Permanent Hair Dyes. Exposure, Diagnostics, and Prevention of Contact Allergy

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The most frequently reported allergens in permanent hair dyes are PPD, 2,5-TDA or 2,5-TDA-S, both categorized as strong skin sensitizers. Recently a new hair dye substance, 2-ME-PPD was introduced with the aim is to decrease the risk of allergic contact dermatitis. PPD is most common in hair dye product sold in central and southern Europe and in non-European countries, while 2,5-TDA-S is more prevalent in northern Europe. Products purchased in Europe and analysed of their content of PPD and 2,5-TDA, never exceeded the limits stated by the European legislation.

Products bought in non-European countries contained higher PPD concentrations and sometimes exceeding the limits of the EC. Hair dyes products can be incorrectly labelled. In spite of the limits of concentrations stated by the EC on permanent hair dyes ingredients, products purchased on Internet or outside Europe can expose consumers and hairdressers to high concentrations of strong contact allergens.

Hairdressers have a high risk to develop hand dermatitis why it is important that they adopt correct preventive strategies as choosing the optimal protective gloves. When considering the diagnostics of contact allergy to permanent hair dyes, PPD 1.0% in pet. is a better tracer than 2,5-TDA although 2,5-TDA is more commonly used in products sold in our geographical area. The free forms, PPD and 2,5-TDA, trace more contact allergy than the respective salt. Contact allergy to PPD, 2,5-TDA and their salts PPD-DHC and 2,5-TDA-S are common and with frequent simultaneous reactions among these compounds.

Different strategies should be adopted simultaneously to improve the prevention of contact allergy to permanent hair dyes:

- Encouraging further investigation on new hair dye ingredients with less allergenic dyeing substances.
- Improving the awareness of consumers using products containing strong sensitizers displaying the concentrations of allergens on the labelling and avoiding the recommendation of self-test.
- NI gloves must be recommended to hairdressers and customers when dying hair with the permanent hair dyes currently available. The PE gloves supplied in hair dye for home use can be considered safe against the same hair dye and for using up till 30 min.

Annarita Antelmi with Professor Giorgio Assennato (Opponent), Emeritus of Environmental and Occupational Medicine, Department of Biology, University of Bari, Italy to the left and Associate Professor Cecilia Svedman (Main Supervisor), Department of Occupational and Environmental Dermatology, Lund University, Malmö, to the right.

- PPD 1% pet. is the best marker of contact allergy to permanent hair dyes and must be tested in the baseline series. 2,5-TDA 1% or 1.1% (equimolar to concentration of PPD 1%) should be tested in hairdressers series in case of occupational exposure to hair dyes or history of allergic reactions to hair colouring.

List of Publications

1. Antelmi A, et al. Are gloves sufficiently protective when hairdressers are exposed to permanent hair dyes? An in vivo study. Contact Dermatitis. 2015; 72: 229–236.
2. Antelmi A, et al. Evaluation of concordance between labelling and content of 52 hair dye products: overview of the market of oxidative hair dye. Labelling and content of hair dye products. Eur J Dermatol 2016 Dec 23. [Epub ahead of print].
3. Antelmi A, et al. In vivo evaluation of the protective capacity of different gloves against hair dyes. In manuscript.
4. Antelmi A, et al. Is it possible to optimise patch testing with hair dye ingredients? Patch testing of 2,477 consecutive dermatitis patients in Malmö, Sweden. In manuscript.