Letter to the Editor

When Was B1, the First Vitamin, Discovered?:
An Alternative Perspective

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Dear Editor:

The title question has been answered repeatedly by many historians (1). Among the most well-known stories are Takaki’s experiments on the Japanese Navy and Eijkman’s experiments with chickens. In addition, several follow-up studies have been performed by Suzuki, Funk, Hopkins, and others. These studies are all widely known and, as such, this article is not intended to provide a review of the aforementioned research. Instead, this article presents an alternative answer to the title question—a concept that has eluded widespread study but still may be worth noting.

In the 1890s, Eijkman found that rice bran contained something vital: a vitamin, which later became known as thiamin or vitamin B1. Before that, an epidemic of beriberi (vitamin B1 deficiency) had led to many lives being lost—particularly in Asia, where polished rice was consumed as a staple food (2). However, rice bran was known, apparently, to be vital for a couple of thousand years prior to Eijkman’s research. Although this sounds implausible, the meaning of the Chinese character (or kanji) shown in Fig. 1 indicates that this is still possible.

Like English words, Chinese kanji are composed of parts—typically, a hen and a tsukuri. The hen is the left side of the character, and the tsukuri is the right side. In the kanji for rice bran (Fig. 1), the hen (米) means “rice” and the tsukuri (糠) means “health”. The tsukuri 糠 is often used as an independent character, meaning the same thing: health. In fact, the origin of 康 is found in the shape of the milling or polishing equipment used on brown rice—the 糠 has the shape of a stamp mill and the short, dash-like lines beneath represent the bran. The original character that was used around 1500 BC (Fig. 2) shows the shape of the bran more clearly. The kanji 糠 is derived from 康, the original meaning of 康 being bran (3–8).

Another intriguing kanji is 米. The hen (米) means “rice” (the same as in Fig. 1), but the tsukuri (粻) means “white”. The meaning of the whole character is “lees”. Now, it might seem obvious that this “white” would indicate white rice or polished rice, which is nutritionally defective causing beriberi. However, the white actually indicates the lees from sake (3, 9). Sake, often called rice wine, is made from rice, and the sake lees are grayish white.

When thinking about the kanji for rice bran (糠), we might be tempted to think that it is not bran that produces a healthy body, but that a healthy body produces bran through milling work, which requires health and vigor. This reasoning is possible, but there are numerous other types of work or activity, like running and plowing, which require a healthy physique. With this in mind, one might wonder why the milling of rice would be associated uniquely with health. There is no etymological evidence to justify the origins of kanji because there are no written records regarding the development of kanji. As a result, the necessary reverse analysis inevitably involves a lot of speculation, ultimately leading only to the most plausible explanation, rather than in fact. Considering the alternative explanations presented here, it is much more logical to assume that bran is depicted as producing health, rather than health producing bran.

Another argument can be made based on the distinction between bran and hull. “Hull” (also known as “husk” or “chaff”) is occasionally called 糠殻 or “coarse bran”. If the dotted lines present in 米 can be said to indicate hull rather than bran, then the whole epistemic enterprise loses its basis, since the hull does not produce health. An extensive literature review, however, shows that “bran” is the most common interpretation for the dotted lines, as 糠 indicates “bran” in both Japanese and Chinese (3, 8). In fact, “hull” is expressed using different characters in both languages, being written as 糠殻 or 糠 in Japanese, and 糠壳 or 米 in Chinese.

Yet another interpretation of 康 needs to be considered. As a logographic symbol, 康 indicates milling in progress, which can be construed as representing an abundant harvest (i.e., a large quantity of food), which would leave the people free from hunger and malnutrition. Therefore, the milling symbol can be interpreted as meaning health. This reasoning explains the definition of 康 well, but is not so appropriate where 米 is concerned, as the meaning of the latter is “bran” rather than “food” or “rice”. As such, this interpretation seems untenable.

Another rather paradoxical argument can also be made. The characters 米 and 康 may indicate that the milling of rice (i.e., removing the bran) produces health; namely, that brown rice and bran are unhealthy. This reasoning seems contradictory since polished rice causes beriberi. However, it is also true that brown rice and bran contain unhealthy components, notably, phytates, which can cause malabsorption of minerals like calcium and zinc. This reasoning, however, is questionable because mineral deficiency, including rickets, was unheard of in ancient Asia. polished rice (surface) and bran are also susceptible to lipid oxidation and mold spoilage, causing an unpleasant odor. The washing of rice might have become common in order to remove...
these effects—but the effects themselves are not associated with any serious illness. Thus, such an argument can be considered irrelevant.

There is still a further question regarding the origin of 康. Was beriberi common when this character was created? If bran was recognized as the source of a healthy body in that era, then beriberi should also have been present, if not prevalent. McDowell (10) provides significant evidence that this was, indeed, the case: in brief, the oldest Chinese medical book, Nei-Ching, written in 2697 BC, describes the existence of beriberi in Southern China, where polished rice formed the major part of the diet. In those early days, various medical prescriptions were given for the condition and, surprisingly, they included thiamin-rich food, such as millet bran, various seeds, and even rice polishings (rice bran). Despite this knowledge, beriberi persisted in subsequent periods, being known by various different names, mostly related to leg edema. Today in Japan, beriberi is called カkke (脚気), which means “leg spirit” literally. The same name has been used in China since the Sui (Zui) dynasty (581–618 AD) at least (11).

It is apparent, therefore, that beriberi was known in ancient China when the 康 character was created. It also seems clear that the ancient people who made and used the character were aware that bran was a source of health for the body, being vital for life. Regrettably, this ancient knowledge has gone unrecognized throughout history. But why? Is it not true to say that the character (糠) gives the remedy for beriberi? This is the most intriguing aspect of the present hypothesis. As is described in the literature on beriberi and other deficiency diseases, it is likely because people did not suspect that beriberi was caused by a deficiency of something in food. The concept of a deficiency disease, so common today, was absent throughout the pre-vitamin era—at least until Lunn’s experiment in 1881. Instead, various other causes, including toxins, infections, alcohol consumption, and an excess intake of nutrients, were prevalent in the minds of doctors and scientists, including Eijkman himself (1, 2, 11). The nobility, whom, it is said, consumed luxurious food, were more vulnerable to beriberi than people in the lowest social strata. It was not conceivable, therefore, that the etiology of beriberi was deficiency in a certain nutrient (2).

Lastly, it may be worthwhile comparing rice bran to cod liver oil. In England, cod liver oil was used as a folk medicine to remedy rickets long before the discovery of vitamin D. This long-standing treatment was also ignored and even slighted by many pediatricians, thus costing so many lives among infants and children. If only doctors and scientists had paid a little more attention to old knowledge, the troubled history of nutrition could have evolved much differently. These two examples show that humanity had great ancient wisdom before the advent of science—a wisdom which remains relevant today.

Afterword: In Japan, rice bran is a common ingredient in fish feed for aquaculture. As a researcher of fish nutrition, I am familiar with the nutritional properties of rice bran. Having lived abroad for 15 y; I have forgotten many 千字. Now that I am back in Japan, I have had to remember and re-learn these symbols. Looking at the 千字 for “rice bran” (糠) with fresh eyes, I began to ask why it was written like “health”. This led me to wonder when this 千字 was created. I was incredulous that it came into being so recently, after the work of Eijkman. These musings led to a literature review and, ultimately, this essay.

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