BULLETIN 54
OF THE
AGRICULTURAL EXTENSION SERVICE, THE OHIO STATE UNIVERSITY

VITAMINS

Prevent Disease
Build Strong Bodies

•

Increase Vitality
Protect Against Infection

Guinea pig with scurvy, caused by lack of vitamin C in the diet. (Compare with animal on right)

Guinea pig fed same diet as one on left *plus orange juice*, which furnished the essential vitamin C.

Fig. 1.—Children and adults react to a vitamin-rich diet much like guinea pigs.

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VITAMINS

How many vitamins exist?

At present, twelve vitamins are thoroughly established, and their exact chemical natures known. All but one of these vitamins are found in foods, as described in the list below. Several other vitamins also are known to occur in foods, but as yet these have not been isolated in pure form and tested for their biological effect on the human body. Eight of the twelve vitamins are manufactured synthetically. Vitamin concentrates and synthetic vitamins represent a major line of business in the modern drug store.

The Twelve Known Vitamins

Vitamin

A — and its parent substance, Carotene, the yellow pigment in green leaves, yellow vegetables, egg yolks, and butter.

B_1 or Thiamin — most abundant in whole-grain cereals, lean pork, egg yolks, liver, nuts, beans, and peas.

C or Ascorbic Acid — also called the Anti-scorbutic vitamin, most abundant in fresh fruits and vegetables.

D — the anti-rachitic vitamin, found abundantly in cod-liver oil, and in small amounts in egg yolks and butter.

E — the anti-sterility vitamin, most abundant in the germs of seeds and in leafy vegetables.

G or B_2 (Riboflavin) — a yellow substance found in milk, cheese, lean meat, liver, eggs, beans, and greens.

B_6 — an anti-dermatitis factor, found abundantly in egg yolk, lard, and vegetable oils.

Niacin — formerly called nicotinic acid, and also the pellagra-preventing vitamin, found most abundantly in liver, milk, eggs, and meat.

Pantothenic Acid, the anti-gray hair factor, found in egg yolk and beef, and less abundantly in many other foods.

K — the vitamin necessary for coagulation of blood, found abundantly in green leaves.

Biotin, formerly called vitamin H, a vitamin recently obtained from egg yolks and milk.

Choline, the vitamin concerned with fat transformations in the liver.

Vitamins Are Indispensable For Health

The idea that the function of food is to satisfy the consumer's taste has been replaced by the theory that the *composition* of food is more important than the taste if a healthy, vigorous life is to be lived. Therefore, it is unwise to choose only what we like, without thought of what is good for us.

A health-giving diet is one that is adequate in vitamins; all of the vitamins are growth and health promoting, but each one seems to do some specific work for the body (as explained on page 2).

The demonstration by food chemists that vitamins are very unequally distributed in seeds, fruits, vegetables, meat, milk, eggs, etc., shows the importance of a well selected diet in order to supply enough of all of the vitamins. Therefore:

Eat the Health-Protecting Foods That You Should

then

Eat What You Want!

A new kind of starvation, hidden hunger (also called malnutrition), has been added to the long-familiar famine type of starvation, now called "hollow-hunger." The victim of hidden hunger, although he may be eating his fill of appetizing food, falls prey to disease, brought on by a lack of some vitamin or other food component, because his diet is not well balanced by a proper selection of food types.

Fig. 2.—Malnutrition is more common than many people, especially mothers, would care to admit. Under-nourished children may eat large meals. But, they do not eat the right foods. This may be due to personal preferences. More often it is caused by poorly planned meals.

What Effects Do Vitamins Have?

Each vitamin has characteristic functions, so that definite disorders and diseases result from eating food too low in a particular vitamin.

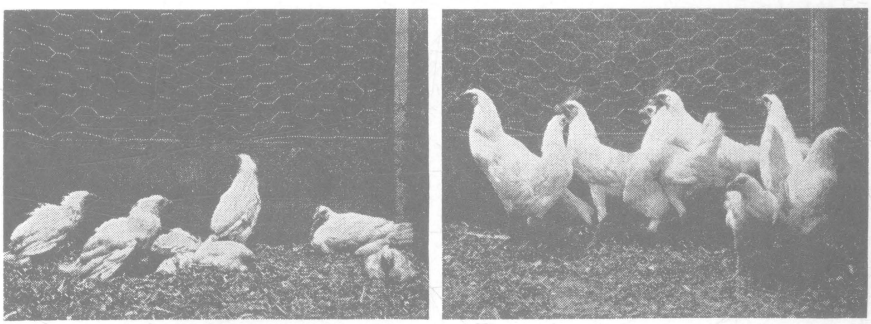
Several vitamins take an important part in the life processes by which the stored energy of the food is released to supply power for the production of muscular work and bodily heat.

Vitamins are necessary for normal growth and for the maintenance of structure and function of the body. For example:

Vitamin A deficiency is followed by changes in the epithelial membranes of the respiratory and digestive passages. A normal retina of the eye and sharp vision depends on a plentiful supply of Vitamin A in the diet.

Lack of G, or B_2 (riboflavin) leads to derangement of the cornea of the eye, with resulting poor eyesight.

Lack of Vitamin C brings on a softening of the material that holds the cells of the body together, which results in rupture of the walls of the small blood vessels and produces inflamed joints and sores somewhat like boils.



Vitamin D deficiency (rickets) is characterized by poor growth of bones, shown above.

Similar flock to that on left, fed same ration, *plus cod liver oil,* furnishing vitamin D.

Fig. 3.—Vitamin D helps to regulate the formation of bones in the young, and to maintain normal bony structure in adults.

Vitamin D takes part in the mineralization of bones. Its lack in infants leads to rickets.

Vitamin K is essential for normal blood clotting.

Pantothenic Acid, in addition to other functions, seems to be required to prevent the hair from turning gray.

Vitamin E affects the reproductive and muscular systems.

Meals For Health

Doctors and food chemists who have carefully studied the problem have concluded that one-fourth to one-third of the American people live on sub-standard diets, low in vitamin and mineral content. A health-giving diet, adequate in vitamins, should include for each day the following:

1. At least a pint of milk or its equivalent in cheese.
2. Leafy or green or yellow vegetables; one or more servings.
3. Citrus fruits, tomatoes, or other vitamin C foods; one or more servings.
4. Eggs, one daily; at least four a week.
5. Whole wheat bread or "enriched" bread; at least two servings daily.

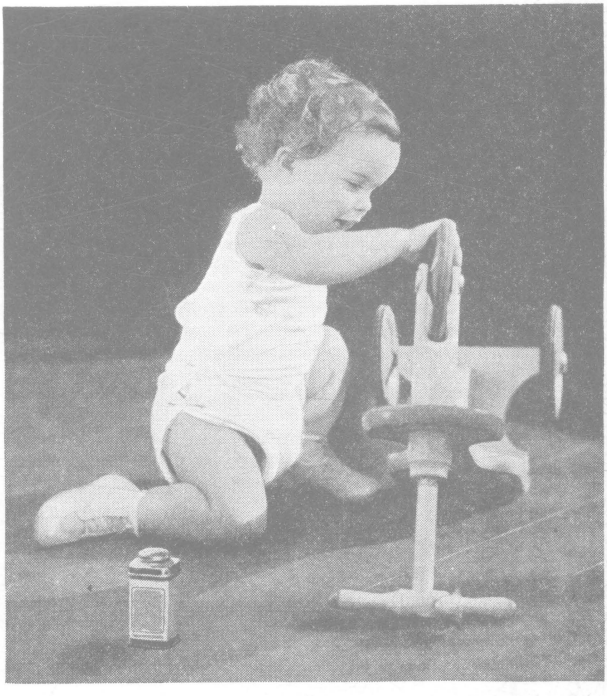


Fig. 4.—A healthy baby is happy and active.

6. Meat, fish, or poultry; at least once a day.
7. Potatoes; one or more servings daily.
8. In addition to the health-protecting foods listed in the first seven rules, other wholesome foods such as vegetables, fruits, cereals, fats, etc. should be used as desired.

If these eight rules for eating are observed, vitamins and other food factors will be plentifully supplied; and health, efficiency, and comfort will improve.

Daily Vitamin Requirements for Men, Women and Children

Exact vitamin requirements are unknown; but enough information has been gathered to make a foundation for practical recommendations.

The Committee on Foods and Nutrition of The National Research Council recommends:

Daily Vitamin Requirements

	Units of A	Units of B_1	Milligrams of C	Milligrams of Riboflavin	Milligrams of Niacin
For a 154-pound man:					
Moderately active .	5000	600	75	2.7	18
Very active.....	5000	766	75	3.3	23
Sedentary	5000	500	75	2.2	15
For a 123-pound woman:					
Moderately active	5000	500	70	2.2	15
Very active.....	5000	600	70	2.7	18
Sedentary	5000	400	70	1.8	12
Pregnancy (latter half)	6000	600	100	2.5	18
Lactation	8000	766	150	3.0	23
For children, daily:					
Under 1 year.....	1500	133	30	0.6	4
1 to 3 years.....	2000	200	35	0.9	6
4 to 6 years..... .	2500	266	50	1.2	8
7 to 9 years.....	3500	333	60	1.5	10
10 to 12 years....	4500	400	75	1.8	12
For children over 12:					
Girls, 13 to 15 years	5000	466	80	2 0	14
Girls, 16 to 20 years	5000	400	80	1.8	12
Boys, 13 to 15 years..	5000	533	90	2 4	16
Boys, 16 to 20 years	6000	666	100	3 0	20

Vitamins Supplied in One Day by the Foods Specifically Recommended for Health

Food	Units of A	Units of B_1	Milligrams of C	Milligrams of Riboflavin	Milligrams of Niacin
1 pint of milk.....	765	54	3	.84	1.0
1 cup spinach or greens.	8400	35	75	.35	1.2
1 Tomato	2000	26	27	.11	.6
1 Egg	500	25	0	.18	1.0
4 slices whole wheat bread	Trace	120	0	.12	3.0
8 oz. beef or meat equivalent ...	47	158	3	.74	9.0
8 oz. potatoes	60	100	25	.13	2.3
Total.	11212	489	133	2.47	18.1

Summary of Vitamin Requirements

The total vitamins supplied by the foods recommended by the Committee on Nutrition, as shown by the table on the preceding page, are nearly sufficient to meet the entire needs of most people. The remaining requirement must be supplied by other foods—such as other fruits, vegetables, cereals, etc.

Fig. 5.—Refrigeration insures the preservation of vitamin values in foods.

The importance of green leafy vegetables as a source of Vitamin A is indicated by the large amount of A in one serving of spinach. For example, a mother nursing a child requires 8000 units of vitamin A. This amount is somewhat over-supplied by one cup of spinach or greens.

Similarly, the table shows that Vitamin C comes mostly from fruit and vegetables.

Whole wheat bread, meat, and potatoes are major sources of B_1; while meat and milk are the principal sources of riboflavin.

Vitamins Lost in Cooking, Canning, and Storage

Some of the vitamins dissolve readily in water and thus may be removed from foods by soaking or cooking in water. To avoid this loss, soaking operations should be eliminated as far as possible and cooking water should be kept down to as small a quantity as is practicable. If the cooking water can be used in soups, gravies, etc., this lost vitamin can be reclaimed.

Some of the vitamins are rapidly destroyed by heat, particularly if exposed to the air at the same time, hence over-cooking and undue stirring should be avoided.

Most foods slowly lose vitamins on storage. This is particularly true of vitamin C in fresh fruits and vegetables. Acid foods retain vitamins in cooking better than neutral or akaline foods. Hence the addition of soda in cooking may lead to loss of vitamins.

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