

Short Communication

Occupational allergic contact dermatitis from UV-cured lacquer containing dipropylene glycol diacrylate

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Case Report

A 24-year-old non-atopic male student worked temporarily in a paint factory on the canning of different types of paint. After 2 months work, he developed redness and vesicular eczema on his thighs, maculopapular eczema on his upper chest and back, and erythema on his lower arms. During the canning process, droplets of paint splashed onto his clothes over the above skin areas. Symptoms improved during days off and weekends, and totally cleared during 2 weeks sick leave.

The 1st patch test session was performed with a modified European standard series, a series of plastics and glues (2), and 1 paint and its hardener containing 1,6-hexamethylene diisocyanate and toluene-2,4-diisocyanate, according to the recommendations of the ICDRG. Only triethylene glycol diacrylate (TEGDA) (Fig. 1) in the modified European standard series gave a doubtful (?+) reaction. The employer informed us that one of the paints contained acrylates. The patient was then patch tested with this paint and the (meth)acrylate series (3). Diethylene glycol diacrylate (DEGDA) provoked a + reaction and 1,4-butanediol diacrylate (1,4-BUDA) a doubtful (?+) reaction, whereas the paint gave reactions to a dilution series: ++ at 0.2%; + at 0.1% and ?+ at 0.05%.

The paint contained 50% dipropylene glycol diacrylate (DPGDA) (Fig. 1), 31% reactive polyacrylate resin mixture and 3% 2-hydroxy-2-methyl-1-phenylpropane-1-one, according to the material safety data sheet. It was

then analyzed by gas chromatography/mass spectrometry, as previously described (2): it contained 43% DPGDA, 4% dipropylene glycol monoacrylate and 8% various types of propylene glycol acrylates (MW >250). The amounts of DEGDA, 1,4-BUDA and 1,6-hexanediol diacrylate (HDDA) were <0.005% (detection limit). The patient left the workplace and was not available for further patch testing.

Discussion

The patient had patch test reactions to a UV-cured paint that had splashed onto his clothes and contaminated his skin during its canning. The patient appeared to have become sensitized to the main component of the paint, namely DPGDA, though we were unable to patch test him with this acrylate, as he had left the workplace to continue his studies. It seems that the patch test reactions to TEGDA, DEGDA and 1,4-BUDA were cross-reactions, because their quantities in the paint were negligible. The paint was used for painting wood, e.g., doors, and has not, to our knowledge, previously caused allergic contact dermatitis, DPGDA seeming to be a further acrylate causing contact sensitization.

Tripropylene glycol diacrylate (TPGDA) and 1,6-HDDA are the most commonly used acrylates in UV-cured paints (4). Less often, glycerol propoxy triacrylate (GPTA), trimethyl propane diacrylate (TMPTA) and ethylene glycol diacrylate (EGDA) are used. DPGDA was not used for patch testing in a large Swedish study on dermatological risks to workers involved in the ultraviolet-radiation wood-surface-coating industry (5), and accordingly, it is possible that workers could have been allergic to DPGDA. Our patient did not have a patch test reaction to TPGDA, and this acrylate was not present in the paints that he handled.

References

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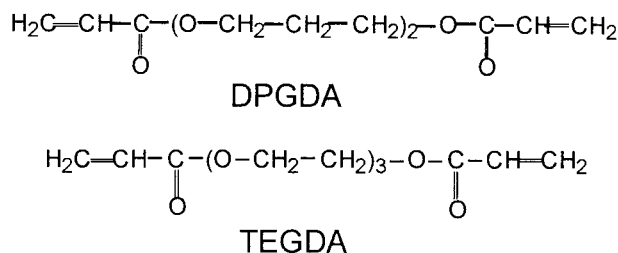


Fig. 1. Chemical structures of dipropylene glycol diacrylate (DPGDA) and tripropylene glycol diacrylate (TEGDA).

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