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## 焦點個案 Incident in Focus

## 從“一滴香”看調味劑 From “One Drop of Incense” to Flavourings

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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火鍋飄香劑的問題近日再度成為焦點。事緣，某本港傳媒在十一月報道，從本港食肆抽取了九個食物樣本進行化驗，發現有兩個樣本含少量乙基麥芽酚，該報指有關調味劑是“一滴香”產品的配料。“一滴香”是火鍋飄香劑的一個牌子，但市面上可能會有不同牌子的其他同類產品。究竟食物味道是什麼？從何而來？使用調味劑的一般安全性又如何？本文將會與大家逐一探討。

### 調味與增味 - 食物味道是什麼？

味道泛指任何物質在我們嘴裏散發出的各種特點，這些特點主要透過味覺和嗅覺感受。調味劑的特性就是讓人感受味道。

調味劑是為了增添或改良食物味道及／或氣味而添加的物質。不過，調味劑既不包括糖、醋和食鹽等物質，因為這些物質只有甜味、酸味或鹹味，也不包括穀氨酸一鈉（俗稱味精）等增味劑，因為增味劑的作用是提高食物現有的味道及／或氣味。

目前，世界上有數千種調味劑，當中許多存在於我們日常食用的天然食物。舉例來說，香蘭素是天然存在於雲呢拿豆莢中的調味劑，帶有雲呢拿的獨有味道。香蘭素可從雲呢拿豆莢中直接提取，又或經化學合成。另一方面，乙基香蘭素是一種相關的調味劑，主要是經化學合成的。由於乙基香蘭素的化學結構與香蘭素類似，故乙基香蘭素同樣帶有雲呢拿的獨有味道，但會較香蘭素濃烈三四倍。

調味劑有悠久的歷史，已安全使用於多種食品內，例如汽水、糖果、湯類、零食、烘焙食品和奶類飲品。



圖一 即食麵的調味包通常加入了調味劑，令湯帶肉味或海鮮味。

Fig.1 Seasoning packs for instant noodles often contain flavourings to give the meat or seafood flavour.

The issue of hotpot flavouring products was once again brought in the limelight in November 2011 when a local media report revealed that two out of nine food samples collected from local food premises were tested with low levels of ethyl maltol, a flavouring claimed by the media as an ingredient of “One Drop of Incense” (ODI) (一滴香). ODI represents one brand of hotpot flavouring products although other similar products may be branded with different names. In this article, we will look into what food flavour is, where food flavour comes from, and how safe in general the use of flavourings is.

### Flavourings and Flavour Enhancers - What is Food Flavour?

Flavour is the sum of those characteristics of any material taken in the mouth, perceived principally by the senses of taste and smell. The perception of flavour is a property of flavourings.

Whilst flavourings are substances added to food to impart or modify taste and/or odour, they do not include substances like sugar, vinegar, and table salt as they have an exclusively sweet, sour, or salty taste. Flavourings do not include flavour enhancers such as monosodium glutamate (MSG) neither because the function of flavour enhancer is to enhance the existing taste and/or odour of a food.

There are thousands of flavourings in existence, many of which exist in the natural foods we eat everyday. For instance, vanillin is a flavouring naturally occurring in vanilla pods and has the characteristic flavour of vanilla. Vanillin can either be extracted directly from vanilla pods, or chemically synthesised. On the other hand, a related flavouring, ethyl vanillin, is formed predominantly by chemical synthesis. With its chemical structure similar to vanillin, ethyl vanillin also possesses the characteristic vanilla flavour but three to four times stronger than that given by vanillin.

Flavourings have a long history of safe use in a wide variety of foods such as soft drinks, confectionary, soups, snack foods, bakery products, and milk beverages.



圖二 適當使用調味香精可令雪糕帶芳香的雲呢拿味道，而香蕉糕則有甜甜的香蕉味道。

Fig.2 Appropriate use of flavouring essence can give ice-cream and banana rolls the desirable vanilla and banana flavour.



## 調味劑的安全性

少量調味劑通常足以達到預期的調味效果，這一點從“一滴香”的名字就能反映出來，即一滴就足以令整鍋火鍋變得美味芳香。由於調味劑能刺激味覺及／或嗅覺，過量使用會令最終產品不為消費者接受，故調味劑在食物中的使用量有限，消費者從膳食攝入的調味劑分量一般不會高。

目前為止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）已對1 700多種調味劑（包括乙基麥芽酚）的安全性作出評估。專家委員會已把乙基麥芽酚的每日可攝入量定為每公斤體重零至二毫克，又認為乙基麥芽酚如在食物中正常用作調味劑不會引起安全問題。雖然專家委員會不建議使用幾種調味劑，但認為絕大部分調味劑，以現時攝入的分量計食用者不會有安全問題。[專家委員會網頁](#)內設立有關調味劑的評估資料庫，不時會作更新。

此外，食物製造商亦可參考有關的業界工具書，並徵詢專業意見，以了解個別調味劑的調味特性和建議用法，舉例來說，肉類產品和肉湯中的肉味可能來自肉類提取物、植物油及／或2,5-二甲基吡嗪和2-甲基吡嗪等調味劑。

### 注意要點

1. 調味劑可增添或改善食物的味道及／或氣味。
2. 目前，超過1 700種調味劑已接受國際組織評估，當中大部分可供安全用於食物中。
3. 調味劑在食物中的使用量一般屬少量，消費者從膳食攝入調味劑的分量不高。

## 本港對調味劑的規管

本港有關食物法例訂明，所有出售的食物必須適宜供人食用。此外，《食物及藥物（成分組合及標籤）規例》（第132W章）規定，如本港出售的預先包裝食物使用調味劑作為配料，就必須在配料表上列明其類別名稱。

鑑於市民關注火鍋調味產品，食物安全中心由今年年初起，已在本港市面上抽取70多個火鍋湯底和濃湯的樣本，進行乙基麥芽酚及／或金屬雜質、染色劑、防腐劑及抗氧化劑等測試，當中只有一個不合格樣本，原因是含有橙黃II這種非准許染色劑。

### 給業界的建議

- 只使用可安全用於食物中的適當調味劑。
- 根據優良製造規範內的規定使用調味劑，這些規定包括使用的分量只限於在食物中發揮預期調味用途所需的最低分量。
- 向可靠的食物進口商或分銷商採購食物配料，並遵從本港對調味劑使用和標籤方面的規管要求。

### 給消費者的建議

- 光顧可靠的食肆，向可靠的零售商選購預先包裝食物。
- 保持均衡飲食，進食不同種類食物。

## Safety of Flavourings

Small amounts of flavourings are usually adequate to give the desired flavouring effect, as is implied by the name of ODI - one drop can give good taste for the whole pot of food. Due to their sensory properties, excessive use of flavourings can render the end product undesirable to consumers. Their use in food is generally self-limiting and consumer dietary exposure to the flavourings can hardly be high.

So far, the Joint FAO/WHO Expert Committee on Food Additives (JECFA) has evaluated the safety of over 1700 flavourings, including ethyl maltol. JECFA has allocated an Acceptable Daily Intake (ADI) of 0.2 mg/kg bw for ethyl maltol, and opined that its normal use in food as a flavouring would not raise safety concern. Whilst very few flavourings have been recommended by JECFA as not to be used, the vast majority have been considered as no safety concern at current levels of intake when used as flavourings. A database of evaluations of flavourings, which is updated from time to time, is available from [JECFA's website](#).

Food manufacturers, additionally, can make reference to relevant industry tool books and consult relevant expertise for understanding the flavouring properties of individual flavourings and their suggested uses. For instance, meat flavour in meat products and soups may be provided by meat extract, vegetable oil, and/or flavourings like 2,5-dimethylpyrazine and 2-methylpyrazine.

### Key Points to Note

1. Flavourings can impart or modify taste and/or odour of food.
2. Over 1 700 flavourings have been evaluated by international organisations and most of them can be used safely in food.
3. Flavourings are generally used in small amount and consumer dietary exposures are usually not high.

## Regulatory Control on Flavourings in Hong Kong

In Hong Kong, the food legislations require that all foods for sale must be fit for human consumption. Furthermore, the Food and Drugs (Composition and Labelling) Regulations (Cap. 132W) require that prepackaged food for sale in Hong Kong shall include in the list of ingredients the class title if flavourings constitute the ingredients of a food.

In view of the public concern on hotpot flavouring products, since early 2011, the CFS has taken more than 70 samples of hotpot soup bases and condensed soup from the local market for testing of ethyl maltol and/or metallic contamination, colouring matters, preservatives, antioxidants, etc. Only one sample was found unsatisfactory due to the presence of a non-permitted colouring matter, Orange II.

### Advice to the Trade

- Use only the suitable flavourings that are safe for use in food.
- Use flavourings under conditions of good manufacturing practice, which include limiting the quantity used in food to the lowest level necessary to accomplish the desired flavouring effect.
- Purchase food ingredients from reliable food importers or distributors and comply with local regulatory requirements on the use and labelling of flavourings.

### Advice to Consumers

- Patronise reliable food premises and purchase prepackaged foods from reliable retailers.
- Maintain a balanced diet and enjoy a variety of foods.

# 發酵和加酸水解食物中的加工過程污染物

## Process Contaminants in Fermented and Acid Hydrolysed Food

食物安全中心  
風險評估組  
科學主任鍾可欣女士報告  
Reported by Ms. Ho-yan CHUNG, Scientific Officer,  
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我們在上一期談到發酵和加酸水解法所產生的加工過程污染物，今期將會介紹如何減低因食用以這些方法生產的食物對健康造成的風險。

### 發酵和加酸水解法所產生的加工過程污染物

發酵是指微生物及其酵素對初級食品產生良好生化變化的過程。這個過程是刻意進行的，旨在改善食物的特性，例如味道、氣味、保質期、質感和營養價值等。不過，發酵過程可能會產生氨基甲酸乙酯等加工過程污染物。氨基甲酸乙酯基本上是食物在發酵過程中天然產生的副產品，主要由酒精（即乙醇）與尿素及其分解物發生化學作用而形成。光線、溫度和貯存期是影響發酵食物產生氨基甲酸乙酯的主要因素。

加酸水解法是指利用酸把糖和蛋白質等食物成分分解或轉化成細小分子的過程。多種含蛋白質的植物和動物物質與鹽酸進行水解作用後會產生加酸水解植物蛋白。加酸水解植物蛋白在豉油、蠔油、清湯、湯類、鹹味小食、調味粉、調味粒等加工鮮味食品中廣泛用作增味劑和配料。加酸水解過程可能會產生加工過程污染物，例如氯丙醇中的氯丙二醇。

### 減低發酵和加酸水解法所產生的加工過程污染物對健康造成的風險

氨基甲酸乙酯和氯丙二醇已分別證實會令人類患癌和損害實驗動物的腎臟，因此，大家應設法減少攝入這些有害物質，盡量減低潛在風險。

對消費者而言，簡單而又有效減低風險的方法是保持均衡及多元化飲食，不要過度進食發酵食物和飲品，特別是酒精飲品和含有加酸水解植物蛋白的醬料和鮮味食品。

為減少從腐乳、豉油、芝士及酒精飲品等發酵食物攝入氨基甲酸乙酯，消費者可把發酵食物和飲品貯存在陰涼及較暗的地方；避免積存過多發酵食物和飲品，盡量縮短貯存時間；以及少喝酒精飲品（各種酒精飲品的氨基甲酸乙酯含量詳見《食物安全焦點》第三十九期（二零零九年十月））。

至於氯丙二醇，目前有多項措施可在加酸水解植物蛋白的生產過程中推行，令最終產品的氯丙二醇含量偏低。食物環境衛生署（食環署）自一九九九年建議業界推行這些措施，以減低食物中的氯丙二醇含量。自二零零五年起，食環署從抽取的醬料和鮮味食品樣本中驗出的氯丙二醇含量均低於所訂的行動水平。

In the previous issue, we mentioned that some process contaminants can be generated during fermentation and acid hydrolysis. In this issue, we will introduce to you ways to reduce health risks from consuming foods involving these processes.

### Process Contaminants Formed by Fermentation and Acid Hydrolysis

Fermentation is defined as a desirable process of biochemical modification of primary food products brought about by microorganisms and their enzymes. It is purposely carried out to enhance properties such as taste, aroma, shelf-life, texture and nutritional values. However, process contaminants such as ethyl carbamate (EC) may be generated during fermentation. EC is naturally formed in fermented foods mainly as a byproduct, primarily from the reaction of alcohol (ethanol) with urea and its break-down products. The presence of light, temperature and duration of storage are the key factors influencing the formation of EC in fermented foods.

Acid hydrolysis is a process of using acid to breakdown or convert food components (e.g. sugar, proteins) into small molecules. Acid-hydrolysed vegetable proteins (acid-HVPs) are produced via the hydrolysis of various proteinaceous vegetable and animal materials with hydrochloric acid. They are used widely as flavour enhancers and as ingredients in processed savoury food products such as soy sauces, oyster sauce, broths, soups, savoury snacks, gravy mixes and stock cubes. During acid hydrolysis, process contaminants such as 3-monochloropropane-1,2-diol (3-MCPD) in chloropropanols may be formed.

### Reducing Health Risks from Contaminants Formed by Fermentation and Acid Hydrolysis

EC and 3-MCPD have been shown to cause cancer in humans and affect kidney in experimental animals respectively. Therefore, efforts should be made to lower our intake of these harmful substances and minimise any possible risks.

For consumers, the simple yet effective way to reduce the risk is to maintain a balanced and varied diet, avoid overindulgence of fermented foods and beverages, in particular alcoholic beverages as well as sauces and savouries containing acid-HVPs.

To reduce intake of EC in fermented food e.g. fermented bean curd, soy sauce, cheese and alcoholic beverages, consumers may store fermented foods and beverages in a cool place under low light conditions; avoid stocking up excessive fermented foods and beverages to minimise the duration of storage; and reduce drinking alcoholic beverages (EC levels in various types of alcoholic beverages are listed in the 39th Issue of Food Safety Focus (October 2009)).

For 3-MCPD, there are measures to take during manufacturing process to yield a final product of acid-HVP with 3-MCPD levels reduced to low levels. Food and Environmental Hygiene Department (FEHD) has advised the trade since 1999 to implement measures to reduce 3-MCPD in food. Since 2005, the levels of 3-MCPD detected in sauces and savoury samples collected by the FEHD were lower than the action level set.



圖一 氨基甲酸乙酯因酒精（即乙醇）與尿素發生化學作用而形成，酒精與尿素會在黃豆、葡萄及麥芽等食物的發酵過程中產生。

Fig.1 Ethyl carbamate (EC) can be formed as a result of the chemical reaction between alcohol and urea, both generated during fermentation of foods like soy beans, grapes, and malt.

## 減少加工過程污染物的指引

食物安全中心（中心）在二零零九年發出有關減少食物中氨基甲酸乙酯含量的**業界指引**。食品法典委員會已發出《有關在生產加酸水解植物蛋白及含加酸水解植物蛋白產品的過程中減少氯丙二醇的工作守則》（只有英文版）。

中心一直密切留意有關的國際發展及科學研究結果，並對部分加工過程污染物進行風險評估研究。如需更多資料，讀者可參考中心有關**氨基甲酸乙酯**及**氯丙二醇**的研究報告。

總結而言，加工過程污染物是在食物加工過程中不經意產生的，但業界可採用多種方法減少這些污染物的形成，而消費者亦可採取措施減少攝入這些污染物。

## Guideline to Reduce Formation of Process Contaminants

The Centre for Food Safety (CFS) issued a **trade guideline** in 2009 for reducing EC in food. Codex has issued a “Code of Practice for the Reduction of 3-Monochloropropane-1,2-Diol (3-MCPD) during the Production of Acid-Hydrolysed Vegetable Proteins (Acid-HVPs) and Products that Contain Acid-HVPs”.

The CFS has been following the international development and scientific findings, and conducted risk assessment studies on some process contaminants. For more information, you may refer to related CFS study reports on **EC** and **3-MCPD**.

To sum up, process contaminants are formed unintentionally during food processing, but there are methods for the trade to reduce its formation and measures for consumers to reduce intake of these contaminants.

### 食物事故點滴 Food Incident Highlight

#### 冷藏水餃中的金黃葡萄球菌

十一月，傳媒指內地有冷藏水餃因驗出含金黃葡萄球菌而下架，有關報道引起市民關注。

金黃葡萄球菌是廣泛存在於大自然的一種細菌，常見於身體健康的人的鼻腔、咽喉、頭髮及皮膚，並大量存在於傷口和受感染的部位。金黃葡萄球菌會在食物中生長和繁殖，繼而產生耐熱的毒素，烹煮過程並不能消滅這些毒素。一般而言，每克食物如含有超過100 000個金黃葡萄球菌，就可產生足夠的毒素（約一微克）引致食物中毒。患者會在吃下毒素後30分鐘至八小時內出現症狀，包括嘔吐、腹瀉及肚痛。這些症狀通常會自行消退，大部分患者會在兩天內康復。

在本港，食物安全中心已擬備《即食食品微生物含量指引》，列明金黃葡萄球菌等經由食物傳播的主要致病菌的安全水平。考慮到金黃葡萄球菌可能會危害消費者健康所需的數目，即食食品樣本每克如含有超過10 000個金黃葡萄球菌，其微生物質素會視作不可接受。英國等其他海外國家亦就即食食品的金黃葡萄球菌含量訂出相若的安全水平，以確保食物安全。如食物樣本含有的致病菌超出可接受的水平，當局除了向食物業處所持牌人作出勸諭外，亦會考慮採取行動，包括發出警告信和其他執法行動。

食物從業員在配製和加工處理食物時，應奉行**良好衛生習慣**：在處理食物之前和之後以視液徹底洗手；避免用手直接接觸已烹調好的食物；在患有或懷疑感染傳染病時停止處理食物。生的食物和供冷吃的食物應存放在攝氏4度或以下，而熱食則應存放於攝氏60度或以上，以免細菌生長。此外，應盡快吃掉食物。

#### Staphylococcus aureus in Frozen Dumplings

In November, media reported that frozen dumplings sold in the Mainland were removed from shelves after being found to contain the bacteria *Staphylococcus aureus* which raised public concerns.

*Staphylococcus aureus* is a bacterium that exists widely in our environment. It is commonly found in the nasal cavity, throat, hair and skin of healthy individuals and present in large numbers in wounds and infections. It can grow and multiply in food and eventually produce heat-stable toxins that cannot be destroyed by cooking. In general, *Staphylococcus aureus* population exceeding 100 000 per gram of food can produce sufficient toxin (about one microgram) to cause food poisoning. The onset of symptoms, which may include vomiting, diarrhoea and abdominal pain can be as soon as 30 minutes to eight hours after intake. These are usually self-limiting with most patients recovering within two days.

In Hong Kong, a set of **Microbiological Guidelines for Ready-to-eat Food** (Guidelines) stipulating the safety limits of major foodborne pathogens including *Staphylococcus aureus* has been developed by the Centre for Food Safety. Taking into account the level of *Staphylococcus aureus* needed to cause potential adverse health effects to consumers, the microbiological quality of a ready-to-eat food sample is considered unacceptable if it contains more than 10 000 *Staphylococcus aureus* per gram. Some other overseas countries such as the UK have also established similar safety level for *Staphylococcus aureus* in ready-to-eat food to ensure food safety. In case of food samples containing unacceptable levels of pathogens, apart from giving advice to the licensees of food premises, actions including issuing warning letters and other enforcement actions will be considered.

Food handlers should maintain **good hygiene practices** during food preparation and processing: always wash hands thoroughly with soapy water before and after handling foods, avoid handling cooked foods with bare hands, and stop handling foods when suffering or suspected to be suffering from infectious diseases. Raw or cold dishes should be kept at 4°C or below and hot foods at 60°C or above to prevent bacterial growth, and consumed as soon as possible.

### 風險傳達 工作一覽 Summary of Risk Communication Work

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