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貝類毒素 — 貝類海產愛好者的大敵

Shellfish Toxins - Nemesis of Shellfish Lovers

食物安全中心風險評估組
科學主任林漢基博士報告

Reported by Dr. John LUM, Scientific Officer,
Risk Assessment Section, Centre for Food Safety

食物安全中心(食安中心)分別在二零二四年四月及五月接獲衛生防護中心轉介共兩宗懷疑麻痹性貝類中毒及神經性貝類中毒的個案。這兩宗個案的患者在家中進食多種貝類海產包括響螺、扇貝、貴妃蚌、海螺及花螺後一小時內出現症狀。本文將概述貝類毒素的來源、感染途徑、其對人類健康的影響以及食物的控制措施。

貝類毒素是什麼？

貝類毒素是一組由名為雙鞭毛藻的藻類產生的天然毒素。世界各地均曾報導由各種貝類毒素所引起的人類中毒個案，當中較為重要的貝類毒素類別包括麻痹性貝類毒素、下痢性貝類毒素、神經性貝類毒素、失憶性貝類毒素及原多甲藻酸貝類毒素。這些貝類毒素的資料及不同的貝類中毒症狀[早前已作探討](#)。

The Centre for Food Safety (CFS) received referrals from the Centre for Health Protection of two suspected cases of paralytic shellfish poisoning (PSP) and neurotoxic shellfish poisoning (NSP) in April and May 2024, respectively. Patients in both cases developed symptoms within one hour after consuming a variety of shellfish at home, including conches, scallops, common oriental clams, sea snails and areolate babylons. An overview of shellfish toxins including their sources, modes of transmission, impact on human health and control measures in food will be provided in this article.

What are Shellfish Toxins?

Shellfish toxins are a group of natural toxins produced by certain species of algae known as dinoflagellate. Suspected or confirmed episodes of human poisoning caused by shellfish toxins have been reported worldwide and the more important ones included paralytic shellfish toxins (PSTs), diarrhetic shellfish toxins (DSTs), neurotoxic shellfish toxins (NSTs), amnesic shellfish toxins (ASTs) and azapiracid shellfish toxins (AZTs). Details on these shellfish toxins and the symptoms of different shellfish poisoning have been [discussed previously](#).

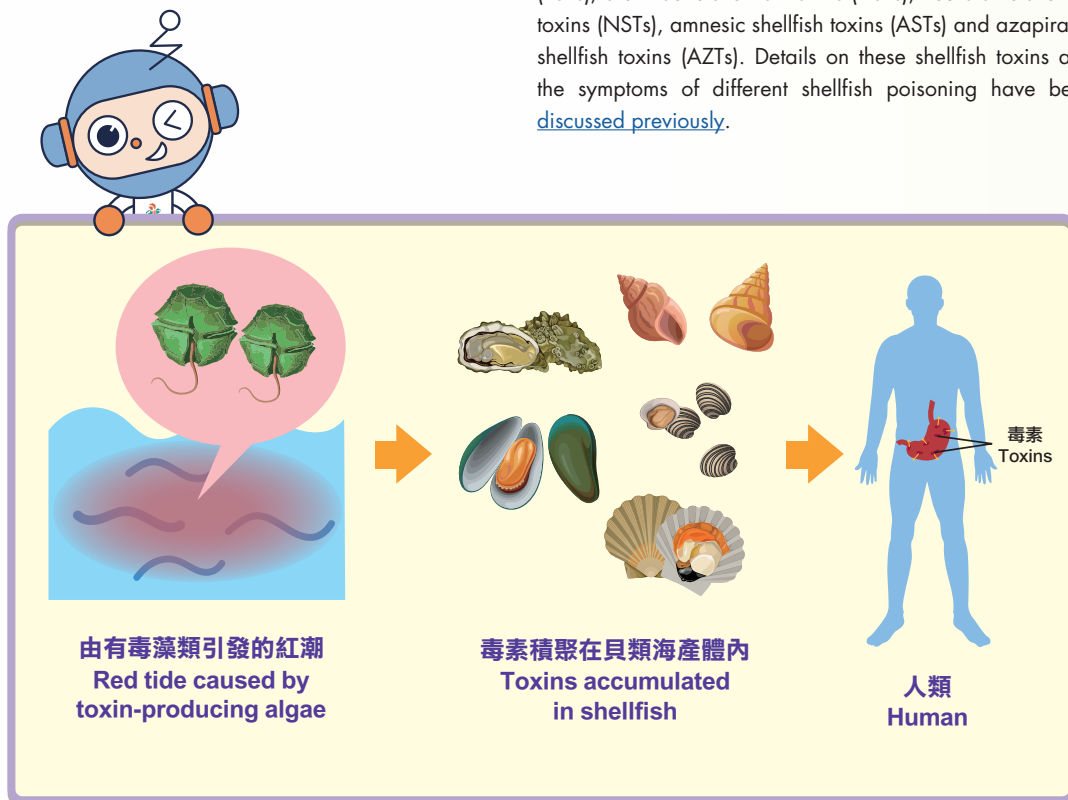


圖1: 貝類海產濾食有毒藻類，並累積毒素在體內，最後可能引致人類出現貝類中毒。

Figure 1: Shellfish filter feed on toxin-producing algae and accumulate the toxins in their bodies, which may eventually cause shellfish poisoning in humans

貝類海產如何受貝類毒素污染？

貝類毒素大部分源自自由微藻引發的有害藻華，通常稱為「紅潮」。因貝類海產是濾食性動物，他們會把水抽進其體內、過濾並吃下藻類及其他食物粒子。當紅潮發生時，貝類海產濾食大量毒藻後，毒素便會在其體內積聚，令吃下這些貝類海產的人中毒（圖1）。部分曾涉及貝類中毒的貝類海產包括青口、蜆、蠔、扇貝、響螺、海螺和象拔蚌等。

貝類毒素的控制措施

由於貝類海產可能含有貝類毒素，以及對消費者健康造成影響，因此貝類毒素成為與貝類相關的最重大危害之一。貝類海產積聚的毒素數量及毒素停留在組織的時間會因海產的品種而異，也取決於海產的生長環境。據報，部分貝類海產在受毒素污染後長達數月的一段長時間內仍保留毒性。目前並無實際可行的方法去除受貝類毒素污染的貝類海產。

國際間對貝類毒素的管控主要透過實施藻類毒素監察計劃來實現，即監察海域上貝類撈捕區或養殖區內有否出現可產生毒素的藻類。不同地區也會對貝類海產的肉進行貝類毒素水平測試。若發現有毒藻類大量繁殖或驗出貝類毒素達到危險水平，受影響的海域便會封閉，暫停撈捕或生產貝類海產，直至調查確定海產的毒素處於安全水平。香港也施行類似的監察計劃。

隨著食品科技的進步和食物貿易全球化，貝類海產的食品可運送到世界各地。因此，除了在貝類海產撈捕區推行監察計劃，各地也實施食物監測計劃，對市面的食品進行貝類毒素測試。

迷思與事實

從外觀可否判斷貝類海產是否含有貝類毒素？

不可以。含有危險水平貝類毒素的貝類海產在外觀或口感上沒有任何分別。因此，肉眼不能區分有毒和無毒的貝類海產。化驗是唯一可檢測貝類毒素的方法。

烹煮能破壞貝類毒素，令貝類海產可安全食用嗎？

貝類毒素耐熱，烹煮、冷藏或其他配製食物的程序均不能破壞這些毒素。不過，由於貝類毒素主要集中積聚在貝類海產的內臟，在進食前盡量除去並棄置所有內臟，可減低貝類中毒的風險。

注意事項

- 貝類毒素由名為雙鞭毛藻的藻類產生，烹煮、冷藏或其他配製食物的程序均不能破壞這些毒素。
- 肉眼不能區分有毒和無毒的貝類海產。
- 一般而言，貝類毒素集中積聚在貝類海產的內臟。進食前除去並棄置所有內臟，可減低貝類中毒的風險。

給消費者的建議

- 向可靠來源購買貝類海產。
- 為減低貝類中毒對健康帶來的風險，應盡量去除並棄置貝類海產的內臟。
- 進食貝類海產後若感到不適，應立即求醫，並保留剩餘的海產，以便進行調查和化驗。

給業界的建議

- 妥善保存交易記錄，以便在有需要時追溯源頭。
- 不要接收來歷不明的貝類海產。

How do Shellfish become Contaminated with Shellfish Toxins?

Shellfish toxins mostly originate from harmful algal blooms (HABs), commonly known as "red tides", which are caused by certain species of phytoplankton. Since shellfish are filter feeders, they pump water through their systems, filtering out and eating algae and other food particles. When shellfish eat large amounts of these toxic algae during red tides, the toxins will accumulate in the shellfish and sicken people who eat them (Figure 1). Examples of shellfish that have been involved in shellfish poisoning include mussels, clams, oysters, scallops, conches, sea snails and geoducks.

Controlling Measures on Shellfish Toxins

The possible presence of shellfish toxins in shellfish, as well as the health consequences to consumers, make shellfish toxins one of the most important hazards associated with shellfish. The amounts of toxins taken up by shellfish and the times that these toxins remain in the shellfish tissues are different for different species of shellfish and depend on growth environment conditions. It has been reported that some shellfish species can remain toxic for an extended period of time, up to several months, after being exposed to toxins. Currently, there are no practical and reliable methods to detoxify shellfish that are contaminated with shellfish toxins.

In the international arena, the control of shellfish toxins is mainly achieved through the implementation of algal toxin monitoring programmes, which monitor the presence of toxin producing algae in shellfish harvesting or culture zones in the sea. The testing of the levels of shellfish toxins in the meat of shellfish is also widely practised in different places. In case toxic algal blooms are noted or shellfish toxins are detected at hazardous levels, the affected sea areas will be closed and suspended from shellfish harvesting and production until toxicological investigation has made clear that the shellfish is free from hazardous amounts of shellfish toxins. Hong Kong has also adopted a similar monitoring programme for shellfish toxins producing algae.

With the advancements in food technology and the globalisation of the food trade, shellfish products can be shipped around the world. Therefore, in addition to adopting monitoring programmes in shellfish harvesting areas, many places have also implemented a food surveillance programme to cover the testing of shellfish toxins on food products available locally.

Myth and Facts

Can I tell if shellfish contain shellfish toxins by how they look?

No. Shellfish containing dangerous levels of shellfish toxins do not look or taste any different from shellfish that are safe to eat. Therefore, toxic shellfish cannot be distinguished from non-toxic ones visually. Laboratory testing of shellfish is the only method of detecting shellfish toxins.

Does cooking shellfish destroy shellfish toxins and make them safe to eat?

Shellfish toxins are heat stable and cannot be destroyed by cooking, freezing or other food preparation procedures. However, as shellfish toxins tend to concentrate in the internal organs of shellfish, the risk of shellfish poisoning can be reduced by removing and discarding all internal organs of shellfish where possible before consumption.

Key Points to Note

- Shellfish toxins are produced by algae known as dinoflagellate, and cannot be destroyed by cooking, freezing or other food preparation methods.
- Toxic shellfish cannot be distinguished from non-toxic ones visually.
- In general, shellfish toxins are concentrated in the internal organs of shellfish. The risk of shellfish poisoning can be reduced by removing and discarding all internal organs of shellfish before consumption.

Advice to Consumers

- Purchase shellfish from reliable sources.
- To reduce the health risk of shellfish poisoning, remove and discard all internal organs of shellfish where possible before consumption.
- Anyone who feels ill after eating shellfish should immediately seek medical attention, and save any leftovers for investigation and laboratory testing.

Advice to Trade

- Maintain proper trade records to facilitate source tracing when necessary.
- Do not accept shellfish from dubious sources.

植物肉是什麼，與肉類有何異同？

Plant-Based Meat – What are they and How do they Compare with Meat?

食物安全中心風險傳達組
科學主任游天頌先生報告

Reported by Arthur YAU, Scientific Officer,
Risk Communication Section, Centre for Food Safety

在追求可持續飲食習慣的趨勢下，植物肉成為受歡迎的傳統肉類替代品。植物肉產品又稱肉類替代品或仿肉，生產時加入植物配料以仿製肉類的味道、質感及外觀。

植物肉是什麼？

亞洲菜式利用大豆產品調配味道與肉類相近的素菜由來已久，例子包括由腐皮製成的齋雞和由麵筋製成的齋滷味。現今的植物肉往往含有萃取自大豆、小麥、豌豆及菇類的蛋白質，提供了跟肉相似的質感和結構。為令口感更佳，會加入椰子油等能使食物有肉汁效果的配料，而甲基纖維素等黏合物則可確保配料結合在一起。此外，還加入多種調味劑以增進色香味，模仿傳統肉類的口感。

營養成分和與傳統肉類的比較

植物肉對環境可持續發展較肉類為佳的同時，檢視植物肉相較傳統肉類的營養成分至關重要。植物肉膽固醇含量低，而且一般來說膳食纖維含量較高，是植物肉的兩大好處。然而，跟肉類是完全蛋白質來源，含有所有必需氨基酸不同，消費者需要悉心搭配植物肉與其他蛋白質或服食補充劑，以達至相等的營養攝取量。

香港中文大學研究人員於2023年進行的一項研究顯示，27個品牌逾270款預先包裝植物肉產品在本港有售，根據營養標籤的資料，當中有相當數量產品的脂肪、鹽及糖含量為中等至偏高。研究結果顯示，植物肉能模仿肉類的質感和味道，同時也可能繼承了加工食品部分不健康的特性。世界衛生組織歐洲辦事處（世衛歐洲辦事處）也強調，植物膳食，特別是在家以外的地方配製的膳食，可能含有大量鹽分。此現象反映人們對植物肉的完整營養成分組合及整體上如何構成均衡飲食的一部份的認識有不足之處。

飲食均衡對素食飲食的重要性

植物性食物的膳食需要好好計劃並保持均衡，否則不一定會較為健康。植物肉或會缺少部分營養素如維他命B12及維他命D、鈣質、鐵質及某些必需氨基酸，凸顯有需要悉心計劃膳食。世衛歐洲辦事處建議選擇最低加工食品，以盡量增加對健康的益處。因此，選擇植物肉的消費者應注意產品的營養成分，不同品牌和產品種類差異可能甚大。最好參閱預先包裝食物上的營養標籤，並考慮在膳食中添加強化食品或進食多種不同植物性食物，確保能攝取所有重要營養素。[有特別營養需要而選擇素食的人士](#)，包括小童、青少年、孕婦、授乳婦女、長者和慢性病患者，應諮詢醫生及營養師的意見，以定下切合個人需要的飲食選擇。此

In the quest for sustainable eating habits, plant-based meat (PBM) has emerged as a popular alternative to traditional animal meat. Known also as meat substitutes or analogs, PBM products are manufactured to replicate the taste, texture and appearance of meat using plant-derived ingredients.

What is PBM ?

Historically, Asian cuisines have utilised soy products to create vegetarian dishes akin to meat flavours. Examples include vegetarian chicken made from bean curd sheets and vegetarian lo mei which is produced from wheat gluten. Modern PBMs often comprise of proteins from soy, wheat, peas and mushrooms, which provide the necessary texture and structure resembling meat. To enhance the sensory experience, ingredients like coconut oil are added for juiciness, while binders like methylcellulose ensure cohesion. Various seasonings are also added to enrich the flavour profile, mimicking the sensory experience of consuming traditional meat.

Nutritional Composition and Comparison with Regular Meat

While PBMs are noted for their environmental sustainability over meat, it is crucially important to examine their nutritional profile compared with that of conventional meat. PBMs' low cholesterol levels and often higher dietary fibre content are two of their main benefits. However, unlike meat, which is a complete protein source containing all essential amino acids, PBMs often require careful combination with other proteins or the consumer has to take supplements to achieve a similar nutritional intake.

A study by researchers at the Chinese University of Hong Kong in 2023 revealed that over 270 prepackaged PBM products from 27 brands were available locally, with a significant percentage containing medium to high levels of fat, salt and sugar based on the information on the nutrition labels. These findings suggest that while PBMs can mimic the texture and taste of meat, they can also inherit some of the unhealthy attributes of processed foods. The World Health Organization - Regional Office for Europe (WHO-Europe) has also highlighted that plant-based meals, especially those prepared outside the home, can contain a lot of salt. This indicates a gap in knowledge regarding the full nutritional composition of PBMs and how they contribute to a balanced diet as a whole.

The Importance of a Balanced Diet in Plant-Based Eating

A plant-based diet does not always equate to better health unless it is well-planned and balanced. PBMs may be deficient in some nutrients, such as vitamins B₁₂ and D, calcium, iron and certain essential amino acids, which highlights the need for careful dietary planning. The WHO-Europe recommends opting for minimally processed plant foods to maximise health benefits. Consumers choosing PBMs should therefore be vigilant about the products' nutritional content, which can vary widely between brands and types. It is always a good idea to read nutrition labels on prepackaged food and consider supplementing the diet with fortified foods or diverse plant sources to ensure the intake of all essential nutrients. [Populations who have special nutrition needs and opt for vegetarian diets](#), including [children, adolescents](#), pregnant women, lactating mothers, elderly persons and people with chronic diseases, should consult medical practitioners and dietitians in order to meet their special nutritional needs. Also, allergens that are usually not present in meat may be present in PBM. People with food allergy should also



圖2: 植物肉的生產流程
Figure 2: Production of PBM

外，肉類中不常見的至敏物可能存在於植物肉。有食物過敏的人士也應了解食物是否有會令自己過敏的配料，例如大豆、穀類（麩質）和堅果。

總括而言，植物肉雖然向因為道德或環境理由希望減少吃肉的人士提供了可行的替代品，但是不能視作動物肉營養的直接替代品。植物肉作為替代品，應作為包含多種未加工植物性食物飲食的一部分。此外，或有需要進食補充劑以免營養不足。若能作出知情的決定，並計劃能全面滿足營養需要的膳食，便能享受植物性食物的膳食對健康帶來的益處而無須犧牲營養價值。

look out for ingredients that they are allergic to, for example, soya, cereals grains (gluten) and nuts.

In conclusion, while plant-based meats offer a viable alternative for those seeking to reduce their meat consumption for ethical or environmental reasons, they should not be viewed as a direct nutritional substitute for animal meats. As an alternative, they ought to be incorporated into a diet consisting of a range of unprocessed plant foods and supplements may be needed to avoid any nutrient deficit. By making informed decisions and planning a diet that fulfills all nutritional requirements, individuals can enjoy the health benefits of a plant-based diet without compromising on nutritional quality.

慎防三文治的食物安全風險 Beware of the Food Safety Risk of Sandwiches

2024年5月，越南發生了多宗懷疑食物中毒個案，與在一家食肆進食名為“bánh mì”的越式三文治有關。對患者進行的抽血化驗顯示患者體內有大腸桿菌，一種常見於牛肉、芝士及水果等新鮮農產品的細菌。媒體報導指室溫偏高也能助長細菌在食物內滋生。

三文治屬高風險食物，原因是製作過程中通常需以人手處理，容易增加交叉污染的可能性。三文治也可能含有容易變壞的配料，稍一處理不當，便有可能被細菌污染。業界應在零售店鋪裝設適當及足夠的冷存設備，並貯存或展示三文治在攝氏4度或以下。市民應向持牌食物業處所購買食物，包括三文治。購買或配製三文治後應立即進食或存放在安全溫度。

In May 2024, there were suspected bacterial food poisoning cases linked to the consumption of sandwiches called “bánh mì” from a food premises in Vietnam. The blood test of victims showed the presence of *Escherichia coli*, which is a bacterium that can be found in fresh produce like beef, cheese and fruit. Media reported that the high ambient temperature could also favour bacterial growth in food.

Sandwiches are regarded as a high risk food, as they are often handled manually during preparation, which increases the possibility of cross-contamination. They may also contain perishable ingredients that can get contaminated with bacteria if they are not handled properly. The trade should provide appropriate and adequate refrigeration facilities in retail outlets, and store or display sandwiches at 4°C or below. The public should purchase food including sandwiches from licensed food premises. Sandwiches should be consumed immediately or kept at a safe temperature after purchase or preparation.

食物安全日2024 — 掌握安全溫度，方為煮食之道！ Food Safety Day 2024 – Keep Bacteria at Bay? Safe Temperature is the Way!

「食物安全日」是食安中心為響應六月七日「世界食品安全日」舉辦的年度重點宣傳活動。本年的主題是把食物存放於安全溫度，即食物安全五要點的要素之一。保持妥善溫度控制對減少包括細菌在內的微生物在食物滋生，從而減低食物中毒風險至關重要。

食物如非立即食用，應存放在適當的溫度。冷食應存放在攝氏4度或以下，熱食則應存放在攝氏60度以上。若無法把食物存放於安全溫度，便應遵從2小時/4小時原則。為慶祝食物安全日2024，食安中心籌備多項推廣活動，包括推出社交媒體貼文、短片及宣傳物品，詳情請瀏覽有關專題網頁。

Food Safety Day (FSD) is an annual signature publicity event organised by the Centre for Food Safety (CFS) to tie in with World Food Safety Day on 7 June. This year's theme is to keep food at safe temperatures, which is one of the essential components of the [Five Keys to Food Safety](#). Maintaining proper temperature control is vital to reducing the growth of microorganisms including bacteria in food and hence minimising the risk of food poisoning.

Food not for immediate consumption should always be kept at proper temperatures. Cold food should be stored at 4°C or below, whereas hot food should be kept at above 60°C. Whenever maintaining food at a safe temperature is not possible, it is advised to follow the [2-hour / 4-hour rule](#). The CFS has organised various promotional activities to celebrate FSD 2024, including social media posts, short videos and publicity materials. For details, please visit the [thematic website](#).



風險傳達工作一覽（二零二四年五月）

Summary of Risk Communication Work (May 2024)

事故/ 食物安全個案 Incidents/ Food Safety Cases: 359	公眾查詢 Public Enquiries: 137	業界查詢 Trade Enquiries: 241	食物投訴 Food Complaints: 574	給業界的快速警報 Rapid Alerts to Trade: 10
給消費者的食物警報 Food Alerts to Consumers: 3	懷疑食物中毒個案通報 Suspected Food Poisoning Alerts: 2	教育研討會/ 演講/ 講座/ 輔導 Educational Seminars/ Lectures/ Talks/ Counselling: 56	上載到食物安全中心網頁的新訊息 New Messages Put on the CFS Website: 55	