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食物中的反式脂肪

Trans Fats in Foods

食物安全中心 Reported by Ms. Melissa LIU, Scientific Officer,

風險評估組 Risk Assessment Section,

科學主任廖珮珊女士報告 Centre for Food Safety

背景

鑑於世界各地的人和香港市民愈來愈關注食物中反式脂肪對健康的影響，食物安全中心(中心)聯同消費者委員會就本港食品中的反式脂肪進行研究，以測試市面上食物中的反式脂肪含量，並提高消費者對反式脂肪及其引致的健康影響的認識。研究結果已於十月十五日公布，並詳載於十月的《選擇》月刊。

研究一共抽取了80個預先包裝和非預先包裝的食品作測試，包括烘焙食品、油炸食品、牛油和軟人造牛油類產品，結果發現同類食品的反式脂肪含量差異很大，而部分測試食品如椰絲奶油包的反式脂肪含量偏高。



椰絲奶油包

Cream-filled bread with shredded coconut

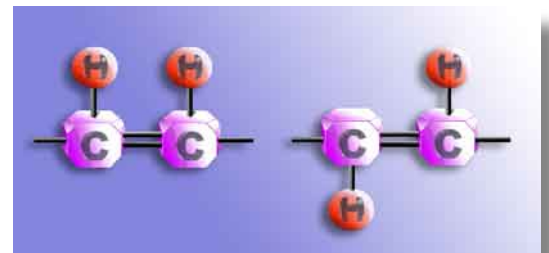
Background

In response to increasing health concern over trans fats in food internationally and locally, the Centre for Food Safety (CFS) and the Consumer Council conducted a joint study on trans fats in foods in Hong Kong to test the levels of trans fats in foods available in the local market and to enhance consumer understanding on trans fats and their health implications. The results of the study were announced on 15 October and published in the October issue of CHOICE magazine.

A total of 80 prepackaged and non-prepackaged food products, including bakery products, deep fried foods, butter and margarine/margarine-like spreads, were collected for testing. The study found that the trans fats levels varied a lot among same kind of food, whereas some of the products tested, such as cream-filled bread with shredded coconut, contained high levels of trans fats.

What are Trans Fats?

Trans fats, also called trans fatty acids, are a type of unsaturated fats. They are mainly formed during the process of hydrogenation of vegetable oils. During hydrogenation, the structure of the fatty acid molecules in the oil changes, which allows the hydrogenated oil to have longer shelf-life and provide desirable texture to the food it produces. These fatty acids with changed structure are known as "trans fats".



不飽和脂肪酸的分子結構
Molecular structures of unsaturated fatty acids

左: 順式不飽和脂肪酸(以雙鍵連接的碳分子, 順式構型)
右: 反式不飽和脂肪酸(以雙鍵連接的碳分子, 反式構型)
Left: cis-unsaturated fatty acid (carbon atoms joined by a double bond, cis-configuration). Right: Trans-unsaturated fatty acid (carbon atoms joined by a double bond, trans-configuration).

反式脂肪是什麼?

反式脂肪又稱為反式脂肪酸，屬於不飽和脂肪，主要在植物油的氫化過程中形成。植物油中的脂肪酸分子結構在氫化過程中會改變，令氫化的油可延長保質期，並提升以這種油生產的食品的口感。這種改變了結構的脂肪酸稱為“反式脂肪”。

哪些食物可能含有反式脂肪?

氫化植物油，例如一些經氫化過程製成的起酥油和人造牛油，通常含大量反式脂肪。我們從飲食中攝取到的反式脂肪主要來自以氫化植物油配製的油炸及烘焙食品。此外，反式脂肪亦會天然存在於牛和羊的奶和脂肪，例如全脂牛奶及牛油，但含量偏低。

What Food may Contain Trans Fats?

Hydrogenated vegetable oils, such as some shortening and margarines produced by hydrogenation, are usually high in trans fats. Trans fats in our diet mainly come from fried and bakery products with hydrogenated vegetable oil. Trans fats are also present naturally in milk and fats of sheep and cattle, such as whole milk and butter, but only at low levels.

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焦點個案
Incident in Focus

可能以氫化植物油製成的食品例子：

- 餅乾
- 蛋糕
- 酥皮糕點
- 麪包
- 脆片類零食
- 沙律醬
- 植脂奶粉
- 薯條等油炸食品

Examples of foods that may be produced with hydrogenated vegetable oil:

- Crackers
- Cakes
- Pastries
- Bread
- Chips
- Salad dressings
- Dried/powdered non-dairy creamers
- Fried products such as French fries

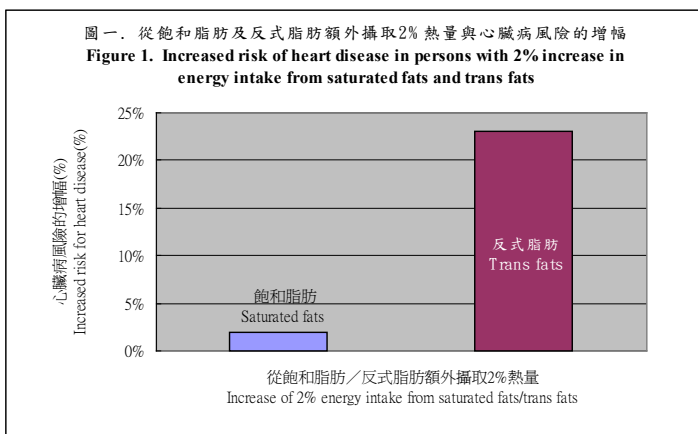
食物中的反式脂肪對健康有何影響？

反式脂肪會增加低密度脂蛋白膽固醇(即對健康有害的膽固醇)，同時減少高密度脂蛋白膽固醇(即對健康有益的膽固醇)，導致罹患心臟病的風險增加，而此病高居本港最常見致命疾病的第二位。世界衛生組織和聯合國糧食及農業組織建議，反式脂肪攝取量應維持在極低水平，即少於人體每天所需熱量的1%¹。以每天攝取2000千卡熱量的人為例，反式脂肪的每天攝取量應少於2.2克。

反式脂肪及飽和脂肪有何分別？

飽和脂肪又稱為飽和脂肪酸。牛油和豬油等動物油脂及椰油等某些植物油含有大量飽和脂肪。這種脂肪在室溫下會呈固體狀，容易辨認。飽和脂肪與反式脂肪相似，同樣會增加低密度脂蛋白膽固醇，但分別之處是飽和脂肪不會減低高密度脂蛋白膽固醇。

不同國家的人的反式脂肪攝取量會有差異，澳洲人的攝取量為熱量總攝取量的0.6%，而美國人則為每天熱量攝取量的2.6%。研究顯示，從反式脂肪額外攝取2%熱量(即在每天攝取2000千卡熱量的人羣中，他們額外攝取約4.4克反式脂肪)會導致心臟病風險增加23%。不過，如果增加的同等熱量是來自飽和脂肪，則心臟病風險只會增加2%^{2,3}(圖一)，因此，專家認為反式脂肪對健康造成的損害較飽和脂肪更大。



What are the Health Concerns Regarding Trans Fats in Food?

Trans fats increase the level of low density lipoprotein (LDL) cholesterol, the harmful cholesterol, while at the same time reduce the level of high density lipoprotein (HDL) cholesterol, the beneficial cholesterol. This increases the risk of heart disease, which is the second major killer in Hong Kong. The World Health Organization and the Food and Agriculture Organization of the United Nations suggest that diets should provide a very low intake of trans fatty acids. In practice, less than 1% of daily energy intake should be from trans fats¹. For example, an individual with a daily energy intake of 2000 kilocalories should limit the intake of trans fats to less than 2.2 grams per day.

What are the Differences Between Trans Fats and Saturated Fats?

Saturated fats, also known as saturated fatty acids, are abundant in animal fats such as butter and lard, as well as some vegetable oils such as coconut oil. As they are in solid state at room temperature, they can be easily recognised. Similar to trans fats, saturated fats also increase the level of LDL cholesterol. However, unlike trans fats, they do not reduce the level of HDL cholesterol.

Trans fats intake varies in different countries. It ranges from 0.6% of total energy intake in the Australian population, to 2.6% daily energy intake in the American population. Studies showed that an extra intake of 2% energy from trans fats (e.g., about 4.4 g extra trans fats intake for an individual with 2000 kcal daily energy intake) led to an increase of 23% of risk of heart disease, but if the same level of extra energy was from saturated fats instead, the risk of heart disease only increased by 2%^{2,3} (Figure 1). Therefore, trans fats are believed to be more harmful to health than saturated fats.

由於飽和脂肪和反式脂肪均會增加罹患心臟病的風險，因此較健康的飲食之道是選吃含較少飽和脂肪及反式脂肪的食物。

有沒有其他油脂類可作替代品？

我們的研究發現，同類食品的反式脂肪含量差異很大。有關結果顯示，要減低食物中的反式脂肪含量是切實可行的。經氫化的油脂類可改用含大量單元不飽和脂肪(例如芥花籽油和橄欖油)或多元不飽和脂肪(例如大豆油、粟米油和葵花籽油)的油類代替。如使用分量適當，這些油類均對健康有益。

給業界和市民的建議

市民應保持均衡飲食，避免吃油炸和肥膩的食物。此外，又應細閱食物標籤，避免吃以氫化油脂類製成的食物，以及選吃含有較少脂肪(包括飽和脂肪及反式脂肪)的食物。

至於業界，則應避免使用氫化植物油，以減低食品中的反式脂肪含量。此外，又應清楚標示預先包裝食物所含的配料，不得有誤導成分，以便消費者作出知情的選擇。

Since both saturated fats and trans fats can increase the risk of heart disease, it is healthier to choose food low in both saturated and trans fats.

Are Alternative Fats and Oils Available?

Our study found that trans fats levels varied a lot among same kind of food. Such results indicate that it is practically possible to reduce trans fats level in food. Hydrogenated fats and oils may be replaced by those oils high in monounsaturated (e.g. canola oil and olive oil) and polyunsaturated fats (e.g. soybean oil, corn oil and sunflower seed oil), which are beneficial to health if taken in appropriate amount.

Advice to the Trade and Public

The public should maintain a balanced diet and avoid deep-fried and fatty foods. They should also read food labels, avoid foods produced with hydrogenated oils or fats and choose food that have lower fat contents (including saturated fats and trans fats).

The trade is advised to reduce trans fats level in food products by avoiding the use of hydrogenated vegetable oil. The ingredients used should be clearly declared for prepackaged food and should not be misleading so that consumers can make informed choices of their food.

鎘與食物安全

Cadmium and Food Safety

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風險傳達組

科學主任郭麗儀女士報告

Reported by Ms. Joey KWOK, Scientific Officer,

Risk Communication Section,

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本文是《食物中的金屬污染物》系列之三，將會集中探討鎘這種金屬，包括人們攝取鎘的途徑和減少攝入鎘的方法。

鎘是什麼？鎘來自何處？

鎘是天然存在於地殼表面的金屬元素。純鎘是銀白色的軟金屬，在環境中通常與氧氣、氯氣或硫磺等其他元素結合成礦物。鎘不會在環境中分解，但會轉化為不同形態混合於泥土或以不同程度溶於水中。

鎘在工業上的用途很多，例如電鍍、生產顏料，以及用於製造塑膠穩定劑及顏料、鎘鎘電池和電子產品等。由磷礦生產的肥料，以及採礦和礦物提煉等工業活動則是環境污染的主要來源。大氣中的鎘主要來自燃燒煤和石油等化石燃料，以及焚燒都市垃圾。空氣中的鎘粒子可以飄至千里之外，然後才像塵埃般沉降到地上，又或隨雨、雪落在地上。

人們如何攝入鎘？

人們會從工作環境中吸入鎘，例如在熔煉或提純金屬的過程中吸入含有鎘的煙或塵，又或在鎘製品工廠中吸入含有鎘的空氣。至於一般人，則主要從食物中攝取鎘。農作物如生長在受鎘污染的土壤中、以受鎘污染的水澆灌或施用了含鎘的肥料，其鎘含量可能較高。同樣，陸上動物如所吃的牧草或飼料含有鎘，其內臟(腎及肝)的鎘含量亦可能較高。魚類和貝類如生活在受污染的水域，亦會攝取到鎘。



鎘含量可能偏高的食物例子：豬肝臟(左)和腎臟(右)
Examples of food items that may have high cadmium contents: pork liver (left) and kidney (right)

吸煙是攝取鎘的另一來源。每天抽20支煙會攝取到1至4微克鎘，因此吸煙者每天攝取的鎘分量可能較非吸煙者高出一倍。

鎘對健康有何影響？

雖然從食物攝取鎘導致急性中毒的機會微乎其微，但長期攝取鎘會損害腎功能。世界衛生組織轄下國際癌症研究機構認為有足夠證據證明因工作關係而攝取到鎘和鎘化合物，會令人患癌。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曾評估鎘的安全，認為從飲食中攝取鎘，似乎不大可能令人患癌。此外，該委員會又訂定鎘的暫定每周可容忍攝入量，按每公斤體重計算是7微克。

較早前進行的一項研究顯示，本港中學生從食物攝取鎘的分量低於暫定每周可容忍攝入量，換言之，他們從食物中攝取鎘而導致健康受損的機會不大。該研究又進一步指出，“魚類以外的海產”(即貝類)是中學生攝取鎘的主要食物類別(33%)，其次依序為“穀類和穀類食品”(27%)和“蔬菜”(17%)。

The following article, being the third in this series on “Metallic Contaminants in Food”, will focus on cadmium. The various sources from which people are exposed to cadmium, as well as the measures that people may take to reduce their exposure to this particular metal will be discussed.

What is Cadmium? Where does it Come from?

Cadmium is a metallic element that occurs naturally in the Earth's crust. Pure cadmium is soft and silver-white, but the metal is usually present in the environment as a mineral combined with other elements such as oxygen, chlorine or sulphur. Cadmium does not break down in the environment, but it can change into different forms and bind to soil or dissolve in water to varying degrees.

Cadmium has a number of industrial applications such as electroplating, pigment production, manufacture of plastic stabilisers and pigments, nickel-cadmium batteries and electronics, etc. Fertilisers produced from phosphate ores, industrial operations such as mining and refining are important sources of environmental contamination. The largest airborne sources of cadmium in the environment originate from the burning of fossil fuels such as coal, oil and the incineration of municipal waste. Cadmium particles in air can travel long distances before coming down to the ground as dust, or along with rain or snow.

How are People Exposed to Cadmium?

People can inhale cadmium from work environment containing cadmium fumes and dust, such as from the smelting and refining of metals, and from the air in plants where cadmium products are made. For the general population, food is the main source of cadmium exposure. Crops that are grown in cadmium-contaminated soil, irrigated with cadmium-contaminated water or applied with cadmium-containing fertilisers may have increased concentrations of cadmium, as may organ meat (kidney and liver) from land animals grazing on pastures or fed on feedstuff containing the metal. Fish and shellfish will take up cadmium when inhabited in contaminated waters.

Cigarette smoking is an additional source of cadmium exposure. Smoking 20 cigarettes per day may contribute 1 to 4 µg of cadmium, and smokers may double their daily cadmium exposure as compared with non-smokers.

What are the Effects of Cadmium on Health?

While acute toxicity of cadmium due to dietary exposure is very unlikely, chronic exposure to cadmium would affect the kidney function. The International Agency for Research on Cancer of the World Health Organization considered that there was sufficient evidence of carcinogenicity of cadmium and cadmium compounds in humans upon occupational exposure. The Joint Food and Agriculture Organization / World Health Organization Expert Committee on Food Additives (JECFA) has evaluated the safety of cadmium, and considered that cadmium did not appear to have significant carcinogenic potential via the oral route. JECFA has established a provisional tolerable weekly intake (PTWI) of 7µg per kg body weight for cadmium.



鎘含量可能偏高的食物例子：貝類
Examples of food items that may have high cadmium contents: shellfish

A study conducted earlier revealed that dietary exposures to cadmium among local secondary school students were below the PTWI, meaning that their dietary exposure to cadmium was unlikely to cause harmful effects. It further suggested that the food group “seafood other than fish” (i.e. shellfish) was the main contributor (33%) of dietary exposure to cadmium, followed by the food groups “cereal

食物安全平台
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給消費者的建議

1. 向可靠的供應商購買食物。
2. 保持均衡飲食，有節制地進食鎘含量可能偏高的食品，例如貝類、腎臟和肝臟。
3. 在烹煮前，用清水浸透和徹底洗淨蔬菜，特別是葉菜。
4. 不要吸煙。

給業界的建議

奉行優良務農規範以減少食用農作物和動物受到鎘污染。

and cereal products" (27%) and "vegetables" (17%).

Advice to Consumers

1. To obtain food supplies from reliable sources.
2. To maintain a balanced diet and consume food items that may have high cadmium contents (e.g. shellfish, kidney and liver) only in moderation.
3. Soak and wash vegetables, particularly leafy vegetables, thoroughly in water before cooking.
4. Do not smoke.

Advice to the Trade

To observe good agricultural practice to minimise cadmium contamination in food crops and animals.

食物事故點滴
Food Incident Highlight

乳酪藏金屬碎片

十月中，澳洲及新西蘭食物標準局因澳洲某牌子乳酪可能藏有金屬碎片而採取回收行動。鑑於部分問題產品在港有售，中心已通知業界和市民有關行動，進口商亦已停售有關產品。

預先包裝食品有時會暗藏異物。異物進入食物的途徑很多：金屬碎片可能經機器、工具、電器裝置和包裝物料進入食物；玻璃碎片可能在食物包裝期間因玻璃破裂或經製作時已有缺陷的玻璃器皿中進入食物；石屑可能在收割和處理農作物期間混進食物內；昆蟲隨時會在我們享用食物前伺機進入食物內；毛髮和個人物品亦可能落在食物中。有些異物如吃下會令人受傷，但有些則會令消費者對產品的品質和衛生程度留下負面印象。

為盡量減低異物進入食物內的機會，食物製造商應奉行優良製造規範。小心處理生產設備和原料，以及利用金屬探測器等工具均可減少食品受污染的情況。

Metal Pieces Found in Yoghurt

The Food Standards Australia New Zealand recalled in mid-October a certain brand of yoghurt in Australia due to the possible presence of metal fragments. Some of the affected products were available locally and both the trade and the public were informed of the recall. The importer had removed the products concerned from sale.

Foreign matters are sometimes found in pre-packaged food products, and there are many possibilities for their entry. Metal fragments may enter food from machinery, tools, electrical installations and packaging materials. Glass fragments may enter food as a consequence of glass breakages during packaging or through defective glassware. Stone chips may also be carried into food during harvesting and handling of crops. Insects may take any chance available and enter food anytime before consumption. Hair and personal artifacts may also fall into food. Some of these foreign matters may cause cuts when ingested, while others may cast a negative impression on the quality and hygiene of the products.

Food manufacturers should practise good manufacturing practice in order to minimise the chance of foreign matters entering food. Care in handling equipment and raw materials, and the use of tools like metal detectors may help to minimise product contamination.

蠍子螫傷與蘆菇

根據衛生防護中心報告，今年一月至十月本港共有四宗因處理一種產自東南亞的熱帶水果蘆菇而遭蠍子螫傷的個案，當中至少兩宗與東南亞常見的 *Lychas mucronatus* 蠍子有關。四名傷者被蠍子螫傷後，手指出現腫脹和麻痺，須往醫院求診。

蠍子可能藏身於纍纍成串的蘆菇內，當人處理蘆菇時才施襲。消費者在處理這種水果時應提高警覺，拿着蘆菇莖部，並放在水中大力搖晃，然後才進食。雖然遭蠍子螫傷未必一定會令人中毒，但亦應盡快求醫。此外，水果一般在收成後如經過清洗或煙熏處理，亦有助除去可能藏身在當中的節肢動物，如蠍子等。



Lychas mucronatus 蠍子，此品種通常長約4厘米。(照片來源：食環署防治蟲鼠事務諮詢組)

Scorpion of species *Lychas mucronatus*. It is usually around 4 cm long. (Photo credit: Pest Control Advisory Section, FEHD)

Scorpion Stings and Langsat

The Centre for Health Protection reported a total of four cases of scorpion stings while handling langsat, a type of tropical fruit from Southeast Asia, between January and October 2007. The four affected persons suffered from swollen and numb fingers after being stung by scorpions and required treatment at hospitals. At least two of the cases involved scorpion of species *Lychas mucronatus* (also known as Chinese Striped Bark Scorpion), which is common in Southeast Asia.

Scorpions may lurk behind the tightly-packed langsat and sting when one handles the fruit. Consumers should pay attention when handling langsat and are advised to hold the stalk of the bunch and shake it vigorously under water before consumption. Although not all scorpion stings are toxic, anyone who is stung by scorpion should seek medical attention as soon as possible. Furthermore, washing or fumigation after harvesting can also help to remove some of the arthropods that may be hiding among fruits.

風險傳達
工作一覽
Summary of
Risk Communication Work

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