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## 焦點個案 Incident in Focus

## 減少食物中的反式脂肪

## Reduction of Trans Fat in Foods

食物安全中心

風險評估組

科學主任何國偉先生報告

Reported by Mr. Nicky HO, Scientific Officer,  
Risk Assessment Section,  
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美國食物及藥物管理局上月初步裁定部分氫化油不再是“普遍認為安全”的食品原料。以部分氫化油製成的加工食品是我們從食物攝取反式脂肪酸的主要來源。這項宣布令食物中反式脂肪酸含量的規管問題再次成為熱話。本文將闡述世界各地就反式脂肪酸採取的措施。

### 這項決定有何意義？

如果這項初步裁定最終成為定案，今後部分氫化油將被視為食物添加劑，除非獲得美國食物及藥物管理局批准，否則食物生產商不得直接售賣或用作食物原料。美國食物及藥物管理局已就有關裁定展開60天公眾諮詢。

### 反式脂肪酸對市民健康的影響

反式脂肪酸是植物油氫化過程中產生的一種不飽和脂肪酸。植物油經部分氫化後製成半固體及固體狀脂肪，廣泛應用於各種食物(如人造牛油和酥皮餅乾等)。所謂氫化過程就是把氫原子加到脂肪酸碳鏈不飽和的位置。理論上，完全氫化的油因為所有脂肪酸均已飽和，故不應含有反式脂肪酸。奶類和牛羊的脂肪也含有少量天然反式脂肪酸。

反式脂肪酸會提高低密度脂蛋白膽固醇(即壞膽固醇)濃度，並使高密度脂蛋白膽固醇(即好膽固醇)濃度下降，從而增加罹患冠心病的風險。世界衛生組織和聯合國糧食及農業組織建議，反式脂肪酸的膳食攝入量應為極低，實際上應少於每日所需能量的1%。不過，世界衛生組織現正檢討有關指引，打算建議進一步減少反式脂肪酸的攝入量。此外，美國國家醫學研究院建議在日常膳食中攝取足夠營養的情況下，反式脂肪酸的攝入量應愈少愈好。

### 海外國家就反式脂肪酸採取的行動

有食物/衛生機構已針對反式脂肪酸採取行動，主要是要求在標籤上加上反式脂肪酸的資料，以及限制食物中反式脂肪酸的含量。

美國、加拿大和台灣幾個國家/地區強制規定在營養標籤上標示反式脂肪酸含量。澳洲、新西蘭和馬來西亞雖然強制規定食物必須附有營養標籤，但除非作出關

Last month, the US Food and Drug Administration (FDA) announced its preliminary determination that partially hydrogenated oils (PHOs), the primary dietary source of artificial trans fatty acids (TFA) in processed foods, are not “generally recognized as safe” for use in foods. The announcement has revived interest over the regulatory control of TFA level in foods. This article discusses the actions on TFA in different countries and places.

### What is the Significance of the Determination?

If the determination is finalised, this would mean that food manufacturers would no longer be permitted to sell PHOs, either directly or as ingredients in another food product, without US FDA's prior approval for use as a food additive. The US FDA has opened a 60-day period for public consultation on the determination.

### Public Health Concern of TFA

TFA are unsaturated fat that are mainly formed during the partial hydrogenation of vegetable oils for producing the semi-solid and solid fats that are widely used in food products (e.g. margarines, pastries). Hydrogenation is the process by which hydrogen atoms are added to unsaturated sites on the carbon chains of fatty acids. In principle, fully hydrogenated oil should contain no TFA since all the fatty acids will be saturated. TFA are also present naturally in milk and fats of sheep and cattle but only at low levels.

TFA can increase the risk of coronary heart disease by not only raising the level of low density lipoprotein cholesterol (the harmful cholesterol), but also reducing the high density lipoprotein cholesterol (the beneficial cholesterol). The World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations have recommended that diets should provide a very low intake of TFA, in practice, this implies an intake of less than 1% of daily energy intake. Nonetheless, the WHO is reviewing the current recommendation to further lower the population intake of TFA. In addition, the US Institute of Medicine has recommended that TFA intakes should be kept as low as possible while consuming a nutritionally adequate diet.

### Actions on TFA in Overseas Countries

Some food/health authorities have called for actions on TFA, which are generally classified into labelling of TFA and limiting the amount of TFA in foods.

Several countries/places such as Canada, the USA and Taiwan require mandatory nutrition labels with TFA declared. In Australia, New Zealand and Malaysia, although nutrition labelling is mandatory, TFA declaration is required only if a nutrition claim is made in respect of

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Incident in Focus

於脂肪酸和其他營養素的營養聲稱，否則毋須列明反式脂肪酸含量。

此外，有些食物／衛生機構嘗試在不同層面限制反式脂肪酸在各種食品中的使用。例如，美國紐約市禁止食肆貯存、使用或出售每食用分量含超過0.5克反式脂肪酸並含有部分氫化植物油、起酥油或人造牛油的食物。新加坡規定每100克的預先包裝食用油脂不可含有超過2克的反式脂肪酸。但現時沒有國家／地區完全禁止食物含反式脂肪酸，而國際間對反式脂肪酸的規管亦無共識。

### 本港情況

香港是全球率先規定在營養標籤上列明反式脂肪酸含量的地區之一。食物安全中心(中心)一方面制定指引，鼓勵業界減少食物中的反式脂肪酸含量，另一方面進行一系列研究，了解本港食物中的反式脂肪酸含量。最新的研究結果顯示，以往研究中反式脂肪酸含量較高的四大類別食物(西餅/蛋糕類；蛋撻、批及酥皮類；麵包類；以及其他烘焙食物類)在這次研究中的反式脂肪酸平均含量有大幅下降趨勢(下降了27至70%)，反映出業界在減低食物中反式脂肪酸含量的成果。中心會繼續留意國際間發展，與業界攜手進一步減少食物中的反式脂肪酸含量。

### 以飽和脂肪酸取代反式脂肪酸的憂慮

美國食物及藥物管理局的宣布亦令市民擔憂食物生產商會以含豐富飽和脂肪酸的油類(例如棕櫚油和椰油)取代食物中的反式脂肪酸。飽和脂肪酸會增加人體內的低密度脂蛋白膽固醇，增加患心臟病的風險。是次研究發現個別樣本的反式脂肪酸含量大為降低而其飽和脂肪酸含量則相若，反映出減少食物中的反式脂肪酸而不增加飽和脂肪酸是切實可行的。

#### 注意要點：

- 反式脂肪酸會增加罹患冠心病的風險。
- 反式脂肪酸的攝入量應愈少愈好。
- 減少食物中的反式脂肪酸而不增加飽和脂肪酸是切實可行的。

### 給市民的建議

1. 保持飲食均衡，反式脂肪酸的攝入量應愈少愈好。
2. 善用營養標籤上的資料，選購總脂肪、飽和脂肪酸和反式脂肪酸含量較低的預先包裝食物。

### 給業界的建議

1. 減少食物中的反式脂肪酸含量。食物製造商可參考中心編製的《減少食物中反式脂肪業界指引》及《降低食物中糖和脂肪含量的業界指引》，生產脂肪含量較低的食物。
2. 清楚標示預先包裝食物所含的配料，不得有誤導成分。

fatty acids and other nutrients.

Some food/health authorities attempt to restrict the use of TFA in various types of food products at different levels. For example, New York City in the USA prohibits food containing partially hydrogenated vegetable oils, shortenings or margarines with more than 0.5g TFA per serving to be stored, used, or served by food service establishments. In Singapore, it requires all pre-packed edible fats and oils to contain no more than 2g TFA per 100g product. However, at present, banning of TFA in food is not imposed by any countries/places and there is no international consensus on the restriction of TFA.

### Local Situation

Hong Kong is one of the first few places in the world that requires the declaration of TFA content on nutrition labels. The Centre for Food Safety (CFS) has also formulated guidelines to encourage the trade to reduce TFA level in foods and, at the same time, conducted a series of studies to track the TFA contents in local foods. The latest study revealed that there has been a large reduction in the average TFA contents (27-70% reduction) in four food categories that had been found in previous studies to contain relatively higher levels of TFA (i.e. cakes; egg tart, pie and pastry; bread; and other bakery products), reflecting the positive effect of the trade in reducing TFA level in their products. The CFS will continue

to monitor the international development and keep working with the food trade to further lower the TFA level in foods.

### Concern on Replacement of TFA with Saturated Fatty Acids (SFA)

The announcement from the US FDA has also aroused the concern on the replacement of TFA with oil high in SFA (e.g. palm oil, coconut oil) in foods. SFA can increase the risk of developing heart diseases by raising the level of low density lipoprotein cholesterol. From our latest study, it was noted that the TFA contents in some individual samples have reduced dramatically whilst a similar SFA contents have been maintained, reflecting that the reduction in TFA without raising the SFA contents in foods is practically feasible.

#### Key Points to Note:

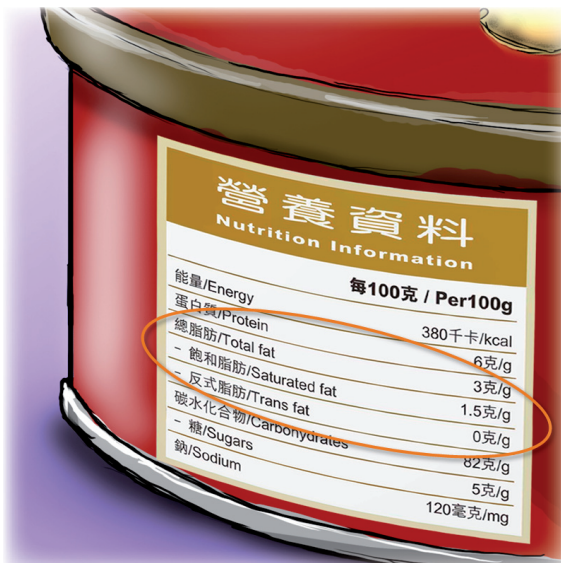
- TFA can increase the risk of coronary heart disease.
- TFA intakes should be kept as low as possible.
- Reduction in TFA without raising the SFA contents in foods is practically feasible.

### Advice to the Public

1. Maintain a balanced diet and keep TFA intake as low as possible.
2. Use nutrition labels to choose prepackaged foods with lower total fat, saturated fat and trans fat content.

### Advice to the Trade

1. Reduce TFA level in foods. Food manufacturers can make reference to the CFS's [Trade Guidelines on Reducing Trans Fat in Food](#) and [Trade Guidelines for Reducing Sugars and Fats in Foods](#) to formulate foods with lower fat content.
2. The ingredients used should be clearly declared for prepackaged foods and should not be misleading.



善用營養標籤上的資料，選購總脂肪、飽和脂肪酸和反式脂肪酸含量較低的預先包裝食物。  
Use nutrition labels to choose prepackaged foods with lower total fat, saturated fat and trans fat content.



## 蜂蜜含毒素嗎？

## Toxins in Our Honey?

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天然毒素，本文為該系列之二。

蜂蜜主要是蜜蜂採集花蜜後製成的甜味液體，也有少部分蜂蜜是採自吸吮植物汁液的昆蟲所排出的蜜露。蜂蜜味道甘甜，芳香馥郁，自古被人們視為珍品。

由於蜜蜂會到離巢五公里之遙的地方採蜜，所以蜂蜜的蜜源往往來自多種植物，有時甚至包括有毒植物。假如某段時期的蜜源主要是有毒開花植物，或昆蟲吸吮有毒植物後排出的蜜露，這段時期生產的蜂蜜便有可能積集了大量天然毒素。本文將對蜂蜜中較廣為人知的三種天然毒素作一簡介。

### 椴木毒素

椴木毒素是一種天然毒素，人們大多知道是由杜鵑花產生，其實杜鵑花科植物的花、葉和枝都含有這種毒素。受椴木毒素污染的蜂蜜多帶苦澀味，進食後有可能引致椴木毒素中毒，又稱為“狂蜜病中毒”，患者會迅速出現頭暈、乏力、大量出汗、唾液過多、四肢麻木和噁心等症狀。

椴木毒素中毒在土耳其黑海地區並不罕見，因當地蜜蜂在一年中某段時期多採杜鵑花蜜，而規模較小的蜂農又沒有能力把杜鵑花蜜與其他無毒蜂蜜混合以減低毒素的濃度。其他國家也有椴木毒素中毒的個案，近年有部分個案是自行從海外購買的蜂蜜引致。

### 吡咯聯啞生物鹼

吡咯聯啞生物鹼是一大類天然毒素，種類超過500種。據悉有幾個科多達6 000個植物品種含有這類化學物，這些植物數量繁多，遍布世界各地。吡咯聯啞生物鹼令人關注的是其對肝臟的慢性毒性，尤其是1, 2-不飽和吡咯聯啞生物鹼。這類生物鹼可引致肝臟出現靜脈阻塞性疾病，急性病例更會在兩週內死亡。

雖然蜂蜜中有時會發現含有吡咯聯啞生物鹼，但這類化學物對健康構成風險往往與中藥或穀物中混雜含吡咯聯啞生物鹼的野草有關。另一方面，蜂蜜裡的吡咯聯啞生物鹼含量有可能較高，尤其是如果蜜源來自含有吡咯聯啞生物鹼的單一花種。含有吡咯聯啞生物鹼的蜂蜜從味道上一般難以分辨。

### 羥基馬桑毒素

羥基馬桑毒素是新西蘭部分地區特有的馬桑樹產生的一種天然毒素。馬桑的花蜜不含羥基馬桑毒素，反而是以馬桑的樹汁為食的西番蓮蟲分泌的蜜露含這種毒素。蜜蜂採集這種蜜露製成的蜂蜜也因此具有毒性。

羥基馬桑毒素及其代謝物對人體的毒性十分強，可引致嘔吐、精神錯亂、暈眩、亢奮、木僵、昏迷及劇烈抽搐。過去曾有因進食受羥基馬桑毒素污染的蜂蜜而死亡的報告。

由於羥基馬桑毒素中毒後果嚴重，而馬桑樹的分布地不廣，新西蘭當局已就蜂蜜及巢蜜中的羥基馬桑毒素含量訂立規

This article is the second in a series of three articles on natural toxins in food.

Honey is the sugary liquid produced by bees mainly from nectars in flowers and to a lesser extent, honeydew from sap-sucking insects. Because of the sweetness and distinctive aroma, honey has been prized since antiquity.

As honey bees can forage up to five kilometres from the hives, the honey they produced often originates from wide varieties of plants, sometimes including poisonous plants. If the density of flowering poisonous plants or in certain cases, honeydew from insects that feed on poisonous plants is high during a particular period, the honey may accumulate significant amount of natural toxins. In this article, we will give a brief introduction on three of the better-known natural toxins that may be found in honey.

### Grayanotoxins

Grayanotoxins is a natural toxin best known to be produced by rhododendrons. The toxin exist in flowers, leaves and twigs of plants of the *Ericaceae* family. Grayanotoxin poisoning is usually caused by the consumption of grayanotoxins-contaminated honey which is often bitter. Such food poisoning cases are sometimes called “mad honey poisoning”, where symptoms like dizziness, weakness, excessive perspiration, excessive salivation, numbing of limbs, nausea develop quickly after consumption.

Grayanotoxin poisoning is well-known in the Black Sea area of Turkey. It is caused by a high concentration of rhododendron flowers in that area in certain time of the year, and it may be difficult for the small-scale beekeepers there to blend the rhododendron honey with non-toxic ones in order to dilute the level of toxins. Grayanotoxin poisoning has also been reported in other countries, and self-imported honey has been involved in certain cases in recent years.

### Pyrrrolizidine Alkaloids

Pyrrrolizidine alkaloids (PAs) are a large group of natural toxins that are found in large number of plants all around the world. There are over 500 different types of PAs and are reportedly found in over 6 000 plant species in several families of plants. The main concerns of PAs, especially 1,2-unsaturated PAs, are their chronic effect on livers. They can cause veno-occlusive disease on the liver, where in acute cases can lead to death in two weeks.

Although PAs are sometimes found in honey, their health risk to humans is more often associated with herbal medicines or PA-containing weeds in cereal grains. On the other hand, the level of PAs in honey can be higher especially in honey harvested from a single type of flower that is known to contain PAs. PA-containing honey generally cannot be distinguished by taste.

### Tutin

Tutin is a natural toxin unique to the tutu plants that are endemic to certain parts of New Zealand. Tutin is found in the honeydew produced by the insect passion vine hoppers that feed on tutu saps. However, tutin is not found in the tutu nectar. When the bees gather

enough tutin-containing honeydew to make honey, the honey can become toxic as a result.

Tutin and its derivative are very toxic to human and can cause vomiting, delirium, giddiness, increased excitability, stupor coma and violent convulsions. Death by consuming tutu-contaminated honey has also been reported in the past.

Because tutin poisoning is serious and the limited distribution of the tutu plant, maximum regulatory levels have been set in New Zealand for honey and honey combs. Products that exceed the limits are not allowed to be sold or



西番蓮蟲(白色：幼蟲；黑色：成蟲)吸吮馬桑的樹汁後在樹葉上排出蜜露，這些蜜露含有未消化樹汁的羥基馬桑毒素和糖分。蜜蜂採集這些蜜露製成的蜂蜜亦會具有毒性。

When passion vine hoppers (white: nymph, black: adult) eat the sap of the tutu plant, the tutin toxin and the sugars in the undigested sap is excreted as honeydew onto the leaves. Bees, after collecting the honeydew, will produce toxic honey.

管限值。超過限值的產品一概不能發售或出口，蜂農及包裝商均須遵從有關規定。

### 進食蜂蜜

只要蜂農對蜂箱附近環境的植物種類有深切了解，包裝商在包裝蜂蜜時把不同蜜源的蜂蜜混合以稀釋毒素，蜂蜜是可以安全享用的。然而，一歲以下的嬰兒不應進食蜂蜜，因為他們的消化系統尚未完全發育，進食蜂蜜有肉毒中毒的風險。蜂蜜主要含果糖和葡萄糖等游離糖，而糖分除了為身體提供能量外，並無其他營養價值，故不宜攝取過量蜂蜜。

exported, and that beekeepers and packers are required to comply with these standards.

### Honey Consumption

With good understanding of plant in the environ around the hives by beekeepers and blending of honey from different sources by packers to achieve a dilution effect if toxic substances are present, honey can be enjoyed without issues. However, infants under one year old should not consume honey as their digestive systems are not fully developed and will be at risk of contracting botulism. Since honey mainly contains free sugars like fructose and glucose, and sugars provide energy for the body but have no other nutritional value, excessive intake of honey should be avoided.



### 飲用魚湯的益處與風險

魚湯一向被視為營養食品。中國傳統上授乳婦女產後坐月時會以魚湯調理身體。然而，最近市民關注魚類體內的甲基汞等污染物會遷移到湯裡，如孕婦或授乳婦女經常喝魚湯，會對胎兒和嬰兒造成影響。

食物安全中心曾就產後授乳婦女常喝的魚湯進行研究，以評估飲用魚湯的益處和風險。結果顯示，飲用魚湯的益處大於風險。

魚類含有奧米加-3脂肪酸及優質蛋白質等多種人體所需的營養素，孕婦及授乳婦女宜適量進食多種魚類。

### Risks and Benefits of Fish Soup Consumption

Fish soup has been regarded as a nutritious food and is traditionally considered by the Chinese to be particularly good for lactating women as part of the postpartum confinement diet. However, there are recent concerns on whether contaminants such as methylmercury present in fish may leach into the soup posing risk to the foetus and infant if pregnant or lactating women drink fish soup frequently.

The Centre for Food Safety has conducted a study to evaluate the risks and benefits of fish soup consumption. The study, which focused on fish soup commonly consumed by lactating women after childbirth, has revealed that the benefits gained outweighed the risks.

Since fish contain many essential nutrients, such as omega-3 fatty acids and high quality proteins, moderate consumption of a variety of fish is recommended for pregnant or lactating women.

### 食物中的葉綠素和葉綠酸銅絡合物

最近，台灣市面上多款食品被檢出含葉綠素和葉綠酸的銅絡合物。事件引起公眾關注這些絡合物中的銅離子的潛在毒性。

銅是人體不可缺少的營養素，天然存在於食物中，是多個重要酶系統的必要成分，並與正常細胞代謝息息相關。食用色素葉綠素銅絡合物(INS 141(i))和葉綠素銅絡合物、鈉鹽及鉀鹽(INS 141(ii))提取自植物色素葉綠素，作用是令小食、煮熟的蔬菜、湯羹、調味品和醬料等呈現綠色。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進行的評估顯示，攝入的葉綠素會隨着糞便排出體外，而這些絡合物中的銅非常穩定，因此正常食用這些色素對健康是無害的。

INS 141(i)和INS 141(ii)在本港是獲准在食物內使用的色素。食品法典委員會亦制定了這些色素在不同食品中的添加標準。食物商在使用食物添加劑以達到理想的技術效果時，應奉行優良製造規範，並為食品加上適當的標籤。

### Copper Complexes of Chlorophyll and Chlorophyllins in Food

Recently, various food products available in Taiwan have been found to contain copper complexes of chlorophyll and chlorophyllin. The incident has raised public concern on the possible toxic effects due to the presence of copper ion in these complexes.

Copper is an essential nutrient naturally present in food. It plays a vital role in a number of important enzyme systems and is closely linked with normal cellular metabolism. The colouring matters chlorophyll copper complex (INS 141(i)) and chlorophyllin copper complex, sodium and potassium salt (INS 141(ii)) are derived from the plant pigment chlorophyll and are used to give green colour to foods such as snacks, cooked vegetables, soups, seasonings and condiments. Evaluation conducted by the Joint Food and Agriculture Organization/World Health Organization Expert Committee on Food Additives (JECFA) has shown that ingested chlorophyll is excreted in faeces. In addition, the copper present in these complexes is firmly bound, therefore, normal consumption of these colouring matters causes no adverse effects to human health.

In Hong Kong, INS 141(i) and INS 141(ii) are permitted colouring matters. The Codex Alimentarius Commission has also set up standards for these colouring matters in different food commodities. Traders are advised to use food additives in accordance with Good Manufacturing Practice to achieve the desired technological effect and label their food products properly.

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

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