食物安全焦點
Food Safety Focus

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Reported by Ms. Waiky WONG, Scientific Officer, Risk Assessment Section, Centre for Food Safety

研究發現的鋁含量偏高的食物例子
Examples of items that were found with high levels of aluminium

食物安全中心在上個月公布食物中鋁的含量風險評估研究，發現有一些食物由於可能使用了含鋁食物添加劑，故通常含有較高水平的鋁。鋁含量偏高的食物包括海蜇、蒸包／蒸糕，以及鬆餅、班戟及窩夫等部分烘焙食品。

鑑於聯合國糧食及農業組織／世界衞生組織聯合食品添加劑專家委員會(專家委員會)的最新評估把鋁的安全攝入量(即暫定每週可容忍攝入量)降低七倍，至每公斤體重1毫克的水平，中心為此進行這項研究。此外，近期有研究顯示，部分歐洲人從食物攝入鋁的分量可能超出新訂的每週可容忍攝入量。加拿大、日本和澳洲的食物安全當局亦正研究當地的情況。

含鋁食物添加劑

過去百多年，含鋁食物添加劑一直用於食物加工過程中，並具有多種作用。現時，美國、歐洲聯盟、澳洲、日本和中國內地等不少國家均准許使用這類添加劑。含鋁食物添加劑通常在蒸糕／蒸包和烘焙食品中用作膨脹劑，在食物混合配料粉中用作抗結劑，在有糖衣的甜點中用作染色料，並在東方地區海蜇製造過程中用作固化劑。加入含鋁食物添加劑的食物是一般人從食物攝入鋁的主要來源。

此外，烘焙食品中的鋁含量差異很大，視乎這些食品是否使用了含鋁食物添加劑和所加入的分量。下表

Last month, the Centre for Food Safety (CFS) released the Risk Assessment Study on Aluminium in Food, which revealed that high levels of aluminium were commonly found in a range of food products, probably a result of using aluminium-containing food additives. Items containing high aluminium levels included jellyfish, steamed bread/bun/cake, and some bakery products such as muffins, pancake and waffle.

The study was conducted in the light of the latest evaluation by the Joint Food and Agriculture Organization/ World Health Organization Expert Committee on Food Additives (JECFA) that the safe intake level (i.e. provisional tolerable weekly intake (PTWI)) was lowered by seven folds to 1 mg/kg body weight (bw) for aluminium. Recent study revealed that dietary exposure of some Europeans may exceed this new PTWI. Food authorities in Canada, Japan and Australia are also examining their local situation.

Aluminium-containing Food Additives

Aluminium-containing food additives have been used in food processing with a variety of functions for over a century and are permitted to be used in many countries such as the United States, the European Union, Australia, Japan and Mainland China. They are commonly used as raising agent in steamed cake/bread and bakery products, anticaking agent in powder mix, colouring matter in candy-coated confectionery, and in the East, as firming agent in jellyfish. Food with aluminium-containing food additives is regarded as the main dietary source of aluminium of the general population.

Moreover, aluminium levels may vary widely among bakery products, depending on whether aluminium-containing food additives are used in such products and their amounts added. Bakery products with low to high levels of aluminium as revealed by the study are grouped in the table below.

各類烘焙食品的鋁含量 Aluminium contents among various bakery products

每公斤食物的鋁含量(毫克) Levels of aluminium (mg/kg)		
通常偏低 Generally low (平均含量≦10) (mean ≦ 10)	通常一般 Generally medium (10<平均含量≦100) (10 < mean ≦100)	通常偏高 Generally high (平均含量>100) (mean > 100)
叉燒酥 Baked barbecue pork puff 麪包 Bun or roll 蛋撻 Egg tart 威化餅 Wafers 麥方包 Wheat bread 白方包 White bread	蛋糕 Cakes 合桃酥或同類食品 Chinese walnut cookies or similar products 曲奇餅和餅乾 Cookies and biscuits 甜圈 Doughnut 果撻 Fruit tart	椰撻 Coconut tart 鬆餅 Muffin 班戟／窩夫 Pancake/Waffle

備註：上述鋁含量數字來自研究所測試的有限樣本數目。
Remarks: Levels of aluminium are drawn from a limited number of samples tested in the study.

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臚列出研究發現的鋁含量偏低、一般及偏高的烘焙食品。

鋁對健康的影響

現時並無報告顯示一般市民經口服途徑攝入鋁會引致急性中毒。鋁也不會令人類患癌。此外，從食物攝入鋁亦不會有患上老人癡呆症的風險。不過，鋁化合物卻證實會對實驗動物產生生殖和發育毒性。

本港市民從食物攝入鋁的情況

中心的研究顯示，市民每週從食物攝入鋁的平均分量為每公斤體重0.6毫克(即暫定每週可容忍攝入量的60%)，因此無須改變對一般市民所作的一貫飲食建議。不過，對於經常食用加入含鋁食物添加劑的食物(例如蒸包／蒸糕、某些烘焙食品和海蜇等)的市民，尤其是兒童，他們可能會較易受鋁影響。不過，只要平均攝入量沒有持續超出暫定每週可容忍攝入量，從食物攝入鋁的分量偶爾高於暫定每週可容忍攝入量不會影響健康。

注意要點

- 海蜇、蒸糕和鬆餅等食品可能含有高水平的鋁。
- 各界應致力減低市民攝入鋁的機會。
- 應保持均衡飲食，以免因偏食某幾類食物而攝入過量鋁。

與業界合力減少市民攝入鋁的機會

中心與業界保持緊密合作，一同制定含鋁食物添加劑使用指引，並呼籲業界採用指引所載的各項措施，以減少食物中的鋁含量。另一方面，食品法典委員會現正檢討有關含鋁食物添加劑的標準，以期減少一般人攝入鋁的分量。中心會繼續監察有關情況和國際發展。

給業界的建議

- 在製造食物時盡可能減少使用含鋁食物添加劑或改用其他替代品。
- 研究新的食品加工技術以減低食品中的鋁含量。
- 在食物標籤上提供正確無誤的資料，包括個別食物添加劑的資料。

給市民的建議

- 保持均衡飲食，以免因偏食某幾類食物(尤其是海蜇、蒸糕和鬆餅)而攝入過量鋁。
- 參考成分表上的資料，包括所使用的食物添加劑及其食物添加劑國際編碼系統(國際編碼系統)編號，從而作出有依據的選擇。

含鋁食物添加劑例子 Examples of aluminium-containing food additives

國際編碼系統編號 INS No.	食物添加劑 Food Additive
173	鋁 Aluminium
520	硫酸鋁 Aluminium sulphate
521	硫酸鋁鈉 Aluminium sodium sulphate
522	硫酸鋁鉀 Aluminium potassium sulphate
523	硫酸鋁銨 Aluminium ammonium sulphate
541	磷酸鋁鈉 Sodium aluminium phosphate
541(i)	酸性的磷酸鋁鈉 Sodium aluminium phosphate (acidic)
541(ii)	鹼性的磷酸鋁鈉 Sodium aluminium phosphate (basic)
554	硅酸鋁鈉 Sodium aluminosilicate
555	硅酸鋁鉀 Potassium aluminium silicate
556	硅酸鋁鈣 Calcium aluminium silicate
559	硅酸鋁 Aluminium silicate
1452	辛烯基琥珀酸鋁澱粉 Starch aluminium octenyl succinate

Health Effects of Aluminium

No acute toxicity by the oral exposure to aluminium has been reported in general population and aluminium is not regarded as a human carcinogen. Moreover, the dietary exposure to aluminium is not considered to pose a risk for developing Alzheimer's disease. However, aluminium compounds have demonstrated reproductive and developmental toxicity in experimental animals.

Local Dietary Exposure to Aluminium

Average dietary exposure to aluminium of the local population revealed by our study was 0.6 mg/kg bw/week (i.e. 60% of the PTWI). Thus, it does not warrant changes in usual dietary advice for average individuals, but people, particularly children, who regularly consume food using aluminium-containing food additives such as steamed bread/bun/cake, some bakery products and jellyfish, may be of higher risk. Nevertheless, occasional exposure above the PTWI would not have health consequences provided that the average intake does not continuously exceed the PTWI.

Key Points to Note

- Food items, such as jellyfish, steamed cakes and muffins, may contain high levels of aluminium.
- Efforts should be made to reduce the dietary intake of aluminium in general population.
- A balanced diet should be maintained to avoid excessive exposure to aluminium from a small range of food items.

Collaboration with Trade to Reduce Aluminium Exposure for the Population

The CFS has worked closely with the trade to devise the Guidelines on the Use of Aluminium-containing Food Additives and urges the trade to adopt measures stipulated in the Guidelines to reduce the aluminium content in food. On the other hand, the Codex Alimentarius Commission is reviewing the standards of aluminium-containing food additives with a view of lowering the aluminium exposure in general population. The CFS will continue to monitor the situation and the international development.

Advice to Trade

- Reduce the use of aluminium-containing food additives in preparing food or replace them with other alternatives as far as possible.
- Develop alternative techniques to reduce the use of aluminium-containing food additives during food processing.
- Provide accurate information on food labels including specific food additives used.

Advice to Public

- Maintain a balanced diet to avoid excessive exposure to aluminium from a small range of food items, particularly jellyfish, steamed cakes and muffins.
- Make informed food choices by making reference to the information on the ingredient list, including the food additives used and their International Numbering System for Food Additives (INS) number.

成分表中列出含鋁食物添加劑的食物標籤
Food label showing a list of ingredients with aluminium-containing food additives

食物安全平台
Food Safety Platform

基因改造食物概論
Genetically Modified Food – An Overview

食物安全中心
風險評估組
科學主任周淑敏女士報告

Reported by Ms. Shuk-man CHOW, Scientific Officer,
Risk Assessment Section,
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在上一個系列文章中，我們介紹了有關食物中潛在危害的資訊。由今期開始，我們將會推出全新系列，探討有關以某些科技衍生或處理的食物和按照特定耕作方法生產的食物的安全問題。首先，我們會介紹以現代生物科技衍生的基因改造食物。

“生物科技”一詞聽起來像是現代事物。其實，從狩獵、採集生活過渡到農耕日子以來，人類利用原始模式的生物科技(即利用生物生產新的食物)已有數千年。他們開始選擇具有預期特性(例如產量高)的植物和動物，並透過雜交方式繁殖出新的品種，而不再只是採摘野外食物。雖然古代農民不明白當中原理，但卻一代又一代利用這些雜交技術獲得適應當地環境並可生長得更好的農作物和動物。

基因工程與基因改造食物

隨着對基因學認識加深和科學日新月異，我們現時能夠把完全無關物種的基因互相轉移，並可更迅速、更精確地改變不同生物的基因構造。基因改造生物可直接作為食物(例如基因改造番茄)，又或製成產品作為食物添加劑或加工處理助劑(例如由基因改造細菌製成並用於汽水中的人造糖天冬酰胺(又稱“阿斯巴甜”))。

基因改造食物／農作物可帶來的好處

事實上，許多基因改造食物仍處於研發階段，但有部分(例如能抵受除草劑和能抵抗害蟲的農作物)則已在市場出售。科研人員預期，研發基因改造食物可帶來下列好處：i)降低生產成本和增加產量；ii)增強農作物對蟲害的抵抗力，從而減少使用除害劑；iii)生產營養價值更高的食物；iv)改良農作物的味道和口感；v)減低致敏原水平。

對基因改造食物／農作物的關注

雖然基因工程的應用可為我們提供品質更佳的食物，但進食基因改造農作物的風險一直引人關注。

1. *改變基因改造農作物致敏性和毒性的意外影響*

   致敏性和毒性是科研人員預料之內的兩種意外影響。首先，在基因工程中轉基因是隨機植入在寄主植物的基因組中，可能會改變寄主植物的表達，繼而影響轉基因植物中的正常代謝和內源毒素及致敏原水平。其次，植入轉基因或產生可能令個別易受影響人士中毒或過敏的其他新的蛋白質。

2. *轉移耐抗生素基因至腸道中的細菌*

   在研發基因改造農作物的過程中通常用耐抗生素基因來識別成功移植的植物細胞。有人關注到，經消化的基因改造植物中的脫氧核糖核酸如尚未完全分解，人類腸道中的細菌便會攝入當中的抗性基因，因而對抗生素產生抗性。

3. *異型雜交*

   異型雜交指基因從基因改造植物轉移至傳統農作物或相關野生物種，以及將傳統農作物的種子與利用基因改造農作物培植的種子混合。這種雜交方式會對食物安全產生間接影響，尚未獲准作為食物的農作物可能會與傳統農作物意外混合在一起，對人們食用構成風險。

為處理有關基因改造食物的安全問題，生產基因改造食物國家的有關當局已設有安全評估制度，以確保新研發的基因改造生物適宜供人食用，然後才獲准作為食物使用。

In previous series, we have introduced information on possible hazards in food. From this issue, we will move to a new series on the safety of foods that are derived from or have been treated with certain kind of technology, as well as foods that are produced under specific agricultural practice. The first one that we are going to introduce is genetically modified (GM) food derived from modern biotechnology.

The term “biotechnology” may sound like modern. In fact, humans have utilised primitive forms of biotechnology (the use of living things to create products) for thousands of years ever since the transition from hunter-gatherer to farmer. Rather than just gathering foods from the wild, humans began to selectively breed plants and animals with desired characteristics (e.g. high yield) and cross breed them to create new varieties. Although ancient farmers did not understand the mechanism behind the processes, they applied such breeding techniques over generations to obtain crops and animals that could match and grow better under local conditions.

Genetic Engineering and GM Food

With increased understanding of genetics and advances in science, we are now able to transfer genes between totally unrelated species and specifically modify the genetic make-up of different organisms in a faster and more precise manner. GM organisms can be applied directly for food use (e.g. GM tomato) or to produce products used as food additives or processing aids (e.g. aspartame, an artificial sweetener, produced by GM bacteria is used in soft drinks).

Potential Benefits of GM Food/Crops

Many of the GM foods are actually still under development, but some, like herbicide tolerant and insect resistant crops are already widely commercialised. Scientists envisage the development of GM crops has the potential to i) reduce production cost and increase yield, ii) provide pest resistance to crops and reduce the use of pesticide, iii) produce food with enhanced nutrition, iv) improve flavour and texture of produce, and v) mitigate allergen level.

Concerns over GM Food/Crops

Although the use of genetic engineering has the potential to provide us with food of better quality, risks associated with the consumption of GM crops continue to attract attention.

1. *Unintended effects altering the allergenicity and toxicity of GM crops*

   Allergenicity and toxicity are two unintended effects envisioned. First, the random insertion of the transgene into the host plant genome during genetic engineering might change the expression of host genes which in turn affects the normal metabolism and level of endogenous toxins or allergens in the transgenic plant. Secondly, insertion of transgene has the potential to create additional new proteins that might be toxic or allergic to susceptible individuals.

2. *Transfer of antibiotic resistance gene to bacteria in gut*

   Antibiotic resistance genes are commonly used for the identification of successfully transformed plant cells during the development of GM crops. There are concerns that bacteria in the gut of human might become antibiotic resistant through the uptake of the resistance gene from the DNA spilling out of the digested GM plant before the DNA is completely degraded.

3. *Outcrossing*

   Outcrossing describes the movement of genes from GM plants into conventional crops or related species in the wild, as well as the mixing of seeds derived from conventional crops with those grown using GM crops. Such crossing has an indirect effect on food safety where crops not yet approved for food use may unintentionally mix with their conventional counterparts that pose risks for human consumption.

To address issues surrounding the safety of GM foods, national authorities of GM food producing countries have put in place safety assessment schemes to ensure newly developed GM organisms are suitable for human consumption before they are approved for food use.

由於大家關注利用基因工程衍生的食物的安全問題，故我們將會在未來兩期深入探討與基因改造食物有關的潛在風險和可能採取的補救措施。

除了食物安全問題外，基因改造食物還可能引起環境和社會問題。有關資料，請瀏覽下列網頁：http://www.cfs.gov.hk/tc_chi/programme/programme_gmf/programme_gmf.html.

詞彙

耐抗生素基因	對抗生素具有抗性的一種基因，在基因工程中用來篩選出移植細胞。
基因	遺傳物質的單位，記載了一切用作製造細胞內蛋白質的所需資料，從而決定生物的特性。
基因工程	可直接操縱生物基因的一種技術。
基因改造食物	任何屬於基因改造生物或衍生自基因改造生物的食物。
基因組	特定物種的細胞核中的整組染色體，當中包含所有基因物質。
轉基因	被植入至宿主生物體內的有關基因。

In view of the concerns over the safety of food derived from genetic engineering, in the coming two issues, we will discuss in detail the potential risks associated with GM food and their possible remedies.

Besides food safety concerns, GM food may also have environmental and social concerns. Relevant information can be found at http://www.cfs.gov.hk/english/programme/programme_gmf/programme_gmf.html.

Glossary

Antibiotic resistance gene	A gene which confers resistance to antibiotics. It is used for the selection of transformed cells during the process of genetic engineering.
Gene	A gene is a unit of hereditary material, which carries the required information necessary to produce a protein(s) that determines the characteristics of an organism.
Genetic engineering	A technique which enables direct manipulation of genes of organisms.
Genetically modified food	Any food which is, or is derived from, genetically modified organisms.
Genome	A complete set of chromosomes found in nucleus of a given species which contains the entire genetic materials.
Transgene	The gene of interest to be introduced into the host organism.

食物事故點滴
Food Incident Highlight

茶葉與除害劑

台灣衛生署在四月至六月間驗出部分進口茶葉產品的殘餘除害劑含量超逾台灣的標準。

除害劑是為防止農作物受昆蟲、真菌和其他生物侵害而施用的。農作物在施用除害劑後或受環境污染影響，可能會殘留小量除害劑。有關事件中驗出的殘餘除害劑含量偏低，正常喝茶不會對健康造成影響。

食物安全中心的食物監察計劃會對茶葉進行定期測試。在二零零七年和二零零八年，經測試的所有茶葉在各項殘餘除害劑化驗中的結果均屬滿意。市民可在沖泡時先用熱水清洗茶葉，以減低風險。

Tea Leaves and Pesticides

Between April and June, the Department of Health in Taiwan detected pesticide residues in some imported tea leave products at levels breaching Taiwan's standards.

Pesticides are applied to prevent crops from infestation by insects, fungi and other organisms. Small amounts of pesticides may remain in crops following its application or as a result of environmental contamination. At the low levels of pesticide residues detected in these reported incidents, adverse effects are unlikely upon normal consumption of tea.

Tea leaves are routinely tested under the food surveillance programme of the Centre for Food Safety. All tea leaves tested in 2007 and 2008 were found satisfactory for pesticide residues. The public is advised to rinse tea leaves in hot water before use to reduce the risk.

非食用的明膠與食物安全

近日，傳媒報導內地有人把皮革廠的廢料進一步加工成為明膠以供製作食物之用，故引起人們關注食物安全問題。

明膠是動物骨膠原經部分水解後而成的一種蛋白質。食用明膠會在啫哩、棉花糖和軟糖製造過程中用作膠凝劑。此外，亦會在果醬、乳酪和雪糕製造過程中用作穩定劑和增稠劑。

非食用的明膠通常含有雜質(例如鉻和水銀等重金屬)，故在食物製造過程中使用並不安全。食物安全中心(中心)的恆常監察計劃包括進行重金屬分析。中心已因應近日事件抽取一些食物樣本進行重金屬測試，結果全部合格。為確保旗下食品的安全，食物製造商應向可靠的來源採購食用配料。

Non-food Grade Gelatin and Food Safety

Recently, media reported in the Mainland that leather factories' remnants are being further processed to make gelatin for food use, which raised some food safety concerns.

Gelatin is a protein made from partial hydrolysis of animal collagen. Food-grade gelatin is used as gelling agent in making jelly, marshmallows and gummy candies. Moreover, it is also used as a stabilising and thickening agent in manufacturing jams, yoghurt and ice-cream.

Non-food grade gelatin is not safe for food production as it often contains impurities, such as heavy metals (e.g. chromium, mercury, etc). Heavy metal analysis is conducted under the routine surveillance programme in the Centre for Food Safety (CFS). To address this recent incident, the CFS has taken some food samples for heavy metal testing and all results were satisfactory. To ensure the safety of the products, food manufacturers should obtain food grade ingredients from reliable sources.

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

風險傳達工作一覽（二零零九年五月） Summary of Risk Communication Work (May 2009)	數目 Number
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