

## Salt of Our Lives

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### Abstract

Too much salt intake has been associated with persons suffering from hypertension. It has been found that the greater the aggregate salt intake, the greater the occurrence of hypertension. Before refrigeration was introduced to preserve food, many cultures used salt as a preservative for foods. These foods include red meat, white meat, fish and plant foods. Many also have used smoke together with the salt for taste, but not usually for plant foods. Research has indicated that the Japanese population has higher than the statistical world average for stomach cancer, and the consumption of salted foods have been implicated. In fact, until the 2012 world census, Japan had the highest rate of stomach cancer. The Mayo Clinic informs that too many salty and smoked foods may be responsible for stomach cancer. The current work proposes that a major companion of salt, calcium sulfate may also be the male factor in salt responsible for diseases such as gastritis and stomach cancer. There also should be the presence of *H. pylori* virus for gastritis and stomach cancer to occur.

**Keywords:** Calcium sulfate; Salted seafood; Hypertension; Gastritis; Stomach cancer

### Introduction

The World Health Organization (WHO) pronouncement that processed meats are carcinogenic is a good thing [1-5], and recommendations should be followed by people all over the world. When applied to modern methods of processing, the pronouncement is an indictment of modern methods of meat processing, with their use of artificial preservatives, food colorings and high temperatures. When applied to traditionally cured and processed meats and seafood, it is an indictment on the traditional methods. The results of the current work came from using this 'hunch' and searching for diseases linked to foods preserved in the traditional styles. Seafood was the first food item to be investigated in the current work because it contained salt naturally, and a bunch of pollutants are possible in the seawater in these modern times.

The need of salt in animals and humans is inherited. The importance of salt, when looking at European history, has been reported in [6]. In Europe of the middle Ages, communities had to be near to each other to cooperate with respect to food and food production. If a poor harvest happened, there had to be enough food stock piled to alleviate the problem of food shortage. Medieval Sweden is a good illustration of how an agricultural society adapted to this problem. Arable land was not plentiful so it was valuable, and had to be used for crops. That fact meant that grazing and foraging animals, principally cattle and pigs were let into the local woodlands for the summer to forage for grass, nuts, roots and other plant foods. A relative lack of winter feed stuff also resulted in surplus animals being slaughtered and the rest driven indoors. The Swedish solution was to preserve almost all their food, and to use salt as the preservative. Pork and beef and even butter were salted. The muscle meats were produced as joints, sausages and hams. The story of salt in Venetian times is also recounted, as well as salt in Austria and Bavaria and its export to other parts of Europe [6]. It would not be surprising that the simple preservation of food with salt for winter occurred in a similar manner (to the Swedish method) in Japan and China.

### Facts and the Deduction

There was a publication about hypertension and salt intake by the people in Japan [7]. It was found that there were notable differences in salt consumption, and large amounts (greater than 20 g) of salt were consumed in the north-eastern part of Japan where the mortality due to apoplexy and the blood pressure of many persons were high. Not to eat too much salt is a pervasive instruction for hypertensive patients in Asia. Publications regarding salt and hypertension include references [8,9]. In a study performed in [10], the disagreement concerning the association of hypertension and sodium consumption was recounted.

In [11], it was reported that calcium sulfate is the most constant mate of natural salt. In other words, calcium sulfate is normally found together with sodium chloride in natural environments. Sea salt contains 0.5 to 1% of calcium sulfate [11]. It was also reported that the macro-composition of seawater around the world is pretty similar (It is not difficult to deduce that the content can be quite contaminated with modern pollutants and pesticides at outfalls of municipal treatment plants, etc.). Calcium sulfate is found in sea salt as well as in lake salt. Calcium sulfate is generally found in saturated state in natural brines.

The solubility of common substances in seawater, obviously including sodium chloride, is shown in Table 1 [12]. It is clear that calcium sulfate has low solubility in water, and probably will crystallize out as seawater evaporated. Hence, it is deduced that in the traditional method of drying vast quantities of krill on the beach by merely spreading them out on a mat

Chemical	0°C g/100g water	10°C g/100g water	20°C g/100g water
Calcium Sulfate	0.223	0.244	0.255
Magnesium Sulfate	25.5	30.4	35.1
Sodium Chloride	35.65	35.72	35.89

**Table 1:** Solubility of Chemicals in Water [12]

to be heated up by the sun, the calcium sulfate will crystallize out first and stay with the krill, rather than be drained off with the excess liquid (which would contain more of the better soluble components). The consumption of salted foods have been implicated as being the practice that has pushed Japan to the top of the charts as being number one in having the highest rates of stomach cancer in the world [13]. The data reported in [13] and presented in the rest of this paragraph came from [14], which is no longer available online. World estimate of cancer incidence in the year 2002 has been provided by the International Agency for Research on Cancer (IARC) [14]. Worldwide in 2002, stomach cancer was the 4th most common occurring cancer (9% of all cancers) after cancer of the lung, breast and the colon. It was the cancer with the 2nd highest morbidity (10% of all cancer mortality) after lung cancer. In 2002, the incidence of gastric cancer was estimated at 934,000 new cases, 56% of the cases coming from Eastern Asia, 41% from China, and 11% from Japan. Overall, 65–70% of incident cases and deaths from gastric cancer are occurring in developing countries. As a percentage of the overall national population, the Japanese figure was larger than the Chinese figure.

It would be interesting to observe and compare after 10 years the statistics about stomach cancer. In reference [15], is presented the statistics of stomach cancer in 2012. There were 952,000 new cases diagnosed in 2012, which is a slight increase over 2002. The leading countries are presented in Table 2. It was reported that Republic of Korea had the highest rate of stomach cancer, with Mongolia second and Japan, third. About 71% of stomach cancer cases occurred in less developed countries. It is known that the cases of stomach cancer in the United States of America (USA) are low, as are the cases of stomach cancer in the immigrant Japanese community in the USA. This later fact maybe because of the desire for assimilation, and that the immigrant Japanese American community (like the Chinese American community) is losing the taste for eating foods salted in the traditional style. Furthermore, the salt used in the USA does not contain calcium sulfate like crude salt. The fact about the large number of stomach cancer cases still persisting in less developed countries is probably due to the fact that salted foods preserved in the traditional styles with crude salt (*i.e.* containing calcium sulfate) are still popular in those countries.

The fact sheets published by the Mayo Clinic about stomach cancer [16], include advice that too much salty and smoked foods is a risk factor for stomach cancer. It is the perspective of the current work that one of the main contaminants in salt, calcium sulfate [11] may also be the significant risk factor in maladies such as gastritis [17,18] and stomach cancer. From references [19,20], it is clear that calcium sulfate or gypsum is a pesticide. Since calcium sulfate is used as a pesticide, the chemical might be a carcinogen. In Felsot [21] study, it is discussed about how the U.S. Environmental Protection Agency classifies chemicals as carcinogens. The scientist correctly criticizes the criterion used as being too lenient so that many chemicals might not come under the radar using current criterion. He also pointed out that the current number of classified carcinogens only include about a third of the pesticides. “This is curious, considering that

World Rank	Country	Age-Standardized Rate per 100,000
1	Korea, Republic of	41.8
2	Mongolia	32.5
3	Japan	29.9
4	Guatemala	23.7
5	China	22.7
6	Tajikstan	21.7
7	Kazakhstan	21.6

**Table 2:** World Leaders of Stomach Cancer Rate [15]

Bruce Ames and Lois Gold’s analysis of the Cancer Potency Database, funded by the National Institute of Health at the University of California, Berkeley, shows that about 50% of all synthetic and natural chemicals tested for carcinogenicity are associated with tumors. Does this mean that pesticides are less likely to be carcinogenic on average than all other chemicals?” [21]. This last question made by [21] is relevant for the discussion at hand. The presence of *H. pylori* virus [16,18] is necessary for gastritis and distal stomach cancer. The *Epstein-Barr* virus is carcinogenic to humans and has been connected to stomach cancers in published studies [15].

## Discussion and Conclusion

It is interesting that besides the *H. pylori* virus, the *Epstein-Barr* virus have been implicated in stomach cancer [15]. It is interesting that the former is stated in Mayo Clinic’s risk factors for stomach cancer [16], but the later virus is not. It would definitely add to the knowledge database, to find out the reasons why the *Epstein-Barr* virus did not make it into Mayo Clinic’s list. Also of interest will be whether both of them are present in some types of stomach cancer.

As it is done all over the world, traditional methods of drying sea food will trap natural components in the seawater within the seafood. This includes the drying of krill in Malaysia and other parts of Southeast Asia, and the preparation of salted fish in China. The traditional methods of manufacturing salted fish in Japan are probably very similar. The thinking by the people of old was that the salt in the seawater helped in the preservation process. However, calcium sulfate (which occurs naturally in seawater) is probably in the seafood because of the simple drying process that has taken place. Calcium sulfate could contribute to tumor formation if consumed over a period of time. It is a commonly accepted fact that the promotion period for cancer (prior to the cancer progression period) could be long, 10-40 years [22,23]. The cumulative effect of calcium sulfate with salted foods could be a significant risk factor for stomach cancer. The current method used by the USEPA to check whether a chemical can damage or change deoxyribonucleic acid (DNA) with a single dose of the chemical, will not help detect cancer causing mechanisms that are cumulative in nature; it can only detect carcinogenicity in chemicals that can destroy or alter DNA at a single-high dose. It is possible that calcium sulfate may be a significant risk factor for cancers associated with consumption over a period of years, of too much salted foods manufactured with crude salt (*i.e.* containing calcium sulfate and other impurities). A scientific research study is required to verify this fact in the field.

## Acknowledgment

This work is dedicated to all peoples, who naturally have to consume salt to live.

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