

食物安全焦點

Food Safety Focus



食物安全中心
Centre for Food Safety

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科學主任鄧紹平博士報告

Reported by Dr. Anna S.P. TANG, Scientific Officer,
Risk Assessment Section,
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今年四月十六日，食物安全中心（中心）公布“魚類的汞含量與食物安全”的風險評估研究，有關結果顯示本港市面供應的大部分魚類汞含量較低，但一小部分含量偏高。魚類中的汞含量，視乎其品種、年齡、食物來源和生活水域而定。根據這項研究和海外報告的結果，鯊魚、劍魚、旗魚、金目鯛及某些品種吞拿魚（金槍魚）等部分捕獵魚類的汞含量通常較高，而三文魚、沙甸魚、鯪魚（草魚）、鰻魚、烏頭、鱸魚、泥鯮、大頭、馬頭、黃花魚、桂花魚（鰻魚）、紅衫及大眼雞（木棉）等魚類的汞含量則較低。由於個別魚類的汞含量或會因來源地和生活水域而不同，消費者宜進食多種魚類。

魚類含有人體成長和發育所需的多種營養素，適量進食魚類是均衡飲食的一部分，對健康有許多益處。不過，孕婦和兒童較易受汞毒性影響，故應避免進食汞含量可能偏高的某幾種魚類。

On 16 April 2008, the Centre for Food Safety (CFS) released the findings of the risk assessment study "Mercury in Fish and Food Safety". Most of the fish available in the Hong Kong market contained relatively low levels of mercury, while a small proportion contained higher levels. Level of mercury in fish depends on their species, age, food sources and living environments. Results of this study together with reports from other countries showed that high mercury levels were usually found in some predatory fish species such as shark, swordfish, marlin, alfonso and some types of tuna, while lower levels were found in fish such as salmon, sardine, grass carp, mud carp, grey mullet, pomfret, rabbitfish, bighead carp, horsehead, yellow croaker, mandarin fish, golden thread and bigeye. Since the level of mercury for individual fish may vary according to the source and living environment, consumers are advised to consume a variety of fish.

Fish contains many nutrients essential for growth and development. It provides many benefits to health when taken in moderation as part of a balanced diet. However, pregnant women and children should avoid consumption of certain fish species that may contain high mercury levels since they are more susceptible to the adverse effects of mercury.

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汞含量較高魚類的例子

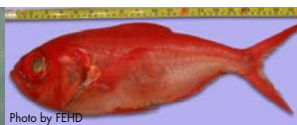
Examples of fish that contain higher levels of mercury



大西洋胸棘鯛 Orange roughy



劍魚 Swordfish



金目鯛 Alfonso



方頭魚 Tilefish



藍鱈吞拿魚 Bluefin tuna



大眼吞拿魚 Bigeye tuna



鯊魚 Shark



旗魚 Marlin

汞含量較低魚類的例子

Examples of fish that contain lower levels of mercury



三文魚 Salmon



烏頭 Grey mullet



桂花魚 Mandarin fish



鯪魚 Mud carp



黃花魚 Yellow croaker



沙甸魚 Sardine



大眼雞 Bigeye



鱸魚 Pomfret



汞是什麼？魚類為何含有汞？

汞（俗稱水銀）是廣泛存在於環境中的一種金屬。大部分人都知道溫度計內的汞在室溫下為銀白色的液體。不過，這種金屬亦可在大自然中與其他物質結合為無機鹽，又或與有機物質結合為甲基汞。

地殼內的汞通過火山爆發和採礦活動進入環境、河流和海洋中。工業廢物進一步增加汞排放。水中的微生物把無機汞轉化為甲基汞，魚類吃下這些微生物會在體內積聚甲基汞，而大魚吃小魚後則會令甲基汞含量沿食物鏈不斷增加。

甲基汞的特性如下：

- 含量在體型較大的捕獵魚類中會較高；
- 對胎兒發育中的腦部損害尤大；
- 含量不能透過烹煮減少。

甲基汞對健康的影響

甲基汞是毒性最強的汞形態，可損害人體的神經系統，尤其是發育中的腦部。魚類是人們攝取到甲基汞的主要食物。甲基汞可透過胃腸道輕易被人體吸收，並迅速進入腦部。攝取大量甲基汞會影響胎兒腦部發育，對成人則會損害其視力、聽覺、肌肉協調性和記憶力。

安全的攝入量

發育中的胎兒是最易受甲基汞毒性影響的羣組。為保護他們，聯合國糧食及農業組織／世界衛生組織聯合食品添加劑專家委員會（專家委員會）已訂定甲基汞的安全攝入量，即暫定每周可容忍攝入量為每公斤體重1.6微克。

有一點十分重要的是，孕婦和正值生育年齡婦女的甲基汞攝入量不應超出暫定每周可容忍攝入量。由於甲基汞需要一段較長時間才可排出體外，所以計劃懷孕的婦女應在懷孕前至少半年之前開始避免進食汞含量較高的魚類。

高效益低風險的吃魚之道

消費者從膳食攝取汞的總量取決於食物中的汞含量以及食用量。在指定時間內（如每周）可安全食用汞含量較高魚類的分量會低於汞含量較低的魚類。因此消費者宜進食不同品種的魚類，切勿偏吃某幾種魚類。要取得吃魚的最大效益同時又盡量減低甲基汞造成的風險，適量進食魚類是關鍵重點。

中心根據上一次和這次研究結果作出的估計顯示，攝取量一般的中學生每周從膳食攝取甲基汞的分量遠低於暫定每周可容忍攝入量。不過，攝取量偏高的中學生每周從膳食攝取甲基汞的分量，則有可能高於專家委員會訂定的暫定每周可容忍攝入量，換言之不能排除他們可能會受甲基汞毒性影響。

給消費者的建議

1. 保持均衡飲食，切勿偏食。
2. 魚類含有多種人體所需的營養素，例如奧米加-3脂肪酸和優質蛋白質等，宜適量進食多種魚類。
3. 孕婦、計劃懷孕的婦女和幼童應避免選吃汞含量可能較高的魚類。

給業界的建議

1. 向可靠的供應商採購食物。
2. 妥善保存貨源資料，以便在有需要時可追溯源頭。
3. 向顧客提供所售賣和供應的魚類品種，以及魚製品所使用的魚類品種。

What is Mercury and Why is it Present in Fish?

Mercury is a metal present widely in the environment. Most people are familiar with its use in thermometers as a silver liquid at room temperature. However, this metal may also combine with other elements in nature to form inorganic salts or may bind to organic matters as methylmercury.

Through volcanic eruptions and mining activities, mercury in the earth's crust can be exposed to the environment and get into rivers and oceans. Industrial waste further adds to mercury emissions. Micro-organisms in the aquatic system convert inorganic mercury to methylmercury. Fish that eat these micro-organisms accumulate methylmercury which goes up the food chain when larger fish eat smaller fish.

Methylmercury:

- is present at higher levels in large predatory fish;
- is particularly harmful to developing brain of foetus;
- cannot be reduced by cooking.

Health Concerns of Methylmercury

Methylmercury is the most toxic form of mercury affecting the nervous system, particularly the developing brain. Fish is the main source of methylmercury in the diet. Methylmercury is easily absorbed into the human body through the gastrointestinal tract and readily enters the brain. At high levels, methylmercury can affect foetal brain development, and affect vision, hearing, muscle coordination and memory in adults.

Safe Intake Level

A safe intake level for methylmercury has been established by the Joint Food and Agriculture Organization/ World Health Organization Expert Committee on Food Additives (JECFA) to protect the most susceptible group, i.e. the developing foetus. This level, called the Provisional Tolerable Weekly Intake (PTWI), is set at 1.6 µg/kg body weight.

It is important that the intake of methylmercury in pregnant women and women of child-bearing age should not exceed the PTWI. Since it takes a relatively long time for methylmercury to be cleared from the body, women planning pregnancy should avoid intake of fish high in mercury levels from at least half a year before pregnancy.

Eating Fish with Maximum Benefits and Minimum Risks

The total dietary exposure to mercury depends on the mercury level present in foods and the amount of the foods consumed. The amount of fish that can be consumed safely within specific period of time (eg. per week) would be less for fish containing higher mercury levels than for fish containing lower mercury levels. It is therefore advisable to consume a variety of fish and not to overindulge in only a few species. In order to get the most benefits from eating fish while minimising the risk posed by methylmercury, moderate consumption is the key.

Estimation based on the results of the current and previous studies showed that dietary exposure to methylmercury among secondary school students fell well below the PTWI for average consumers. However, the PTWI may be exceeded for high consumers, which means that the adverse effect of methylmercury cannot be excluded for these people.

Advice to Consumers

1. Maintain a balanced diet. Avoid overindulgence of food items.
2. Fish contain many essential nutrients, such as Omega-3 fatty acids and high quality proteins. Moderate consumption of a variety of fish is recommended.
3. Pregnant women, women planning pregnancy and young children should avoid the types of fish which may contain high levels of mercury in their diet.

Advice to the Trade

1. Obtain food supplies from reliable sources.
2. Maintain proper records to enable source tracing when required.
3. Inform customers of the type of fish that is sold, served, or used in fish products.

淺談食物中的持久性有機污染物

Persistent Organic Pollutants in Food – An Overview



食物安全中心
風險評估組
科學主任邱頌韻女士報告

Reported by Miss Joan YAU, Scientific Officer,
Risk Assessment Section,
Centre for Food Safety

從大約十年前在比利時發生的“二噁英污染危機”，該國的奶類和家禽類製品驗出含有甚高的二噁英，到近日在意大利發生水牛芝士受二噁英污染的食物事故，食物中的有毒污染物可見不時成為人們關注的焦點。事實上，二噁英是一組稱為“持久性有機污染物”的物質，會長時間殘留在環境中，對人類健康和環境構成重大威脅。本欄會在這一期刊介持久性有機污染物，而下一期則探討這種污染物引起的食物安全問題。

何謂持久性有機污染物？

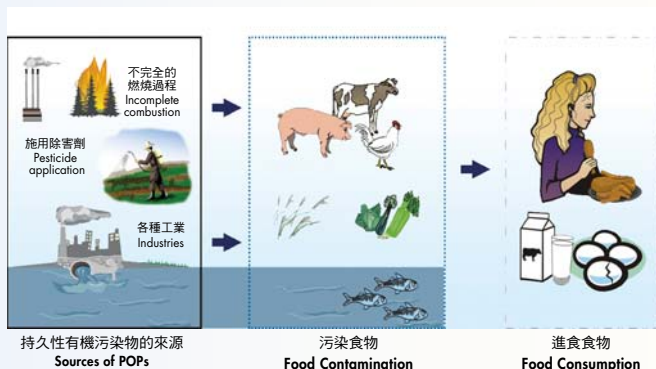
持久性有機污染物是以往用作除害劑和工業化學物的有機化合物，又或是由人類活動產生的副產品。根據定義，這些化學物具有下列四項特性：

- (1) 毒性極高（即可令人類和動物患癌，損害生殖和免疫系統）；
- (2) 長時間殘留在環境中（即經過數年甚至數十年才能分解為危險性較低的物質）；
- (3) 可經空氣遠程傳播，因而散布在世界上不同的地方，包括從來沒有使用這些化學物的地區；以及
- (4) 在生物的脂肪組織內積聚（即經過很長時間才會排出體外）。

為什麼食物會含有持久性有機污染物？

鑑於持久性有機污染物特性獨特，它們會存在於地球上的任何地方，在生物的脂肪組織內積聚，同時其含量會透過生物捕食過程沿食物鏈逐漸增加。魚類、食肉鳥類和哺乳類動物等處於食物鏈頂層的生物，其脂肪組織內的持久性有機污染物含量可比背景含量高出數千倍。動物源性食物（即肉類、家禽、魚類、蛋類、奶類和前述食物的製品）通常會含有較多的持久性有機污染物。

持久性有機污染物如何進入食物內
How POPs ended up in food



國際間有何行動？

二零零一年，多國政府通過了《關於持久性有機污染物的斯德哥爾摩公約》。此國際公約旨在限制和最終杜絕持久性有機污染物的生產、使用、排放和貯存，又定出12種最值得關注的持久性有機污染物，包括：

- 某些除害劑，例如曾一度在農務和環境中用來控制害蟲的滴滴涕和氯丹。這兩種除害劑均已禁用，但滴滴涕在一些國家仍會有限度用於控制可傳播瘧疾的蚊子。
- 工業化學物，例如多氯聯苯。這種化學物過去在多

From the “Belgium Dioxin Crisis” happened almost a decade ago that unusually high level of dioxins was found in dairy and poultry products in Belgium, to the recent food incident on dioxins contamination of mozzarella cheese in Italy, concerns over toxic contaminants in food have been raised from time to time. Dioxins, in fact, belong to a group of organic contaminants, namely “Persistent Organic Pollutants (POPs)”, that are persistent in the environment and pose significant threats to human health and the environment. In this issue of the Food Safety Platform, we would present an overview of POPs and in the next issue their food safety implication.

What are POPs?

POPs are organic compounds that were used as pesticides and industrial chemicals, or are by-products of human activities. By definition all of these chemicals share four properties:

- (1) highly toxic (i.e. may cause cancer, damage to reproductive and immune systems in humans and animals);
- (2) persistent (i.e. lasting for years or even decades before degrading into less dangerous forms);
- (3) transport long distances in the atmosphere, resulting in widespread distribution across the earth including regions where they have never been used; and
- (4) accumulate in fatty tissue of living things (i.e. eliminated from the body very slowly).

Why are POPs Present in Food?

Owing to their special characteristics, POPs can be present anywhere in the world, accumulate in the fatty tissue of living organisms and gradually concentrate as organisms eat others as they move up the food chain. Their levels can be magnified up to many thousands of times higher than background levels in the fatty tissues of organisms at the top of the food chain, such as fish, predatory birds and mammals. Foods of animal origin, i.e. meat, poultry, fish, egg, milk and their products, are likely to have higher levels of POPs.

《斯德哥爾摩公約》定出的 12 種持久性有機污染物
The 12 POPs under the Stockholm Convention

持久性有機污染物 POPs	除害劑 Pesticide	工業化學物 Industrial chemical	無意產生的化學副產品 Unintentional chemical by-product
艾氏劑 Aldrin	✓		
氯丹 Chlordane	✓		
滴滴涕 DDT	✓		
狄氏劑 Dieldrin	✓		
二噁英 Dioxins			✓
異狄氏劑 Endrin	✓		
呋喃 Furans			✓
七氯 Heptachlor	✓		
六氯代苯 Hexachlorobenzene	✓	✓	✓
滅螺靈 Mirex	✓		
多氯聯苯 Polychlorinated biphenyls (PCBs)		✓	✓
毒殺芬 Toxaphene	✓		

What have been Done in the International Arena?

In 2001, the world's governments adopted an international treaty, namely the [Stockholm Convention on Persistent Organic Pollutants](#), which aims at restricting and ultimately eliminating the production, use, release and storage of POPs. Twelve POPs of the greatest concern have been identified. These 12 POPs include:

- Certain pesticides: e.g. DDT and chlordane were once used to control pests in agriculture and environment. Their applications had been banned, except for DDT with restricted use to control malaria-bearing mosquitoes in several countries.

食物安全平台
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種工業中用作熱交換液，在變壓器和電容器上使用，也是油漆、無碳複寫紙、密封劑和塑膠的添加劑。

由工業過程和其他人類活動無意產生的化學副產品，例如不完全的燃燒過程、某些除害劑和其他化學物的製造過程和紙漿漂白過程等無意產生的二噁英和呋喃。

飲食一向是一般人攝取持久性有機污染物的主要途徑，我們將會在下一期細探這種污染物可能引起的食物安全問題。

- Industrial chemicals: e.g. polychlorinated biphenyls (PCBs) had been employed in industries as heat exchange fluids, in electric transformers and capacitors, and as additives in paint, carbonless copy paper, sealants and plastics.
- Unintentional chemical by-products of industrial processes and other human activities: e.g. dioxins and furans are produced unintentionally due to incomplete combustion, the manufacture of certain pesticides and other chemicals, as well as pulp and paper bleaching, etc.

Diet has been considered as the major route of POP exposure for the general population. We would talk about the potential food safety implication of POPs in the next issue.

食物事故點滴
Food Incident Highlight

皺皮瓜與沙門氏菌

今年三月底，美國食物及藥物管理局發出進口警報，並扣查產自洪都拉斯某公司的皺皮瓜，因為該公司的皺皮瓜可能與美國和加拿大爆發的利齊菲爾德沙門氏菌 (*Salmonella* Litchfield)

個案有關。同類事故早前在兩國接連發生。

沙門氏菌是一類可在人類和野生及飼養動物（包括家禽、豬和寵物（如狗、貓和爬蟲類動物））腸道中存在的細菌。多種沙門氏菌可引起人類食物中毒，症狀包括噁心、發燒、腹痛和肚瀉，有時更會出現嘔吐。這些症狀在嬰兒和長者身上會更為嚴重。



在流動的清水下刷洗皺皮瓜
Cleaning cantaloupe by scrubbing under running water

皺皮瓜外皮粗糙，其表面容易受田裏的泥土、不潔灌溉水和動物排泄物所污染，又或收割後清洗期間不潔的水所污染，因此，市民必須在流動的清水下用清洗農作物的乾淨刷子刷洗皺皮瓜，然後才切開享用，以免沙門氏菌污染瓜肉。

Cantaloupes and *Salmonella*

In late March 2008, the US Food and Drugs Administration (FDA) released an import alert and detained cantaloupes produced by a company in Honduras. The FDA believed that the fruit from this company appears to be associated with a *Salmonella* Litchfield outbreak in the United States and Canada. Similar incidents had been reported a number of times in the US and Canada.

Salmonella is a group of bacteria that can be found in the intestine of humans as well as wild and domestic animals (including poultry, pigs and pets like dogs, cats and reptiles). A number of *Salmonella* species can cause food poisoning in humans. The symptoms include nausea, fever, abdominal pain, diarrhoea and sometimes vomiting, which are more severe in infants and the elderly.

Cantaloupe has a rough rind and its surface may easily be contaminated in the field by soil, unclean irrigation water, animal droppings or unclean water during post-harvest wash. Therefore, it is important to scrub the cantaloupe with a clean brush (used only for produce) under running water before cutting in order to prevent *Salmonella* from contaminating the flesh.

Watercress and Parasitic Infection

In late April 2008, newspapers reported that a local woman was infested by the parasitic liver fluke *Fasciola* after consuming raw watercress during her travel in southeast Asia.

Fascioliasis is an infection caused by *Fasciola hepatica* (the sheep liver fluke) or *Fasciola gigantica*. Human may get infested after eating uncooked water plants like watercress, which provide shelter for liver flukes. They can cause damage and enlargement of the liver during early stage of infestation, and can later cause severe pain in the right upper abdomen or yellowing of skin, and in some cases, skin inflammation.

To prevent parasitic infections, do not consume uncooked water plants, particularly watercress and water chestnut.



西洋菜
Watercress

西洋菜與寄生蟲病感染

今年四月底，多份報章報道一名本港女子到東南亞旅遊時吃下生的西洋菜後感染了肝吸蟲病。

肝吸蟲病是由牛羊肝吸蟲或巨大肝吸蟲引致的感染。西洋菜等水生植物可為肝吸蟲提供棲息之所，人們吃下未經烹煮的水生植物可能會感染此病。患者在感染初期會出現肝臟受損和脹大，繼而感到右上腹劇痛或出現皮膚轉黃，部分患者會有皮膚炎。



馬蹄（植物和球莖）
Water chestnut (plant and corm)

為免感染寄生蟲病，市民切勿進食未經烹煮的水生植物，尤其是西洋菜或馬蹄（荸薺）。

風險傳達
工作一覽
Summary of
Risk Communication Work

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