



由食物環境衛生署食物安全中心於每月第三個星期三出版
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蔬菜沙律中的沙門氏菌

Salmonella in Vegetable Salad

食物安全中心

風險評估組

研究主任方朗茵博士報告

Reported by Dr. Fiona FONG, Research Officer,
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二零一六年九月，食物安全中心(中心)透過恆常的食物監察計劃，在本地超級市場收集的一個入口預先包裝蔬菜沙律樣本中檢出沙門氏菌。本文將探討沙門氏菌的風險和蔬菜受致病菌污染的風險因素。

沙門氏菌及食源性疾病

沙門氏菌是一類可在動物(包括寵物、活生牲畜及野生動物)腸道中存在的細菌。一些沙門氏菌可引致人類感染食源性疾病。人類受沙門氏菌感染，可引致嘔吐、腹瀉、腹痛及發燒。若未能及時接受適當治療，患者可能出現嚴重併發症，如脫水及敗血病，甚至死亡，但這些情況十分罕見。潛伏期由6至72小時不等，通常在人類受感染後約12至36小時出現徵狀。

與外國(如澳洲、加拿大、美國及英國)的情況相若，在香港，沙門氏菌是主要的食源性致病菌。根據衛生署衛生防護中心的監測數據，在二零一零至二零一六年年中期間，沙門氏菌是本港最常見引致食物中毒確診個案的病原體，佔這類個案總數超過三分之一。沙門氏菌病通常與進食生的蛋和未熟透的肉類及家禽有關。

蔬菜受污染的風險因素

生吃的蔬菜及水果(例如漿果)等植物源性食物亦存在備受關注的微生物危害(例如沙門氏菌、大腸桿菌及李斯特菌)。糧農組織/世衛微生物風險評估聯席會議表示，從全球角度來看，綠葉蔬菜(例如沙律菜)是最令人關注的，主要是由於綠葉蔬菜是大量種植，出口量大，並曾在不同地區爆發多宗涉及多人食物中毒的事故。而且，很多綠葉蔬菜是以複雜多樣的方式種植和加工處理，包括即場包裝的產品以至預先切好的包裝產品等。

In September 2016, the routine Food Surveillance Programme of the Centre for Food Safety (CFS) detected *Salmonella* in an imported sample of prepackaged vegetable salad collected at local supermarket. This article discusses the risk of *Salmonella* and risk factors for contamination of vegetables with pathogens.

Salmonella and Foodborne Illness

Salmonella is a group of bacteria that can be found in the intestinal tracts of animals, including domestic pets, livestock and wildlife. Some *Salmonella* species can cause foodborne illness in humans. Individuals who are infected with *Salmonella* may suffer from vomiting, diarrhoea, abdominal pain, and fever. Though rare, serious complications like dehydration, septicaemia and death may occur when appropriate treatment is delayed. Human infection typically occurs 12 to 36 hours after its introduction to human, although incubation period of six to 72 hours is reported.

Similar to overseas countries (e.g. Australia, Canada, the United Kingdom, and the United States), *Salmonella* is an important foodborne pathogen in Hong Kong. According to surveillance data of the Centre for Health Protection of the Department of Health spanning between 2010 and mid-2016, *Salmonella* was the most common causative agent of confirmed food poisoning cases in Hong Kong, accountable for more than one third of these cases. *Salmonellosis* is usually associated with raw eggs and inadequately cooked meat and poultry.

Risk Factors for Contamination of Vegetables

Food of vegetable origin, such as vegetables to be eaten raw and fruits (e.g. berries), is also of concern in terms of microbiological hazards (e.g. *Salmonella*, *Escherichia coli* (*E. coli*) and *Listeria monocytogenes*). The Joint FAO/WHO Expert Meeting on Microbiological Risk Assessment indicated, from a global perspective, that leafy green vegetables (e.g. salad leaves) presented the greatest concern, mainly because they are grown and exported in large volume and are found associated with multiple outbreaks with high numbers of illnesses. Moreover, many of them are grown and processed in grossly diverse and complex manners, ranging from in-field packing to pre-cut and bagged products.



蔬菜沙律可能含致病菌(例如沙門氏菌)

Pathogens such as *Salmonella* can be found in vegetable salad

焦點個案
Incident in Focus

沙門氏菌可隨食物鏈進入蔬菜，增加數量。主要關注範疇大概是初級生產階段，因為蔬菜大多在地面生長，會沾上泥土。若採用了不良的耕種方式，例如使用未經妥善處理的動物糞便或以污水灌溉，可能會把食源性致病菌(例如沙門氏菌及大腸桿菌)引入農產品。

此外，蔬菜也可能在加工處理過程中受污染或被食物處理人員污染。收割後的工作(例如貯存及運輸時的存放溫度)可能導致蔬菜中的食源性致病菌，由少量細菌增加至可令人致病的細菌數目。

中心採取的行動

中心已知會有關商戶及進口商不合格的化驗結果，並指示他們即時停止出售受影響的產品，並進行回收。此外，中心已追查受影響產品的分銷情況，並向業界及出口國家有關當局通報此事。中心會繼續跟進有關事件，並採取適當行動。

注意要點

1. 沙門氏菌是可在動物腸道中存在的細菌。一些沙門氏菌可引致人類感染食源性疾病。
2. 與外國的情況相若，在香港，沙門氏菌是常見引致食物中毒的病源體。
3. 在初級生產階段及／或收割後工作(例如加工處理)期間，蔬菜均可被致病菌(例如沙門氏菌)污染。

給消費者的建議

- 以流動的清水徹底洗淨蔬菜，包括配製沙律所用的蔬菜。
- 在處理生吃的蔬菜時，避免會出現交叉污染的機會(例如使用一塊砧板處理即食食物，另一塊處理非即食食物)。
- 即時食用拌好的沙律；或即時把拌好的沙律放入雪櫃，並盡快食用。
- 易受感染的人士(包括孕婦、初生嬰兒、長者及免疫力較弱的人)如想品嚐沙律，建議自行配製並盡快食用。

給業界的建議

- 食物處理人員應保持良好的個人衛生，並在處理食物時遵從優良的衛生守則。
- 不應將冷凍的配料及製成品(例如沙律)放置在攝氏4度以上的環境超過兩小時。
- 在製作蔬菜沙律時，可遵從優良製造規範及採用食物安全系統(例如食物安全重點控制)。

Salmonella can be introduced and get amplified in vegetables as they move through the food chain. Primary production is probably the main concern area as vegetables are mostly grown and in contact with soil. Undesirable agricultural practices such as using improperly treated animal manure and irrigating with contaminated water may introduce foodborne pathogens like *Salmonella* and *E. coli* to the produce.

Besides, vegetables can also become contaminated during processing or by food handlers. Post-harvest activities, for example, holding temperature during storage and transport, may provide opportunities for contaminating pathogenic bacteria in vegetables to increase from an insignificant number to an infective dose.

Actions Taken by CFS

CFS notified the vendor and the importer concerned of the unsatisfactory test result, and instructed them to stop selling the affected product immediately and initiate a recall. CFS also traced the distribution of the affected product, and alerted the trade and the relevant authorities of the exporting country about the incident. CFS would continue to follow up on the incident and take appropriate action.

Key Points to Note

1. *Salmonella* can be found in the intestinal tracts of animals. Some species can cause foodborne illness in humans.
2. Similar to overseas countries, *Salmonella* is a common causative agent of food poisoning in Hong Kong.
3. Vegetables can be contaminated with pathogens including *Salmonella* at primary production and/or during post-harvest activities, e.g. processing.

Advice to Consumers

- Wash vegetables, including those for making salad, thoroughly under clean running water.
- Avoid opportunity where cross-contamination can take place when handling vegetables that will be eaten raw (e.g. use one cutting board for ready-to-eat food and a separate one for raw non-ready-to-eat food).
- Consume freshly made salad immediately, or refrigerate it immediately and consume it as soon as possible.
- Susceptible groups (including pregnant women, newborns, the elderly and people with low immunity), if want to consume salad, are advised to prepare their own salad and consume it as soon as possible.

Advice to Trade

- Food handlers should maintain good personal hygiene and have good hygienic practices when handling food.
- Avoid holding chilled ingredients and final products (e.g. salad) at above 4°C for more than two hours.
- Follow Good Manufacturing Practice and adopt food safety systems such as HACCP in the production of vegetable salad.

風險傳達
工作一覽
Summary of
Risk Communication Work

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二噁英及二噁英樣多氯聯苯是什麼？

Dioxins and Dioxin-like Polychlorinated Biphenyls – What are They?

食物安全中心
風險評估組
科學主任朱源強先生報告

Reported by Mr. Johnny CHU, Scientific Officer,
Risk Assessment Section,
Centre for Food Safety

什麼是二噁英及二噁英樣多氯聯苯？

二噁英及二噁英樣多氯聯苯是一組毒理性質相近的持久性環境污染物。燃燒(例如焚化廢物)及某些工業過程(例如利用氯氣漂白紙漿)都會產生二噁英這類沒有實際用途的副產品，自然災害(例如森林大火及火山爆發)亦會釋出二噁英。相反，多氯聯苯則是人類刻意製造的物質，過去曾作多種不同的工業用途，例如電子絕緣體、潤滑劑、增塑劑及專用的液壓機液體。

二噁英及二噁英樣多氯聯苯已散布於全球環境中。不過，自七十年代開始，大部分國家已禁止生產和使用多氯聯苯，加上焚化廢物技術的改善已令二噁英的排放量降低。因此，在過去二十年，在環境中的二噁英及二噁英樣多氯聯苯的水平已不斷下降。

二噁英及二噁英樣多氯聯苯如何污染食物？

二噁英及二噁英樣多氯聯苯不溶於水，且不易分解，一旦釋出，會污染土壤表面及水中沉積物，並沿食物鏈在生物體內積聚和濃縮(即濃度增加)。二噁英及二噁英樣多氯聯苯屬脂溶性，可在動物的脂肪組織積聚。因此，肉類、家禽、海產及奶類製品等脂肪含量較高的食物是市民攝入二噁英及二噁英樣多氯聯苯的主要膳食來源。至於水生動物，身體一些部位天然含有較高脂肪量，同時也會含有較多二噁英及二噁英樣多氯聯苯。例如，魚肝和螃蟹的棕色肉(包括蟹黃/蟹膏及肝胰臟等內臟)含有較多的二噁英及二噁英樣多氯聯苯。

長期攝入二噁英及二噁英樣多氯聯苯會對人體不同系統產生毒性作用，包括損害免疫系統、內分泌系統、發育中神經系統及生育功能。二噁英及二噁英樣多氯聯苯也可致癌。

健康參考值

很多“非基因毒性致癌物”(即不是透過直接破壞脫氧核糖核酸(DNA)而誘發癌症的化學物)會因另一毒性作用而引發腫瘤。有關毒性作用具有閾限值，即低於該水平便不會有毒性作用。對於這些物質，若攝入量低於閾限值，在致癌及其他毒性作用方面均不會構成健康風險。二噁英及二噁英樣多氯聯苯均為“非基因毒性致癌物”，屬這類物質。

What are Dioxins and Dioxin-like Polychlorinated Biphenyls (DL-PCBs)?

Dioxins and DL-PCBs refer to a group of environmental persistent chemicals with similar toxicological properties. Dioxins are produced as unwanted by-products of combustion (e.g. waste incineration) and some industrial processes (e.g. bleaching paper pulp using chlorine). Natural disasters such as forest fires and volcanic eruptions can also release dioxins. In contrast, polychlorinated biphenyls (PCBs) were manufactured in the past for a variety of industrial uses such as electrical insulators, lubricants, plasticisers, and specialised hydraulic fluids.

Dioxins and DL-PCBs are found throughout the world in the environment; however, their levels in the environment have been declining during the last two decades due to the prohibition of production and use of PCBs in most countries since 1970s and the improved technology of waste incineration with low dioxin emissions.

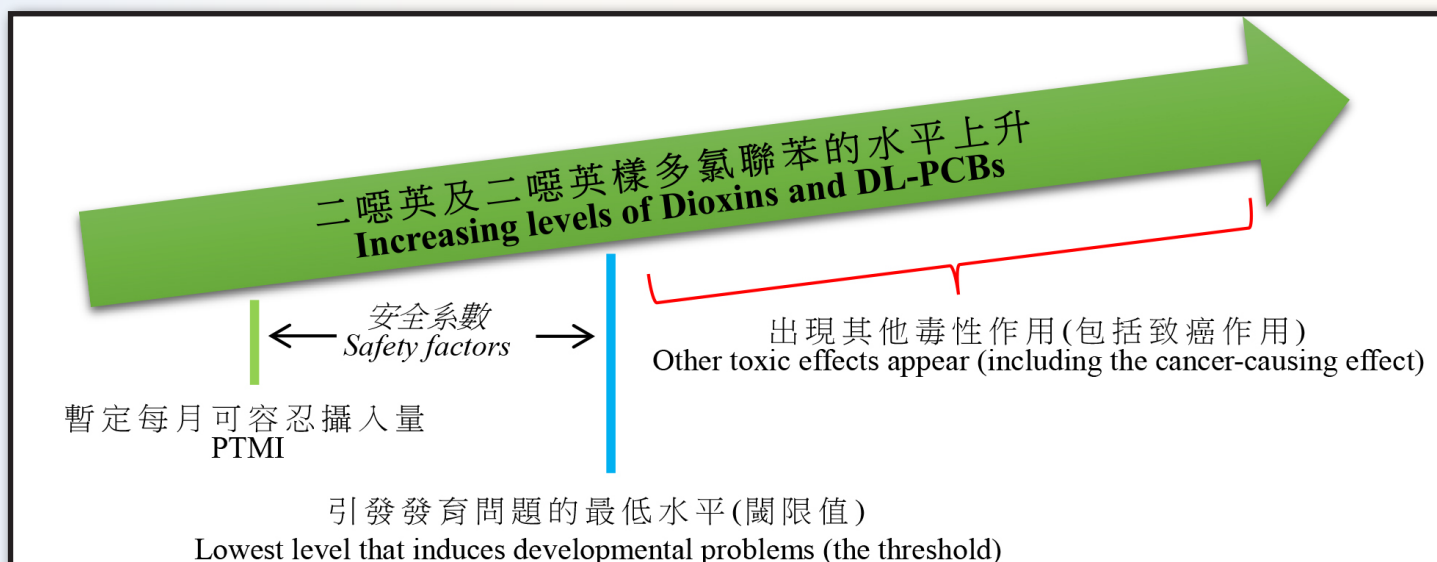
How do Dioxins and DL-PCBs Contaminate Food?

Dioxins and DL-PCBs are not soluble in water and highly resistant to degradation. Once released, they contaminate soil surfaces and aquatic sediments leading to bioaccumulation and biomagnification (i.e. increasing concentration) of the contaminants through the food chain. Since dioxins and DL-PCBs are fat-soluble, they accumulate in fatty tissues of animals. Hence, fatty foods such as meat, poultry, seafood and dairy products are the major dietary sources of dioxins and DL-PCBs in the general population. For aquatic animals, the body parts which naturally have a higher content of fat may also contain a higher amount of dioxins and DL-PCBs. For example, fish livers and brown meat (includes gonads, livers and digestive glands) of crabs are known to contain a higher amount of dioxins and DL-PCBs.

Long-term exposure to dioxins and DL-PCBs has been associated with a range of toxic effects on different parts of the human body, including impairment of the immune system, the endocrine system, the developing nervous system and the reproductive function. Dioxins and DL-PCBs can also cause cancer.

Health-based Guidance Value

Many **non-genotoxic carcinogens** (i.e. chemicals that induce cancers via a mechanism not involving direct damage to DNA) induce tumours as a result of another adverse toxic effect which has a threshold (i.e. a level below which no effect occurs). For these substances, exposure below the threshold poses no health risk, both cancer and other toxic effects. Dioxins and DL-PCBs are non-genotoxic carcinogens and belong to this category of substances.



計算暫定每月可容忍攝入量的示意圖

Diagrammatic representation of the derivation of a provisional tolerable monthly intake (PTMI)

二噁英及二噁英樣多氯聯苯都是極難分解的物質，即意味著某一天接觸小劑量的這些物質對人體健康可能沒有影響或只造成輕微的影響，但長期接觸小劑量的這些物質便會有累積效應，對人體健康造成不利的影響。因此，在評估這些物質對人體健康帶來的長期風險時，重點應該放在評估這些物質在多個月內的累積總攝入量。糧農組織／世衛組織食品添加劑專家聯合委員會(委員會)決定以每月為計算基礎，為二噁英及二噁英樣多氯聯苯訂定暫定每月可容忍攝入量(見圖)。暫定每月可容忍攝入量是一個指標，重點在於人類一生可攝取的有毒物質分量而不致對健康構成可見風險。換言之，偶爾短期攝入高於暫定每月可容忍攝入量的分量不會影響健康。

根據香港首個總膳食研究報告的結果，攝入量一般及攝入量高的市民從膳食攝入二噁英及二噁英樣多氯聯苯的分量，均低於委員會所訂下的暫定每月可容忍攝入量。換言之，本地市民的健康受到二噁英及二噁英樣多氯聯苯嚴重不良影響的機會不大。

消費者怎樣才可從食物減少攝入二噁英及二噁英樣多氯聯苯？

由於二噁英及二噁英樣多氯聯苯會積聚在動物脂肪，故去掉肉類的脂肪和食用低脂奶類製品或可減少攝入二噁英及二噁英樣多氯聯苯。此外，保持均衡飲食(包括進食充足水果、蔬菜及穀類食品)有助避免從單一食物來源攝入過量二噁英及二噁英樣多氯聯苯。世界衛生組織認為減低人體的二噁英及二噁英樣多氯聯苯負荷量(即體內積存量)是長期策略，尤其對女童及年輕女性來說，可能更為適切，因為可令發育中的胎兒，以及日後以母乳餵哺的嬰兒減少攝入二噁英及二噁英樣多氯聯苯。

The persistency of dioxins and DL-PCBs means that exposure to a small dose of these substances on a given day may have little or no impact on human health; however, long periods of exposure to small doses can have a cumulative adverse effect on human health. Hence, when assessing the long-term risk to human health of these substances, emphasis should be placed on assessing the cumulative total intake of these substances over a period of several months. The Joint FAO/WHO Expert Committee on Food Additives (JECFA) decided to express the tolerable intake for dioxins and DL-PCBs on a monthly basis in the form of a provisional tolerable monthly intake (PTMI) (see Fig). PTMI is an indicator that stresses on the ingestion of a toxic substance over a lifetime without appreciable risk to health. In other words, occasional short-term exposure above PTMI would have no health consequences.

According to the results of the First Hong Kong Total Diet Study, the dietary exposures to dioxins and DL-PCBs for both the average and high consumers of the local population were below the PTMI set by JECFA, meaning that the local population is unlikely to experience major undesirable health effects of dioxins and DL-PCBs.

What can Consumers Do to Reduce Exposure to Dioxins and DL-PCBs from Food?

As dioxin and DL-PCBs accumulate in fats of animals, trimming fat from meat and consuming low fat dairy products may decrease the exposure. Also, a balanced diet (including adequate amounts of fruits, vegetables and cereals) will help to avoid excessive exposure from a single source. According to World Health Organization, this is a long-term strategy to reduce body burdens (levels in the body) and is probably most relevant for girls and young women to reduce exposure of the developing fetus and when breastfeeding infants later on in life.



留意糖水的糖含量

食物事故點滴
Food Incident Highlight

食物安全中心與消費者委員會聯合進行研究，讓市民了解糖水的糖含量及能量值，從而作出有益健康的選擇；並藉此推動食物業界採取行動減低市場出售的糖水的糖含量。

攝入過多糖分與肥胖症有關，而肥胖症是導致患上心血管系統疾病及糖尿病的風險因素。市民應保持均衡及多元化的飲食，限制進食添加大量糖分及能量值高的食物及飲品(包括糖水)。如在外進食糖水，只要情況可行，在點糖水時可要求食肆把黃糖或糖漿分開送上；在試味後，有需要才為糖水(如豆腐花)添加適量的糖；以及與他人分享超過個人一般食用分量的糖水。如在家自製糖水，應限制添加糖。

Watch Out for the Sugar Content in Sweet Soups

The Centre for Food Safety and the Consumer Council have jointly conducted a study to inform the public on the sugar content and energy value in sweet soups to enable healthy choices, and to urge the food trade to take action to reduce the sugar content of sweet soups in the market.

Excessive sugar intake is associated with obesity, a risk factor of cardiovascular disease and diabetes. The public is advised to maintain a balanced and varied diet and limit the consumption of foods and drinks with high amount of added sugar and high energy value, including sweet soups. While consuming sweet soups, whenever practical, request brown sugar powder or sugar syrup to be served separately during ordering, add suitable amount of sugar to sweet soups (e.g. soybean curd dessert) if necessary after tasting, and share the sweet soups of large portion size with others. When making sweet soups at home, limit the amount of sugar added.

外型類似芋頭植物含有的草酸鈣

二零一六年九月，衛生署衛生防護中心匯報發生一宗與草酸鈣針晶體有關的中毒事故，個案涉及五人。他們在進食友人從農地取得的一些類似芋頭植物的澱粉球莖部分後，隨即出現口腔及舌頭灼熱、舌頭麻痺及嘴唇腫脹等病徵。

部分水果及蔬菜天然含有草酸鹽，例如楊桃、大黃、紅菜頭、菠菜及莧菜。草酸鹽有多種形態，當中針狀草酸鈣較容易滲入皮膚及黏膜，引起刺激。一些外型類似芋頭的植物(如海芋)可能含有針狀草酸鈣。

為免出現與草酸鈣有關的食物中毒，消費者應注意：1)從可靠的供應商購買蔬菜；2)取走混在食用蔬菜的任何不明植物／東西；3)在烹煮和食用前徹底洗淨蔬菜；以及4)切勿採食野生植物。

Calcium Oxalate in Taro-like Plants

In September 2016, the Centre for Health Protection of the Department of Health reported a cluster of five people with calcium oxalate raphide (needle-shaped crystal) poisoning. They developed burning sensation of the mouth and tongue, numbness of the tongue and swelling of lips shortly after the consumption of the starchy corm part of some taro-like plants obtained from a friend from a farm.

Oxalates are found naturally in some fruits and vegetables, such as starfruit, rhubarb, beetroot, spinach and amaranth. Oxalates are in many forms of which calcium oxalates in needle shape can penetrate the skin and mucous membranes more readily and cause irritation. Some plants look like taro, e.g. a wild plant elephant ear (*Giant Alocasia*), may contain calcium oxalates in needle shape.

To prevent calcium oxalate food poisoning, consumers are reminded: 1) to purchase vegetables from reliable suppliers; 2) to remove any unidentified plants/objects mixed with edible vegetables; 3) to wash vegetables thoroughly before cooking and consumption; and 4) not to pick and consume wild plants.