

# Etiology of Nasopharyngeal Carcinoma and Nutrition

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## Abstract

Salted fish (in the presence of nitrites and nitrates from rough salt) is a proven risk-factor in the etiology of nasopharyngeal carcinoma. Nasopharyngeal carcinoma (NPC) is endemic in Southern China and Southeast Asia, where salted fish is a common food. The current work points at another food that is common in Southeast Asia, which could be another risk factor for NPC. This food comes under the guise of different names in the many Southeast Asian countries. It is 'belacan' in Malaysia and 'terasi' in Indonesia, which is salted dried shrimp paste. One objective of the paper is to point to some shortcomings in recommendations placed online for the general public (by a very respectable body like the Mayo Clinic). Logic and basic science principles are used to arrive at the deductions. It is proposed that if clean salt with no nitrites and nitrates is used, salted fish may be safe to consume. From previous research, consumption of salted fish traditionally preserved, with vitamin C, could also be safe if no other carcinogens are present. It is noted that the Epstein-Barr virus needs to be present for NPC to be initiated. A presentation for proposed research in a new area related to NPC is outlined.

**Keywords:** Salted fish; Dried shrimp paste; Nitrosamines; Nitrites; vitamin C; Epstein-Barr virus

## Literature, Facts and the Deduction

There are many articles on the probable risk factors of nasopharyngeal carcinoma [1-11]. However, nasopharyngeal carcinoma (NPC) persists to this day in Southern China and Southeast Asia, where the rates of the disease are far higher than in the United States of America (USA) [1]. The occurrence rates in Europe and North America are less than 1 per 100,000 and greater than 50 per 100,000 in certain parts of the Southern China [2,3]. These facts point to the dietary and cultural factors that have been pointed out as risk-factors in the etiology of NPC.

When the author [12-14] lived in 'Little Italy' neighborhood in Cleveland, Ohio, United States of America (USA) during his graduate school days about 40 years ago, he had to walk past an Italian grocery with salted fish every day. By the smell, it was deduced that the Italians salted the fish almost identically to the Chinese, which the author knew very well because of his cultural upbringing. The foul smell also gave rise to the suspicion that though common in Chinese and Italian cuisines, salted fish had something that was not healthful.

Here are two recipes with salted fish by Italians, from the Internet:-

(1) "Roasted Bacala with Bell Peppers" [15].

(2) "Stoccafisso: Stock Fish. Stoccafisso is dried cod, and was once a mainstay of the inland Italian diet: It keeps very well, and was therefore one of the best options for Fridays and other days the Church forbade the consumption of meat, for example Lent. As an added bonus, it was inexpensive. This tasty Piemontese recipe combines stoccafisso and potatoes with olives for added flavor." [16].

The Italian salted fish is cooked with fresh vegetables or fruit, as stated in the two randomly selected recipes above. It is assumed that since the selection was random (many recipes were in fact obtained, but only two have been cited for clarity), that most of the Italian recipes would include either fruit or vegetables or both.

Chinese preserved fish is typically not cooked with fresh vegetables or fruit. It is steamed often with ginger, and sometimes with onions. The small amounts of vitamin C in onions are lost in cooking. Ginger does not have significant amounts of vitamin C. These are well known facts in the field of nutrition.

Previous scientific publications stated that the nitrites and nitrates present in Chinese salted fish and salted shrimps come from the crude salt used in their preservation. Salted shrimps are included in a variety of packaged ramen noodles, a common processed food in the USA, especially known for its affordable cost. (There are many cultural jokes in the media regarding packaged ramen noodles and those who are low in their monetary funds.) These nitrites and nitrates produce the nitrosamines in the digestion process of these preserved fish. (It is noted that these fish products were not included in the recent WHO pronouncement of 'processed meat' as being carcinogenic [17-20].) Vitamin C prevents nitrites from transforming into nitrosamines, the carcinogenicity of which is known [21]. The review [21] cites 445 references. Steaming salted fish as in the Chinese style, releases whatever carcinogens are present in the preserved fish. Steam by itself is not a risk factor. It is noted that saunas and Japanese steam baths (for instance) are very healthful.

It is the consumption of salted fish (with nitrites) without consuming vitamin C at the same time, which is the more specific risk factor for NPC. From the Mayo Clinic on the risk factors of NPC [22], "Salt-cured foods. Chemicals released in steam when cooking salt-cured foods, such as fish and preserved vegetables, may enter the nasal cavity, increasing the risk of nasopharyngeal carcinoma. Being exposed to these chemicals at an early age may increase the risk even more." There is not even a specific statement about the consumption of salted fish, as has already been shown in [1-11].

## Nasopharyngeal Carcinomas Endemic in Southern China and Southeast Asia.

Nasopharyngeal carcinoma is not endemic in Italy. From the sample Italian recipes with salted fish presented, the reasons are apparent. The vitamin C is present with the fruits and vegetables used in the preparation of most salted fish dishes in Italian cuisine.

Steamed salted fish is a rather common dish among the Chinese (especially those who abstain on certain days of the year, by partaking in meals comprising only of porridge or rice with preserved fish and preserved vegetables only) and the fact that the Epstein-Barr virus is in the blood of many Southern Chinese and Southeast Asians, are in my perspective, the necessary risk factors for the infectious NPC to continue to spread in Southern China and Southeast Asia. Hot steam transmits whatever carcinogens present in the salted fish and thus contributes to the spread of disease in the nasopharynx. Cancers in general do have a long incubation period [12].

It is noted that the Mayo Clinic's list of risk factors for NPC [22], does include the need for the common Epstein-Barr virus to be present. The important role of vitamin C intake at the time of consuming nitrites from preserved fish is not mentioned.

The consumption of salted fish/shrimps with vitamin C is necessary for the nitrites in these preserved foods to not act as carcinogens in the form of nitrosamines. This fact has been missed by even the very reputable Mayo Clinic. This important fact should be propagated, especially to at-risk communities who continue to love their salted fish and shrimps. In addition, the financially-challenged American college student who regularly consumes ramen noodles with dried shrimps need to be warned about snacking on the noodle soup without taking in vitamin C at the same time.

In reference [1], written by Cantonese researchers, it was shown that the Cantonese mothers commonly feed their babies with salted fish (and rice porridge) when weaning their babies. This study showed convincingly that the practice caused the NPC rates to sky-rocket among Southern Chinese adults who had been weaned on salted fish. The lack of a fully developed immune system in babies is a well-established fact.

It is known by the author who grew up in Malaysia that during the fifties through the seventies, porridge and salted fish and vegetables diet was recommended by Chinese traditional medicine men in Malaysia. The weakened state of a sick patient and the consumption of foods with nitrites and nitrates without vitamin C provide a 'trifactor' situation for NPC to be initiated, in the presence of Epstein-Barr virus if present in patient's body. This would be a cultural factor that encourages the persistence of NPC in the ethnic Chinese communities in Malaysia.

Dried shrimp paste or 'belacan' is a popular food in Southeast Asia [23]. The following 2 paragraphs are extracted from [23]: "Shrimp paste, made with fermented shrimps and salt, is the foundation of many Southeast Asian dishes especially in Indonesian and Malaysian cuisines. Called 'belacan' in Malaysia, it is also known as 'terasi' in Indonesia, 'mam ruoc' or 'mam tom' in Vietnam, 'kapi' in Laos and 'bagoong' in the Philippines. Adding a small amount of shrimp paste to a dish gives it a rich flavor.

Belacan is a shrimp paste in dry form made from the small crustaceans called krill, a bottom-feeder that lives on phyto planktons and zooplanktons. Before it is added to a dish, belacan must be roasted to release its flavors and aroma."

There are nitrosamines produced when belacan is eaten. When roasted (or baked at 375°F), the belacan is as potentially problematic as

cooked sliced bacon (thin-sliced, factory-made processed bacon with nitrites) [13,20,24]. This paste would be one of the serious suspects for contributing to NPC in Southeast Asians because of its popularity. This is in addition to the salted fish already incriminated.

## Discussion and Conclusion

For the total glucosinolate nutrient, turnip greens have more than cabbage, kale, cauliflower, and broccoli when ranked among the most commonly eaten cruciferous vegetables. It is known that glucosinolate nutrient provides health benefits. The glucosinolates in turnip greens are phytonutrients which are digested in the body and produces isothiocyanates (ITCs) with characteristics of protecting against cancers. That cruciferous vegetables hold glucosinolates has been an established fact for a while; current research has shown the potential of many vegetables including the relative content of glucosinolates in the different vegetables. Cruciferous vegetables are recommended for consumption with salted fish and belacan, if one cannot shake off the habit of eating salted fish and shrimps. In general, any vitamin C consumed at the same time would work.

Another culture where salted fish (cod) is consumed regularly is the Jamaican culture. In fact, the ackee and salted cod dish is promoted as the national breakfast of Jamaica, since stir-fried ackee tastes somewhat like scrambled eggs. Since ackee is high in vitamin C, and if the stir-frying is not done at too high a temperature or for too long, there should be enough vitamin C to prevent the nitrosamines from forming within the body.

As stated previously, the presence of the Epstein-Barr virus is necessary for NPC to be initiated in the body. The not unusual virus generally causes only minor symptoms, similar to that of cold. Occasionally it can be the origin of infectious mononucleosis. It should be noted that cancer normally has a long incubation period [12]. It was stated in the Mayo Clinic risk factors [22] that it strikes when one is in the 30-50 years range.

It is suggested that if clean salt (without nitrites and nitrates) is employed for preservation, salted fish may be safe to consume if no other carcinogens are present. Vitamin C consumption with this clean salted fish is still recommended for safety.

## Proposal for Research Work

One fact that has to be taken into account in presenting the following proposal is that belacan or dried shrimp paste is very popular in Southeast Asia. It will not be easy to look for a study group to abstain from this favorite food. The hypothesis would be that the rate of NPC in persons who eat belacan manufactured in the traditional way would be more than the rate of NPC in persons who consume belacan manufactured with clean salt (without nitrites or nitrates or any other carcinogens). The volunteers would be informed clearly about the purpose, and the procedural steps of the study. They would be told that their identities would be anonymous, and they would have to sign a consent agreement. Persons who are to consume clean belacan should also not have consumed belacan much (criterion to be set depending on the ease of finding volunteers) in the past twenty years or more. The amount of belacan and the frequency of consumption (per week, say) have to be stipulated. The number of persons in each of the two cohorts has to be large enough to be statistically significant for the population studied.

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This work is dedicated to my late second sister, Theresa Wong, who had nasopharyngeal carcinoma.

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