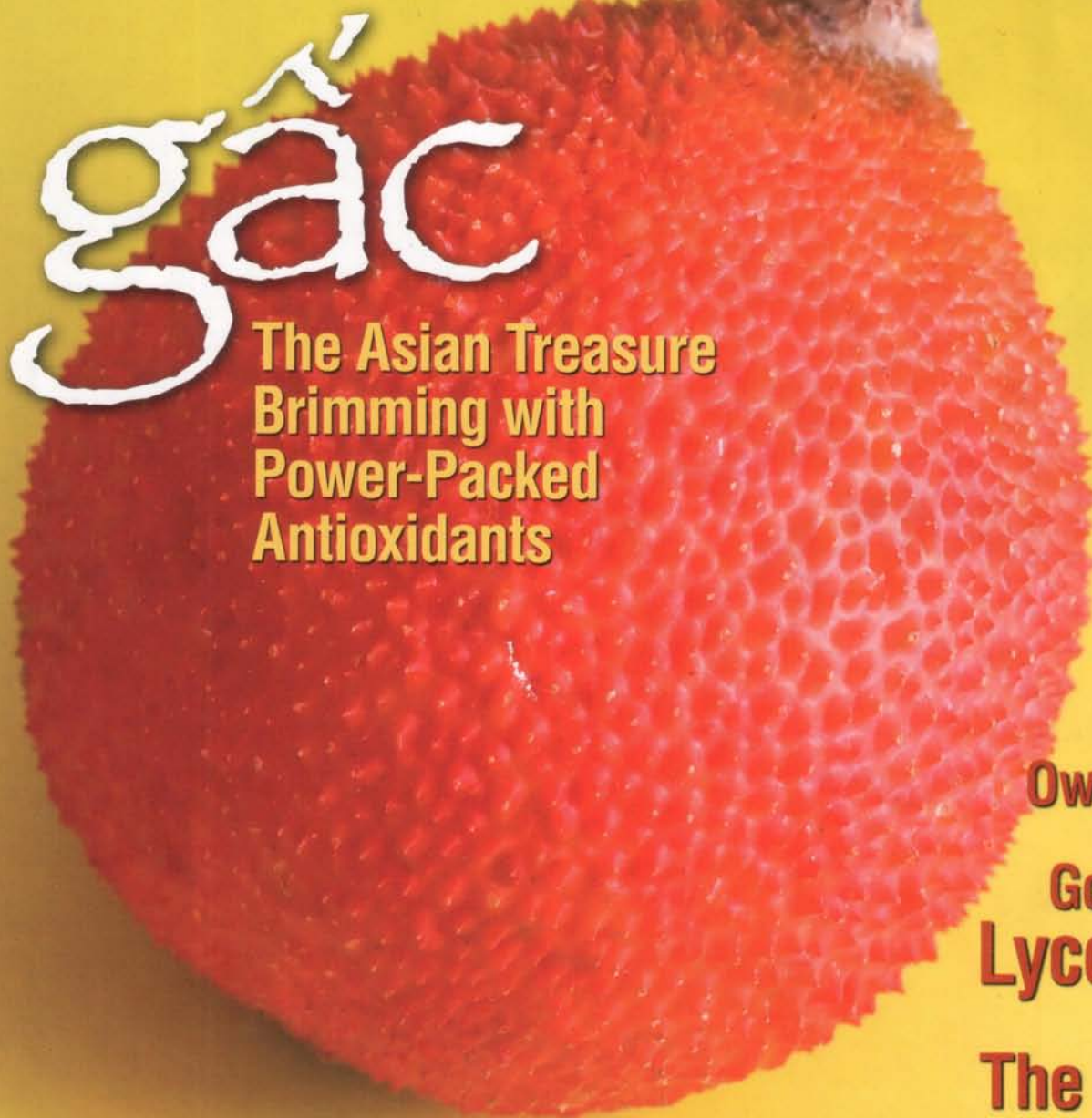
Exercise for Healthy Eyes

VOLUME 2 ISSUE 2

Breakthroughs

IN HEALTH

BONUS
CD
INSIDE



gac

The Asian Treasure
Brimming with
Power-Packed
Antioxidants

Aging
On Your
Own Terms

Gotta Like
Lycopene

The Power
of CoQ10



Mike Fillon

For nearly 20 years, Mike Fillon has written hundreds of health, medical and science articles for WebMD, CBS HealthWatch, MSNBC, *Doctor's Guide*, *Popular Mechanics* and a score of other publications. He has also written seven health books including *Natural Prostate Healers* (Prentice Hall) and his latest, *Supplements Under Siege* (Woodland Publishing). He has a Master of Science degree from the State University of New York Maritime College and is a member of the American Medical Writers Association and the National Association of Science Writers.

Here's to Your Health.

Is anyone else as tired of the word *super* as I am? Instead of a championship football game we have the *Super Bowl*; above-average athletes are called *superstars*; and gluttonous food portions large enough to feed a village in a Third World country are called *super-sized*. I guess we can thank Superman for this craze.

The world of nutrition has latched onto this trend and has labeled highly nutritious foods, such as the gac fruit, as super foods and super fruits. I prefer the phrase *functional foods*, because that's what they do; they help our bodies function the way they're supposed to.

There's some irony here. While many of us in the Western World are overindulging, we're not getting any healthier as a result. In fact, many of us are nutritionally poor. To reverse this trend, super foods are emerging and gaining in popularity. The gac fruit, one of these foods, emerged from Southeast Asia after undergoing a study looking for a way to counteract vitamin A deficiencies in Vietnamese children. What researchers found is the fruit is chock-full of the powerful antioxidants lycopene and beta-carotene, which strengthen our bodies, and essential fatty acids that help us absorb critical nutrients. The irony is, it's taking Third World villages to help show us the way.

Read about the gac fruit in this month's cover story and an array of feature articles trumpeting the fruit's benefits. Afterward, you may agree with me; the gac fruit is much more than super.

Do you dread growing older and developing the diseases common to aging? There

are things you can do to help yourself age at your own speed. Read about them in our feature articles about vitamin C, CoQ10, resveratrol and an overview titled "Aging on Your Terms."

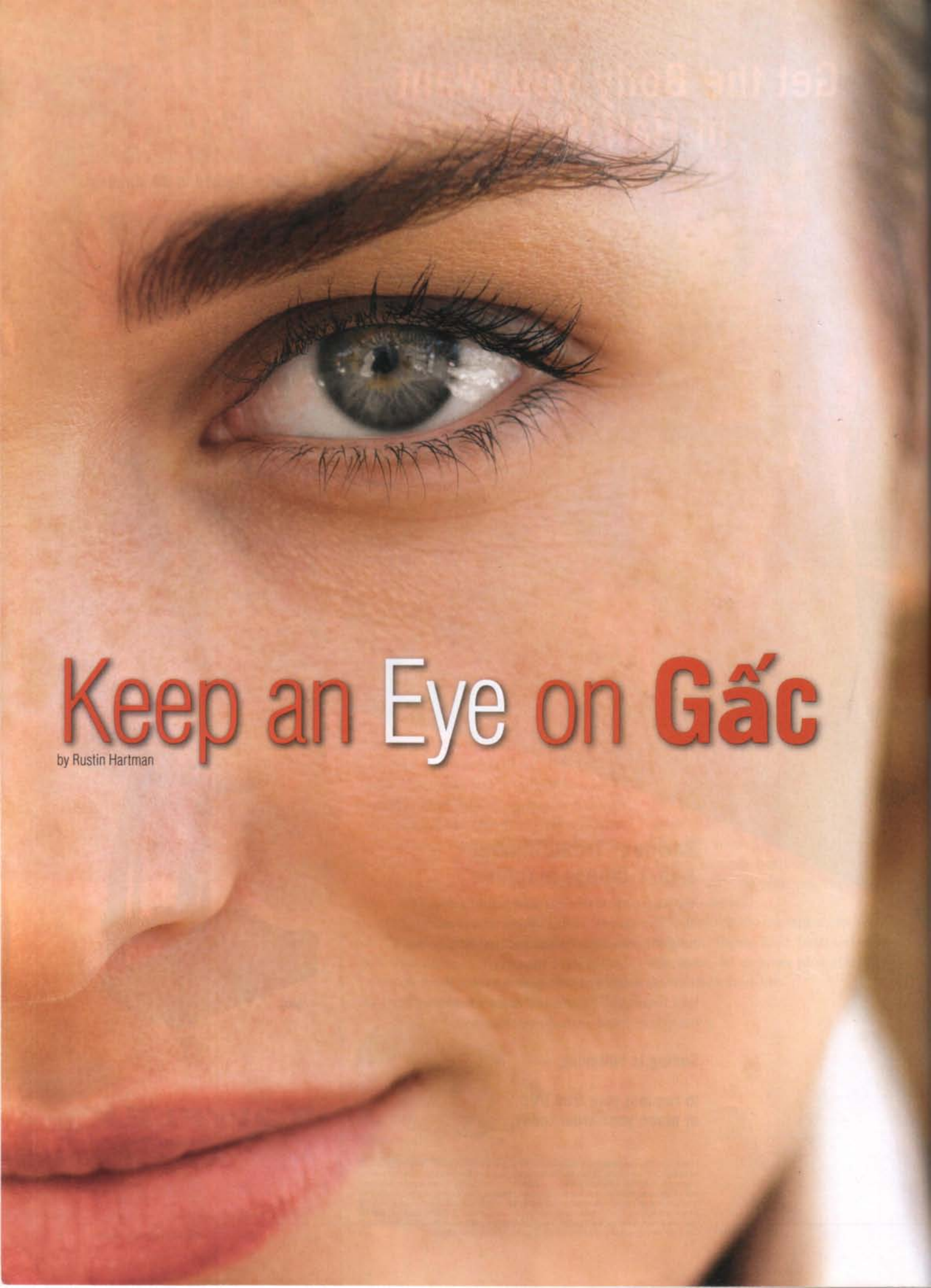
Every week, hundreds of medical journal articles and news reports from the world's leading research institutions appear on my desk and in my e-mail. I study each one to find the topics I believe it's most important for *BIH* readers to know about; things you might not hear about in the mainstream media or stories they believe only deserve a few seconds or sentences. In *BIH*, we flesh out these stories, trusting you'll find them interesting and helpful in your daily living.

In this issue you'll read about the discovery of a lowly yeast that may hold the key to disease formation in humans; how researchers reversed the ravages of Alzheimer's disease in mice and how they hope their discovery might lead to a cure in humans; and why the new lower cholesterol targets are more a function of pharmaceutical marketing efforts than a reduction in heart disease risks. We also report on a new device that may help people with hearing loss beyond what they can achieve with hearing aids; and how exercise can help your eyesight. With contaminated food warnings occurring almost weekly, we also tell you what you need to know to protect yourself.

One of the key ingredients for your health is in your hands. Read, learn and enjoy—and of course, let us know what you think. We'd love to hear from you.

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Get the Book
The Book

Keep an Eye on Gác

by Rustin Hartman

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The human eye is an amazing machine with complex structure and functions. The vision process does not work if the eye is not fully supplied with proper nutrition. Some foods are more important to vision than others, and it seems like the gác fruit was created specifically to benefit the eye. It is rich in vitamin A and carotenoids like beta-carotene, zeaxanthin and lutein, nutrients that, you will find, are absolutely vital to the health and proper function of the eye.

From the outside in, the eye has many layers and parts, and each performs an important role. When light enters the eye, it passes through a thin coat of tears that helps protect and lubricate the eye on the cornea. Behind the cornea, a fluid called aqueous humor

Without lutein and zeaxanthin, we simply would be unable to see.

circulates through the eye's front section and maintains constant pressure.

The iris—the colored part of the eye—dilates and contracts depending on how much light the eye encounters. The pupil is the black dot in the middle of the eye. As the iris dilates or contracts, the pupil allows an appropriate amount of light to pass through the eye's lens. The lens changes shape as we try to focus our vision on objects at different distances.

As light passes through the lens, it flows into the center of the eye, which is filled with vitreous humor, a clear, jellylike fluid surrounded by the sclera, the tough, white part of the eye. At the back of the eye, the retina receives focused light like a movie screen, and its many parts work together to process the information and send it to the brain. Photoreceptors called rods and cones receive light and convert it into electrochemical signals that can be passed through the nervous system. Since it's the focal point of the eye, the macula has more photoreceptors than any other part of the eye.

Beneath the rods and cones is a layer called the retinal pigment epithelium (RPE). The RPE absorbs excess light, allowing the rods and cones to receive a better, clearer signal. The RPE also removes waste and delivers nutrients to the rods and cones. Blood vessels cover the layer behind the retina, also bringing vital nutrients and removing potentially harmful waste products.

Signals received by the rods and cones travel through the RPE along nerve fibers leading to the optic nerve, really a bundle of nerves at the back of the eye. This nerve carries to the brain all the information collected from the eye. Imagine the amount of information that passes through the optic nerve each second. Everything you see passes through this nerve.

When the brain receives the information passed through the optic nerve, it translates it so we know what we are looking at. This process may seem complex, but it is also instantaneous. It takes mere nanoseconds for the entire process to be completed from the thin layer of tears over the cornea to the brain.

Serious Eye Disorders and How Gác May Help

Glaucoma

Glaucoma appears when the aqueous humor builds up or does not circulate properly, causing increasing pressure within the eye. This pressure, called intraocular pressure, must stay within normal bounds to avoid damage to the optic nerve. Without treatment, glaucoma causes gradual loss of vision and, eventually, blindness. Observation and research has shown that glaucoma can be inherited and may not appear until older age.

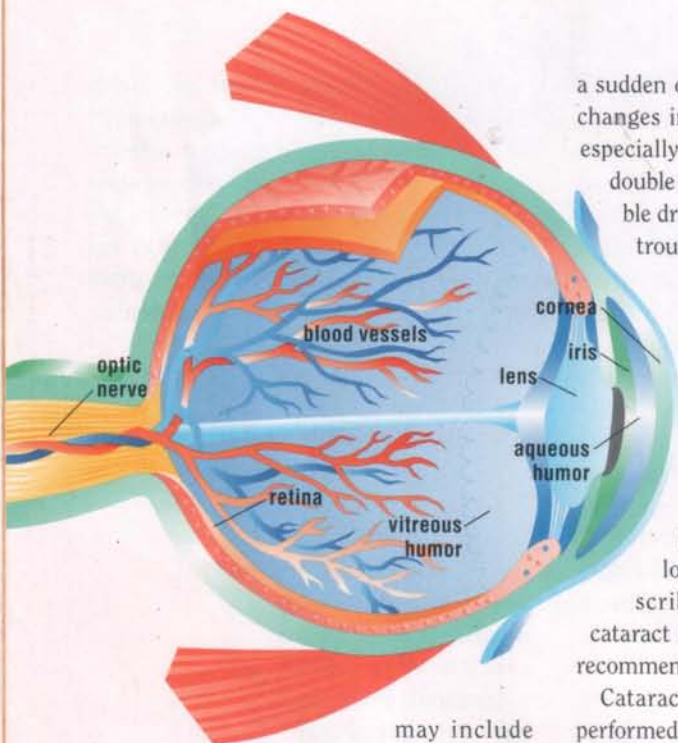
Although glaucoma is most commonly seen in adults over age 40, it can also affect adolescents, children and even infants. Studies show that African-Americans suffer glaucoma's effects more severely than others, experiencing the disorder at an earlier age and enduring more severe vision loss. Other factors that indicate an increased risk of glaucoma include:

- A previous vision loss
- Diabetes
- Russian, Japanese, Hispanic, Inuit, Irish or Scandinavian family history
- Use of corticosteroid prescriptions

Often, the first sign of glaucoma is the loss of peripheral vision.

This symptom often goes unnoticed until the disease has progressed to a dangerous point, so have your peripheral vision tested often. Sometimes, you can detect rising intraocular pressure. Symptoms





may include sudden eye pain, headache, blurred vision, tunnel vision, seeing a distortion or halo around lights, the feeling or look of laziness in the eye, even nausea and vomiting.

Experts have been unable to find a way to prevent glaucoma. Some factors cannot be overcome. But if diagnosed and treated early, glaucoma can be controlled. Also, proper nutrition and eating foods rich in nutrients beneficial to eye health can help. The gấc fruit is especially valuable to the eye because it is rich in carotenoids like beta-carotene, lutein and zeaxanthin.

Cataracts

A cataract is a clouding of the lens that impairs vision. More than one-half of all Americans over the age of 65 have cataracts. Cataracts occur when proteins build up in the lens making it cloudy, preventing light from passing through and focusing correctly. Experts do not yet know what causes this protein buildup, but they recognize several types of cataracts.

Cataracts usually form slowly and the symptoms are few at first. As they progress, cataracts can cause blurry or cloudy vision,

a sudden onset of nearsightedness and even changes in the way you see certain colors, especially yellow. Cataracts can also cause double vision, sensitivity to glare and trouble driving at night from sensitivity to or trouble seeing other cars' headlights.

Doctors can diagnose cataracts with a series of special tests. First, the doctor checks the vision in general. Then the doctor dilates the pupil to get a good look at the lens and other eye parts. This allows the doctor to determine how the cataract may be affecting the vision. If vision loss is minor, the doctor may prescribe corrective lenses. But if the cataract is serious enough, the doctor may recommend surgery.

Cataract surgery is the most commonly performed surgery of any kind in the United States. More than 1.5 million cataract surgeries are performed each year, and more than 90 percent of the patients experience an improvement in vision. The American Academy of Ophthalmology recommends that people between 40 and 64 should have a comprehensive eye exam at least once every two to four years, and that those 65 and older should have an exam every one to two years.

Gấc May Help

Most experts will tell you there is no way to prevent cataracts, because no one knows exactly what causes them. But recent stud-

extremely important to the health of the eye and may play a central role in preventing several major eye diseases, including macular degeneration.

Macular Degeneration

Macular degeneration is a condition in which the photoreceptors of the macula, the retina's midpoint, malfunction and eventually die. The American Academy of Ophthalmology states that macular degeneration is the leading cause of blindness for people over 50 in the United States. Experts estimate that more than 17 million people in the United States have symptoms of macular degeneration and that half a million new cases will be diagnosed this year.

The term *macular degeneration* usually refers to age-related macular degeneration (AMD), although there are some forms of macular degeneration that affect younger people. There are two major types of AMD, wet and dry, and AMD first manifests itself with the accumulation of drusen, a yellowish deposit, on the macula. These deposits don't affect vision themselves, but their existence signals an increased risk of developing AMD. The macula begins to degenerate when the retinal pigment's epithelium below the macula becomes disturbed, cutting off nutrients and preventing the removal of waste materials.

Macular degeneration risk factors include smoking, age (three of 10 people between 75 and 85 will show some signs of macular

Recent studies found the carotenoids in gấc fruit may help prevent cataract development.

ies have found that carotenoids in gấc fruit may have a preventive effect against cataract development. Several scientific studies indicate that those who increase their intake of two carotenoids, lutein and zeaxanthin, may experience a reduced risk of developing cataracts. Lutein and zeaxanthin are

degeneration), family history, high blood pressure, obesity, cardiovascular disorders and excessive exposure to sunlight.

AMD symptoms include blurred vision, shadows or blank areas, distortion and trouble discerning colors. Most conventional treatments involve pharmaceutical drugs.



Common Sense about the Eye: Was Mom Right?

Eating fruits and veggies will help you see better.

True: Some fruits and vegetables (especially the gác fruit) are rich sources of vitamin A and beta-carotene. These nutrients are very important to the retina's photoreceptors. A vitamin A deficiency can result in night blindness, while sufficient levels of vitamin A can support and speed up the reaction to light and information transfer.

Using prescription glasses or contacts will only make your eyes weaker and more dependent on vision aids.

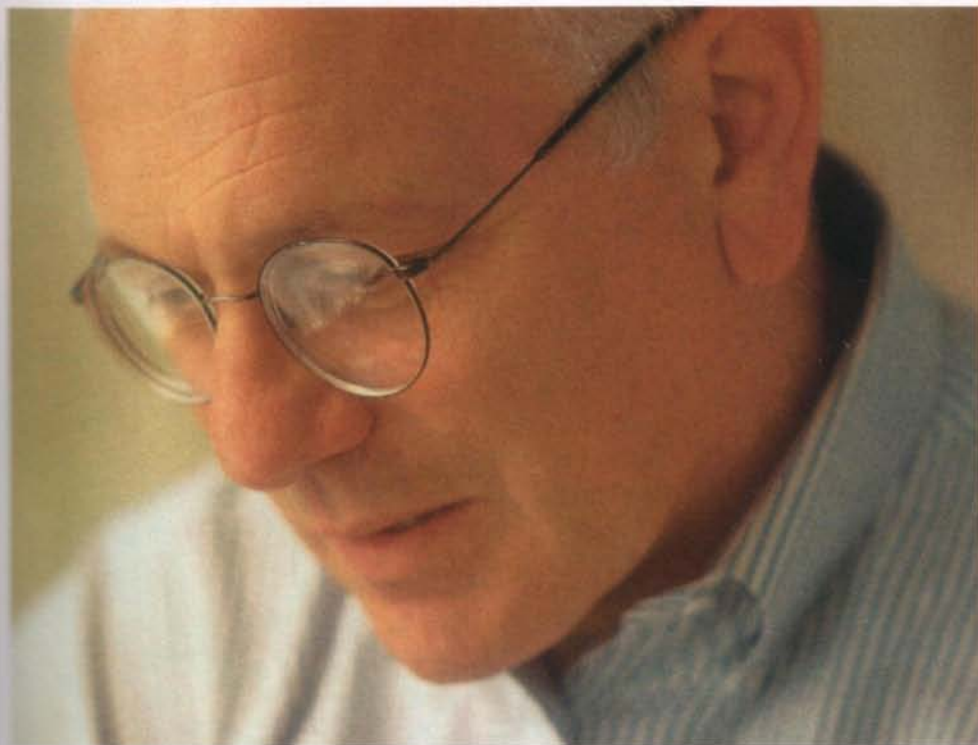
False: Corrective lenses do not make your eyes weaker. Your vision may change over time, but it's caused by the growth of your eye, not by your corrective lenses.

Drinking diet sodas or using artificial sweeteners can affect your vision.

True: Studies suggest that artificial sweeteners, especially cyclamates, may cause your eyes to be more sensitive to light. There are other factors that can make your eyes more sensitive to light, as well. They include antibiotics, oral contraceptives, hypertension medications, diuretics and diabetic medications.

Reading in the dark is bad for your eyes.

False: You might get a headache from straining to see, but your eyes will not be harmed.



Gác Can Help

Recent studies have shown that macular degeneration may be reduced or even prevented by increasing the intake of certain beneficial nutrients. The Age-Related Eye Disease Study found that a combination of beta-carotene, vitamins C and E and zinc can reduce the risk of developing advanced AMD by roughly 25 percent in patients with significant signs of the disease. This combination of nutrients is the only proven method to reduce the risk of advancing from moderate to advanced AMD.

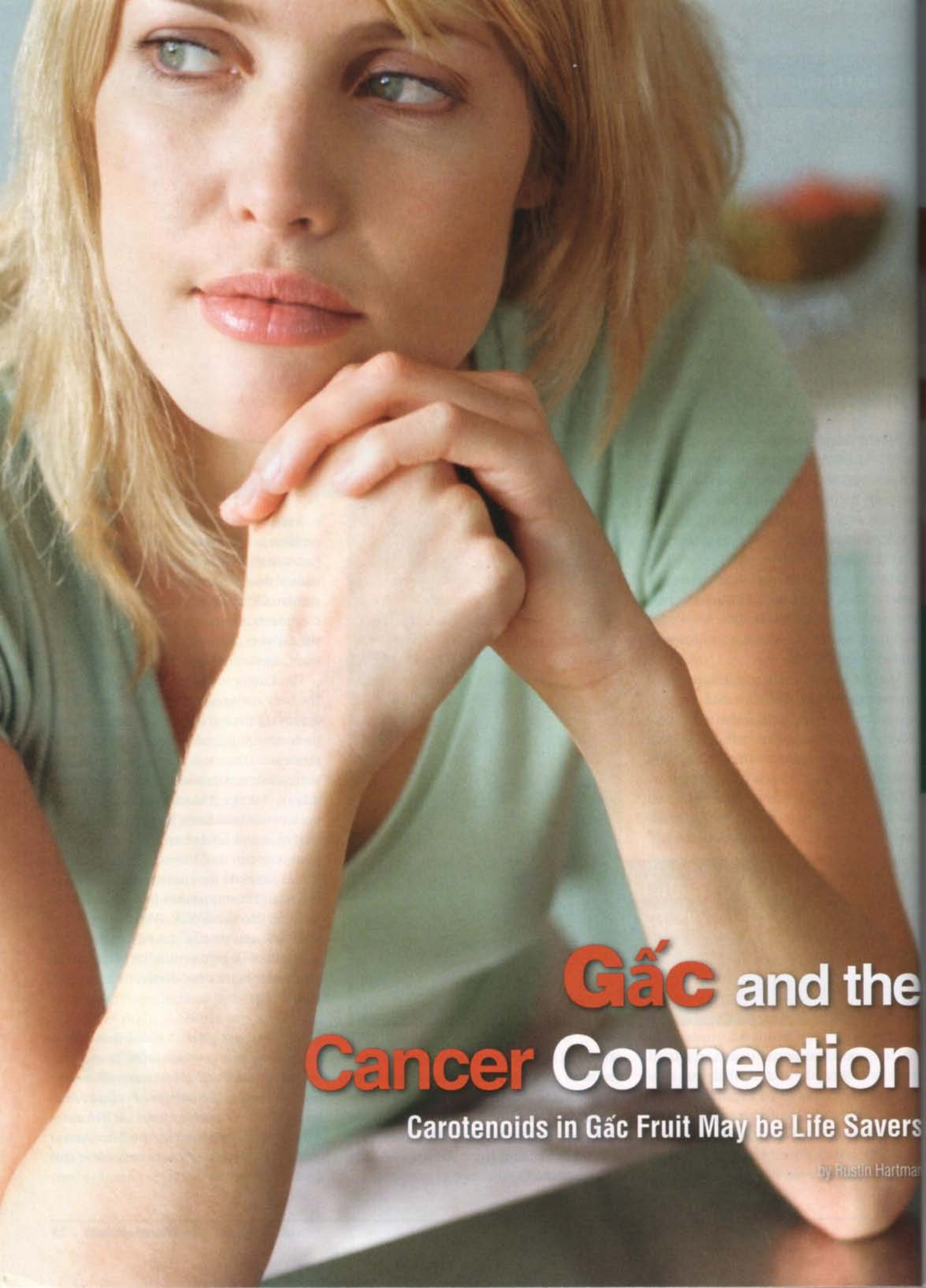
Another follow-up study examined the efficacy of two important carotenoids found in rich concentrations in the gác fruit, lutein and zeaxanthin. These carotenoids are integral, working parts of the macula and peripheral retina. Without lutein and zeaxanthin, we simply would be unable to see. Several studies have found a connection between low plasma levels of these two carotenoids and an increased AMD risk. Other studies have found that increased concentrations of

lutein and zeaxanthin in the macula translate directly to a decreased risk of developing macular degeneration.

Finally, a recent study at Harvard Medical School discovered that zeaxanthin may protect the retina by absorbing blue light and act as a scavenger of damaging free radicals. The same study found that zeaxanthin may protect against light damage and prevent photoreceptor death, the major cause of vision loss in AMD.

Additional studies indicate that zeaxanthin and lutein may protect the blood vessels that supply nutrients to the macula and the rest of the retina. An important study that examined 90 AMD patients found that supplementation with these amazing carotenoids caused improvement in vision for the majority of patients.

These carotenoids are, without a doubt, a vital part of any eye-healthy diet, and gác may well be the world's most potent source. This little fruit from the jungles of Southeast Asia might be the eye's best friend. **BIH**



Gấc and the **Cancer Connection**

Carotenoids in Gấc Fruit May be Life Savers

by Rustin Hartman



Researchers estimate that 60 to 70 percent of all cancers are directly linked to foods and lifestyle factors.

While we cannot ensure that we will never develop cancer, there are some ways to lower the risk. The American Institute for Cancer Research (AICR) estimates that 60 to 70 percent of all cancers are directly linked to the foods we eat and related lifestyle factors, including smoking, exercise and obesity, and the National Cancer Institute reports that as many as 35 percent of cancer deaths are diet-related. "If you add to that those that are related to smoking and alcohol, as many as three-quarters of all cancer deaths are diet or lifestyle related," the AICR reports.

Simple choices can improve the odds dramatically. Eating at least five servings of fruits and vegetables each day, eating a healthy variety of whole grains and nuts and limiting fat intake, especially saturated fats and trans-fatty acids, are particularly helpful. Drinking plenty of water, regular exercise and sufficient sleep are other important choices we can make. Finally, nutritional supplements rich in vitamins, minerals and immune-boosting antioxidant carotenoids—such as those found in gấc fruit—can have potent anti-tumor and cancer-preventive properties.

What Are Carotenoids?

These plant chemicals got their name from the first plant from which they were isolated in a laboratory—carrots. Carotenoids are found in many types of fruits and vegetables and are responsible for their red, orange and yellow colors. Scientists discovered the antioxidant effects of carotenoids in 1968, and just two years later researchers found that many cancer patients had low levels of carotenoids in their blood. Scientists now believe these important photochemicals may be essential to preventing chronic disease. Studies also indicate that carotenoids stimulate the immune system by activating natural killer cells, which kill cancer cells and some virus-infected cells. Two carotenoids, beta-carotene and lycopene, have attracted a lot of attention in the field of cancer-prevention research.

Two of the most prevalent forms of cancer are colorectal and prostate cancer. Thanks to

several new scientific studies, we now know the gấc fruit, which contains beta-carotene and lycopene in abundance, may be a valuable tool in the fight against these cancers.

What You Should Know about Colorectal Cancer

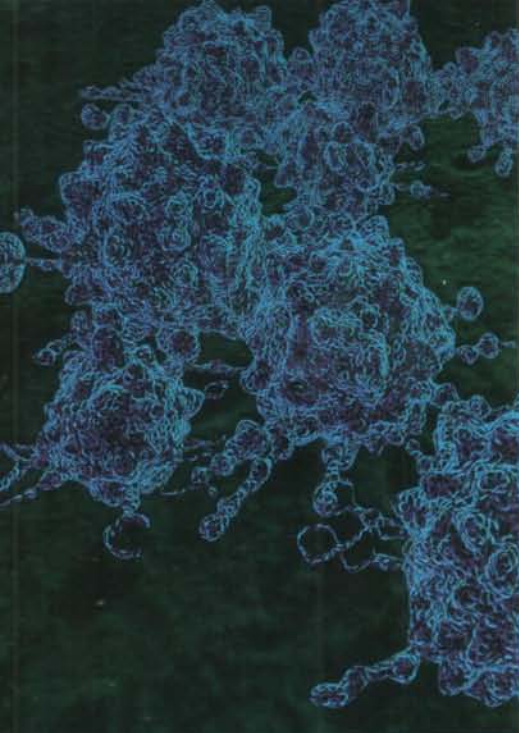
Each year, doctors diagnose more than 130,000 cases of colorectal cancer in the United States, and more than 50,000 people die from colorectal cancer each year. Colorectal cancer is the second leading cause of all cancer deaths. But many colorectal cancer-caused deaths are preventable because, when diagnosed early through colonoscopy, most cases are treatable.

There is not one single cause of colon cancer. Major risk factors include a family history of colon cancer, ulcerative colitis and colorectal polyps. Studies also show that the risk of colon cancer also increases when a person is diagnosed with some other, unrelated form of cancer. Researchers have also found that certain dietary factors also have a potential causative role. High-meat, high-fat, low-fiber diets show some connection to an increased colon cancer risk.

In most terminal cases of colon cancer, the victims do not know they have cancer until it is too late for help. In almost all cases, colon cancer can be detected long before it manifests symptoms. Both a colonoscopy or sigmoidoscopy may reveal evidence of cancer, but only a colonoscopy examines the entire colon. Fecal occult blood tests may detect other cancer indicators like blood in the stool, but this test often comes back negative in patients who actually have colon cancer. Of all possible tests, the colonoscopy offers the best chance of detecting colon cancer.

Cancer of the Prostate

More than 230,000 new cases of prostate cancer in 2005, more than 30,000 deaths from prostate cancer in the United States, and the fact that a man's risk seems to increase every year he lives highlight prostate cancer's seriousness. More than 70 percent of all prostate cancer incidences occur in men over



What Is Cancer?

Cancer occurs when cellular damage or DNA mutation triggers uncontrolled cell replication. These triggers can be caused by a number of forces, especially free-radical damage. When cells mutate and begin to proliferate abnormally, they begin to form growths that interfere with the healthy function of vital organs. Cancer patients die from the damage to organs by invasive cancerous growths, not just from cell proliferation.

Within the body, two unique, natural functions are designed to counteract the development of cancer; the immune system and antioxidant protection are the body's two most powerful anti-cancer weapons. Boosting and supporting these functions is our best path to preventing, and possibly even overcoming, some cancers.

the age of 65. African-American men are 60 percent more likely to develop prostate cancer than other groups.

Not all of the statistics are bad, though. The American Cancer Society reports nearly 86 percent of all prostate cancers are discovered while they are either still confined to the prostate or to a nearby region. One hundred percent of men diagnosed with cancer in these stages survive at least five years. That's not bad. And in the last two decades, the general survival rate for these stages has increased from 67 to 97 percent. Prostate cancer, although more common than we'd like, is one of the most treatable cancers when it's diagnosed in time.

A normal, healthy prostate gland is usually just a little larger than a walnut. It surrounds the urethra in front of the rectum and just below the bladder. Inside the prostate, the

urethra merges with the two ducts that carry semen during ejaculation. The prostate gland is an important part of the male reproductive system because it produces a slightly non-acidic fluid that comprises about one-third of the volume of semen, which carries sperm through the urethra during orgasm. To function properly, the prostate requires male hormones, especially testosterone, which is primarily produced in the testicles.

In its early stages, prostate cancer can only be found during a prostate examination by a doctor. Early prostate cancer may not present any symptoms. Regular blood tests and exams can help you make sure you're not part of that 3 percent who don't survive prostate cancer.

How Gác May Help

Lycopene, like other carotenoids, is a fat-soluble pigment found in certain plants. It's responsible for the bright color of the gác

fruit and the tomato's red color. Gác may be the world's richest source of this especially beneficial carotenoid.

Dozens of scientific studies have shown that lycopene may protect against certain disorders, including prostate cancer and coronary heart disease. One recent study found that the intake of lycopene-rich foods caused a significantly lower risk of prostate cancer. The same study found the same relationship between lycopene and lung cancer.

In another study that followed the eating habits of 47,000 men for six years, a positive correlation was found between tomato-based food consumption and apparent resistance to the development of prostate cancer, due to lycopene. There was a 35 percent reduction in risk of developing prostate cancer among those who consumed more than 10 servings of tomato products weekly, compared with

those who consumed fewer than 1.5 servings weekly. Most of these servings (82 percent) were in the form of tomatoes, tomato sauce, and pizza. Tomato sauce appeared to offer the most protection.

These results support another study that followed the eating habits of a group of men for a six-year period. The study found that men who ate lycopene-rich foods more than five times each week had a 40 percent reduced risk of prostate cancer compared with men who consumed lycopene-rich foods less than once a week.

Researchers recently reviewed 72 studies about lycopene and found 57 reports of reduced risks of various types of cancer. Lycopene's protective effects were especially notable for cancers of the prostate and stomach. Of course, these reports don't prove a cause-and-effect relationship, but a relationship seems clear.

Beta-carotene and lycopene have attracted a lot of attention in the field of cancer prevention research.



New evidence has emerged that suggests lycopene protects and possibly fights prostate cancer. Another new study examined 33 men who were to undergo surgery to remove cancerous prostate glands. These men were randomly given a placebo or 30 milligrams of lycopene daily for 30 days before their surgery. After surgery, researchers examined the removed prostate glands. They found that cancer had spread much less in the lycopene-treated subjects than those who did not receive lycopene. The researchers also noted that precancerous tissue in the lycopene group was less abnormal than precancerous tissue in the control group. Also, levels of prostate specific antigen (PSA) fell 20 percent in the lycopene group but were unchanged in the control group.

Gac's Lycopene: Potent Cancer Fighter

Scientists don't understand how lycopene may work against cancer, but they have a few theories.

Like many chronic diseases, cancer is linked to oxidative stress. Oxidation occurs when an aggressive free radical, a molecule missing an electron, scavenges one from a healthy cell. The average human cell normally faces thousands of free radical attacks each day. Oxidation can cause permanent damage to cell proteins, membranes, mitochondria and DNA. Damage to the first three can cause the cell to become malnourished, sick or even die. But damage to DNA can cause it to mutate and begin to reproduce uncontrollably, and uncontrolled cell replication is known by many as cancer.

Several laboratory studies have demonstrated that lycopene has the highest antioxidant activity of all carotenoids. Lycopene is also an effective scavenger of several kinds of free radicals. Reducing cell damage from oxidative stress by increasing intake of lycopene-rich foods may reduce the risk for certain types of cancer.

Another theory about lycopene's anti-cancer properties involves the failure of cell signaling. Studies indicate that failed cel-



lular communication may be a cause of cell overgrowth and, eventually, cancer. Research shows that lycopene may stimulate communication between cells. Other studies indicate that lycopene may block the effects of certain carcinogens, preventing cell damage and stopping uncontrolled cell division before it starts.

Can Beta-Carotene Beat Cancer?

The gac fruit is also extremely rich in beta-carotene. In fact, it contains many times the amount of beta-carotene found in carrots, which have long been thought to be its best source. Beta-carotene has long been studied for its preventive effects on several types of cancer. A study at Yale University showed a noted decrease in the risk of lung cancer in women and men who had high dietary intake of fruits and vegetables rich in beta carotene.

Another study compared the diets of lung cancer patients to the diets of 540 healthy individuals. The researchers found that those with diets rich in carotenoids (especially beta-carotene) had a significantly lower incidence of lung cancer.

Lycopene is responsible for the bright color of the gac fruit.

Several important studies have linked beta-carotene to a reduced prostate cancer risk. In 1999, the American Cancer Society published the *Physicians' Health Study*, a landmark research project that followed thousands of patients for a number of years. The study found that men with lower amounts of beta-carotene in their blood had a significant increase in the risk of prostate cancer.

The Future Looks Bright

Most of these studies were performed using less potent sources of lycopene and beta-carotene than gac. Since this little fruit is perhaps the most potent source of these immune-boosting, free-radical scavenging and cancer-fighting nutrients, the best may still be yet to come as future research focuses on the gac fruit's cancer prevention and treatment potential. **BIH**



gac

The Asian

**This “Gift from Heaven” Brims With an
Unsurpassed Mix of Antioxidants.**

by Mike Fillon



Treasure

Photo: Cedric Arnold

gác





December and January are times of celebration throughout Southeast Asia, including Vietnam. These months mark the end of the rainy season and are the peak harvest time in the northern, mountainous regions for a cherished, spiny, orange fruit.

About the size of a cantaloupe when ripe, the scientific name of the fruit is *Momordica cochinchinensis* Spreng. Indigenous to India, Vietnam, Cambodia, Thailand, China, the Philippines and Malaysia, it is known as *bhat kerala* in India, *moc niet tu* in China and spiny gourd in the English-speaking world. The Vietnamese simply call it *gác*.

Interwoven in blankets of lush foliage with countless branches, as *gác* ripens it turns from green to a vibrant orange-red color, making it easy to spot. *Gác* is a seasonal fruit available only from September through December each year.

In villages across northern Vietnam, it's common to see trellises in front of homes with vines weaving their way toward the sun. The Vietnamese have nicknamed *gác* the "fruit from heaven," not only because of its skyward-climbing vines, but as tribute to its nutritional goodness.

When ripe, the *gác* fruit has a 2 cm- to 3 cm-thick rind covered with thorn-like spikes. Inside, an orange, spongy lining cushions between 15 and 20 round, bright-red seedpods. The membrane surrounding the pods is rich in *gác* oil, which is valued for its lipocarotene. The lipocarotene aids in absorbing nutrients, especially fat-soluble nutrients including vitamins A, D, E and K.



Gấc has high levels of fatty acid-bound carotenoids called lipocarotenes that facilitate the delivery of carotenoids to cells.

Gấc occupies a place of honor in Asia. The Vietnamese use the red pulp inside the seedpods in a dish called *xoi gấc*, or red rice, made by adding the ground pulp to white rice. In Vietnamese culture, white is considered the color of death, and red, the color of life and vitality. Served as a traditional dish at weddings, Lunar New Year celebrations and other festive events, the rice dish is served with the vibrantly colored gấc seeds visible, signaling guests it includes the fruit.

Most of gấc's nutritional power is contained in its seedpod chambers. The fruit's bright orange and red colors indicate its high concentration of powerful antioxidants called carotenoids, specifically beta-carotene and lycopene.

Memories Run Deep

Gấc researcher Thuy Le Vuong, Ph.D., a nutritionist at the University of California-Davis, has fond memories of gấc from her childhood in Vietnam. "The changing colors of the gấc fruits, dangling on the vines woven around entrance gates as the season ends, signify a time of growing anticipation among the children," she says, "because festivities with xoi gac that usher in the New Year are soon to be celebrated."

Le Vuong says that by December you can't help but notice the many gấc vines in front of houses in northern Vietnam, with their pendulous ruby and green melons hanging from them. "Today I still enjoy a bowl of xoi gac for breakfast when I can," she says. "The crimson

rice brings a feeling of warmth to the bluest cold mornings."

The unusual topography and climate of Vietnam are ideal for growing gấc. The country has a tropical, monsoon climate, with humidity averaging 84 percent throughout the year. The northern part of the country, where gấc thrives, is mostly highlands with hills and densely forested mountains, with level land covering no more than 20 percent of the country.

During the winter or dry season, roughly November to April, the monsoon winds usually blow from the northeast along the China coast and across the Gulf of Tonkin, picking up considerable moisture. Winter is dry in most parts of the country, but only in comparison with the rainy or summer season. Gấc thrives in the harsh climate.

While Vietnam is emerging as an important trading partner with the United States and other countries, it is still considered poor after decades of war. The poverty and accompanying malnutrition in many parts of the country brought the power of gấc to light.

In a paper by Harriet V. Kuhnlein, professor of human nutrition and founding director of the Centre for Indigenous Peoples' Nutrition and Environment (CINE) at McGill University in Montreal, noted that because government health services in areas inhabited by indigenous people are often either of low quality or missing, most governments designate their indigenous peoples as those most in need of public health attention.

In a 2002 paper titled, "Micronutrient Nutrition and Traditional Food Systems of Indigenous Peoples," Kuhnlein states that the development, health and scientific communities usually don't understand the food resources indigenous people know and use. Therefore, the nutrients and other phytochemicals in those sources go undiscovered. "This means that the usual processes for nutrition assessment must be modified, and that the recognition and promotion of local food for alleviating micronutrient malnutrition will require preliminary studies," she writes.



Dr. Le Vuong understands the situation as well as anyone. "In populations where intakes of animal foods are inadequate and food sources of retinol are not economically possible, efficient use of carotene-rich plants may prevent vitamin A deficiency," she writes. "In Vietnam, the gac fruit is an excellent source of beta-carotene. While this fruit is familiar to indigenous people and is easy to grow, it has been underutilized because it is available only three months out of a year; there has been no effort to educate the at-risk population about its nutritional benefit, and research efforts in production or preservation techniques have been lacking."

Kuhnlein reported that investigation into this issue was recently conducted by researchers from the Food and Agriculture Organization of the United Nations (FAO) through five case studies of indigenous peoples in rural Asian areas. They found that of 736 species of traditional food reported by the five community areas, 93 species still required original scientific identification, and for approximately 147 species there was not even the most basic nutritional data on file.

"Arguments that attempt to justify the scientific neglect of these food resources often claim the need to give more priority to food species that are commonly used nationally and available through commercial distribution," Kuhnlein writes. "Certainly, work on commercial food needs to be carried out; however, it is equally important to pay attention to the traditional food resources of indigenous peoples." As it turns out, Vietnam's gac was one of the five studies conducted by the FAO mentioned in Kuhnlein's paper.

Not Enough Vitamin A

In rural Vietnam, vitamin A deficiency has been a long-term concern. Vitamin A helps maintain smooth, soft, disease-free skin and protects the mucous membranes of the mouth, nose, throat, lungs, which in turn helps reduce susceptibility to infection and provide protection against air pollutants and carcinogens. It also helps improve eyesight and counteracts night blindness; aids in bone

and teeth formation; improves skin elasticity, moisture content and suppleness; and helps reverse the signs of aging caused by the sun. A lack of vitamin A can cause skin to become dry and hardened. Vitamin A is also an antioxidant, like vitamins E and C.

Beta-carotene and lycopene are classified as carotenoids and give fruits and vegetables, including gac, their bright color, and they're found in abundance in gac. Of all the fruits

group of natural chemicals known as carotenes or carotenoids. Carotenes and another group of natural chemicals called flavonoids give fruits and vegetables their color. Beta-carotene is essential for vision, growth, and cell division and reproduction. It also helps boost the immune system, protecting against organisms that may cause disease, and it supports the structural integrity of tissues. It can help prevent fatigue caused by anemia,



Photo: Cedric Arnold

Carotenoids are the human body's first line of defense and protect other antioxidants.

and vegetables containing these two powerful antioxidants, gac is emerging as one of the world's best-known sources of both beta-carotene and lycopene.

Beta-carotene is used by the body to produce vitamin A. Beta-carotene is one of a

group of natural chemicals known as carotenes or carotenoids. Carotenes and another group of natural chemicals called flavonoids give fruits and vegetables their color. Beta-carotene is essential for vision, growth, and cell division and reproduction. It also helps boost the immune system, protecting against organisms that may cause disease, and it supports the structural integrity of tissues. It can help prevent fatigue caused by anemia,

improve skin health, help protect eyesight and balance the adrenal system to enhance energy and stamina. Gac has been identified as having the highest beta-carotene concentration of Vietnam's indigenous fruit and vegetables. In the FAO

Nutritional Snapshot

Beta-carotene

- Beta-carotene, found in plants, is a precursor of vitamin A. The body converts beta-carotene to vitamin A.
- It occurs mainly in fruits and vegetables that are deep yellow, orange or dark green, such as carrots, squash, yams, peaches, apricots, spinach, broccoli, and collard and mustard greens.
- It is an antioxidant, a compound that may prevent cancer-causing substances from damaging DNA. Epidemiologic studies have linked high intake of foods rich in beta-carotene and high serum levels of the micronutrient to a reduced risk of cancer, particularly lung cancer.

Vitamin A

- Vitamin A is found in foods and is necessary for human health.
- Besides gac, vitamin A is found in liver; dairy products with fat, such as milk, cheese, butter and ice cream; and in fatty fish including herring, sardines and tuna. It can also be found in the liver oils of shark, cod and halibut.
- Vitamin A is known to play a part in cell differentiation, a process by which cells "mature." Differentiation helps prevent inappropriate growth, such as the uncontrolled cell growth that is seen in cancer.
- Many studies in animals show that vitamin A and similar compounds decrease the incidence of cancer.

Lycopene

- Lycopene is an open-chain, unsaturated carotenoid that imparts red color to tomatoes, guava, rosehip, watermelon, pink grapefruit and gac.
- Lycopene is a proven antioxidant possessing the ability to neutralize free radicals that may damage the body's cells.
- In the body, lycopene is deposited in the liver, lungs, prostate gland, colon and skin. Its concentration in body tissues tends to be higher than all other carotenes and carotenoids.

- Numerous studies have shown that high intake of lycopene-containing vegetables is inversely associated with the incidence of certain types of cancer. For example, habitual intake of tomato products has been inversely associated with the risk of cancer of the digestive tract. Several other studies show that lycopene consumption improves prostate health and reduces the risk of prostate cancer. Other cancers for which lycopene consumption may be beneficial include lung, bladder, cervix and skin cancers.
- Ongoing preliminary research suggests that lycopene is associated with reduced risk of macular degenerative disease, serum lipid oxidation, cardiovascular disease and diabetes.

Fatty Acids

- Body fat can be divided into two categories: Essential fat and storage fat.
- Fat is essential for our health and the essential building blocks of dietary fats are fatty acids (EFAs).
- EFAs are a key component of a healthy diet and perform vital functions in our bodies.
- Essential fat is necessary for normal, healthy functioning. It is stored in small amounts in bone marrow, organs, central nervous system and muscles.
- When fats are consumed they are broken down into fatty acids, which are used for energy, growth, development and important cellular components.
- Certain essential fatty acids cannot be generated by the body and must be ingested.
- The two main essential fatty acids are omega-6 and omega-3.
- Most of us consume more omega-6 than omega-3. Omega-3s are important for brain and vision development in infants and may affect learning, memory and stress levels throughout life.

study, which appeared in the May 2002 issue of *The American Journal of Clinical Nutrition*, a team of researchers from the University of California-Davis, led by Dr. Le Vuong, evaluated the beta-carotene-rich rice preparation xoi gac as a source of provitamin A, the precursor for vitamin A, for children in rural Vietnam.

The study included 185 preschoolers participating in the 30-day controlled-sup-

plementation trial. Children with low hemoglobin concentrations were assigned to one of three groups: a fruit group, who received xoi gac with 3.5 mg of beta-carotene per serving; a powder group, who received rice mixed with 5 mg synthetic beta-carotene powder; and a control group, who received rice without fortification.

The researchers found that the children receiving the gac supplementation achieved

a significant increase in blood plasma beta-carotene levels. In addition, gac improved hemoglobin concentrations of those with low or borderline hemoglobin levels. "Several micronutrient-rich local fruits and vegetables in northern Vietnam have been identified for health-promotion potential, and gac contains the highest levels of beta-carotene at approximately 45 mg or 45,000 µg/100g fruit," the researchers concluded. "Beta-car-



time from xoi gac is a good source of provitamin A carotenoids. Severely anemic children might particularly benefit from routine xoi gac consumption."

Then There's Lycopene

The gac fruit is also packed with more than 10 times the amount of the powerful antioxidant lycopene than found in any other fruit, including tomatoes. In a study in the November 2002 issue of the journal *Biotechnology, and Biochemistry*, researchers from the food color laboratory division of San-Ei Gen F.F.I. Inc. in Osaka, Japan, analyzed and measured the carotenoids in gac, including beta-carotene, lycopene, zeaxanthin and beta-cryptoxanthin. Using high-performance liquid chromatography, they discovered the concentration of lycopene in gac-seed membrane was about 10-fold more than that in known lycopene-rich fruit and vegetables. They concluded that gac "could be a new and potentially valuable source of lycopene."

In another study, appearing in the Nov. 22, 2003, issue of *Journal of Agricultural and Food Chemistry*, researchers reported that the total lycopene concentration in gac was 18 times the amount of lycopene found in tomatoes. The research was conducted by the U.S. Department of Agriculture.

There's more. Recent research suggests that lycopene may help prevent prostate cancer and some other forms of cancer, cardiovascular disease and other serious conditions like the eye disease macular degeneration. Lycopene levels tend to remain higher in body tissues than any other carotenoids, which could be significant for heart health. A recently published study revealed that men with the highest amount of lycopene

in their body fat were half as likely to suffer a heart attack as those with the least amount of lycopene in their body fat.

More on the Importance of Carotenoids

As already stated, beta-carotene and lycopene, which give certain fruits and vegetables their bright colors (including gac), are called carotenoids. Carotenoids play another important role: They are the human body's first line of defense and protect other antioxidants like vitamins C and E from sustaining damaging hits from free radicals. In fact, a typical carotenoid molecule can sustain more than 20 free radical hits before it's destroyed. In essence, carotenoids protect the antioxidant network.

Lester Packer, Ph.D., professor and senior researcher at the University of California at Berkley and author of a number of books about antioxidants,

including *The Antioxidant Miracle* (Wiley, 1999), says carotenoid antioxidants are a good indicator of overall antioxidant status. "Carotenoid antioxidant molecules travel in groups, or networks," Dr. Packer says. "Since carotenoids are delivered to tissues by LDL circulating in the blood, their concentrations are correlated with the amounts of the other fat-soluble antioxidants in the body. Therefore, increased levels of carotenoids reflect overall levels of antioxidant defense and diminished oxidative stress."

The Importance of Antioxidants

It's hard to underestimate the importance of oxygen. Without it, we die. And yet, it can also contribute to illness. It's one of the great paradoxes.

Oxidative stress, damage caused by reactive oxygen species such as free radicals and peroxides, is implicated in a number of diseases and conditions that plague us. Our bodies are continuously faced with trying to balance the need for oxygen with the rate of oxidative damage.

These diseases are among the many affected by oxidative stress:

- Alzheimer's disease
- Autoimmune diseases
- Cancer
- Cardiovascular disease
- Diabetes
- Iron overload
- Macular degeneration
- Multiple sclerosis
- Muscular dystrophy
- Pancreatitis
- Parkinson's disease
- Rheumatoid arthritis
- Segmental progeria disorders (when children age prematurely)



Photo: Cedric Arnold



Photo: Cedric Arnold

Gac could be a new and potentially valuable source of lycopene.

A Chief Culprit

One of the chief causes of oxidative damage is pollution. Consider these two recent studies:

One of the largest studies of its kind found that women breathing polluted city air were at increased risk of heart attack and stroke. The study involved almost 66,000 women between 50 and 79 who were monitored for nine years as part of the Women's Health Initiative, a major U.S. investigation into the causes of heart disease in women.

The results, appearing in the February 2007 issue of *The New England Journal of Medicine*, suggest that—for older women at least—fine particulates in the air are far more hazardous than previously thought. In the study, pollution was assessed by the average number of particulates, which ranged from 4 micrograms to almost 20 micrograms per cubic meter of air. The risk increased by 76 percent with each 10 microgram particulate increase. For women living in cities, however, the risk more than doubled (to 128 percent) with each increase in particulate level.

A previous investigation by the American Cancer Study found a 12 percent increased risk of cardiovascular heart disease with each

10 microgram increase in particulates. The study was conducted among men and women across a range of ages. An unanswered question posed by the new study is whether women in general, or this particular group of women, are unusually susceptible.

Pollution also adversely affects children. A study in the Dec. 16, 2006, issue of the medical journal *The Lancet* points out that exposure to industrial chemicals in the environment can damage the brain during fetal development and early childhood, leading to neurodevelopmental disorders including autism, attention deficit disorder and mental retardation. (For more on this study see the accompanying article in this issue, "Industrial Chemicals Impairing Children's Brain Development.")

Antioxidants for Pain Relief

A handful of studies published in the last 10 years suggest that free radicals may also contribute to chronic pain. Left unchecked, free radicals build up in the body and can further damage already injured tissue. An equally small number of studies, including those by Robert Stephens, a professor of physiology and cell biology at Ohio State University, suggest that antioxidants may

fight chronic pain by helping the body to break down free radicals.

Environmental Protection

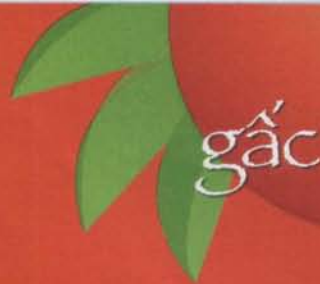
Dr. Packer says there are thousands of studies confirming that antioxidants can help prevent numerous diseases and will not only enhance life, but in all probability extend it. At the National Library of Medicine's and National Institutes of Health's Web site, its PubMed search engine returns more than 15,000 hits when "antioxidants and disease" is typed into the search box.

Packer says the public's increasing interest in healthy lifestyles and healthy aging has led to heightened awareness of antioxidant food supplements. "The development of technologies for the study of free radicals and antioxidants has led to many new discoveries," he writes in his latest book, *Antioxidant Food Supplements in Human Health* (Academic Press, 2006). "For example, it is now known that antioxidants modulate oxygen and nitrogen free radicals, which are important in cell signaling, in regulation of metabolism, and in pathophysiological processes."

Free radical damage is probably the best known feature of oxidative stress. You've seen free radicals in action when you cut an apple. The white flesh turns brown as free radicals move in. If you put lemon juice on the apple when it's cut, you'll witness an antioxidant blocking the potential free-radical damage.

Free radicals are atoms with unpaired or odd numbers of electrons with one mission—to seek and find their lost mates. Unfortunately, they often steal their missing electron from a healthy cell, which starts a chain reaction that may cause cell damage, particularly to the DNA, or it may interfere with the cell's metabolism.

While free radicals can come from bad things—such as pollution, smoking, ingesting nonnutritious foods—they can also come from good things, like exercise, which increases our oxygen use. "Endurance exercise can increase oxygen utilization from 1 to 20 times over the resting state," reports an article on Rice University's Web site.



(www.rice.edu). "This greatly increases the generation of free radicals, prompting concern about enhanced damage to muscles and other tissues."

Fortunately, our bodies have a defense system against free-radical damage—antioxidants. Antioxidants neutralize free radicals. While our bodies continuously produce free radicals, healthy tissues negate these damaging substances and keep their levels in check. It's when free radical production somehow exceeds the body's natural defenses that problems occur, and a lifetime of oxidative stress can lead to the general cellular deterioration associated with aging and degenerative diseases. In fact, researchers have linked this excessive production to diseases like cancer and Alzheimer's disease.

When Fat Is Fine

Besides carotenoids, gac contains a high percentage of fat—the kind of fat we need. Specifically, gac has high levels of fatty acid-bound carotenoids called lipocarotenes that facilitate the delivery of carotenoids to the cell. In the Nov. 12, 2003, *Journal of Agricultural and Food Chemistry*, researchers found gac contained 22 percent fatty acids by weight, consisting of high concentrations of unsaturated oleic acids (33.7 percent) and linoleic acids (28.7 percent), and concentrations of palmitic acid (32 percent).

Fat helps the body absorb the nutrients in fruits and vegetables. For absorption by the human digestive system, the nutrients must bind with fat molecules. Unfortunately, most fruits do not have enough fat content to help deliver their fat-soluble nutrients. Dr. Steven Shwartz of Ohio State University explains, "Many fruits and vegetables are rich in beneficial carotenoids, but most fruits and vegetables are virtually fat free, which may limit the body's ability to absorb some of these nutrients."

But in the case of the gac—which is up to 10 percent fat—beta-carotene and lycopene are highly bioavailable and can be absorbed into the bloodstream readily, thanks to a significant amount of oil, vitamin E and

What are Super or Functional Foods?

You may have heard the terms *functional food* or *super foods* recently and wonder what they are. While there is some slight disagreement about what they are among industry experts, they are foods that provide a variety of several nutrients, or foods that provide significantly higher levels of one particular nutrient than other foods. In essence, a functional food is one that provides benefits beyond basic nutrition.

While this is a relatively recent development in the food industry, the idea is not new. Hippocrates, often called the father of modern medicine, proclaimed centuries ago: "Let food be thy medicine." For many, the functional food has largely come to represent another form of supplementation. Consumers see the functional food both as a normal food—providing energy and basic nutrients that any food might provide—as well as a supplement that offers any number of specific nutrients known to reduce the risk of disease or offer other health benefits.

An example of a functional food is orange juice to which calcium has been added. In the last few years the marketplace has seen an explosion in the development of many highly specialized and potent functional foods, ranging from energy bars and yogurts to meal-replacement shakes. In fact, a report by Datamonitor, an online database and analysis service, notes U.S. sales of functional products reached \$18.9 billion in 2004, and annual sales growth averaged 7.2 percent between 1999 and 2004 (other reports put the numbers even higher, probably due to differences in how the category is defined.)

One category of functional food that's grown by leaps and bounds in the past few years is the functional beverage—usually juices from a fruit (many exotic, such as gac) supported by other fruit or vegetable juices. These beverages may also have specific nutrients added to them, such as amino acids, essential fatty acids or minerals. Most of these beverage products are designed to function as foods—provide good taste, energy and basic nutrition—as well as the purported enhanced-health benefits. Currently, a majority of the beverages boast very high levels of antioxidant components that help protect against chronic diseases such as heart disease, dementia, cancer and arthritis. Others focus their benefits on improving immune function and reducing inflammation levels in the body.

The demand for functional food is driven by a growing public understanding of the link between diet and disease. So whether you're looking for a simple energy boost, a meal replacement shake, or a new, improved morning juice, functional foods may be your answer.

the essential fatty acids found within the fruit itself.

Research indicates that the bioavailability of the carotenoids in gac, a direct result of its high levels of fatty acids, dramatically exceeds that of synthetic beta-carotene and dark-green, leafy vegetables, those generally considered to have the most bioavailable nutrients. In this way, gac both supplies and delivers some of the highest levels of antioxidants of any known fruit.

Then there's the oil. The gac seed membrane is used in traditional Vietnamese medicine to make a tonic called gac oil. For

centuries, gac oil has been given to pregnant and lactating women and children to treat dry eyes and night blindness. The rich, nutty oil has also proven worthy in treating wounds, skin infections and burns, and is traditionally given to children to improve their growth.

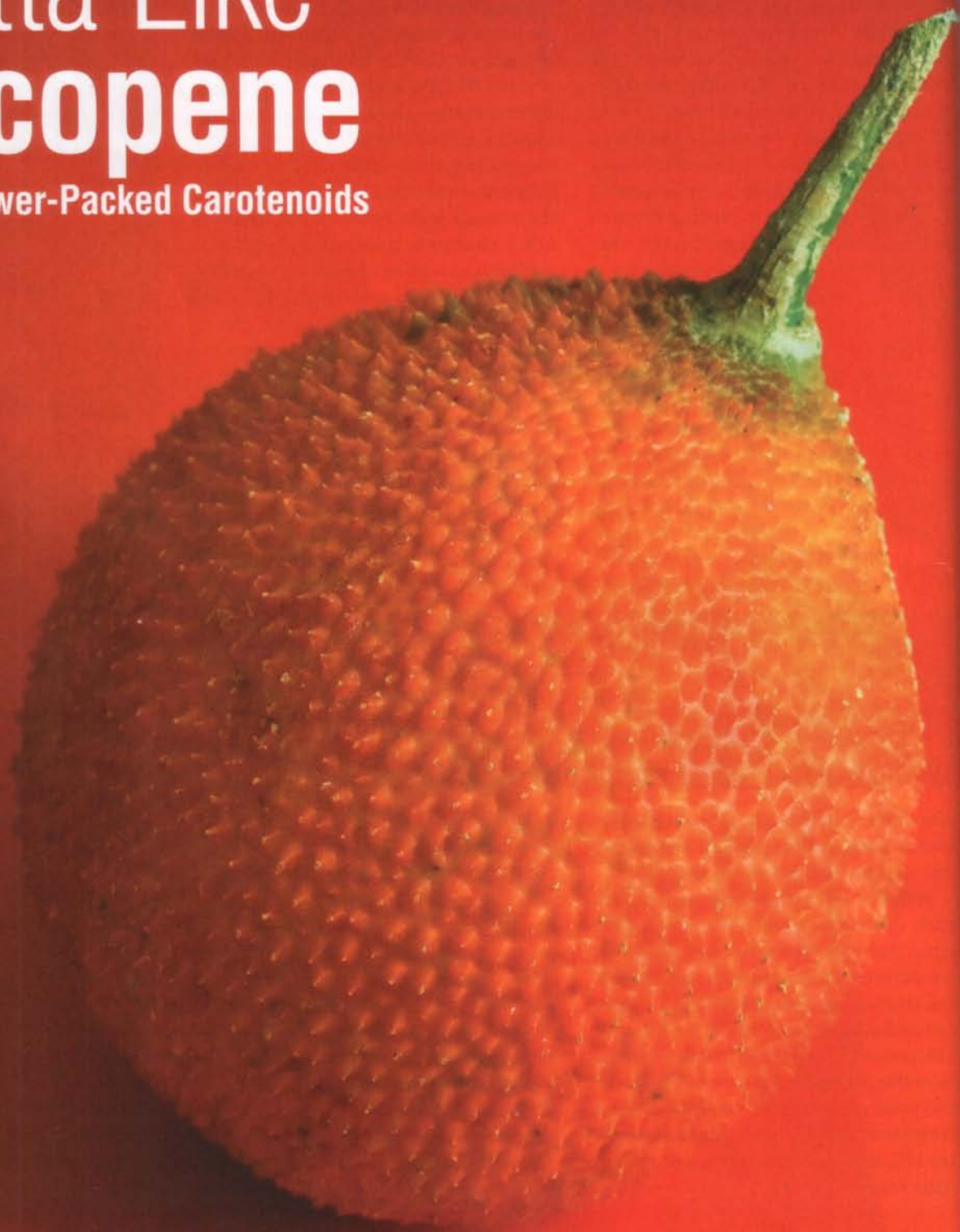
Once the Word Gets Out

Gac fruit is not yet widely known in the United States—but no doubt will be—especially as more people learn about how it may boost their health. The Vietnamese might not be the only people who call it, "A gift from heaven." **BIH**

Gotta Like **Lycopene**

Gấc's Power-Packed Carotenoids

by Cord Udall





Ever wonder where nature's "red" comes from? A member of the carotene (or carotenoid) family—lycopene—suffuses fruits with bright red and orange colors and offers several healthful properties, particularly for men. Research indicates that lycopene-rich foods and supplements may support fertility, promote prostate and heart health, and even stymie cancer.

At least one study suggests that fruits and vegetables that are red or orange in color are higher in carotenoids than green, leafy vegetables. Researchers from the Netherlands investigated the blood carotenoid levels of Indonesian children after consuming various foods, including orange fruits and leafy green vegetables. The findings, published in the *American Journal of Clinical Nutrition*, suggest that orange fruits in particular offer the greatest concentrations of carotenoids, especially beta-carotene and lycopene.

It's fairly well known that foods such as tomatoes, pink grapefruit and watermelon are some of nature's best sources of lycopene. But in the last few years, ongoing research has demonstrated that another fruit—the gấc, common to Southeast Asia—is another particularly rich source of lycopene. Recent data shows that, on average, the gấc fruit contains up to 70 times more lycopene than tomatoes.

That's right, 70 times more lycopene than tomatoes. What's more, if that's not enough, it appears the fruit also boasts up to 10 times the beta-carotene of carrots or sweet potatoes.

So let's take a look at the health benefits of gấc's super ingredient that has scientists and consumers alike "seeing red."

Prostate Health

Probably the most well known benefit of lycopene has to do with the prostate. Tens of thousands of men are afflicted every year with benign prostatic hyperplasia (BPH), which contributes to a number of annoying and lifestyle-changing symptoms. Statistics show that in the United States about 8 million men over the age of 50 are candidates for treatment for BPH.



Because of the increasing age of baby boomer men everywhere, prostate health—particularly, prostate cancer—looms larger every year. Simply stated, prostate cancer is a highly prevalent disease. In 2005, more than 230,000 men were diagnosed with the cancer,

subject. It's a fact that men in general are less likely than women to seek help for any health problem or symptom, and prostate health is an area that is particularly neglected. But celebrities and public figures are endeavoring to change that. Former NFL star quarterback

Lycopene and other carotenoids were able to slow breast cancer cell progression by inhibiting estrogen signaling.

and more than 30,000 of those died of it. The American Cancer Society reports from 2005 that one in six men will develop prostate cancer in his lifetime, and one in 33 will die of it. It's the No. 2 cancer killer among men.

While knowledge of prostate disorders is increasing, it still is somewhat of a "taboo"

Joe Theismann has recently begun working to increase public awareness of conditions related to the prostate.

Fortunately, the science and health worlds are discovering that nutritional interventions can have a significant impact on prostate health. According to various studies, includ-



Saving Our Skin

Cancer of the skin is the most common of all cancers in the United States, with more than 1 million cases diagnosed each year. Rates continue to rise, despite education efforts and marketing strategies to push the use of products that filter harmful UV rays. It appears that the lure of tanning (either outside or in tanning booths) for a cosmetic "healthy" look is still too tempting. Fortunately, science is providing direction on how increasing our intake of certain nutrients—such as the antioxidant lycopene—can protect not just our skin, but our bodies.

For all of lycopene's internal health benefits, researchers are now exploring whether its antioxidant effects may also work their magic when it's applied directly to the skin to prevent skin cancer and aging. Initial research is promising.

A research team from Mount Sinai School of Medicine in New York City found that when used on the skin lycopene prevented sunburn. And a 2004 study in the *Journal of the European Academy of Dermatology and Venereology* reported that topically applied lycopene appeared to halt inflammation and DNA damage in skin cells after exposure to sunlight. Finally, a 2006 study from German researchers suggests that oral supplementation of lycopene can improve skin. The researchers found that lycopene improved skin roughness and scaling among test subjects.

Manufacturers are using lycopene's topical benefits to your advantage by adding lycopene to moisturizers for a natural SPF boost (it has a very mild sunscreen effect with an SPF of about 3) and antioxidant support.

ing 2004 research published in the *Archives of Biochemistry and Biophysics*, lycopene can help prevent and reverse the symptoms of BPH. A 2005 study from Brazilian scientists found that daily consumption of tomato paste for 10 weeks reduced PSA levels (a marker both for BPH and prostate cancer) in subjects suffering from BPH. The researchers stated that the PSA levels were reduced "probably as a result of the high amount of lycopene."

A 2004 study in *The Journal of Nutrition* shows that processed tomato products reduce the risk of prostate cancer, with lycopene being the most likely phytonutrient causing this effect. Several other studies support this

Finnish researchers found a correlation between reduced plasma lycopene concentrations and heart disease in men.

notion, including research from Australian scientists, who found that fruits and vegetables rich in lycopene and other carotenoids may protect against prostate cancer. In a 2005 issue of the *International Journal of Cancer*, the Australians reported a reduced risk of prostate cancer in men with higher intakes of lycopene and other carotenoids.

When it comes to lycopene's direct effect on prostate cancer, the results are mixed. But some studies have indicated that lycopene consumption may inhibit the growth and activity of prostatic tumors. A 2002 study from a Wayne State University research team found that supplementation with a tomato-lycopene extract lowered PSA levels and reduced tumor sizes in subjects recently diagnosed with prostate cancer.

Finally, researchers from the University of Illinois at Urbana-Champaign recently published a report suggesting that certain compounds—metabolites—of lycopene, which the researchers dubbed "lycopenoids," could work synergistically with lycopene to produce the prostate-friendly effects.

Infertility

In 35 to 50 percent of all infertility cases, male infertility is the primary factor in conception difficulties, which occur in about 10 percent of American couples. Sperm health is obviously a key factor in male fertility, and lycopene, as an antioxidant, may help maintain semen quality. Armand Zini, M.D., from McGill University in Montreal, addressed this issue during a recent meeting of the American Dietetic Association (ADA). He reported that oxidative damage is linked to male infertility, as are low levels of lycopene in the semen. Zini's research isn't the first to demonstrate this correlation. A 1996 study appearing in the *Archives of Andrology* revealed a connec-

tion between dietary antioxidants and male fertility and showed reduced seminal lycopene levels in infertile subjects.

The good news is that increased lycopene consumption may increase semen lycopene levels, thereby improving sperm health. Zini and others have suggested this possibility. A study from India indicated that, after three months of lycopene supplementation, participants exhibited significant improvements in sperm concentration, motility, and morphology.

Cancer

We've already discussed the potential of lycopene for preventing prostate cancer. Several studies suggest that both the gac fruit and lycopene may provide benefits for other cancers, as well. The following is a brief overview of the body of research demonstrating lycopene's anti-cancer benefits:

Breast Cancer: Several studies from 2006 strongly suggest that lycopene can effectively reduce the risk of, and directly slow the progression of, breast cancer. Italian



gác

researchers found that lycopene consumption slowed the growth of breast cancer cells, and they surmised that lycopene may be involved in the intercellular communication process the body uses to combat cancer. Another study published in *Breast Cancer Research and Treatment* demonstrated that lycopene and other carotenoids were able to slow breast cancer cell progression by inhibiting estrogen signaling.

Cervical Cancer: An early study examined the levels of different carotenoids, including lycopene, in cervical tissues obtained from 87 women subjects (27 cancerous, 33 precancerous and 27 noncancerous). Women with cancer had lower levels of lycopene and other carotenoids compared with pre- and noncancerous women. Other research involving cervical cancer patients and noncancerous subjects demonstrated that only lycopene was found to be significantly lower in cancerous patients. Finally, a study published in *Nutrition and Cancer*, which involved 32 women with cervical cancer and 113 noncancerous women, measured nutrient levels in the blood. The findings show that women with higher levels of blood lycopene have one-third less chance of developing cervical cancer.

Gastric Cancers: Several studies have demonstrated lycopene's potential for reducing the risk of various gastrointestinal cancers, including those of the liver, colon and pancreas. Findings from a 2005 study published in *The Journal of Nutrition* showed that lycopene both slowed the migration of highly aggressive metastatic liver cancer cells and significantly restricted the invading activity of those cells. The researchers also determined that lycopene's anti-metastasis effect was probably due to the stimulation of a gene that suppresses metastasis.

Other data has linked lycopene to a reduced risk of pancreatic cancer in men. According to Canadian researchers, whose research appeared in a 2005 issue of *The Journal of Nutrition*, tomato and tomato-based products high in lycopene may lower pancreatic cancer risk by up to 31 percent.



Oral/Throat Cancer: Research published in a 2004 issue of the *Journal of the American College of Nutrition* indicates that lycopene reduces the risk of death in patients suffering

can reduce the risk of cardiovascular conditions. A British research team published their findings regarding lycopene and other carotenoids in a 2003 issue of the *European*

On average, the gác fruit contains up to 70 times more lycopene than tomatoes.

a second bout of oral cavity, pharynx or larynx cancers. The findings suggest that plasma lycopene levels were inversely related to mortality in the total population.

Heart Health

Obviously, heart health is a top concern among doctors and health professionals—it's the No. 1 killer of American men and women. Several studies imply lycopene consumption

Journal of Clinical Nutrition. The researchers found that supplementation with a carotenoid mixture including lycopene for three weeks lessened oxidation of LDL-cholesterol (a primary contributor to heart disease) and significantly lowered triglyceride levels.

Research reported in a 2004 issue of *Stroke* showed that higher plasma levels of lycopene and other carotenoids from fruit and vegetable intake reduce the risk of ischemic stroke.

It's also known that tomatoes and tomato-based foods protect against cardiovascular disease, probably due to their lycopene content. Scientists from Ohio State University found that daily servings of tomato-rich foods significantly increased lycopene levels in the blood, thereby lowering the risk of cardiovascular disease.

Finnish researchers found a correlation between reduced plasma lycopene concentrations and heart disease in men. Their study showed that low serum lycopene concentrations translate to a higher likelihood of markers indicating the early stages of atherosclerosis, or hardening of the arteries.

Diabetes

Data on lycopene and diabetes are mixed, though several studies have shown benefits,

Oxidative damage is linked to male infertility, as are low levels of lycopene in the semen.

especially involving type 2 diabetics and insulin resistance in prediabetics. For instance, a 2005 study published in the *American Journal of Clinical Nutrition* found that higher blood levels of carotenoids (including lycopene) are "associated with a decreased risk of type 2 diabetes and impaired glucose metabolism." Additionally, research published in a 2006 issue of the *American Journal of Epidemiology* concluded that increased consumption of lycopene and other carotenoids is associated with a lower risk of type 2 diabetes and related conditions in nonsmoking women.

The gác fruit is a newcomer to Western markets; it's relatively unknown to consumers in the West. But combining what we know about it with our knowledge of lycopene and other carotenoids leads many to believe that the gác has a promising future in the world of health and nutrition. **BIH**

Carotenoids: Health-Friendly Phytonutrients

As mentioned, the gác fruit boasts an unusually high amount of carotenoids, including lycopene and beta-carotene. What exactly are carotenoids, and why are they essential to human health?

Carotenoids are a widely distributed group of naturally occurring plant pigments, usually in the red, orange and yellow color ranges. There are more than 600 known natural carotenoids, all of them synthesized only in plants. They are necessary for plant growth and photosynthesis, and are a main dietary source of beta-carotene (which is later converted to vitamin A) in humans. Increasing research shows that carotenoid consumption is associated with reduced risk of several chronic health conditions, including some forms of cancer, heart disease, and eye degeneration. The following are brief overviews of some of the most beneficial carotenoids:

Beta-carotene: Beta-carotene is one of the orange dyes found in most green leaves and carrots. It is the most potent precursor to vitamin A. Beta-carotene is considered a conditionally essential nutrient, and becomes an essential nutrient when the dietary intake of retinol (vitamin A) is less than adequate.

Lutein: Like other carotenoids, lutein is found in the red, orange, and yellow pigments of various fruits and vegetables. Lutein is found in our retinas, so it is needed for healthy vision. It lowers the risk of cataracts and macular degeneration. Additionally, lutein may also help to prevent or slow thickening of the arteries, or atherosclerosis, a major contributor to cardiovascular disease.

Astaxanthin: Astaxanthin is a powerful antioxidant. It exhibits strong free-radical scavenging activity and protects against lipid peroxidation and oxidative damage of LDL-cholesterol, cell membranes, cells, and tissues. Thus, it may help reduce the risk of cardiovascular disease. Other research shows it may be helpful for other degenerative diseases such as macular degeneration, dementia, Parkinson's disease, and certain forms of cancer. Astaxanthin has been the focus of a large and growing number of peer-reviewed scientific publications.

Zeaxanthin: Zeaxanthin is one of the two carotenoids in the retina—lutein is the other. Like lutein, research indicates that low levels of zeaxanthin are linked to eye diseases such as macular degeneration and cataracts. Other data suggests that increasing dietary intake (even with supplements) of zeaxanthin can lower the risk of such conditions. Also, one study showed that zeaxanthin is able to induce apoptosis in neuroblastoma cells, which are involved in the formation of a rare type of cancer of the nervous system.

Alpha-carotene: Alpha-carotene is one of the most abundant carotenoids in the North American diet, and like most other carotenoids is found typically in the orange, red and yellow pigments in fruits and plants. It is a "provitamin A" compound, one of approximately 50 carotenoids able to be converted in the body into the active form of vitamin A. Alpha-carotene is a potent antioxidant, and is thought to stimulate cell-to-cell communication. Researchers now believe that poor communication between cells may be one of the causes of cell overgrowth, a condition that eventually leads to cancer.

Cryptoxanthin: Also called beta-cryptoxanthin, this compound is found in many vegetables and fruits, mainly in papaya, mango, peaches, oranges, tangerines, bell peppers, corn, gác and watermelon. Cryptoxanthin is a strong antioxidant and prevents oxidative damage to your cells and DNA. Studies suggest that cryptoxanthin may reduce the risk of lung cancer and colon cancer. Some scientists believe that the anti-cancer effect is linked to the antioxidant activity of cryptoxanthin, as well as to a specific gene expression that restricts cells from becoming cancerous. Other studies indicate that cryptoxanthin can reduce the risk of rheumatoid arthritis by about 40 percent.