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## 焦點個案 Incident in Focus

## 嬰兒配方奶粉中的碘

## Iodine in Infant Formula

食物安全中心  
風險傳達組

科學主任周淑敏女士報告

Reported by Ms. Shuk-man CHOW, Scientific Officer,  
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入口商於八月八日自願回收兩款被驗出碘含量偏低的日本嬰兒配方奶粉。這次檢測是食物安全中心(中心)就市面上初生嬰兒及較大嬰兒配方奶粉的營養素含量進行的兩年檢測計劃(2012-2013)的一部分。截至二零一二年九月十九日,在61個嬰兒配方奶粉樣本中,有七個產品的碘含量偏低,單純以這些產品餵哺嬰兒,有可能影響其健康。

On 8 August, two Japanese brands of infant formulae were voluntarily recalled from market after being found to have low iodine content. The testing is part of a two-year programme (2012-2013) of the Centre for Food Safety (CFS) to test the nutritional composition of infant and follow-up formulae available in the local market. As of 19 September 2012, seven out of the 61 powdered infant formulae tested were found to have low level of iodine content to an extent that may cause health problems to those infants who have been solely fed on them.

### 嬰兒與碘

碘是一種用來製造甲狀腺素的基本營養素,甲狀腺素對促進人體生長發育十分重要。人體攝入的碘主要來自食物。對於單純以嬰兒配方奶粉餵哺的嬰兒,奶粉是他們攝取碘的唯一食物來源。因此,奶粉中的碘含量直接影響嬰兒每天攝取碘的分量。身體長期缺乏碘有可能影響甲狀腺功能。若甲狀腺功能顯著受損,可能會令嬰兒的腦部發育受影響。

### Iodine for Infants

Iodine is an essential nutrient necessary for the production of thyroid hormones which are responsible for normal growth and development. Diet is the major source of iodine intake for humans. For exclusively formula-fed infants, infant formula is their only food source of dietary iodine. Iodine content in infant formulae will affect the daily iodine intake of these infants. A prolonged deficiency in iodine may affect the functioning of the thyroid gland. If thyroid function



七款嬰兒配方奶粉被驗出碘含量偏低,單純以這些產品餵哺嬰兒,有可能影響其甲狀腺功能  
Seven infant formulae were found to have low iodine content which may affect the normal function of the thyroid gland of infants solely fed on them

is significantly affected, there may be potential impact on brain development of infants.

### 嬰兒配方奶粉碘含量的檢測結果

市面上不同品牌的嬰兒配方奶粉的碘含量各有差異。根據食品法典委員會訂立的標準,每100千卡的初生嬰兒配方奶粉須提供10至60微克碘。不過,這個標準所列出的只是食品中碘含量的理想水平,檢測值低於這個標準的食品並不一定會對消費者的健康構成風險。

### Findings on Iodine Content of Infant Formulae

Iodine content in infant formula available in the market varies from brand to brand. The Codex Alimentarius Commission (Codex) sets a standard of 10 to 60µg/100kcal of iodine for infant formula. However, Codex only specifies the desirable level of iodine in food. Detected level below Codex standard does not necessarily mean the consumer's health is at risk.

在評估一個產品是否對消費者構成健康風險時,中心會進行風險評估研究,以判斷產品的碘含量是否符合世界衛生組織(世衛)建議的每天營養素攝入量(人體每天應攝取的營養素分量)。世衛指出,如果嬰兒的碘攝入量少於世衛建議的三分之一,可能會出現甲狀腺功能減退,以致有腦部受損的風險。

When assessing whether a product may pose health risk to the consumer, risk assessment has to be conducted to determine if the level of iodine in the diet meets the World Health Organization (WHO) recommended daily nutrient intake (the amount of a nutrient a person should consume in a day). According to WHO, infants might have lowered thyroid function with the risk of brain damage when the iodine intake is about one-third of this value.

### 跟進措施

鑑於嬰兒依靠配方奶粉為唯一食糧,為安全起見,中心呼籲市民停止向嬰兒餵哺問題奶粉,業界則應停售有關產品。相

### Follow-up Measures

In view of the potential reliance on infant formula as the sole source of dietary intake for infants, as a precautionary measure, the CFS has advised the public to stop feeding

焦點個案  
Incident in Focus

關入口商獲知會有關檢測結果後，已自願回收受影響的產品。為釋除市民的疑慮，中心開設了熱線電話(3798 0600)，為家長提供相關資料，並回覆公眾查詢。此外，中心亦設立了專題網頁，上載有關嬰兒配方奶粉中碘含量的常見問題、香港部分品牌的嬰兒配方奶粉中碘含量的資料，以及相關的檢測結果等多項資料，供公眾查閱及參考。

雖然有七款嬰兒配方奶粉驗出碘含量偏低，可能會影響嬰兒的甲狀腺功能，但截至二零一二年九月十七日衛生署測試的111個血液樣本中，只有兩個樣本的甲狀腺素水平在參考標準之外。醫院管理局的專家表示，這兩宗個案都不太可能是由於食用碘含量不足的嬰兒配方奶粉所致。有關的嬰兒已獲轉介往醫管局兒科專科診所作跟進。

鑑於上述監察結果，中心會繼續以食品法典委員會的標準為準則，檢測市面上初生嬰兒及較大嬰兒配方奶粉的營養素含量。相關的檢測結果日後會陸續公布。如檢測結果顯示嬰兒的健康有可能受影響，中心會採取適當的跟進行動。因應最新情況，政府將盡快訂立嬰兒配方奶粉的營養素成分及營養標籤的規管方案，並着手準備有關的立法工作。

注意要點：

1. 嬰兒缺碘會令甲狀腺功能減退，進而影響生長和腦部發育。
2. 細閱營養標籤，找出嬰兒配方奶粉的碘含量。
3. 暫時未有因為進食問題嬰兒配方奶粉而引致甲狀腺功能受影響的臨床病例。

給業界的建議

- 停售有關問題產品。
- 按照食品法典委員會的標準生產嬰兒配方奶粉，確保奶粉的營養素含量不會對本港市民構成健康風險。
- 按照食品法典委員會的規定提供標籤資料，讓消費者作出知情的選擇。

給消費者的建議

- 依照世衛的建議，嬰兒出生後首六個月純以母乳餵哺。之後在哺乳的同時開始添加安全而合適的補充食物，直至孩子兩歲或以上。
- 停止以問題產品餵哺嬰兒，轉用其他碘含量足夠的嬰兒配方奶粉。
- 在選購嬰兒配方奶粉時，參閱包裝上的營養資料。
- 如有疑慮，徵詢家庭醫生或兒科醫生的意見。

infants with the concerned infant formulae and the trade should stop selling the affected products. The relevant importers were informed of the test results and voluntarily withdrew the products from market. To allay concerns associated with the incident, the CFS has set up a hotline (3978 0600) to provide information to concerned parents and handle any related enquires from the public. In addition, a dedicated website has been developed with frequently asked questions regarding iodine in infant formula, iodine levels in selected infant formulae available in Hong Kong, and the announced test results uploaded for the public's information and reference.

Although seven infant formulae were found to have low iodine content which may affect the normal function of the thyroid gland of infants, as at 17 September 2012, among the 111 blood samples tested by the Department of Health, only two were found to have thyroid hormone levels outside the normal reference range. According to specialists of the Hospital Authority (HA), both results were less likely caused by consumption of the iodine-deficient infant formulae. Nonetheless, the infants concerned were referred to the HA paediatric specialist clinic for follow-up.

Given the above surveillance finding, the CFS will continue testing on the nutritional composition of infant and follow-up formulae in the local market with respect to the Codex standard. Relevant testing results will be released in phases. The CFS will take appropriate follow-up actions if the findings indicate any potential health impact on infants. In view of the latest development, the Government will expedite preparatory work for legislation to regulate the nutritional composition and nutrition labelling for infant formulae.

Key Points to Note:

1. Iodine deficiency may result in lowered thyroid function, which in turn may affect growth and brain development in infants.
2. Use the nutrition label on infant formula to find out its iodine content.
3. So far, there have been no apparent clinical cases of abnormal thyroid function due to the consumption of the concerned infant formulae.

Advice to Trade

- Stop selling the products of concern.
- Formulate infant formula in accordance with Codex standards. Ensure the composition poses no health risk to the local population.
- Provide labelling information according to Codex standards to allow consumers to make informed choices.

Advice to Consumers

- Follow WHO's recommendation on exclusive breastfeeding for the first six months after birth, with safe and appropriate complementary foods and continued breastfeeding for up to two years or beyond.
- Stop feeding infants with the concerned products and switch to other infant formulae with adequate iodine content.
- Read the nutrition information on the product label when choosing infant formula.
- Consult family doctors or paediatricians if in doubt.

風險傳達  
工作一覽  
Summary of  
Risk Communication Work

風險傳達工作一覽 (二零一二年八月) Summary of Risk Communication Work (August 2012)	數目 Number
事故/食物安全個案 Incidents / Food Safety Cases	140
公眾查詢 Public Enquiries	929
業界查詢 Trade Enquiries	201
食物投訴 Food Complaints	609
給業界的快速警報 Rapid Alerts to Trade	65
給消費者的食物警報 Food Alerts to Consumers	3
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# 再談食物中的霉菌毒素

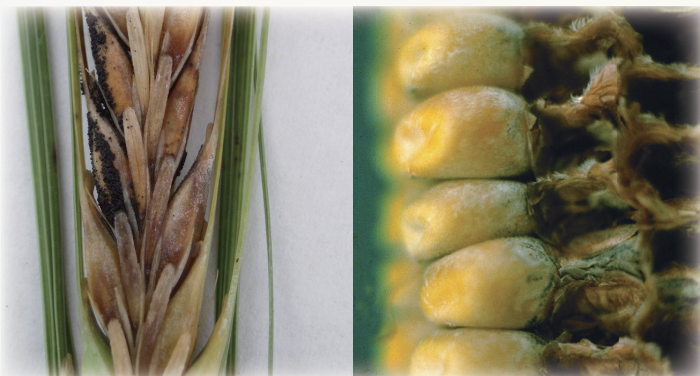
## More on Mycotoxins in Food

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, Centre for Food Safety

我們一連三期介紹食物中的霉菌所產生的毒素，本文為此系列之完結篇，這次我們會探討食物中的另外幾種霉菌毒素。

### 食物中的其他霉菌毒素

除了上期介紹的黃曲霉毒素外，以科學家目前所知，其他危害人類健康的還有棒曲霉毒素、赭曲霉毒素、伏馬镰孢毒素、單端孢霉烯和玉米赤霉烯酮等霉菌毒素。很多農作物都會受霉菌毒素污染，但有些農作物特別容易受某些毒素污染。下文會舉例詳細加以說明。



許多青霉菌屬和镰孢菌屬霉菌能在穀類和玉米中產生多種毒素(照片由 International Maize and Wheat Improvement Center 提供)  
Many moulds of *Penicillium* and *Fusarium* genus can produce a number of mould toxins in cereals and maize (Photo by courtesy of International Maize and Wheat Improvement Center)

This is the last article of a series of three that focuses on mould toxins (mycotoxins) in food. We will talk about other mould toxins in this article.

### Other Mycotoxins in Food

Other than the aflatoxins that we discussed in the last issue, other mycotoxins, namely patulin, ochratoxins, fumonisins, trichothecenes and zearalenone are also known to scientists due to their potential harm to human health. A wide range of crops may be affected by mycotoxins, but some food-toxin pairs are more common. Some examples will be listed in the following paragraphs.

棒曲霉毒素、赭曲霉毒素、伏馬镰孢毒素、單端孢霉烯和玉米赤霉烯酮等霉菌毒素的特徵一覽表

Table: Features of mould toxins patulin, ochratoxins, fumonisins, trichothecenes and zearalenone

	棒曲霉毒素 Patulin	赭曲霉毒素 Ochratoxins	伏馬镰孢毒素 Fumonisin	單端孢霉烯 Trichothecenes	玉米赤霉烯酮 Zearalenone
產生毒素的霉菌 Major toxin producing moulds	曲霉菌屬和青霉菌屬的霉菌 Members of <i>Aspergillus</i> & <i>Penicillium</i> genus	曲霉菌屬和青霉菌屬的霉菌 Members of <i>Aspergillus</i> & <i>Penicillium</i> genus	串珠镰孢菌及相關菌種 <i>Fusarium moniliforme</i> & related species	镰孢菌屬的霉菌 Members of <i>Fusarium</i> genus	禾谷镰孢菌及相關菌種 <i>Fusarium graminearum</i> & related species
主要致病毒素 Major toxic component involved	棒曲霉毒素 Patulin	赭曲霉毒素A Ochratoxin A	伏馬镰孢毒素B1及B2 Fumonisin B1 & B2	嘔吐毒素、T-2毒素 Deoxynivalenol (DON), T-2	玉米赤霉烯酮 Zearalenone
主要受影響的食物種類 Major foods affected	蘋果及蘋果製品 Apple & its products	穀類、乾豆類、咖啡、麵包 Cereals, pulses, coffee, bread	玉米 Maize	穀類、小麥、玉米 Cereals, wheat, maize	玉米 Maize
人類主要中毒症狀 Possible major effects in humans	胃腸道血流量增加、大量出血、黏膜潰瘍 Increased blood flow in gastrointestinal tract, heavy bleeding, open sore in mucous membrane	腎臟毒性、可能致癌、抑制免疫力 Kidney toxic, possibly cancer causing, suppress immunity	可能致癌 Possibly cancer causing	抑制蛋白質合成(對細胞產生毒性、抑制免疫力)、腎臟毒性 Suppress protein synthesis: toxic to cells & suppress immune system. Kidney toxic	有可能導致幼童性早熟 Possible premature puberty in young children

### 蘋果

棒曲霉毒素會造成胃腸道出血，這種毒素主要污染蘋果及蘋果製品。蘋果汁一般被視為健康食品，不但嬰幼兒愛喝，也是注重健康的人士光顧鮮果汁店時的熱門選擇，棒曲霉毒素因而一度受到國際關注。本港在二零零三年曾進行棒曲霉毒素研究，發現本港的蘋果汁樣本全部符合國際標準，大部分沒有檢出棒曲霉毒素，證明本港市民從蘋果汁攝取棒曲霉毒素以致影響健康的風險不大。

由於只有爛蘋果才會有棒曲霉毒素，蘋果爛了或有損傷就不能吃。製作蘋果汁前先把蘋果切開檢查，因為有些霉菌只影響蘋果核，外表是看不出來的。明智的做法是妥為貯存蘋果，以減少損傷及抑制霉菌生長，蘋果有損傷便應棄掉。此外，發酵的過程(例如製作蘋果酒時的發酵處理)可消滅棒曲霉毒素。

### Apples

Patulin may cause gastrointestinal bleeding and it mostly occurs in apple and its products. As apple juice is generally considered a healthy food and is popular among infants, children and health conscious patrons of fresh fruit juice stores, patulin has attracted some international attention. In 2003, a local study found that all apple juice samples collected in Hong Kong complied with international standard and most of them had no detectable level of patulin, suggesting that there was little risk from patulin in apple juice locally.

Since patulin occurs in rotting apples but not apples in good condition, we should not consume apples that are mouldy or damaged. Cut and check the conditions of apples before making apple juice, as some mould growth affects only the apple core and the mould is invisible from the outside. It is also sensible to store apples properly to reduce physical damage and discourage mould growth. Dispose of apples if they are damaged. On the other hand, fermentation, like the one during the manufacture of ciders, can destroy patulin.

## 穀類

穀類可受多種霉菌感染而產生霉菌毒素。其中以赭曲霉毒素因分布廣泛而較為人熟知，單端孢霉烯則較少見。

赭曲霉毒素A是一種可能致癌的霉菌毒素，主要存在於麵包、麵條和穀類早餐等穀類製品。此外，赭曲霉毒素A也存在於其他食品，包括咖啡、可可、葡萄酒、啤酒、乾豆類、香料、乾果、葡萄汁、豬腰，以及其他肉類等。食物安全中心在二零零六年進行的**風險評估研究**顯示，本港食品中的赭曲霉毒素A含量很低，對消費者構成的風險極微。

## 玉米

玉米是產生伏馬镰孢毒素和玉米赤霉烯酮的霉菌的主要宿主。伏馬镰孢毒素對牲畜和實驗動物的健康有多種不良影響。目前，尚未有直接證據證明伏馬镰孢毒素對人類的健康有不良影響，現有的研究並未對伏馬镰孢毒素與人類患癌的聯繫達致結論。在製造墨西哥脆餅和玉米片時，玉米粒的處理過程(加熱和作鹼液處理)可能會令伏馬镰孢毒素以結合形式存在。這些結合的伏馬镰孢毒素一旦釋放出來對腸道有甚麼影響，暫時還不清楚。

玉米赤霉烯酮對各種動物具有雌激素作用，影響雌性動物的外生殖器、乳腺和繁殖機能，並會令雄性動物雌性化。此外，科學家亦懷疑幼童吃了受玉米赤霉烯酮污染的食物會導致性早熟。但由於本港市民並非以玉米為主食，這兩種毒素對我們的影響不大。

## 減少霉菌毒素攝入量的方法

霉菌在大自然中無處不在，要完全消滅食物中的霉菌毒素是不可能的。雖然如此，只要在農作物的耕種、收成前、收成、貯存、運輸加工及分銷等各階段依循良好的農務作業，以及生產食品時採用以“**食物重點控制系統**”為基礎的管理制度，要減少攝入霉菌毒素還是有計可施的。

消費者減少攝入霉菌毒素的方法是切勿食用明顯發霉或異常潮濕的食物，並把未進食的食物存放在陰涼乾燥的地方，或按照說明的方式貯存。

## Cereals

Cereals can be infected by a number of moulds that can produce mould toxins. Among them, ochratoxins are better known as they are more widespread while trichothecenes are less common.

Ochratoxin A is potentially carcinogenic. It mainly occurs in cereal products like bread, noodles and breakfast cereals. It is also found in a range of other food commodities, including coffee, cocoa, wine, beer, pulses, spices, dried fruits, grape juice, pig kidney and other meat, etc. In 2006, the **Risk Assessment Study** of the Centre for Food Safety revealed that the prevailing levels of ochratoxin A in local food were low and posed minimal risk to consumers.

## Maize (Corn)

Maize is the main host to mould that produce fumonisins and zearalenone toxins. Fumonisin are associated with a variety of adverse health effects in livestock and experimental animals. Currently, there is no direct evidence that fumonisins cause adverse health effects in humans because available studies demonstrate only inconclusive associations between fumonisins and human cancer. During the processing of maize kernels for the manufacture of tortilla and maize chips, i.e. the heating and alkali process, the fumonisins might become bounded. However, the effect on the intestinal tract upon the release of the bounded fumonisins is unknown.

On the other hand, zearalenone has oestrogenic effects in various animals, affecting vulva, mammary glands and fertility in females and causing feminisation in males. It is also suspected to cause premature puberty in young children possibly through contaminated food. Nonetheless, the two toxins are possibly of less concern locally as maize is not a staple food in Hong Kong.

## Ways to Reduce the Amount of Mycotoxin Intake

As moulds are ubiquitous, there is no way to totally eliminate mould toxins from food. However, there are ways to reduce mycotoxins via good agricultural practices throughout the stages of planting, pre-harvest, harvest, storage, transport, processing and distribution of crops, and develop management system based on **Hazard Analysis and Critical Control Points** for food production.

As a consumer, we may reduce the exposure by not consuming foods with the presence of visible moulds, or foods that are dampened with unexpected moistures. Consumers should also store foods in a cool and dry place before consumption or follow storage instructions.

## 食物事故點滴 Food Incident Highlight

### 膠粒、持久性有機污染物與海魚

上月颱風韋森特吹襲香港期間，幾個載有聚丙烯膠粒的貨櫃被吹落香港水域，數以噸計的膠粒飄散到各個魚類養殖場。事件對海洋生態的影響固然成為社會關注的焦點，海魚的食物安全問題也引起了市民的注意，本文將談談這方面的問題。

聚丙烯是無毒的塑膠原料，常用於製造乳酪盒、奶瓶和即棄外賣盒等食物包裝物料。散落在海裡的膠粒隨着時間會吸附**持久性有機污染物**等環境污染物，並被海魚誤以為是食物。

由於本地捕獲的野生或養殖海魚只佔我們日常膳食很小的部分，市民因為吃下受污染的海魚而增加的食物安全風險不大。此外，政府一直在清理這些四散的膠粒，大大減少海魚因為進食這些膠粒而攝入污染物的可能性。雖然從養魚區抽取的活魚樣本體內曾發現膠粒，但截至二零一二年九月十二日止，食物安全中心**從批發和零售市場抽驗市面上的810條海魚**，全部沒有檢驗出膠粒。由此可見，海魚誤食膠粒構成的食物安全風險十分低，市民毋須過分擔心。

雖然食物安全風險不大，但我們建議市民不要吃外表、氣味或味道有異的魚，也不要吃在沙灘拾獲的死魚。另外，烹調魚類前應徹底清洗及把內臟清除。

### Plastic Pellets, POPs and Marine Fish

Last month, tonnes of polypropylene (PP) plastic pellets split into Hong Kong waters and scattered in fish culture zones when the shipping containers carrying the plastic cargo were knocked into the sea during Typhoon Vicente. Impact on marine ecology has been the major concern in the wake of the incident. Since there have been also some concerns over food safety of marine fish, this article will talk about this aspect.

PP is a non-toxic plastic material commonly used in food packaging such as yoghurt containers, feeding bottles and disposable containers for take-away meals. When released into the sea, these pellets can adsorb environmental contaminants, such as **persistent organic pollutants (POPs)**, over time and be mistaken as food by marine fish.

Since marine fish caught locally and farmed in Hong Kong waters only constitute a small part of our diet, the increased food safety risk is unlikely to be significant due to the consumption of the contaminated fish. Furthermore, the continued effort of removing the scattered pellets could reduce the chance of marine fish encountering any possible pollutants on the pellets. Although traces of plastic pellets were found in fish samples captured in fish culture zone, as of 12 September 2012, the Centre for Food Safety has detected no plastic pellets from the **810 fish samples collected from the wholesale and retail markets**. There is no cause for undue concern over food safety due to the accidental consumption of the plastic pellets by marine fish.

Although the food safety risk remains low, members of the public are advised not to eat fish with an abnormal appearance, smell, or taste, or dead fish on the beach. Fish should be washed thoroughly, and their internal organs removed, before cooking.