

# 食物安全焦點

## Food Safety Focus



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### 焦點個案 Incident in Focus

## 肉毒中毒與真空包裝食物

## Botulism and Vacuum Packed Food

食物安全中心  
風險評估組  
科學主任莊梓傑博士報告

Reported by Dr. Ken CHONG, Scientific Officer,  
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今年四月十五日，台灣食品藥物管理局發出新聞公告，指台灣發生兩宗懷疑與真空包裝豆乾製品及罐裝鹽漬蚵有關的食源性肉毒中毒個案。兩名患者出現呼吸困難，其中一人死亡。食物安全中心已就事件通知有關業界。本文將會探討真空和氣調包裝中肉毒桿菌的風險。

### 食源性肉毒中毒與肉毒桿菌

肉毒桿菌可產生毒性極強的神經毒素，如進食含有這些毒素的食物，可引致食源性肉毒中毒。極少量的神經毒素(即數納克)已足以引致肉毒中毒，但加熱食物至攝氏80度並維持至少10分鐘，就可破壞這種毒素。肉毒中毒症狀包括非常疲倦、虛弱無力、眩暈，通常隨後會出現視力模糊、言語障礙和吞嚥困難。神經毒素可令患者的呼吸肌肉癱瘓，引致死亡。上述症狀通常在患者進食毒素後約18至36小時出現，但亦可介乎4小時至8天不等。在治療方面，患者應盡快獲給予肉毒中毒抗毒素。

可產生致命毒素的肉毒桿菌是一種會產生孢子的細菌，其孢子散布在環境中，可於土壤、清水、海洋沉積物和魚類及其他動物的腸道中找到。因此，孢子可能會存在於動物源性或植物源性食物中。雖然孢子的數量通常不多，但可在合適的環境下(尤其是無氧環境)發芽生長，並迅速產生毒素。視乎菌株種類，肉毒桿菌的理想生長溫度介乎攝氏35至40度或28至30度。部分菌株可在低至攝氏3度的環境下生長和產生毒素，但它們在低溫環境下或需數星期才可產生毒素。因此，單憑冷藏這項措施不能有效消除容易腐壞的密封包裝食物的肉毒桿菌風險。

### 真空包裝食物中的肉毒桿菌

肉毒桿菌不會在有氧環境中的食物上繁殖。不過，罐頭、真空和氣調包裝等食物包裝方法能提供合適環境讓肉毒桿菌生長。在真空包裝的過程中，空氣會被抽掉，而食物會放進密封包裝內。至於氣調包裝，則會以一種或數種氣體(例如二氧化碳及氮)代替包裝內的空氣。這些包裝方法抽掉氧氣或大幅減少氧氣含量，可防止多種需要氧氣才可生長和令食物腐壞的微生物及致病菌繁殖，從而延長冷藏食物的保質期。不過，真空和氣調包裝食物均沒有經過可殺死肉毒桿菌孢子的嚴格加熱程序，故

On 15 April 2010, the Food and Drug Administration of Taiwan issued a press release reporting that vacuum packed soybean products and canned pickled oyster were suspected to be linked to two foodborne botulism cases in Taiwan. Both patients experienced breathing difficulties and one died. The Centre for Food Safety has alerted the relevant traders of the incident. We discuss the risks associated with *Clostridium botulinum* in vacuum and modified atmosphere packaging in this article.

### Foodborne Botulism and *Clostridium botulinum*

Foodborne botulism is caused by ingestion of food containing very potent neurotoxin produced by *Clostridium botulinum*. The toxin can cause illness in minute amount, in the range of a few nanograms. However, it can be destroyed by heating at 80°C for more than 10 minutes. Symptoms of intoxication include marked fatigue, weakness, and vertigo, often followed by blurred vision and difficulty in speaking and swallowing. The toxin may paralyse the breathing muscles and cause death. Onset of symptoms is usually around 18 to 36 hours after the ingestion of the toxin, but may range from 4 hours to 8 days. For treatment, botulism antitoxin should be administered as soon as possible.

The producer of the fatal toxin – *Clostridium botulinum*, is a spore-forming bacterium. Its spores are widely distributed in the environment and can be found in soil, fresh water and marine sediments, as well as intestinal tracts of fish and animals. Hence, they may occur in foods of animal or plant origin. While the level of contamination is generally low, the spores germinate, multiply, and readily produce toxin when under favourable condition, especially during absence of oxygen. The optimal temperatures for growth are 35 to 40°C or 28 to 30°C depending on types of strains. Some strains can grow and produce toxins at temperature as low as 3°C, although it may take several weeks to form toxin when placed at low temperatures. Hence, refrigeration alone cannot effectively remove the risk of *Clostridium botulinum* in perishable foods in airtight packaging.

### *Clostridium botulinum* in Vacuum Packed Food

*Clostridium botulinum* cannot multiply on food stored where there is oxygen. However, certain food packaging methods, including canning, vacuum packaging, and modified atmosphere packaging, can create a suitable environment for the bacterium to grow. During vacuum packaging, air is removed and the food is enclosed in an airtight package. For modified atmosphere packaging, air in the package is replaced with one or several gases such as carbon dioxide and nitrogen. By excluding or greatly reducing oxygen levels, these packaging methods can prevent the growth of many spoilage microorganisms and pathogens that require oxygen to grow and thus increase the shelf-life of chilled foods. Yet, vacuum and modified atmospheric packaging does not involve a strict thermal process designed to destroy the spores of *Clostridium botulinum*, the spores may persist. In addition

焦點個案  
Incident in Focus

孢子可能仍然存活。除了由台灣呈報的上述個案外，其他國家亦曾發生有關這類包裝燻魚的肉毒中毒事件。

英國食物標準局已就有關這類包裝冷藏食品的肉毒桿菌問題發出安全指引。這些食品在整個食物鏈的過程中會作冷藏，其保質期最長為十天。如食品需有更長保質期，製造商應額外採取一項或多項措施，以防止肉毒桿菌生長或毒素形成。這些措施包括：

- 把食物加熱至攝氏90度，並維持10分鐘，或進行可同樣有效殺死肉毒桿菌的其他加熱程序；
- 提高酸度，使食物的酸鹼度保持在5或以下；
- 提高水相中的鹽含量至3.5%或更高水平；
- 降低食物的水活性至0.97或更低水平；以及
- 使用適當分量的防腐劑，例如亞硝酸鹽。

注意要點：

1. 把食物冷藏未必足以抑制肉毒桿菌的生長，因為有些菌株可在攝氏3度低溫的無氧環境中生長和產生致命毒素。
2. 真空或氣調包裝冷藏食物通常沒有經過嚴格的加熱程序，以殺死肉毒桿菌的孢子。
3. 如這類食品的保質期超過十天，業界應額外採取一項或多項控制措施，例如對食品進行加熱處理和調節食品的鹽含量。

給業界的建議

- 確保真空和氣調包裝冷藏食物經過妥善加工和處理，把肉毒中毒的風險減至最低。
- 向消費者提供有關安全食用和貯存真空和氣調包裝食品的資料，例如保質期和有關食物必須再經烹煮的要求。

給消費者的建議

- 遵從製造商有關真空和氣調包裝食品的貯存指示。
- 在食用限期前進食預先包裝食品，包括真空和氣調包裝食物。

更多資料

由英國食物標準局擬備的《真空包裝冷藏食物：降低肉毒桿菌的風險》(<http://www.food.gov.uk/multimedia/pdfs/publication/vacpack0708.pdf>) (只有英文版)

to the cases reported in Taiwan, incidents of botulism associated with smoked fish in these packages have also been reported in other countries.

Food Standards Agency (FSA) of United Kingdom has issued guidance on safety regarding chilled food products in these packages in relation to *Clostridium botulinum*. These food products can be refrigerated throughout the food chain with a shelf-life of not more than 10 days. If longer shelf-life is required, manufacturers should apply one or more additional measures to prevent the growth of the bacterium or toxin formation. These measures include the following:

- Heat-treat at 90°C for 10 minutes, or that with equivalent lethality to the bacterium;
- Increase the acidity to give a pH at or lower than 5;
- Increase salt level to 3.5% or higher in the water phase;
- Reduce water activity to 0.97 or lower; and
- Use preservatives such as nitrite in an appropriate level.

Key Points to Note:

1. Placing in refrigeration may not be able to inhibit the growth of *Clostridium botulinum* as some strains can grow and produce fatal toxin at as low as 3°C in the absence of oxygen.
2. Chilled foods in vacuum packaging or modified atmospheric packaging usually do not involve strict thermal treatment process for destroying spores of this bacterium.
3. Additional controlling measures, such as heat treatment and adjusting salt level, should be applied singly or in combination for these food products with shelf-lives longer than 10 days.

Advice to Trade

- Ensure chilled food products in vacuum packaging and modified atmospheric packaging are properly processed and handled to minimise the risk of botulism.
- Provide information for consumers on safe use and storage of vacuum and modified atmosphere packed food products, such as shelf-life and requirement for cooking.

Advice to Consumers

- Follow the instruction on the storage of vacuum and modified atmosphere packed food products given by the manufacturers.
- Use prepackaged food items, including foods in vacuum and modified atmosphere packages, before the expiry date.

Further Information

Vacuum packed chilled foods: Reducing the risk of *Clostridium botulinum* by FSA (<http://www.food.gov.uk/multimedia/pdfs/publication/vacpack0708.pdf>)

風險傳達  
工作一覽  
Summary of  
Risk Communication Work

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# 甜菊醇糖苷 — 源自草本的代糖

## Steviol glycosides – Sugar Substitutes from Herb

食物安全中心  
風險評估組  
科學主任馬嘉明女士及陳蓉蓉女士報告

Reported by Ms. Janny MA and Ms. Melva Chen, Scientific Officers,  
Risk Assessment Section,  
Centre for Food Safety

我們在上一期品嚐了“紐甜”這種高效代糖。大家想選用天然的東西嗎？那就別錯過今期介紹的代糖 — 甜菊醇糖苷。正如糖一樣，甜菊醇糖苷是天然的植物源性物質。

In the past issue, we have savoured a powerful sugar substitute called neotame. Do you prefer something natural? Then you should not miss the one in this issue - steviol glycosides. Just like sugar, they are naturally occurring of plant origin.

### 甜菊醇糖苷小檔案

- 名稱(食物添加劑國際編碼系統編號)：甜菊醇糖苷(960)
- 來源：甜葉菊植物
- 成分組合：視乎甜葉菊的葉子和所採用的提取及淨化程序；通常含有大量甜菊糖苷及瑞鮑迪甙A，並有少量其他糖苷。
- 技術用途：甜味劑
- 甜味強度：比砂糖甜大約200至300倍
- 能量值：每克大約0千卡
- 應用：水果製品、醃菜、甜品、甜點及餐桌甜味劑

### Portfolio of Steviol Glycosides

- Name (INS number): Steviol glycosides (960)
- Source: Stevia plant (*Stevia rebaudiana* Bertoni)
- Compositions: Depends on the stevia leaves and the extraction and purification processes used; usually contains high percentage of stevioside and rebaudioside A and small amounts of other glycosides
- Technological function: Sweetener
- Sweetness intensity: ~200 - 300 times sweeter than table sugar
- Energy value: ~0 kcal per gram
- Applications: fruit products, pickles, desserts, confectioneries and table-top sweeteners

### 從草藥到甜味劑

甜葉菊原產於南美洲。數百年來，巴西人及巴拉圭人一直以甜葉菊的葉子作為茶和食物的甜味劑，又使用甜葉菊作為草藥治療糖尿病、肥胖症和高血壓等疾病。直至七十年代，甜菊醇糖苷這種甜葉菊提取物才首度作為甜味劑在日本出售。目前，許多國家都種植甜葉菊，而中國是全球最大的甜葉菊種植國和甜菊醇糖苷出口國。

### From Herb to Sweeteners

Stevia is native to South America. For hundreds of years, people in Brazil and Paraguay have used the leaves of stevia to sweeten teas and foods and have used it as herbal medicine for diabetes, obesity, hypertension, etc. Not until the 70s, the extracts, steviol glycosides, were first commercialised as a sweetener in Japan. Today, stevia is cultivated in many countries and China is the largest grower of stevia as well as exporter of steviol glycosides.

### 甜菊醇糖苷的味道

雖然“天然”是甜菊醇糖苷的優點，但“味道”卻可能是其缺點。與砂糖相比，甜菊醇糖苷一般在入口後散發甜味的速度較慢，而甜味亦較持久。此外，每種甜菊醇糖苷可能會有不同的味道，例如甜菊糖苷略帶草藥味，瑞鮑迪甙A具有清新的甜味，其他次要的甜菊醇糖苷則會有苦澀或類似甘草的後味。有些人認為持久甜味和苦澀味難以接受。甜菊醇糖苷混合物的成分組合可能會因用來提取甜菊醇糖苷的栽培品種和不同的生產過程而有異。



甜葉菊植物 (相片來源：珠海市甜菊科技發展有限公司)  
Stevia plant (Source: Zhuhai Stevia Science Development Co., Ltd.)

### Taste of Steviol Glycosides

While “natural” is the strength of steviol glycosides, “taste” may be the weakness of this sweetener. Steviol glycosides in general have a slower onset and longer duration of sweetness than sugar. Furthermore, each steviol glycoside has different taste, for instance, stevioside has a slight herbal taste, rebaudioside-A has a clean sweet taste, and other minor steviol glycosides have bitter or licorice-like aftertaste. Some people find the lingering sweetness and bitter taste to be less desirable. The composition of the steviol glycoside mixtures may differ according to the cultivar from which the steviol glycosides are extracted, and differences in the manufacturing process.

### 甜菊醇糖苷的安全問題

國際及各國食物安全當局基於多項研究結果顯示甜菊醇糖苷的毒性偏低，不會損害人類基因或令人類患癌，確定甜菊醇糖苷是安全的。甜菊醇糖苷的每日可攝入量為每公斤體重0-4毫克。由於食物中只會使用少量甜味劑，正常食用含甜菊醇糖苷的食物不會超出甜菊醇糖苷的每日可攝入量。

### Safety of Steviol Glycosides

Steviol glycosides are determined safe by both international and national food safety authorities based on the findings that they are of low toxicity and are not toxic to genes or cancer-causing. The Acceptable Daily Intake (ADI) for steviol glycosides is 0-4 mg/kg body weight. Since only small amount of sweeteners is used in foods, the ADI is unlikely to be exceeded upon normal consumption of foods containing steviol glycosides.

### 甜菊醇糖苷的規管

根據不同食物安全當局對甜菊醇糖苷作出的正面安全評估結果，食品法典委員會這個負責制定食物標準的國際組織現正就甜菊醇糖苷用作甜味劑一事擬訂規定。直至目前為止，甜菊醇糖苷

### Regulation of Steviol Glycosides

Based on the favourable safety assessment results of steviol glycosides by food safety authorities, the international food standard-setting body, Codex, is currently drafting provisions for steviol glycoside for use as a sweetener. To date, steviol glycosides are permitted in many countries

已獲中國內地、日本、韓國、美國、澳洲及新西蘭等多國批准使用。

## 本港情況

二零零二年，本港因多種食物含有甜菊糖甙(現稱甜菊糖苷，是甜菊醇糖苷中的主要甜味化合物)而進行大規模的食物回收行動。當時，世界各地的食物安全當局對甜菊糖苷的安全問題尚未有定論。現在，基於最新的科學發展，甜菊醇糖苷的安全問題已得到保證。本港法例將於短期內作出修訂，增列甜菊醇糖苷作為經准許的甜味劑，因此我們很快便可享用加入了這種天然甜味劑的食物。

## 甜味劑的小提示

在甜味劑系列文章中，我們為大家介紹了紐甜、甜菊醇糖苷及現有的經准許甜味劑。業界不久將會有十種甜味劑可供選用。雖然這些甜味劑並無安全問題，但大家仍須留意一些“甜食陷阱”。糖尿病患者或注意體重的人可能會選用甜味劑。一種食物不會單單因為沒有糖就自然成為低能量或低脂肪的食物。過量進食含有甜味劑的食物，仍可能令糖尿病患者出現高血糖(因為食物含有其他碳水化合物)或令人增加體重(因為食物含有脂肪等其他成分)。因此，不論食物是添加了糖或甜味劑，關鍵是保持均衡飲食。

including Mainland China, Japan, Korea, the USA, Australia and New Zealand.

## Local Situation

In 2002, a large-scale food recall took place in the territory because of the presence of stevioside, the principal sweetening compound of the steviol glycosides, in a variety of food. At that time, food safety authorities around the world have not yet come to a conclusion regarding the safety of stevioside. Now, in view of the latest scientific development, the safety of steviol glycosides has been assured. We will soon be able to enjoy food with these natural sweeteners as the local regulation will shortly be amended to include steviol glycosides as permitted sweeteners.

## A Kind Reminder on Sweeteners

In the series of sweeteners, we have introduced to you neotame and steviol glycoside, along with the currently permitted sweeteners. A total of 10 sweeteners will be available in the near future. Although there is no safety concern on these sweeteners, there are “sweet-traps” to be aware of. People with diabetes or weight-watchers may opt for sweeteners. Removing sugar solely from a food does not automatically make it low-calorie or low-fat. Eating too much of these sweeteners-containing food may still lead to high blood sugar in diabetic patients due to other carbohydrates in the food or weight gain due to other ingredients such as fat. So, no matter the food is added with sugars or sweeteners, it is important to maintain a balanced diet.



## 雞尾腸中的李斯特菌

食物安全中心(中心)在上月接獲歐洲委員會的通知，指有數批Jean Caby 預先包裝雞尾腸因不當的巴士德消毒過程而可能受李斯特菌污染，當中部分產品已出口往本港。中心立即通知業界停售有關產品，並在四月二十一日向市民發出食物警報。

李斯特菌是一種散布於環境中的細菌，可引致食源性疾病。此菌可透過烹煮過程輕易殺死，但能在冷藏溫度下生存和繁殖。

雖然大部分身體健康的人在感染後很少會出現病徵，但李斯特菌可嚴重影響孕婦、初生嬰兒、長者及免疫力較弱的人，並可引致流產和腦膜炎。保質期較長的冷藏即食食物，例如軟芝士、塗醬、經加工的冷吃肉類及家禽，均屬高危食物，上述容易受影響的群組應避免進食。

## Listeria Monocytogenes in Cocktail Sausages

Last month, the Centre for Food Safety (CFS) received notification from the European Commission that certain batches of Jean Caby pre-packaged cocktail sausages may be contaminated with *Listeria monocytogenes* due to incorrect pasteurisation process. Some of the affected products had been exported to Hong Kong. The CFS promptly alerted the trade to stop selling the products and issued a food alert to the public on 21 April.

*Listeria monocytogenes* is a bacterium widely dispersed in the environment which can cause foodborne disease. It can be easily destroyed by cooking but can survive and multiply at refrigeration temperatures.

Although most healthy individuals rarely develop symptoms when infected, *Listeria monocytogenes* could pose severe effects on pregnant women, newborns, the elderly and people with weak immunity, and could cause miscarriage and meningitis. Ready-to-eat foods with long shelf-lives under refrigeration such as soft cheeses, pate, processed cold meat and poultry are high risk foods and should be avoided by these susceptible groups.

## 火山灰與食物安全

自三月冰島發生火山爆發後，有些人關注到火山灰沉降物對公眾健康(包括食物安全方面)的影響。

火山灰是由火山大爆發時岩石飛散所產生的沙塵組成。不同地區積聚的火山灰數量視乎火山灰可飄移的距離。至於火山灰對牲畜和農作物的影響，則取決於火山灰沉降物的數量和酸度。採用架空灑水和鼓風裝置，以及清洗農作物後才包裝出售，均可清除農作物上的火山灰。

此外，就健康影響而言，火山灰沉降物中的氟化物含量亦是關鍵之一。雖然現時掌握的數據有限，但歐洲食物安全局(只有英文版)認為，由冰島火山爆發造成的火山灰沉降物中的氟化物不會對歐盟地區造成食物安全問題。

## Volcanic Ash and Food Safety

Following the eruption of the volcano in Iceland in March, some people are concerned about volcanic ash fall on public health, including the aspect of food safety.

Volcanic ash is made up of sand and dust produced when explosive eruptions demolish solid rock. The amounts of ash different areas received depend on the distance that ash can travel. The effects on livestock and crops depend on the amount of ash deposited and the acidity of ash. Removal of ash by overhead irrigation and air blasting, together with washing the produce before packing and marketing are possible measures.

Furthermore, the level of fluoride in the ash fall is critical in relation to health effects. Despite limited data, the European Food Safety Authority considered that fluoride found in ash fall from the volcanic eruption in Iceland would not pose food safety concern in the European Union.