



食物安全中心  
Centre for Food Safety

# 食物安全焦點

## Food Safety Focus

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### 焦點個案 Incident in Focus

## 受三聚氰胺污染的奶類及奶類產品 Melamine Tainted Milk and Milk Products

食物安全中心  
風險評估組  
科學主任陳蓉蓉女士報告

Reported by Ms Melva CHEN, Scientific Officer,  
Risk Assessment Section,  
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今年九月，據報內地有多名嬰兒在飲用受三聚氰胺污染的嬰兒配方奶粉後患上腎結石，而甘肅省大部分個案中的嬰兒曾飲用三鹿牌嬰兒配方奶粉達三至六個月。其後，內地當局宣布，在某些內地製造及銷售的嬰兒配方奶粉中驗出三聚氰胺，當中以三鹿牌的三聚氰胺含量最高，含量為百萬分之二千五百六十三。雖然香港沒有三鹿牌嬰兒配方奶粉發售，但食物安全中心（中心）的跟進行動亦發現本港一些奶類及奶類產品含有三聚氰胺。鑑於不少父母正為子女的健康而憂心忡忡，本文會提供更多有關三聚氰胺的食物安全資料。

### 三聚氰胺的用途

三聚氰胺是工業用化學物，用來生產三聚氰胺樹脂以製造膠水、紙品、紡織品及塑膠製品（包括餐具和廚房用具）。除了從可能經攪雜的食物攝入三聚氰胺外，一般人攝入三聚氰胺的機會不大。

### 食物中的三聚氰胺

世界各國均不准使用三聚氰胺作為食物配料或食物添加劑，亦不容許在食物中添加任何分量的三聚氰胺。內地有人在奶類中添加三聚氰胺廢料，目的是令這些產品在蛋白質測試中出現蛋白質含量增加的假象。

去年，由於內地輸往美國的寵物食物配料含有三聚氰胺，因而引致大量貓狗患腎衰竭死亡。

至於今次事故，則發現內地、本港和世界各地多國的部分奶類及奶類產品均受三聚氰胺污染。

### 進食三聚氰胺對健康的影響

三聚氰胺可引致尿道出現結晶體；如情況嚴重，這些細小的結晶體可形成腎結石，阻塞腎臟內的細小管道，引致患者無法排尿和出現腎衰竭，部分患者更會死亡。有證據顯示，三聚氰胺令動物患癌，但並無足夠證據證明三聚氰胺可令人類患癌。實驗研究顯示，三聚氰胺不會破壞細胞中的基因物質或引致胚胎畸形。由於嬰兒以奶類為主要食物，他們攝入的三聚氰胺分量按人體體重計算會較進食多種類食物的成年人高很多，故特別容易因進食受三聚氰胺污染的奶類受到影響。根據內地提供的流行病學資料，超過99%的受害者為三歲或以下的幼童。截至十月十四日為止，本港有七名兒童因懷疑食用了受三聚氰胺污染的奶類／奶類製品而患上腎結石，其中三名兒童大部分時間在內地居住，並食用了在內地出售的奶類／奶類製品。

In September 2008, cases of kidney stones affecting infants who have consumed melamine-tainted infant formula were reported in the Mainland. Most of the cases in Gansu province were found to have consumed Sanlu infant formula for three to six months. Subsequently, the Mainland authority announced that a number of infant formulae made and sold in the Mainland were found to contain melamine, with the Sanlu brand having the highest level (up to 2 563 ppm). Sanlu infant formula was not available in Hong Kong. Nevertheless, follow-up actions undertaken by the Centre for Food Safety (CFS) found melamine in a number of milk and milk products available in Hong Kong. Many parents worried about the health of their children. This article provides more information on food safety relating to melamine.

### Uses of Melamine

Melamine (also known as tripolycyanamide) is an industrial chemical used for the production of melamine resins, which are used in glues, paper, textiles as well as plastics including tableware, kitchen utensils, etc. Besides the potential adulteration of food, exposure to melamine for the general population has been considered to be low.

### Melamine in Food

Melamine is neither a food ingredient nor a permitted food additive in any countries. It is not allowed to be added to food in any quantity. Melamine scrap was added to milk in the Mainland to cause a false increase in the measurement of protein in dairy products.

In 2007, melamine was found in pet food ingredient manufactured in China and exported to the United States. This led to the death of a large number of dogs and cats due to kidney failure.

In the present incident, melamine contamination has been found in a number of milk and milk products in China, Hong Kong and many countries around the world.

### Health Effects of Melamine Consumption

Melamine can cause crystals formation in urinary tract. In severe cases, these small crystals can form kidney stones, blocking the small tubes in the kidney, stopping the production of urine, causing kidney failure and in some cases death. Melamine has been shown to have caused cancer in animals but there was inadequate evidence to show that melamine can cause cancer in human. Laboratory studies showed that melamine did not damage genetic materials in cells or cause malformation in foetus. Infants are particularly at risk of developing adverse health effects as a result of consuming melamine tainted milk because milk is their major food, and the amount of melamine intake per body weight is much higher than that of adults who consume a variety of foods. According to the epidemiological information obtained from the Mainland, over 99% of the victims were children aged 3 years or below. As at 14 October 2008, seven children in Hong Kong were found to have kidney stones relating to the consumption of suspected melamine tainted milk/milk products. Three of them, however, mainly lived in the Mainland and had consumed milk/milk products that were purchased in the Mainland.



受三聚氰胺影響的兒童可能會出現無故哭鬧，血尿，少尿或無尿（如患上急性腎衰竭），尿中排出結石，高血壓或腎臟範圍疼痛。

## 安全的攝入量

二零零七年，美國食物及藥物管理局制定三聚氰胺的每日可容忍攝入量為每日每公斤體重0.63毫克。根據內地經驗所得，三聚氰胺對嬰幼兒（初生至三歲）的影響可能較大，因此中心將這一年齡組別的每日可容忍攝入量降低至每日每公斤體重0.32毫克作風險評估。

## 對三聚氰胺的規管

為了保障公眾健康，政府已採取緊急行動，修訂了《食物內有害物質規例》（第132AF章）。根據規例，奶類、擬主要供36個月以下幼兒食用的任何食物，以及擬主要供懷孕或授乳的女性食用的任何食物，其三聚氰胺含量均不得超過每公斤1毫克。至於其他食物，其三聚氰胺含量則不得超過每公斤2.5毫克。修訂規例已在憲報刊登，並於二零零八年九月二十三日生效，但須在十月提交立法會進行先通過後訂立的程序。政府所訂立的規管標準，與海外食物安全當局（包括澳洲和歐盟）的標準大致相若，並足以保障公眾健康。

三聚氰胺是除害劑滅蠅胺的代謝物，可存在於環境中。由於環境污染又或以三聚氰胺製成的食物處理器具會釋出三聚氰胺，食物可能會含有微量三聚氰胺，因此“零容忍”的做法並不適用於三聚氰胺。政府所採用的三聚氰胺法定上限是根據幼童每日可容忍攝入量的風險評估結果來釐定，當中已包括一個較大的安全係數。此外，政府還考慮了幼童易受三聚氰胺影響，三聚氰胺可透過用具進入食物和環境污染這三項因素。根據現時的證據，這套標準相信足以保障市民的健康。

### 三聚氰胺：

- 不論分量多少，均不得加進食物內；
- 可引致尿道出現結晶體；
- 含量超出法定上限的產品不應食用。

## 中心的監察行動

中心自九月開始不斷抽取各款奶類、奶類產品及其他食品進行三聚氰胺測試。截至十月十四日為止，一共檢測了超過 2 350 個樣本（例如飲品、嬰兒食品、冰凍甜點和糕點產品），當中有 29 個樣本未能符合標準。[所有抽取的食品樣本的檢測結果](#)已在中心網頁內公布。

## 給消費者的建議

1. 消費者關注進食問題產品可能會影響健康是可以理解的，但無須過分恐慌。
2. 如食品之三聚氰胺含量超出法定上限，消費者不應食用。
3. 按一般食用量進食三聚氰胺含量符合法定上限的食物後引致健康受損的機會不大。
4. 兒童如有不正常的排尿症狀（包括出現泌尿系統結石），以及曾長期進食含三聚氰胺的奶類產品，應就診求醫。

## 給業界的建議

業界：

1. 不應出售已知含有三聚氰胺的食品或使用這類食品作為配料；
2. 應確保其食品符合有關三聚氰胺的法定標準，並適宜供人食用。

## 更多資料

讀者如有興趣，請瀏覽中心有關[內地奶粉含三聚氰胺事故](#)的網頁，以取得更多資料。

Affected children may experience symptoms of irritability for unknown reasons, blood in urine, little or no urine (in acute renal failure), stones in urine, high blood pressure, or pain over the kidney region.

## Safe Intake Level

In 2007, the US Food and Drug Administration has derived a Tolerable Daily Intake (TDI) of 0.63 mg/kg bw/day for melamine. Based on the Mainland experience, infants and young children (0-3 years) may be more vulnerable to the effects of melamine, as such the TDI was lowered by the CFS to 0.32 mg/kg bw/day for this age group in assessing the risk.

## Regulatory Control on Melamine

To protect public health, the Government took emergency action and amended the Harmful Substances in Food Regulation (Cap. 132AF). Under the Regulation, milk, any food intended to be consumed principally by children under the age of 36 months and any food intended to be consumed principally by pregnant or lactating women shall not contain melamine exceeding 1 mg/kg. For other food, melamine level shall not exceed 2.5 mg/kg. The amended regulation was gazetted and came into operation on 23 September 2008, subject to negative vetting of the Legislative Council in October. The regulatory standards set by the Government are generally in line with those of overseas food safety authorities (including Australian and the European Union authorities) and adequate to protect public health.

Melamine is a metabolite of cyromazine, a pesticide, and can be present in the environment. Trace amount of melamine may be present in food due to environmental contamination or migration from food processing equipments made of melamine. Therefore, the “zero tolerance” approach is not applicable to melamine. The legal limits for melamine were derived based on risk assessment results using the TDI of melamine for young children and have incorporated a large safety margin. It has also taken into consideration vulnerability of young children to the effects of melamine, migration of melamine from utensils to food and environmental contamination. Based on available evidence, this set of standards is considered adequate to protect public health.

### Melamine:

- is not allowed to be added to food in any quantity;
- can cause crystals formation in urinary tract;
- -tainted products that exceed the legal limits should not be consumed.

## Surveillance Action of CFS

The CFS has been testing various milk, milk products and other food products for melamine since September 2008. As at 14 October 2008, more than 2 350 food samples such as beverages, baby foods, frozen confections, bakery products, etc, were examined. 29 of them failed to meet the standards set. [The test results of all the food products sampled](#) are posted on the CFS website.

## Advice to Consumers

1. Consumers are understandably concerned about the possible adverse health effects associated with the consumption of the affected products. Nevertheless, there is no cause for undue alarm.
2. If food products have melamine levels exceeding the legal limits, consumers should not consume them.
3. Adverse health effects are unlikely after usual consumption of foods meeting the legal limits.
4. Children should seek medical advice if they have urinary symptoms including the development of urinary stone and with history of prolonged exposure to melamine contaminated dairy products.

## Advice to Trade

Members of the trade:

1. Should not sell food products that have been found to contain melamine or use them as ingredients ;
2. Should ensure that their food products comply with the legal standards for melamine and are fit human consumption.

## Further Information

Interested readers may visit the CFS web page on [Melamine in Mainland's milk Powder Incident](#) for further information.

# 食物中的生物危害：寄生蟲

## Biological Hazard in Food – Parasites

食物安全平台

Food Safety Platform

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,  
Risk Assessment Section,  
Centre for Food Safety

細菌以單細胞的形式存在，而病毒以單一粒子的形式存在，但寄生蟲則不然。本文是《食物中的生物危害》系列的最後一篇，將會集中討論寄生蟲這種包括單細胞和多細胞類型的生物。

### 寄生蟲

寄生蟲是居於宿主身上或體內以求本身得益或損害宿主利益的生物。雖然有些食物可能會較少人知道有寄生蟲存在，但其實肉類、海產和生的農作物等不同種類的食物都可找到寄生蟲。寄生蟲主要分為原蟲和蠕蟲兩大類。

### 原蟲

原蟲與細菌相似，是單細胞生物，通常在光學顯微鏡下讓人看見。雖然原蟲不能在食物中生長，但卻能夠在人體內繁殖。部分原蟲會產生包囊，讓其免被胃部內的胃液殺死，令原蟲能夠在食物或環境中傳播。一般相信只需很少數目便可引致原蟲感染，部分原蟲可能只需數個包囊便可令人患病。生或未經徹底煮熟的肉類中的弓形蟲和受污染的水中的藍氏賈第鞭毛蟲都是常見的原蟲。

### 蠕蟲

蠕蟲是較大的多細胞生物，不同種類的體型分別很大，部分可長逾六米。蠕蟲的成蟲不會在人體內繁殖。食物中常見的蠕蟲見下表：

Bacteria appear as single cells and viruses appear as single particles, but this is not the case for parasites. This last issue of the series on biological hazard in food will focus on parasites, which consist of organisms from single cell to multiple cells.

### Parasites

Parasites are organisms that can live on or in a host as well as to derive benefit from or at the expense of its host. They can be found on various kinds of food, such as meats, seafood and fresh produce, despite some of them may not be commonly known of harbouring parasites. Two main types of parasites found in food are protozoa and helminths (also known as worms).

### Protozoa

Similar to bacteria, protozoa are single cell organisms and generally can be seen under light microscope. Yet, they are not able to multiply in food but in humans. Some protozoa produce cysts (closed sacs), which can resist destruction by gastric juice in stomach and help protozoa to transmit in food or environment. Infective dose is generally believed to be low and some protozoa may only require a few cysts to cause disease. *Toxoplasma gondii* and *Giardia lamblia* are common protozoa found in raw or undercooked meat and contaminated water respectively.

### Helminths

Helminths are larger organisms that compose of multiple cells and can vary a lot in size; some can grow up to more than six meters long. In their adult form, helminths cannot multiply in humans. Common helminths found in food are shown below:

	外形特點 Physical characteristics	例子 Examples	寄生蟲存在的食物例子 Examples of source food
吸蟲 Flukes	身體扁平，長約1至2厘米 Flat and about 1 to 2 cm long	中華肝吸蟲 <i>Clonorchis sinensis</i>	生的鯪魚片 Raw sliced grass carp
		牛羊肝吸蟲 <i>Fasciola hepatica</i>	西洋菜 Watercress
		衛氏並殖吸蟲 <i>Paragonimus westermani</i>	醉蟹 "Drunken" crab (crab marinated with wine)
絛蟲 Tapeworms	身體扁平，可長逾6米 Flat and could be up to more than 6 meters long	豬帶絛蟲 <i>Taenia solium</i>	豬肉 Pork
蛔蟲 Roundworms	身體呈圓形，可長達20厘米 Round and long and the length can reach 20 cm	廣州管圓線蟲 <i>Angiostrongylus cantonensis</i>	福壽螺 Golden apple snail
		旋毛形線蟲 <i>Trichinella spiralis</i>	豬肉 Pork

蠕蟲蟲卵可存在於糞便中。這些附有蟲卵的糞便令蠕蟲可再寄生於該名宿主，又或排放往環境中再寄生於其他宿主。屬於蛔蟲之一的蟯蟲，會在肛門附近產卵，令人奇癢無比。體內有蟯蟲的兒童在搔抓肛門四周後，便會把蟲卵藏在指甲縫內，之後可能會因吃下蟲卵而再受感染。

### 寄生蟲的生命周期

有些寄生蟲可獨立生活，但有些則須在整個或部分生命周期中寄生在其他生物內。寄生蟲在生命周期內可能有超過一個

Eggs laid by helminths can be found in faeces, which can reinfest the host or release to the environment to infest other hosts. One of the roundworms, called pinworm, can lay eggs around anus, which cause intense itching. Children harbouring the worm may reinfest themselves by harbouring the eggs under their fingernails after scratching around the anus and subsequently transfer the eggs back to the mouth.

### Life Cycle of Parasites

Some parasites are free-living, while some require to parasitise other organisms in whole or some part of their life cycle. There may be more than one host in the life cycle of the parasite. Sometimes humans help the spread of parasites by being a definitive host which a parasite reaches sexual maturity and reproduces.

The life cycles are quite different



中華肝吸蟲:(左)成蟲及(右)蟲卵(照片來源:香港大學微生物學系黃世賢醫生)

*Clonorchis sinensis*: (left) adult and (right) egg (Photo: Dr. Samson S.Y. Wong, Department of Microbiology, University of Hong Kong)

宿主。有時人類也會成為寄生蟲的最終宿主（即寄生蟲在該宿主體內處於性成熟期並能生殖後代），協助傳播寄生蟲。

寄生蟲的生命周期各有不同，視乎種類而定。有些原蟲會由受感染的食物處理人員或用受糞便污染的水作灌溉的生吃農作物經口糞途徑傳播。至於吸蟲和蛔蟲等寄生蟲，則有較複雜的生命周期，在不同的階段可能會寄生在毫無關係的宿主內。舉例來說，上文提及的吸蟲便需在螺內經過不同的發展階段，然後才沾染在人們食用的食物傳播媒介。

### 預防食物中的寄生蟲

大部分寄生蟲感染個案是由進食生或未經徹底煮熟的食物所致，例如生的農作物；醉蟹或生滾鯪魚粥等中式食品；以及未經徹底煮熟的火鍋或燒烤食物。清洗和削去表皮可以預防某些在蔬果表面上的寄生蟲。不過，徹底煮熟食物才是預防寄生蟲病的較有效方法。

除了透過飲食傳播寄生蟲外，口糞途徑亦是另一個重要的傳播途徑。嚴格遵守良好的個人衛生習慣有助預防寄生蟲感染。寄生蟲在不同的成長階段（例如包囊和蟲卵）均可經糞便傳播。這種情況不但存在於人類，對動物亦然，例如弓形蟲便可在家貓的糞便中找到。因此，我們必須徹底洗淨雙手，尤其是處理食物前，如廁後，以及接觸寵物和處理其糞便後，才能預防寄生蟲傳播。

depending on the types of parasites. Some protozoa are transmitted through faecal-oral route via infested food handlers or fresh produce nourished with faecal contaminated water. Some parasites, like flukes and tapeworms, have complex life cycles in which some unrelated hosts may be involved at different stages. For example, the flukes mentioned above need to go through some developmental stages in the snail before reaching the food vehicles that are consumed by humans.

### Prevention of Parasites in Food

Most parasitic cases are caused by consumption of raw or undercooked food, such as fresh produce, some Chinese food like "drunken" crab and congee with undercooked grass carp slices, and food without thorough cooking by hot pot or barbecue. Washing and peeling can help to prevent certain parasites on the surface of fruits and vegetables. But the more effective way to prevent parasitic disease is to cook food thoroughly.

Besides foodborne transmission, faecal-oral route is another important route of transmission of parasites. Strict observance on personal hygiene can help to avoid parasitic infestation. Parasites may be disseminated during various parasite stages, such as cyst and eggs, in the faeces. This is not only for humans but also for animals, e.g. *Toxoplasma gondii* can be found in domestic cat faeces. Hence, it is crucial to wash your hands thoroughly, especially before handling food, after going to the toilet and after handling pets and their waste.

## 食物事故點滴 Food Incident Highlight

### 乾燥劑與食物安全

### Desiccant and Food Safety

誤食乾燥劑的事件時有所聞。乾燥劑用於包裝食物上，目的是保持包裝內的環境乾燥，從而抑制霉菌生長和延長食物保質期。常見的乾燥劑有矽膠和生石灰兩大類。

矽膠的外形呈小圓珠狀，具有化學及生物惰性，故即使人們誤食少量矽膠，相信亦不會對人體有害。

至於生石灰，則是白色粉末，與水分接觸後會具有腐蝕性。人們如誤食生石灰，可能會出現灼熱感，胃痙攣及腹瀉。

乾燥劑並非食物，因此通常會加上禁止食用的中英文警告字句，例如“Do Not Eat 請勿食用”。食物開封後，消費者應立即棄掉包裝內的乾燥劑，以免他人（尤其是兒童和長者）誤食；如發現乾燥包有破損，切勿進食有關食物。

There have been incidents regarding accidental consumption of desiccant from time to time. Desiccant is used in food packages to help maintaining a low relative humidity, which in turn can limit mould growth and extend shelf-life. Commonly used desiccants include silica gel and calcium oxide.

Silica gel is in form of small beads. It is chemically and biologically inert, so it is not expected to cause harmful effects if accidentally ingested in small amount.

Calcium oxide, also called quicklime, is a white powder. It becomes caustic when in contact with moisture and may cause burning sensation, stomach cramps and diarrhoea if swallowed accidentally.

Desiccant is not a food and thus usually marked with bilingual warnings against consumption, e.g., "Do Not Eat 請勿食用". Consumers are advised to discard the desiccant once the food package is opened to avoid accidental consumption, particularly by children and the elderly, and not to eat the food if the sachet of desiccant is found broken.



各款乾燥包  
Sachets of desiccant

## 風險傳達 工作一覽 Summary of Risk Communication Work

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