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解讀本地膳食中的鎘

A Closer Look at Cadmium in the Local Diet

食物安全中心風險評估組
科學主任郭麗儀女士報告

Reported by Ms. Joey KWOK, Scientific Officer,
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鎘是普遍存在於環境中的金屬污染物，透過自然過程和人類活動釋出。攝入鎘是全球關注的公共衛生問題。本文章集中討論香港第二次總膳食研究的最新結果，包括本地飲食中的鎘含量，以及從膳食攝入鎘的評估結果。

攝入來源和對健康的影響

鎘在環境中持久存留，可被植物吸收和被動物食用，繼而進入食物供應鏈。對於不吸煙的普羅市民而言，食物是攝入鎘的主要途徑。至於吸煙者，吸煙是攝入鎘的另一重要來源。

人體排出鎘的速度非常緩慢。長年累月下來，透過食物攝入的鎘主要積聚在腎臟和肝臟。長期攝入鎘可損害腎功能，並令骨質密度減少。根據職業健康研究，鎘亦被列為令人類患癌的物质。

香港第二次總膳食研究： 從膳食攝入鎘的情況

香港第二次總膳食研究評估了食物中的鎘含量，以及本港市民從膳食攝入鎘的總體情況。是次研究選取了187種總膳食研究食物，涵蓋15個食物組別，以代表市民食用的大部分食物。研究人員收集了這些食物的樣本，處理至可食用的狀態，然後檢測其鎘含量。

在經檢測的食物中，有125種(67%)食物檢出鎘，涉及12個食物組別。鎘含量最高的是某些種類的貝類水產(例如龍蝦、蠔、墨魚、瀨尿蝦(蜆蜆蝦)、青口)和藻類。其他食物(包括魚類、蔬菜、穀物、水果、肉類和家禽、乳類製品和不含酒精飲品等)的鎘含量則較低。整體而言，香港第二次總膳食研究結果所得的鎘含量分布模式與文獻所載一致。

Cadmium is a metallic contaminant that is present ubiquitously in the environment through natural processes and human activities. Exposure to cadmium is a global public health concern. This article focuses on the latest findings of the [Second Hong Kong Total Diet Study](#) (2nd HKTDS), covering the occurrence of cadmium in the local diet and the results of the dietary exposure assessment.

Sources of Exposure and Health Effects

Cadmium persists in the environment. It can be taken up by plants and ingested by animals for food use, thereby entering the food supply. For the non-smoking general population, the major route of exposure to cadmium is through food. For smokers, smoking tobacco is another important source of cadmium uptake.

The human body eliminates cadmium slowly. Over years of exposure, cadmium ingested through food accumulates mainly in the kidneys and liver. Prolonged exposure to cadmium can impair kidney function and is associated with decreased bone mineral density. Cadmium is also classified as a human carcinogen on the basis of occupational studies.

Dietary Exposure to Cadmium in the 2nd HKTDS

The 2nd HKTDS assessed the levels of cadmium in food and related overall dietary exposure among the Hong Kong population. A total of 187 TDS food items covering 15 food groups were selected to represent the majority of foods consumed by the local population. Samples of these food items were collected, prepared as for consumption, and tested for cadmium.

Cadmium was detected in 125 (67%) of the food items tested, involving 12 food groups. The highest levels of cadmium were found in certain types of shellfish (e.g. lobster, oyster, cuttlefish, mantis shrimp, mussel) and seaweed. Lower cadmium levels were found in other foods including fish, vegetables, cereals, fruits, meat and poultry, dairy products and non-alcoholic beverages, etc. In general, the pattern of cadmium levels revealed in the 2nd HKTDS was in line with those reported in literature.

Dietary exposure to cadmium of the Hong Kong population was estimated by integrating laboratory analytical results with the local food consumption data. According to the findings, the dietary exposure estimates of cadmium were 5.3 - 6.1 and



圖1：總膳食研究食物組別佔本港成年人口(左)及較年輕人口(右)鎘膳食攝入量的百分比
Figure 1: Percentage contribution to cadmium dietary exposure by TDS food group in the adult (left) and younger (right) populations in Hong Kong

是次研究透過結合化驗分析結果與本港食物消費量數據，來估算本港人口從膳食攝入鎘的分量。根據研究結果，就成年人口而言，攝入量一般和攝入量高的市民每月從膳食攝入鎘的分量，分別為每公斤體重5.3至6.1微克和9.3至10微克。至於較年輕群組（6 - 17歲）方面，攝入量一般和攝入量高的市民每月從膳食攝入鎘的分量，分別為每公斤體重8.8至9.9微克和15至17微克。由於上述分量均低於聯合國糧食及農業組織 / 世界衛生組織食物添加劑聯合專家委員會所訂的暫定每月可容忍攝入量（即每公斤體重25微克），故此，本港市民因從膳食攝入鎘而對健康構成風險的機會不大。

在評估本港市民從膳食攝入鎘的主要來源時，須一併考慮在食物中檢出的鎘含量及其食用量。從本地膳食攝入的鎘主要源自「蔬菜及其製品」、「魚類和海產及其製品」以及「穀物及其製品」。這三個食物組別，佔本港人口從膳食攝入鎘的總量約八成。值得注意的是，雖然蔬菜和穀物的鎘含量並非最高，但由於其食用量大，因此成為從本地膳食攝入鎘的重要來源。

與香港首個總膳食研究和其他總膳食研究所得結果比較

香港首個總膳食研究於2010年至2014年間進行，該研究的結果顯示，攝入量一般和攝入量高的成年人口每月從膳食攝入鎘的分量，分別為每公斤體重7.8至8.8微克和13至15微克。與之相比，第二次總膳食研究所得從膳食攝入鎘的分量有所下降。

另一方面，數據顯示，香港第二次總膳食研究所得從膳食攝入鎘的分量，與其他地方（包括中國內地、日本、澳洲、新西蘭、法國、愛爾蘭、葡萄牙、英國和美國）進行的總膳食研究相比，大致屬中等水平。

給市民的建議

市民應保持飲食均衡多元，以免因偏食某幾類食物而攝入過量金屬污染物。此外，市民可採取額外的食物配製步驟，包括徹底清洗蔬果以去除塵土、摘去綠葉蔬菜的外葉和削去塊根類農作物的表皮，以減低其鎘含量。

9.3 - 10 $\mu\text{g}/\text{kg}$ bw/month for average and high consumers of the adult population respectively. For the younger population (aged 6 to 17), the dietary exposure estimates of cadmium were 8.8 - 9.9 and 15 - 17 $\mu\text{g}/\text{kg}$ bw/month for average and high consumers respectively. As these dietary exposure estimates fell below the Provisional Tolerable Monthly Intake (i.e. 25 $\mu\text{g}/\text{kg}$ bw/month) established by the Joint Food and Agriculture Organization of the United Nations / World Health Organization Expert Committee on Food Additives for cadmium, dietary exposure to cadmium is unlikely to pose health risks to the local population.

When attributing the main dietary sources of cadmium in our local diet, both the levels of cadmium detected in foods and the amount of food consumption go hand in hand. The major contributing food groups were identified as “Vegetables and their products”, “Fish, seafood and their products”, and “Cereals and their products”, accounting for about 80% of the total dietary exposure to cadmium in the local population. Of note, although the cadmium levels in vegetables and cereals were not the highest, they were consumed in large amounts and thus became important contributors of dietary exposure to cadmium in the local diet.

Comparison with Results of the 1st HKTDS and Other TDSs

Comparing with the results of the 1st HKTDS conducted between 2010 and 2014 which revealed that the dietary exposure estimates of cadmium were 7.8 - 8.8 and 13 - 15 $\mu\text{g}/\text{kg}$ bw/month for average and high consumers of the adult population respectively, it is noted that the dietary exposure estimates of cadmium were lower in the 2nd HKTDS.

On the other hand, data show that the dietary exposure estimates of cadmium in the 2nd HKTDS were roughly in the mid-range as compared with TDSs conducted in other places (including Chinese Mainland, Japan, Australia, New Zealand, France, Ireland, Portugal, the UK and US).

Advice to the Public

Members of the public are reminded to maintain a balanced and varied diet to avoid excessive exposure to metallic contaminants from a small range of food items. Moreover, additional food preparation steps, including washing vegetables and fruits thoroughly to remove dust and soil, removing outer leaves from leafy greens and peeling off the skin of root crops, may be adopted to reduce cadmium levels therein.

標籤背後：為何防腐劑及抗氧化劑比你想像中更重要

Beyond the Label: Why Preservatives and Antioxidants Matter More Than You Think

食物安全中心風險評估組
科學主任黃詩雯女士報告

Reported by Ms. Sosanna WONG, Scientific Officer
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大規模食品加工需要使用食物添加劑，以確保加工食物從生產到食用的整個過程，其安全和品質均得到保障。防腐劑和抗氧化劑是常用以延長食物保質期的食物添加劑。

在食物中使用防腐劑和抗氧化劑受《食物內防腐劑規例》（第132BD章）規管。《2024年食物內防腐劑(修訂)規例》（《修訂規例》）旨在讓本地和國際食物安全標準保持一致，從而加強保障消費者和促進食品貿易。

本文將探討這些添加劑在食物中的功能和《修訂規例》背後的理據。

認識防腐劑和抗氧化劑

防腐劑（例如山梨酸和苯甲酸）可延緩細菌、霉菌和酵母菌等微生物引致的變壞，藉延長食物的保質期確保食物可在家安全享用。

抗氧化劑（例如抗壞血酸和生育酚）可保護食物免受氧化，防止食物中的油脂出現酸敗，並保持風味。

《修訂規例》的內容是什麼？

為讓本地和國際食物安全標準保持一致，從而加強保障消費者和促進食品貿易，本港的食物安全法例會定期予以檢視和更新。

Large-scale food processing requires the use of food additives to ensure the food safety and quality of processed food products throughout their entire journey from production to consumption. Preservatives and antioxidants are food additives commonly used to prolong the shelf life of food products.

The use of preservatives and antioxidants in food is governed by the Preservatives in Food Regulation (Cap. 132BD). The objective of the [Preservatives in Food \(Amendment\) Regulation 2024](#) (the Amendment Regulation) is to keep local food safety standards on par with international standards, thereby enhancing consumer protection and facilitating the food trade.

This article discusses the functions of these additives in foods and the rationale behind the Amendment Regulation.

Understanding Preservatives and Antioxidants

Preservatives (e.g. sorbic acid and benzoic acid) delay spoilage caused by microorganisms like bacteria, moulds and yeasts. By prolonging the shelf-life, preservatives ensure that food can be safely enjoyed at home.

Antioxidants (e.g. ascorbic acid and tocopherols) protect food from oxidation, preventing fats and oils in food from turning rancid and preserving flavour.

What is the Amendment Regulation About?

To keep local food safety standards on par with international standards, thereby enhancing consumer protection and facilitating the food trade, our food safety legislations are periodically reviewed and updated. The Amendment

《修訂規例》是以食品法典委員會的標準為骨幹，輔以內地以及香港的其他主要食品貿易夥伴所採用的標準。

主要修訂包括：

准許名單：准許防腐劑和抗氧化劑的總數由32種增至58種。《修訂規例》把更多這些添加劑納入嚴格的監管，並明確界定准許的種類和含量，從而加強規管。

最高准許含量：《修訂規例》已更新／制訂指明食物分類中准許防腐劑和抗氧化劑的最高准許含量，使「添加劑—食物」組合的數目由約900個增至約2 000個。

事實與迷思

一起來拆解環繞防腐劑和抗氧化劑的常見迷思：

迷思1：「防腐劑和抗氧化劑並不安全」

事實：一如其他食物添加劑，防腐劑和抗氧化劑已通過嚴格的安全評估，才獲准用於食物中。國際及各國的食物安全當局（例如聯合國糧食及農業組織／世界衛生組織食品添加劑聯合專家委員會）會根據所有現有毒理及相關資料的科學審查，評估這些添加劑的安全性。

迷思2：「沒添加防腐劑或抗氧化劑的食物總是比較安全」

事實：防腐劑和抗氧化劑是現今大規模食品加工和全球食物供應鏈中的重要工具，讓食物可長途從工廠運到餐桌上。沒有防腐劑和抗氧化劑，食物可能會更快變壞或出現酸敗。在妥善規管和使用下，這些添加劑可確保食物在整個過程中均保持安全和穩定。

迷思3：「過量使用防腐劑和抗氧化劑」

事實：就指明食物類別所含個別防腐劑和抗氧化劑制訂最高准許含量，可確保從所有使用來源攝入的總量不超過每日可攝入量，即一生中每日攝入某一食物添加劑而不致構成顯著健康風險的分量。

迷思4：「製造商可隨意添加任何分量的防腐劑」

事實：雖然防腐劑和抗氧化劑的標準已經更新，但使用這些添加劑的原則維持不變。換言之，食物添加劑只有在其使用必須有利、對食物起到一項或多項科技上的作用，且不會危害消費者的健康的前提下，才可使用。

這對你來說意味着什麼？

業界應把握餘下的過渡期（於2026年12月29日屆滿），確保產品符合《修訂規例》的規定；市民則應閱讀食物標籤，以作出知情選擇，並維持均衡多元的飲食。

關於《修訂規例》的詳情，請瀏覽食物安全中心（中心）的網站，當中載有使用指引和常見問題，協助業界遵從規定。



圖2：預先包裝食物的配料表載有關於防腐劑或抗氧化劑（如有添加）的資料

Figure 2: The ingredient list of prepackaged foods contains information on preservatives or antioxidants, if added

Regulation has kept the standards of the Codex Alimentarius Commission (Codex) as the backbone, supplemented with those adopted by the Chinese Mainland and other major food trading partners of Hong Kong.

Some major amendments include:

Permitted list: The total number of permitted preservatives and antioxidants has been increased from 32 to 58. The Amendment Regulation strengthens the regulatory control by bringing more of these additives under strict supervision, clearly defining permitted types and levels.

Maximum permitted levels (MPLs): The MPLs of permitted preservatives and antioxidants in specified food categories have been updated/stipulated, increasing the number of "additive-food" pairs from around 900 to around 2000.

Facts vs Myths

Let's address common misconceptions surrounding preservatives and antioxidants:

Myth 1: "Preservatives and antioxidants are unsafe"

Fact: Like other food additives, preservatives and antioxidants have undergone rigorous safety evaluation before permitted for food use. International and national food safety authorities, such as the Joint FAO/WHO Expert Committee on Food Additives (JECFA), evaluate the safety of these additives based on scientific reviews of all available toxicological and related data.

Myth 2: "Food free of preservatives and antioxidants is always safer"

Fact: Preservatives and antioxidants are important tools in today's large-scale food processing and global food supply chain, where foods may travel long distances from factory to table. Without them, foods may spoil or turn rancid much faster. Properly regulated and used, these additives ensure food remains safe and stable throughout its journey.

Myth 3: "The use of preservatives and antioxidants is excessive"

Fact: Establishing MPLs for individual preservatives and antioxidants in specified food categories ensures that the total intake from all uses does not exceed the Acceptable Daily Intake (ADI), that is the amount of a food additive that can be ingested daily over a lifetime without appreciable health risk.

Myth 4: "Manufacturers can add as much preservatives as they want"

Fact: While the standards of preservatives and antioxidants are updated, the principles of using these additives remain unchanged. That is, the use of food additives is justified only when such use has an advantage, serving one or more technological functions in the food and does not compromise health of consumers.

What Does This Mean for You?

The trade is advised to make full use of the remaining window of the transitional period ending on 29 December 2026 and ensure their products comply with the Amendment Regulation. On the other hand, the public is advised to read the food label to make an informed choice, and maintain a balanced and varied diet.

For details of the Amendment Regulation, please visit the website of the Centre for Food Safety (CFS) which contains User Guidelines and Frequently Asked Questions to facilitate the trade's compliance.

本地麵包的鈉含量 Sodium Content in Local Bread

食物安全中心(中心)最近對超過100個本地非預先包裝麵包樣本進行鈉含量研究。研究涵蓋12種麵包，其中提子麥包、牛油排包和甜餐包的鈉含量較低(每100克100至130毫克)，而法式麵包(每100克550毫克)、芝士包(每100克490毫克)和比高包(每100克470毫克)的鈉含量則較高，進食一份便可能達建議每日鈉攝取量上限(即每日低於2 000毫克)的約25%。此外，腸仔和吞拿魚餡料的鈉含量佔整個麵包總鈉含量的比重可分別高達55%和35%。

該項研究亦發現，由不同供應商生產的同款麵包鈉含量差異明顯，反映業界仍有改變配方的空間。消費者可參考[有關研究結果](#)，選擇鈉含量較低和體積較少的麵包以減少攝入鈉。消費者購買預先包裝麵包時，亦應參閱營養標籤，以選擇鈉、糖和脂肪含量較低的麵包。

A recent study by the Centre for Food Safety (CFS) on the sodium content in over 100 non-prepackaged local bread samples across 12 varieties. While varieties such as wheat bread with raisins, butter loaves and sweet plain rolls/buns were found to contain less sodium (100 - 130mg/100g), some varieties like French bread (baguette, 550mg/100g), cheese bread (490mg/100g) and bagels (470mg/100g) contain more sodium such that consuming a single serving may contribute about 25% of the recommended daily limit of less than 2 000mg sodium/day. Moreover, fillings like sausage and tuna can contribute significantly (55% and 35% respectively) to the total sodium content.

The study also found significant variations in sodium levels among identical bread types from different suppliers, indicating room for reformulation. Consumers can make reference to the [study results](#) and choose bread with less sodium and smaller portion size to reduce intake of sodium. Consumers should also refer to the nutrition labels when purchasing prepackaged bread and select products with lower sodium, sugar and fat levels.

烘焙以外：芝士蛋糕的蠟樣芽孢桿菌風險 Baking and Beyond: *Bacillus cereus* Risks in Cheesecakes

今年7月，食物安全中心在一個巴斯克芝士蛋糕樣本中檢出過量蠟樣芽孢桿菌。蠟樣芽孢桿菌是一種可產生孢子的細菌，能夠直接或通過產生毒素引致嘔吐或腹瀉。

雖然一般烘焙過程可以殺滅細菌繁殖體，但蠟樣芽孢桿菌的孢子能抵受高溫，即使蛋糕表面已烤至焦黑，看似可以常溫存放，然而內部仍屬流質，且未必達到足以消除食安風險的溫度，一旦冷卻太久，存活的孢子便會發芽，並大量繁殖。

要防範這項風險，就必須嚴格控制時間和溫度。容易腐壞的烘製麵包餅食(例如芝士蛋糕、鮮忌廉蛋糕、含有牛奶或雞蛋餡料的餡餅，以及鮮果撻)必須妥為冷卻，並於烘焙後兩小時內放進雪櫃，以免長時間處於「[危險溫度範圍](#)」(攝氏4度至60度)。顧客應光顧環境清潔、信譽良好，並把芝士蛋糕放在冷藏環境陳列的店鋪。購買蛋糕後，應盡快貯存於雪櫃內，並及早食用。

In July, the Centre for Food Safety found that a sample of Basque burnt cheesecake contained excessive levels of *Bacillus cereus*. This spore-forming bacterium can cause vomiting or diarrhoea, either directly or by producing toxins.

While standard baking kills vegetative bacteria, *Bacillus cereus* spores can survive high temperatures. The deeply charred exterior may falsely suggest a shelf-stable product, but its runny centre may not reach temperatures sufficient to eliminate risks. If cooling takes too long, surviving spores can germinate and multiply.

Preventing this risk requires strict time and temperature control. Perishable bakery products (e.g., cheesecakes, fresh cream cakes, pies with milk or egg fillings, and fresh fruit tarts) must be properly cooled and placed in the refrigerator within 2 hours after baking to avoid prolonged holding in the "[temperature danger zone](#)" (4°C to 60°C). Consumers should patronise clean, reputable shops that display cheesecakes under refrigeration. Once purchased, the cake should be promptly stored in the refrigerator and consumed as soon as possible.



風險傳達工作一覽 (二零二六年八月)

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