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Occupational contact allergy to 2-butylaminocarbonyloxyethyl acrylate in UV-curing printing inks

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Acrylates are plastic materials formed by polymerization of monomers derived from acrylic or methacrylic acids. The acrylic polymers are thermoplastic resins, usually with small residues of monomers.[1,2] Handling of (monomeric) acrylates by printers and graphic artists has been reported to cause allergic contact dermatitis.[3,4]

CASE REPORT

We report a case of occupational contact allergy to 2-butylaminocarbonyloxyethyl acrylate in a 30-year-old male with atopic constitution, working as a graphic printer in a small family-owned company. He was referred to our clinic due to a 7-month history of dermatitis with "ulceration and itching" on the inside of his right forearm (Figure 1). Half a year before onset of symptoms, new ink colors had been introduced. On a daily basis, he swept away excess ink color from the printing machine, which exposed his unprotected right forearm. Several hours later he washed his arm, using a washing-up liquid (YES). Slight improvement occurred during 2 weeks off work.

Investigation of the occupational exposure revealed printing inks containing UV-curing acrylates. The patient was patch tested with the Swedish baseline series (Chemotechnique Diagnostics, Vellinge, Sweden), the (meth)acrylate – printing series (Chemotechnique Diagnostics), and the inks tested 0.25% pet. (Table 1). All inks, except the white, showed ++/+++ reactions on day (D) 3 and D7, respectively. However, the patient did not react to any of the tested acrylates in the (meth)acrylate – printing series, where only a doubtful reaction on D3 to diethylene glycol diacrylate 0.1% pet. (?+) was seen. He also reacted to nickel sulfate 5% pet. (++/+++) and the washing-up liquid YES tested "as is," semiopen (+/+).

The manufacturer was contacted regarding the ink ingredients. These were patch tested and 2-butylaminocarbonyloxyethyl acrylate 0.1% pet. gave a positive reaction on D3/D7 (++/+). Dipropylene glycol diacrylate (DPGDA) showed a doubtful reaction on D3/D7 (for full results, see Table 1). 2-Butylaminocarbonyloxyethyl acrylate 0.1% pet. was also applied to 19 control patients, with no positive result.

DISCUSSION

Reports on contact allergy to 2-butylaminocarbonyloxyethyl acrylate could not be found in the literature. However, one publication was found regarding the sensitizing capacity of DPGDA.[5] The molecular weight for 2-butylaminocarbonyloxyethyl acrylate (Figure 2) is 215.25 g/mol, that is, a similar size as the sensitizing acrylates in the (meth)acrylate – printing series. It seems that this acrylate, 2-butylaminocarbonyloxyethyl acrylate, was the cause of dermatitis on the forearm of the patient.

He also had a doubtful reaction to DPGDA, which may have contributed to the dermatitis.[5] The patient showed a strong reaction to

FIGURE 1 Dermatitis on the inside of the right forearm of a graphic printer

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TABLE 1 The patch test results for the five inks, six ingredients, four pigments, and the concentrations used

Substance	Concentration	Patch test results (D3/D7)
Magenta ink	0.25% pet.	++/+++
Cyan ink	0.25% pet.	++/+++
Yellow ink	0.25% pet.	++/+++
Black ink	0.25% pet.	++/+++
White ink	0.33% pet.	–/–
Dipropylene glycol diacrylate, CAS no. 57472–68-1	0.1% pet.	?+/?+
4-(1,1-Dimethylethyl)cyclohexyl acrylate, CAS no. 84100–23-2	0.1% pet.	–/–
Ethoxylated trimethylolpropane triacrylate, CAS no. 28961–43-5	0.1% pet.	–/–
2-Butylaminocarbonyloxyethyl acrylate, CAS no. 63225–53-6	0.1% pet.	++/+
2-Methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one, CAS no. 71868–10-5	0.1% pet.	–/–
2-Benzyl-2-dimethylamino-4-morpholinobutyrophenone, CAS no. 119313–12-1	0.1% pet.	–/–
Quinacridone pigment	10% pet.	–/–
C.I. Pigment Blue 15:4	10% pet.	–/–
Pigment Yellow 150	10% pet.	–/–
Carbon black	10% pet.	–/–

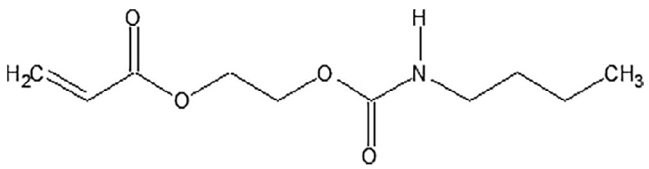

FIGURE 2 Molecular structure of 2-butylaminocarbonyloxyethyl acrylate (CAS no. 63225–53-6), molecular weight 215.25 g/mol

nickel. However, although the yellow pigment (pigment yellow 150) in the yellow ink is a nickel compound, the patient did not react to patch testing with this pigment. The patient also used the washing-up liquid YES as a soap on the underarms. Because he also reacted to this product, it probably contributed to the dermatitis.

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CONFLICTS OF INTEREST

None to declare.

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