Pharmacokinetic Study of Tris(2-chloroethyl)phosphate (TCEP) After Inhalation Exposure

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Objective
Tris(2-chloroethyl)phosphate (TCEP) is a synthetic resin flame retardant with plasticity which is commonly added as a working material for flame protection. Toxicity studies on this compound have shown an increase in weight of the liver and kidney after oral administration, as well as mortality rate, necrosis of the hippocampus and epithelial tumor of the renal tubule. However, the toxicity or pharmacokinetic results of TCEP after inhalation have not been reported. We modified a nasal exposure system with a flow-past chamber to conduct inhalation exposure of mist of a labeled compound to rats. The disposition of TCEP was studied after inhalation of the retardant labeled with $^{14}$C (14C-TCEP) as part of the substances safety evaluation.

Methods
Fischer 344 male rats 7–8 weeks old were used. A nasal exposure system (designed by Daiichi Pure Chemicals, Shibata Kagaku) was equipped with a nebulizer producing mist from 10 ml aqueous solution and 300 l air per h. Rats were exposed for 15 min, and immediately thereafter were sacrificed by exsanguination under anesthesia and the carcases were solubilized. Radioactivity in aliquots of the carcass solution was measured to determine the inhaled dosage. The dosage was 31 $\mu$g/6.85 kBq/body (158 $\mu$g/34.9 kBq/kg). For oral dosing, TCEP dissolved in corn oil was administered at a dose of 44 mg/3.7 MBq/5 ml/kg.

Results and Discussion
The excretion of radioactivity derived from $^{14}$C-TCEP in the urine and feces was 83% and 4% of the dose, respectively, up to 72 h after inhala-

References