MESAEP

Mediterranean Scientific Association of Environmental Protection

20th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region

October 26-27, 2020

Book of Abstracts

2020

Edited by D. Sarigiannis, D. Seker, A. Gotti, M. Zucchetti

ISBN 9781005202804

MESAEP
Mediterranean Scientific Association of Environmental Protection

20th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region - October 26-27, 2020

Steering Committee

Denis Sarigiannis (Chair)
Alberto Gotti (IT)
Dimitrios Kotzias (GR)
Dursun Seker (TR)
Spyros Karakitsios (GR)
Massimo Zucchetti (IT)
Laura Mancini (IT)
Sani Dimitroulopoulou (UK)
Florentina Villanueva (ES)

Associated Members

Werner Bergheim (DE)
Manfred Kirchner (DE)

Organizing Committee

Denis Sarigiannis (Chair)
Alberto Gotti
Spyros Karakitsios
Laura Mancini
Dursun Seker
Massimo Zucchetti
Sani Dimitroulopoulou
Dimitrios Kotzias
Florentina Villanueva
George Sarigiannis
Marianthi Kermenidou
Ilias Frydas
Nafsika Papaioannou

Honorary Committee

M. Bahadir (DE), J. Cornejo (E), P. Foster (F), A. Kettrup (DE), K. Nikolaou (GR), H. Parlar (DE), A. Piccolo (I), G. Pilidis (GR), B. Rubin (IL), N. Senesi (I), G. Vasilikiotis (GR), U. Zoller (IL)

Scientific Committee

Albanis T. (Univ. Ioannina); A. Alimonti (ISS, Rome), N. Balkis (Istanbul University), D. Barcelo (CSIC, Barcelona), I. Bartzis (Univ. West Macedonia), B. Bayram (Yildiz Technical University – Turkey), S. Bilgili (Yildiz Technical University – Turkey), F.X. Bogner (Univ. Bayreuth), G. Calamandrei (ISS, Rome), P. Ciccioli (CNR, Rome), E. Diamadopoulos (TU Crete), S. Dimitroulopoulou (PHE, UK), D. Djordjevic (Univ. of Belgrade), A. Gotti (Eucentre), M.C. Hermosín (CSIC, Sevilla), I. Kabdasli (ITU, Istanbul), M. Karagiannis (Univ.Ioannina), S. Karakitsios (Univ. Thessaloniki), P. K. Katsifarakis (Univ.Thessaloniki), S. Kaya (ITU – Istanbul), D. Kotzias (ex-European Commission-JRC, Ispra), M. Loizidou (NTU Athens), L. Mancini (ISS, Rome), H. Mankolli (Univ. Tirana), St. Canna-Michaelidou (General State Laboratory of Cyprus), G. Michalopoulos (Univ. Crete), M. Mingazzini (IRSA-CNR), N. Moussiopoulos (Univ. Thessaloniki), K. Nikolaou (O.R.S.&P.E.), E. Papachristou (Univ. Thessaloniki), P. Papagiannakopoulos (Univ. Crete), D. Papameletiou (European Commission-JRC, Ispra), A. Paya-Perez (EC-JRC, Ispra, Italy), C. Samara (Univ. Thessaloniki), D. Sarigiannis (Univ. Thessaloniki), K. Schaefer (Forschungzentrum, Karlsruhe), D. Seker (ITU Istanbul), N. Sotiriou (GOIC, Athens), C. Stalikas (Univ. Ioannina), E. Stephanou (University of Crete), A. Tanik (ITU Istanbul), B. Topkaya (Akdeniz University – Turkey), A. Triantafyllou (TEI, West-Macedonia), V. Tsihritzis (Univ. Thrace), M. Tsimidou (Univ. Thessaloniki), R. Tzimou-Tsitouridou (Univ.Thessaloniki), C. Vassilakos (EC, Brussels), E. Voudrias (Univ. Thrace), A. Zabaniotou (Univ. Thessaloniki), K. Ziegler-Skylakakis (Technical University Munich, Germany), A. Zoumboulis (Univ. Thessaloniki), M. Zucchetti (Politecnico Torino), M. Horvat (JSI), E. Dogliotti (ISS), S. Vardoulakis (IOM), F. Villanueva (Univ. Castilla-La Mancha).

Endocrine disrupting chemicals in indoor dust and the implications for human exposure: preliminary findings

Joana Madureira[1], Ana Catarina Sousa[2], Ana Inês Silva[3], Lívia Aguiar[1], Rumi Tanoue[4], Tatsuya Kunisue[4], Shinsuke Tanabe[4], João Paulo Teixeira[1], Carla Costa[1]

[1]Environmental Health Department, National Institute of Health, Porto, Portugal; EPIUnit, Instituto de Saúde Pública, Universidade do Porto, Porto, Portugal
[2]CICECO-Aveiro Institute of Materials, Department of Chemistry, University of Aveiro, Aveiro, Portugal
[3]ICBAS-Institute of Biomedical Sciences Abel Salazar, U. Porto-University of Porto, Porto, Portugal
[4]Center for Marine Environmental Studies (CMES), Ehime University, Matsuyama, Japan

Personal care products, including cosmetics and pharmaceuticals, are major sources of endocrine disrupting chemicals (EDC), such as parabens and triclosan (TCS) (Mitro et al. 2016). The use of these compounds has resulted in extensive environmental occurrence and human exposure. So far, levels of these chemicals in residences has not yet been fully explored, particularly in indoor dust (Chen et al. 2018; Geens et al. 2009).

The objectives of the study were to determine the concentrations of four parabens and TCS in house dust samples and to estimate human exposure doses to these compounds through ingestion in different life stages (infants, toddlers, children, teenagers and adults). Between May 2018 and February 2019, dust samples from 31 residential homes were collected. The quantification of parabens and TCS was performed by liquid chromatography-tandem mass spectrometry (LC-MS/MS) after solid phase extraction using OASIS MAX Cartridge (Waters). The dust samples analysed correspond to the 63 µm fraction. Estimated daily intake (EDI, ng/kg) through dust ingestion was calculated using the following equation:

$$EDI = (Ci \times IR)/BW \quad (1)$$

where Ci is the measured concentration of a specific analyte (ng/g) in dust, IR is the daily dust ingestion rate (g/d) and BW is average body weight (kg). Based on the USEPA exposure factors handbook (US-EPA 2011), daily dust ingestion rate for infants, toddlers, children, teenagers and adults were 30, 60, 60, 60, and 30 mg, respectively, with average BW for each group at 7.5, 12.6, 25.2, 64.2 and 80 kg, respectively.

All target compounds were detected in all samples, indicating a widespread occurrence of these chemicals in home environments. Concentrations of individual compounds (median) are listed in decreasing order: methyl paraben (MePB) > TCS > propyl paraben (PrPB) > ethyl paraben (EtPB) > butyl paraben (BuPB) (Table 1). The sum of four parabens (ΣPB) ranged from 0.7 to 2770 ng/g, with a median at 82 ng/g.

The large range of observed levels may be associated with the different sources found indoors. Consistent with other studies, MePB and PrPB were the most abundant parabens found in indoor dust (Chen et al. 2018); although different sampling methods, sieved fractions, sample preparation techniques and analytical methods might influence the differences found among studies. Individual parabens concentrations were positively correlated, particularly for MePB and PrPB (Spearman's rho=0.710;

p<0.001), indicating similar sources. Table 2 summarize the maximum, median and mean EDI of Σparabens and TCS.

Median EDI varied from 0.33 (adults) to 3.50 (toddlers) and 0.05 (adults) to 0.61 (toddlers) for total parabens and TCS, respectively. In general, infants and toddlers had about 10 times higher EDI of parabens and TCS than the ones for adults. It is possible that toddlers use fewer products containing parabens and TCS than adults; therefore, dust ingestion may contribute more to total intake for infants and toddlers than for children and adults.

The present study investigated the levels of important environmental contaminants: MePB, EtPB, PrPB, BuPB and TCS in indoor dust samples. Assessing the occurrence of these chemicals can lead to a better understanding of their environmental distribution.

Median concentrations in 31 domestic dust samples were 550, 56, 110, 9.8 and 130 ng/g for MePB, EtPB, PrPB, BuPB and TCS, respectively. In general, toddlers and infants had higher EDI of parabens and TCS thus may be more affected by exposure through dust.

Acknowledgements
This work was supported by FCT-FAPESP (FAPESP/19914/2014); Joana Madureira, Ana Inês Silva, Carla Costa are supported by FCT (SFRH/BPD/115112/2016; SFRH/BD/145101/2019, SFRH/BPD/96196/2013 grants, respectively) and Ana Catarina Sousa by University of Aveiro. Further financial support was provided by LaMer Project funded by the Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT).

References
Chen J., Hartmann E. M., Kline J., Wymelenberg K. V. D., Halden R. U. 2018. Assessment of human exposure to triclocarban, triclosan and five parabens in U.S. indoor dust using dispersive solid phase extraction followed by liquid chromatography tandem mass spectrometry. J. Hazard Mater. 360: 623-630.

Geens T., Roosens L., Neels H., Covaci A. 2009. Assessment of human exposure to Bisphenol-A, Triclosan and Tetrabromobisphenol-A through indoor dust intake in Belgium. Chemosphere. 76: 755-760.

Mitro S. D., Dodson R. E., Singla V., Adamkiewicz G., Elmi A. F., Tilly M. K., Zota A. R. 2016. Consumer product chemicals in indoor dust: a quantitative meta-analysis of U.S. Studies. Environ. Sci. Technol. 50: 10661-10672.

US-EPA. 2011. Exposure Factors Handbook 2011. (Edition (final)) (2011). Washington, DC.

Keywords: parabens, triclosan, indoor dust, daily intake

Table 1. Individual parabens and TCS concentrations (ng/g) found in 31 indoor dust samples

	MePB	EtPB	PrPB	BuPB	TCS
Median	550	56	110	9.8	130
P25	200	28	71	4.8	767