

The DRESS project: DeRmal Exposure aSsessment Strategies



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Introduction

Estimating realistic dermal consumer exposure is a challenging task: 1) dermal exposure is often difficult to assess by direct measurements because of the complexity of dermal exposure processes and lack of standardized methods; 2) there is a lack of appropriate models featuring realistic exposure estimates from the use of some consumer products and articles.

Project objectives and outline

The DRESS project aims to develop a refined dermal exposure modeling strategy. The main steps to perform in the DRESS project are:

1. Identification of the key consumer products and articles to focus on in the project
2. Inventory and analysis of existing information on dermal exposure determinants, and identification of data gaps
3. Data generation to fill these gaps: consumer surveys and experiments on migration and transfer
4. Establishing a framework on how to generate realistic predictions for dermal exposure
5. Testing in three case studies

Selection of Article and Product Categories for further focus in the DRESS project

Focusing on a limited number of products and articles is needed because there is an enormous variety of individual substances mixtures, articles and products to which consumers might be exposed. Data types needed to model dermal exposure, and methods to generate these data, might differ largely between groups and even subgroup of articles and products, due to the variety of processes involved in dermal exposure to several articles and product groups.

Approach

Consumer exposure relevant Article and Product categories (AC & PC) considered in REACH (REACH guidance R.12 (ECHA, 2010)), and its subcategories as defined in ECETOC TRAv3 were considered. In a first stage, several AC & PC (PC8: biocidal products, PC 27: plant protection products, PC28: perfumes, fragrances and PC35: washing and cleaning products) were excluded, because these are covered under specific regulations in the EU (Dir. 98/8/EC, Reg.EC 1107/2009 and Dir. 76/768/EEC)

The remaining AC/PC (sub)categories were scored with regard to 7 criteria:

- Criterion 1: widespread use
- Criterion 2: high amounts of product/article used per event
- Criterion 3: high use frequency
- Criterion 4: high contact duration
- Criterion 5: high potential contact area between product/article and skin
- Criterion 6: differences in processes underpinning models and processes relevant for those articles and products
- Criterion 7: significance of post-application exposure.

Outcome

The ranking of the sum of the scores was used as a starting point to select products and article subcategories. Additional considerations such as feasibility of performing experiments and surveys, analogies in types, uses and exposure processes across categories were taken into account to select AC/PC categories. The following articles and products were selected for further focus of the DRESS project: AC 5 fabrics, textiles and apparel (clothing), AC 6 leather articles (footwear: shoes and boots), AC 8 paper articles (printed paper), AC13: plastic, larger articles (PVC flooring) and PC 31 polishes and wax blends (floor polish).

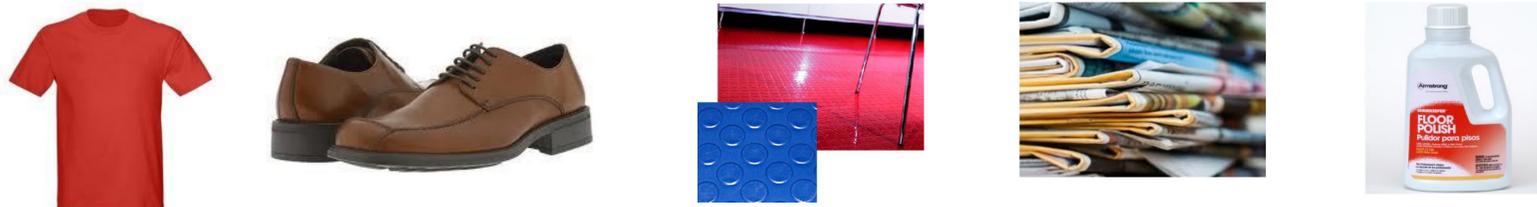


Figure 1: Selected article and products for further focus of the DRESS project - selection based on 7 predefined criteria

Dermal exposure processes - exposure determinants and modifying factors for selected AC/PC

For each of the five selected AC/PC, a conceptual framework describing processes involved in dermal exposure was constructed (for example, for clothing: see Figure 2). Relevant exposure determinants and relevant modifying factors were identified from literature searches, and the relative importance of these factors on dermal exposure was assessed. An illustration of this exercise for textile - clothing is shown in Table 1.

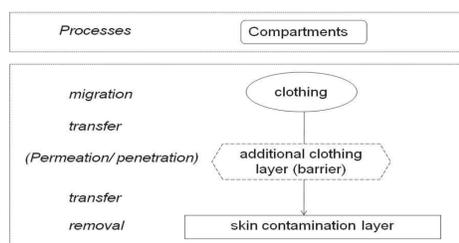


Figure 2: Conceptual framework for dermal exposure to substances in textile – clothing (direct contact textile –skin)

migration		transfer		other exposure conditions	
modifying factors	impact	modifying factors	impact		impact
initial concentration of substance in textile	+++	skin properties - perspiration	++	duration of contact	+(+)
weight/density of textile	(+)	skin properties - skin roughness	(+)	frequency of contact	+(+)
skin surface area in contact with textile	++	surface type: roughness of textile	(+)		
type of substance	++(+) (?)	skin contact factor (fraction actual/potential contact between skin and textile)	+(+)		
type of textile (natural fibres vs synthetic)	++	presence of a barrier (protection layer)	++		
'textile ageing factor': influence of preworn, new or washed conditions	+	contact pressure	+		
influence of manufacturing (dyeing, coating, additives) processes	++ (?)				

Table 1: preliminary selected determinants and modifying factors for dermal exposure to clothing, and its relative impact on dermal exposure

Ongoing work and next steps

A sensitivity and data gap analysis is ongoing for the 5 selected article and product categories, and will be used to indicate for which parameters there is the most pressing need to gather new information. In the next phase of the project, experiments and consumer surveys will be set up, and results will be integrated with existing information.

Acknowledgements

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