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愛爾蘭豬肉含二噁英

Dioxins in Irish Pork

食物安全中心

風險評估組

科學主任鄧紹平博士報告

Reported by Dr. Anna S. P. TANG, Scientific Officer,
Risk Assessment Section,
Centre for Food Safety

二零零八年十二月六日，鑑於愛爾蘭食物安全局早前的化驗結果證實，有關動物飼料和豬脂肪的樣本含大量二噁英，愛爾蘭政府從市面上回收自九月一日或之後在愛爾蘭屠宰的豬製成的所有愛爾蘭豬肉製品。本文提供有關食物受二噁英污染的更多資料。



排骨 Pork ribs

On 6 December, 2008, the Government of Ireland recalled from the market all Irish pork products produced from pigs slaughtered in Ireland from 1 September 2008, after laboratory results of animal feed and pork fat samples obtained by the Food Safety Authority of Ireland (FSAI) confirmed high levels of dioxins. This article provides more information on dioxins contaminations in foods.

What are Dioxins?

Dioxins are a group of persistent environmental pollutants resulting from various industrial processes and combustion activities. A number of structurally and chemically similar chlorinated compounds including polychlorinated dibenzo-para-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and certain dioxin-like polychlorinated biphenyls (PCBs) with similar toxic properties are together classified as "dioxins and dioxin-like compounds". The term dioxins used below refer to above group of dioxins and dioxin-like compounds. Since these pollutants are found ubiquitously throughout the world, all people have background exposure and a certain level of dioxins in the body.

How Do Dioxins Get Into Foods?

Deposition of dioxins present in the atmosphere, application of pesticides and spreading of contaminated sewage may pollute water, sediments, soils, plants, feeds, and accumulate in body tissues in terrestrial and aquatic animals via the food chain. In the current incident, the cause of dioxins contaminations in pork was found to be the use of contaminated animal feed. For most people, about 90% of overall exposure to dioxins may be from diet. Food of animal origin (e.g. meat, poultry, fish, milk, eggs and their products) is the predominant source of human exposure to dioxins. Since dioxins tend to accumulate in animal fat, foods that are rich in animal fats may contain higher levels of dioxins.

Effects of Dioxins on Human Health

Short-term exposure of humans to high levels of dioxins could lead to the development of chloracne (a skin disease), excessive body hair and other skin lesions such as skin rashes and skin discolouration. Exposure to food products of contamination to such an extent is uncommon nowadays. The International Agency for Research on Cancer (IARC) has classified 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD), the most toxic dioxin compound, as human carcinogen. Animal studies showed that long-term exposure to dioxins may affect the immune system, reproductive function, endocrine system and the developing nervous system. Associations with diabetes, thyroid dysfunction and heart diseases in humans have been reported in some studies.

Tolerable Intake Level

Considering the long half-lives of dioxins and dioxin-like compounds, ingestion each day may have a small or even

二噁英是什麼？

二噁英是一組由各種工業過程和燃燒活動產生的持久性環境污染物。多種在結構和化學上相近的氯化化合物，包括多氯二苯並二噁英、多氯二苯並呋喃和毒性特性相近的一些類似二噁英的多氯聯苯，均歸類為“二噁英和類似二噁英化合物”。下文所用“二噁英”一詞是指上述一組二噁英和類似二噁英化合物。由於這些污染物在世界各地無處不在，所有人都會在環境中接觸到二噁英，體內會有一定程度的二噁英。

二噁英如何進入食物？

在空氣中沈降的二噁英，除害劑的應用和含二噁英的污水的散播會污染水、沈積物、泥土、植物和飼料，繼而經食物鏈在陸上和水中動物的身體組織內積聚二噁英。這次二噁英污染豬肉事件的肇因，是豬隻吃了受二噁英污染的動物飼料所致。對大部分人而言，所攝入的二噁英約90%是來自食物。動物源性食物，例如豬肉、家禽、魚類、奶類、蛋類和上述食物的製品，是人們攝入二噁英的最主要來源。由於二噁英往往在動物脂肪中積聚，故含大量動物脂肪的食物可能會有較多二噁英。

二噁英對人們健康的影響

短期攝入大量二噁英可引致氯痤瘡（一種皮膚病）、體毛過多和皮膚出疹及變色等皮膚病。從受污染食物攝入大量二噁英的情況現已十分罕見。國際癌症研究機構已把毒性最強的2, 3, 7, 8-四氯二苯並二噁英列為人類致癌物。動物研究顯示，長期攝入二噁英可能會影響免疫系統、生殖功能、內分泌系統及發育中神經系統，一些研究亦發現二噁英與人類的糖尿病、甲狀腺功能異常和心臟病有關。

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可容忍攝入量

由於二噁英及類似二噁英化合物的半衰期較長，每天進食對整體攝入量可能只有很小甚或微不足道的影響。為了評估二噁英及類似二噁英化合物對健康造成的風險，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認為，這些化合物的可容忍攝入量評估期應有至少一個月，因此把二噁英及類似二噁英化合物的暫定每月可容忍攝入量訂定為按每公斤體重計 70 皮克世界衛生組織的毒性當量。只要平均攝入量並非長期超出暫定每月可容忍攝入量，偶然短期攝入高於這一數值的分量也不會影響健康。

歐洲食物安全局的風險評估

在發生這次事件後，歐洲食物安全局應要求就愛爾蘭豬肉及其製品可能含有二噁英對人們健康造成的影響進行風險評估。該局認為，二噁英污染情況只出現於短時間，雖然在這段短時間內人們攝入二噁英的分量可能會超出可容忍攝入量，但長期來說，一般的消費者不會因這次個別事件而影響健康。

注意重點：

1. 二噁英是一組毒性極強的環境污染物，容易在食物鏈中積聚。
2. 二噁英會集中於脂肪內。消費者可透過少吃動物脂肪，減少從食物攝入二噁英。
3. 只要平均攝入量並非長期超出可容忍攝入量，偶然短期攝入高於可容忍攝入量的分量也不會影響健康。

規管本港食物中的二噁英

根據《公眾衛生及市政條例》（第132章）的規定，在本港出售的所有食物均須適宜供人食用。由一九九九年開始，食物環境衛生署一直透過食物監察計劃監察食物含二噁英的情況，一旦發現二噁英含量超出一般水平，便會進行風險評估和採取跟進行動。

在二零零六年至零八年期間，食物安全中心（中心）一共抽取了341個食物樣本進行二噁英測試，所有結果均屬滿意。

給消費者的意見

消費者可透過下列方法減少從食物攝入二噁英：

1. 保持均衡飲食，以免因偏食少種類食物而過量攝入二噁英；
2. 除去肉類及肉類製品的脂肪；
3. 避免使用動物脂肪配製或烹調食物；
4. 採用可減低食物脂肪含量的烹煮方法（例如烤、焗等）；以及
5. 進食低脂食物。

給業界的意見

農民、飼料生產商和食物生產商應：

1. 在食物和飼料的初級生產、加工、分銷和出售過程中，奉行優良務農規範、良好動物飼養規範和良好衛生守則。
2. 在食物和飼料加工過程中防止和減少二噁英污染和產生。
3. 飼料買家和用家應留意飼料所添加的物質和飼料配料來源，避免飼料受二噁英污染。

更多資料

- 由中心編製有關“食物中的二噁英”單張和風險簡訊
- 中心有關“中學生從食物攝取到二噁英的情況”的風險評估研究報告
- 由食品法典委員會擬備的《防止和減少食物及飼料受二噁英及類似二噁英的多氯聯苯污染守則》（只有英文版）。

negligible effect on overall intake. In order to assess health risk, the Joint Food and Agriculture Organization / World Health Organization Expert Committee on Food Additives (JECFA) considered that tolerable intake for these compounds should be assessed over a period of at least one month, hence a provisional tolerable monthly intake of 70 µg WHO-TEQ (toxic equivalent) / kg body weight was established. Occasional short-term exposure above this tolerable intake would have no health consequences provided the average intake over a long period is not exceeded.

EFSA Risk Assessment

In response to this incident, the European Food Safety Authority (EFSA) was requested to carry out a risk assessment for human health related to the possible presence of dioxins in Irish pork and pork products. EFSA considered that contamination of dioxins only occurred over a short period of time. Although the tolerable intake level might be exceeded within this short period, there would be no health concern for this single event for an average consumer over the long term.

Key Points to Note:

1. Dioxins are a group of highly toxic environmental pollutants which tend to accumulate in the food chain.
2. Dioxins are concentrated in fats. Consumers may reduce dioxins intake from foods by reducing intake of animal fat in the diet.
3. Short-term excursion above tolerable intake level would have no health consequences provided the average intake over a long period is not exceeded.

Control of Dioxins in Foods in Hong Kong

The Public Health and Municipal Services Ordinance (Cap. 132) stipulates that all food for sale in Hong Kong must be fit for human consumption. The Food and Environmental Hygiene Department has been monitoring dioxins in foods as part of the Food Surveillance Program since 1999. When elevated levels of dioxins are found, risk assessment and follow-up actions will be taken.

Of the 341 food samples tested for dioxins from 2006 to 2008, the results were all satisfactory.

Advice to Consumers

Consumers may reduce dietary intake of dioxins by:

1. maintaining a balanced diet so as to minimise excessive exposure to dioxins from a small range of food items
2. trimming fat from meat and meat products
3. avoiding the use of animal fat for food preparation and cooking
4. using cooking methods that can reduce fat (e.g. broiling, baking)
5. consuming low-fat products

Advice to the Trade

Farmers, feed and food manufacturers should:

1. adopt good agricultural practices, good animal feeding practices and hygienic practices during primary production, processing, distribution and sale of food and feed
2. prevent and reduce contamination and formation of dioxins during food and feed processing
3. purchaser and user of feed should pay attention to substances added to feeds and origin of feed ingredients for possible dioxins contaminations.

Further information

- CFS Pamphlet and Risk in Brief on “Dioxins in Foods”
- CFS Risk Assessment Study Report on Dietary Exposure to Dioxins of Secondary School Students
- The Codex “Code of Practice for the Prevention and Reduction of Dioxin and Dioxin-like PCB Contamination in Foods and Feeds”.

營養素與健康：碳水化合物 – 澱粉及膳食纖維 Nutrient and Health - Carbohydrates: Starch and Dietary Fibre

食物安全中心
風險傳達組
科學主任馮慧中女士報告

Reported by Ms. Jacqueline Fung, Scientific Officer,
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我們在上一期介紹了食物是身體的燃料這一概念後，今期和下一期會集中討論碳水化合物。碳水化合物是由碳、氫和氧按固定比例所組成的化合物，並視乎化學結構的複雜程度分為簡單碳水化合物和複合碳水化合物兩類。我們將會在下一期深入探討簡單碳水化合物（包括單糖和雙糖），現在先集中談談複合碳水化合物（多糖），即我們在日常生活中泛指的澱粉和膳食纖維。

澱粉

澱粉是由多個葡萄糖單位所組成，亦是植物貯存葡萄糖的方式，可分為長鏈葡萄糖分子（直鏈澱粉）和支鏈葡萄糖分子（支鏈澱粉）兩種形式。這些葡萄糖分子經過消化會釋放出來，被人體吸收後可作為燃料供即時使用，又或在肌肉和肝臟中貯存為糖原（高度分支的葡萄糖分子鏈）供日後使用。

碳水化合物是人體較佳的能量來源。根據世界衛生組織的建議，碳水化合物應佔能量攝入量的55%至75%。穀類和高澱粉蔬菜（如馬鈴薯和芋頭）含豐富澱粉，為我們提供大量能量。根據健康飲食金字塔，這些食物位於金字塔底層，即應該“吃最多”。以實際分量而言，一名成年人每天應進食三至六碗已煮熟的白飯或粉麵（一碗已煮熟的白飯或粉麵的分量約相等於兩片麵包）。

膳食纖維

膳食纖維最初被形容為“存在於植物細胞壁內而人體難以消化的食物成分”。這些植物細胞壁主要是纖維素、半纖維素和果膠，全部屬於非澱粉多糖。至於細胞壁內的一種非碳水化合物物質“木質素”，亦屬於膳食纖維類別。換言之，膳食纖維未必全都是碳水化合物。事實上，膳食纖維包括許多不同的化合物，專家至今對其定義仍未有共識，但他們普遍同意非澱粉多糖是膳食纖維的主要部分。

膳食纖維一般被視為毫無能量價值，因此，“可獲得的碳水化合物”一詞是指總碳水化合物，但不包括不會提供能量的膳食纖維。

膳食纖維可簡單區分為可溶性纖維和不可溶性纖維兩大類。由於這兩個名詞能夠在進行營養教育時讓公眾明白膳食纖維的生理特性，故被廣泛使用和為消費者所接受。一般而言，可溶性纖維可影響小腸吸收葡萄糖和脂類，因此有助控制糖尿病和預防高膽固醇血症。另一方面，不可溶性纖維則對排便習慣有明顯的影響，因為大腸內的微生物會利用它們進行緩慢、不完整的發酵作用。至於食物來源方面，水果、燕麥、大麥和豆類都含有大量可溶性纖維，而蔬菜、小麥和穀類則有較多不可溶性纖維。

膳食纖維一向公認為可促進人體健康，有助預防癌症和心臟病等多種慢性疾病。根據中

In the last issue, we introduced the concept of food as fuel of the body. In this and the next issue, we will focus on carbohydrates. Carbohydrates are compounds consist of carbon, hydrogen and oxygen that are in a set ratio. Depending on the complexity of the chemical structures, they can be divided into simple and complex carbohydrates. We will further examine simple carbohydrates, which include monosaccharides and disaccharides, in the next issue. Here we concentrate on complex carbohydrates (i.e. polysaccharides), which we generally refer to as starch and dietary fibre in our daily life.

Starch

Starch is built of glucose units and it is the storage form of glucose in plants. Starch can be in the form of long chains of glucose molecules (amylose) or branched chains of glucose molecules (amylopectin). Through digestion, these glucose molecules are released for use. Once absorbed, glucose can be used as fuel immediately, or store as glycogen (highly branched chains of glucose molecules) in the muscle and liver for future use.

Carbohydrate is the body's preferred energy source. According to the World Health Organization's recommendation, 55-75% of energy contribution should come from carbohydrates. Grains and cereals, plus starchy vegetables, such as potatoes and yams, are rich in starch, which provide much of the food energy for us. With reference to the food pyramid, it is the bottom level which represents the "Eat Most" level. In terms of actual amount, an adult should eat 3-6 bowls of cooked rice or noodles (one bowl of cooked rice or noodles approximately equals to two slices of bread) a day.

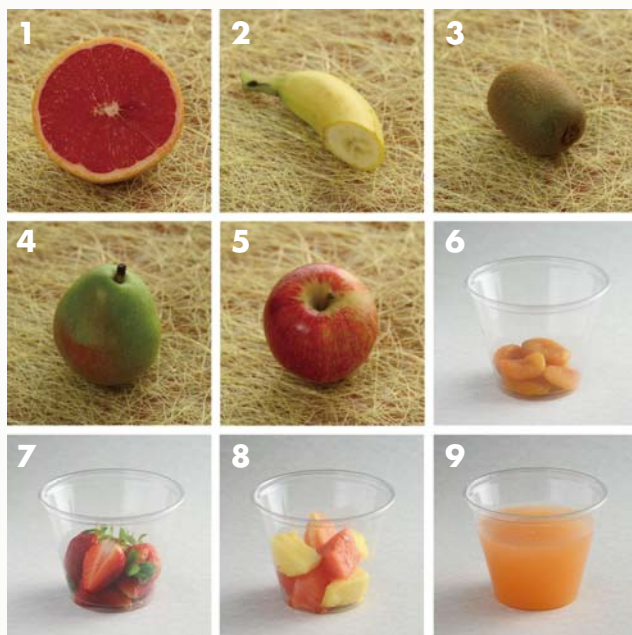
Dietary Fibre

Dietary fibre was first described as "portion of food which is derived from cellular walls of plants which is digested very poorly by human beings". These cell walls of plant material are mainly cellulose, hemicellulose and pectin, which are non-starch polysaccharides (NSP). A non-carbohydrate component found in the cell wall, lignin, is also included in the classification of dietary fibre. In other words, not all dietary fibres are carbohydrates. In fact, dietary fibre is a diverse group of compounds. Until now, there is no consensus on the definition of dietary fibre; however, the general agreement is that NSP are the principal part of dietary fibre.

Conventionally, dietary fibres are being considered as having no energy value. Thus, the term "available carbohydrate" means total carbohydrate excluding dietary fibre as dietary fibres are not available for energy.

A simple division of dietary fibres is to group them under soluble and insoluble fibres. These two terms have widespread use and are acceptable to consumers as they have been useful in nutrition education for the understanding of the physiological properties of dietary fibres. Generally, soluble fibres have effects on glucose and lipid absorption from the small intestine thereby can help to control diabetes and prevent high blood cholesterol. Insoluble fibres, on the other hand, have more pronounced effects on bowel habit as they are slowly and incompletely fermented by microorganisms in the large intestine. Regarding food sources, fruits, oats, barley and legumes have plenty of soluble fibres, whereas vegetables, wheat and cereals have more insoluble fibres.

Positive health effects of dietary fibre are well recognised, it can help to

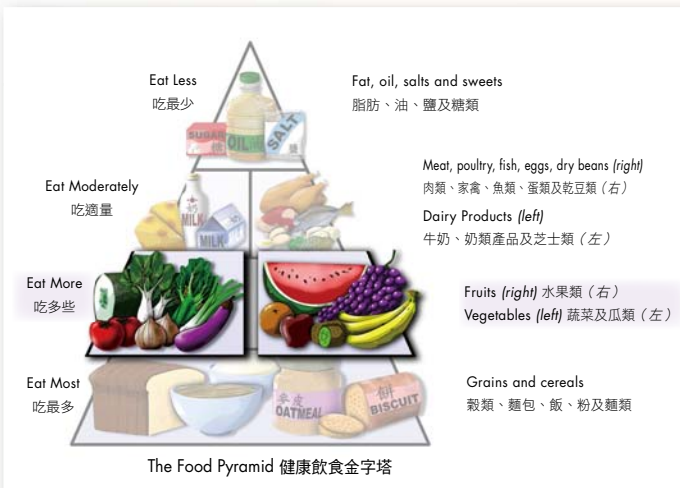


一份水果 A Serving of Fruits

- 1, 2 - 半個大型的水果 Half piece of large-sized fruit
- 3, 4, 5 - 一個中型的水果 One piece of medium-sized fruit
- 6 - 1/4杯沒有加糖和鹽的乾果 1/4 cup of dried fruits without added sugars or salt
- 7, 8 - 半杯莓類或已切的水果 Half cup of berries or cut-up fruits
- 9 - 3/4杯沒有加糖的果汁 3/4 cup of fresh fruits juices without added sugars

國適宜攝入量，一名成年人每天每攝入 1 000 千卡能量，就應進食 12.6 克膳食纖維。換言之，如從飲食中攝入 2 000 千卡能量，就應進食約 25 克膳食纖維。以健康飲食金字塔來說明這一點的話，水果和蔬菜就是膳食纖維的主要來源，我們應該“吃多些”這類食物。均衡、健康的飲食應每天包括至少兩份水果和三份已煮熟蔬菜（相等於 6 至 8 兩）。要盡量攝取更多膳食纖維，一有機會就應選吃全穀食品。

介紹過澱粉和膳食纖維之後，我們在下一期將會配合浪漫的情人節，與大家探討一種甜蜜蜜的碳水化合物——糖。



prevent numerous chronic diseases, such as cancers and heart diseases. With reference to the Chinese Adequate Intake (AI), an adult should consume 12.6g of dietary fibre for each 1 000-kcal intake a day. In other words, a 2 000-kcal diet should have about 25g of dietary fibre. Conveying the message by using the Food Pyramid, fruits and vegetables are the main sources of dietary fibre and we should “Eat More” of these foods. A balanced and healthy diet should include a minimum of 2 servings of fruits and 3 servings of cooked vegetables (equivalent to 6-8 taels) daily. Taking the opportunity to maximise dietary fibre intake, individuals can select whole grain products whenever available.

After starch and dietary fibre, we will examine another group of carbohydrates – sugars the sweets, in the Valentine’s month.

麵粉中的過氧化苯甲酰

Benzoyl Peroxide in Flour

食物事故點滴 Food Incident Highlight

近日，中國內地對過氧化苯甲酰用作食物添加劑一事有爭論，社會上對麵粉中可否使用過氧化苯甲酰存在分歧的意見。有些人認為，容許麵粉使用過氧化苯甲酰會造成濫用，因為部分生產商可能會大量添加，又指使用過氧化苯甲酰是並無必要的，歐洲聯盟成員國的麵粉亦無使用這種添加劑。另一方面，有些人則認為，許多國家都容許麵粉使用過氧化苯甲酰，而中國內地容許的使用量屬於較保守水平。

過氧化苯甲酰是一種食物添加劑，可用作麵粉處理劑。麵粉天然含有類胡蘿蔔素，故未經處理的麵粉會略帶黃色。過氧化苯甲酰可氧化類胡蘿蔔素，令麵粉變白。由於有些消費者喜用白色麵粉而不選擇微黃色麵粉，故過氧化苯甲酰常用於麵粉中。當麵粉製成食物後，大部分過氧化苯甲酰會轉化為苯甲酸這種常見的防腐劑。人們吃下苯甲酸後，苯甲酸會隨尿液排出。

根據國際癌症研究機構的分類，過氧化苯甲酰並未列為致癌物。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（專家委員會）曾對過氧化苯甲酰進行評估，認為攝入過氧化苯甲酰這一問題應與人們從其他食物來源攝入的苯甲酸一併考慮。此外，專家委員會又表示，苯甲酸的急性和慢性毒性均較低，而食品法典委員會則准許在多種食物類別中使用苯甲酰。

在國際方面，不少機構（包括食品法典委員會、中國內地、美國、加拿大、澳洲和新西蘭等）均准許麵粉或其他食品使用過氧化苯甲酰。食物安全中心認為，只要遵從食品法典委員會的使用準則，過氧化苯甲酰可安全應用於麵粉中。

麵粉生產商和進口商應確保麵粉可供人安全食用，並符合有關規例。

Recently, there had been some debates on the use of benzoyl peroxide as a food additive in Mainland China, where there were some differing opinions on its use in flour. Some argued that by allowing its use in flour, it opens the gate to abuses as some manufacturers may add excessive amount. They also argued that the use of benzoyl peroxide is unnecessary and it is not being used in flour in the European Union. On the other hand, some argued that many countries allow the use of this additive in flour and that the level allowed in Mainland China is quite conservative.

Benzoyl peroxide is a food additive that can be used as a flour treatment agent. It oxidizes the naturally-occurring carotenoids in flour, which gives untreated flour a yellowish tint, and whitens the flour as a result. It is often used as some consumers prefer white flour to yellowish ones. When the flour is made into food, most of the benzoyl peroxide is converted to benzoic acid, a commonly-used preservative. The benzoic acid ingested will be excreted in the urine afterwards.

According to International Agency for Research on Cancer, benzoyl peroxide is not classified as a carcinogen. The Joint FAO/WHO Expert committee on Food Additives (JECFA) had evaluated benzoyl peroxide and concluded that the intake of benzoyl peroxide should be considered with other sources of dietary intake of benzoic acid. JECFA also concluded that benzoic acid is of low acute and chronic toxicity and the Codex Alimentarius Commission (Codex) has allowed its use in many food types.

Internationally, benzoyl peroxide is permitted to be used in flour or other food products by many authorities, including Codex, Mainland China, USA, Canada, Australia, New Zealand etc. CFS considers that benzoyl peroxide can be safely applied to flour if it is used following Codex’s standard.

Manufacturers and importers of flour should ensure that the flours are safe for human consumption and the relevant regulations are followed.



過氧化苯甲酰可令麵粉變白，而部分消費者喜用白色麵粉。
Benzoyl peroxide can whiten flour which is preferred by some consumers

風險傳達 工作一覽 Summary of Risk Communication Work

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