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Reevaluating Dietary Interventions for Health and Longevity: Beyond Low-Carb Diets and Exploring Phyton-Chemicals

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Abstract

This article explores the complexities of dietary interventions for combating obesity and metabolic disorders, moving beyond the traditional focus on carbohydrate restriction. Acknowledging the diverse sources of glucose production from various foods, it reexamines the role of diet in health and longevity from a broader perspective. The manuscript delves into the multifaceted nature of food addiction, insulin response challenges, and the potential harms and benefits of plant-based components. Specifically, it introduces the concept of 'Phyton-Chemicals,' a term coined to encompass both phytoncides and phyto-chemicals, honoring Tokin's extensive work in this field. This exploration offers innovative dietary suggestions, such as using alternative flours and seaweed noodles, while integrating phytoncide therapy for holistic well-being. The article seeks to stimulate expert discussion and clarification on these topics, aiming to refine dietary advice for better health outcomes.

Keywords: Dietary interventions, Insulin response, Longevity, Metabolic disorders, Phyton-chemicals.

1. Escaping from obesity

The obesity problem is very serious, and people will become more short-lived or will live in agony, as is discussed in [Li *et al.* (2023)]. Only recently have we become aware of a way out from short life.

There were some incorrect ideas in our world and also in our papers, too. We thought traditional medicine is for longevity, but it is totally wrong. It is a medicine against infections for short-lived people. This can be immediately recognized by the fact that there is no treatment of metabolic syndromes, including diabetes. It is true that trad. medicine is the best medicine compared with the Western one. Secondly and more seriously, we believed in the dogma that food is for energy and therefore if you take more food than is necessary, you get obese. This is the 19th century dogma and cannot apply to the situation where there are many people suffering from obesity, etc. The fact is that taken-in food is not only for energy but also for building up our body (*It may vary from person to person, but we would like to know an approximate ratio of food material spent on energy and building components. Clarification will be appreciated*). The traditional medication

treats diabetes by restricting calories (less food and less fatty acids) and more low-calorie (believed to be healthy) grains and exercises. There was no improvement in most cases and patients got worse. **Every time one eats heated starch or sugar, the blood sugar level goes up—insulin spike—and the blood vessels are in danger for 2 hrs. (after insulin is secreted).** Then insulin breaks down glucose (sugar) into fat, which is absorbed by vowels and kept as fat, resulting in obesity. To avoid such an insulin spike, the only way is not to eat (heated) grains. But this is almost impossible as we live on cooked rice, bread, flour products, noodles, etc. The book we've been analyzing [Natsui (2017)] suggests the way of changing food. Although the author recommends **protein, animal fats, leafy vegetables, sea vegetables, mushrooms**, it is extremely hard to keep this type of food as one would feel very hungry. Here there is a chance for the company to save people. The author does not consider the GC index, i.e., food which increases blood sugar but more mildly than ordinary heated starch. As intermediate products, obese people can eat such food products, like instantaneous noodles made of vermicelli (of sea food origin) with meat, fish, etc. And when they get used to the way, they can slowly decrease the amount of grains. Plus, instead of natural sugar, one can try artificial ones. We need to elaborate this in a more detailed way, but this is a practical way of getting health back damaged by high blood glucose levels and the resulting obesity, metabolic syndromes. Res. on TCM has nothing to do with longevity. Only the philosophy is adopted, i.e., not to get ill.

2. Ancient Chinese and Indian medication is that of natural anti-biotics

It has been a long time since Traditional Chinese Medicine (TCM) and Traditional Indian medicine (Ayurvedic) have been targeted as the rich source of potential pharmacological substances. But why are they so effective? The principle we claim is that they are medicine of natural antibiotics in the sense that they use an enormous amount of medical resources of plant origin, sometimes of animal origin in the case of TCM. The reason is that these are medicines for people who had short lives, and as evidence, there is no treatment of metabolic syndromes. On the other hand, they have a lot of the most effective medicine against infection. Since Ayurvedic medicine contains aroma-therapy, it seems more akin to Phyton-chemicals. But there is a lack of material, and we would like to know any relevant references.

3. Strategy of plants

Plants produce energy by photosynthesis and store part of it in their roots as**insoluble starch** for the case where there is no light, as in the night. The starch stored in the roots of plants is ***β*-starch**, which animals cannot digest as it is. When humans came to know that **heated starch** tastes sweet and therefore is edible, they started eating root vegetables. This is quite unexpected by plants. They prepared a lot of weapons—phytoncides, resp. alkaloids to inhibit micro-organisms, resp. insects, which work as poison to smaller size creatures, but they often work as stimulants to bigger size creatures. Here's the size-matching problem. It turns out that substances that cause dependence are all of plant origin: opium (morphine, heroin) cocaine nicotine glucidics caffeine This is persuasive enough that we must cope with phyton-chemicals on recalling that the first item, morphine, worked so effectively as **anesthesia**, without which a surgical operation couldn't have been done.

4. Why those substances cause dependence?

The reason why such substances cause dependence probably depends on the hereditary reasons. Multi-cell creatures must have suffered from bacteria which produce **nerve-system disrupting substances** which go through the cell membranes of neurotransmission substances to reach nerve systems to disrupt them. What is most serious was that there is no way to detoxify such substances, and many species must have extinguished unless they could manage to inhibit them. A plausible theory is that those creatures whose dopamine-producing nerves can deal with such nerve-system disrupting substances could survive. The problem occurred with humans since the A10 nerves, which take on the disrupting substances, are synapse-connected to the brain reward system. Around 12,000 years ago, when ancestors ate heated acorns, they found them sweet and adopted them as food. This is because their criteria for edible food was to avoid a bitter (which could be poisonous as an alkaloid) and sour (rotten food) taste. But the criterion was for natural food material, not artificial food like heated starch. With this discovery, the ancestors started eating heated starch. Then they found more productive plants—wheat—and started agriculture. Before that event, there was never a chance of having high blood glucose as there is very little glucose in nature. After eating heated starch, what happened was the insulin spike, a sudden high rise of blood glucose which is one of the nerve-system disrupting substances, and A10 nerves secrete a lot of dopamine according to their roles. But insulin was not designed to detoxify glucose but to store it as triglyceride in adipocytes, resulting in obesity. But as stated above, A10 nerves are connected with the brain reward system and they stimulate it to produce feelings of happiness and satisfaction, causing the reason for dependence.

5. Analysis of the functions of insulin

In the body, there are a few antagonizing hormones against any hormone, save for insulin. E.g., regarding protein, there are a few antagonizing hormones, synthesizing ones and break-down ones. But there is no antagonizing hormone against insulin, although there are 5 hormones against a low blood glucose level. When the brain detects the blood glucose level, it sends signals to the following 4 organs to secrete respective hormones. 1. The adrenal glands secrete cortisol and adrenaline 2. The pancreas secretes glucagon 3. The thyroid secretes the thyroid hormone 4. The pituitary gland (hypophysis) secretes the growth hormone. This fact implies that in the process of the development of the bodies of creatures, there was almost no possibility of a high blood glucose level because there used to be almost no chance to get glucidics. As mentioned above, it was only 12,000 years ago when humans started eating heated starch that this unusual event started occurring. The bodies of ours and domesticated animals can become diabetic. The body system does not recognize glucose as toxins. For otherwise, the liver will take it in and detoxify. One illustrating example is the case of fructose. When fructose is taken in, it is the liver that catches it and detoxifies it so that it does not go into the blood vessels. Thus, if there is something wrong with the function of the pancreas, there will be a serious situation as *insulin is the only hormone that can reduce the blood glucose*. But it is known that it takes insulin 2 hrs. to reduce the blood glucose. It is to make clear why it takes so much time, with the blood vessels being under serious oxidation stress,

producing AGF.

6. Some concrete advices to practice glucidics restriction

To practice the restriction of glucidics seems to be hard since one must reduce the amount of carbohydrate, which is ubiquitous; in almost every food material, this is contained. It seems the worst combination is lipids and glucidics. We now explain this. Lipids themselves cannot be absorbed over the set-up limit, and they do not contribute to obesity. But if you take in lipids and glucidics together, then the following process is induced. When the brain (hypothalamus) detects a high blood glucose level, it sends a signal to the pancreas to secrete insulin. Then insulin promotes the storage of triglyceride in adipocytes, which decreases the amount of free fatty acids in the blood. Then the absorption of lipids through the membranes of the small intestine increases. *This part is not clear as it takes 2 hrs. for insulin to break down glucidics into neutral lipids. Clarification will be appreciated.*

What SUDA could do is to produce a substitute for flour in batter. E.g., soybean powder may be a possible candidate. In the same vein, the company can produce a substitute for noodles made of flour, e.g., by sea-weed material. Or as the second best, use material with a low GC index as a medium toward strict restriction of glucidics. Here's a problem to be solved. *Does a low GC index food material give a less bad effect on blood vessels? Or do they have only the effect to give a less insulin stress? Clarification will be appreciated.* **SUDA batter for fried food**. This is made from soybean powder which is made from dried soybeans after soaking them in water to remove most of the lectin and purine. It is almost free of glucidics, lectin, and purine, so that it is best recommended for glucidics restriction. The daily limit of purine is 400 mg. Dried soybeans: 173 mg /100g, rather much (over 200mg is much) Bean curd: 30 mg /100g, rather little (below 50mg is little) Soy sauce: 45 mg /100g, rather little Green soybeans: 48 mg /100g, rather little Okara (Soy pulp): 49 mg /100g, rather little Fermented soybeans: 114 mg /100g, rather much Peanuts: 49 mg /100g, rather little There is one more problem of isoflavone which has a similar effect as estrogen (female hormone), but the effect is known to be 1/1000 times. *We need to find more numerical evidence for safety and the limit of isoflavone. Clarification will be appreciated.* Maybe to replace grains by soybeans only is not so easy. Cf. §7.

7. Evolutionary strategies of plants. Passive protection of seeds and eggs

The ultimate objective of all living creatures on the earth is to let their species survive as off-springs. They are therefore particularly careful to protect their eggs (oviparous animals) and seeds or buds (plants). It is well-known and studied that animals have their own weapons to protect them against their predators. Plants, on the other hand, cannot move from their own living places and developed their own revolutionary strategies. The principle is that vegetables don't want to be eaten while fruits want to be eaten (so that the eaters will carry their seeds to far places). As is known by a phrase, "as cool as a cucumber", it is thought that cucumbers cool bowels, thus loose bowels but it turns out that it is oxalic acid which causes loose bowels. Oxalic acid is a common protector of many vegetables. One of the strong points of Chinese Cuisine (CC) is that all vegetables are (lightly-) boiled, which removes oxalic acid. Other vegetables developed more serious plant

toxin, which we illustrate by examples. Example 1. Beans. As has been discussed in [Li *et al.* (2023)] and [Li *et al.* (2023)], these are essential food material for keeping health and some of them are miraculous including black beans, kidney beans, lentil beans, soy beans. The toxin contained is **lectin**, which has the effect of coagulating blood and yielding symptoms of food poisoning—digestion disorder, vomiting, diarrhea, etc. This is because beans are seeds and they contain lectin to protect seeds. Humans spent a long time to invent the method of removing lectin by boiling beans for a long time with at least three times of change of water. Example 2. Sprout vegetables and buds of plants. Broccoli is one of the most recommended vegetables for many purposes. There is a warning against eating young ones since they contain alkaloid, which is toxic to humans. But then whether eating ripe broccoli is totally safe is questionable. Plant buds contain a lot of **nucleoprotein**s (**purine**-$C_5N_4H_4$), which are nutrients for the growth of buds to become the plants. When purine is in-taken, it is metabolized in the body to become uric acid. *The uric acids that are produced by disintegration of a portion of genes get crystalized to produce uric acid stones, yielding gout*. The nutrition—nucleoproteins—are the main source of growth and are full of nutrition, which is why sprout vegetables are recommended. But this negative side is to be noted since there are many other food material which contain purines. Malts are typical plants that contain a lot of purine. It is warned that drinking too much beer may result in gout. Although beans are rare vegetable food that is recommended for restriction of glucidics, they are seeds of plants and it is to be made clear if there is purine remaining in cooked beans. Broccoli and beer are prohibited food for restriction of glucidics and so if beans are also prohibited, there will be much smaller choice. Young bean stalks may have less purine since they are somewhat grown by spending nulceo-proteins. Eggs are another source of nutrition, containing a lot of purines. We discuss this in the next example. Example 3. Eggs. For predators it is the easiest to eat eggs rather than catching a prey and kill it. To protect their species, oviparous animals built purines in their eggs. Caviars, salmon roes, birds' eggs are typical examples of food material which is not to be taken too much. Here's again conflicting situations arising.

Since the recommended food is animal meat, fish meat and animal fat, it is not clear if eggs are eatable or not. But from the point of view of purines, eggs are not recommended to eat too much. Some authors are rather right in many common points, e.g., taking enough protein (Natsui, Wada). Weil is against taking too much protein since it gives more burden on the liver and kidneys which are responsible for immune system. Weil also warns that animal meat lying at the top of food chain, it can be heavily polluted, thus implying that only the rich can survive eating safe animal meat.

8. Phytoncides as anti-biotic produced by plants

Hitherto, we have discussed about obesity caused by heated starch of plants. We now turn to some effective therapies and nutrients for self-healing in terms of active protection of plants. First we state the present understanding of phytoncides and phyto-chemicals. For self-protection and inhibition of harmful entities, *all plants* including lower plants (bacteria, fungi etc.), flowering plants and trees, produce chemical compounds which inhibit competitive plants and resist against plant viri, bacteria, fungi infections (pathogens) and also avoid consumption by insects and other animals (predators). Indeed, this is the original definition of phytoncides by Tokin [Tokin and Kamiyama (1980)], see below. The chemical compounds are called **phytochemical**s. At present, phytochemicals are mainly regarded as a source of various

vitamins and antioxidant resources and are restricted to fruits and vegetables, cf. [Li *et al.* (2023)]. Thus they may be called passive protectors, which humas can make good use of.

On the other hand, higher plants, trees, produce phytochemicals which are antibacterial substances called **phytoncide**s. *Phytoncides are antimicrobial allelochemic volatile organic compounds derived from plants as active protectors* However, in the original theory [Tokin and Kamiyama (1980)], phytoncides cover a much larger area including allelopathy and natural antibiotics. It is written that phytoncide cannot be called antibiotics since it is material for producing antibiotics, [Tokin and Kamiyama (1980), p. 27]. But it is better to widen the meaning to include natural antibiotics since we treat all the toxic as well as beneficial products of plants and it is inevitable to introduce a new term to include all these. We refer to chemical compounds containing both phytoncides and phytochemicals as **phytonchemical**s. A typical example is the penicillin, which is extracted from natural antibiotics produced by aromatic penicillium (fungus penicillium) belonging to fungus genus. Lower plants category contain bacteria, fungus, lichen, algae, etc. Fungus genus involves koji mold (Aspergillus spp.), yeast (Saccharomyces cerevisiae), blue mold (Penicillium spp.), and various fungi: Shiitake (Lentinula edodes) Enoki-dake (Flammulina velutipes), shimeji(Lyophyllum shimeji)

9. Phytoncide therapy and Kneipp therapy

The word “phyton-cide” means “exterminated by the plant” and was coined by Boris Tokin, Leningrad Univ. in 1928. Some trees give off volatile and very active substances that help to prevent them from rotting or being eaten by some insects and animals. More than 5,000 volatile substances defend plants that protect them from bacteria, fungi, and insects. Phytoncides work by inhibiting or preventing the growth of the attacking organism.

Mainly in areas where there are *coniferous forest*s, people know very well about “(walking in the) forest therapy.” Germany, Japan, Russia are typical examples. This is because in the coniferous forest there are many trees which give off high purity of phytoncides. Sakhalin fir, Japanese cypress mainly contains α-pinene, Japanese red pine contains α-pinene and α-terpinene.

According to WHO standards, air-pollutants are: Particulate matters PM, carbon monoxide CO, ozone O_3, nitrogen dioxide NO_2, Sulphur dioxide SO_2.

Of these, majority is NO_2 which is generated by burning things. When it is exposed to the sunlight (UV), it is changed into PM2.5, which can be carcinogenic. NO_2 is oxidative and if it attaches the bark, the tree would be oxidized. To avoid this, some trees emit phytoncides. When NO_2 molecules floating in the air are attached by phytoncide, they’ll become a larger particle and fall down to the earth (precipitation effect). Then NO_2 is biodegraded and become nitrogen compounds and can be used as fertilizer of the forest. It seems that other dangerous particles like active oxygen are treated in the same way.

This is the main function of phytoncide from the tree side. It has many other functions quite useful to humans: antioxidant effect, stress reduction effect, reduction effect of allergic reaction against pollen source. We suspect that many of them

are caused by the healing effect of phytoncides since they work inhibiting or preventing the growth of the attacking organism. For bigger organism as humans, this works as relaxing their tension. We have too few material. The only book, save for [Tokin and Kamiyama (1980)], we found is [Metlitskii and Ozeretskovskaya (1968)], which is for agricultural purpose. More substantial books are expected.

This section is not finished and will be completed soon. References include [Borukh (1974)], [Jung (1964)], [Li*et al.* (2006)], [Li *et al.* (2008)], [Li *et al.* (2009)], [Muller (1956)], etc.

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