

## POLYSTYRENE IS A SAFE FOOD PACKAGING MATERIAL

Polystyrene is made from styrene, listing as “possibly cause cancer to human”.  
Is polystyrene food packaging safe?

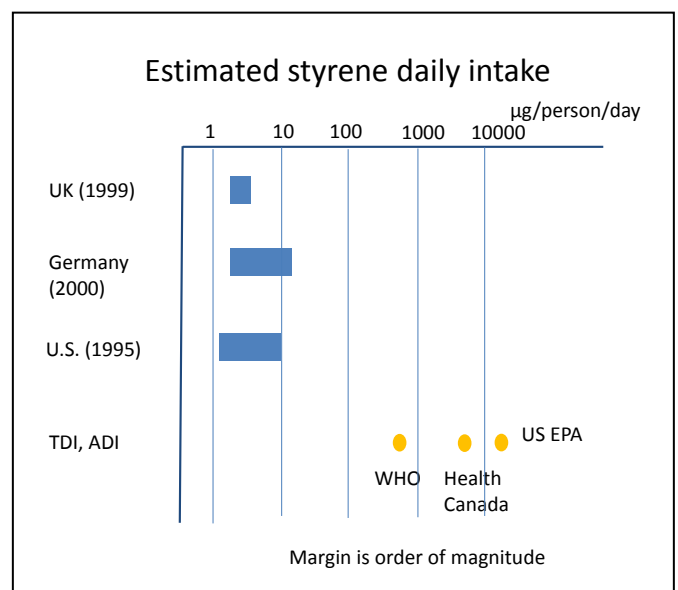
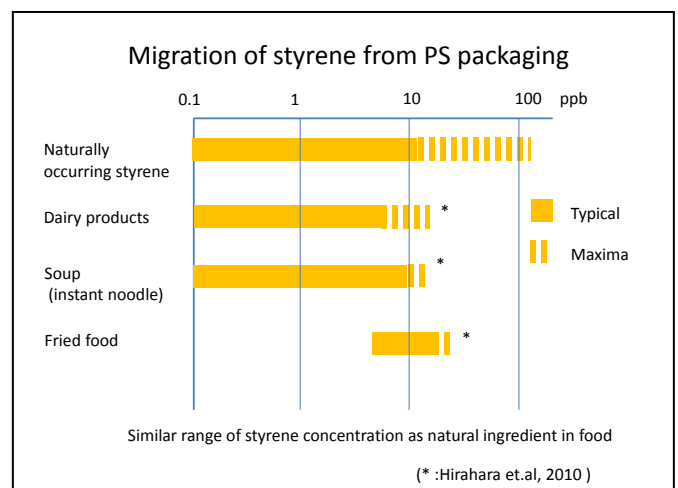
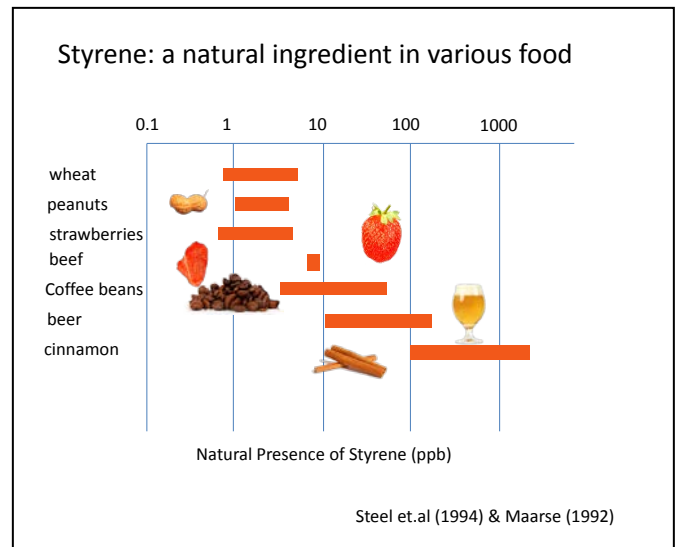
Yes. PS is safe.

- Minor residual level of styrene is remain in polystyrene and may migrate to food. But there is no data suggesting that the level of styrene migrating to food cause any harmful effect to animals and humans. The listing as carcinogen for styrene is based on studies of workers and animals exposed by inhalation to very high levels of styrene .

- Styrene occurs naturally in some foods (e.g., strawberries, peanuts, beef, beer, coffee and spices). Styrene concentration of these natural diet and migration from PS food packaging into food are similar range.

- Acceptable Daily Intake (ADI) and Tolerable Daily Intake (TDI) for styrene based on animal studies ,0.46 ~ 12.0 mg/person/day, are published by several authorities. Estimated styrene daily intake in EU and U.S. are in the range of 1 ~ 10  $\mu$  g/person/day. Styrene intake is 40~ 1000 times below safe intake level.

- Polystyrene is authorized for food contact materials in U.S.A, EU , Japan and China etc.



**Styrene:** Is there any concern about cancer risk to human ?

No. There is not. Styrene is not a human carcinogen.

- The results of extensive health studies of workers in styrene-related industries and a two-year styrene inhalation study in rats exposed to high concentrations of styrene show that exposure to styrene does not increase the risk of developing cancer.

- The International Agency for Research on Cancer (IARC) has classified for styrene as a "possible" human carcinogen. Many scientists have disputed this action because it was not based on new studies. Competent authorities of EU decided not to classify styrene for carcinogenicity taking into account all available scientific information in 2007.

#### **Styrene dimers and trimers (SDT) :**

What are SDT ?

- Residual amount ( ~ 1 %) of SDT present in polystyrene resin as reaction byproducts and degradation products. Very low migration ( less than 50 ppb ) of SDT from PS food container into food were reported.

- SDT was suspected of having estrogenic activity in the Wingspread Declaration [Our Stolen Futures, 1996] despite the lack of scientific analysis.

Are there any risk for human health ?

No. There is no risk.

- Endocrine disruption activity: Competent authorities in Japan concluded no specific actions are judged to be necessary for the time being, since no evidence indicating the endocrine disrupting activity of SDT has been found from the test results on purely synthesized SDT and extracts from polystyrene, then Japanese EPA deleted SDT

from suspected materials list (2000).

- Other health effects\_

a) General toxicity

A mixture of styrene dimers and trimers extracted from polystyrene was orally administered to pregnant rats at up to 1 mg/kg • bw/day. There were no test compound-related clinical signs or effects in dams and offspring. The highest dosage of 1 mg/kg • bw/day is 1000 times of the maximum estimated daily intake of SDT assuming that a man of 60 kg takes 1 liter of instant noodle and soup a day (Nagao et. al, 2000) .

b) Genotoxicity

A mixture of styrene oligomers extracted from polystyrene was examined conformed to the FDA test guide line for food contact materials. Point mutation using bacteria (Ames test ) and Chromosomal aberration using mammalian cell were negative (Nakai et.al, 2014).

#### **Ethylbenzene (EB):**

Can EB migrate into food from PS packaging ? If so, are the migration of EB of concern to consumers?

No. it is of no concern.

It is unlikely to cause any health risks to humans due to EB migrated from PS packaging.

- In the production of PS, they primarily use EB as a solvent . Small amount of EB may remain in PS as a residual volatile substance.

- The migration concentration level of EB into foods are extremely low. Migration level of EB is similar as of styrene monomer.

- Estimated maximum daily intake for EB migrated from PS packaging is 6  $\mu$  g/person.

This value is about 2 order lower than the TDI established by WHO (580  $\mu$  g/person).

**Japan Styrene Industrial Association**  
**3-5-2, Nihonbashi-Kayabacyo, Chuo-ku**  
**Tokyo, 103-0025, Japan**  
**Tel: +81-3-5649-8261**