

REPORT TO  
PHYSICIANS

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THE UNIVERSITY OF TEXAS  
MD ANDERSON  
CANCER CENTER  
*Making Cancer History™*

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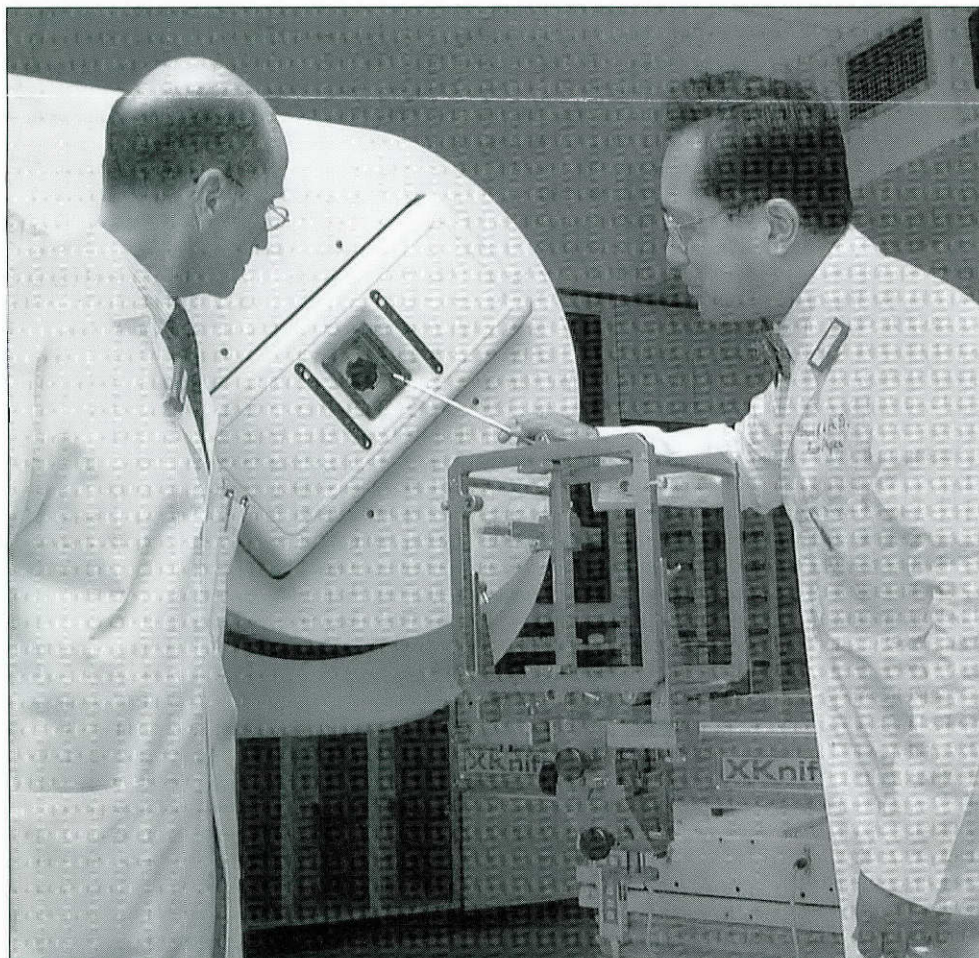
House Call takes a  
look at the cancer-  
prevention properties  
of fruits and vegetables.



# MD Anderson Oncology

## Stereotactic Unit Expands Treatment Options for Patients with Brain Tumors

by Dawn Chalaire



**P**romising results achieved using stereotactic radiosurgery (SRS) and increased demand for the procedure have led to the opening of a new Stereotactic Unit at The University of Texas M. D. Anderson Cancer Center and to the development of stereotactic techniques that can be used to treat brain tumors that are not amenable to conventional SRS.

In contrast to standard radiation therapy, which is given in small, daily doses over a period of weeks, SRS delivers a high dose of radiation to a small volume of tumor in a single treatment.

"A higher degree of accuracy is required with stereotactic radiosurgery than with standard radiation therapy because the target is smaller and because you have only one opportunity to get it right,"

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Associate Professor of Radiation Physics **Almon Shiu, Ph.D.**, (right) and **Moshe Maor, M.D.**, a professor in the Department of Radiation Oncology, examine the miniature multileaf collimator (MMLC) component of the Stereotactic Unit's new linear accelerator. The MMLC, designed by Dr. Shiu, is used to deliver conformal stereotactic procedures.



## Stereotactic Unit Expands Options

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said Moshe Maor, M.D., a professor in the Department of Radiation Oncology and director of the new Stereotactic Unit.

The high, concentrated dose of radiation delivered in SRS is made possible by the precise convergence of beams of radiation to one focal point, the patient's tumor. The radiation beams are delivered by a linear accelerator from different points along multiple arcs of rotation. The treatment couch also rotates 180 degrees, making possible many angles of rotation. The precision of SRS produces a sharp dose gradient between the target and surrounding area, allowing a much higher dose of radiation to the tumor with minimal damage to surrounding normal brain tissue.

"The full radiation dose falls to negligible levels within a few millimeters outside the target. Such precision cannot be achieved with any other method. Being able to deliver a high, concentrated dose to the tumor enables us to overcome the tendency of some tumors to resist radiation," Dr. Maor said.

At M. D. Anderson, SRS is most commonly used to treat patients with 1 or 2 primary or metastatic brain tumors that are smaller than 4 cm in diameter and not surgically accessible. Studies of SRS show tumor regression in 70% of patients, Dr. Maor said, and in two-thirds of patients with brain metastases, neurological deterioration can be avoided.

M. D. Anderson has been performing SRS since 1991, but steadily increasing demand for the procedure over the past few years has led to the purchase of a new linear accelerator that will be used exclusively for SRS procedures. With the dedicated linear accelerator, more than one SRS treatment can be performed each day. The dedicated machine has the same capabilities as the department's other linear accelerators, along with a more stable treatment couch and the ability to deliver intensity-modulated radiation therapy.

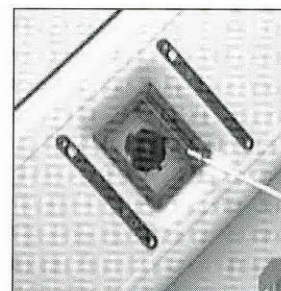
Dr. Maor said that collaboration with the Department of Neurosur-

gery—particularly Raymond Sawaya, M.D., Samuel Hassenbusch, M.D., Ph.D., and Frederick Lang, M.D.—is essential when performing SRS. Plans are in place to open a dedicated SRS clinic, which will be located within the Neuro Center. In the new clinic, patients will be seen simultaneously by Dr. Maor and Dr. Hassenbusch, the neurosurgeon in charge of SRS, to streamline the selection of candidates for the procedure.

Almon Shiu, Ph.D., an associate professor in the Department of Radiation Physics, has been overseeing the technical development of SRS at M. D. Anderson from the beginning. Dr. Shiu helped develop the current table-mounted system and table-supporting device, and in 1991 he began designing the miniature multileaf collimator (MMLC) system.

The MMLC contains a series of very thin tungsten leaves that can be programmed using a three-dimen-

(Continued on page 4)



**The MMLC contains a series of very thin tungsten leaves that can be programmed using a three-dimensional planning system to conform to the contours of irregularly shaped tumors.**

## PROTOCOLS

### Brain Tumor Protocols Include Stereotactic Treatments, Surgery, and Radiation Therapy

Clinical trials in progress at The University of Texas M. D. Anderson Cancer Center include the following using stereotactic treatment techniques, surgical procedures, and radiation therapy for patients with brain tumors.

- Phase I study of stereotactic fractionated radiotherapy using a miniature multileaf collimator (MMLC) and a relocatable frame for the treatment of brain tumors (ID97-011). *Physician: Moshe H. Maor, M.D.*

Participants will receive radiotherapy treatments on an outpatient basis for

recurrent primary brain tumors or new or recurrent brain metastases. Patients must be older than 16 years and have a Zubrod performance status of 2 or more and a life expectancy of at least three months. Patients with primary or metastatic tumors outside the brain must have stable disease. Magnetic resonance imaging of the brain performed within three weeks of treatment planning must show a well-defined tumor. Patients may not undergo chemotherapy for three weeks prior to treatment until one month after the last fraction.

- A randomized, phase III trial of surgery vs. stereotactic radiosurgery in the treatment of single brain metastases (NS97-199). *Physician: Frederick Lang, M.D.*



## Accuracy Essential in Stereotactic Radiosurgery

**J**im Lii holds a magnifying glass in front of one eye and stares intently at the image of a laser beam that appears to be exactly in the center of a pair of tiny lines engraved on a target that is mounted on top of a mechanical isocenter stand in a radiation therapy treatment room. He is not satisfied.

"You see how the laser beam is touching the line?" Lii asks. "It should not be touching."

As Lii makes miniscule adjustments to the wall-

mounted laser by remote control, fellow medical physicist Jin-Song Ye explains that the beam is between 0.10 and 0.20 mm from the isocenter, well within the allowable accuracy of 0.25 mm.

"But Jim is trying to be exact," Ye says.

The two medical physicists are performing a quality assurance check in preparation for a stereotactic radiosurgery procedure at The University of Texas M. D. Anderson Cancer Center. They have spent the morning participating in the acquisition of a patient's computed tomographic images, performing treatment planning on a computer, and transfer-

ring the BRW coordinates of the center of the treatment target to a metal frame known as a rectilinear phantom pointer (RLPP), which serves as a model of the patient's head. The RLPP is attached to a laser target localizer frame and to the treatment couch of the linear accelerator. A tungsten ball is placed within the RLPP in the exact location of the center of the treatment target within the patient's head, and film shots are taken to verify its alignment. During SRS, all the radiation beams will crossfire through the center of this point.

Lii and Ye spend 30-45 minutes applying

the same sub-millimeter precision to checking and double-checking the positions of the RLPP, the laser target localizer frame, and the treatment couch during the patient's treatment. They even make adjustments to allow for the weight of the machine's gantry as it rotates around the treatment couch, the weight of the patient's head, and the ever-so-slight tilt of the treatment couch.

"Everything we do here is for one purpose," Ye says. "We want to place the center of the treatment target, the patient's tumor, at the radiation isocenter of the linear accelerator." ●

## PROTOCOLS

Patients aged 16-75 years with newly diagnosed single brain metastases who are candidates for both conventional surgical resection and stereotactic radiosurgery (SRS) will be randomly chosen to undergo surgery or SRS. After the initial procedure, patients will return for follow-up once a month for the first two months and then every two months thereafter. Patients must have a life expectancy of at least four months, be able to care for themselves, have adequate bone marrow and platelet function, and have no active, uncontrolled infection. Patients who require immediate treatment to prevent neurological deterioration are not eligible for this study. Evidence of leptomeningeal disease, prior radiation therapy to the brain, prior radioiodine treatment, and a primary tumor that is extremely radiosensitive are all criteria for exclusion.

Patients who are pregnant or breastfeeding are ineligible.

- A prospective randomized trial of surgery with whole-brain radiation therapy versus whole-brain radiation therapy alone in the treatment of multiple brain metastases (ID98-028).  
*Physician: Raymond Sawaya, M.D.*

This phase III study includes both inpatient and outpatient procedures for patients with newly diagnosed multiple brain metastases determined by MRI. Patients will return for follow-up at one month and two months after treatment and every two months thereafter. To participate, patients may have no more than three lesions, and all lesions must be resectable. A life expectancy of at least four months is required, and patients must be candidates for conventional surgical resection. If a neurosur-

geon and radiation oncologist determine that all of a patient's brain tumors necessitate surgical resection, the patient is not eligible. Patients who have an extremely radiosensitive primary tumor, have received prior radiation therapy to the brain or prior radioiodine, have evidence of leptomeningeal disease, or are pregnant or breastfeeding are ineligible. ●

**FOR MORE INFORMATION** about these clinical trials, physicians or patients may call the M. D. Anderson Information Line. Those within the United States should call (800) 392-1611; those in Houston or outside the United States should call (713) 792-6161. Visit the M. D. Anderson Cancer Center clinical trials web site at <http://www.clinicaltrials.org> for a broader listing of treatment research protocols.



## Stereotactic Unit Expands Options

(Continued from page 2)

sional planning system to conform to the contours of irregularly shaped tumors, blocking radiation to normal tissue. Conformal SRS, using the MMLC attached to the gantry of the dedicated linear accelerator, delivers a high dose of radiation in one fraction with a single isocenter. In conventional SRS, a circular collimator focuses the beam of radiation on the tumor. If the tumor is large or irregularly shaped, two or more isocenters must be used for the treatment.

"Using the circular collimator in such instances is not advantageous because when using more than one isocenter, the overlapping radiation fields result in a high dose," Dr. Shiu said. "The overlapping area receives twice the peripheral dose, which could lead to complications."

The MMLC can also be used with stereotactic fractionated radiation, which uses the same multiple-arc technique as SRS to deliver small doses of highly conformal radiation in multiple fractions. Stereotactic fractionated radiation is used for tumors larger than 4 cm or when maximum sparing of normal tissue is critical.

The standard SRS head frame, which a neurosurgeon attaches to the patient's skull by four pins, cannot be used with stereotactic fractionated radiation because treatment is extended over a few weeks. Instead, a frame that attaches through a bite block that can be held in the patient's mouth was developed. Although the bite block does not ensure the same exactness as the surgical head frame, it achieves more than satisfactory reproducibility, Dr. Maor said.

Researchers at M. D. Anderson are also developing a body frame that will be used to immobilize patients during SRS for metastatic spine, lung, and liver tumors. According to Dr. Maor, SRS is effective against these metastases if they are small and isolated. ●

FOR MORE INFORMATION, contact Dr. Maor at (713) 792-3410 or Dr. Shiu at (713) 792-3292.

# New Center Teams with Community Physicians to Treat Patients with Advanced Cancer

by Dawn Chalaire

**P**atients with advanced cancer can experience many severe symptoms—pain, fatigue, chronic nausea, lack of appetite, and malnutrition—simultaneously. In addition, these patients and their families must cope with emotional distress and face what may seem like a never-ending parade of difficult decisions.

"The patient needs a combination of very well planned control of physical symptoms and emotional support, and the family needs to see that the patient is well treated, from both the physical and emotional points of view," said Eduardo Bruera, M.D., director of the newly established Symptom Control and Palliative Care Center at The University of Texas M. D. Anderson Cancer Center. "The family needs support and validation of their own fears and concerns. They also need to address some of the issues regarding the duration of the patient's life and anticipate and plan for the care that the patient will need."

Working in partnership with community physicians, the Symptom Control and Palliative Care Center provides multidisciplinary assessment and management strategies to control and alleviate the severe symptoms faced by patients with advanced cancer and offers support and counseling for family members.

"The goals of the center are to treat patients who have very advanced and incurable cancer," said Dr. Bruera, "and to help and empower all other centers and all other oncologists and practitioners in our area of influence to feel more

comfortable with the assessment and treatment of these patients."

Most patients will be referred to the center, which officially opened the second week in October, by physicians at M. D. Anderson, Dr. Bruera said, although a small number may be referred by other physicians in the Houston area. Because most of the patients seen at the center are extremely weak and frequently have symptom distress, the center has private rooms with bathrooms and full-size beds. The center does not, however, have a waiting room; as soon as patients and family members arrive, they are taken to a private room where they are provided educational videos and computer programs to view between consultations. During their half-day stay at the center, patients are visited by a physician, nurse, pharmacist, physical therapist, occupational therapist, nutritionist, psychologist, pastoral care representative, and social worker.

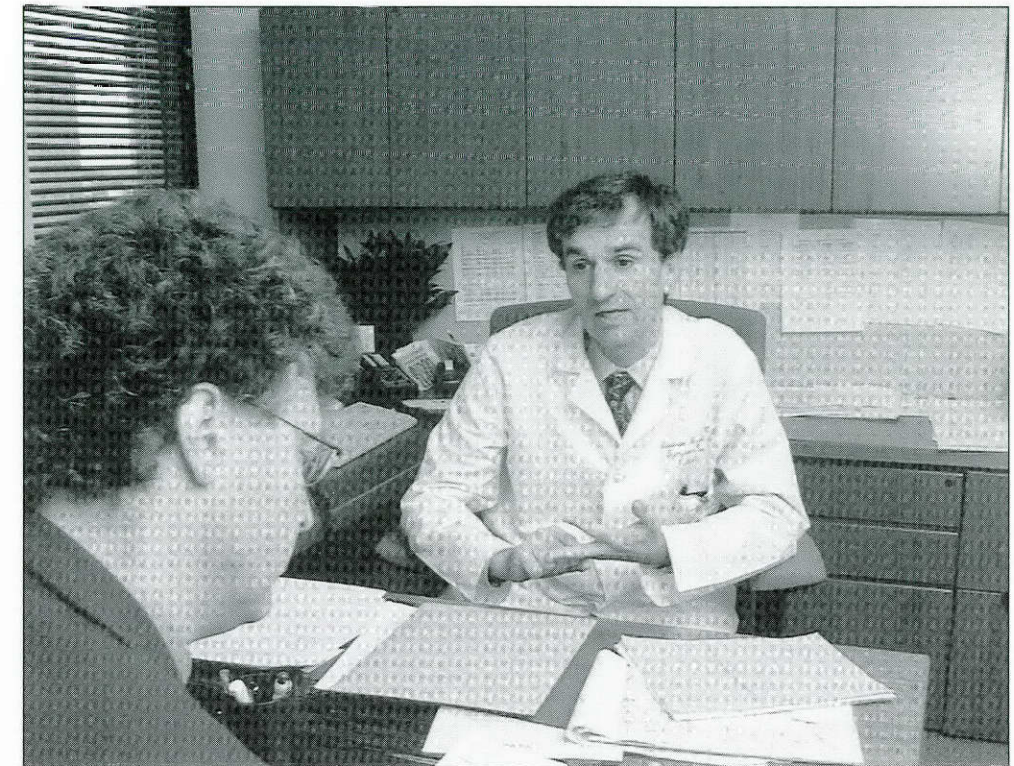
"The representatives of each discipline offer their support, make an assessment, and meet together to discuss the strategy to be proposed to the patient and family. Then, a series of recommendations and suggestions are given to the patient and family and sent to the patient's primary care physician and community nurse," Dr. Bruera said.

All patients are provided with written, as well as verbal, recommendations and an audiocassette that summarizes the main recommendations so that the patients can share the information with their families. Some patients will require follow-up at the center, while other patients will be referred back to their primary care physicians. Patients who return to the center receive a two-hour assessment by a physician, nurse, and pharmacist. Two-hour assessments are also available for patients who do not require a half-day stay at the center. Patients visiting the center for

**"The patient needs a combination of very well planned control of physical symptoms and emotional support, and the family needs to see that the patient is well treated."**

— Eduardo Bruera, M.D., director, Symptom Control and Palliative Care Center

*Before a treatment recommendation is made, patients with advanced cancer are evaluated by representatives from several disciplines in the Symptom Control and Palliative Care Center. Eduardo Bruera, M.D., center director, also conducts an initial interview of each patient who is referred to the outpatient center.*



either half-day or two-hour assessments may receive treatments or undergo tests before being referred back to their primary care physicians.

A 13-bed, tertiary palliative care unit designed to stabilize patients with severe symptom distress is scheduled to open in the spring of 2000 on the same floor as the outpatient center, Dr. Bruera said. Once their symptoms are under control, patients will leave the unit and return to their local hospital or hospice or, occasionally, home.

"That will make for a very nicely integrated setting," Dr. Bruera said. "On the same floor, we will have the nursing staff, support staff, and facilities, as well as a common theme and integrated policies and procedures."

In addition to offering specific treatment strategies for individual patients, the Symptom Control and Palliative Care Center educates community physicians about caring for patients with advanced cancer through lectures, courses, and symposiums. A major palliative care conference is scheduled for June 2

and 3, 2000, and beginning in April 2000, the center plans to offer four-hour Internet courses for Continuing Medical Education credit. Information about the center's educational offerings can be found on its home page at [www.mdanderson.palliative.org](http://www.mdanderson.palliative.org).

"Contrary to other centers that mainly provide treatment, we see ourselves as having less of a direct treatment role and a major educational role," Dr. Bruera said.

Dr. Bruera and others in the center are also working to expand on the limited research available on the causes and treatments of many of the devastating symptoms associated with advanced cancer. Dr. Bruera, who came to M. D. Anderson in July 1999 after spending 15 years as a professor of oncology at the University of Alberta in Edmonton, Alberta, Canada, will continue his research in several areas related to palliative care.

"The questions that we are addressing in our research cover a broad spectrum," Dr. Bruera said. "They include: How can we prevent

cachexia and fatigue? What is the best communication strategy? Which medications are the most effective? What models of health service delivery make access to care most effective? All of these questions are focused on treating patients with advanced cancer."

Incorporated into the new Symptom Control and Palliative Care Center are the Pain Research Group and the Physical Medicine and Rehabilitation Group. The Pain Research Group has contributed a body of work to the new center that includes studies of the best ways to assess pain and other symptoms. The Physical Medicine and Rehabilitation Group helps all patients with cancer, including those whose cancers are incurable, express their maximum physical and psychosocial function and assists patients who have undergone successful aggressive cancer treatments in returning to a productive and effective life. ●

FOR MORE INFORMATION, contact Dr. Bruera at (713) 792-6085.



# IRS Deduction Gives Smokers One More Reason to Quit

by Alison Ruffin and Vickie Williams

**C**igarette smokers and users of smokeless tobacco now have yet another incentive to break the habit. Under new Internal Revenue Service guidelines, the cost of tobacco cessation programs and associated prescription medications can be claimed as income tax deductions. These items are now considered “Deductible Medical Expenses” and can be itemized under this category on the yearly income tax statement.

Allowable deductions include expenses for prescription medications such as antidepressants, which are often included in tobacco cessation regimens; tobacco cessation programs; and physician’s fees. However, non-prescription smoking cessation aids such as nicotine patches and gum are not deductible.

“We hope this endorsement at the federal level will spur insurance companies and managed care companies to offer coverage for tobacco cessation programs,” commented Bernard Levin, M.D., vice president for cancer prevention at The University of Texas M. D. Anderson Cancer Center.

Dr. Paul Cinciripini, Ph.D., director of tobacco research and treatment at M. D. Anderson, said that the tax deductions are a small step in the right direction.

“This will help some people receive reimbursement for important prevention services,” Dr. Cinciripini said, “but far more should be done to address the need for insurance coverage of tobacco cessation programs.”

An example of an allowable deduction is the service provided

## Smoking Cessation

You may include in medical expenses unreimbursed costs for smoking cessation programs and for prescription drugs designed to alleviate nicotine withdrawal.

through M. D. Anderson’s Tobacco Cessation Clinic. At the clinic, patients receive individualized counseling in a six- to eight-week program that costs about what most pack-a-day smokers spend on cigarettes in six months.

“We’re very glad to see such a broad-brush incentive,” said Therese Bevers, M.D., medical director of M. D. Anderson’s Cancer Prevention Center, home to the Tobacco Cessation Clinic. “This may be just the right form of encouragement to help many tobacco users kick the habit.” ●

**FOR MORE INFORMATION** about M. D. Anderson’s Tobacco Cessation Clinic, call (713) 745-8040 or (800) 438-6434.

## Impact of Tobacco Use

- Tobacco use is responsible for **35% of all cancer-related deaths** and is the chief avoidable cause of illness and death in the United States.
- Tobacco use **causes more deaths annually** than alcohol, heroin, cocaine, suicide, homicide, automobile accidents, fires, and AIDS combined.
- In 1999, an estimated **158,900 Americans will die of lung cancer**, and an estimated 171,600 Americans will be diagnosed with the disease.
- Lung cancer **kills more women each year than breast cancer**. In the United States, an estimated 68,000 women will die of lung cancer in 1999, whereas 43,300 will die of breast cancer.
- Every day, **more than 3,000 children and adolescents become addicted to tobacco**.
- About **25% of Americans (48 million people) currently smoke**, and about one-fifth of high school seniors in the United States smoke.
- The estimated **annual cost for smoking-related medical care is \$50 billion**, with the cost of lost productivity and forfeited earnings due to smoking-related disability estimated at another \$50 billion per year.
- Roughly **one-third of M. D. Anderson patients receive treatment for tobacco-related cancers**.

**35%**  
of all  
cancer-  
related  
deaths  
in the U.S.  
are linked to  
tobacco use.







# Vitamins and Cancer Risk: Why You Should Eat Your (Fruits and) Vegetables

**Y**our mother was right: Fruits and vegetables are good for you. In fact, there is overwhelming evidence that eating fruits and vegetables can help decrease your risk of developing certain cancers.

While it is clear that diets that include a wide variety of fruits and vegetables protect against several types of cancers, determining which constituents of fruits and vegetables are responsible for the decreased risk is more difficult.

**Vitamin C.** There is convincing evidence that vitamin C decreases the risk of developing cancers of the larynx, esophagus, stomach, and pancreas, according to an analysis of studies of vitamin C published in *Nutrition and Cancer Prevention*. In addition, the authors concluded that dietary vitamin C possibly decreased the risk of lung cancer in non-smokers and the risk of cancers of the oral cavity, rectum, and cervix.

Eating foods high in vitamin C seems to have a more beneficial effect than taking vitamin C supplements, probably because there are additional cancer-protective agents in vitamin C-rich foods. Good sources of vitamin C include citrus fruits, broccoli, cabbage and other green leafy vegetables, peppers, tomatoes, potatoes, mangoes, strawberries, and melons.

**Vitamin A.** The American Cancer Society recommends eating a lot of fruits and vegetables that are rich in vitamins A

and C for possible protection against cancers of the throat, stomach, and lungs and some skin cancers. Foods high in vitamin A include apricots, cantaloupe, carrots, romaine lettuce, mangoes, mustard greens, pumpkin, spinach, sweet potatoes, and winter squash.



**Carotenoids.** Researchers have also been investigating the cancer-reducing effects of carotenoids, chemicals that are synthesized by plants.

Diets high in carotenoids probably decrease the risk of lung cancer and also may decrease the risk of esophageal, stomach, colorectal, breast, and cervical cancers, according to the American Institute for Cancer Research's *Food, Nutrition, and the Prevention of Cancer: A Global Perspective*.

Beta-carotene is a carotenoid that is found mainly in yellow-orange vegetables and fruits and in dark green, leafy vegetables. Other carotenoids are found in tomatoes, watermelon, pink grapefruit, pumpkin, grapes, eggplant, and some berries.



**Vitamin E.** An American Institute for Cancer Research panel also found that diets high in vitamin E possibly decrease the risk of lung and cervical cancers. Vitamin E is found in vegetable oils, whole grains, nuts, seeds, and wheat germ.

**Antioxidants.** Vitamins C and E, beta-carotene, other carotenoids, and the trace mineral selenium have antioxidant properties. Antioxidants, scientists theorize, neutralize potentially destructive reactive molecules called free radicals before they can attack DNA. By halting free radical assault, antioxidants may stop

genetic mutations and thereby reduce the risk of certain cancers.

## How much is enough?

For cancer prevention, eating a diet rich in fruits and vegetables is preferable to swallowing vitamin supplements because other components of fruits and vegetables may also contribute to cancer prevention. Taking megadoses of a particular vitamin over an extended period of time may also be harmful.

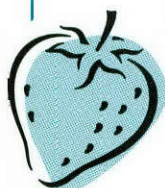
**The National Cancer Institute advises eating five or more servings of fruits and vegetables a day.**



One medium piece of fruit or 1/2 cup of fresh fruit, 3/4 cup of 100% fruit or vegetable juice, 1/4 cup of dried fruit, 1/2 cup of raw or cooked vegetables, and 1 cup of leafy vegetables each count as a single serving.

Surveys show that most people already eat an average of two to three daily servings of fruits and vegetables. Adding an extra two or three servings a day can be as simple as eating a banana at breakfast, snacking on an orange, and having an extra serving of vegetables with dinner.

The good news is that you can improve your eating habits at any age. Whenever you start, you'll begin to be healthier and reduce your cancer risk. ●



For more information, contact your physician or contact the M. D. Anderson Information Line:

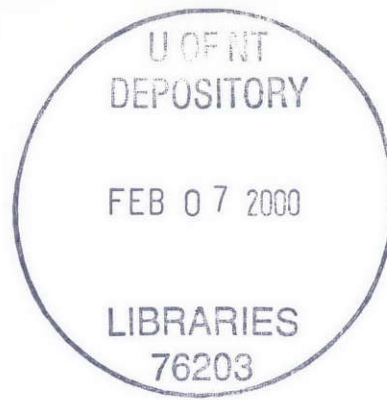
(800) 392-1611 within the United States, or

(713) 792-6161 outside the United States.

October 1999

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## Staff Publications in October

Below is a partial list of staff publications appearing this month.

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