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## 焦點個案 Incident in Focus

# 急凍帶子與麻痹性貝類中毒 Frozen Scallops and Paralytic Shellfish Poisoning

食物安全中心

風險評估組

科學主任游天頌先生報告

Reported by Mr Arthur YAU, Scientific Officer,

Risk Assessment Section,

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食物安全中心(中心)宣布,一家本港零售商停售一批急凍半殼含卵帶子,因為有關食物含有麻痹性貝類毒素。中心在這批帶子中驗出麻痹性貝類毒素,含量為每100克含114微克。麻痹性貝類中毒在本港並不多見,但不時會有零星個案和事故,特別是有關帶子和扇貝。本文將會概述貝類的麻痹性貝類毒素。



事件涉及的半殼帶子例子

Example of Half-shell Scallops Involved in the Incident

## 麻痹性貝類中毒是什麼?

麻痹性貝類中毒是由進食含有麻痹性貝類毒素的貝類所致。中毒症狀在人們進食受污染雙貝類後數分鐘至數小時內出現,主要與神經系統有關,包括刺痛、麻痺、口部四周出現灼熱感覺、發燒、出疹和踉蹌等,並有腸胃病症狀。患者通常在數天內康復,嚴重者可能出現癱瘓、呼吸停頓,甚或死亡。

## 麻痹性貝類毒素是什麼?

麻痹性貝類毒素有21種類近毒素,當中以石房蛤毒素的毒性最強。含有麻痹性貝類毒素的微藻類存在於熱帶和溫帶海域,雙貝類吃下這些微藻便會把毒素積聚在體內。雖然麻痹性貝類毒素在貝類體內的分布情況因品種而異,但有報告指進食內臟(消化腺)和生殖腺最容易引致麻痹性貝類中毒。

## 麻痹性貝類毒素對人們造成的毒性影響

由於個人敏感程度有別,可引致中毒症狀的麻痹性貝類毒素水平因人而異,加上不同的化驗方法檢出的毒素水平亦有差異,現以麻痹性貝類毒素中最為人認識的石房蛤毒素作為標準闡釋。

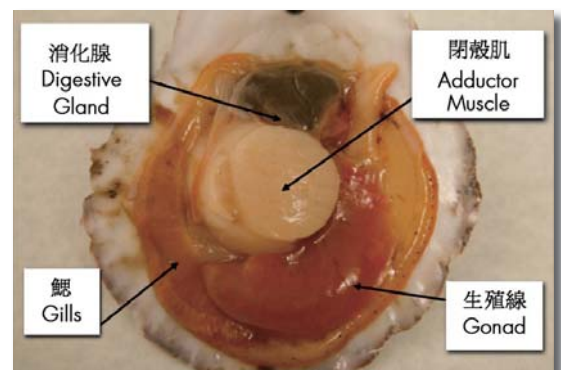
The Centre for Food Safety (CFS) announced that a local retailer withdrew from sale a batch of frozen, roe-on, half-shell scallops as they contained paralytic shellfish poisoning (PSP) toxins. The CFS found that the scallops contained PSP toxins at 114µg/100g. PSP is uncommon in Hong Kong, but sporadic cases and outbreaks, particularly involving scallops, may occur from time to time. This article provides an overview of PSP toxins in shellfish.

## What is PSP?

PSP is caused by ingestion of shellfish containing PSP toxins in humans. PSP intoxications exhibit mainly neurological symptoms like tingling, numbness, burning sensation near the mouth, fever, rash and staggering etc., accompanied by gastro-intestinal symptoms, minutes to several hours after consuming contaminated bivalves. People usually recover from it in a few days. In severe cases, muscle paralysis, respiratory arrest and death may occur.

## What are PSP Toxins?

PSP toxins consist of 21 closely related toxins, with saxitoxin (STX) being the most toxic. The toxins accumulate in bivalve as they consume PSP toxins-containing algae, which occur in tropical to moderate climate zones. Although the distribution of PSP toxins varies among different species, it was reported that the consumption of viscera (digestive gland) and gonad contribute the most significant risk to PSP.



帶子/扇貝的內部構造 — 消化腺和生殖腺最容易引致麻痹性貝類中毒

Anatomy of a Scallop – The digestive gland and the gonad contribute the most significant risk to PSP

## Toxicity of PSP Toxins to Human

The level of PSP toxins that can cause symptoms in human varies considerably because of variations in individual sensitivity. Also, the level detected varies by laboratory methods. The best understood member of the group, STX, is used as a benchmark.



## 安全參考值

聯合國糧食及農業組織／政府間海洋學委員會／世界衛生組織轄下的雙貝類軟體動物中的生物毒素特別專家諮詢會議已於二零零四年把暫定急性參考劑量定為每公斤體重0.7微克石房蛤毒素當量。以回收行動涉及的半殼帶子為例，一名60公斤重的成年人只需進食少於兩個帶子便達到參考劑量，可能會開始出現中毒症狀。

## 預防措施

即使受麻痹性貝類毒素污染的雙貝類在外表上與一般雙貝類並無分別，但我們仍有多種方法預防供人食用雙貝類中的麻痹性貝類毒素危害。業界應避免在近期受含有麻痹性貝類毒素的微藻類影響的海域撈捕野生雙貝類。雖然把雙貝類放在不含麻痹性貝類毒素的水中可令牠們釋出毒素，從而降低毒素水平，但所需時間因品種而異，而且會影響成本和質量。因此，在經常爆發含有麻痹性貝類毒素的微藻類的海域，人們仍依賴監察制度來提醒作業的漁民和貝類飼養者。

由於麻痹性貝類毒素集中於消化腺，而閉殼肌含有較少毒素，故摘除所有內臟能有效減少帶子、扇貝等貝類中的麻痹性貝類毒素。雖然烹煮不能消除麻痹性貝類毒素，但卻能把貝類中的毒素轉移到烹煮的汁液（本地的一項研究顯示帶子內約有半數毒素轉移到烹煮的汁液），令汁液含有毒素。因此，棄掉烹煮的汁液可降低麻痹性貝類毒素水平。

### 注意要點：

- 麻痹性貝類毒素是由某些微藻類產生的毒素，非常耐熱，不能透過烹煮清除。
- 烹煮前先摘除雙貝類的內臟和生殖腺（如適用），以及食用前棄掉烹煮的汁液，均可大大降低麻痹性貝類毒素水平。
- 避免過量進食貝類。

## 本港情況

中心一直定期監察本港貝類中的麻痹性貝類毒素。由二零零七至零九年，中心約為1 249個樣本進行麻痹性貝類毒素分析，當中有12個（<1%）屬於不合格樣本。

## 給市民的建議

- 向可靠來源購買貝類。
- 烹煮前先刷洗外殼。
- 烹煮前先摘除雙貝類的內臟（如適用），並棄掉烹煮的汁液才進食。
- 避免進食過量貝類，保持均衡飲食。

## 給業界的建議

- 避免在近期受含有麻痹性貝類毒素的微藻類影響的海域撈捕雙貝類。
- 向已建立有關可產生毒素微藻類監察計劃的國家採購貝類。

## 更多資料

- 中心製作有關“小心食用貝類海產”的電視宣傳短片
- 中心編製有關“預防貝類中毒”的單張

## Safety Reference Value

The Joint Food and Agriculture Organization / Intergovernmental Oceanographic Commission / World Health Organization ad hoc Expert Consultation on Biotoxins in Bivalve Molluscs established a provisional acute reference dose of 0.7µg STX equivalents/kg body weight in 2004. With the recalled half-shell scallop as an example, a 60kg adult only needs to consume less than two pieces to reach the reference dose, where symptoms may start to appear.

## Preventive Measures

There are several ways to keep the hazards of the PSP toxins away from bivalves for human consumption even though PSP toxins-contaminated bivalves look no different from normal ones. When harvesting bivalve shellfish, the trade should avoid areas that have recently been affected by PSP toxin-containing algae. Although keeping bivalves in PSP toxin-free water can allow them to release the toxins and reduce their toxins level, the time required varies from species to species and this can have impact on cost and quality. Therefore, people still depend on monitoring systems to warn fishermen and shellfish farmers in areas where there are regular outbreaks of PSP toxin-containing algae.

Removal of all internal organs (evisceration) is an effective PSP-toxin reduction measure that can be used in shellfish like scallops, as the toxins concentrate in the digestive gland and the adductor muscle contains lower level of the toxins. Although PSP toxins cannot be destroyed by cooking, the cooking process can transfer the heat-resistant toxins to the cooking liquid (about half of the toxins are transferred in a local study with scallops) and render it toxic. Therefore, discarding the cooking liquid may reduce the level of PSP toxins.

### Points to Note:

- PSP toxins are heat-stable toxins produced by certain algae and cannot be destroyed through cooking.
- Removal of viscera and gonads from bivalves before cooking, where possible, and discarding any cooking liquid before consumption can greatly reduce the level of PSP toxins.
- Avoid over-indulgence in consumption of shellfish.

## Local Situations

The CFS has been regularly monitoring shellfish in Hong Kong for PSP toxins. From 2007 to 2009, about 1 249 samples were analysed for PSP toxins and 12 (<1%) of them were found unsatisfactory.

## Advice to Public

- Purchase shellfish from reliable source.
- Scrub and clean shells before cooking.
- Reduce PSP toxins level by removal of the innards from bivalves before cooking where possible and discard any cooking liquid before consumption.
- Avoid over-indulgence in shellfish consumption and maintain a balanced diet.

## Advice for Trade

- When harvesting bivalve shellfish, avoid areas that have recently been affected by PSP toxin-producing algae.
- Source shellfish from countries where they have established monitoring programmes for toxin-producing algae.

## Further Information

- The CFS television advertisement on “Safety Tips on Consumption of Shellfish”
- The CFS pamphlet on “Prevent Shellfish Poisoning”

# 微波煮食與食物安全

## Microwave Cooking and Food Safety

食物安全中心  
風險評估組  
科學主任周淑敏女士報告

Reported by Ms. Shuk-man CHOW, Scientific Officer,  
Risk Assessment Section,  
Centre for Food Safety

除了過去兩期介紹的電離輻射外，微波是另一種常用於控制食源性病原體的輻射形式。

### 微波煮食的原理

微波是類似無線電波和陽光的一種電磁能，由電力產生，能穿過玻璃、紙張、塑膠和類似物料。微波可用來轉送長途電話，發送電視訊號和治療肌肉疼痛。不過，我們最為熟悉的用途，是作為煮食能量源。

食物接觸到微波時，所吸收的能量會導致極性分子(例如水分子)和離子化合物(例如已溶解的鹽分)旋轉／振動，從而產生煮食的熱能。雖然熱能直接在食物中產生，但微波並非如一般人所想，把食物“由內至外”烹煮。事實上，微波只能穿透食物達約2.5至3.8厘米(或1至1.5吋)深。就較厚的食物而言，食物的外層主要由微波加熱和烹煮，而內部則主要透過滾燙的外層所傳導的熱能烹煮。

### 有關微波煮食的安全關注

使用微波爐解凍、烹煮和翻熱食物既方便又節省能源，因此微波爐常用於配製膳食。不過，有關食用經微波處理的食物的安全問題備受公眾關注。

#### 微生物安全

幾乎所有食物在某程度上都受到微生物的污染。一如其他傳統煮食方法，微波煮食的過程同樣會消滅這些微生物，因此微波爐可安全烹煮食物。不過，由於微波爐內的交流電磁場分布不均，以及食物沒有規則地吸收微波(骨頭會令四周的肉不能徹底煮熟)，因此經微波處理的食物會出現“冷點”。如食物加熱不均勻以及有些部分沒有煮熟，細菌和其他病原體可能會繼續生存，引起食源性疾病。

為盡量減低微波煮食的微生物風險，多個國家食物安全機構已就使用微波爐的正確食物處理方法及煮食習慣提出建議，舉例說，應蓋好使用微波加熱的食物，以保存水分，因為蒸氣有助消滅有害細菌，並確保安全、均勻地烹煮食物。

#### 化學安全

烹煮食物的過程會產生可能致癌的物質。有人擔心微波煮食也會增加食物的致癌或誘變物質。但目前並無有力證據證明利用微波加熱食物會增加致癌物質。

#### 營養價值

有人擔心微波煮食會影響食物的營養價值。事實上，微波煮食所減低的營養含量不會高於其他加熱方法。由於微波煮食的烹煮時間較短，所用的水分亦較少，因此對營養素的破壞往往比傳統煮食方法少。美國食物及藥物管理局指出，以微波爐烹煮的食物可能保存更多維他命和礦物質。

Besides ionizing radiation introduced in the previous two issues, microwaves are another form of radiation that is commonly used to control foodborne pathogens.

### Principles of Microwave Cooking

Microwaves are a form of electromagnetic energy like radio waves and sunlight. They are generated by electricity and capable to pass through glass, paper, plastic, and similar materials. They are used to relay long distance telephone calls, send television communications, and treat muscle soreness. But microwaves are most familiar to us as an energy source for cooking.

When food is exposed to microwaves, the energy absorbed causes polar molecules (e.g. water molecules) and ionic compounds (e.g. dissolved salts) to rotate/vibrate and produce heat to cook the food. Although heat is produced directly in the food, microwaves do not cook, as is commonly believed, from the “inside out”. Actually, microwaves penetrate foodstuffs to a depth of about 2.5 to 3.8 centimetres (or 1 to 1.5 inches). In thicker pieces of food, the outer layers are heated and cooked primarily by microwaves while the inside is cooked mainly by the heat conducted from the hot outer layers.

### Safety Concerns Associated with Microwave Cooking

Microwave ovens provide a convenient and energy efficient way to thaw, cook and reheat food, and they are commonly used in meal preparation. However, the safety issues on the consumption of microwaved food have attracted public concerns.

#### Microbiological safety

Nearly all foods are contaminated by microorganisms to certain extent. These microorganisms will be destroyed during microwave cooking just as in other conventional methods, so food can be safely cooked in microwave ovens. However, “cold spot” can occur in microwaved food because of the uneven distribution of electromagnetic field in the oven and the irregular way the microwaves absorbed by the food (e.g. bone can shield the meat around it from thorough cooking). If food does not heat evenly and some parts are left undercooked, bacteria and other pathogens may survive and cause foodborne illness.

To minimise the microbiological risk associated with microwave cooking, a number of national food safety authorities have recommended proper food handling techniques and cooking practices for the use of microwave oven. For example,

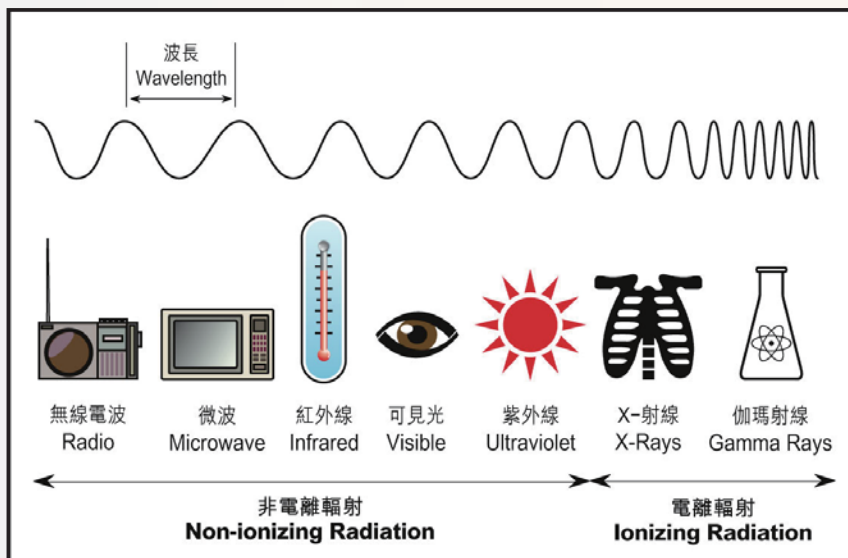
food for microwave heating should be covered to hold moisture where the steam will help destroy harmful bacteria and ensure safe, even cooking.

#### Chemical safety

Cooking processes are known to induce the production of potential carcinogens. There have been concerns that microwave cooking may also increase the production of carcinogens or mutagens in food. Currently, there is no tenable evidence that the production of any carcinogenic substances would be increased upon the application of microwave heating.

#### Nutritional quality

There is concern that microwave cooking will have effects on the nutritional quality of food. In fact, microwave cooking does not reduce the nutritional value of foods any more than other heating methods. Because of the shorter cooking times and less water used, microwave cooking tends to be less harsh on nutrients than conventional cooking methods. According to the U.S. Food and Drug Administration (FDA), foods cooked in a microwave oven may keep more vitamins and minerals.



電磁頻譜(由無線電波至伽瑪射線)

Electromagnetic spectrum stretches from radio waves to gamma rays.

輻射安全

微波與核能毫無關係。微波由電力產生，使用的波長與電視波、電鬚刨及雷達相若。微波能量被食物吸收後會轉化為熱力，不會令食物帶有“放射性”或受“污染”。

如欲深入了解有關經微波處理食物的安全性以及使用微波爐加熱某些食物時（例如水和蛋）為防灼傷而應特別注意的事項，請參考中心有關“微波煮食與食物安全”的文獻研究。

Radiological safety

Microwaves are nothing related to nuclear energy. They are generated by electricity and use a wavelength similar to television waves, electric shavers and radar. Microwave energy changes to heat as it is absorbed by food, it does not make food “radioactive” or “contaminated”.

For more information on the safety of microwaved food and the special cautions to prevent potential burns in heating certain specific food items (e.g. water and egg) with microwave ovens, please refer to our literature review on “Microwave Cooking and Food Safety”.

食物事故點滴  
Food Incident Highlight

海蜇中的鋁

北京當局在上個月公布一項調查結果，指某些海蜇產品的鋁含量過高。本港報章亦有報道這則消息，並引起市民關注。

硫酸鋁鉀(國際編碼系統編號522)，俗稱明礬，一向在加工海蜇時用作固化劑。海蜇的鋁含量過高可能因業界使用明礬作為食物添加劑所致。由於鋁化合物已證實會影響實驗動物的生殖和發育情況，因此近期引起公眾關注從食物中攝入過量鋁的問題。

食物安全中心已制訂“含鋁食物添加劑使用指引”，並促請業界採用指引訂明的措施來減少食物中的鋁含量。市民應保持均衡飲食和限制進食海蜇產品，以免因偏食某幾類食物而攝入過量鋁。

Aluminium in Jellyfish

Last month, Beijing authority released the results of a survey which found excessive amount of aluminium in some jellyfish products. This news was reported in local newspapers, which raised some public concerns.

Aluminium potassium sulphate (INS No. 522), commonly known as alum, has been used as a firming agent in the processing of jellyfish. Excess amount of aluminium in jellyfish may be due to use of alum as food additive. Since aluminium compounds have demonstrated adverse reproductive and developmental effects in experimental animals, there have been recent concerns on excessive intake of aluminium from food.

The Centre for Food Safety has devised the [Guidelines on the Use of Aluminium-containing Food Additives](#) and urged the trade to adopt measures stipulated in the Guidelines to reduce the aluminium content in food. The public is advised to maintain a balanced diet and limit consumption of jellyfish products, so as to avoid excessive exposure to aluminium from a small range of food items.

食物智庫  
Food for Thought

海蜇

海蜇是中國菜中常見的冷盤或小吃，因為許多人都愛其爽韌質感。為令海蜇爽韌，傳統的海蜇加工過程會使用鹽和硫酸鋁鉀(又稱明礬)的混合物，這可能會引起食物安全問題。此外，某些海蜇菜式可能未經徹底煮熟。因此，消費者應注意以下各項：

Jellyfish

Jellyfish dish is a common cold dish or appetiser in the Chinese cuisine because many people like its firm texture. To attain this desirable texture, traditional processing of jellyfish uses a mixture of salt and aluminium potassium sulphate (also known as alum), which may raise food safety concern. Furthermore, in some cases, preparation of jellyfish dish may not involve thorough cooking. Therefore, consumers are advised to note the following -

主要的食物安全問題 Significant Food Safety Concerns	給市民的建議 Advice to the Public
<p>鋁 (Aluminium)</p> <p>鋁化合物證實會對實驗動物產生生殖和發育毒性。從膳食中攝入鋁不會有患上阿爾茨海默氏癡呆(早老性癡呆)的風險。阿爾茨海默氏癡呆是可影響記憶力、思考力和日常生活能力的腦部疾病，主要影響老年人。</p> <p>Aluminium compounds have demonstrated reproductive and developmental toxicity in experimental animals. Dietary exposure to aluminium is not considered to pose a risk for developing Alzheimer's disease, a brain disease that affects memory, thinking skills, and the ability to carry out daily tasks usually among older people.</p>	<ul style="list-style-type: none"> <li>保持均衡飲食。 Maintain a balanced diet.</li> <li>限制進食海蜇 Limit consumption of jellyfish.</li> </ul>
<p>細菌污染 (Bacterial Contamination)</p> <p>海蜇通常不會徹底煮熟。如處理不善，便會增加細菌污染的風險。</p> <p>Jellyfish is usually not thoroughly cooked. Improper food handling, in addition, increases the risk of bacterial contamination.</p>	<ul style="list-style-type: none"> <li>以飲用水配製海蜇菜式，並遵從良好個人衛生習慣。 Prepare jellyfish dish with potable water and follow good personal and food hygiene practices.</li> <li>把即食海蜇放在有蓋容器內，遠離生的食物，並保持在攝氏4度或以下。 Keep the ready-to-eat dish in covered containers and away from raw food at temperature at 4°C or below.</li> </ul>

風險傳達  
工作一覽  
Summary of  
Risk Communication Work

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