

# 2016 SCIENTIFIC REPORT



MINISTRY OF FOOD AND DRUG SAFETY

National Institute  
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## Risk Assessment of Trans fat

A trans fat is a fatty acid that has at least one trans structure. Trans fats are formed when vegetable oils are hardened into margarine or shortening through the hydrogenation process, or when food is deep-fried in oil, or otherwise treated at high temperatures.

Residual hazardous substances in food that are formed during food manufacturing, processing, or cooking, and remain in the foods afterward, may pose a threat to food safety, even in small amounts, as they tend to be ingested for a lifetime. This has heightened anxiety over food safety among the Korean people. Under the existing monitoring system for hazardous substances, the content of a hazardous substance in uncooked food is measured to estimate its exposure dose based on the monitoring results. This approach fails to capture the true content of a harmful substance accurately because of changes that occur during the cooking process, where concentrations can be increased or decreased due to both physical and chemical interactions. For this reason, this risk assessment determined daily exposure doses more accurately based on a TDS, which estimates daily intakes through an analysis of table-ready foods, or an analysis of the content of hazardous substances. A quantitative assessment of potential health risks was also performed.

This risk assessment was carried out in accordance with the Regulations on Risk Assessment Methods and Procedures, as well as the Risk Assessment Guidelines, in the following four stages: hazard identification, hazard characterization, exposure assessment, and risk characterization. Target foods were selected from the 2008–2013 (six years) Integrated Database, and the study covered 97.4% of the total food intake of Koreans and 98% or more of their energy, protein, fat, and carbohydrate intakes. A final set of 1,224 sample pairs was selected (293 pairs from agricultural products, 96 from livestock products, 233 from fishery

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products, and 581 from processed foods) after adding food commodities intended to be eaten uncooked (raw) with the “food and cooking method pairs.” In order to analyze trans fats present in foods, oils and fats were extracted from the samples and then hydrolyzed to produce fatty acids. The resulting fatty acids were derivatized to methyl ester. The analysis was performed using gas chromatography-flame ionization detection, and samples of the food commodities, purchased across the country, were combined to create composite samples. One sample was analyzed for each cooking method per food, and the pairs from which trans fats were not detected were considered to have a zero content.

According to the results of the TDS-based risk assessment, the average intake of trans fat is 0.745 g/person/day, which is 37.2% of the WHO recommendation of 2.0 g/day in a 2,000-kcal diet. This shows that risks from trans fats are controlled at safe levels. Meat accounted for almost half of the total contributions to the intake of trans fats, followed by imported beef (17.2%), tofu (14.9%), and chicken (11.3%). The average exposure to trans fats per body weight was 13.7 mg/kg bw/day or 0.745 g/person/day, which is lower than that in other countries, including Canada and the United States. However, as eating habits change, or as the environment changes, exposure levels may exceed the safety margin. Therefore, it is necessary to continue monitoring exposure trends and reducing exposure levels by finding new methods to reduce the formation of PAHs during cooking or manufacturing, and b focusing on foods whose exposure levels show an upward trend.

As a method for reducing the intake of trans fats, it is recommended to use fats with a high content of unsaturated fatty acids (olive oil, canola oil, soybean oil, corn oil, sunflower seed oil, etc.), instead of fats with a high content of saturated fats or trans fats (shortening, margarine, animal fats, and butter). In the case of chicken and beef, which are significant trans fat contributors, it is advisable to remove the skin before eating, or eat the parts with relatively low fat content.

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