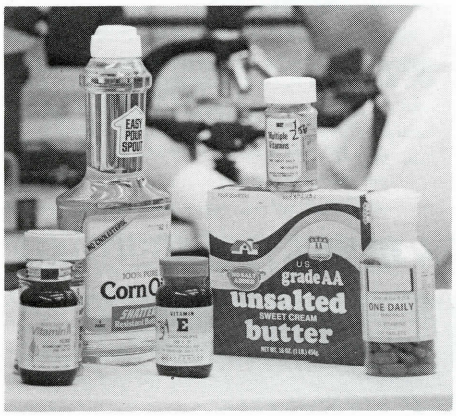
1985

Humphrey Center News: Summer 1985 v. 1, no. 2

Humphrey Center
NEWS
A PUBLICATION OF THE HUBERT H. HUMPHREY CANCER RESEARCH CENTER OF BOSTON UNIVERSITY
Volume 1, Number 2 Summer 1985

Do fats in the diet boost cancer risks? Yes they do, experts say.



Bradford F. Herzog

Fats, such as those contained in corn and other vegetable oils, are one of the major components of the diet that scientists have linked to increased cancer risks. On the other hand, vitamin A seems to have a protective effect.

How does diet affect our chances of being afflicted by cancer?

It's a topic that's arousing more and more concern these days. And the increased attention is affecting the messages we hear about what we should eat. For example:

- A major cereal company advertises that one of its products may help to protect against cancer.
- Advocates of various high-vitamin regimens tout the effectiveness of their chosen approaches as anti-cancer measures.
- Environmentalists and others warn about the cancer-causing potential of some chemicals that turn up in food and drinking water.

The welter of claims and counter-claims surrounding the cancer-diet issue makes it hard to know what to believe. But one strategy for making informed judgments, suggests the Humphrey Center's Adrianne Rogers, M.D., is to focus on cases where a wide range of scientists agree on the cancer-causing potential of particular types of food.

Relatively few components of the diet have generated such a consensus, but one that has is fat. In fact, notes Dr. Rogers, a government-sponsored panel representing a broad spectrum of experts concluded last year that there appears to be a clear link between the amount of fat women eat and their risk of developing breast cancer.

The conclusion was based on two types of studies: animal experiments, and comparisons between groups of women who eat relatively large amounts of fat and groups who eat little fat.

Dr. Rogers notes that the studies don't show that fats have a dramatic effect, only that they do contribute to breast-cancer risks. "The studies suggest that the high-risk groups are two to five times as likely to get breast cancer as the low-risk groups," she says. By contrast, smoking can boost lung cancer risks by 100 times or more.

Still, the panel strongly agreed that women could improve their cancer outlook by reducing fats. They particu-

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Vitamin A: The nutrient that can help to stave off cancer

Few issues stir controversy like the issue of whether vitamins affect cancer risks.

One reason is that a lot of the scientific evidence about the role individual types of vitamins play in cancer tends to be inconclusive. That's true even of vitamins C and E, both often described as good protectors against cancer. But there is strong evidence that at least one nutrient, vitamin A, does protect against cancer.

"There are lots of animal studies," says the Humphrey Center's Dr. Adrianne Rogers, "that show that vitamin A suppresses tumor development at several different sites: the lung, the larynx, the bladder, the breast, and possibly the colon."

In addition, studies comparing groups of people who eat foods high in vitamin A or beta-carotene — a substance that the body converts into vitamin A — with groups who eat diets low in the nutrient confirm that the vitamin seems to help stave off certain cancers.

How does vitamin A work? "It appears to push cells to mature and behave normally, rather than to remain immature, growing and dividing

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INSIDE: CLONING

CANCER NOTES

CANCER NOTE: Bone cancer, the main form of the disease that affects teenaged children, is today often successfully treated by removing a section of the bone and replacing it with a prosthetic device. This avoids the need for amputation.

CANCER NOTE: The mortality rate from cancer has been steadily rising, even after adjusting for the aging of the American population. But lung cancer's continuing rise is the main reason. Deaths from virtually all other types of cancer are either holding steady or dropping.

CANCER NOTE: Skin cancer claims an estimated 7,400 lives each year. Most are from the form of skin cancer called malignant melanoma.

CANCER NOTE: Cancer kills more children between ages 3 and 14 than any other disease.

BEHIND THE SCENES
People & Research

They're supposed to lead lives of drudgery and poverty, looked upon as cheap labor by "the professor" and as objects of pity by others. But Greg Robinson is one of "them" — graduate students – and he says that the life is nothing like the stereotype.

Yes, there are times when the work goes on until midnight or after, says Robinson, who works in the Humphrey Center lab of biochemist Stephen Farmer, Ph.D. And yes, the breaks are few. "I'm usually here every day except Saturday," says the second-year graduate student.

But the time commitment, he notes, isn't anything that's forced on him. "Steve generates a tremendous amount of enthusiasm," says Robinson, "so we're saying to ourselves, 'Yeah, let's do it.' It's not that we're feeling pressured; we're pressuring ourselves."

An idyllic existence, then? Well, not entirely. The work *can* become wearing, he says, and that's usually when there are temporary lulls in progress in the research.

"There are hills and valleys," says Robinson. "On the other hand, you know that if it's not going well at times, it's probably going to be better again in a few days."□

VITAMIN A

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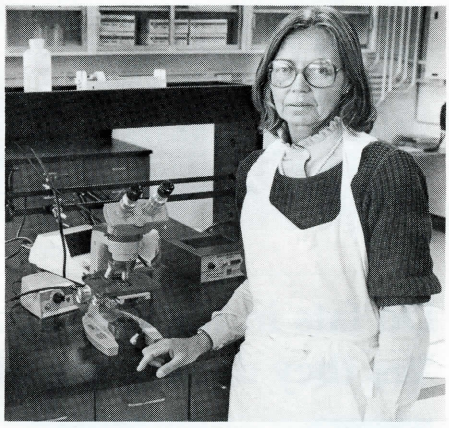
rapidly, the way cancer cells do," says Dr. Rogers.

This doesn't mean, though, that it makes sense to consume large amounts of vitamin A. At high doses — say, 10 times the recommended daily allowance — the vitamin is toxic. It can boost the pressure in the brain and spinal cord, leading to severe headaches and ultimately, in serious cases of vitamin A poisoning, to death.

The safest way to boost the body's stores of vitamin A, therefore, is to eat foods that are rich in the vitamin or in beta-carotene. Fortified milk, liver and eggs all provide vitamin A but since they also may contribute to arterial buildups, Dr. Rogers advises against relying on them as the only sources of the vitamin. Instead, she urges eating more foods that are rich in beta-carotene.

"Beta-carotene is found in most green and yellow vegetables," she notes. "It's especially high in carrots, tomatoes, spinach and squashes."

Eating two servings of vegetables that are high in beta-carotene daily, she says, provides all the vitamin A needed to put the nutrient's protective powers to work.□



Bradford F. Herzog

Dr. Rogers in her new laboratory, where she will be carrying out experiments aimed at further clarifying the relationships between diet and cancer.

Cloning aimed at copying genes, not monsters

Lewis Glass, Educational Media, BUSM

Dr. Farmer in his Humphrey Center laboratory.

The term cloning conjures up images of thousands upon thousands of identical, and presumably horrible creatures.

For many Humphrey Center scientists, though, cloning is an everyday activity. But rather than cloning monsters, they're making copies of those minuscule strips of the natural chemical DNA that constitute our genes.

Genes are to organisms what blueprints are to a building. They contain the chemical "instructions" for making different types of proteins, the bricks and mortar of living tissue.

Since genes have such a key role in growth they're of deep interest to cancer researchers, who are trying to solve the puzzle of uncontrolled

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FATS IN THE DIET

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larly singled out polyunsaturated fats — the ones that are found in foods like corn and other vegetable oils. Dr. Rogers says, though, that cutting down on fats of all types is probably the simplest strategy, since the polyunsaturates will drop along with the others.

Meanwhile, she says, the panel also found there's enough evidence of a link between dietary fat and prostate and colon cancer to suggest that men should cut back, too.

The scientist, herself an expert on the links between diet and cancer, adds that another consideration strongly bolsters these recommendations: the fact that dietary fats have been identified as a major culprit in boosting heart-disease risks. That, she says, explains why the American Heart Association and the National Cancer Institute make virtually identical recommendations about fats.

"The average American takes in about 40 percent of calories as fat," says Dr. Rogers. "The recommendations are that we all try to cut that figure to 30 percent or less."

That means eating less red meat, and more fish and poultry; switching to low-fat or skimmed milk and reduced-fat cheese; eating more grain and vegetable products; and cutting back to no more than two or three eggs a week. (Eggs contain fat and cholesterol, both of which contribute to fatty buildups in the arteries and thus help to set the stage for heart attacks.)

Of course, cutting back fat intake to less than 30 percent is likely to reduce both cancer and heart-disease risks still further, but such a cutback might be tough for some.

"Getting fat consumption down to 30 percent of calories wouldn't involve that much of a change for most of us," says Dr. Rogers, "but getting it substantially lower than 30 percent — down to 20 percent, for example — probably would. It basically means going to an oriental diet, with small portions of meat, and lots of rice and other vegetables."

According to Dr. Rogers, the exact way in which fats influence cancer development isn't known. She says, though, that there's some evidence that it's partly because fats contain more calories, ounce for ounce, than most other types of foods.

Animal experiments, she notes, show that many types of tumors grow more rapidly when calorie intake is high than when it's low. But there's also evidence, she adds, that fats themselves have specific tumor-promoting properties. □

You Can Help

For more information on the important work of the Hubert H. Humphrey Cancer Research Center, and how you can help, send this coupon to:

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of Medicine
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CANCER NOTES cont.

CANCER NOTE: Three quarters of colorectal cancer victims can be cured if their disease is discovered before it spreads to other areas of the body. The American Cancer Society recommends annual visits to the physician for a colorectal cancer checkup for any one over 40.

CANCER NOTE: Detecting cancers in children is often hard because the symptoms may seem minor at first. Nausea, swelling, double vision, stumbling, nosebleeds and listlessness are among the warning signs.

CANCER NOTE: Hodgkins disease, a cancer of the lymph glands that occurs mainly in young adults, is rapidly yielding to improved therapies. An estimated 90 percent of cases diagnosed early are now curable, as are 70 percent of advanced cases.

QUESTIONS...

Answer to question on back panel.

A. Like other forms of radiation, such as x-rays and the radiation produced by nuclear weapons, the sun's radiation can cause cancer. It does its damage by injuring the genetic material, or DNA, in skin cells. This can lead to uncontrolled growth of such cells: in other words, to cancer.

Since the ultra-violet part of the sun's radiation is the most damaging, good protective skin lotions have ingredients that keep most of the UV radiation out. Many physicians recommend using the strongest type of lotion, rated number 15, at least once a day every day, even in winter. The reason is that the radiation has a cumulative effect over the course of a lifetime (which is why farmers and others who work outside are frequent skin-cancer victims). For users worried about a tan, a number 15 lotion will permit some tanning, though less than lower-rated lotions.

Q. *Why do tumors keep on growing?*

A. This is a complicated issue. In fact, much of the Humphrey Center's research effort is devoted to shedding light on this question. One thing that seems to be critical, though, is the ability of populations of tumor cells to keep reproducing generation after generation.

In normal cell populations, the ability to reproduce stops after the third, fourth or fifth generation. For many cancer cell populations, though, the body's normal growth-control mechanisms fail and so succeeding generations keep their reproductive powers.

This phenomenon has yet to be explained. If researchers at the Humphrey Center and elsewhere are able to come to an understanding of it, however, that may lead to cancer treatments based on eliminating this unfortunate trait. □

CANCER NOTE: Breast cancer strikes an estimated 115,000 women each year in the U.S. and kills roughly 37,000. The majority of breast cancers are initially found by women examining themselves.

CLONING – COPYING GENES

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growth. But, says Humphrey Center scientist Stephen Farmer, Ph.D., cloning genes isn't as simple as making copies of a blueprint.

The toughest part of cloning, he says, is finding the gene you want. Since there are an estimated 100,000 genes within a human cell, isolating one of them is no simple matter.

Fortunately, medical science has developed sophisticated techniques for accomplishing this daunting task. Once you have the gene you want, though, what then?

At that point, says Dr. Farmer, the gene can be introduced into bacteria. This is done by a technique called gene splicing. Virus-like entities called phage, which aren't a part of the bacteria but normally dwell inside them, are isolated. Their DNA, which comes in a ring-shaped form, is chemically snipped open, using special chemicals as the "scissors." Then, the gene is inserted into the ring, and the phage is allowed to re-enter the bacteria.

Now, all that remains is to start the bacteria on a rapid reproduction cycle. This is done using a large metal vat called a fermenter, which is designed to hold a yeasty brew that bacteria thrive on.

"You take a sample of the bacteria that contain the gene you want," explains Dr. Farmer, "put them into the fermenter, and in just a few hours you can produce liters and liters of the bacteria, and each one of them has a copy of the gene you want.

"There's really nothing to it," he concludes, with a wry grin.□

The Humphrey Cancer Center News is published by the Hubert H. Humphrey Cancer Research Center of Boston University School of Medicine. John I. Sandson, M.D., Dean of the School of Medicine; *Director,* Herbert H. Wotiz, Ph.D.; *Deputy Director,* Isaac M. Taylor, M.D.; *Editor,* William J. Freeman. "Cancer Notes" information is provided courtesy of the American Cancer Society.

Why does direct exposure to the sun's rays pose a cancer risk?

ANSWER ON PAGE 3

Address Correction Requested

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