食物中的塑化劑:
鄰苯二甲酸酯
PHTHALATES IN FOOD

風險評估研究結果
2018年2月2日

Result for a Risk Assessment Study
2 February 2018

食物環境衞生署
Food and Environmental Hygiene Department

食物安全中心
Centre for Food Safety

研究內容 The Study

- 食物安全中心(中心)剛完成了一項有關 “食物中的鄰苯二甲酸酯(phthalates)” (下稱「塑化劑」) 的研究。

- CFS has just finished a research on “Phthalates in Food”. “Plasticisers” refers to phthalates in the following presentation.

研究內容 The Study (2)

- 檢測市面超過310個食物樣本中七種的塑化劑(即DEP, DBP, BBP, DEHP, DNOP, DINP 及 DIDP)的水平。
- 評估循膳食攝入上述物質對健康帶來風險的可能性。

- CFS has analysed over 310 samples for the level of seven types of phthalates (i.e. DEP, DBP, BBP, DEHP, DNOP, DINP and DIDP).
- Assessed the impact on health from the dietary exposure to the seven types of phthalates.

塑化劑 Plasticisers (1)

- 鄰苯二甲酸酯(phthalates)是塑膠添加劑，使塑膠變得柔軟，是一類常用的「塑化劑」。
- 塑化劑廣泛應用在塑膠製品中，多種日常消費品例如塑膠器具和玩具等均含有不同份量的塑化劑。

- Phthalates is a large group of chemicals that are commonly used to soften plastics polymers (otherwise known as “plasticisers”).
- Used in a wide range of consumer products including but not limited to plastic utensils and toys.

塑化劑 Plasticisers (2)

- 由於塑化劑會在使用塑膠產品時釋放到環境中，因此塑化劑普遍存在於環境中。各類食物原料及製品可經由環境沾染微量的塑化劑，所以食物有微量的塑化劑並不意外。
- 當中七種塑化劑設有安全參考值。

- Being ubiquitous in the environment due to extensive use in plastics, low levels of phthalates in food is not unexpected due to environmental contamination.
- Health-Based Guidance Values (HBGVs) are available for the seven phthalates.

以往食物中濫用塑化劑事件
Past Abusive use of Plasticisers in Food

- 在 2011年5月起 ，台灣當局發現有食品非法添加塑化劑 (DEHP, DINP, DBP) 用作起雲劑，以圖降低生產成本和提高產品的穩定性。
- 中心當時在本港發現相關食品(主要涉及飲品)，塑化劑水平可高達 200,000 µg/kg 以上。

- Starting in May 2011, authorities in Taiwan announced that they had found illegal use of plasticisers (DEHP, DINP, DBP) as a clouding agent in order to reduce cost and increase stability.
- CFS found that relevant products (mainly drinks) can contain plasticisers up to level exceeding 200,000 µg/kg.

以往食物中濫用塑化劑事件(2)
Past Abusive use of Plasticisers in Food

- 中心自此為該四種塑化劑設立行動水平，以便快速篩選濫用塑化劑的產品，盡快通知市民停止食用和業界停止售賣和進口有關產品。塑化劑自此納入恆常的食物監察計劃內。
- CFS had since established action levels for the four plasticisers in order to quickly screen out products abused with plasticisers, to inform the public to stop consumption and to remove the affected products from the market. Plasticisers were included in the Center's regular Food Surveillance Programme since.

(μg/kg)	DBP	DEHP	DINP	DIDP
行動水平 **Action levels**	300	1500 (食物 food) 5000 (烈酒 distilled spirits)	DINP + DIDP: 9000	

研究目的 Aim of the Study

- 量度不同食物樣本中七種設有**安全參考值**的**塑化劑的含量**；
- 配合食物消費量調查的數據，估算**全港成年人從膳食攝入塑化劑的情況**；
- 評估相關的**健康風險**。

- To determine the levels of the seven plasticisers with HBGVs in the different foods;
- To estimate the dietary exposure to phthalates of the Hong Kong adults with the data from the HK Food Consumption Survey;
- To assess the health risk associated with the exposure, if any.

選擇樣本 Sample Selection (1)

- 選擇樣本時參考市民平日飲食習慣（即食物消費量調查的數據）作藍本，並加入以往塑化劑較高的食物種類。

- When selecting the samples, we take reference from the the Hong Kong Food Consumption Survey in including food commonly consumed locally, and also select food items that had been reported to contain higher levels of plasticisers in the past.

選擇樣本 Sample Selection (2)

- 樣本可分為16 組、100多種食物，共310多個樣本。
  - 包括： 飲品、 奶類製品、魚、肉類、蔬菜、生果、穀物 、油脂等。
  - 亦涵蓋小量以往曾超出中心行動水平的食物類別，例如： 茶飲品、 果汁飲品等。

- About 100 types of food in 16 groups were collected, totalling more than 310 samples.
  - e.g. drinks, dairy products, milk products, fish, meat, vegetables, fruits, cereals, oil and fats.
  - Some quota were allocated to the types of food that had exceeded the CFS action levels in the past. E.g. tea drinks, juice drinks etc.

取樣地點 Sampling Locations

- 主要從市民普遍購買食物的地方採樣，包括：
  - 超級市場
  - 街市

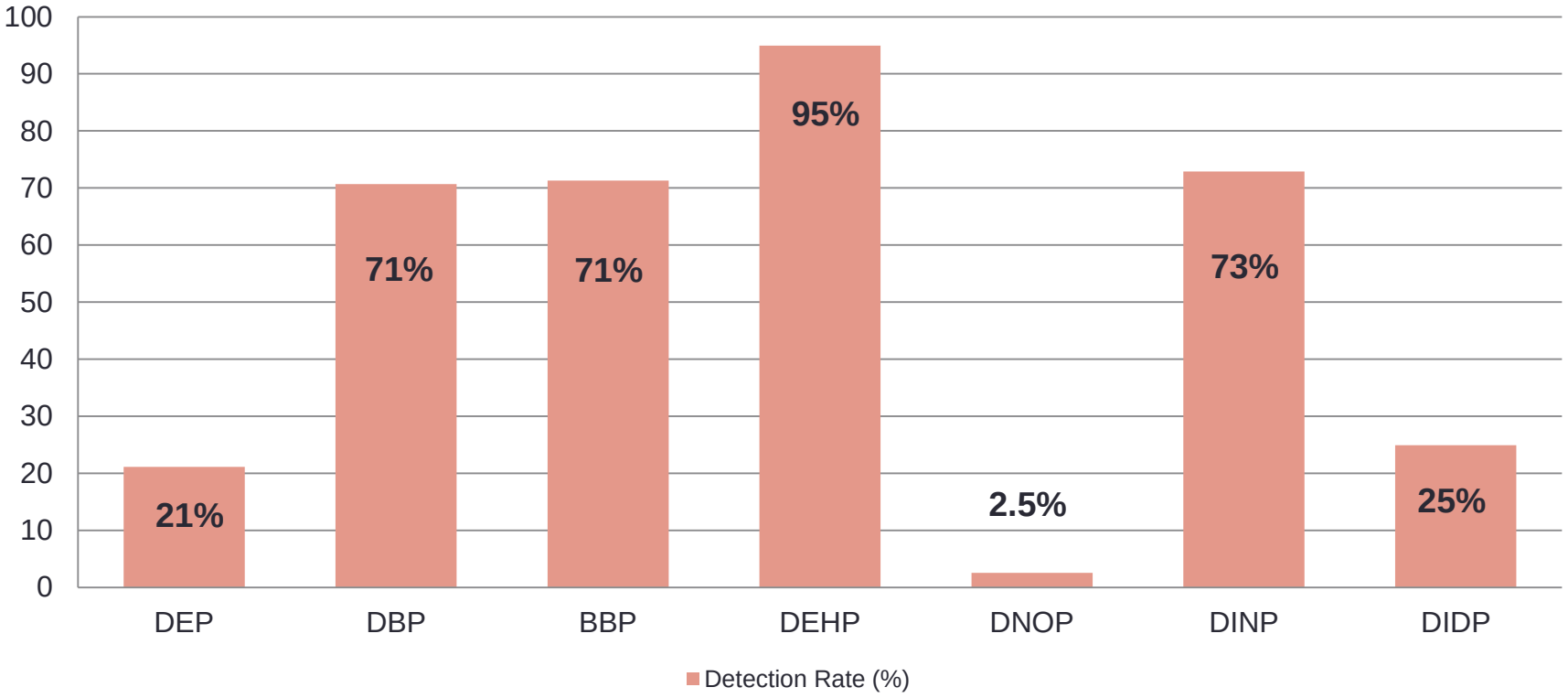
- Samples were mainly collected from places where the public commonly purchase foods, including:
  - Supermarkets
  - Wet markets

化驗結果 Analytical Results

- 這項研究合共抽取了317個樣本，以檢測七種塑化劑的含量
- 絕大多數樣本(310個樣本或98%)含有至少一種檢測的塑化劑
- 結果顯示食品普遍含有低水平的塑化劑，與外地的同類研究相約。

- 317 samples were collected for analysis of the seven phthalates mentioned;
- 310 samples (98%) were detected with at least one phthalate;
- Results shows that phthalates are widespread in food at low levels, which is in line with similar studies in other countries.

塑化劑檢測率
Detection Rate of Plasticisers



- 98%樣本含有至少一種檢測的塑化劑
- 98% of samples were detected with at least one phthalate

化驗結果 Analytical Results (2)

- 在測試的七種塑化劑中，最多樣本驗出DEHP，其後順序為DINP、BBP、DBP、DIDP、DEP 和 DNOP

- DEHP was the most commonly detected plasticiser, followed by DINP, BBP, DBP, DIDP, DEP and DNOP.

攝入量評估 Exposure Assessment

- 是次研究顯示，就算是塑化劑攝入量較高的成年市民，每種塑化劑所攝入的分量，都跟相關的安全參考值的距離甚遠 (最高只達13%)。 因此市民無需過分擔心。
- 攝入量評估是可以用來估算從飲食取得污染物的風險的方法。 若評估結果超出安全參考值(即大於100%)，代表攝入較多污染物，部分人士在長期保持該攝入量的情況下可能會影響健康。

- The results showed that even for the exposure to consumers that has higher plasticiser intake, the values were well within the corresponding HBGVs for individual phthalate (maximum 13%). Therefore, there is no point to worry unnecessarily.
- Exposure assessment is a mean to estimate the risk of contaminants from food. If the result exceeds the HBGV (i.e. >100%), health may be affected if the exposure remains the same over extended period.

攝入量評估 Exposure Assessment (2)

塑化劑 Plasticiser	健康安全參考值 (微克/每公斤體重/每日) HBGVs (µg/kg bw/day)	高塑化劑攝入量 佔安全參考值 的百分比 (UB) % HBGVs (UB) for high intake (P95) persons
DEP	5000	0.0039%
DBP	10	7.5%
BBP	500	0.10%
DEHP	25	**13%**
DNOP	400	0.043%
DINP	150	7.2%
DIDP	150	0.38%

攝入量評估 Exposure Assessment (3)

- 上圖列出七種塑化劑高攝入量的估算。最高出現在DEHP，只佔健康安全參考值的13%，代表健康風險甚低 。
- 其他塑化劑如 DEP、BBP、DNOP攝入量更低於相關健康安全參考值的 0.1%，風險更低。

- The chart shows the high intake level for the 7 plasticisers. The highest level (DEHP) was only 13% of the HBGV, which means that the risk was low.
- The intake levels for DEP, BBP, DNOP are less than 0.1% of the corresponding HBGVs, which means that the risk is even lower.

攝入量 Exposure Assessment

- 本地攝入量跟外國類似研究相若

塑化劑 (μg/kgbw/day)	本研究 This study	丹麥 Denmark	英國 UK	歐洲 Europe	美國 USA	中國大陸 Mainland China
DEP	0.034 - 0.11	-	-	1.15	0.033	0.14 – 1.33
DBP	0.37 - 0.39	1.8 – 4.1	0.2	3.61	0.184	5.62 – 6.30 1.21
BBP	0.27 - 0.29	0.3 – 0.4	0.1	0.31	0.085	0.44 – 1.67
DEHP	1.7 - 1.7	2.7 – 4.3	2.5	2.85	0.673	6.03 – 6.38 2.07
DNOP	0.011 - 0.098	-	-	-	0.021	0.00 – 1.27
DINP	4.8 - 4.8	5	<0.17	-	-	4.39
DIDP	0.096 - 0.18	3	<0.17	-	-	-

樣本的塑化劑水平
Measured levels of phthalates in samples

(μg/kg)	DEP	DBP	BBP	DEHP	DNOP	DINP	DIDP
平均水平 (上限計算) Average (Upper Bound)	6.0	23	15	100	5.2	130	37
最高值 Max level	43	560	93	3500	23	7900	3800

LOD = 5 μg/kg, LOQ = 15 μg/kg

- 今次研究的樣本中，並沒有發現以往台灣塑化劑事件般故意添加的高劑量塑化劑的情況。

- No samples in this study contains abusive level of plasticisers which were deliberately added as those found during the Taiwan Plasticisers Incident.

化驗結果 Analytical Results (1)

- 小量樣本(4個或1.3%)的塑化劑含量超出中心的行動水平
  - 兩個食油: 3300 和 3500 µg/kg DEHP (行動水平: 1500 µg/kg)
    - 其他食油樣本: 44 - 900 µg/kg DEHP
  - 兩個中式白酒: 560 和 470 µg/kg DBP (行動水平: 300 µg/kg)
    - 其他中式白酒樣本: 15 - 31 µg/kg DBP
- 由於油脂及高濃度酒精的化學特性，令塑膠內在的塑化劑更易遷移到有關食物中，這類食品出現較高塑化劑水平並不意外，暫時亦沒有跡象顯示有刻意摻雜的情況。
- A few samples (4 or 1.3%) phthalates exceeded action levels
  - 2 edible oil samples with 3300 and 3500 µg/kg DEHP (AL: 1500 µg/kg)
    - Levels in other oil samples: 44 to 900 µg/kg DEHP
  - two Chinese white wines with 560 and 470 µg/kg DBP (AL: 300 µg/kg)
    - Levels in other Chinese wines: 15 to 31 µg/kg DBP
- As chemical natures of both edible oil and spirits dissolves phthalates more readily from the plastics upon direct contact, these results were not a surprise and did not point to intentional adulteration.

化驗結果 Analytical Results (2)

- 另外一個免治豬肉樣本DINP水平較高:7900 µg/kg
  - 其他免治豬肉樣本: 34 & 52 µg/kg DINP
  - 其他豬肉樣本　　: 7.4 至 870 µg/kg DINP
- 樣本水平不會導致健康問題，亦沒有超越行動水平，不過情況顯示應有進一步減低塑化劑水平的可能 。
- Also, relatively higher level of DINP was identified in a sample of minced pork with 7900 µg/kg DINP
  - other minced pork sample 34 & 52 µg/kg DINP
  - other pork samples 7.4 to 870 µg/kg DINP
- Level found would not cause adverse health problem upon usual consumption and did not exceed action levels. However, it could be possible to reduce the plasticiser level further.

跟進行動 Follow-up actions

- 中心已跟相關的食油、酒、超級市場的業界會面，強調為產品選擇適當的食物包裝材料和食物接觸材料，和適當訓練員工的重要性，盡量減少塑化劑的轉移的機會。

- 中心會繼續進行塑化劑的恆常監察。

- CFS has already meet with the relevant representatives of the oil, wine and supermarket trade, stressing the importance of choosing the correct food grade packaging and food contact materials for its applications and to train staff properly in order to reduce the chance of plasticisers being transferred to food.

- CFS will continue the surveillance of plasticisers in food in the routine Food Surveillance Programme.

結論 Conclusions

- 整體而言，市民因攝入七種塑化劑的健康風險不高。
- Overall, the health risk posed by the intake of the seven plasticiser is low.

結論 Conclusions

- 雖然在這項研究中的樣本水平不會導致健康問題，不過部分樣本應有進一步減低塑化劑水平的空間 。
- 中心聯絡業界，強調為產品選擇合適的食物包裝及接觸材料，及留意製造過程細節的重要性，盡量減少塑化劑的轉移的機會。
- While the levels found in this study will not cause health issues, it was believed that it may be possible to further reduce the plasticiser level in some samples.
- CFS has contacted the trade in stressing the importance of choosing the right food packaging for the intended use, and pay attention to the details of the production process in order to minimize the transfer of plasticisers to food.

~ 多 謝 Thank you ~

有關預先包裝的免治肉類
About Prepackaged Minced Meat

- 中心額外採集了20個預先包裝、一般脂肪含量較高的免治肉類樣本進行塑化劑化驗。
- 化驗結果顯示，雖然沒有樣本超過行動水平，但從同一連鎖店的不同分店獲得的兩份免治豬肉樣本中，三種塑化劑的含量也較其餘18個樣本中明顯為高。
- 與其他樣本比較，2個樣本中的塑化劑含量，有改進的空間。
- CFS collected 20 extra prepackaged minced meats samples for testing of selected plasticisers, as minced meat generally contain more fat.
- The result indicates that no samples has exceed action level, but the plasticiser levels in the 2 samples from different branches of a chain store are significantly higher than the remaining 18 samples.
- The level of plasticizers in the 2 samples have room for improvement.