

Impossible to protect hairdressers against harmful chemicals with gloves

Heidi S¸sted

Research Centre for hairdressers and Beauticians, Gentofte Hospital, Hellerup, Denmark

Introduction

Parabens are widely used in cosmetic products which are professionally used by hairdressers (1) and they are suspected to be endocrine disrupters. It is well-known that handling of the dark hair dye p-phenylenediamine (PPD) is associated with skin reactions and that the substance has a toxicological profile that categorises the substance as harmful (2). Hair dye are absorbed by the skin and are excreted by the kidneys (3). PPD is known to cause contact dermatitis, renal impairment (4) and hair dye exposure is indicated to an increased risk of bladder cancer among hairdressers (5). Another common hair dye ingredient in the hairdressing trade is toluene-2,5-diamine, which is the most sold dye ingredient (6). The substance has shown to have severe endocrine effects leading to a margin of safety that is far lower than the accepted 100, which means that the substance is not safe to use (7;8). It is important to know, if hair dresser can be protected against these chemicals, by wearing gloves.

Hair dyes are on hairdressers hand and in the salon surroundings

In a study of skin exposure to permanent hair dye, 33 Swedish hairdressers were included. Hand rinse samples were collected from each hand before the start of hair dyeing, after application of the dye and after cutting the newly-dyed hair. Exposure occurs from dye application, from newly-dyed hair and from background exposure (combs, trolley). PPD was identified in percentages ranging from 10-30% of the studied samples in PPD amounts of 22-939 nmol per hand. Toluene-2,5-diamine was found in amounts of 13-741 nmol per hand (9;10). Even hairdressers that uses gloves for hair dye mixing and application, get detectable amounts of hair dye on their hands from the procedures, from the following styling of the hair and even from the surroundings in the salon (10). The authors concluded that that hairdresser's skin is exposed to allergenic compounds during hair dyeing; both those hairdressers who used gloves and those who didn't wore gloves.

Hairdressers have a culture of reusing gloves or avoid using gloves

Fare from all hairdressers in Denmark and Sweden use gloves when they work with coloured hair (10;11) and 18% of Danish hairdressers that use gloves re-use them, e.g. by turning them inside out. Only 48 % of educated hairdressers uses gloves when they rinse out hair dye (12).

You can get a hair dye allergy by touching another person's dyed hair

If you have your hair dyed, you can get an allergy (13), but there is also a risk of getting an allergic reaction just by touching another persons dyed hair. Below are some examples.

A 12-month old baby girl gets vesicular hand eczema by playing with her mother's dyed hair. The mother had dyed her hair two days before the baby developed the hair dye reaction (14).

Another example is a 39-years old man that has had a huge eczema reaction on the inner side of his left arm for two month. The eczema came every time his partner had dyed her hair. The man was

tested with the dark hair dye p-phenylenediamine (PPD) as well as the partners hair dye and had a patch test reaction on both, indicating that he couldn't tolerate hair dye (15).

A third example is a 21-years-old female dental hygienist who develops eczema on the inner aspect of her left forearm. As she was right-handed, she held her instruments in that hand and her mirror in the left hand so that the bare skin of her left forearm came into frequent contact with her patient's dyed hair (16). From the above studies it can be concluded that dyed hair can release harmful chemicals in an amount that can have an effect on the body.

Even with intensive education, you can not get all hairdressers to wear gloves all the time

The teachers of half of Denmark's hairdresser trainee were educated in for 1½ year by Research Centre for Hairdressers and Beauticians, with the purpose of increasing the use of gloves, decreasing the exposure to irritant and allergenic substances and decreasing the frequency of hand eczema. It was possible to decrease the frequency of hand eczema and to increase the glove use significantly by the education, but 10% of the hairdresser apprentices still did not use gloves when they rinsed dyed hair at the school (17). The results show that even with intensive education it is not possible to get all hairdressers to wear gloves all the time (17). It is not enough to teach hairdressers in personal protection, because there will be times where they avoid wearing gloves. From this chapter it can be concluded that it is not realistic to rely on that all hairdressers can wear gloves all the time.

Conclusion: Even a small contact with cosmetics can enter the body through the skin. It seems impossible to work as a hairdresser with out coming in contact with chemicals in the working environment. Strictly use of gloves in all steps can protect the hairdresser, but it is not realistic to believe that a full hand protection is happening all working day, changing to new gloves every 15 minutes. In order to protect hairdressers it is important to substitute e.g. parabens to non endocrine preservative. It is important to remove carcinogenic formaldehyde releasers and avoid the use of p-phenylenediamine, toluene-2,5-diamine and other harmful hair dyes with sensitizing and systemic toxicological effects.

Reference List

- (1) Turchin I, Moreau L, Warshaw E, Sasseville D. Cross-reactions among parabens, para-phenylenediamine, and benzocaine: a retrospective analysis of patch testing. *Dermatitis* 2006; 17(4):192-5.
- (2) European Commission, Scientific Committee on Consumer Products. Opinion of p-phenylenediamine Colipa A7. European Commission, Health and Consumer Protection Directorate-General; 2006 Oct 10. Report No.: SCCP/0989/06.
- (3) Hueber-Becker F, Nohynek GJ, Dufour EK, Meuling WJ, De Bie AT, Toutain H, Bolt HM. Occupational exposure of hairdressers to [14C]-para-phenylenediamine-containing oxidative hair dyes: a mass balance study. *Food Chem Toxicol* 2007; 45(1):160-9.
- (4) Hamdouk M, Abdelraheem M, Taha A, Christina D, Ionel C, Alexandru C. The Association between Prolonged Occupational Exposure to Paraphenylenediamine (Hair-dye) and Renal Impairment. *Arab Journal of Nephrology and Transplantation* 2011; 4(1):19-23.

- (5) Gago-Dominguez M, Castelao JE, Yuan JM, Yu MC, Ross RK. Use of permanent hair dyes and bladder-cancer risk. *Int J Cancer* 2001; 91(4):575-9.
- (6) Sosted H, Basketter DA, Estrada E, Johansen JD, Patlewicz GY. Ranking of hair dye substances according to predicted sensitization potency - quantitative structure-activity relationships. *Contact Dermatitis* 2004; 51:241-54.
- (7) European Commission, Scientific Committee on Consumer Products. Opinion on toluene-2,5-diamine. 2007 Oct 2.
- (8) White IR. Æresforelæsning for professor Torkil Menné. 28-9-2011.
Ref Type: Personal Communication
- (9) Lind ML. Dermatitis in hairdressers as a problem in chemical control. *Ann Occup Hyg* 2005; 49(6):457-9.
- (10) Lind ML, Boman A, Sollenberg J, Johnsson S, Hagelthorn G, Meding B. Occupational dermal exposure to permanent hair dyes among hairdressers. *Ann Occup Hyg* 2005; 49(6):473-80.
- (11) Lysdal SH, Johansen JD, Flyvholm MA, Søsted H. A quantification of occupational skin exposures and the use of protective gloves. 2011.
Ref Type: Unpublished Work
- (12) Lysdal SH, Johansen JD, Flyvholm MA, Søsted H. A quantification of occupational skin exposures and the use of protective gloves among hairdressers in Denmark. 2011.
Ref Type: Unpublished Work
- (13) Sosted H, Agner T, Andersen KE, Menne T. 55 cases of allergic reactions to hair dye: a descriptive, consumer complaint-based study. *Contact Dermatitis* 2002; 47(5):299-303.
- (14) Seidenari S, Manzini BM, Motolese A. Contact sensitization in infants: report of 3 cases. *Contact Dermatitis* 1992; 27(5):319-20.
- (15) Warin AP. Contact dermatitis to partner's hair dye. *Clin Exp Dermatol* 1976; 1(3):283-4.
- (16) Hindson C. O-nitro-paraphenylenediamine in hair dye - an unusual dental hazard. *Contact Dermatitis* 1975; 1(5):333.
- (17) Bregnhøj A, Menné T, Johansen JD, Søsted H. Prevention of hand eczema among Danish hairdressing apprentices - an intervention study. 2011.
Ref Type: Unpublished Work