

食物安全焦點

Food Safety Focus



食物安全中心
Centre for Food Safety

二零一四年六月·第九十五期
June 2014 · 95th Issue
ISSN 2224-6908



食物環境衛生署
Food and Environmental
Hygiene Department

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
Published by the Centre for Food Safety, Food and Environmental Hygiene Department on every third Wednesday of the month

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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

二零一四年五月，本港傳媒報道一項關於本港街市所售蔬菜，包括乾冬菇和乾竹筍等的重金屬含量調查，據報有兩個乾冬菇及一個乾竹筍樣本的鎘含量超過法定上限。食物含重金屬的情況一向備受關注。另一方面，有人對這些乾製蔬菜樣本中驗出的重金屬含量可否直接與法定上限作比較產生疑問。

國際間如何解讀乾製食品中重金屬的最高准許濃度？

重金屬是一種環境污染物，既天然存在於大自然中，也會經由農耕、工業或汽車廢氣等人類活動產生。因此，食物中難免存有重金屬殘餘。雖然食物中重金屬的總分量經過加工(例如乾製)後不會改變，但其濃度會有所增加。

In May 2014, the local media reported the results of a survey on heavy metals in vegetables including dried mushrooms and dried bamboo fungi available in the local market. According to the report, the cadmium levels in two dried mushrooms and one dried bamboo fungus exceeded the legal limits. The presence of heavy metals in food often arouses public concern. On the other hand, some people cast doubts on whether the detected levels of heavy metals in the dried vegetable samples can be compared with the legal limits directly.

What are the International Practices in Interpreting Maximum Permitted Concentrations for Heavy Metals in Dried Food?

Heavy metals are environmental contaminants, from both natural sources and human activities such as farming, industrial activities or car exhausts. Hence, they can occur as residues in food. Although the total amounts of heavy metals in food do not change upon drying, their levels will be concentrated.

舉例來說，

一枚鮮冬菇的鎘含量為每公斤0.03毫克，低於法定上限(每公斤0.1毫克)。但同一枚冬菇乾製後的鎘含量為每公斤0.3毫克或更高，似乎超逾了法定上限。出現這個現象，是因為鮮冬菇的重量在乾製過程中減少了約90%。因此，在解讀化驗結果時須考慮脫水這個因素。

For example,

A fresh shiitake mushroom with cadmium at 0.03 mg/kg does not exceed the legal limit of 0.1 mg/kg. However, the same mushroom after drying will have cadmium at 0.3 mg/kg or higher and this level apparently exceeds the legal limit! This is because the fresh mushroom has lost about 90% of its weight through the drying process and this factor of water loss has to be taken into account when interpreting the laboratory result.

食品法典委員會曾就加工過程的影響提出以下建議：“一般來說……最高上限最好是針對初級農產品而制定。若將最高上限應用於加工食物、衍生食物和以多種配料製成的食物時，應該採用適當的轉換系數”。澳洲和歐洲聯盟成員國等多個國家均採用這種方法解讀化驗結果。

食物安全中心(中心)在評估乾製食品中的重金屬含量有否超逾法定上限時，一向遵從食品法典委員會的上述建議和國際做法，應用轉換系數作出評估。

The Codex Alimentarius Commission (Codex) has recommended that “in general...maximum levels should preferably be set for primary agricultural products and may be applied to processed, derived and multi-ingredient food by using appropriate conversion factors” to take into account the effect of processing. This approach has been adopted by many countries such as Australia and EU member states when interpreting laboratory results.

In line with the Codex's recommendation and international practice, the Centre for Food Safety (CFS) has been applying the concept of “conversion factors” when assessing whether the levels of heavy metals in a food have exceeded the legal limits.

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焦點個案
Incident in Focus

如何判斷加工食品的重金屬含量？

乾製的加工食品中某種重金屬的“原本”含量，可按以下公式計算出來：

乾製食品在新鮮狀態(鮮冬菇)時某種重金屬的“原本”含量
“Original” level of a heavy metal in a fresh food (e.g. a fresh mushroom)

=

乾製食品(例如乾冬菇)所含某種重金屬分量的化驗結果
“Laboratory-reported” level of a heavy metal in a dried food (e.g. a dried mushroom)

X

轉換系數
Conversion factor

假設一枚乾冬菇的鎘含量化驗結果是每公斤0.2毫克，用轉換系數(0.1)加以運算後，該枚乾冬菇在新鮮狀態時的“原本”鎘含量應為每公斤0.02毫克。換言之，該枚乾冬菇的鎘含量低於法定上限(每公斤0.1毫克)。

How are the Levels Determined in a Processed Food?

The “original” level of a heavy metal in a dried processed food can be determined using the following formula:

If the “laboratory-reported” level of cadmium in a dried shiitake mushroom is 0.2 mg/kg, the “original” level of cadmium in its fresh state should be 0.02 mg/kg after applying a conversion factor of 0.1. In other words, the level of cadmium in the dried mushroom is lower than the legal limit (i.e. 0.1 mg/kg).

每公斤0.02毫克(鮮冬菇的鎘含量)
0.02 mg/kg (Level of cadmium in the fresh mushroom)

=

每公斤0.2 毫克(化驗結果)
0.2 mg/kg (“Laboratory-reported” level)

X

0.1(轉換系數)
0.1(Conversion factors)

上述方法可確保在本港供應的食物安全嗎？

有人可能把法例所訂的上限與各項相關的安全參考值(例如由聯合國糧食及農業組織/世界衛生組織聯合食物添加劑專家委員會制定的每周可容忍攝入量)混為一談。法例訂明不同食物中的化學物准許含量，目的是為了執法和確保食物的質素。吃下的食品如含有超逾法定標準的化學物，並不一定表示對健康有害。在評估食物樣本的整體安全和所驗出的重金屬對健康造成的影響時，應考慮有關污染物在食物中的含量及有關食物的平均食用量。

中心一直透過恆常的食物監察計劃，在進口、批發及零售層面監察食物中的污染物，包括重金屬等，以確保在市面出售的食物是安全及適宜供人食用的。二零一三年，中心抽取了768個蔬菜樣本作重金屬測試，其中只有三個超出法定上限。

部分乾製食品的轉換系數 Examples of conversion factors for some dried foods	
食品 Food Item	轉換系數 Conversion Factor
鮑魚 Abalone	0.28 – 0.38
蠔 Oyster	0.15 – 0.21
海參 Sea cucumber	0.28
冬菇 Shiitake mushroom	0.09 – 0.10
黑木耳 Black wood ear	0.12

不同的乾製食品有不同的轉換系數
Different dried food items may have different conversion factors

Can the Above Approach Ensure the Supply of Safe Food in Hong Kong?

Some people may confuse legal limits with the respective safety reference values such as the Tolerable Weekly Intake (TWI) established by the Joint Food and Agriculture Organization/World Health Organization Expert Committee on Food Additives (JECFA). The law states the amounts of chemicals allowed in different foods for enforcement and

maintenance of food standards. Consuming food products with chemicals exceeding the legal standards does not imply that the consumer’s health is at risk. When assessing the overall safety of the sample and the associated health effects of the heavy metals detected, both the level of the contaminant in the food and the quantity of the food consumed should be taken into account.

To ensure that food on sale in the market is safe and fit for human consumption, the CFS monitors food contaminants, including heavy metals, at import, wholesale and retail levels through the Food Surveillance Programme. In 2013, 768 vegetable samples were taken for heavy metals analysis, and only three samples were detected with levels exceeding the legal limits.

注意要點

- 重金屬在環境中無處不在，很可能會殘留在食物中。
- 雖然食物中重金屬的總分量經乾製後不會改變，但其濃度會有所增加。
- 為反映加工過程對重金屬含量的影響，加工食品在計算“原本”的重金屬含量時，必須採用適當的轉換系數。

Key Points to Note

- Heavy metals are ubiquitous in the environment and may be present as residues in our food.
- While the total amount of a heavy metal in a food may not change upon drying, its level may be concentrated.
- To take into account the effect of processing, an appropriate conversion factor has to be applied when calculating the “original” level of a heavy metal present in a processed food.

給市民的建議

- 蔬菜是健康飲食不可或缺的一部分。消費者應保持均衡飲食，進食多種蔬菜。

Advice to the Public

- Vegetables are an important part of a healthy diet. Consumers are advised to take a balanced diet and eat a variety of vegetables.

給業界的建議

- 業界應確保所出售或進口的食物適宜供人食用，並符合法定標準。

Advice to the Trade

- The trade should ensure that the foods they sell or import are fit for human consumption and comply with legal standards.

食物、致癌物質與癌症 — 上篇

Food, Carcinogens and Cancer - Part I

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,
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我們由今期起會一連數期探討食物、致癌物質與癌症三者之間的關係。

癌症二字，往往令人聯想到長期受病痛煎熬的痛苦、艱苦的療程以及死亡率高的殘酷事實。令人聞之色變的癌症成為人們的關注焦點並不是沒有理由的。事實上，香港癌症新增個案和死亡人數在過去數十年大幅上升。根據二零一零年的數據，本港每四名男性或每五名女性中便有一位可能於75歲前患癌。死亡率最高的癌症是肺癌、結腸與直腸癌和肝癌。

甚麼是癌症？

癌症在醫學文獻中又稱“惡性腫瘤”，是一大類疾病的統稱，病發位置可以是全身任何部位。

正常細胞會很有秩序地繁殖、分裂和死亡。而癌細胞則會失控地不斷分裂，產生新的異常細胞，這些異常細胞會侵入周遭正常組織，甚至經由血管或淋巴管轉移到身體其他部分。

癌症與脫氧核糖核酸 (DNA)

DNA是細胞裡的遺傳物質，裝載了所有細胞活動的指令和基因編碼。如細胞的DNA受損後沒有修復或未完全修復，該細胞便可能會接收錯誤指令，從而不受控制地分裂。DNA出現異常，原因可能是在細胞分裂過程中出現錯誤，亦有可能是由於遺傳因素或環境因素而造成DNA損傷。環境中的致癌物質包括：

- 物理致癌物質 (例如紫外線和電離輻射)；
- 生物致癌物質 (例如長期帶有乙型肝炎病毒和丙型肝炎病毒可增加患上肝癌的風險；受幽門螺旋桿菌感染會增加患上胃癌的風險；受寄生蟲中華肝吸蟲感染則會增加患上膽管癌的風險)；以及

This is the first article in a series on the relation of food, carcinogens and cancer.

When talking about cancer, an image of long term suffering, excruciating therapies and high death toll may come up. These serious diseases therefore attract much public attention. This is not without reason, as in Hong Kong, the number of new cancer cases and cancer deaths has been substantially increased in the past few decades. One in four men and one in five women in Hong Kong developed some forms of cancer before 75 years old based on 2010 figures. The leading sites of cancer deaths were cancers of the lung, colon and rectum and liver.

膳食中的致癌物質 Carcinogens that can be present in diet

食物中的致癌物質 Carcinogens in food	主要有關食物 Major food sources	相關癌症或基因毒性 Associated cancers or genotoxic effect
丙烯酰胺 Acrylamide	薯片、薯條 Potato chips, French fries	細胞實驗研究顯示，會引致基因突變及染色體轉變 mutations and chromosomal changes in laboratory cell study
黃曲霉毒素 Aflatoxins	發霉的花生或穀類 Mouldy peanuts or cereals	肝癌 Liver
酒精 Alcohol	酒精飲品 Alcoholic beverages	口腔癌、咽癌、喉癌、食道癌和肝癌 Oral cavity, pharynx, larynx, oesophagus and liver
無機砷 Inorganic arsenic	部分地區受污染的飲用水 Contaminated drinking water in certain area	皮膚癌和肺癌 Skin and lung
苯並[a]芘 Benzo[a]pyrene (B[a]P)	烤肉 Roasted meat	基因毒性 Genetic toxicity (genotoxic)
鎘 Cadmium	葉菜類蔬菜、穀類、貝類 Leafy vegetables, cereals, shellfish	腎癌和前列腺癌 動物基因突變 (胚胎畸形) Kidney and prostate. Gene mutation (teratogenic) in animals
鹹魚 (含N-亞硝基二甲胺) Chinese-style salted fish (containing N-nitrosodimethylamine)	鹹魚 Chinese-style salted fish	鼻咽癌 Naso-pharynx
六價鉻 Chromium (VI)	部分地區受污染的飲用水 Contaminated drinking water in certain area	可能增加患上胃癌的風險 Possibly increase stomach cancer risk
二噁英和二噁英樣多氯聯苯 Dioxins and dioxin-like polychlorinated biphenyls (PCBs)	魚類和動物的脂肪組織 Fatty tissue of fish and animals	增加患上各類癌症的風險 Increased risk for all cancers combined
無機鉛 Inorganic lead	醃製不當的皮蛋 Improperly treated preserved eggs	基因毒性，可能會提高其他物質的基因毒性 Genotoxic, possibly enhancing genotoxicity of other agents
經由攝入硝酸鹽和亞硝酸鹽而產生的某些亞硝基化合物 Certain nitroso compounds resulted from ingested nitrate / nitrite	醃製肉類和生長環境含高硝酸鹽的蔬菜 Cured meat and vegetables grown in high nitrate areas	胃癌 Stomach

mistakes during cell reproduction, inherited from our ancestors or damaged by factors in the environment we come into contact with. The carcinogens from the environment include:

- physical carcinogens (e.g. UV light and ionising radiation);
- biological carcinogens (e.g. chronic viral infections with hepatitis B and C increase chance of liver cancer, bacterial infections with *Helicobacter pylori* increase the chance of stomach cancer, parasitic infection with Chinese liver fluke can increase chance of bile duct cancer.); and

What is Cancer?

Cancers refer to a large group of diseases that can affect every part of the body. They are also known as “malignant tumours” or “neoplasms” in scientific literatures.

Normal cells grow, divide and die in an orderly and controlled fashion. But for cancer cells, a single cell can grow out of control and form new abnormal cells which can then invade other tissues nearby or other parts of the body through bloodstream or lymph vessels in some cases.

Cancer and DNA

DNA is the genetic material in cells and contains all the instructions and coding for all cell activities. When a cell survives with unrepaired or improperly repaired DNA damages, the cell may receive incorrect instructions and divide uncontrollably. The abnormality in DNA can be caused by

- 化學致癌物質(例如黃曲霉毒素、酒精、烤肉中的苯並[a]芘、煙草的煙霧、經由攝入醃製肉類中的硝酸鹽和亞硝酸鹽而產生的某些亞硝基化合物)。

你可能留意到，上文提及的很多致癌物質在我們日常生活中無處不在，例如陽光中的紫外線、酒精飲品，以及火腿和烤肉等。事實上，要生活在一個全無致癌物質的環境中不但不切實際，而且也是不可能的，有些致癌物質固然可以避免，但很多卻是防不勝防的。

膳食中的致癌物質從何而來

從上表可見，多種食物都可能含致癌物質，要完全避免攝取黃曲霉毒素、二噁英、某些由攝入硝酸鹽和亞硝酸鹽產生的亞硝基化合物等致癌物質是不可能的。有意見認為，一生的飲食習慣或某個年齡段的飲食模式，是致癌的重要因素。

下一期我們將談談如何減少食物帶來的致癌風險，以及如何有系統地評估致癌物質等。

- chemical carcinogens (e.g. aflatoxins, alcohol, benzo[a]pyrene (B[a]P) in roasted meat, tobacco smoke, certain nitroso compounds resulted from ingested nitrate / nitrite in preserved meat).

You may notice that many of the carcinogens above may be very much part of everyday life for many people. For example, UV light from the sun, alcoholic drinks, ham or roast meat. It is unrealistic or impossible to live in a carcinogen free environment as some carcinogens can be avoided while many others cannot.

Sources of Carcinogens in Diet

As described in the table above, carcinogens in diet come from a wide range of food and many of the carcinogens like aflatoxins, dioxins, certain nitroso compounds resulted from ingestion of nitrate and nitrite cannot be avoided in its totality. It has been suggested that lifelong dietary patterns or dietary intake during specific life stages maybe important in inducing cancers.

We would talk about how to reduce cancer risk from food, and how carcinogens are systemically evaluated in the next issue.

食物事故點滴 Food Incident Highlight

粽子裏的硼酸 Boric Acid in Rice Dumpling

食物安全中心最近完成一項有關粽子的時令食品調查。結果顯示，有一個樣本含有不准在食物中使用的防腐劑“硼酸”。中心已指令追查有關食物來源和停售有問題食品。

由於硼酸能防止食物腐壞和令食物更有彈性，過去曾被用作食物添加劑。一九六一年，聯合國糧食及農業組織/世界衛生組織聯合食物添加劑專家委員會總結認為，硼酸不適宜用作食物添加劑。這些年來，食物製造商已使用其他較安全的添加劑取代硼酸。

在本港，根據《食物內防腐劑規例》，硼酸並非可用於食物中的防腐劑。售賣含有硼酸作防腐劑的食物即屬違法，違例者最高可判罰款五萬元及監禁六個月。食物製造商須遵從法例要求，並按優良製造規範的條件來配製食品。

Recently, seasonal food surveillance conducted by the Centre for Food Safety (CFS) revealed that a rice dumpling sample contained a non-permitted preservative, boric acid. The CFS immediately conducted source tracing and suspended sale of the products.

Boric acid was used in food in the past due to its preservative properties and ability to increase elasticity of foods. Over the years, its use as food additive has been replaced by safer alternatives. The Joint FAO/WHO Expert Committee on Food Additives (JECFA) concluded in 1961 that boric acid was not suitable for use as food additive.

In Hong Kong, boric acid is not a permitted preservative under the Preservatives in Food Regulation. The sale of food containing boric acid as a preservative is an offence which carries a maximum penalty of a \$50,000 fine and six months' imprisonment. The food trade should comply with legal requirements and adhere to Good Manufacturing Practice.

前往中東遊覽和朝聖的食物安全建議 Food Safety Advice for Travellers and Pilgrims to Middle East

自沙地阿拉伯在二零一二年首次出現中東呼吸綜合症冠狀病毒後，全球至今已累積逾700宗中東呼吸綜合症確診個案，患者大部分在中東染病。雖然最近有研究指部分人類感染個案是源自駱駝，但確實的感染源頭仍未完全查明。

食用生的或未經徹底煮熟的動物製品很容易感染各種病原體，令身體不適。前往中東遊覽和朝聖的人士除應注重個人及環境衛生外，亦應避免飲用生乳；只進食經烹煮、巴士德消毒或其他熱處理方法作適當加工的動物製品；此外還須遵守食物安全守則，例如蔬果進食前要清洗乾淨。

Since Middle East Respiratory Syndrome Coronavirus (MERS-CoV) was first recognised in Saudi Arabia in 2012, up till now there have been more than 700 confirmed cases of Middle East Respiratory Syndrome globally, mostly originated in the Middle East. Although recent studies suggest that camels may be a source of some human infections, the full picture on the source is not yet clear.

Consumption of raw or undercooked animal products carries a high risk of infection from a variety of organisms that might cause disease in humans. Besides observing good personal and environmental hygiene, travellers and pilgrims to the Middle East should avoid drinking raw milk and only consume animal products that have been appropriately processed through cooking, pasteurisation or other heat treatments. They should also adhere to good food safety practices such as washing fruits and vegetables properly before consumption.

風險傳達 工作一覽 Summary of Risk Communication Work

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