

# 茶和茶類飲品中的高氯酸鹽

## Perchlorate in Tea and Tea Beverages

### 風險評估研究

### Risk Assessment Study

2018年8月10日

10 August 2018

# 茶葉中高氯酸鹽含量的報道

## Media report on perchlorate levels in tea leaves

- 2016年初，本地傳媒報道在歐洲發現產自中國內地的茶葉含有較高水平的高氯酸鹽
  - 中心從市面抽取三十個進口茶葉樣本檢測其高氯酸鹽含量，結果全部樣本通過檢測
- 
- In early 2016, local media reported that Mainland-produced tea leaves available in Europe were found to contain higher levels of perchlorate
  - CFS collected 30 imported tea leaf samples in the local market for testing of perchlorate levels. All samples collected passed the tests

# 研究內容

## The Study

- 食物安全中心(中心)進行一項有關「茶和茶類飲品中的高氯酸鹽」的研究
  - 檢測市面超過300個乾茶葉和茶類飲品中高氯酸鹽的水平
  - 評估從茶類產品攝入上述物質對健康可能帶來的風險
- 
- Centre for Food Safety (CFS) conducted a study on “Perchlorate in Tea and Tea Beverages”
  - Analysed perchlorate levels in over 300 samples of dried tea leaves and tea beverages available in the local market
  - Assessed the potential health impact due to exposure to perchlorate from tea products

# 高氯酸鹽的性質

## About perchlorate ( $\text{ClO}_4^-$ )

- 一種天然存在的化學物
  - 主要用作固體火箭燃料、汽車安全氣墊、煙火和道路照明彈中的氧化劑
  - 亦用於治療甲狀腺功能亢進症
- 
- A chemical that occurs naturally in the environment
  - Used primarily as an oxidiser in solid rocket fuels, automotive air bags, fireworks and road flares
  - Also used as a pharmaceutical to treat overactive thyroid disorders

# 高氯酸鹽的污染來源

## Sources of perchlorate contamination

- 於大氣和地表水中自然形成
  - 使用含高氯酸鹽的肥料和灌溉水
  - 工業排放
  - 含氯消毒劑的降解
- 
- Natural formation in the atmosphere and surface water
  - Use of perchlorate-containing fertilisers and irrigation water
  - Industrial emission
  - Degradation of chlorine-based disinfectants

# 食物中的高氯酸鹽

## Perchlorate in foods

- 人類主要從食物和食水攝入高氯酸鹽
  - 很多食品，包括蔬菜、水果、香料、茶、奶類和乳製品，皆報稱發現含有高氯酸鹽
  - 蔬菜、水果、奶類及它們的製品是攝入高氯酸鹽的主要膳食來源
- 
- Human exposure to perchlorate occurs primarily through ingestion of food and water
  - Perchlorate had been reported in a wide range of foods including vegetables, fruits, spices, teas, milk and dairy products
  - Vegetables, fruits, milk and their products are important contributors to perchlorate exposure

# 對健康的影響

## Health effects

- 持續攝取一定水平的高氯酸鹽可導致甲狀腺機能衰退
- 影響：
  - 胎兒、嬰兒和兒童的腦組織和腦功能發展
  - 成年人的新陳代謝及心血管、腸胃、骨骼、神經肌肉和生殖系統的功能
- Sustained exposure to sufficiently high level of perchlorate can lead to hypothyroidism
- Adversely affect:
  - structural and functional brain development in the foetus, infant and child
  - metabolism and functioning of cardiovascular, gastrointestinal, skeletal, neuromuscular and reproductive systems in adults

# 健康參考值

## Health-based guidance value

- 糧農組織 / 世衛組織食品添加劑聯合專家委員會(JECFA) 2010年就高氯酸鹽的安全性進行評估
  - JECFA 把高氯酸鹽的暫定最高每日可容忍攝入量定為每公斤體重0.01毫克（即每日每公斤體重10微克）
- 
- Joint FAO/WHO Expert Committee on Food Additives (JECFA) evaluated the safety of perchlorate in 2010
  - JECFA established a Provisional Maximum Tolerable Daily Intake (PMTDI) of 0.01 mg/kg bw/day (i.e. 10 µg/kg bw/day) for perchlorate



# 高氯酸鹽的規管

## Regulatory control of perchlorate

- 食品法典委員會沒有為食物中高氯酸鹽的最高含量訂定標準
- 美國、歐盟、澳洲、新西蘭、加拿大、中國大陸、日本及台灣等地方均未有就食物中高氯酸鹽的最高含量訂立法定標準
- Codex Alimentarius Commission has not established any maximum limits (MLs) for perchlorate
- No regulation stipulating the MLs for perchlorate in foods in the US, the EU, Australia, New Zealand, Canada, Mainland China, Japan and Taiwan

# 目的

## Objectives

- 檢測本地市場常見的乾茶葉和茶類飲品的高氯酸鹽含量
  - 估算本港成年人從這些茶類產品攝入高氯酸鹽的分量
  - 評估相關健康風險
- 
- To determine the levels of perchlorate in dried tea leaves and tea beverages commonly available in the local market
  - To estimate the dietary exposure to perchlorate of the Hong Kong adult population arising from the consumption of these tea products
  - To assess the associated health risk

# 採樣

## Sampling

- 2017年6月至8月
  - 從本港市面（茶莊、超級市場、便利店、快餐店、食肆、外賣茶店等）
  - 共抽取305個樣本

- Sampling work was conducted from June to August 2017
  - From local retail market (tea houses, supermarkets, convenience stores, fast food shops, restaurants, take-away tea shops)
  - 305 samples



# 研究範圍

## Scope

- 包括9類香港市民日常飲用的乾茶葉及茶類飲品
  - 沒發酵茶
  - 半發酵茶
  - 全發酵茶／後發酵茶
  - 花茶
  - 玄米茶
  - 檸檬茶
  - 調味茶／茶飲
  - 奶茶
  - 珍珠奶茶
- Cover 9 groups of dried tea leaves and tea beverages commonly consumed by the local population
  - Non-fermented tea
  - Semi-fermented tea
  - Fully-fermented tea / Post-fermented tea
  - Floral tea
  - Genmai tea
  - Lemon tea
  - Flavoured tea / Tea drinks
  - Milk tea
  - Milk tea with “pearls”

# 化驗結果

## Analytical results

- 是次研究共抽取305個市民日常飲用的茶類產品樣本(包括乾茶葉及茶類飲品)，以檢測當中的高氯酸鹽含量
  - 大部分樣本(96%)皆含有高氯酸鹽
- 
- A total of 305 samples of tea products (including dried tea leaves and tea beverages) commonly consumed by the Hong Kong population was analysed for perchlorate
  - Perchlorate was present in the majority (96%) of samples

# 乾茶葉中高氯酸鹽的平均含量

## Mean perchlorate levels in dried tea leaves

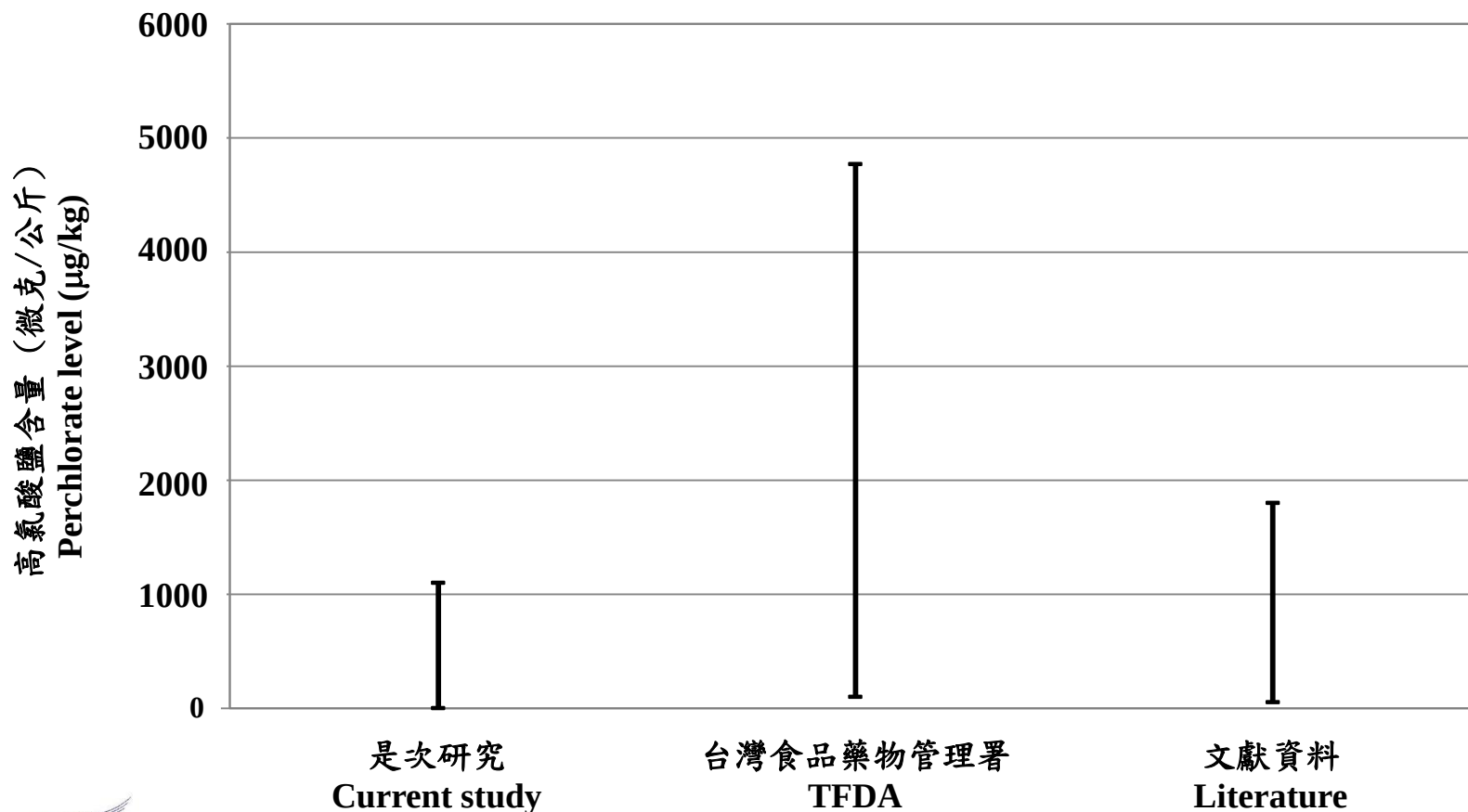


| 茶葉種類<br>Types of tea leaves                                           | 平均值 Mean<br>微克/公斤 $\mu\text{g/kg}$ [範圍 range] |
|-----------------------------------------------------------------------|-----------------------------------------------|
| 半發酵茶葉 Semi-fermented tea leaves                                       | 250 [1.2-1100]                                |
| 花茶(乾) Floral tea (dried)                                              | 150 [1.4-470]                                 |
| 非發酵茶葉 Non-fermented tea leaves                                        | 140 [ND-790]                                  |
| 玄米茶(乾) Genmai tea (dried)                                             | 79 [ND-840]                                   |
| 全發酵茶葉／後發酵茶葉<br>Fully-fermented tea leaves / Post-fermented tea leaves | 69 [1.3-660]                                  |

ND: 沒有檢出 Not detected

# 與其他研究的比較

## Comparison with other studies





# 茶湯中高氯酸鹽的平均含量

## Mean perchlorate levels in tea infusions



| 茶湯種類<br>Types of tea infusions                        | 平均值 Mean<br>微克/公升 $\mu\text{g/L}$ [範圍 range] |
|-------------------------------------------------------|----------------------------------------------|
| 半發酵茶 Semi-fermented tea                               | 1.6 [0.0080-7.3]                             |
| 花茶 Floral tea                                         | 0.98 [0.0093-3.1]                            |
| 非發酵茶 Non-fermented tea                                | 0.96 [ND-5.3]                                |
| 玄米茶 Genmai tea                                        | 0.53 [ND-5.6]                                |
| 全發酵茶／後發酵茶<br>Fully-fermented tea / Post-fermented tea | 0.46 [0.0087-4.4]                            |

ND: 沒有檢出 Not detected



# 茶湯中高氯酸鹽的平均含量

## Mean perchlorate levels in tea infusions



| 茶湯種類<br>Types of tea infusions                                                                                                                                                                                 | 平均值 Mean<br>微克/公升 $\mu\text{g/L}$ [範圍 range] |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| 半發酵茶 Semi-fermented tea                                                                                                                                                                                        | 1.6 [0.0080-7.3]                             |
| <ul style="list-style-type: none"><li>各類茶湯中高氯酸鹽的平均含量屬低水平（每公升0.46-1.6微克）</li><li>The mean perchlorate levels among different types of tea infusions were low (0.46 to 1.6 <math>\mu\text{g/L}</math>)</li></ul> | 0.98 [0.0093-3.1]                            |
|                                                                                                                                                                                                                | 0.96 [ND-5.3]                                |
|                                                                                                                                                                                                                | 0.53 [ND-5.6]                                |
|                                                                                                                                                                                                                | 0.46 [0.0087-4.4]                            |

# 茶類飲品中高氯酸鹽的平均含量

## Mean perchlorate levels of tea beverages



| 茶類飲品的種類<br>Types of tea beverages    | 平均值 Mean<br>微克/公升 $\mu\text{g/L}$ [範圍 range] |
|--------------------------------------|----------------------------------------------|
| 奶茶 Milk tea                          | 3.1 [0.49-8.3]                               |
| 檸檬茶 Lemon tea                        | 1.3 [ND-3.2]                                 |
| 珍珠奶茶 Milk tea with “pearls”          | 0.84 [0.51-1.2]                              |
| 玄米茶(飲品) Genmai tea (beverages)       | 0.78 [ND-2.5]                                |
| 調味茶／茶飲<br>Flavoured tea / Tea drinks | 0.59 [ND-1.8]                                |

ND: 沒有檢出 Not detected

# 茶類飲品中高氯酸鹽的平均含量

## Mean perchlorate levels of tea beverages



茶類飲品的種類

Types of tea beverages

平均值 Mean

微克/公升  $\mu\text{g/L}$  [範圍 range]

奶茶 Milk tea

3.1 [0.49-8.3]

檸檬茶 Lemon tea

1.3 [ND-3.2]

- 茶類飲品中高氯酸鹽的平均含量屬低水平（每公升0.59-3.1微克）

0.84 [0.51-1.2]

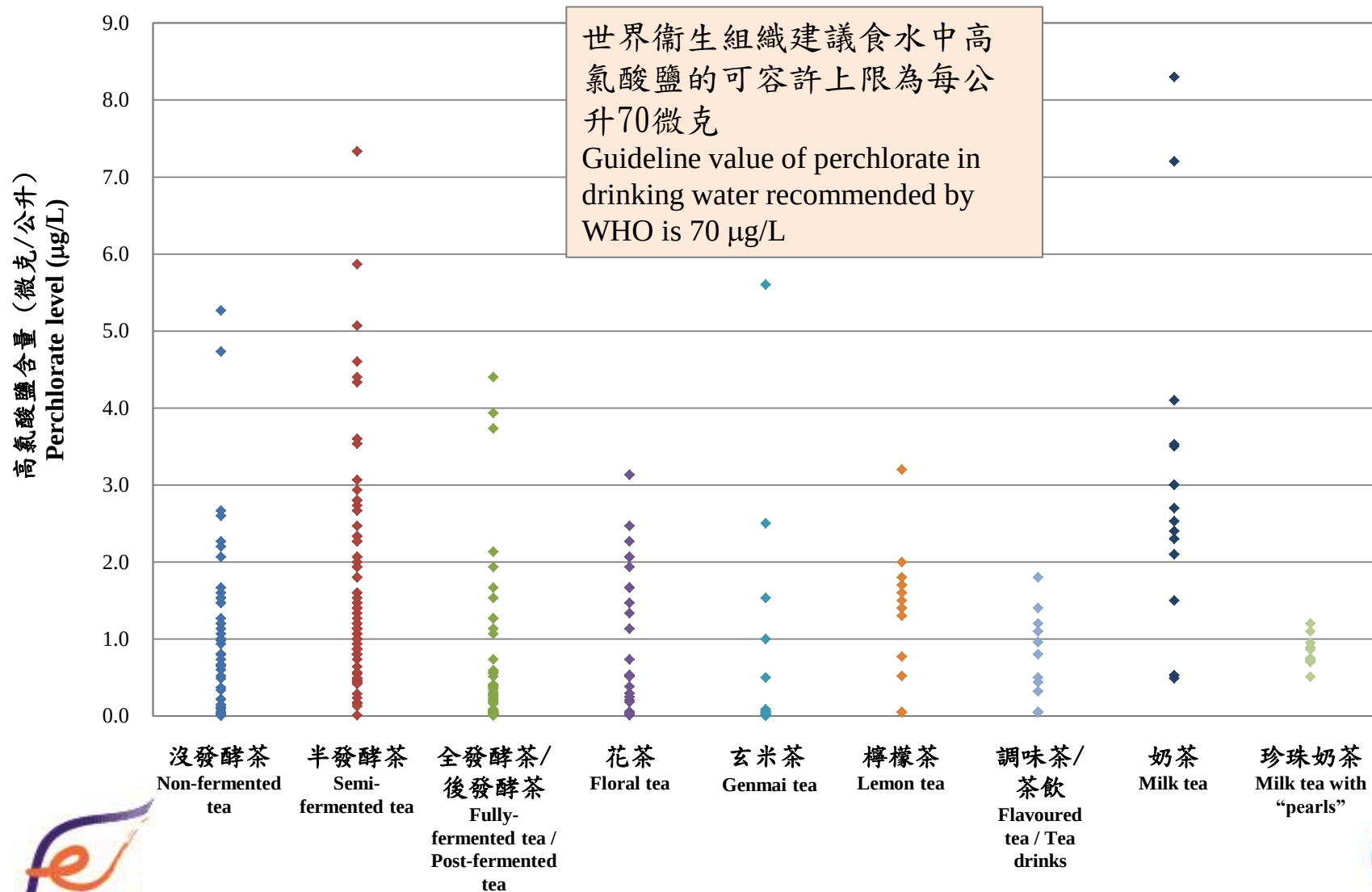
- The mean perchlorate levels in tea beverages were low (0.59 to 3.1  $\mu\text{g/L}$ )

0.78 [ND-2.5]

0.59 [ND-1.8]

# 茶和茶類飲品中的高氯酸鹽含量

## Perchlorate Levels in Tea and Tea Beverages



# 從茶和茶類飲品攝入高氯酸鹽的情況(一)

## Dietary exposure to perchlorate from tea and tea beverages (1)

|                               | 高氯酸鹽攝入量<br>(微克/每日每公斤體重)<br>Perchlorate exposure<br>( $\mu\text{g/kg bw/day}$ ) | 健康參考值<br>(微克/每日每公斤體重)<br>HBGV ( $\mu\text{g/kg bw/day}$ ) | 高氯酸鹽攝入量佔健康參考值的百分比<br>% HBGV for perchlorate exposure |
|-------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------|
| 攝入量一般的市民<br>Average consumers | 0.012                                                                          | 10                                                        | 0.12%                                                |
| 攝入量高的市民<br>High consumers     | 0.031                                                                          |                                                           | 0.31%                                                |

➤ 與同類研究結果相約

➤ Consistent with the result of a similar study

# 從茶和茶類飲品攝入高氯酸鹽的情況(二)

## Dietary exposure to perchlorate from tea and tea beverages (2)

- 市民從本地市場出售的乾茶葉和茶類飲品攝入高氯酸鹽的分量，不會對健康構成影響
  - 市民不用過分擔心從乾茶葉和茶類飲品攝入高氯酸鹽的問題
- 
- Adverse health outcome due to perchlorate exposure of the Hong Kong adult population from dried tea leaves and tea beverages commonly available in the local market was remote
  - There is no cause for undue concern over the exposure to perchlorate from dried tea leaves and tea beverages

# 結論(一)

## Conclusion (1)

- 這項研究抽取的乾茶葉和茶類飲品樣本大多(96%)檢出高氯酸鹽
- Perchlorate is present in the majority (96%) of the dried tea leaf and tea beverage samples collected



## 結論(二)

## Conclusion (2)

- 市民從本地市場出售的乾茶葉和茶類飲品攝入高氯酸鹽的分量，不會對健康構成影響
- Adverse health outcome due to perchlorate exposure of the Hong Kong adult population from dried tea leaves and tea beverages commonly available in the local market was remote

謝謝  
Thank you