

Letter to the Editor

Thresholds of contact sensitization from disperse dyes in textiles

Dear Sir,

Projects were initiated based on the background that limited evidence exists that dyes to which patients are patch test positive are actually present in the textiles suspected to have caused their dermatitis.

The results of phase 1 of the project [1] revealed that only a limited number of patients was patch test positive to at least one dye identified in the fabrics submitted. Dyes appearing most frequently in cloth or patch test were Blue 106, Blue 124, Yellow 3 and Red 1. Overall, dyes to which a patient was patch test positive were infrequently identified in the fabric suspected to be the cause of the skin lesions. In most cases, the garment exhibited poor, or very poor, fastness to perspiration properties.

As concluded earlier, available data from animal tests on disperse dyes may not be sufficient to perform a risk assessment.

Local lymph node assays (LLNA) have been conducted in a single laboratory of eight disperse dyes that were considered to be linked to significant cases of consumer sensitization by the BfR (German Institute of Risk Evaluation). These show a large range of potencies as determined by EC3 values derived from LLNA dose responses. In the case of Disperse Blue 106, an EC3 value of 0.015% was found, which is the strongest sensitizer in the series [close to the EC3 value for the reference contact sensitizer 2,4-dinitrochlorobenzene (DNCB)]. In previous investigations, using human volunteers, a no observable effect level (NOEL) of $1.4 \mu\text{g}/\text{cm}^2$ has been derived for DNCB.

For a reference textile of $100 \text{ g}/\text{m}^2$, this NOEL would correspond to a dye concentration of 140 ppm. on the garment migrating to the skin. The Working Group Textiles of the BfR developed an exposure model, which assumes that up to 0.5% of a dye from a textile garment can migrate to the skin. In order to achieve a $1.4 \mu\text{g}/\text{cm}^2$ (140 p.p.m.) migration, a dye loading on the textile of 2.8% (28 000 p.p.m.) would be necessary.

Measured peak migrations for good perspiration fastness properties (≥ 4) showed values in the order of $0.01\text{--}0.03 \mu\text{g}/\text{cm}^2$, whereas for poor fastnesses (2) this value was up to $0.3 \mu\text{g}/\text{cm}^2$ [2]. The default model submitted to the BfR [3] would predict $0.5 \mu\text{g}/\text{cm}^2$ peak migration for a 1% dyeing. Therefore, it is expected that under good fastness conditions induction of sensitization can essentially be precluded.

Nevertheless, it is not recommended to use Disperse Blue 106 on textiles with potential consumer exposure, especially not on substrates with limited fastness properties like polyamide or polyacetate.

We make a precautionary statement that patch testing may bear the risk of inducing sensitization or eliciting allergies in recurrent patients, if the dose applied is significantly higher than that which can be expected to be a maximum dose from dye migration. The current standard patch test concentration is 1% (petrolatum). Prospective studies will be required to ascertain whether a lower concentration would be satisfactory.

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References

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2. ETAD Project G 1033. 'Extractability of Dyestuffs from Textiles over a Normal Life Time of Use'. 1997.
3. T. Platzeck, BfR, Germany. 'Current and future health issues of textile dyes'. Presentation at ETAD General Assembly 2004.

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