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VITAMINS AND HEALTH

BY WILLIAM RUBIN

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tract, and the nervous, respiratory, and digestive systems. It is essential for the normal growth of bones and teeth, and is necessary for vision under dim light. Night blindness, rough skin, and increased susceptibility to infections, especially of the eyes, bronchi, lungs, and urinary system, are characteristic of vitamin A deficiency. Large reserves of vitamin A can be stored by the body within the liver.

Vitamin A occurs in two forms; the vitamin itself, and carotenes, "provitamins" from which the body can manufacture the vitamin.

The vitamin as such is found only in foods of animal origin. The best sources are liver, kidney, eggs, whole milk (fresh, dried, or evaporated), cream, cheddar cheese, and vitamin A fortified margarine. The richest, generally available natural sources of vitamin A are certain fish liver oils and their concentrates.

Carotenes, found in vegetables, are less well absorbed from foods than is vitamin A itself, and are more easily destroyed in the intestinal tract. They are, however, an extremely

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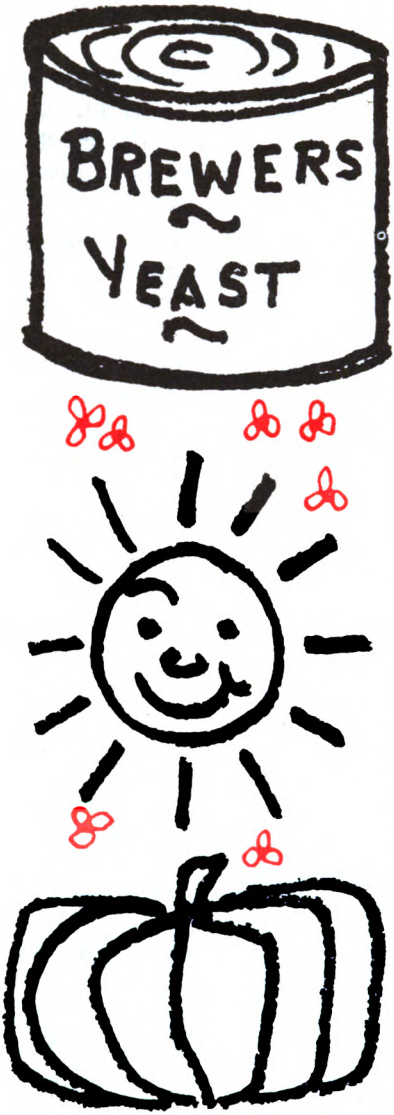

The vitamins D are fat-soluble vitamins formed by the effects of long wave ultraviolet radiation on certain sterols (provitamins D) which occur in nature chiefly in the animal organism. The two vitamins D of practical nutritional importance are vitamin D_2, formed by the ultraviolet irradiation of ergosterol (a provitamin natural to the plant kingdom), and vitamin D_3 formed by the irradiation of 7-dehydrocholesterol (the natural provitamin D of animal tissues). The terms "activated ergosterol," "viosterol," and "calciferol" are all applied to vitamin D_2.

Man and other mammals are able to build 7-dehydrocholesterol within the body. This provitamin then is transformed into vitamin D_3 in the skin by the action of sunlight, carried in the blood to the places of use or to the liver for storage. Relatively small quantities of vitamin D are made available to the body in this way in the temperate zones, where rickets is of common occurrence. Covering the skin with clothing and the screening of the sun's ultraviolet rays by smoke both cut down the body's manufacture of vitamin D.

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Because the vitamin E deficient rabbit develops a muscular dystrophy, the adult male rat becomes sterile, and the adult female rat shows habitual abortion, vitamin E has been widely used for the treatment of similar conditions in man – but with very unimpressive results.

Evidence suggesting a role for vitamin E in man was found in 1952, when an abnormality of the red blood cells in premature infants was corrected with vitamin E. Subsequently, a number of full-term infants with this same abnormality of the red blood cells were found to make a more rapid and complete return to normal when fed with human milk than when they received cow's milk. Treatment with vitamin E was uniformly effective.

There is further proof that this abnormality of the red blood cells is due to vitamin E deficiency. The abnormality was developed in a group of adult males who were maintained on diets very low in vitamin E and high in unsaturated fatty acids. Thus it seems that vitamin E deficiency may occur in man, especially in infants (particularly premature infants) and in older

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and the vascular system. Earl signs of deficiency include los of appetite, constipation, irrita bility, lassitude, and insomnia. A the deficiency progresses, poly neuritis, eye muscle paralysis blindness, severe mental disturb ances, fluid retention with edema, and acute heart failure may de velop. Thiamine is not too well stored by the body and, there fore, each day's diet should con tain adequate amounts of it.

Among the richest food sources of thiamine are dried brewers yeast, dried cultured food yeasts, and practically all pork cuts, in cluding ham (fresh and smoked) and Canadian bacon but ex cluding pork sausage, salt pork, and American type bacon. Fair but important sources of thiamine in the American diet include most other meats (including poultry and oysters but exclud ing other shell fish and fish), whole grain or vitamin-enriched or fortified cereals, whole grain or enriched wheat bread and flour, peanuts and peanut butter, wheat germ, milk (including but ter milk and skim milk), eggs, green peas, and oranges.

Thiamine is soluble in water and is destroyed by heat. It is

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tines, the yeast cells must be killed. This is accomplished commercially by drying the yeast until the cells are no longer viable.

Riboflavin, a water soluble vitamin, is resistant to the heat of ordinary cooking procedures, especially in the presence of acid, but is readily destroyed by light. The losses of the vitamin in milk during pasteurization and exposure to light during bottling are from 10 to 20 per cent. Unless proper precautions are taken to protect bottled milk from light, much more may be lost.

The requirement for riboflavin does not appear to be related to the caloric requirement or to muscular activity, but it does seem to be related to the protein requirement. The recommended allowance is 1.6 mg. per day.

vitamin B_6

The vitamin B_6 group consists of pyridoxine, pyridoxal, and pyridoxamine. Frequently, the group is referred to collectively, and incorrectly, as pyridoxine. Vitamin B_6 occurs in animal products largely as pyridoxal and pyridoxamine, while pyridoxine is the largest component of the group in vegetable products. The

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stomach or intestinal disorders appears to be uncommon. The gastric juice of the healthy stomach contains a substance which greatly facilitates the absorption from the intestines of vitamin B_{12} taken by mouth. In the absence of this substance, vitamin B_{12} is not absorbed in adequate amounts, and the disease "pernicious anemia" develops. Abnormalities affecting the spinal cord, peripheral nerves, and brain often are present, with or without anemia.

Vitamin B_{12} deficiency generally occurs because of the lack of an intrinsic factor in the stomach secretions. It may also occur, however, if anything interferes with the absorption of the vitamin from the small intestine, as may happen with tapeworm infestations, sprue, chronic diarrhea, and obstruction, blind loops, and short circuits of the intestinal tract. Diets devoid of or extremely low in animal protein may also be responsible for vitamin B_{12} deficiency, particularly in individuals who have intestinal abnormalities that interfere with the absorption of the vitamin. The vitamin is stored in the liver and it may take five to

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pantothenic acid

Pantothenic acid deficiency, produced experimentally in man, caused disturbances in the secretion of the adrenal hormones and in the nervous system. Pantothenic acid has also been found essential for the normal synthesis of adrenal hormones, as well as for many other fundamental processes. It has been reported that large amounts of pantothenic acid would improve the ability of young men to withstand the stress of exposure to cold.

Pantothenic acid is widely distributed in nature, having been found in all living things. The synthetic product is available commercially in two forms: calcium pantothenate and panthenol. Good food sources include liver, other organ meats, yeast, eggs, muscle meats, fresh deep green leafy vegetables, nuts, and whole grain cereals. The vitamin is reasonably stable in foods during long periods of storage provided that exposure to air and high temperatures is avoided. In usual cooking or baking procedures only relatively small amounts of pantothenic acid are lost.

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greater food intake, doesn't t
fact that he is growing rapid
and is so active indicate that
isn't lacking anything? No, not
all. There is probably no way
prove that his growth fell sho
of the mark it could have reache
What can be demonstrate
however, are such things as poo
musculature. Less obviousl
many of the aches and pains an
reduced effectiveness of middl
age have their origin at th
time.

pregnancy

Perhaps the most important ap
plication of the stress principl
is in pregnancy. The pregnan
woman must nourish both he
self and the fetus. Statistica
studies have shown that wome
whose diets were supplemente
with animal protein and vita
mins had less trouble in labo
developed fewer complications
had fewer stillbirths, miscar
riages, and premature birth
than did mothers with non-sup
plemented but otherwise ade
quate diets. The babies of the
supplemented group also showe
fewer congenital defects, and
during the first six months of life
were in much better health

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good nutrition. Unfortunately when they do get nutrition information, it often is from someone who doesn't really know himself; sometimes this information is from self-styled authorities with axes to grind.

One of the greatest obstacles to our getting enough vitamins lies in our eating habits and patterns. We usually eat the foods we are used to, without too much thought about their nutritional value. Often, we pass on to our children the same likes and dislikes we picked up from our parents. Our peculiar likes and dislikes may keep us from eating some foods, no matter how good they are for us. Liver is a veritable bonanza of vitamins; there are many people who cannot stand the sight of it. Most of us are quite fond of fresh fruit; there are those who practically never eat fruit. The list could be extended almost indefinitely: vegetables, eggs, cheese, milk, oysters, etc. Occasionally, finding an adequate substitute source for particular vitamins is difficult; making the effort to find a substitute may prove to be well worth while.

Food faddism can be of sev-

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