

2016 SCIENTIFIC REPORT



MINISTRY OF FOOD AND DRUG SAFETY

National Institute
of Food and Drug Safety Evaluation

Risk Assessment of Fenthion

Fenthion is an organophosphorus pesticide used on numerous crops. It is mainly used to control lice, flies, mites, and mosquitoes in livestock, and it is also applied as an insecticide against mosquito larvae, horn flies, houseflies, *Amblyomma maculatum*, and dragonfly larvae. In Korea, it was first registered in emulsion form in 1981, and its MRL is set at 0.05–0.5 mg/kg for 19 foodstuffs, such as potato and soybean (MRLs for Pesticides in Foods, May 31, 2016).

The ADI of fenthion at 0.0023 mg/kg bw/day was established by applying the safety factor of 30 (differences between individual entities and insufficient data) to the NOAEL of 0.07 mg/kg bw/day drawn from a 4-week repeated dose study on male volunteers. The NOAEL was set at 0.07 mg/kg bw/day, the concentration level where toxicity effects (inhibited activation of acetyl esterase in red blood cells and clinical symptoms) were not apparent.

The intake amount of fenthion was estimated based on the results of 2,082 samples of 52 foodstuffs, including rice, in the Monitoring of Agricultural Products in Korea (2011–2015) by the National Institute of Food and Drug Safety Evaluation. The results demonstrated that the pesticide level was below the LOQ, and thus, fenthion was not detected in any of the samples. Concerning data lower than the LOQ, in case more than 60% of data were below the LOQ, estimation was made by applying 0 (non-detection) as the lower exposure limit or LOQ (upper exposure limit), according to the “evaluation of low level contamination of foods” recommended by the WHO. Food consumption was calculated through SAS 9.4 using the tertiary food code data from the KNHANES conducted for five years (2010–2014). For the average weight of all age groups, 60 kg, the weight currently (as of 2016) applied for establishment and revision of pesticide residue standards, was used. Risk characterization

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was made by calculating the HI in consideration of the EDI calculated in the exposure assessment and the ADI, the safe level of human exposure.

In general, when HI is 1 or higher, the adverse effects of toxicity are expected from exposure, and when HI is lower than 1, an adverse effect is not expected. The results of the risk assessment of fenthion in all age groups revealed HI between 0 (non-detection data, value of 0 applied) and 0.009 (non-detection data LOQ applied), as shown in the table below, and that its concentration is within the safe level of human exposure.

Table 1. ADI and HI of fenthion

Age	EDI (mg/person/day)		Average weight (kg)	EDI (mg/kg bw/day)		ADI (mg/kg bw/day)	HI	
	0	LOQ (mg/kg)		0	LOQ (mg/kg)		0	LOQ (mg/kg)
All	0	1.3×10^{-3}	60	0	0.2×10^{-4}	0.0023	0	0.009

Key words: Fenthion, Risk Assessment, Organophosphorus insecticide, ADI, Monitoring, Pesticide