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SCIENTIFIC COMMITTEE ON TOXICITY, ECOTOXICITY AND THE ENVIRONMENT (CSTEE)

OPINION OF THE CSTEE ON "POTENTIAL HEALTH RISKS ASSOCIATED WITH THE USE OF LEAD CONTAINING CANDLE-WICKS"

Opinion expressed at the 36th CSTEE plenary meeting

Brussels, 6 February 2003

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Terms of Reference

The Committee is requested to assess the potential human health risks from exposure to lead when candles containing lead candle-wicks are burned during normal use. In elaborating this opinion the CSTEE is asked to consider, among other data sources, the recent evidence produced in the United States by the Consumer Protection Safety Commission.

CSTEE Opinion

In a number of candles, wicks supported by metal wires are used to increase rigidity to help the wick remain centered and upright to ensure clean and proper burning. Many of these metal wires are made of zinc or tin, which are not considered a health problem. In samplings of candles in the USA, up to 8 % of candles investigated were found to contain lead wicks. When these candles are burned, considerable amounts of lead may be released into indoor air and result in human exposure to lead by inhalation. Candles as a possible source of unusual and high lead exposure have been identified in a previous opinion of the CSTEE (CSTEE, 2000).

Recent studies have determined the amount and speciation of lead released during the burning of candles containing lead wicks and performed an exposure assessment for this source of indoor lead pollution using realistic emission and exposure scenarios (van Alphen, 1999; Wasson *et al*., 2002; Nriagu and Kim, 2000).

Burning of candles with lead wick cores resulted in an emission of lead at rates from < 0.05 to 1.7 mg/h in the form of bioavailable lead carbonates and hydroxides in particles with mean aerodynamic diameters of 1 μm or less. Lead is highly bioavailable from these inhalable particles. Using the determined emission rates expected, maximal indoor air concentrations of lead resulting from the burning of one candle were calculated to range between 0.6 $\mu g/m^3$ and 209 $\mu g/m^3$ depending on candle burning duration, room size, and extent of ventilation. The burning of a single candle with high lead emission may raise the air concentration of lead well above ambient air lead concentrations limits of 1 $\mu g/m^3$ (WHO), 1.5 $\mu g/m^3$ (US EPA) or 2 $\mu g/m^3$ (EU) and burning of multiple candles with high lead emission in one room may exceed permissible workplace concentrations for lead in air (50 – 100 $\mu g/m^3$). Due to the high bioavailability of lead in air released by the frequent burning of lead-containing candles, additional body burdens of lead exceeding the tolerable weekly intake for lead in children are expected. In addition, lead released by the burning of candles may be deposited in indoor dust and may thus be digested by small children resulting in addition lead exposure.

The CSTEE agrees with the conclusions that frequent indoor burning of candles with lead wick cores may results in a high additional exposure of humans to lead in addition to lead

exposure with food and from other sources (dust as a relevant indoor source of lead for small children).

Children (both pre- and postnataly exposed) are a specific risk group for lead exposure and increased blood lead levels in children are associated with a reduced performance in psychomotor, cognitive and behavioural tests. These deficits are observed at blood lead levels above 100 µg/L. Based on a number of studies and assessments, the CSTEE previously concluded that a threshold for lead induced impairment of neuronal function cannot be identified (CSTEE, 2000; ATSDR, 1999; Goyer and Clarkson, 2001).

The CSTEE notes that the average blood levels of lead in children in many countries in Europe are now below 50 µg Pb /L, but that the provisional tolerable weekly intake (PTWI) for lead in children may already be reached by exposure to lead in diet and in dust (TNO, 2001). Moreover, a complete protection from adverse effects of lead by the defined PTWI was questioned by the CSTEE. Additional lead exposures such as inhalation and ingestion of deposited lead from lead in candle-wicks may represent an important source of lead exposure and significantly elevate blood lead levels in children. Due to the lack of an identifiable threshold for lead induced neurophysiological effects, emission of lead from lead containing candle-wicks results in high lead exposure of sensitive groups of the population and represents a health hazard.

References:

ATSDR; Toxicological Profile for Lead, US Department of Health and Human Services, Washington, DC, 1999.

CSTEE, 2000; Opinion on Lead, Danish notification. May 5, 2000.

Goyer, R. A. and Clarkson, T.W.; Toxic Effects of Metals, in: Toxicology, the Science of Poisons (ed. Klaassen, C.D.); McGraw-Hill, New York, 2001.

Nriagu, J.O. and Kim, M.-J.; Emissions of lead and zinc from candles with metal-core wicks. The Science of the Total Environment 250 (2002), 37-41.

TNO-Report STB-01-39, Risks to Health and the Environment related to the Use of Lead in Products; Delft, 2001.

Van Alphen, M.; Emission testing and inhalation exposure-based risk assessment for candles having Pb metal wick cores. The Science of the Total Environment 243/244 (1999), 53-65.

Wasson, S.J., Guo, Z., McBrian, J.A. and Beach, L.B.; Lead in candle emissions. The Science of the Total Environment 296 (2002), 159-174.