# 安全製備粉、麵、飯以預防食物中毒(包括米酵菌酸)

Safe handling of rice and noodles to prevent food poisoning including Bongkrekic Acid

業界諮詢論壇
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食物環境衞生署
Food and Environmental Hygiene Department

食物安全中心
Centre for Food Safety

# 01 粉麵飯的食物安全問題

## Food safety problems of rice and noodle products

# 食物安全風險 Food safety risk

- 未經烹煮的大米和磨製穀物產品（例如麵粉）是生的農產品，會有霉菌、酵母菌和細菌等多種微生物天然存在。
  Uncooked rice and milled cereal products such as flour are raw agricultural commodities. They are naturally associated with a variety of microorganisms such as mould, yeast and bacteria.

- 大米和麵條經徹底煮熟後，大多數可能存在於食物中的微生物會被消滅，但某些細菌孢子（例如蠟樣芽胞桿菌的孢子），可能會在烹煮過程中存活。
  When rice and noodles are cooked thoroughly, most microorganisms that may be present in food are destroyed. However, some bacterial spores e.g. *Bacillus cereus* spores may survive cooking.

- 經烹煮的食物長時間在室溫貯存可讓這些孢子發芽、繁殖和產生耐熱的毒素
  Prolonged storage of cooked products under room temperature may allow these spores to germinate, multiply and produce heat-stable toxin

- 有些細菌在適合的環境下，能產致命毒素(如米酵菌酸)
  Some bacteria can produce fatal toxins under the appropriate environment, such as Bongkrekic Acid

# 蠟樣芽胞桿菌 *(Bacillus cereus)*

## 無處不在
ubiquitous

存在於土壤、植物、農產品等
naturally present in soils, plants, agricultural products

## 最佳生長温度
optimal growth temperature

30℃ - 37℃

## 產生孢子
form spores

可抵受正常的烹煮溫度;
必須經過高溫處理才能消滅
(如以121℃加熱3分鐘)

resistant to normal cooking temperature, only be eliminated by high temperature treatment, e.g. 121°C for 3 minutes

## 產生耐熱致吐毒素
product heat-stable emetic toxin

能抵受攝氏126度長達90分鐘
can resist 126°C for 90 minutes

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# 米酵菌酸 Bongkrekic Acid

- **耐熱毒素，由椰毒伯克氏菌產生，這種細菌在土壤及植物中無處不在**
  a heat-stable toxin produced by the bacterium *Burkholderia gladioli* pathovar cocovenenans (*B. cocovenenans*), which is ubiquitous in soil and plants.
- **適合細菌生長溫度為30 - 37℃ 、適合產生米酵菌酸的溫度約為22 - 30℃**
  The temp. range for bacterial growth is 30 - 37℃ and that for toxin production is 22 - 30℃
- **受毒素影響的器官有肝臟、腦部及腎臟，引發的症狀包括缺乏能量、眩暈、嗜睡、腹痛和嘔吐。發病的潛伏期由30分鐘至12小時不等，嚴重者可能在症狀出現後1至20小時內死亡**
  Target organs mainly include the liver, the brain and kidneys, causing symptoms including a lack of energy, dizziness, drowsiness, abdominal pain and vomiting. The incubation period for the illness is reported to be between 30 minutes and 12 hours. In severe cases, death can occur within 1 to 20 hours after the onset of symptoms.

# 02 出現米酵菌酸中毒風險的食品

## Food Items with Emerging Risk of toxic Bongkrekic Acid

# 米酵菌酸中毒個案 bongkrekic acid poisoning cases

- **最初通報的個案為發酵粟米和以椰子為原料的食物。部分脂肪酸，特別是椰子和粟米內的脂肪酸能促進細菌生長和產生該毒素。**
  Cases were originally reported as a result of consuming fermented corn and coconut-based products. Certain fatty acids, particularly those found in coconut and corn, can facilitate growth of the bacteria and production of the toxin.

- **近年曾爆發的個案涉及浸泡過的菇菌 (銀耳（雪耳）和黑木耳)。**
  In recent years, outbreaks due to the consumption of certain soaked mushrooms (silver ear fungus (snow fungus) and black fungus).

- **濕澱粉製品或濕米粉製品（以大米為主要原料）是另一種在過去數年間涉及食物中毒個案的食品。毒素產生的主要原因相信是長時間在室溫下存放，特別是存放時間超過24小時。**
  Wet starch products or wet rice noodle products (using rice as the main raw material) is another type of food linked to outbreaks in the past few years. Similarly, the main cause of toxin production was believed to be prolonged storage at room temperature, specifically, storage for longer than 24 hours.

# 03 食物安全措施
# Food safety measures

## 良好衞生規範
Good Hygiene Practices

# 預防食物中毒 (包括米酵菌酸酸中毒)

## Prevention of food poisoning (including bongkrekic acid poisoning)

### ✓ 精明選擇: Choose safe raw material

- 不要購買/使用來歷不明或有腐壞跡象（有色斑/異常氣味/粘液等）的菇菌。
  do not purchase/use mushrooms of unknown origin or with signs of spoilage (discoloration, abnormal odor, slime, etc.).

- 濕米粉產品於運送時必需包好，並於即日用完。若保質期超過1天的產品，則必須冷藏運送及保存。氣味或味道異常的產品則應丟棄。
  Wet rice noodle products must be properly packaged during transportation and consumed on the same day. If the shelf life exceeds one day, they should be refrigerated during transportation and storage. Discard products with abnormal odor or taste.

- 避免購買含脫氫醋酸鈉的濕米粉，這種違法使用的防腐劑可抑制部分真菌及腐敗細菌的生長，但不能抑制椰毒伯克氏菌的生長。當米粉已變壞而沒有味道變化的情況下，存在著細菌已經滋長的風險。
  Avoid purchasing wet rice noodles that contain sodium dehydroacetate. This illegal preservative can inhibit the growth of some fungi and spoilage bacteria but cannot inhibit the growth of *Burkholderia cocovenenans* (Bongkrekic acid-producing bacteria). This poses a risk of bacterial growth when the noodles spoil without any noticeable change in odor.

# 預防食物中毒 (包括米酵菌酸酸中毒)

## Prevention of food poisoning (including bongkrekic acid poisoning)

### ✓ 保持清潔: Keep Hands and utensils clean

- 時刻保持良好的個人衞生習慣
  Maintain good personal hygiene at all times
- 所有與食物接觸的器具和表面，在使用前應徹底清潔和消毒。
  All utensils and food contact surfaces should be thoroughly cleaned and disinfected before use.
- 製備菇菌如銀耳和木耳時，應先以流動的淨水沖洗乾淨，然後放入清潔的容器內浸泡，並避免一次過浸泡過多份量。
  When preparing mushrooms such as silver ear fungus and black fungus, wash them under clean running water before transferring them in clean containers for soaking. Avoid soaking too many mushrooms all at once.

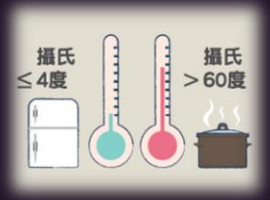
# 預防食物中毒 (包括米酵菌酸酸中毒)

## Prevention of food poisoning (including bongkrekic acid poisoning)

### ✓ 安全温度: Keep food at safe temperature

- 在室溫浸泡菇類的時間一般不宜超過2小時，否則應該放入雪櫃進行浸泡。已浸泡的菇類應盡快烹煮食用。
  The time for soaking mushrooms at room temperature generally should be no more than 2 hours, otherwise they should be kept in the refrigerator. Mushrooms that have been soaked should be used and consumed promptly

- 非即日使用的濕米粉的存貨應貯存在雪櫃內。
  Store any stock that is not intended for immediate use in the refrigerator




- 把煮熟的飯/麵保持在攝氏60度以上，或攝氏4度或以下。
  Keep cooked rice and noodles in above 60°C or at 4°C or below.

- 在2小時內把已烹煮的飯和麵由攝氏60度降至攝氏 20度，並在4小時或更短的時間內由攝氏20度降至攝氏4度。
  Cool cooked rice from 60°C to 20°C within 2 hours; and from 20°C to 4°C, within 4 hours or less

# 預防食物中毒 (包括米酵菌酸酸中毒)

## Prevention of food poisoning (including bongkrekic acid poisoning)

### ✓ 徹底煮熟 Cook thoroughly

- 徹底煮熟飯和麵或其他食材，中心溫度至少達到攝氏75度
  Cook rice and noodles or other ingredients thoroughly, with core temperature reaching at least 75°C
- 經冷藏的飯和麵如要熱食，應徹底翻熱，中心溫度至少達到攝氏75度
  Reheat refrigerated rice and noodles intended for hot serve thoroughly, with core temperature reaching at least 75°C.

### ✓ 生熟分開 Separate raw and cooked food

- 使用不同的用具分開處理生的食物與熟食或即食食物
  Use different utensils to handle raw and cooked or ready-to-eat food separately
- 把已烹煮的食材放在有蓋容器內，與生的食物分開存放，避免交叉污染
  Store cooked ingredients in covered containers and away from raw foods

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# 總結 Take-home message

- 製備粉麵飯時必須遵從良好衞生規範， 以盡量減少污染食物或導致致病菌生長
  Good hygiene practices must be observed when preparing noodle and rice to minimize food contamination and growth of pathogenic bacteria.

- 近年曾發生進食浸泡菇菌和濕米粉引致米酵菌酸的中毒個案，大多是由於在室温下存放多於一天引起
  Recent outbreaks due to the consumption of black fungus and wet rice noodles have been reported in the past few years, which were typically caused by leaving these food items under ambient condition for more than a day.

- 要預防米酵菌酸，除了保持良好食物衞生，即使在烹煮之前也務必保持高風險食品的時間和温度控制，以盡量減少因污染而可能存在的椰毒伯克氏菌的生長
  To prevent Bongkrekic acid, apart from maintaining good food hygiene, it is important to maintain time and temperature control of the high-risk food items, even before cooking, to minimise the growth of *B. cocovenenans* that may be present due to contamination.

# 更多資訊 More information

## 食物安全焦點 Food Safety Focus

- **黑木耳浸泡不當可產生有毒米酵菌酸**
  Black Fungus Soaked Improperly May Produce Toxic Bongkrekic Acid

- **浸泡菇類與食物安全**
  Soaking Mushrooms and Food Safety

- **米酵菌酸 - 不常見但可致命的毒素**
  Bongkrekic Acid – Uncommon but Fatal Toxin in Certain Foods

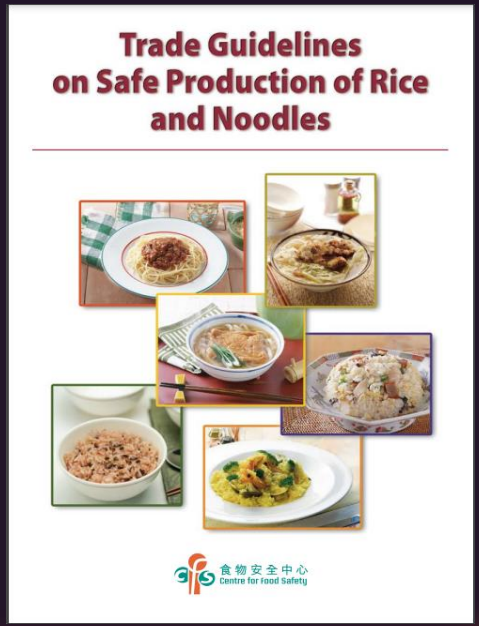


# 更多資訊

如欲了解更多資訊，可參閱**安全烹製飯麵業界指引**


# For more information

For details, please refer to **Trade guidelines on Safe Production of Rice and Noodles**

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