

食物安全焦點

Food Safety Focus



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Centre for Food Safety

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風險評估組

科學主任朱源強先生報告

Reported by Mr. Johnny CHU, Scientific Officer,
Risk Assessment Section,
Centre for Food Safety

食物安全中心(中心)在二零一五年六月公布有關非二噁英樣多氯聯苯的風險評估研究結果,其中指魚類有較大機會含有該組化學污染物。研究結果引起公眾對吃魚,尤其是三文魚的關注。其實,國際機構和中心的研究均顯示食用三文魚、桂花魚和黃花魚等多種魚類對健康的好處,明顯超過攝入魚類體內污染物(以目前含量計)所帶來的風險。本文將重點探討吃魚對育齡婦女和幼童的好處和壞處。

對健康的好處

魚類除了含豐富的奧米加-3脂肪酸和優質蛋白質外,還含有多種營養素,例如碘質、硒質、鈣質、鐵質,以及維他命A和D等。每種魚都含有DHA(二十二碳六烯酸)和EPA(二十碳五烯酸)等奧米加-3脂肪酸,其中以油脂較多的魚類(例如三文魚和黃花魚)的含量較高(見表一)。

表一. 本港部分常見魚類的DHA和EPA及非二噁英樣多氯聯苯含量

Table 1: Amount of DHA and EPA and NDL-PCBs in some fish available in Hong Kong

魚類 Fish	DHA和EPA的總和 Sum of DHA and EPA (毫克/克mg/g)	6種指示性非二噁英樣多氯聯苯的總和 Sum of 6 indicator NDL-PCBs (微克/公斤µg/kg)
黃花魚 Yellow croaker	21	1.7
三文魚 Salmon	19	5.7
鱧魚 Pomfret	8.2	1.2
紅衫魚 Golden thread	8.2	0.3
馬頭 Horse head	5.1	0.3
石斑 Grouper	3.5	0.5
大頭魚 Big head	3.4	0.2
吞拿魚(刺身及罐裝) Tuna (sashimi and canned)	2.3	0.03
桂花魚 Mandarin fish	1.8	3.1
烏頭 Grey mullet	1.6	0.2

奧米加-3脂肪酸有助預防冠心病及中風,而且有利於胎兒的腦神經發育。鈣質和維他命D是牙齒和骨骼健康生長的必要元素。而碘質則是製造甲狀腺激素的必需營養素,人體缺乏碘質可引致甲狀腺腫(俗稱“大頸泡”)和發育遲緩。

對健康的壞處

另一方面,我們在吃魚時同時也攝入

In June 2015, the Centre for Food Safety (CFS) announced the results of a risk assessment study on non-dioxin-like polychlorinated biphenyls (NDL-PCBs) including that relatively low levels of this group of chemical contaminants are more likely to be found in fish. The issue sparked the concerns of the public on eating fish, especially salmon. However, international and CFS studies have found that the benefits of consuming a variety of fish including salmon, mandarin fish and yellow croaker clearly outweigh the risks presented by current levels of contaminants in fish. This article discusses the benefits and risks of fish consumption, in particular, for women of child-bearing age and young children.

Health Benefits

Fish is an excellent source of high quality proteins and omega-3 fatty acids. It also contributes to the intake of nutrients, such as iodine, selenium, calcium, iron and vitamins A and D. Omega-3 fatty acids such as DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid) are found in every kind of fish, but are especially high in fatty fish (e.g. salmon and yellow croaker) (see Table 1).

Omega-3 fatty acids help lower the risk of coronary heart disease and stroke, and are important for foetal neurological development. While calcium and vitamin D are important in developing healthy teeth and bones, iodine is needed for the production of thyroid hormones. A deficiency of iodine in the diet is associated with the development of goitre and arrested growth.

Health Risks

Fish is also a source of exposure to contaminants

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焦點個案
Incident in Focus

了魚體內的二噁英、二噁英樣多氯聯苯和汞等污染物。不過，中心以往的研究已確定本港市民健康受食物中二噁英和二噁英樣多氯聯苯，

包括非二噁英樣多氯聯苯影響的機會不大。此外，不少海外研究均指魚類體內的這些污染物含量近年來有所下降。

甲基汞是有機形態的汞，對胎兒發育中的神經系統有不良影響。研究顯示，捕獵性魚類的汞含量可能較高，育齡婦女應有所警惕。此外，幼童的腦部仍在發育中，比成人更易受甲基汞影響，甲基汞可造成幼童智力下降。

其他衛生機構的建議

糧食及農業組織和世界衛生組織

對正值生育年齡的婦女來說，在奧米加-3脂肪酸的益處與甲基汞的害處兩相比較之下，懷孕期間吃魚比不吃魚，更能減低胎兒的神經系統發育不健全風險。

歐洲食物安全局

歐洲食物安全局最近報告，相對於沒有吃海產(包括魚類)的孕婦，孕婦每星期吃一至兩份，最多三至四份(相當於150至600克)魚類等海產，孩子的神經系統機能發展更佳。

本港育齡婦女吃魚的利與弊

中心的食物消費量調查和利弊分析研究顯示，本港育齡婦女平均每星期吃450克(約12兩)魚和海產；而吃這個數量的魚給胎兒的智力發育所帶來的好處超過有關的風險。至於吃大量魚類和海產(每星期吃1500克或約40兩)的孕婦，如所吃的魚類中包括體型較大的捕獵性魚類，吃魚的好處可能會被抵消。

魚類的汞含量多寡，視乎其食物來源和生活水域而定。一般來說，體型較小(一斤以下)的魚、養殖魚、淡水魚和非捕獵性魚類的甲基汞含量較低。由於攝入過量甲基汞會對發育中的神經系統造成損害，育齡婦女和幼童雖然應適量進食多種魚類，但應避免進食體型較大的捕獵性魚類，如吞拿魚(特別是某些品種如大眼吞拿魚和藍鰭吞拿魚)、金目鯛、鯊魚、劍魚、旗魚、橘棘鯛和大王馬鮫魚等。

注意要點：

- 魚含有多種人體所需的營養素，如奧米加-3脂肪酸和優質蛋白質等。油脂較多的魚類(例如三文魚和黃花魚)含豐富的奧米加-3脂肪酸。
- 奧米加-3脂肪酸有助預防冠心病及中風，而且有利於胎兒生長和腦神經發育。
- 以魚類體內污染物(例如二噁英)目前的含量計，吃魚的好處超過壞處。

給市民的建議

1. 市民應保持均衡及多元化的飲食，而進食多種魚類是健康飲食的重要部分。
2. 要取得吃魚的最大效益，育齡婦女和幼童應適量進食不同品種的魚類，切勿偏吃。
3. 孕婦、準備懷孕的婦女和幼童應避免進食體型較大的捕獵性魚類。

like dioxins, PCBs and mercury. However, previous CFS studies have confirmed that it is unlikely for the local population to experience, through the consumption of food, undesirable health effects of dioxins and PCBs, including NDL-PCBs. In addition, many overseas studies have reported a reduction in the level of these contaminants in fish over the years.

Methylmercury is the organic form of mercury and can adversely affect the nervous system in the developing foetus. Studies have shown that some predatory fish species may contain high methylmercury levels which are therefore a concern for women of child-bearing age. Besides, young children whose brains are still developing may be more susceptible than adults to the adverse effects of methylmercury, which include a reduction in intelligence quotient (IQ).

Opinions and Advice from Other Health Authorities

Food and Agriculture Organization and the World Health Organization

When comparing the benefits of omega-3 fatty acids with the risks of methylmercury among women of child-bearing age, maternal fish consumption, in general, lowers the risk of suboptimal neurodevelopment in their offspring compared with the offspring of women not eating fish.

European Food Safety Authority

Recently, the European Food Safety Authority has reported that consumption of 1-2 up to 3-4 servings (equivalent to 150–600 grammes) per week of seafood including fish during pregnancy is associated with better functional outcomes of neurodevelopment in children compared to no consumption of seafood including fish.

Risk-benefit Analysis of Fish Consumption for Women of Child-bearing Age in Hong Kong

The Food Consumption Survey and risk-benefit analysis conducted by the CFS revealed that the average fish and seafood intake by women of child-bearing age was about 450 grammes (~12 taels) per week and the benefits of eating such amount of fish outweighed the risks in terms of IQ gained by their developing fetuses. For those who ate a lot of fish and seafood (i.e. 1500 grammes or ~40 taels per week), the benefits might be negated by the inclusion of certain types of large predatory fish in the diet.

The level of mercury in fish may vary according to the source and living environment. Generally speaking, smaller fish (below one catty), farmed fish, freshwater fish and non-predatory fish contain lower levels of methylmercury. Since excessive intake of methylmercury can affect the developing nervous system, women of child-bearing age and young children should consume a variety of fish in moderation and avoid consumption of large predatory fish such as tuna (especially the bigeye and bluefin species), alfonso, shark, swordfish, marlin, orange roughy, tilefish and king mackerel.

Key Points to Note:

- Fish contains many essential nutrients, such as omega-3 fatty acids and high quality proteins. Fatty fish such as yellow croaker and salmon, in particular, contains high levels of omega-3 fatty acids.
- Omega-3 fatty acids help lower the risk of coronary heart disease and stroke and are important for the foetal growth and neurological development.
- Benefits from fish consumption outweigh potential risks associated with current levels of contaminants (such as dioxins) in fish.

Advice to the Public

1. The public is advised to maintain a balanced and diverse diet and to consume a variety of fish as part of a healthy diet.
2. To get the most benefits from eating fish, women of child-bearing age and young children are advised to consume a variety of fish in moderation and avoid overindulgence.
3. Pregnant women, women planning pregnancy and young children should avoid consumption of the large predatory fish.

味精：使用它還是厭惡它？(上篇)

Monosodium Glutamate (MSG): Use it or Loathe it? (Part I)

食物安全中心 風險評估組 科學主任郭麗儀女士報告
Reported by Ms. Joey KWOK, Scientific Officer,
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穀氨酸一鈉（俗稱味精）經常受人關注，人們對這種增味劑的看法兩極。一些廚師和食物生產商把味精視為好幫手，因為味精能產生“肉香”味，能令菜餚和食品更為美味可口。然而，有些消費者卻對味精非常抗拒，避之唯恐不及，認為味精對身體有害。我們將一連兩期介紹味精，今期先介紹其特性、在食物中的使用和安全問題。

穀氨酸和味精的特性和來源

味精是穀氨酸(glutamic acid)的鈉鹽。穀氨酸是大自然中最豐富的氨基酸之一，是組成蛋白質的重要成分。包括味精在內的各種穀氨酸鹽和穀氨酸的離子形態都稱為穀氨酸(glutamates)。

其實穀氨酸對我們並不陌生。我們的身體也會自行製造穀氨酸，母乳中也有這種成分。事實上，幾乎所有食物都天然含有穀氨酸，包括奶類、肉類、家禽、魚類、蔬菜、菇類等。此外，水解蛋白、自溶酵母、酵母萃取物、大豆萃取物等食物配料亦天然含有大量穀氨酸。

二十世紀初，一名日本化學教授發現，海帶湯的滋味與別不同，秘密在於海帶中的穀氨酸。他注意到這種味道與甜、酸、苦、鹹這四種基本味道截然不同，因此命名為第五種味道—“umami”，英文意思是“meaty”(肉香味)或“savoury”(美味)，中文則稱之為“鮮味”。穀氨酸以結合態(與其他氨基酸結合成蛋白質)或游離態(不與其他氨基酸結合成蛋白質)存在，只有游離態的穀氨酸才能提高食物的鮮味及有增味的作用(見表二)。

味精中的穀氨酸與食物中天然存在的穀氨酸並無化學上的區別。這些穀氨酸在我們身體內的代謝過程都是一樣的。

People may have opposing views on monosodium glutamate (MSG), a flavour enhancer that often receives public attention. Some chefs and food manufacturers may see MSG as an ally as it imparts the “meaty” taste and enhances flavour of the dishes and food products. Nevertheless, some consumers may loathe MSG and try to avoid it as much as they can because they believe that MSG is bad for them. In the first article of a series of two on MSG, let us look into the nature, uses and food safety issues in relation to MSG in food.

Nature and Sources of Glutamate and MSG

MSG is the sodium salt of glutamic acid. Glutamic acid is one of the most abundant amino acids found in nature and an important component of proteins. Various salts of glutamic acid including MSG, as well as the ionic form of glutamic acid, are known as “glutamates”.

Indeed glutamate is not foreign to us. It is produced inside our body and is found in breast milk. Glutamate occurs naturally in almost all foods, including milk, meat, poultry, fish, vegetables, mushrooms, etc. In addition, certain food ingredients such as hydrolysed protein, autolysed yeast, yeast extract, soy extract, etc. also contain high levels of glutamate naturally.

In the early 1900's, a Japanese chemistry professor discovered that glutamate extracted from seaweed being the key to the distinctive taste of seaweed broth, which was different from the four basic tastes (i.e. sweet, sour, bitter and salty). He named this fifth taste “umami”, meaning “meaty” or “savoury” in English terms and “xianwei” in Chinese term. Glutamate exists either in “bound” form (i.e. bound to other amino acids as part of proteins) or in “free” form (i.e. not bound to other amino acids as part of proteins). It is the free form of glutamate that has been shown to impart the “umami” taste in food and has a flavour enhancing effect (see Table 2).

Glutamate in MSG is chemically indistinguishable from glutamate present in food naturally. Our body metabolises glutamate from these sources in exactly the same way.



含豐富穀氨酸的食物
Glutamate-rich food

表二. 部分食物和食物配料中的穀氨酸含量

Table 2: Glutamate content in some foods and food ingredients

食物/食物配料 Foods/Food ingredients		結合穀氨酸 Bound glutamate (百萬分率ppm)	游離穀氨酸 Free glutamate (百萬分率ppm)
乳製品 Dairy products	牛奶 Cow's milk	8 190	20
	巴馬臣芝士 Parmesan cheese	98 470	12 000
肉類/家禽 Meat/Poultry	豬肉 Pork	23 250	230
	牛肉 Beef	28 460	330
	雞肉 Chicken	33 090	440
魚類 Fish	三文魚 Salmon	22 160	200
	馬鮫魚 Mackerel	23 820	360
蔬菜 Vegetables	蘑菇 Mushroom	-	420
	蕃茄 Tomato	2 380	1 400
調味料 Seasonings	蠔油 Oyster sauce	-	9 000
	豉油 Soy sauce	-	4 120 - 12 640
	魚露 Fish sauce	-	7 270 - 13 830
	味精 MSG	-	780 900

味精的使用

世界各地的人們自古已在烹調時使用穀氨酸含量豐富的食物或食物配料調味。芝士(例如馬馬臣芝士)、成熟的蕃茄、乾冬菇、發酵而成的魚露和豉油等含有大量穀氨酸，能增加食物的鮮味，我們日常烹調常常都會用到。

除了味精外，穀氨酸本身和多種穀氨酸鹽都可用作食物增味劑。這些食物添加劑在食物標籤上的名稱分別是穀氨酸(620)、穀氨酸一鈉(621)、穀氨酸一鉀(622)、穀氨酸鈣(623)、穀氨酸一鉍(624)和穀氨酸鎂(625)。

味精和其他增味劑多用於製作湯羹、炆炖類食物、高湯、肉類醬汁、混合調味料和小食。不過，味精不是放得越多越好的，只要少量味精，便能達到最理想的味道，放得過多反而收效甚微甚至起不到作用。

味精的安全性

有些人可能自覺對味精敏感，多年來，亦偶有報道指有人在食用含有味精的食物後出現輕微和短暫症狀(頭痛、頸後麻木/刺痛、面色潮紅、肌肉緊張及全身乏力等綜合症狀)。但是，多個國際和國家食物安全機構曾多次評估味精的安全性，結論是目前的證據不足以支持食用味精和這些綜合症狀之間存在任何因果聯繫。以我們平時在食物中加入的味精分量，加上我們從膳食中的蛋白質攝入的穀氨酸分量，食用味精是安全的。

下篇我們會探討味精在攝取鈉方面的角色和味精的標籤事宜。

Uses of MSG

People in different parts of the world have been incorporating glutamate-rich foods or food ingredients in their culinary tradition for a long time. Cheeses (e.g. Parmesan cheese), ripened tomatoes, dried mushrooms, fermented fish sauce and fermented soy sauce containing high levels of free glutamate are frequently used in our daily cooking, owing to their flavour-enhancing effect.

Besides MSG, glutamic acid itself and a variety of its salts can be deliberately added to food for use as flavour enhancers. These can be identified in food labels as the food additives glutamic acid (620), monosodium glutamate (621), monopotassium glutamate (622), calcium glutamate (623), monoammonium glutamate (624) and magnesium glutamate (625).

MSG and other flavour enhancers are more frequently used in soups, stews, stocks, meat-based sauces, seasoning mixes and snack foods. Nevertheless, the use of MSG in foods is self-limiting, in which an optimum taste can be achieved by adding a small amount of MSG and any excessive amount will contribute little or no improvement in taste.

Food Safety of MSG

Some people may consider themselves as sensitive to MSG and, over the years, there have been reports on cases of occurrence of mild and short-term symptoms (the symptom complex of headache, numbness/tingling in back of neck, flushing, muscle tightness and generalised weakness) after the consumption of MSG. Nevertheless, a number of international and national food safety authorities have evaluated the safety of MSG on multiple occasions and concluded that available evidence has failed to demonstrate a causal relationship between the consumption of MSG and the development of this symptom complex. MSG is considered safe for the general population at the level typically used in foods and having taking into consideration the usual dietary intake of glutamate from ingested protein.

In the next article, we will look into the role of MSG in sodium intake and labelling issues around MSG.



泰國榴槿含染色料薑黃素

食物安全中心(中心)上月在跟進泰國榴槿以化學劑進行人工催熟的報道時，從泰國進口的榴槿中檢出染色料薑黃素和過量除害劑乙烯利。中心已要求有關商戶停售及將有關產品下架，並從涉事商戶抽取跟進樣本檢測，結果再次在三個榴槿樣本中檢出薑黃素。中心一方面通知有關商戶，如證據充足，將提出檢控；另一方面通知泰國有關當局，以便其採取所需的跟進措施。

薑黃素是一種從植物薑黃提取的天然食用色素。薑黃是一種歷史悠久的香料，主要用於製作咖哩粉和咖哩醬料，而薑黃素則普遍用於使食物着色，例如芥菜、醃漬食品、糖果和湯類等。根據《食物內染色料規例》(第132H章)，薑黃素可用於加工食物，但不可以加進未經烹煮及未經加工處理的肉類、野味、家禽、魚、水果或蔬菜中。

乙烯利是一種植物生長調節劑，在分解時能釋放出乙烯，從而促使植物生長。據知一些國家的果農會利用乙烯利在採收前催熟果實。在香港，食物中的乙烯利受《食物內除害劑殘餘規例》(第132CM章)規管。雖然在榴槿樣本中檢出的乙烯利含量超過法定的最高殘餘限量，但按這個分量，在正常食用情況下，不會對健康造成不良影響。一般來說，將榴槿的外殼去掉已能減少攝入的除害劑殘餘。

中心會繼續跟進及採取適當行動，以保障市民健康。

The Colouring Matter Curcumin in Thai Durian

Last month, the Centre for Food Safety (CFS) detected the colouring matter curcumin and excessive residues of ethephon in durians imported from Thailand while following up on reports on the use of chemicals to accelerate ripening of Thai durians. The CFS has instructed the vendors concerned to stop the sale and remove from shelves the affected products. The CFS took follow-up samples from the vendors concerned and again detected curcumin in three durian samples. The CFS has informed the vendors that prosecution will be instituted should there be sufficient evidence. The Thai authority has also been informed for necessary follow-up actions.

Curcumin is a natural food colour extracted from the plant turmeric (*Curcuma longa* L.). Turmeric has a long history of use in food as a spice, mainly as an ingredient in curry powders and sauces, where curcumin is widely used to dye foods such as mustard, pickles, candy and soup. According to the Colouring Matter in Food Regulation (Cap 132H), curcumin is a permitted colouring matter which can be added to processed food. However, its use in meat, game, poultry, fish, fruit (except citrus fruit) or vegetable in a raw and unprocessed state are not allowed in Hong Kong.

Ethephon is a plant growth regulator that acts by generating ethylene during its decomposition, where ethylene can affect the growth of the plant. Ethephon is known to be used in pre-harvest ripening of fruits in certain countries. In Hong Kong, ethephon in food is regulated under the Pesticide Residues in Food Regulation (Cap 132CM). Although levels of ethephon residues exceeding the maximum residual limit prescribed by the law were detected in the durian samples, such levels will not cause adverse health effects under usual consumption. In general, removing the shells of durians before consumption can reduce the intake of the chemical.

The CFS will continue to follow up the incident and take appropriate actions to safeguard public health.

風險傳達 工作一覽 Summary of Risk Communication Work

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