

Carpets: Accomplice in Children's Exposure to Toxic SVOCs Indoors

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Received: May 02, 2017; Accepted: October 12, 2017; Published: October 19, 2017

Letter to the Editor

Children's health and their exposure to all kinds of semi-volatile substances (SVOCs) (e.g. 10 flame retardants) in dust are of growing concerns in modern society [1-5]. Carpet is widely used in indoor environment because of its performance in improving comfort of indoor life, but the presence of contaminated carpets inhibits the effectiveness of home cleaning [6]. The health effect of carpet on children in aspect of exposure to toxins in dust is now in urgent need to be illustrated.

In recent years, SVOCs have been recognized as significant pollutants of the indoor environment, which are present in both, indoor air and indoor dusts, often primarily in the latter, depending on the vapor pressures of the compounds. Indoor dust generally originates from interior use, air intrusion, weathering, excretion and track-in. With very high proportion of organic contents, it represents as an absorbent and is the main sink of SVOCs in indoor environment. Thus, settled dust is seen as a global indicator for residential contamination [7,8]. Previous studies have demonstrated partitioning of SVOCs in gas phase, airborne particles [9-11] and settled dust [12,13] can be well described by the KOA (octanol-air partition coefficient) model and the occurrence of SVOCs in indoor environment is dominated by quantity relations of different indoor compartments (**Figure 1**).

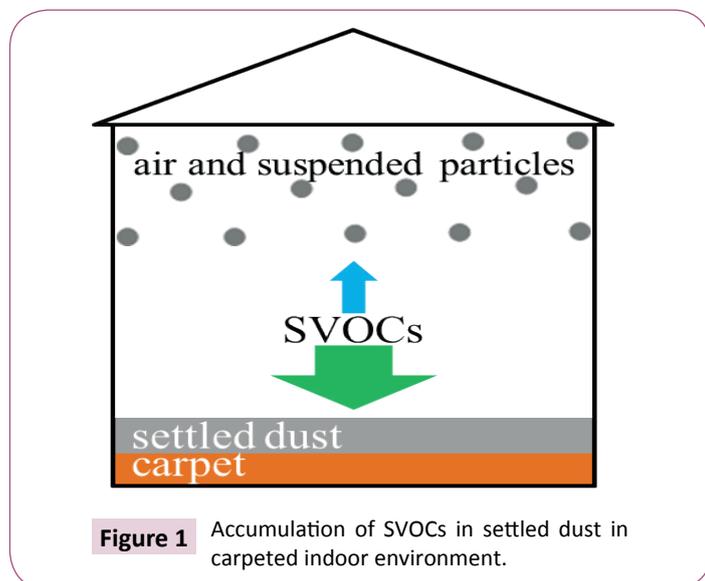


Figure 1 Accumulation of SVOCs in settled dust in carpeted indoor environment.

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Citation: Cao Z, Shen M, Zhao L, Yan G, Shi Y, et al. (2017) Carpets: Accomplice in Children's Exposure to Toxic SVOCs Indoors. *J Nutraceuticals Food Sci.* Vol. 2 No.3:15

Because rougher surface may lead to larger particle deposition velocity for fine particles [14] dust accumulates in carpet effectively, and dust load on carpet is much higher than that without carpet [6,15] because the surface of carpet is much rougher than bare floor. As a result, SVOCs can accumulate indoors together with carpet and settled dust and persist for even many years [3,16,17]. More specifically, concentrations of flame retardants in one carpeted bedroom in a house exceeded markedly those in another bedroom in the same house that was not carpeted [18]. Another study found that carpeted surfaces were strong sinks and generally had higher surface loadings of bio-contaminants [19].

Children are not "small adults" and they possess completely different behaviour patterns with adults. Though for a long

period dust/soil ingestion is generally considered to be a negligible pathway for human exposure to toxic trace pollutants, recently large amounts of data have suggested that dust ingestion [20,21] and dermal absorption [22] might be the most important exposure pathway for children for some SVOCs such as flame retardants. For dust ingestion, dust mainly composes of settled dust on the floor for children and children suffered much higher exposure risk to settled dust than adults because they perform lots of activities near the floor and frequent "hand-mouth contact".

With higher dust load and higher SVOC concentrations, children are deduced to suffer higher exposure risk to dust-bound SVOCs in carpeted indoor environments. It is recommended that in indoor environment such as homes and day-care centers where children spend most of their time, carpet is better to be removed

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and bare floor should be cleaned as often as possible, which will contribute to reduce SVOC exposure through dust ingestion for children. And this viewpoint can be considered by public health officials and used in the community in future.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgements

We wish to thank the Project funded by China Postdoctoral Science Foundation (Grant no. 2015M570629), the Scientific Research Starting Foundation (Grant no. 5101219170102) and Postdoctoral Research Foundation (Grant no. 5101219470205) of Henan Normal University and Key Scientific Research Project Plan of Henan Province (Grant no. 15A610005).