食物安全焦點
Food Safety Focus

食物安全中心
Centre for Food Safety

食物環境衞生署
Food and Environmental Hygiene Department

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癱瘓性貝類中毒
Paralytic Shellfish Poisoning

食物安全中心
風險傳達組科學主任
郭麗儀女士報告

Reported by Ms. Joey KWOK, Scientific Officer,
Risk Communication Section,
Centre for Food Safety

背景

二零零七年四月二十七日，食物安全中心(中心)宣布，從某街市抽取的一個扇貝樣本驗出高水平的癱瘓性貝類毒素。中心認為有關毒素水平對健康造成影響的風險偏高，遂建議市民暫時停吃扇貝，並立即加強監察工作，追查問題扇貝的來源。隨後的抽查和化驗工作顯示，再有七個扇貝樣本驗出含癱瘓性貝類毒素，全部屬於同一品種(蝦夷扇貝)，毒素含量由每100克1 120至2 560微克。另外有四個屬於不同品種的扇貝樣本及五個帶子樣本均取得滿意的化驗結果。其間，衞生防護中心亦接獲與進食扇貝有關的懷疑癱瘓性貝類中毒個案。

插圖：驗出含高水平癱瘓性貝類毒素的扇貝
Illustration: Scallops found to contain high levels of PSP toxins

貝類及其他海產中的癱瘓性貝類毒素

癱瘓性貝類毒素屬於四氫嘌呤類，約有20多個不同毒性的相關種類，當中以石房蛤毒素的毒性最強。癱瘓性貝類毒素由某些品種的微藻類所產生。在有利的環境條件下，微藻類可迅速生長，造成藻類暴發性地大量繁殖(海水因滿布藻類而變色，故俗稱“紅潮”)。如有關品種的藻類會產生毒素，以濾食為生的雙貝類(例如扇貝、帶子、青口、蠔、蜆和蛤)吃下這些在受影響海水中的藻類便會受污染。

雙貝類雖然較能抵受癱瘓性貝類毒素的毒性影響，但會把毒素積聚在組織內。貝類積聚毒素的速度、毒素留在貝類體內的時間長短及毒素在貝類組織內的分布，主要取決於貝類的品種及當時的環境條件。部分貝類品種可在長達數周至數月後仍然有毒。癱瘓性貝類毒素在受污染貝類的內臟含量一般較高。

現時既無已知是安全、快捷及符合經濟原則的方法消除活的受污染貝類海產中的毒素，亦無可靠的快速測試確定貝肉是

Background

On 27 April 2007, the Centre for Food Safety (CFS) announced that Paralytic Shellfish Poisoning (PSP) toxins were detected at a high level in a scallop sample taken from a local market. Having considered the high health risk associated with the level of PSP toxins, the CFS advised members of the public to stop consuming scallops (Sin Pui) for the time being. Meanwhile, the CFS stepped up surveillance and initiated source-tracing of the affected shellfish. Subsequent sampling and testing revealed the presence of PSP toxins in the range of 1 120 to 2 560 micrograms per 100 grams in another seven scallop (Sin Pui) samples, all belonging to the same species, *Patinopecten yessoensis*. Another four samples of scallop (Sin Pui) belonging to a different species and five samples of a different type of scallop (Dai Tsi) were all found to be satisfactory. At around the same period, the Centre for Health Protection (CHP) received reports of suspected PSP cases in association with the consumption of scallops.

PSP Toxins in Shellfish and Other Seafood

PSP toxins are a group of some 20 closely related tetrahydropurines with varying toxicities amongst which saxitoxin being the most toxic. PSP toxins are produced by certain species of microscopic algae. Under favourable environmental conditions, microscopic algae may multiply rapidly and result in algal blooms (commonly known as “red tide” because seawater can become discoloured from the dense accumulation of algae). In the event that the species of algae concerned are toxin-producing, filter-feeding bivalve shellfish such as scallops, mussels, oysters, clams and cockles which feed on these algae in the affected seawaters can become contaminated.

Bivalve shellfish can accumulate PSP toxins in their tissues, although they are relatively resistant to the toxic effects. The rate of toxin taken up by the shellfish, the period of toxin retention and the distribution of toxins within the shellfish tissues are highly dependent on the particular species of shellfish, as well as prevailing environmental conditions. Some shellfish species can remain toxic for extended period of time from weeks up to several months. The concentration of PSP toxins is generally higher in the viscera of contaminated shellfish.

Currently, there are no known methods available for detoxifying live contaminated shellfish in a way that is safe, fast and economically feasible, nor reliable quick test to determine the presence of PSP in shellfish flesh. As such, algal toxin monitoring programmes which monitor for the presence of toxin-producing algae in shellfish harvesting or culture zones and for toxins in shellfish flesh are widely practised preventive measures against shellfish poisoning across the world. With reference to the routine surveillance programme conducted by the CFS in 2004-06, some 1300 molluscan shellfish samples were tested for PSP toxins, five samples were found unsatisfactory.

Besides bivalve shellfish, PSP toxins can accumulate through the marine food web and be found in gastropods like whelks and abalones, crustaceans like crabs and lobsters as well as fishes such as mackerels and puffers. Such contaminations, however, are reported less frequently than those related to their bivalve shellfish counterparts.

焦點個案
Incident in Focus

否含痲痺性貝類毒素。因此，各類藻類毒素監察計劃在世界各地廣泛推行，作為貝類中毒預防措施。這些計劃監察貝類撈捕區或養殖區內有否出現可產生毒素的藻類及貝肉中的毒素。中心在二零零四至零六年間進行的恆常監察計劃，已就1 300多個軟體貝類動物樣本進行痲痺性貝類毒素化驗，其中有5個屬於不滿意樣本。

除了雙貝類之外，痲痺性貝類毒素會透過海洋食物網積聚，並可存在於腹足類動物(例如蛾螺和鮑魚)、甲殼類動物(例如蟹和龍蝦)及魚類(例如鯖魚和河豚)內，但這些海產受污染的報告較雙貝類為少。

痲痺性貝類毒素對健康的影響

可引致中毒的痲痺性貝類毒素水平因人而異，差別甚大，這主要因為每個人的敏感程度有別。根據文獻記載，令人出現痲痺性貝類中毒症狀的毒素分量可低至120微克，此外，亦有指毒素分量超過1 000微克才會令人出現這些輕微中毒症狀。

痲痺性貝類中毒症狀主要與神經系統相關，通常在進食貝類後數分鐘至數小時內出現。初期症狀包括刺痛、口部及四肢痲痺、頭痛、暈眩及腸胃不適。在大多數的病例中，症狀會在數日內完全消退。嚴重者可能會出現吞嚥及發音困難、癱瘓、呼吸停頓，甚至死亡。由於現時並無解毒劑可消解痲痺性貝類毒素，因此，向病者提供的臨牀療法均屬支持性質。

本港不時發生零星的痲痺性貝類中毒個案。根據衞生防護中心的資料，在二零零五、零六及零七年(截至零七年六月六日)，分別有42宗、3宗及5宗痲痺性貝類中毒個案，受影響人數分別為70人、5人及9人。

減低貝類中毒風險的措施

有毒貝類在外貌、氣味及味道上與沒有受污染貝類並無分別。痲痺性貝類毒素非常耐熱，不能透過一般家居烹調或蒸煮消除。此外，這種毒素可溶於水，可能會溶於烹調的汁液內，令汁液毒性甚高。

市民應在烹煮前先除去貝類的內臟及生殖腺(請參考插圖)，每次進食較少分量，並避免食用烹調汁液。如進食貝類後出現中毒症狀，應立即求醫。

業界應向可靠的供應商採購貝類，並保存良好的記錄制度，以便在有需要時有助追查來源。

更多資料

讀者可透過下列網頁取得更多資料：

- 中心發出的新聞公報
- 中心編製有關“預防貝類中毒”的單張

Health Significance of PSP Toxins

The levels of PSP toxins at which intoxications occur vary considerably in humans, mainly due to individual difference in sensitivity. According to literature, the doses causing symptoms of PSP in humans can be as low as 120 micrograms per person. Some reported a dose of over 1 000 micrograms to cause mild symptoms.

The symptoms of PSP are predominantly neurological and the onset is usually within minutes to hours after ingestion of the shellfish. Initial symptoms may include tingling, numbness of the mouth and extremities, headache, dizziness and gastrointestinal discomfort. In the majority of cases, symptoms resolve completely within a few days. In severe cases, difficulty in swallowing and speech, paralysis with respiratory arrest and even death may occur. There is no antidote for PSP toxins, clinical management for affected individuals is therefore supportive.

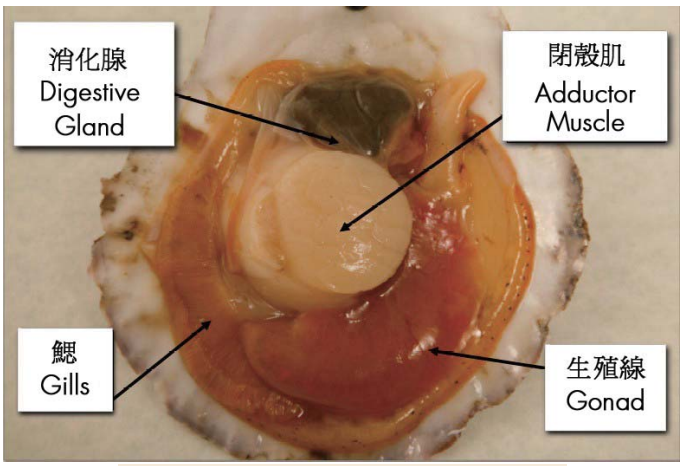
In Hong Kong, sporadic cases of PSP occur from time to time. According to the CHP, there were 42, 3 and 5 cases of PSP in 2005, 2006 and 2007 (as of 6 Jun 2007), affecting 70, 5 and 9 people, respectively.

Risk Reduction Measures in Relation to Shellfish Poisoning

Poisonous shellfish neither looks, smells nor tastes different from uncontaminated shellfish. PSP toxins are heat-stable and cannot be destroyed through normal home cooking or steaming. Furthermore, the toxins are water-soluble and may dissolve in the cooking liquid, rendering the cooking liquid highly toxic.

Members of the public are advised to remove the viscera and gonads of shellfish before cooking (please refer to illustration). They should eat a smaller amount of shellfish in any one meal, and avoid consuming the cooking liquid. They should seek medical advice immediately if symptoms occur after consuming shellfish.

Members of the trade are advised to source shellfish from reliable suppliers, and maintain a good recording system to facilitate source-tracing if necessary.



插圖：扇貝的內部構造
Illustration: The anatomy of a scallop

Further Information

Readers may obtain further information from the following websites:

- The CFS press releases
- The CFS pamphlet on “Prevent Shellfish Poisoning”

風險傳達工作一覽
Summary of Risk Communication Work

風險傳達工作一覽（二零零七年五月） Summary of Risk Communication Work (May 2007)	數目 Number
事故/食物安全個案 Incidents / Food Safety Cases	61
公眾查詢 Public Enquiries	184
食物投訴 Food Complaints	500
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食物安全平台
Food Safety Platform

淺談食物中的天然毒素
An Overview of Natural Toxins in Food

食物安全中心風險評估組
研究主任鄧紹平博士報告

Reported by Dr. Anna S.P. TANG, Research Officer, Risk Assessment Section, Centre for Food Safety

什麼是食物中的天然毒素？

除害劑、獸醫藥物或環境污染物等人造化學物是食物供應中由外而至的東西，但天然毒素則不同，是食物內的已有東西。天然毒素已存在於一些植物及動物源性食物內，人們若吃下足夠的分量可以造成不良影響。

天然毒素來自何處？

有毒化合物來自各類植物和動物。天然毒素可能為發揮特定作用而存在於食物及動物，又或是抵禦捕食者、昆蟲或微生物的化學防衛。這些化學物有形形色色的化學結構，其性質和毒性亦大有分別。

植物源性食物中的天然毒素

在全球超過300 000個已知的植物品種中，有至少2 000個屬於有毒。人們吃下野生的菇類、醬果或其他植物以致中毒的個案屢見不鮮。世界上只有幾百種植物為人們經常食用，但當中不少如過量進食或未經妥善處理便進食，亦會對人體有害。視乎植物的品種，可供食用部分會有不同，可以是葉子、葉芽、莖部、根部、果實或塊莖，而有毒部分亦一樣。

同一屬的植物可有相若或截然不同的毒性。不同品種或地理環境的植物，其毒素含量及分布會有不同。

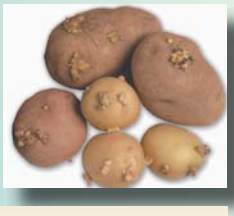
插圖：北杏
Illustration: Bitter Apricot Seeds

一般而言，對生存及繁殖有重要作用的植物器官(例如花朵及種子)會含有大量防衛化合物。在某些重要的生長階段(例如馬鈴薯發芽時)，這些化合物可能會在葉芽、幼嫩組織或幼苗中更快速地合成或貯存。

食用植物中的天然毒素常見例子有馬鈴薯中的甙生物鹼，北杏及竹筍中可產生氰化物的化合物，黃豆、四季豆及其他豆類中的酶抑制 劑及植物血球凝集素。

動物源性食物中的天然毒素

動物源性天然毒素可能是新陳代謝過程中的產物或食物鏈中的化學物。雖然進食陸生動物後出現中毒的情況較少見，但由海洋生物毒素引致的中毒情況則在世界上不少地方發生。貝類、甲殼類動物和魚類吃下由有毒微藻類產生的海洋毒素後會在體內積聚。河豚毒素是一種毒性強烈的海洋生物神經毒素，相信是由某些細菌所產生。超過90種河豚含有這種毒素，人們即使吃下小量毒素亦可致命。由於雪卡毒素可存在於超過300種珊瑚魚，故此海產食物中毒報告常涉及這類魚。鯖魚因細菌性腐壞而產生的組胺亦會導致另一種海產食物中毒。



插圖：已發芽的馬鈴薯
Illustration: Sprouted Potatoes

目前全球約有1 200種有毒及有毒腺的動物。雖然大多數不會作食用，但如用作食物時，必須小心避免毒腺或含毒素的組織。吃下一般不被認為是有毒動物的某些腺狀組織，例如含有與鯉醇相關化學物的鯇魚膽，也可引致食物中毒。

毒性影響與食物中毒

食物中的天然毒素可對健康造成急性及慢性影響，有關臨牀症狀各有不同。急性症狀由輕微的腸胃不適、神經症狀、呼吸系統停頓以至死亡。兒童和長者等組別尤其易受毒素影響。有關症狀會在吃下貝類及其他海產中的海洋生物毒素後數小時甚或更短的時間出現。

What are Natural Toxins in Food?

As opposed to man-made chemicals such as pesticides, veterinary drugs or environmental pollutants that get into our food supply, toxins can be present due to their natural occurrence in food. Natural toxins found inherently in foods of plant and animal origins can be harmful when consumed in sufficient quantities.

Where do They Come From?

Toxic compounds are produced by a variety of plants and animals. Natural toxins may be present serving specific function in the plant and animal or evolved as chemical defense against predators, insects or microorganisms. These chemicals have diverse chemical structures and are vastly different in nature and toxicity.

Natural Toxins Present in Food of Plant Origin

Of over 300 000 different plant species in the world, at least 2 000 species are considered to be poisonous. Cases of poisoning are often reported when wild species of mushrooms, berries or other plants are ingested. Globally, only hundreds of plant species are commonly eaten, yet many of them can become toxic to the body if they are taken in excess or if they are not properly treated before consumption. Depending on the species, the edible parts of plants vary, which may include foliage, buds, stems, roots, fruits and tubers, and so are their poisonous parts.

Plants from the same genera may exhibit similar or vastly different toxicities. The amount and the distribution of the toxins present in a plant vary according to the species as well as the geographical conditions where it is grown.

In general, plant organs that are important for survival and reproduction, such as flowers and seeds, will concentrate defense compounds. These compounds may be more rapidly synthesised or stored at certain stages of critical growth, i.e. in buds, young tissue or seedlings as in the case of potato sprouts.

Common examples of natural toxins in food plants include glycoalkaloids in potatoes, cyanide-generating compounds in bitter apricot seeds and bamboo shoots, enzyme inhibitors and lectins in soya beans, green beans and other legumes.

Natural Toxins Present in Food of Animal Origin

Natural toxin of animal origin may be a product of metabolism or a chemical that is passed along the food chain. While poisoning after eating terrestrial animals is relatively uncommon, poisoning due to marine toxins occurs in many parts of the world. Marine toxins produced by toxic microalgae are accumulated in shellfish, crustacean and finfish following their consumption. Tetrodotoxin, a potent marine neurotoxin, is thought to be produced by certain bacteria. It is found in over 90 species of puffer fish and may cause lethality after ingested even a small amount. Seafood poisoning commonly reported in coral reef fish is due to the presence of ciguatoxin that may be found in more than 300 species of fish. Histamine produced by bacterial spoilage of scombroid fish causes another kind of seafood poisoning.

插圖：竹筍
Illustration: Bamboo Shoots

There are approximately 1 200 species of poisonous and venomous animals in the world. While most of them are not used as food, care must be taken to avoid the poisonous glands or tissue containing the toxins when these animals are used as food. Glands of some animals that are not considered poisonous or venomous when ingested can also cause food poisoning such as gall-bladder of grass carp which contains the cyprinol related chemicals.

插圖：珊瑚魚的例子

Illustration: Examples of Coral Reef Fish

插圖：金錢龍躉

Illustration: Potato Grouper

插圖：蘇眉

Illustration: Hump Head Wrasse

插圖：燕尾星斑

Illustration: Lyretail

此外，涉及食用野菇或未經恰當處理植物(例如白果和北杏)的中毒個案亦會出現急性中毒。至於慢性中毒，則較常見於由植物毒素(例如多種生物鹼)引起的中毒個案。長時間吃下穀物雜草及某些植物中的吡咯聯啶生物鹼可對肝臟有害。可造成毒性影響的食物分量視乎毒性水平及個人敏感程度而定。

減低風險措施

在一些情況下，適當的處理食物方法和徹底煮熟食物均可去除毒素或減低其水平。在不能減低或消除毒素的其他情況下，則應限制攝取量。徹底烹煮可消除豆類當中的酶抑制劑和植物血球凝集素。此外，浸泡於水中和以沸水烹煮亦可消除有關食物中部分可產生氰化物的化合物。摘去某些品種魚類的生殖腺、皮及器官可除去集中在這些組織內的毒素。一般而言，某物質是否有害視乎其濃度、攝取量及個人健康狀況，因為人體能夠消解許多低水平的潛在危險物質。根據經驗所得，市民應遵從傳統已知的安全處理食物方法，並保持均衡飲食，進食不同種類的食物，以求把某些天然毒素攝取量維持在安全水平。

Toxic Effects and Food Poisoning

Natural toxins in food can cause both acute and chronic health effects with a range of clinical symptoms. Acute symptoms range from mild gastrointestinal upset, neurological symptoms, respiratory paralysis to fatality. This is more likely among the susceptible groups of the population such as children and the elderly. Within hours if not shorter, acute symptoms are seen following ingestion of various marine toxins in shellfish and other seafood. Acute poisoning is also seen in the consumption of wild mushrooms or inadequately treated plants such as ginkgo seeds and bitter apricot seeds. Chronic toxicity is seen more often in poisoning caused by plants toxins such as many alkaloids. Pyrrolizidine alkaloids that are present in weeds in crops and in certain plants may cause toxicity to the liver over prolonged consumption. The amount of food that would cause toxic effects depends on the toxin level present as well as individual susceptibility.

Risk Reduction Measures

In some cases, appropriate methods of food processing and thorough cooking can be employed to destroy or reduce the level of toxin. In other cases where the toxin cannot be reduced or removed, intake should be limited. Thorough cooking destroys enzyme inhibitors and lectins of beans. Soaking in water, and boiling also remove some cyanide-generating compounds in the foods concerned. Removal of gonads, skin, and parts of certain fish eliminates toxins concentrated in these tissues. In general, whether a substance poses harm depends on its concentration, amount of intake and the health status of individual since the body can detoxify low levels of many potentially dangerous substances. As a rule of thumb, the public should follow the conventional ways of food processing that are known to be safe, and maintain a balanced and varied diet so that exposures to certain types of natural toxins can be kept to a safe level.

食物事故點滴
Food Incident Highlight

野菇引致的食物中毒

五月初，本港發生兩宗進食野菇引致的懷疑食物中毒個案。患者在家中進食從郊外採摘的野菇後，出現急性中毒症狀，遂向醫生求診。涉及的一個吃剩野菇樣本驗出有毒化學物毒蕈鹼，含量為每公斤320毫克。毒蕈鹼中毒症狀包括嚴重的副交感神經系統活化作用，而此作用最終可引致抽搐及死亡。

本港菇類有超過380個已知品種，當中約一成屬於有毒。由於人們往往難以分辨有毒品種與可供食用品種，而烹煮不能消除毒素，市民不應進食從郊外和公園採摘的野菇。

Food Poisoning Caused by Wild Mushrooms

Two suspected cases of food poisoning caused by the consumption of wild mushrooms were reported in early May. The affected persons had been collecting wild mushrooms from the countryside. They developed symptoms of acute poisoning after having consumed the mushrooms at home and sought medical attention. The toxic chemical muscarine was detected at a level of 320 mg/kg in one mushroom remnant involved. Symptoms of muscarine poisoning include profound parasympathetic activation that may end in convulsions and death.

Of the over 380 known species of mushroom in Hong Kong, about ten percent are poisonous. As it is often difficult to distinguish between poisonous and edible species and cooking cannot render them non-toxic, the public is advised not to consume wild mushrooms collected from the countryside and parks.

動物飼料受三聚氰胺污染與食物安全

五月初，美國當局發現某些貓狗食品以及豬、雞和魚的飼料受三聚氰胺及其有關化合物污染。三聚氰胺是一種含有氮的化學物，用於製造塑膠。飼料中的三聚氰胺可在初步分析時，令蛋白質含量看起來高於實際含量。

美國農業部和美國食物及藥物管理局已就人們透過進食問題豬肉及家禽等攝取三聚氰胺的情況，一同進行風險評估。有關中期評估的結論是，就算在最差情況下，人們所攝取的三聚氰胺分量較兩個機構認為安全的水平低250倍，一名成年人須每天進食超過300公斤受污染豬肉才會達到可能影響健康的水平。食物安全中心將會繼續監察有關情況。

Contamination of Animal Feed with Melamine and Food Safety

In early May, the authorities in the United States found that certain pet food for cats and dogs and feed for hogs, chickens and fish had been contaminated with melamine and its related compounds. Melamine, a nitrogen containing substance, is a chemical used in the manufacture of plastics. Its presence in feed can make the protein level appears higher than reality during crude analysis.

The US Department of Agriculture (USDA) and Food and Drugs Administration (FDA) have conducted a joint risk assessment on human exposure of melamine from the consumption of affected pork, poultry etc. Their interim assessment concluded that exposure level in the worst case was 250 times lower than what is considered safe and an adult had to consume over 300 kg of contaminated pork each day to reach a level that may cause a health concern. The Centre for Food Safety will continue to monitor the situation.