MEDICINE

Vitamin May Be One Key To Diet-Cancer Problem

Latest Experiments Indicate Biotin Favors Growth Of One Kind of Liver Cancer, Nullifies Preventives

ONE of the vitamins, biotin, may be one key for solving the problem of whether cancer can be caused or controlled by what you eat. This is a burning question in medical research right now. Important new knowledge is expected within the year and it is believed quite possible that something practical may come from the present research leads.

Latest reports show that biotin favors the development of one kind of liver cancer in rats. Experiments in which this discovery was made are reported by Prof. Vincent du Vigneaud, Dr. Juliet M. Spangler and Dr. Dean Burk, of Cornell University Medical College and the National Cancer Institute, and Dr. C. J. Kensler, Dr. K. Sugiura and Dr. C. P. Rhoads, of Memorial Hospital, New York (*Science,* Feb. 13). Similar results have been obtained by Dr. Paul Gyorgy, Dr. Landy and Dr. H. Goldblatt of Cleveland.

Biotin is found in yeast, liver and many other plant and animal tissues. But don't let that stop you from eating liver or yeast bread or yeast itself. No experiment has yet been reported in which cancer was cured by a diet low in biotin.

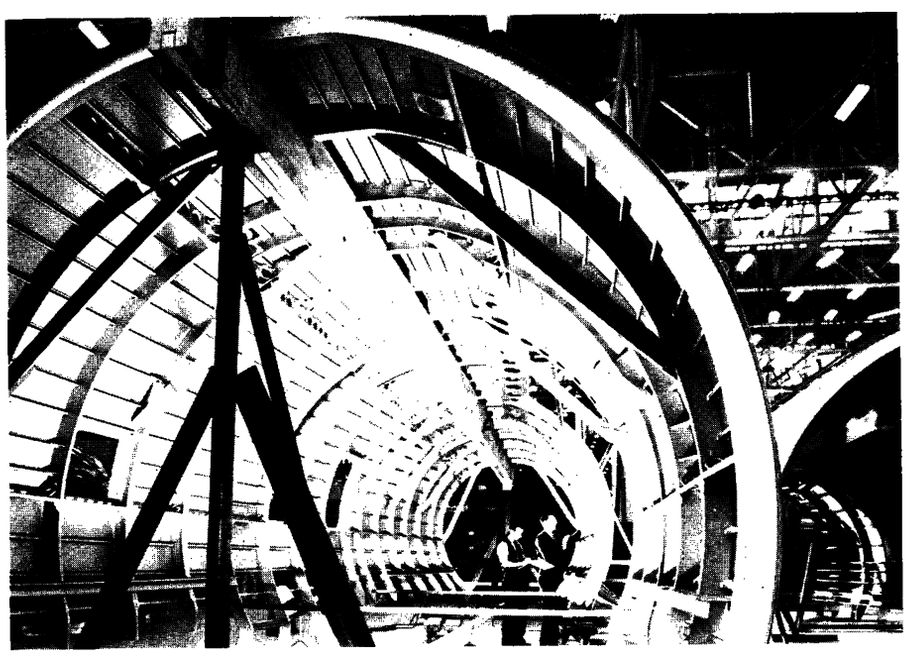
Egg white contains a substance, avidin, which combines with biotin and if enough avidin is fed an animal, he becomes deficient in biotin. Unfortunately, he also becomes very sick. It would be logical to suppose that experiments are under way or soon will be to determine whether by using the proper amount of avidin, just enough biotin can be removed to stop its cancer-promoting activity without removing so much biotin that the animal becomes sick.

Biotin, the present experiments show, nullifies the cancer-preventing effects of diets recently found to protect rats against liver cancers. When these animals are fed a dye called butter yellow, 96 out of every 100 have liver cancers at the end of 150 days. When they are given riboflavin (one of the B vitamins) and casein, chief protein of milk, only 7 out of 100 get liver cancer from the dye. Cystine and choline also have a cancer-preventing effect. But when biotin is added, the riboflavin and casein fail to protect the animals against the butter yellow liver cancers.

Whether any vitamin or chemical other than biotin can break through the riboflavin-casein protection against cancer is not yet known. Nor do the scientists know yet whether the cancer-favoring effect of biotin takes place in man or animals other than rats, or whether biotin favors or enhances the cancer-causing action of other chemicals, such as those in coal tar which caused chimney-sweeps' cancer and mule spinners' cancer. When these questions have been answered they may know how, or whether, humans can be saved from cancer by diet.

Butter yellow, which caused the liver cancers in the rats, is providing another clue. This dye has nothing to do with butter, in spite of its name, and is not contained in any foods humans eat. The fact that it would cause liver cancer in rats when fed to these animals with a diet of brown rice and carrots was discovered by a group of Japanese scientists headed by Dr. R. Kinosita. Other Japanese scientists, W. Nakahara, K. Mori, T. Fujiwara, and T. Ando, reported that liver and yeast protected the animals against the butter yellow cancers.

Prof. du Vigneaud and associates and other scientists who were then investigating the role of biotin in the body suspected that it might be the substance in yeast and liver which had the cancer-preventing effect. In preliminary experiments, very crude biotin preparations from yeast and liver did show signs of protecting against the butter yellow cancers. But when pure crystalline biotin



HOW IT LOOKS INSIDE

Interior of the new giant Curtiss Condor III, or C-46, first of a large but undisclosed number of these great 2-engine Army transports now under construction. The plane will have a wing-span of 108 feet and a gross weight of more than 50,000 pounds. It was originally designed to transport 36 airline passengers and heavy mail and express cargo. Militarized, it is expected to accommodate many more than 36 fully equipped infantrymen. Prototype of the Condor III is the Curtiss CW-20 which was received enthusiastically by the British who renamed it the St. Louis. The St. Louis was recently flown across the Atlantic non-stop.

became available, the experiments were repeated, and unexpectedly showed that biotin favored the production of the cancers.

Meanwhile, Dr. Rhoads and associates had pinned down the anti-butter yellow diet substances to riboflavin and casein. They also saw in the butter yellow cancers another important lead on the cancer problem.

It had previously been discovered that mice, rats and rabbits were able to change other powerful cancer-producing chemicals to harmless substances. Dr. Rhoads and associates suspected that the change was effected by means of enzymes, chemicals known for their role in the body's conversion of foods into simple chemicals used for body building and body fuel.

Riboflavin, which gives little protection against butter yellow cancer, is one of the B vitamins. Like others in the vitamin B group, it is a necessary part of one of the body's enzymes. Pellagra-preventing nicotinic acid is a necessary part of another enzyme, coenzyme one. The activity of this enzyme can be easily measured, and so can the effect on it of butter yellow feeding.

Following this lead the scientists discovered that butter yellow breakdown stops the activity of coenzyme one, which is needed by normal liver cells. The process is very complex, but in simplest terms, a chemical released from butter yellow in the body displaces the nicotinic acid in the enzyme. The result is that normal liver cells are strangled, as it were, being deprived of life-essential oxygen. But the cancer cells are able to live and thrive, because they apparently do not need the enzyme.

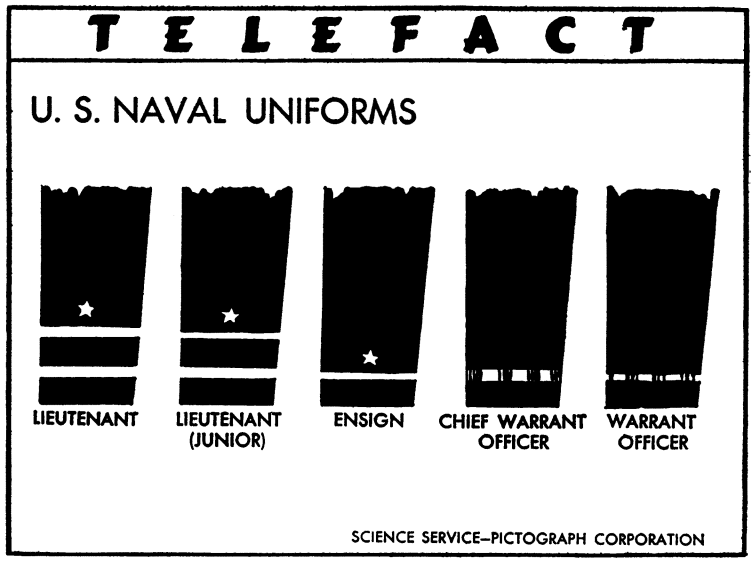
Next step is to find a chemical which will interfere with cancer cells, strangling them by combining with some enzyme they need, while it leaves normal cells alone.

Scientists believe that it may not be impossible some day many years hence to follow this lead to the development of a compound which will damage cancer cells and not normal cells, thus providing a chemical, if not a dietary, means of controlling cancer.

Science News Letter, February 21, 1942

Large flocks of *cormorants* chase whole schools of fish, while small flocks hunt individual fish.

Blackout problems raised by easily visible steam were solved in England by adding finely divided carbon to the steam, forming *"black steam."*



MEDICINE—NUTRITION

New Vitamin Hunger Disease Is Found; Cured By Biotin

Experimental Diet Lacking Vitamin Produces Symptoms In Human Volunteers Similar to Those From Poor Diet

DISCOVERY, with the aid of four human volunteers, of a new vitamin hunger disease previously known only in laboratory animals is reported by Dr. V. P. Sydenstricker, Dr. S. A. Singal, Dr. A. P. Briggs and Dr. N. M. DeVaughn, of the University of Georgia School of Medicine, and Dr. H. Isbell, of the National Institute of Health (*Science,* Feb. 13).

The disease results from lack of biotin, and was cured by daily doses of biotin. This is the same vitamin just reported to have a cancer-promoting effect in rats under certain conditions.

The symptoms and signs of the new vitamin hunger disease, biotin deficiency, were "strikingly similar" to those seen in patients suffering from vitamin lack arising spontaneously, presumably from poor diet, but not from an experimental diet.

Biotin is found in liver, yeast and a number of plant and animal tissues. The only known way of creating a biotin deficiency is by giving raw egg white or avidin, a substance in egg white which combines with biotin. Consequently the human volunteers were given dried egg white up to about one-third (30%) of the calories in their experimental diet. The rest of the diet was made up of polished white rice, patent white flour, farina, cane sugar, butter, lard, and lean beef, plus adequate supplements of vitamins and minerals.

While on this diet, the volunteers developed dry, peeling skin, a pronounced grayish pallor, muscle pains, lack of appetite, nausea, distress around the heart, and, after the fifth week, symptoms strikingly like those in experimental deficiency of thiamin, the morale vitamin.

"Mild depression progressed to extreme lassitude, somnolence and in two instances a mild panic state," the scientists report.

The depression, muscle pains, lack of appetite and distress around the heart were abolished within three to five days after doses of biotin were given. The striking ashy palor of the skin and mucous membranes disappeared in four days.

Science News Letter, February 21, 1942

"Visible whistles" which emit visible puffs of aluminum stearate have been developed by the American Cyanamid & Chemical Company, of New York.