



# *Benzo[a]pyrene in Cooking Oil*

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11/1/2013

# Background

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- In mid-December 2012, there was a report in the newspaper alleging that
  - a suspected unlicensed food processing establishment had been supplying cooking oil of substandard quality to 13 restaurants
  - the content of Benzo[a]pyrene (B[a]P), a human carcinogen, in the cooking oil concerned exceeded the limit set by the European Union (EU)

# Benzo[a]pyrene

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- Benzo[a]pyrene (B[a]P)
  - is a type of polycyclic aromatic hydrocarbons (PAHs)
    - PAHs is ubiquitous in the environment
    - PAHs may be found in trace amounts in various types of food, including cereals
    - level of PAHs in uncooked food may range from 0.01 to 0.1 microgram per kilogram (mcg/kg)

PAHs may be formed during incomplete combustion or burning of organic matters. Almost all food contains PAHs to a certain extent.

# Benzo[a]pyrene

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- Source of B[a]P
  - The two major sources of B[a]P in food
    - deposition and uptake of B[a]P from polluted air on food crops and
    - formation and deposition of B[a]P during heat processing using methods such as roasting, smoking, and grilling

# Occurrence in oil

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- Source of B[a]P in Oil
  - Drying of cereals and plants used for production of crude vegetable oils
    - using direct application of combustion gases can result in contamination of the product with B[a]P as combustion products may come into contact with the grain, oil seeds
  - The level of B[a]P in oil may increase after repeated use

# Occurrence in oil

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- Reduction of B[a]P in Oil
  - The level of B[a]P in oil much reduced after oil refining processes e.g. deodorisation step
  - The ultimate level of B[a]P would depend on the conditions under which refining takes place and quality control

# B[a]P in oil and gutter oil

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- There is no definition of “gutter oil”
  - generally, it refers to discarded oil recovered from gutters and ditches
- Presence of B[a]P in oil does not mean that the oil is gutter oil as B[a]P may be present in oil as mentioned above
  - *the quality of cooking oil could be monitored by conducting chemical tests to ascertain the amount of harmful substances contained*

# Dietary exposure to B[a]P

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- Joint Food and Agriculture Organization/World Health Organization Expert Committee on Food Additives (JECFA) (2006)
  - The major contributors to dietary exposure of PAHs
    - cereals and cereal products (owing to high consumption in the diets) and
    - vegetable fats and oils (owing to higher concentrations of PAHs in this food group)

# Toxicology of B[a]P

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- BaP is toxic to genes and may cause cancer in humans
- The International Agency for Research on Cancer (IARC) (2009)
  - B[a]P is classified as “carcinogenic to human” (i.e. Group 1 agent)

# Safety reference value of B[a]P

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- A safety reference value cannot be determined
- To reduce the health risk associated with B[a]P
  - efforts should be made to minimise exposure to B[a]P

# Regulation on B[a]P in vegetable oil in different countries/region

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- The Codex Alimentarius Commission has not at present established any standard on B[a]P in food
- Many developed countries (e.g. the United States, Australia, New Zealand, Japan and Singapore, etc. have not at present set any limits on B[a]P in food
- The EU and Mainland China have established limits on B[a]P at 2 and 10 mcg/kg respectively for fats/vegetable oil

# Risk Assessment approach

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- Margin of exposure (MOE) approach
  - MOE is used to assess the degree of health concern. The smaller the MOE, the higher the health concern, and vice versa
  - JECFA considered that an MOE value of lower than 10,000 indicated public health concern

# Risk Assessment approach

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- If a B[a]P level at 20 mcg/kg is detected in edible vegetable oil,
  - the MOE calculated will be lower than 10 000, indicating a public health concern
  - CFS would take enforcement action in accordance with Section 54 of the Public Health and Municipal Services Ordinance (Cap. 132), and initiate a mandatory recall of the cooking oil

# Provisional action level

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- CFS suggests adopting a provisional action level of 10 mcg/kg for B[a]P in edible vegetable oil
  - with reference to the standards of different countries / jurisdictions and
  - taking into account the results of risk assessment using the MOE approach

# Provisional action level

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- If a B[a]P level higher than 10 mcg/kg but lower than 20 mcg/kg is detected in edible vegetable oil,
  - the calculated MOE will be higher than 10 000, indicating that the public health concern is low
  - Nevertheless, under such a scenario, CFS may still take enforcement action in accordance with Section 52 of the Public Health and Municipal Services Ordinance (Cap. 132)

# Advice to trade

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- Only use cooking oil satisfying safety and quality requirements
- Maintain proper records in accordance with the Food Safety Ordinance (Cap. 612) to allow source tracing

# Advice to trade

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- Source food from reliable suppliers, including -
  - checking whether the suppliers possess the relevant food business licenses;
  - checking whether they have been registered as food importers or distributors under the Food Safety Ordinance (Cap. 612); and
  - checking the source and quality of the food ingredients

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End