we found that several phthalates, organophosphorus flame retardants, and brominated flame retardants possess agonistic and/or antagonistic activities via these receptors (Kojima et al., 2009, 2013; Takeuchi et al., 2005a).

Chemicals in indoor air are important because of their continuous exposure through inhalation, which allows them to directly enter the bloodstream via the lungs and escape from digestive organs and metabolism by the liver; therefore, their exposure pathway differs from that of compounds ingested with food.

4. Conclusions

In this study, we measured 59 SVOCs in indoor air samples from 12 rooms in 6 houses in Sapporo, Japan, and we isolated 34 compounds, including DEHT, which was found for the first time in indoor air samples in Japan. The concentration of TXIB (20.8 $\mu g/m^3$) detected in a newly built house was the highest among the 34 chemicals detected in this study. Among the chemicals detected, seven compounds (TXIB, DMA, DiPA, DBP, DBA, 1M2Pd, DEHP) were found at concentrations higher than 1 $\mu g/m^3$. These results suggest that a variety of plasticizers and flame retardants are present in the indoor environments of houses in Sapporo.

These chemicals contribute to increased quality and safety of furniture and building materials, and new compounds are continually being added to the list of such chemicals. Although the concentrations of the indoor air chemicals detected in this study were lower relative to cases related to sick-building syndrome, it is difficult to identify the concentration limits for indoor air chemicals with regard to human health because of a lack of knowledge regarding the pathogenesis of sick-building syndrome and/or chemical sensitivity. Further study of indoor chemicals in houses and office buildings is required to prevent health problems and improve indoor environments.

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