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Why Are There So Many Vitamins Among The New Medicines In Japan?



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ABSTRACT

Vitamins are among the five major nutrients, along with carbohydrates, lipids, proteins, and minerals, and should be ingested through food. However, vitamin intake through only food may be inadequate, resulting in poor health and increased susceptibility to diseases. Vitamin preparations have been used to treat poor physical health and diseases, and in recent years, many medicines and supplements for preventing vitamin deficiency have been developed in Japan. They are intended to maintain and regulate the effects of vitamins as nutrients. However, vitamin preparations that claim to have new effects have recently been sold in Japan and other countries. Naturally, many medicines are being developed for the treatment of various diseases. However, why are vitamins used in most of them? In this paper, I introduce how vitamins are positioned and why such a phenomenon occurs in Japan.



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INTRODUCTION

Vitamins are one of the five major nutrients, along with carbohydrates, lipids, proteins, and minerals¹). Nutrients are ingredients contained in food that the human body cannot synthesize. However, nutrients are necessary for the functioning of the human body²). They can be ingested through food and are used for purposes such as energy production for growth and maintenance of the body. Therefore, vitamins should be ingested through food. Dietary intake of vitamins may be inadequate, resulting in poor physical condition and disease. Vitamin preparations have been used as medicines to treat ill health for a long time, and many medicines and supplements (a type of food) for prevention are available in Japan³).

Recently, new vitamin preparations have been sold in Japan and other countries⁴). When the medicinal effects of vitamins are explained in TV commercials, many effects seem to be unrelated to the vitamins that are advertised. In Japan, many medicines that have been commercially available in recent years often contain vitamins or vitamin preparations. We believe that this is peculiar. Many medicines are being developed for the treatment of various diseases. However, why are vitamins used in most of them? This paper introduces the position of vitamins in Japan and discusses why this phenomenon occurs. The conventionally known effects of vitamins are described, and new effects of vitamins that have been reported in recent years are listed. Finally, we provide the authors' opinions on why many of these new medicines are vitamins.

The original role of vitamins

Among the nutrients necessary for the human body, vitamins and minerals are required in smaller amounts than the three major nutrients (carbohydrates, lipids, and proteins). While tens to hundreds of grams of the three major nutrients are required per day, only 1 g or less (in approximately μg to mg of order) of vitamins is required¹). This is because the three major nutrients act as a direct raw material for generating the energy necessary for heat production and exercise, whereas vitamins contribute to the regulation of enzymatic reactions. Calcium, a mineral that is a component of bones, and iron, which is a component of red blood cells, are exceptions. As they are catalytically involved in many in vivo reactions, only small amounts may be required.

Many reports, such as books and our previous report, summarize the general and specific effects of vitamins^{1),3), and 5)}. The fundamental function of vitamins is to catalyze the necessary

reactions in the body, thereby maintaining a healthy state. Moreover, vitamins also enhance wound healing and accelerate recovery from illnesses. Rather than having a special effect, the general idea is that vitamins contribute to the regulation of physiological processes so that abnormalities do not occur and allow the body to return to a normal state when irregularities occur. The amount that provides the effect is rarely regulated in multiple ways, including the amount produced, the amount secreted, and competitive reaction with components that contribute to the reverse reaction, as with biological components; the amount of the substance in the body depends on food intake. As vitamins are excreted with time after ingestion, an abnormal state may develop (deficiency or excess compared to the necessary amount) depending on the amount and quality of food and time of intake. Vitamin preparations (medicines) and supplements (healthy foods) are necessary to compensate for insufficient dietary intake⁴). In modern Japan, large amounts of food are readily available; therefore, food shortages are unlikely to occur. Depending on the daily schedule, the maintenance of food intake and irregular meal times may lead to abnormal conditions.

Examples of new vitamins released in recent years

Table 1 summarizes the effects of vitamins other than those previously reported. Table 2 displays examples of vitamin-rich pharmaceutical preparations currently available in the Japanese market. As summarized in Table 1, vitamins C and E have long been known to have antioxidant effects; however, vitamin A has recently been discovered to have an indirect antioxidant effect (by preventing the oxidation of vitamin C)^{5),6)}. In addition, many vitamins prevent hyperlipidemia by lowering cholesterol levels. This may be because many patients have obesity and hyperlipidemia in Japan, which may be an underlying factor in the development and efficacy of labeling. The fatigue recovery effect, improvement of immune function, anti-stress effect, attenuation of allergy action, and improvement of blood flow effect were also recognized. However, we were unable to investigate the effectiveness, and the vitamin may only have a small effect or the same effect as conventionally used medicines. This is because vitamin preparations are generally used for prevention rather than for treatment. Hence, vitamins are unlikely to have a sufficiently strong effect if temporarily used for treatment.

Table 2 demonstrates examples of actual medicines that contain many vitamins. Some medicines are believed to have disease-preventive effects such as recovery from fatigue, whereas others are medicines claiming beautifying effects such as smoothening rough skin

and skin whitening⁴⁾. Furthermore, some medicines are believed to have anti-stress effects. Only a few examples are listed here, however, medicines also have various other effects. In recent years, rejuvenating, beautifying (including pigmentation suppression and whitening), and antioxidant (including oxidative stress) effects are often advertised⁴⁾. Further, new effects may be reported in the future.

Among the aforementioned effects, those claiming recovery from fatigue, prevention of stomatitis, and improvement of blood flow are new expressions that did not exist in the past; however, they only pinpoint the part of the original effects of vitamins. Recovery from fatigue is possible if the production of energy progresses through the catalytic action of vitamins, and stomatitis can be treated by reducing skin diseases and infections. Improving blood flow involves recovering from an unhealthy state where blood flow is poor. Rough skin and whitening are not considered unhealthy conditions but are new effects related to beauty. Vitamin intake may also be associated with improved immunity. For anti-stress, it is believed that this has been recognized and is appealing as a new effect of the vitamins due to the problem of mental illness in modern society, including Japan and other countries.

However, it is also possible that vitamins act only in an auxiliary manner and are not responsible for the main actions of medicines. Vitamins undeniably promote the excretion and decomposition of many components of herbal medicines, thereby reducing their side effects. For example, Yokuinin (coix seed) is an ingredient in Chinese medicine that is believed to promote skin renewal and improve skin diseases, and vitamins may contribute slightly to the regeneration of skin cells.

Why vitamins now?

Why are many of the new medicines available in Japan vitamins? We believe that the main reason for this is that vitamins are originally present in large amounts in foods and their toxicity is rarely recognized. When people consume food, they do not have to worry about side effects and limit the amount; therefore, they do not have to worry about toxicity, apart from the effectiveness of the vitamins. Moreover, vitamin preparations have a long history of being marketed as medicines. As they are also supplied as supplements, enough information is available about the safety of vitamins, and we believe that there are almost no unexpected adverse side effects³⁾. Even if side effects occur, the extent of their actions and countermeasures have already been established.

However, based on this, I wonder if the consumption of vitamins as medicines or supplements rather than as food is necessary. Furthermore, vitamin supplementation can be achieved with a proper meal^(3),7). This also raises questions regarding whether conventional vitamin preparations are sufficient. In some countries, including Japan, people rarely consider using vitamins to treat diseases, and there is a tendency to increase the regular use of supplements, which are healthy foods, because of dietary imbalance. In the medical industry, the objective is to acquire new customers, and recently, there has been an increase in TV commercials advertising vitamins under the guise of disease prevention. Against this background, and taking advantage of consumers' lack of medical knowledge, it may be that people are trying to promote sales by appealing to the new effects of vitamins.

CONCLUSION

Vitamins are essential nutrients and are necessary for maintaining good health. In addition, vitamins should originally be obtained from food. However, excessive or insufficient intake can cause various diseases. Vitamin preparations and supplements are considered effective for treatment or prevention, and if a mild effect such as disease prevention is desired, vitamin obtained through food intake is preferable. When consuming vitamins as supplements or medicines, it is easy to take them casually. Therefore, caution to prevent the emergence of pathological conditions due to excessive intake is necessary. As diseases resulting from excess consumption of vitamins are mainly recognized for fat-soluble vitamins¹⁾.

Vitamin preparations claiming different benefits seem strange. Prescribed vitamins should not have unwanted effects, nor are they likely to interact within one product. However, claiming new efficacy for existing medicines does not lead to significant profit from medicine sales. Possibly, this is done to differentiate new medicines from others when they are introduced to the market. In addition, there may be differences in what is emphasized and appealed to among the many pieces of information obtained from clinical trials (in response to humans). Although medicines containing vitamins have various effects, it is conceivable that the effects that appeal may change to ensure that more of these medicines are used. One perspective is that this deceives consumers with limited scientific knowledge. As knowing the effects of each vitamin is difficult, care should be taken to avoid excessive intake and prevent overdose.

Vitamins can be obtained from food intake. If people have adequate vitamin intake from food, they cannot usually consume an extremely large amount, and will not overdose. Supplements and vitamin preparations are convenient for improving deficiencies, however, it is advisable to reconsider whether it is better to take vitamins using these.

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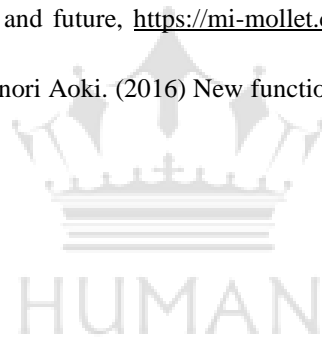


Table 1 New, recently reported effects of vitamins

Types of vitamins	Main effects	Side effects
Vitamin A (Retinol, Carotinol)	Antioxidant action (suppresses the oxidation of vitamin C) Eye health (prevents vision loss)	Strengthens skin immunity For external use as an aid in the treatment of acne, wrinkles, and skin ulcers Helps in the treatment of eye disorders
Vitamin B ₁ (Thiamine)	Stabilization and improvement of the mental state Normalization of muscle and heart function	Relieves postoperative pain Helps in the treatment of shingles Prevents motion sickness
Vitamin B ₂ (Riboflavin)		Aids in reproduction Improves eyesight and reduces eye strain
Vitamin B ₆ (Pyridoxine, Pyridoxal)		Strengthens the immune system
Vitamin B ₁₂ (Cobalamin)	Calms the nerves, improves concentration and memory	Prevents neuropathy and maintains neurological health Promotes growth and increases appetite Reduces cancer risk from smoking
Niacin (Niacinamide, Nicotinic acid)	Reduces cholesterol and triglyceride levels Improves blood circulation and lowers blood pressure Helps in the decomposition of alcohol	Prevents and relieves migraines Prevents ulcers, relieves diarrhea
Pantothenic acid (Panthenol, Vitamin B ₅)	Creates antibodies to increase anti-infectivity Lowers cholesterol and triglyceride levels	Hastens wound healing Reduces side effects and toxicity of antibiotics Fatigue prevention, relief of joint pain, relief of allergy symptoms
Folic acid (Pteroyl glutamic acid)	Sedative effect	Prevents abnormal births and improves breast milk production Protects against parasites and food poisoning Prevents oral ulcers
Biotin (Vitamin H, Vitamin B ₇)		Aids in the prevention and treatment of baldness Relieves symptoms of eczema and dermatitis
Vitamin C (Ascorbic acid, Cetitanic acid)	Accelerates wound healing and improves the firmness of the skin Strengthens and softens blood vessel walls Lowers blood pressure Maintains the youthfulness of cells and prolongs cell life Lowers blood cholesterol levels	Boosts immunity and protects cells from carcinogens Prevents blood clots in veins Weakens the effects of allergens Inhibits melanin production and prevents pigmentation Promotes synthesis of adrenocortical hormones and enhances anti-stress effects Prevents colds and diseases, improves resistance to infectious diseases
Vitamin D (Calciferol, Bioosterol, Ergosterol)	Helps in the treatment of conjunctivitis	Helps in the absorption of vitamin A
Vitamin E (Tocopherol)	Works with vitamin A to protect the lungs from environmental pollutants Prevents oxidation of bad cholesterol; prevents and dissolves blood clots	Aids in maintaining normal vascular circulation (reducing the risk of ischemic heart disease and stroke) Maintains liver function Maintains healthy teeth Slows down body oxidation and reduces fatigue Increases oxygen supply to the brain and cells and improves endurance Accelerates wound healing and prevents deep scarring Helps in maintaining cognitive function (reducing the risk of Alzheimer's disease)

Based on references 1), 2), 5), 6), 8)

Table 2 Preparations containing vitamins

Prescription	Effect of medicine	Ingredients	Effects
1	Fatigue recovery	Fursultiamine hydrochloride, pyridoxine hydrochloride, cyanocobalamin, vitamin E calcium succinate, calcium pantothenate, γ -oryzanol, etc.	For those with symptoms such as eye and body fatigue, stiff shoulders, back pain, and muscle pain
2		Vitamin B ₁ derivative, vitamin B ₆ , vitamin B ₁₂ , γ -oryzanol, vitamin E derivative, nicotinamide, calcium pantothenate	Relieves muscle pain It works for stiff shoulders and numbness in the hands and feet.
3		Fursultiamine hydrochloride, pyridoxine hydrochloride, cyanocobalamin, vitamin E succinate calcium, etc.	It acts on blood flow, nerves, and muscles. Relieves symptoms such as headaches caused by blurred vision and eye fatigue
4		Fursultiamine, calcium tocopherol succinate, pyridoxine hydrochloride, nicotinamide, γ -oryzanol, etc.	Effective for numbness in the limbs and joint pain Alleviates neuralgia Effective for stiff shoulders and eye strain It is also recommended as a vitamin supplement for tiredness or when physical strength is declining during or after an illness.
5	Treatment and prevention of stomatitis	Vitamin B ₂ , vitamin B ₆ , vitamin C, nicotinamide	It works from inside the body to improve rough skin, acne, and stomatitis.
6		Vitamin B ₂ , vitamin B ₆ , calcium pantothenate, γ -oryzanol, thiamine nitrate, nicotinamide	Relieves rough skin, acne, stomatitis, and tiredness
7		Vitamin B ₂ , vitamin B ₆ , nicotinamide, biotin, ascorbic acid, Yokuinin (coix seed) extract	In addition to stomatitis and acne, it is effective for symptoms such as bloodshot eyes and itching. A combination of ingredients that are good for enhancing beauty
8	Anti-stress	Vitamin B ₁ , vitamin B ₂ , vitamin B ₆ , vitamin E, Tochu (Eucommia ulmoides) extract, Shakuyaku (peony) extract, Ezoukogi (Siberian ginseng) extract	Anti-stress action It is effective for symptoms such as physical fatigue, anorexia, and malnutrition.
9	Prevention of rough skin	Vitamin B ₂ , vitamin B ₆ , vitamin B ₁ nitrate, nicotinamide, calcium pantothenate	It can be used for a wide range of mucous membranes and skin problems (including acne).
10		Kikyuu (bellflower), Senkyu (cnidium, rhizome), Daiou (rhubarb), Ougon (scutellaria root), Touki (Angelica keiskei), Botanpi (moutan cortex), Yokuinin, Keihi (cinnamon), Keigai (schizonepeta spike), Rengyo (forsythia), Sankirai (smilacis rhizoma), Nindo (Lonicera japonica), nicotinamide, vitamin C/D, methionine, calcium pantothenate,	While promoting the excretion of waste products and pus from the body, it replenishes the ingredients necessary for the skin. Improves blood flow to skin capillaries and supports skin renewal

		calcium lactate hydrate	
11		Vitamin B ₂ , vitamin B ₆ , vitamin C, Yokuinin	Relieves symptoms of acne and rough skin
12	Whitening	Vitamin C, calcium pantothenate, L-cysteine	Effective against hyperpigmentation such as age spots, freckles, sunburn, acne, eczema, hives, rashes, drug addiction, general malaise, and hangovers

Based on reference 4)

Underlined parts are vitamin compounds

