Promoting the autonomous implementation of the European framework agreement on occupational health and safety in the hairdressing sector

VS/2019/0440

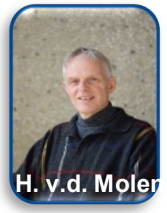
Introduction

Final Conference
Friday, 09 September 2022

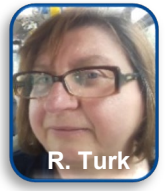
The project consortium

Department of Dermatology, Environmental Medicine, Health Theory, University of Osnabrück (Germany)

Coronel Institute of Occupational Health, Department of Public and Occupational Health, Amsterdam UMC, University of Amsterdam (Netherlands)



Institute for Medical Research & Occupational Health (Croatia)



Gentofte Hospital, Copenhagen, University of Copenhagen (Denmark)

Department of Medical Informatics, Biometry and Epidemiology (IMBE), University of Erlangen/Nürnberg (Germany)

Our mandate (12/2020 -05/2022)

- ✓ identify / prioritize hazardous and harmful substances contained in cosmetic products (including reprotoxic substances) professionally used by hairdressers by reviewing available data (**systematic reviews)**
- ✓ draft **Medical Reference Document**
- ✓ draft a **Methodological Note** showcasing the difference in exposure between a consumer and a professional hairdresser
- ✓ assess possibility of **alternative research methods** for the evaluation of the impact of cosmetic substances on hairdressers;
- ✓ participate in the **Technical Working Group** at the level of the CEN on the hairdressing glove standardisation process

Health risks of hairdressers

- ✓ **70%** of hairdressers suffer from work-related skin damage at some point during their career

- ✓ important risk factors for occupational skin diseases, respiratory and reproductive disorders are:
  - ✓ wet work
  - ✓ contact to irritants and allergens
  - ✓ inhalation exposure to hazardous chemicals from the used products
  - ✓ exposure to reprotoxic substances

Health risk assessment challenges of hairdressers´ exposure @ workplace

- ✓ exposure is subject to change due to **changing compositions of products @ work**
- ✓ a large number of **hair dye products often differ in chemical composition**
- ✓ hairdressers **are exposed 8 hours/day, 5-6 days/week** to hazardous substances (hair dying 6 x / day)
- ✓ **not comparable with exposure of a consumer** to cosmetic substances (few minutes per day; colouring once per month)
- ✓ **European Cosmetics Regulation** focuses on consumer
- ✓ **mandate of SCCS** is restricted to consumer behaviour
- ✓ **Risk Assessment Committee** on occupational exposure (RAC) looks mainly into respiratory and systemic toxicology, not skin

Health risk assessment challenges of hairdressers´ exposure @ workplace

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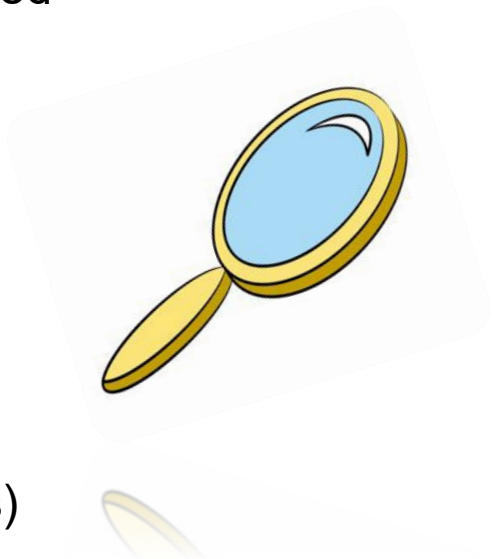
Occupational risks of hairdressers associated with the use of cosmetic products are not sufficiently taken into account

Knowledge and data gap

- ✓ **lack of data** concerning **exposure to hazardous substances** from cosmetic products which hampers risk assessment
- ✓ **lack of toxicity data** at relevant exposure levels and typical exposure durations for chemical substances used in hairdressing products due to the cosmetics animal testing ban and the limitations in place for cosmetics compatibility and acceptability tests on human volunteer subjects
- ✓ **lack of evidence-based recommendations** for personal skin protection (often controversial)
- ✓ **lack of accepted standards** to objectify effectiveness of gloves, protective creams, after-work emollients, skin cleansers and other personal protective equipment
- ✓ **lack of conclusive data** to which extent skin damage that may occur in contact with hair dyes increases dermal absorption of hazardous substances

Our study: How did we proceed?

- **defined** eligible substances by means of a *Delphi survey*
- **compiled** an indicative list and selected one / two hazardous substance(s) within the categories of the products, which are the most relevant in hairdressing
- **skin** (contact allergy) and **respiratory/systemic toxicity** endpoints were considered
- **analyzed extracted literature**
- **published our findings**
- **prepared** *Medical Reference Document (MRD)* containing an:
  - ✓ extract of the evidence (summary of all systematic reviews and key messages)
  - ✓ methodological note (conclusions and recommendations)



Identified substances

Table 2 List of most relevant product groups in hairdressing with substances finally included into the systematic review

	Product category	Substance(s)
1	Oxidative hair dyes/ colourants	*p*-Phenylenediamine (PPD; CAS no. 106-50-3) and its salts (CAS no. 624-18-0, 16245-77-5), toluene-2,5-diamine (PTD; CAS no. 95-70-5) and its sulphate (CAS no. 615-50-9), 2-methoxymethyl-PPD (mePPD; CAS no. 337906-36-2)
2	Bleaches	Persulfate salts: ammonium, APS, CAS no. 7727-54-0; potassium, PPS, CAS no. 7727-21-1; sodium, SPS, CAS no. 7775-27-1
3	Perms and relaxing substances	Salts and esters of thioglycolic acid: glyceryl thioglycolate (GMTG; CAS no. 30618-84-9), ammonium thioglycolate (ATG; CAS no. 5421-46-5)
4	Cosmetic glues	2-Hydroxyethyl methacrylate (HEMA; CAS no. 212-782-2), ethyl cyanoacrylate (ECA; CAS no. 7085-85-0)

(results of Delphi survey: 121 experts consulted, 39.7% response)

UNIVERSITÄT OSNABRÜCK

Output: 9 systematic reviews

Open access Protocol

BMJ Open Protocol for a systematic review on systemic and skin toxicity of important hazardous hair and nail cosmetic ingredients in hairdressers

Wolfgang Uter ,[1] Jeanne D. Johansen,[2] Martin S. Havmose,[2] Sanja Kezic,[3] Henk F. van der Molen ,[3] Jelena Macan,[4] Željka Babić,[4] Rajka Turk,[4] Cara Symanzik,[5] Swen M. John[5]

Review › Contact Dermatitis. 2022 May;86(5):333-343. doi: 10.1111/cod.14055. Epub 2022 Feb 16.

Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review

Cara Symanzik [1 2], Jeanne D Johansen [3], Patricia Weinert [2], Željka Babić [4], Sarah Hallmann [5], Martin S Havmose [3], Sanja Kezic [6], Marija Macan [4], Jelena Macan [4], Julia Strahwald [5], Rajka Turk [4], Henk F van der Molen [6], Swen M John [1 2], Wolfgang Uter [5]

Affiliations + expand

PMID: 35088418 DOI: 10.1111/cod.14055

International Journal of Environmental Research and Public Health MDPI

Review

Occupational Exposure of Hairdressers to Airborne Hazardous Chemicals: A Scoping Review

Sanja Kezic [1,*], Roberto Nunez [1], Željka Babić [2], Sarah Hallmann [3], Martin S. Havmose [4], Jeanne D. Johansen [4], Swen M. John [5,6], Marija Macan [2], Cara Symanzik [5,6], Wolfgang Uter [3], Patricia Weinert [6], Rajka Turk [2], Jelena Macan [2] and Henk F. van der Molen [1]

Received: 4 October 2021 | Revised: 1 December 2021 | Accepted: 11 January 2022
DOI: 10.1111/cod.14048

REVIEW

CONTACT DERMATITIS WILEY

Prevalence and incidence of hand eczema in hairdressers—A systematic review and meta-analysis of the published literature from 2000–2021

Martin S. Havmose[1] | Sanja Kezic[2] | Wolfgang Uter[3] | Cara Symanzik[4,5] | Sarah Hallmann[3] | Julia Strahwald[3] | Patricia Weinert[5] | Marija Macan[6] | Rajka Turk[6] | Henk F. van der Molen[2] | Željka Babić[6] | Jelena Macan[6] | Swen M. John[4,5] | Jeanne D. Johansen[1]

International Archives of Occupational and Environmental Health
https://doi.org/10.1007/s00420-022-01852-w

REVIEW ARTICLE

Respiratory toxicity of persulphate salts and their adverse effects on airways in hairdressers: a systematic review

Jelena Macan[1] · Željka Babić[1] · Sarah Hallmann[2] · Martin S. Havmose[3] · Jeanne D. Johansen[3] · Swen M. John[4,5] · Marija Macan[1] · Cara Symanzik[4,5] · Wolfgang Uter[2] · Patricia Weinert[5] · Henk F. van der Molen[6] · Sanja Kezic[6] · Rajka Turk[1]

Received: 31 December 2021 / Accepted: 1 March 2022
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Received: 29 October 2021 | Revised: 18 January 2022 | Accepted: 25 January 2022
DOI: 10.1111/cod.14056

REVIEW

CONTACT DERMATITIS WILEY

Allergic contact dermatitis caused by 2-hydroxyethyl methacrylate and ethyl cyanoacrylate contained in cosmetic glues among hairdressers and beauticians who perform nail treatments and eyelash extension as well as hair extension applications: A systematic review

Cara Symanzik[1,2] | Patricia Weinert[2] | Željka Babić[3] | Sarah Hallmann[4] | Martin S. Havmose[5] | Jeanne D. Johansen[5] | Sanja Kezic[6] | Marija Macan[3] | Jelena Macan[3] | Julia Strahwald[4] | Rajka Turk[3] | Henk F. van der Molen[6] | Swen M. John[1,2] | Wolfgang Uter[4]

International Journal of Environmental Research and Public Health MDPI

Review

Skin toxicity of cysteamine hydrochloride, polyvinylpyrrolidone, polyvinylpyrrolidone copolymers, sodium laureth sulfate, cocamide diethanolamine, and cocamidopropyl betaine with a focus on cosmetic products and the occupational group of hairdressers: a review with systematic components

Cara Symanzik [1,*], Patricia Weinert [1], Željka Babić [2], Sarah Hallmann [3], Martin S. Havmose [4], Jeanne D. Johansen [4], Sanja Kezic [5], Marija Macan [2], Jelena Macan [2], Julia Strahwald [3], Rajka Turk [2], Henk F. van der Molen [5], Swen M. John [1], Wolfgang Uter [3]

DOI: 10.1002/1348-9585.12351

REVIEW ARTICLE

Journal of Occupational Health WILEY

Association of hairdressing with cancer and reproductive diseases: A systematic review

Željka Babić[1] | Marija Macan[1] | Zrinka Franić[1] | Sarah Hallmann[2] | Martin S. Havmose[3] | Jeanne D. Johansen[3] | Swen M. John[4,5] | Cara Symanzik[4,5] | Wolfgang Uter[2] | Patricia Weinert[5] | Henk F. van der Molen[6] | Sanja Kezic[6] | Rajka Turk[1] | Jelena Macan[1]

submitted, under review:

Systematic review on skin adverse effects of important hazardous hair cosmetic ingredients with a focus on hairdressers

Wolfgang Uter (1) (0000-0002-4498-3710), Julia Strahwald (1), Sarah Hallmann (1), Jeanne D. Johansen (2) (0000-0002-3537-8463), Martin S. Havmose (2) (0000-0003-2147-016X), Sanja Kezic (3) (0000-0002-1063-4547), Henk F. van der Molen (3) (0000-0002-0719-2020), Jelena Macan (4) (0000-0001-6269-5475), Željka Babić (4) (0000-0002-5335-9522), Zrinka Franić (4) (0000-0001-9016-2545), Marija Macan (4) (0000-0001-8415-7571), Rajka Turk (4) (0000-0002-5876-8923), Cara Symanzik (5,6) (0000-0002-4090-6726), Patricia Weinert (6), Swen M. John (5,6) (0000-0001-5406-9458)

All important findings are compiled in Medical Reference Document and Methodological Note

UNI europa hair & beauty global union

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Medical Reference Document and Methodological Note

"Promoting the autonomous implementation of the European framework agreement on occupational health and safety in the hairdressing sector"

VS/2019/0440

Submitted by

Department of Dermatology, Environmental Medicine, Health Theory, University of Osnabrück (Germany)	UNIVERSITÄT OSNABRÜCK
Coronel Institute of Occupational Health, Department of Public and Occupational Health, Amsterdam UMC, University of Amsterdam (Netherlands)	Amsterdam UMC
Institute for Medical Research & Occupational Health (Croatia)	imi
Gentofte Hospital, Copenhagen, University of Copenhagen (Denmark)	Gentofte Hospital
Department of Medical Informatics, Biometry and Epidemiology (IMBE), Friedrich-Alexander Universität Erlangen/Nürnberg (Germany)	FAU

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UNIVERSITÄT OSNABRÜCK · Amsterdam UMC · imi · Gentofte Hospital · FAU

Friedrich-Alexander-Universität
Medizinische Fakultät

Skin effects

Wolfgang Uter, Erlangen, Germany

Skin problems in hairdressers

- Manual work “in the wet”
- Contact with acid/alkaline products
- Irritating product constituents
- Some strong contact allergens
  … exposure is the topic of the following talk
  by Dr. Symanzik

- I will focus on the clinical aspects, including allergies

An “old problem”

PubMed.gov

hairdresser skin

Search

Advanced Create alert Create RSS User Guic

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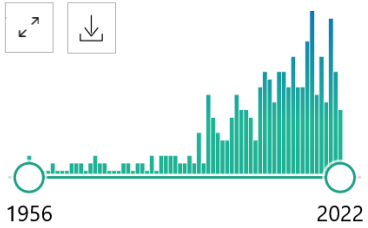
MY NCBI FILTERS

311 results Page 1 of 32

RESULTS BY YEAR



TEXT AVAILABILITY

- Abstract
- Free full text
- Full text

ARTICLE ATTRIBUTE

- Associated data

ARTICLE TYPE

- Books and Documents
- Clinical Trial

1 Cite Share
[Frequency of **skin** injuries in **hairdressers**].
BORELLI S.
Arch Gewerbepathol Gewerbehyg. 1956;14(6):686-99.
PMID: 13355413 German. No abstract available.

2 Cite Share
[Necessary **skin** protection in **hairdressers**].
BORELLI S.
Dermatologica. 1956 Nov;113(5):278-83.
PMID: 13397198 German. No abstract available.

3 Cite Share
[Contribution to the study of **skin** disease in barbers and **hairdressers**].
TOME BONA JM.
Medicamenta (Madr). 1961 Oct 1;13:164-9.
PMID: 13921727 Spanish. No abstract available.

4 Cite
[Results of a 4-year serial test on apprentices of the **hairdresser** profession].
Borelli S, Moormann J, Düngemann H, Manok M.
Berufsdermatosen. 1965 Aug;13(4):216-38.
PMID: 4221238 German. No abstract available.

How does it look like, in the beginning

British Journal of Dermatology 2000; **142:** 1011–1012.

Interdigital dermatitis: sentinel skin damage in hairdressers

H.J.SCHWANITZ AND W.UTER

Department of Dermatology, Environmental Medicine and Health Theory, University of Osnabrück, Sedanstraße 115, D-49069 Osnabrück, Germany

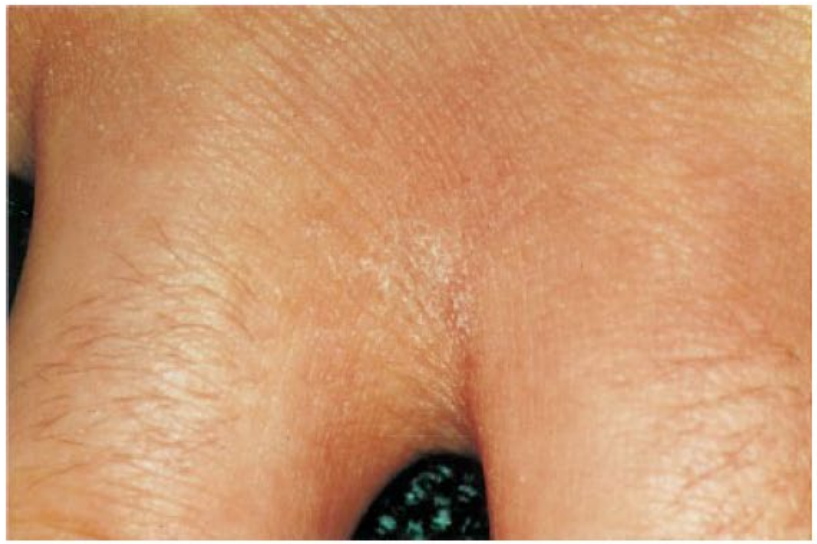


Figure 1. Mild interdigital dermatitis.

Figure 2. Moderate interdigital dermatitis.

How it may develop

More intense inflammation (above), spread (right)

How it may develop

Massive, chronic inflammation with painful fissures

How frequent is hand eczema?

To address/consider:

- Definition: “hand eczema” (HE) … “skin changes”, validated scores like HECSI or OHSI
- Assessment: “physical examination” vs. “self-report”, (repeat) cross-sectional vs. cohort study
- Frequency measure: “incidence” vs. “prevalence”, i.e., new HE cases during a time period vs. % of HE cases at a point in time or during a period

Skin changes in apprentices, 90ies

Wolfgang Uter · Annette Pfahlberg · Olaf Gefeller
Hans Joachim Schwanitz

Int Arch Occup Environ Health (1998) 71: 487–492

Prevalence and incidence of hand dermatitis in hairdressing apprentices: results of the POSH study

Methods: A cohort of 2,352 hairdressing apprentices (of the 2,570 invited to participate, i.e., 91.5% response) was prospectively followed for the duration of their vocational training (3 years) by three examinations. Three waves (years) were recruited in 1992, 1993, and 1994 from 15 vocational training schools in northwestern Germany.

Results: The point prevalence of (mostly slight) irritant skin changes of the hands increased from 35.4% in the initial examination to 47.5% in the intermediate examination and to 55.1% in the final examination. Given a more conservative definition of a case of "hand dermatitis," these estimates were 12.9%, 23.5%, and 23.9%, respectively. Altogether, 34.3 and 15.2 cases of "skin changes (any degree)" and "hand dermatitis," respectively, in 100 person-years were observed during the study period. The incidence rate, i.e., the number of newly diseased study participants in relation to the person-time at risk contributed, decreased in

Current systematic review

Prevalence and incidence of hand eczema in hairdressers—A systematic review and meta-analysis of the published literature from 2000–2021

Martin S. Havmose[1] | Sanja Kezic[2] | Wolfgang Uter[3] | Cara Symanzik[4,5] | Sarah Hallmann[3] | Julia Strahwald[3] | Patricia Weinert[5] | Marija Macan[6] | Rajka Turk[6] | Henk F. van der Molen[2] | Željka Babić[6] | Jelena Macan[6] | Swen M. John[4,5] | Jeanne D. Johansen[1]

Contact Dermatitis. 2022;86:254–265.

Current systematic review (2)

Eight studies were cohort studies[7,16-22] and 11 were cross-sectional studies.[11,23-32] Hand eczema was assessed by a questionnaire in 14 studies,[7,19-23,25-32] of which 7 used the Nordic Occupational Skin Questionnaire (NOSQ).[7,20-22,28,31,32] Five studies used clinical examinations in assessing current hand eczema,[16,26,29,32,33] of which two used standardized scoring systems (one used HECSI[11] and one used OHSI[32]). A single study used a registry of hairdressers with recognized occupational HE.[18]

Results: A pooled lifetime prevalence of 38.2% (95% confidence interval [CI] 32.6-43.8), a pooled 1-year prevalence of 20.3% (95% CI 18.0-22.6), and a pooled point prevalence of 7.7% (95% CI 5.8-9.6) of HE was observed in hairdressers. The lifetime prevalence in fully trained hairdressers and hairdressing apprentices was almost identical. The pooled incidence rate of HE was 51.8 cases/1000 person-years (95% CI 42.6-61.0) and the pooled prevalence of atopic dermatitis was 18.1% (95% CI 13.6-22.5).

Current systematic review (3)

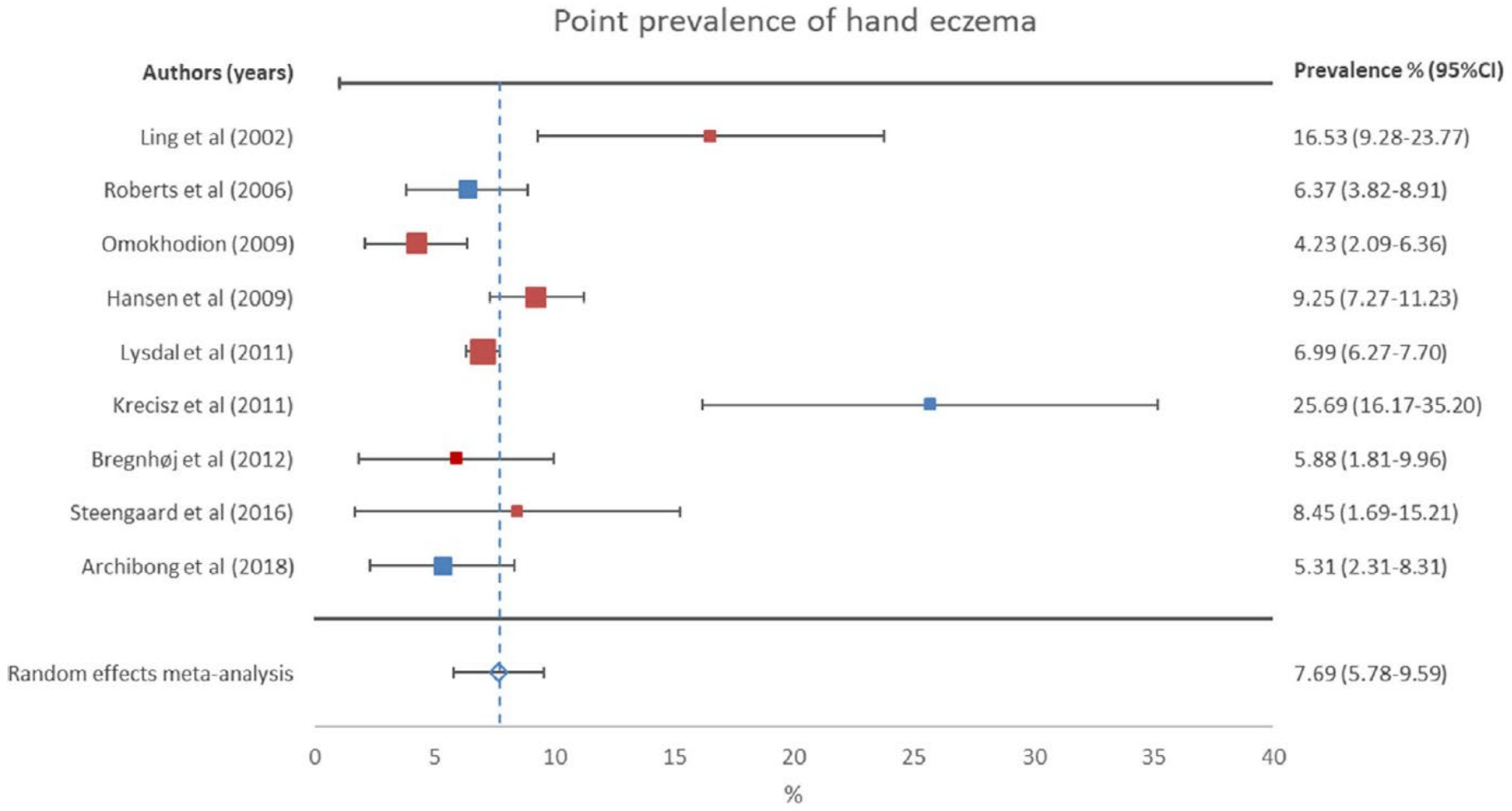


FIGURE 4 Point prevalence of hand eczema in 7542 hairdressers/hairdressing apprentices. Red dot indicates self-reported point prevalence and blue dots indicate point prevalence assessed by clinical examination. $I^2 = 77.0$

Contact allergy to specific agents

BMJ Open

Protocol for a systematic review on systemic and skin toxicity of important hazardous hair and nail cosmetic ingredients in hairdressers

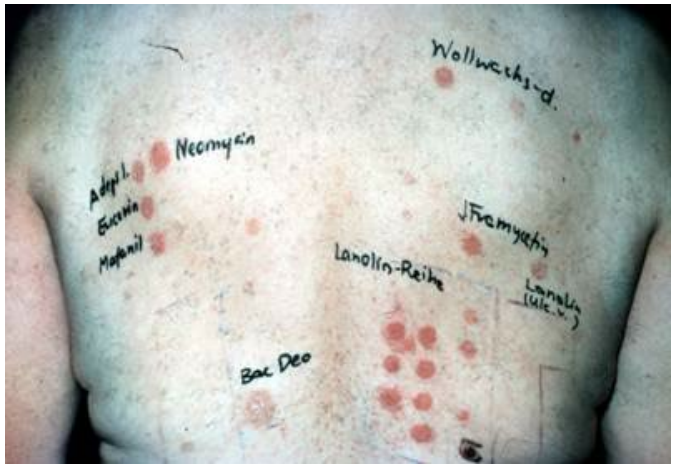
Wolfgang Uter ,[1] Jeanne D. Johansen,[2] Martin S. Havmose,[2] Sanja Kezic,[3] Henk F. van der Molen ,[3] Jelena Macan,[4] Željka Babić,[4] Rajka Turk,[4] Cara Symanzik,[5] Swen M. John[5]

Uter W, *et al. BMJ Open* 2021;**11**:e050612. doi:10.1136/bmjopen-2021-050612

Table 2 List of most relevant product groups in hairdressing with substances finally included into the systematic review

	Product category	Substance(s)
1	Oxidative hair dyes/ colourants	*p*-Phenylenediamine (PPD; CAS no. 106-50-3) and its salts (CAS no. 624-18-0, 16245-77-5), toluene-2,5-diamine (PTD; CAS no. 95-70-5) and its sulphate (CAS no. 615-50-9), 2-methoxymethyl-PPD (mePPD; CAS no. 337906-36-2)
2	Bleaches	Persulfate salts: ammonium, APS, CAS no. 7727-54-0; potassium, PPS, CAS no. 7727-21-1; sodium, SPS, CAS no. 7775-27-1
3	Perms and relaxing substances	Salts and esters of thioglycolic acid: glyceryl thioglycolate (GMTG; CAS no. 30618-84-9), ammonium thioglycolate (ATG; CAS no. 5421-46-5)
4	Cosmetic glues	2-Hydroxyethyl methacrylate (HEMA; CAS no. 212-782-2), ethyl cyanoacrylate (ECA; CAS no. 7085-85-0)

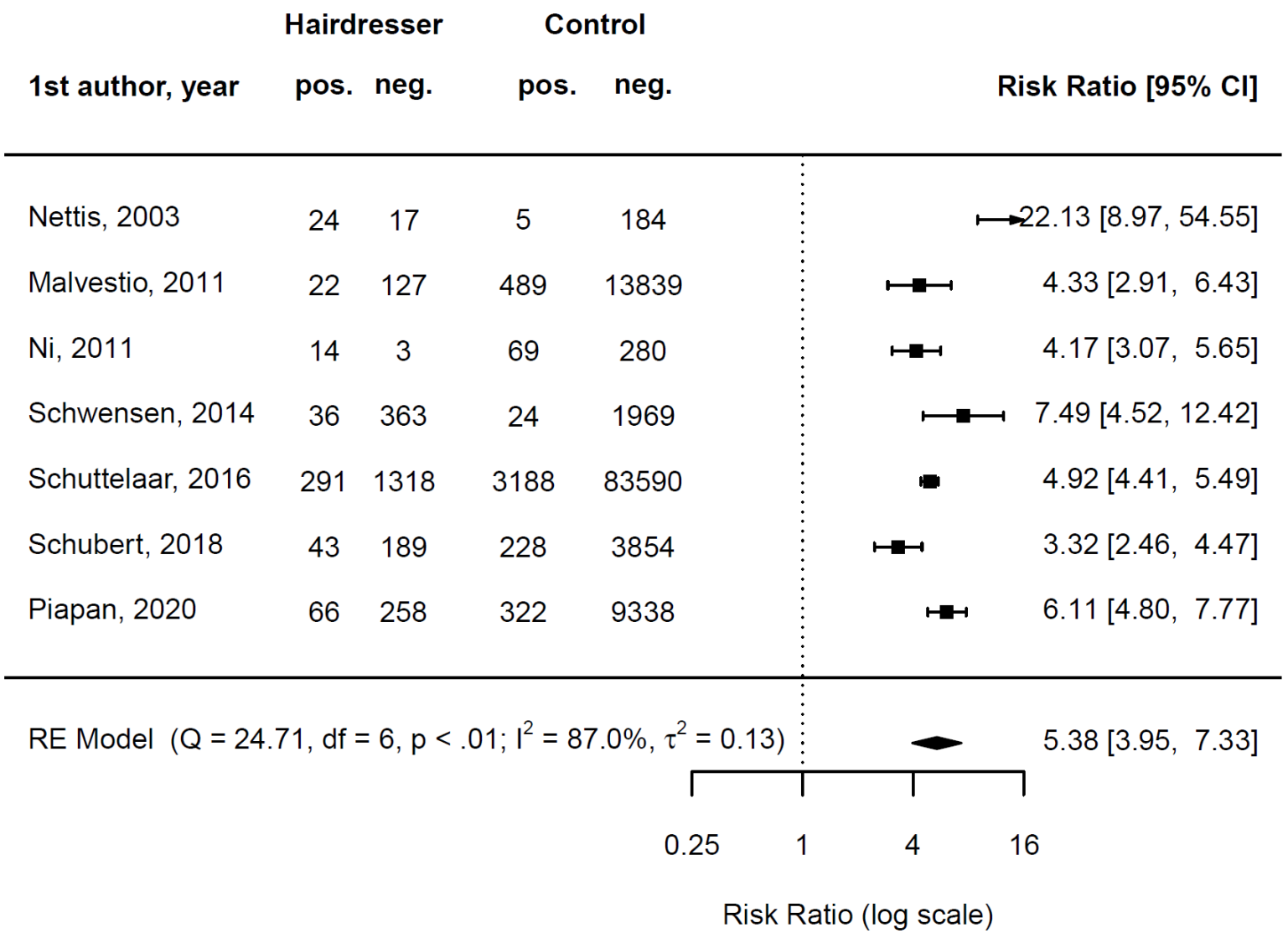
Assessment based on patch test



Patch test results: interpretation

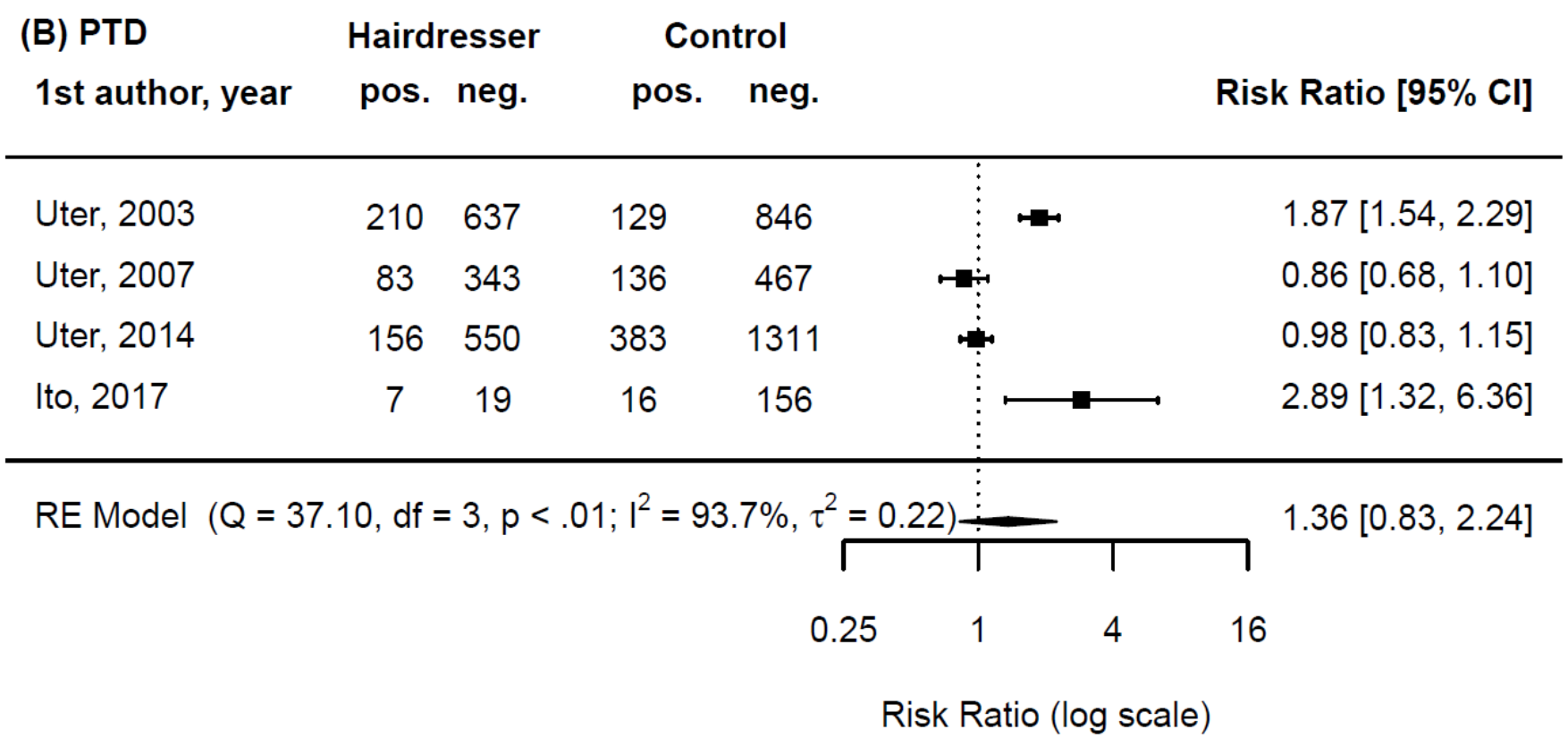
- Proven diagnostic method
- Limited access to health care may lead to under-estimation of allergy frequency
- Patch test (PT) results presented …
  - as prevalences in patch tested patients (!)
  - as risk quotients of these prevalences in hairdressers vs. other patients (“**risk ratio**”)

p-Phenylenediamine

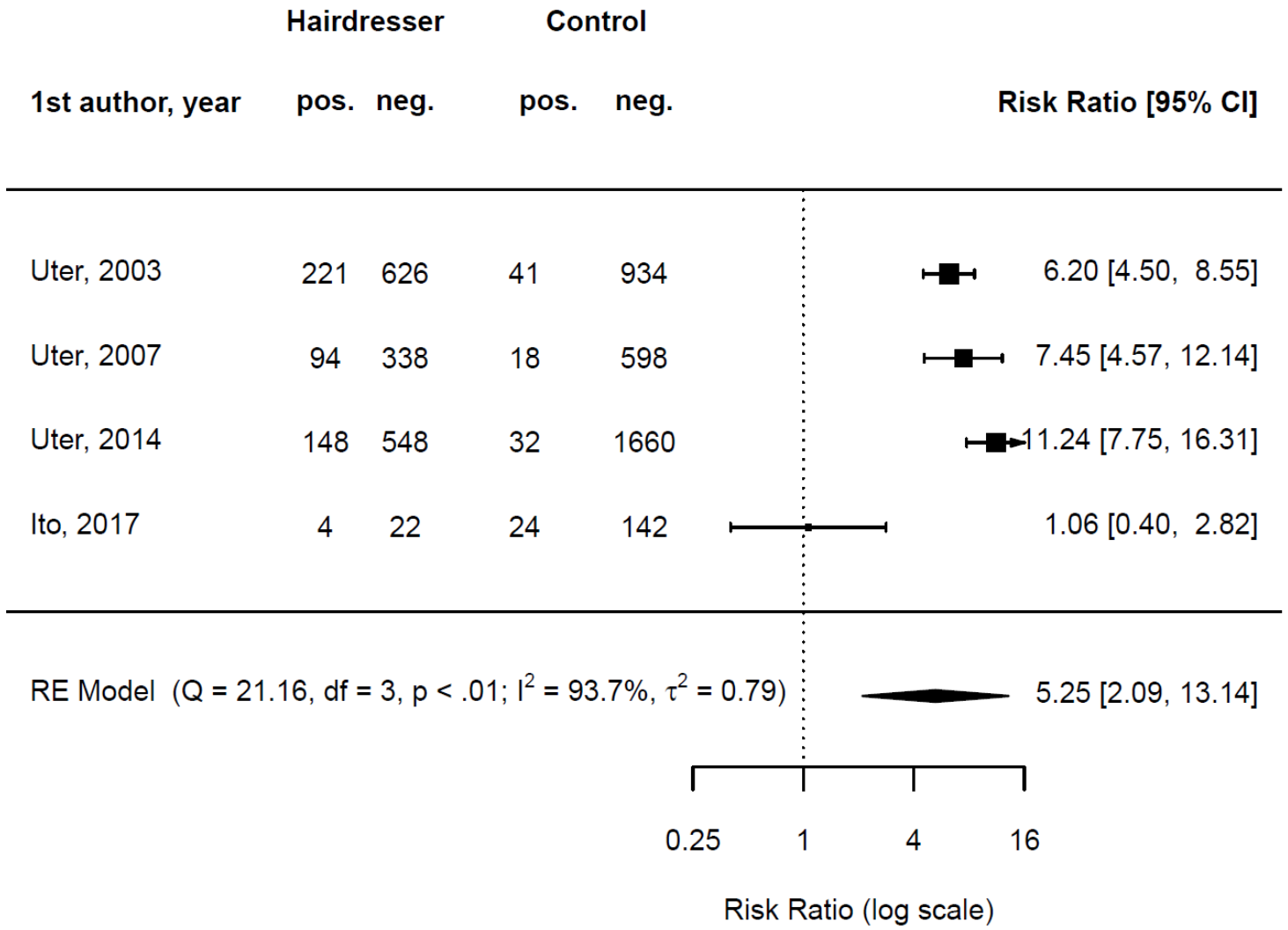


Toluene-2,5-diamine

Comprising only clients or self-users of hair cosmetics with suspected allergy!

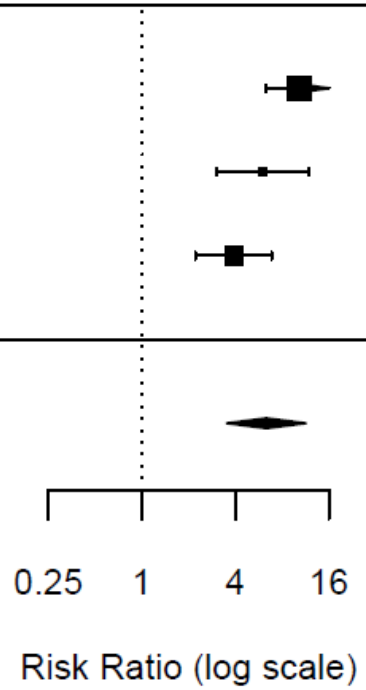


Ammonium persulfate

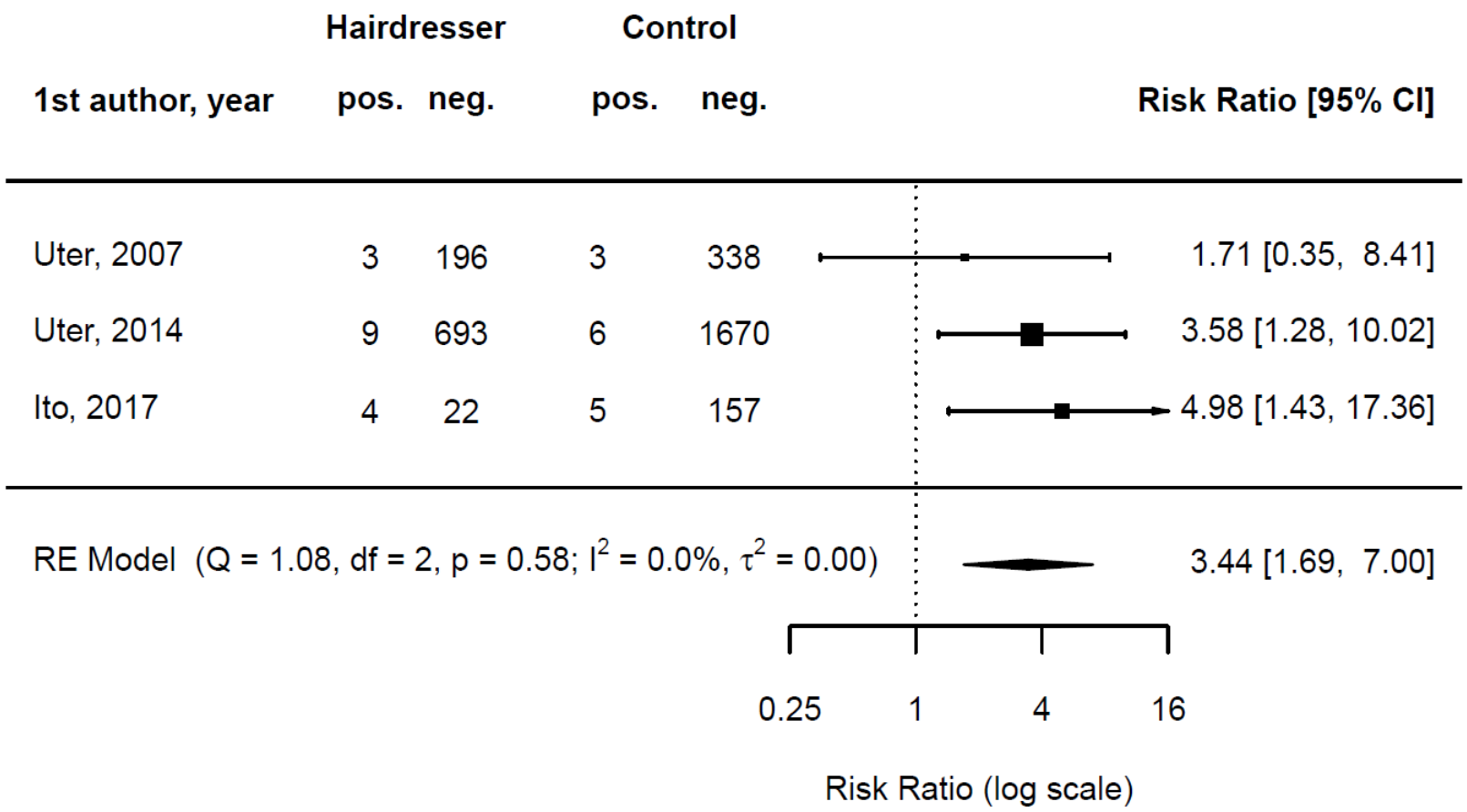


Glyceryl thioglycolate

1st author, year	Hairdresser pos.	Hairdresser neg.	Control pos.	Control neg.	Risk Ratio [95% CI]
Uter, 2003	153	694	17	958	10.36 [6.33, 16.95]
Uter, 2007	42	387	10	604	6.01 [3.05, 11.85]
Uter, 2014	31	671	19	1657	3.90 [2.22, 6.85]
RE Model (Q = 6.65, df = 2, p = 0.04; I^2 = 68.1%)					6.33 [3.52, 11.39]



Ammonium thioglycolate

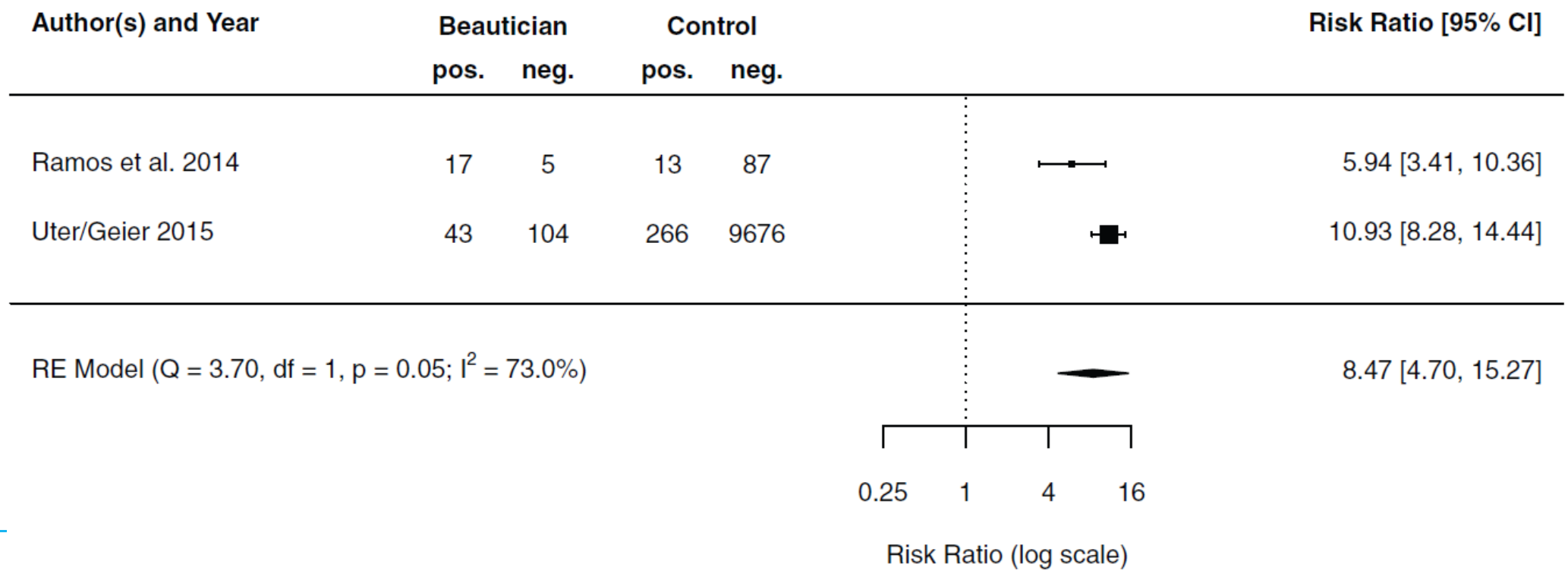


2-Hydroxyethyl methacrylate

Allergic contact dermatitis caused by 2-hydroxyethyl methacrylate and ethyl cyanoacrylate contained in cosmetic glues among hairdressers and beauticians who perform nail treatments and eyelash extension as well as hair extension applications: A systematic review

Cara Symanzik[1,2] | Patricia Weinert[2] | Željka Babić[3] | Sarah Hallmann[4] | Martin S. Havmose[5] | Jeanne D. Johansen[5] | Sanja Kezic[6] | Marija Macan[3] | Jelena Macan[3] | Julia Strahwald[4] | Rajka Turk[3] | Henk F. van der Molen[6] | Swen M. John[1,2] | Wolfgang Uter[4]

Contact Dermatitis. 2022 Jun;86(6):480-492.



Conclusion

- The frequency of HE is high in hairdressers; onset is often during apprenticeship
- The current excess risk of contact allergy to important hair cosmetic ingredients has been quantified and is high
- Concerning mePPD and ethyl cyanoacrylate, exposure has been ascertained, but broad patch test data are yet lacking

Thank you for your attention!

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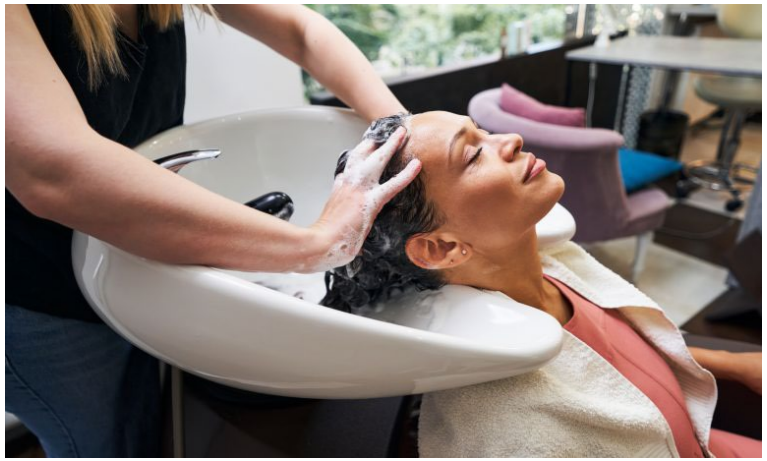
iDerm
Institut für interdisziplinäre Dermatologische Prävention und Rehabilitation
an der Universität Osnabrück

Promoting the autonomous implementation of the European framework agreement on occupational health and safety in the hairdressing sector

Skin exposure in hairdressers



Final Project Conference on 9 September 2022

Dr. rer. nat. Cara Symanzik, B.Sc., M.Ed.

https://i0.wp.com/scimoms.com/wp-content/uploads/2018/02/risk-hazard-sharks.png?resize=1040%2C693&ssl=1

Hairdresser conduct a lot of different work tasks…

- Cleaning and conditioning hair and scalp
- Massaging the head
- Cutting hair
- Colouring hair
- Lightening / bleaching hair
- Perming and relaxing hair
- Styling hair
- Make-up services
- Manicure services and hand massages

Washing the hair with shampoo

Product	Category of ingredients	Examples of ingredients
Shampoo	Detergents	Cocamide DEA Cocamido propylbetaine Sodium laureth sulfate

- How often is this task done? 5-12 times/day
- Regular glove wearing? 23.9%
- Differences in exposure? 6-13 times more exposed than consumers

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Deep conditioning the hair with hair conditioner

Product	Category of ingredients	Examples of ingredients
Conditioner	Detergents	Cocamide DEA Cocamido propylbetaine Sodium laureth sulfate

- How often is this task done? 1-5 times/day
- Regular glove wearing? 11.5%
- Differences in exposure? 5-19 times more exposed than consumers

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Colouring hair with permanent/oxidative hair colour using 6-12% hydrogen peroxide (full head)

Product	Category of ingredients	Examples of ingredients
Colour cream	Colouring agents	Toluene-2, 5-diamine (sulfate) p-Phenylenediamine (PPD) 2-Methoxymethyl-p-phenylenediamine (ME-PPD)

- How often is this task done? 30.6-76.6 times/month
- Regular glove wearing? 95.2%
- Differences in exposure? 32-78 times more exposed than consumers

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

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Breakthrough times!

Inadequate use!

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Colouring hair with semi-permanent oxidative hair colour using 2-3% hydrogen peroxide or non-oxidative hair colour (full head)

Product	Category of ingredients	Examples of ingredients
Colour cream	Colouring agents	Toluene-2, 5-diamine (sulfate) p-Phenylenediamine (PPD) 2-Methoxymethyl-p-phenylenediamine (ME-PPD)

- How often is this task done? 3 times/week
- Regular glove wearing? 95.2%
- Differences in exposure? 4 times more exposed than consumers

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Colouring hair with semi-permanent oxidative hair colour using 2-3% hydrogen peroxide or non-oxidative hair colour (full head)

Product	Category of ingredients	Examples of ingredients
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- How often is this task done? 3 times/week
- Regular glove wearing? 95.2%
- Differences in exposure? 4 times more exposed than consumers

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Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Colouring hair (root/regrowth only) using oxidative/non-oxidative hair colours according to previous treatment

Product	Category of ingredients	Examples of ingredients
Colour cream	Colouring agents	Toluene-2, 5-diamine (sulfate) p-Phenylenediamine (PPD) 2-Methoxymethyl-p-phenylenediamine (ME-PPD)

- How often is this task done? 11.5 times/month
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Bleaching the hair with bleach using mostly using 6-9% hydrogen peroxide (full head)

Product	Category of ingredients	Examples of ingredients
Bleaching powder Bleaching cream	Bleaching agents	Persulfate salts: Potassium persulfate Ammonium persulfate Sodium persulfate

- How often is this task done? 7.6-47.9 times/month
- Regular glove wearing? 77.9%
- Differences in exposure? 9-49 times more exposed than consumers

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

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A special case: cosmetic glues

- Hair extension applications
- Make-up services: bridal make-up, evening make-up
- Nail cosmetics, manicures; new trends (daylight curing ‘hybrid’ gel nail polish)

Symanzik, C, Weinert, P, Babić, Ž, et al. Allergic contact dermatitis caused by 2-hydroxyethyl methacrylate and ethyl cyanoacrylate contained in cosmetic glues among hairdressers and beauticians who perform nail treatments and eyelash extension as well as hair extension applications: A systematic review. *Contact Dermatitis*. 2022; 86(6): 480- 492. doi:10.1111/cod.14056

Hairdressers doing nail treatments and make-up services

Information from **framework curricula**

Country	Nail treatments	Make-up services
Austria	yes	yes
Germany	yes	yes
Spain	yes	no
Switzerland	yes	no
Denmark	no	yes
Croatia	no	no
France	no	no
Netherlands	no	no
Portugal	no	no

Symanzik, C, Weinert, P, Babić, Ž, et al. Allergic contact dermatitis caused by 2-hydroxyethyl methacrylate and ethyl cyanoacrylate contained in cosmetic glues among hairdressers and beauticians who perform nail treatments and eyelash extension as well as hair extension applications: A systematic review. *Contact Dermatitis*. 2022; 86(6): 480- 492. doi:10.1111/cod.14056

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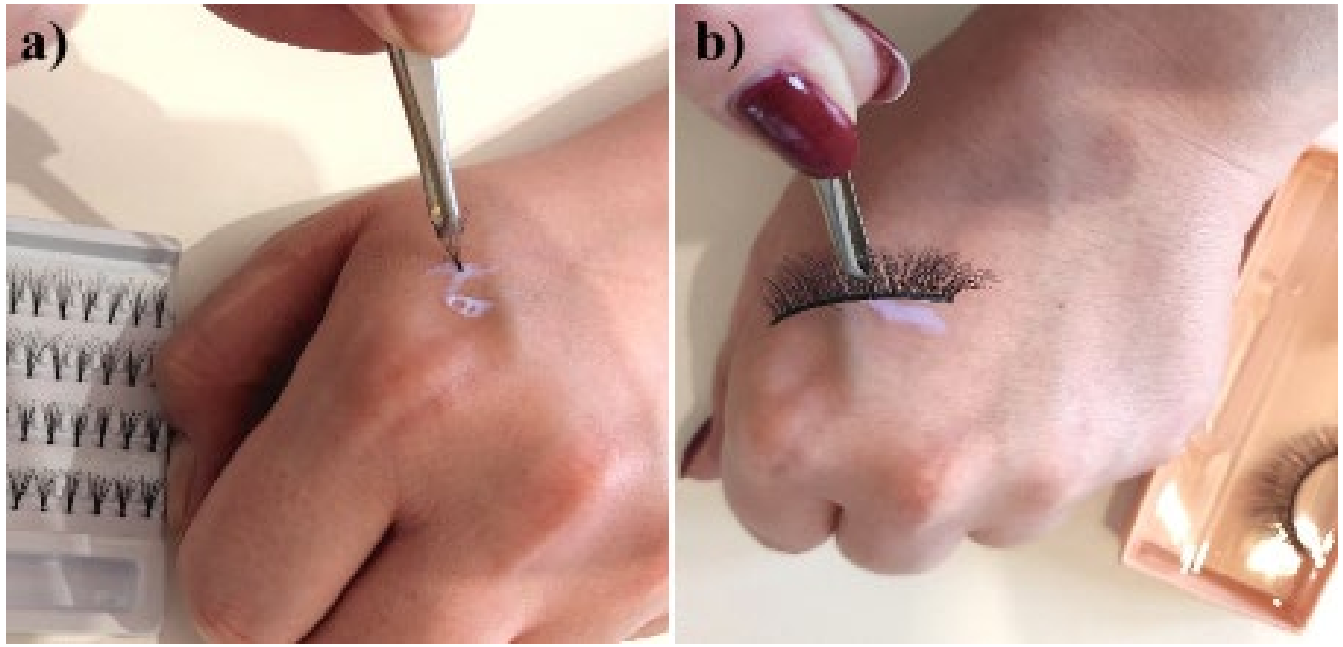

Residue adequately removed?

Symanzik, C, Weinert, P, Babić, Ž, et al. Allergic contact dermatitis caused by 2-hydroxyethyl methacrylate and ethyl cyanoacrylate contained in cosmetic glues among hairdressers and beauticians who perform nail treatments and eyelash extension as well as hair extension applications: A systematic review. *Contact Dermatitis*. 2022; 86(6): 480- 492. doi:10.1111/cod.14056

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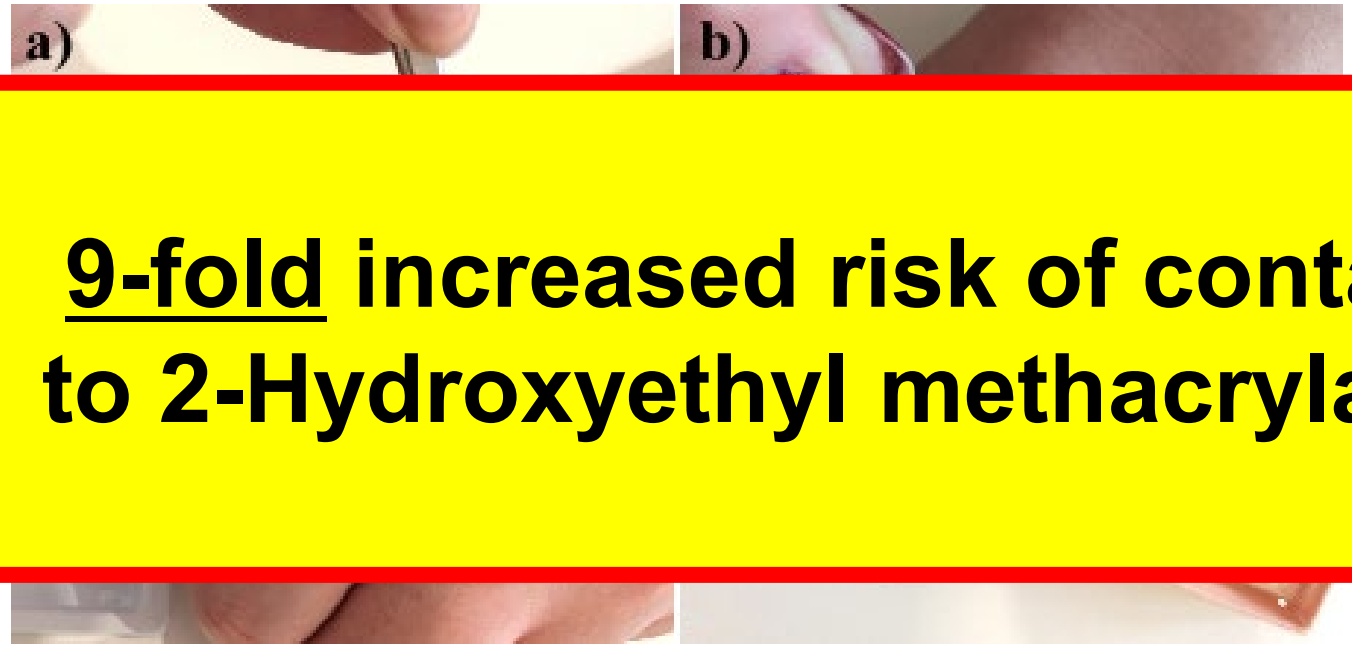


9-fold increased risk of contact allergy to 2-Hydroxyethyl methacrylate (HEMA)

Symanzik, C, Weinert, P, Babić, Ž, et al. Allergic contact dermatitis caused by 2-hydroxyethyl methacrylate and ethyl cyanoacrylate contained in cosmetic glues among hairdressers and beauticians who perform nail treatments and eyelash extension as well as hair extension applications: A systematic review. *Contact Dermatitis*. 2022; 86(6): 480- 492. doi:10.1111/cod.14056

Styling the hair

Product	Category of ingredients	Examples of ingredients
Hairspray Gel Wax	Film-forming agents	Polyvinylpyrrolidone (PVP) PVP-copolymers

- Daily task
- Usually no gloves are worn
- Residue removed by washing the hands?

Symanzik C, Weinert P, Babić Ž, Hallmann S, Havmose MS, Johansen JD, Kezic S, Macan M, Macan J, Strahwald J, Turk R, van der Molen HF, John SM, Uter W. Skin Toxicity of Selected Hair Cosmetic Ingredients: A Review Focusing on Hairdressers. Int J Environ Res Public Health. 2022 Jun 21;19(13):7588. doi: 10.3390/ijerph19137588. PMID: 35805241

Perming and relaxing the hair

Product	Category of ingredients	Examples of ingredients
Perming solution Relaxing balm	Perms and relaxers	Cysteamine hydrochloride (cysteamine-HCl) Glyceryl thioglycolate Ammonium thioglycolate

- High popularity of permanent remodelling of the hair structure also in men: “this '80's hairstyle is back in a big way, and especially popular among men” (https://www.menshealth.com/grooming/a40683569/perms-for-men/)

- New trends (Brazilian blowouts or keratin treatments) = new exposures

Cutting wet hair (possibly directly after colouring)

- Residue of hair colouring agents, e.g. PPD
- Hair care / styling products, e.g. film-formers, resins, fragrances
- Regularly no gloves are worn
- ***Wet work***; swellling of *Str. corneum* -> epidermal barrier function ↓

What is wet work?

- exposure to humid environments / water (>2h/d)
- high frequencies of hand washing procedures
- prolonged glove occlusion

What is wet work?

- exposure to humid environments / water (>2h/d)
- high frequencies of hand washing procedures
- prolonged glove occlusion

Main risk factor for occupational (irritant) hand eczema.

Wet work in hairdressers: Wet work (h/day)

Study	Hairdressers' exposure according to the respective study (mean values)
Kralj et al. (2011), n=106	8234±3826s (for 8h shifts)
Lysdal et al. (2012), n=2896	never: 0.1% <½h/day: 2.2% ½h-1h/day: 4.1 >1-<2h/day: 7.0% 2-3h/day: 16.8% >3-<4h/day: 15.8% ≥4h/day: 54.0%
Lund et al. (2019), n=74	4.75±2.63 h/d

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Wet work in hairdressers: Hand washing (times/day)

Study	Hairdressers' exposure according to the respective study (mean values)
Lysdal et al. (2012), n=2911	0-5 times/day: 22.0% 6-10 times/day: 41.1% 11-20 times/day: 29.9% >20 times/day: 7.0%

Handwashing at least 8–10 times daily significantly increases risk of hand eczema.

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Wet work in hairdressers: Glove wearing (h/day)

Study	Hairdressers' exposure according to the respective study (mean values)
Lysdal et al. (2012), n=2887	<½h/day: 5.8%
	½h/day: 19.6%
	>1-<2h/day: 33.7%
	2-3h/day: 31.7%
	>3-<4h/day: 6.8%
	≥4h/day: 2.4%

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Additional potential sources of exposure

Product	Potentially harmful substances (extract)	Tasks
hot wax, sugaring paste	colophony, cera alba, fragrances	Depilation of body hair (e.g. facial hair in women)
metal tools / objects (e.g. tweezers, crochet hooks)	nickel and / or cobalt	Tweezers: to pluck eyebrows Crochet hooks: for highlighting the hair using a cap

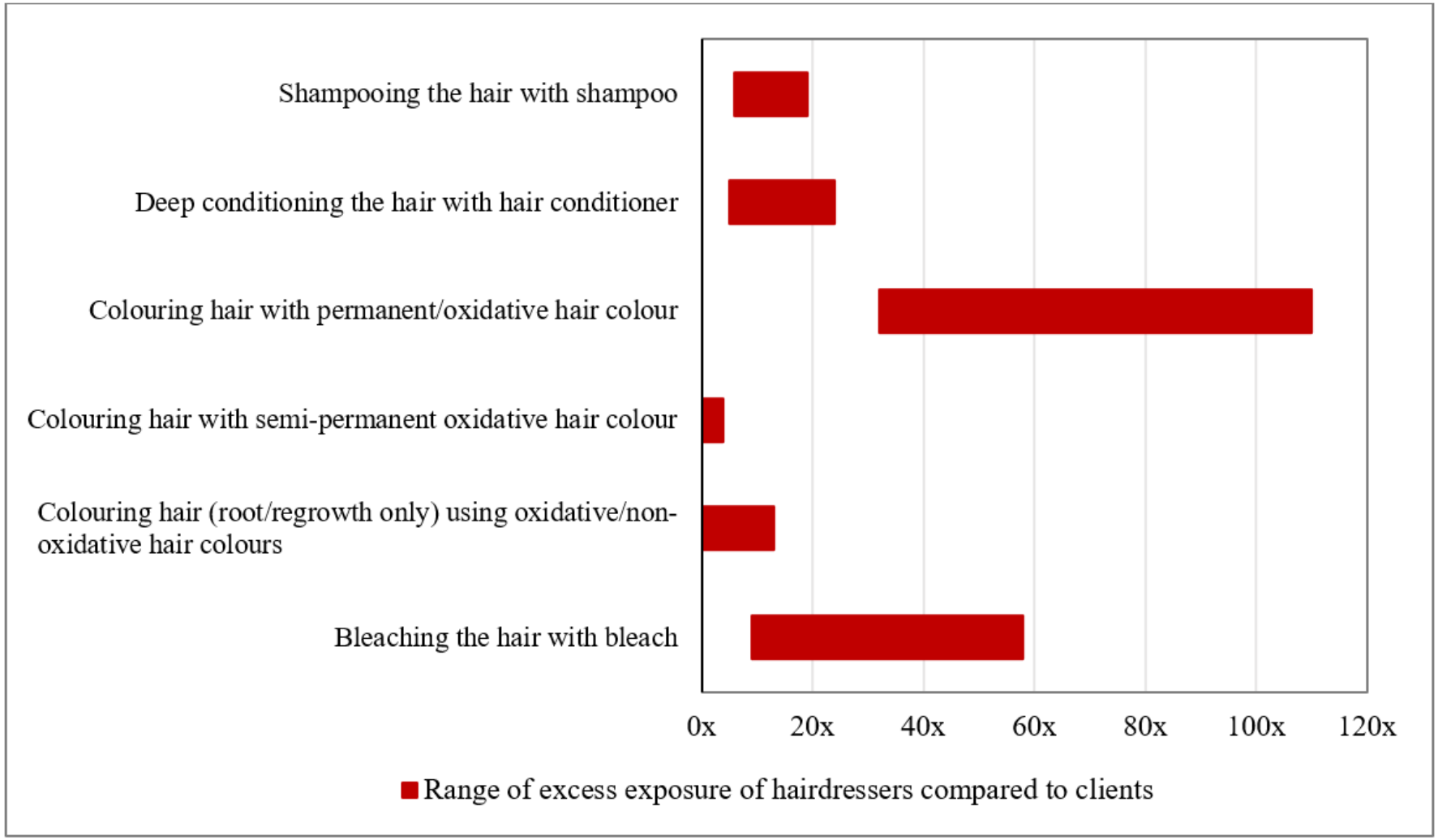
Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Hairdresser exposure vs. client exposure

Procedure with products types	Likely performed by consumers?
Shampooing/washing hair using **shampoo**	yes, possibly daily
(Deep) Conditioning hair using hair **conditioner**	yes, possibly daily
Colouring hair i) with **permanent/oxidative** hair colour using 6-12% hydrogen peroxide on the full head, ii) with **semi-permanent oxidative hair** colour using 2-3% hydrogen peroxide or non-oxidative hair colour on the full head, iii) on the **root/regrowth** only with oxidative/non-oxidative hair colours according to previous treatment	 i) yes, possibly monthly ii) yes, possibly monthly iii) yes, possibly monthly
Cutting wet hair i) without previously conducted **colouring service** and ii) after previously conducted **colouring service**	 i) no ii) no
Highlighting the hair (mostly using **bleach** with 6-9% hydrogen peroxide) and lowlighting the hair (mostly using **oxidative hair colour** with 6% hydrogen peroxide) **using (aluminium) foil**	no
Highlighting the hair (mostly using **bleach** with 6-9% hydrogen peroxide) and lowlighting (mostly using **oxidative hair colour** with 6% hydrogen peroxide) the hair **using a cap**	no
Perming the hair using **waving/perming lotions** (acid, alkaline, and exothermic perms)	no
Bleaching the hair with **bleach** using mostly 6-9% hydrogen peroxide on the **full head**	rarely
Colouring eyelashes and/or eyebrows with **oxidative hair colour** using mostly 3% hydrogen peroxide	highly unlikely

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Summary: Exposure of hairdressers vs. exposure of clients



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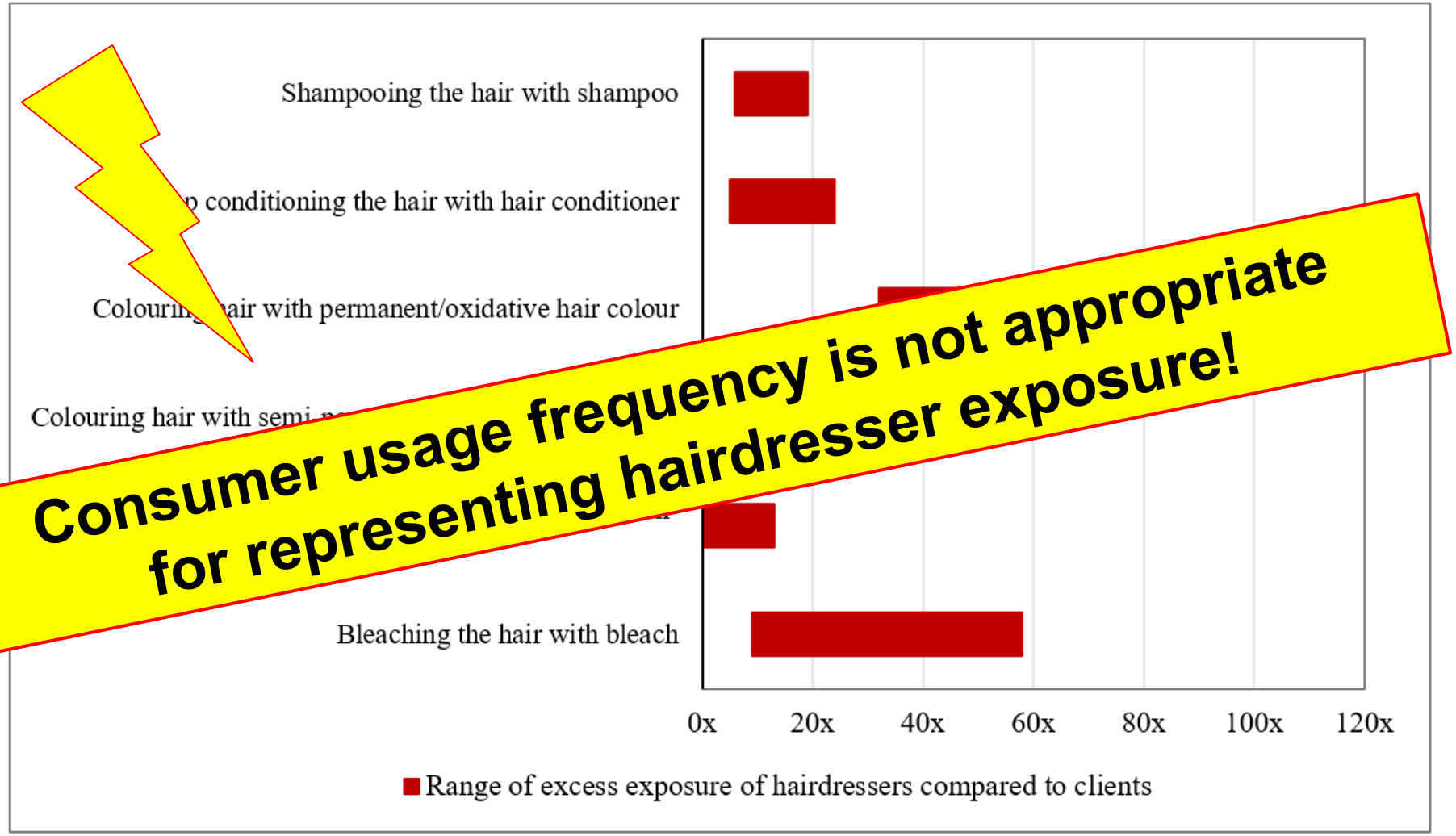


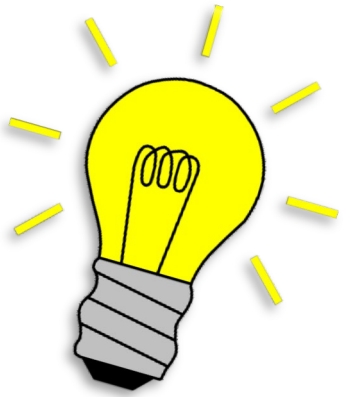
Consumer usage frequency is not appropriate for representing hairdresser exposure!

Symanzik, C, Johansen, JD, Weinert, P, et al. Differences between hairdressers and consumers in skin exposure to hair cosmetic products: A review. *Contact Dermatitis*. 2022; 86(5): 333- 343. doi:10.1111/cod.14055

Thank you very much for your attention!

Correpondence:
Dr. rer. nat. Cara Symanzik, B.Sc., M.Ed. ✉ cara.symanzik@uni-osnabrueck.de

Q/A - Discussion



Respiratory and systemic effects and exposure

RAJKA TURK, Jelena Macan, Željka Babić, Sanja Kežić

VS/2019/0440

"Promoting the autonomous implementation of the European framework agreement on occupational health and safety in the hairdressing sector"

Final project conference

9 September 2022

Respiratory effects of hairdressing chemicals

Irritation of respiratory system

- ammonia, acetone and similar solvents, formaldehyde, persulphate salts, hydrogene peroxide, etc.

Inflammatory disorders: rhinitis, asthma

- persulphate salts, formaldehyde

Tumor promotion/development ?

- aromatic amines (p-phenylenediamine)

Respiratory effects of hairdressing chemicals

Irritation of respiratory system

- intensity and duration of symptoms depends on the level of exposure and individual sensitivity
- burning sensation in the nose and throat, sneezing, runny nose, stuffy nose, dry cough;
- wheezing/shortness of breath (in sensitive persons)
- develops with high level exposure (usually above occupational exposure limits - OELs)

Respiratory effects of hairdressing chemicals

Inflammatory disorders

Rhinitis

- Nasal inflammation characterized with sneezing, runny nose, stuffy nose, nasal itching…
- Mechanisms involved:
  - Irritation - exposure to chemicals with irritative potential
    - Irritative rhinitis
  - Sensitization - exposure to chemicals with sensitizing properties
    - Allergic rhinitis
  - Rhinitis caused by exposure to chemicals with irritative/sensiziting properties at workplace, with symptoms present dominantly at workplace
    - Occupational rhinitis

Respiratory effects of hairdressing chemicals

Occupational rhinitis

- Symptoms often not present in form that compromise work or need medical help and therapy,

but,

- Nasal symptoms often preceed the development of asthma
  - Nasal symptoms are present firstly in up to 78% of workers with occupational asthma
  - Early recognition of occupational rhinitis can help to select and closely monitor workers with increased risk for the development of occupational asthma

Respiratory effects of hairdressing chemicals

Inflammatory disorders

Asthma

- Recurrent attacks of airways obstruction with symptoms of shortness of breath, wheezing, chest tightness after inhalation of causative agents
  - substances with irritative or sensitizing properties
    - irritative or allergic asthma
    - chemicals, ubiquitous inhalatory allergens (pollens, dust mites,…), cold air, physical exercise…
- **Occupational asthma**
  - caused by inhalation of hazardous agents at workplace
  - serious disease which compromise work, results in sick-leaves and often leaving the profession
  - development depends on levels of exposure (irritative asthma), sensitizing potential of a chemical, and individual susceptibility

Persulphate salts - main risk for occupational rhinitis/asthma in hairdressers

Macan J, Babić Ž, Hallmann S, Havmose MS, Johansen JD, John SM, Macan M, Symanzik C, Uter W, Weinert P, van der Molen HF, Kezic S, Turk R.

Respiratory toxicity of persulphate salts and their adverse effects on airways in hairdressers: a systematic review. Int Arch Occup Environ Health 2022

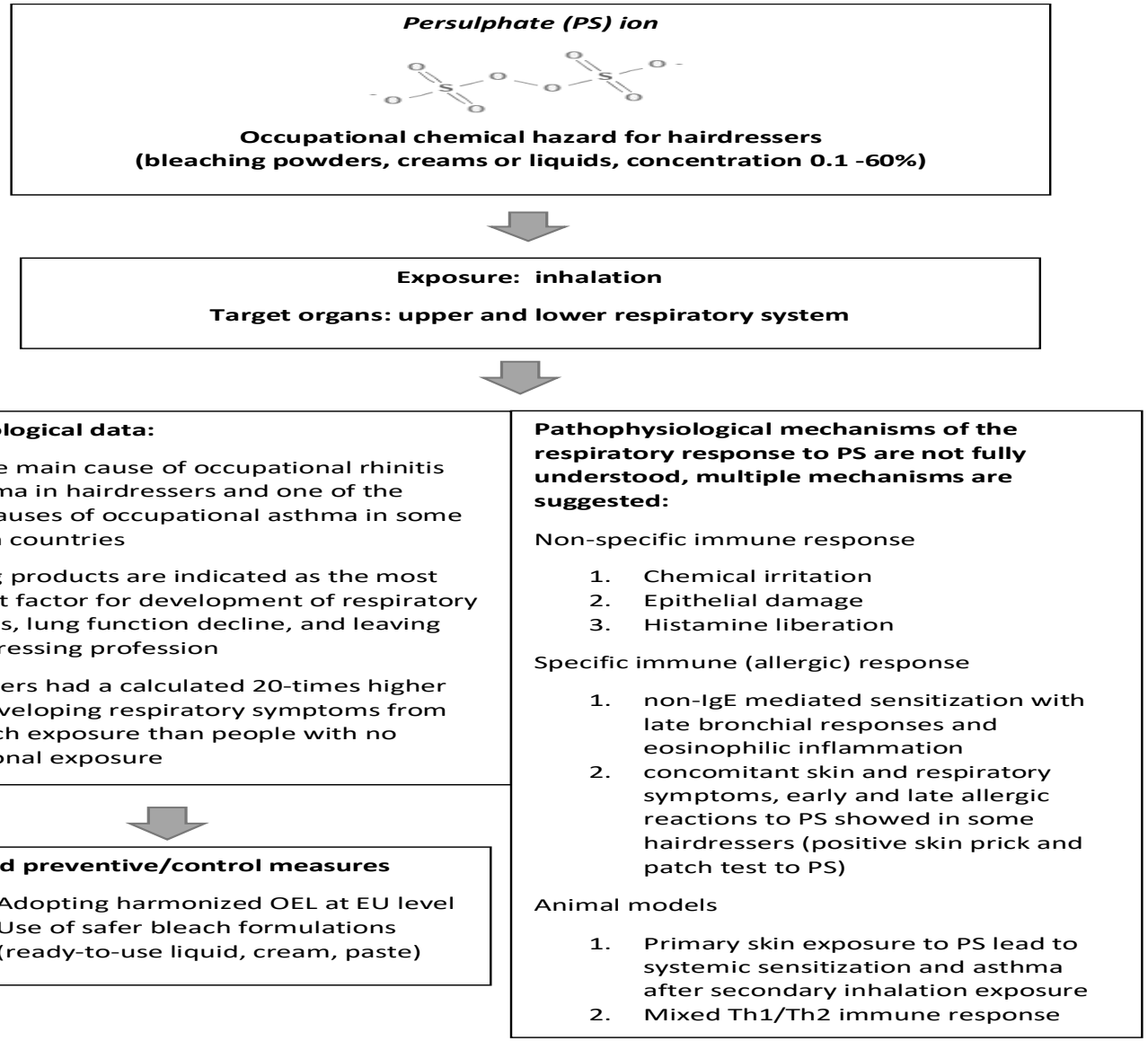


Figure 2. Main goals and outcomes of the systematic review.

Persulphate ion picture source:

https://pubchem.ncbi.nlm.nih.gov/compound/Sodium-persulfate#section=2D-Structure

Persulphate salts

- commonly used in hair products are ammonium ((NH4)2S2O8; CAS 7727-54-0), potassium (K2S2O8; CAS 7727-21-1) and sodium (Na2S2O8; CAS 7725-27-1) persulphate

- used to color, lighten or bleach hair, can be found in tonics, conditioners, other hair grooming aids, eye make-ups and toothpastes

- concentration range from 0.1 to 60%, formulated as powders (mixed with hydrogen peroxide just before application), creams or liquids

Persulphate salts

- no systemic toxicity expected (not likely to be systemically available by inhalation, ingestion, or skin exposure)
- no carcinogenic, mutagenic potential or reproductive toxicity
- main health risks are skin and respiratory toxicity:
  - irritative and allergic contact dermatitis
  - contact urticaria
  - generalized urticaria

  - **rhinitis**
  - **asthma**

Persulphate salts classification and labelling
(Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation)

• Ox. Sol. 3	H272 May intensify fire; oxidiser.
• Acute Tox. 4	H302 Harmful if swallowed.
• Skin Irrit. 2	H315 Causes skin irritation.
• Skin Sens. 1	H317 May cause an allergic skin reaction.
• Eye Irrit. 2	H319 Causes serious eye irritation.
• Resp. Sens. 1	H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
• STOT SE 3	H335 May cause respiratory irritation.

Persulphate salts - results

- data on the frequency, i.e. significance of respiratory disorders caused by persulphates are scarce
- mechanisms underlying respiratory responses are not fully understood
- we performed a systematic review of scientific literature for the last 20 years to find new data on adverse respiratory effects of persulphates in hairdressers
  - **42 relevant studies selected and analysed**

Persulphate salts – results

Exposure

- hairdressers are **exposed to hair bleaches significantly more** than their clients or consumers using hair-bleaching products at home
  - **About 2/3 of hairdressers and about 1/2 of hairdressing apprentices reported that they perform bleaching procedures ≥ 2 times per week, or ≥ 1 times per day**
- **self-reported respiratory symptoms and asthma** in hairdressers and hairdressing apprentices are **more frequent** in comparison to control subjects not occupationally exposed to hair bleach
- **bleaching products** are the most important factor for development of respiratory symptoms, lung function decline, and leaving the hairdressing profession
- hairdressers had **20 times higher risk** to develop respiratory symptoms from exposure to bleaching powder than persons occupationally not-exposed to hair bleaches

Persulphate salts – results

Occupational diseases

- Persulphate salts were confirmed as **the most common** cause of **occupational asthma in hairdressers** :
  - **87.5% of occupational asthma cases in Italian hairdressers**
  - **92% of occupational asthma cases in French hairdressers**

- Study from France described data from national registry about all occupational asthma cases (n= 2178) for the period 1996-1999:
  - Hairdressers - 4th most frequent occupation with a total of 149 cases
  - Persulphates - 5th most frequent cause of occupational asthma

Persulphate salts – results

Occupational diseases

- Persulphate salts suggested as the most common cause of **occupational rhinitis in hairdressers** in the study from Finland

- Rhinitis and asthma often occur together
  - Possible development of systemic hypersensitivity reactions in terms of **contact urticaria and anaphylaxis**

- Contact dermatitis and rhinitis/asthma can occur together, skin problems develop first

- An **irritant vocal cord dysfunction** after exposure to persulphates was described

Persulphate salts – conclusions

- Occupational exposure limits (**OELs**) for persulphates **not yet established** in EU
  - Studies suggest no increased risk of occupational respiratory disease from workplace exposures up to **1 mg/m^3** of ammonium persulphate
  - The American Conference for Governmental Industrial Hygienists defined 8-h time-weighted average OEL for persulphates at **0.1 mg/m^3**
  - Exposure measurements in EU salons performed only in Sweden and France
    - Concentrations in air up to **0.5 mg/m^3**

- Lack of **well-conducted cohort studies** at EU level is evident
  - Data available only for a few EU countries

- Research needs at EU level:
  - Frequency of respiratory disorders caused by persulphates
  - Patterns and levels of exposure
  - Implementation of preventive measures (formulation of products, ventilation, personal protective equipment)
  - Mechanisms of respiratory responses

Carcinogenicity
Reproductive toxicity

Babić Ž, Macan M, Franić Z, Hallmann S, Havmose MS, Johansen JD, John SM, Symanzik C, Uter W, Weinert P, van der Molen HF, Kezic S, Turk R, Macan J.

Association of hairdressing with cancer and reproductive diseases: A systematic review. J Occup Health 2022

Carcinogenicity
Reproductive toxicity

Hair product	Typical ingredients	Routes of exposure for hairdressers	Health hazards (Annex VI to the CLP Regulation (EC) No 1272/2008)
Oxidative hair dyes/colourants	Dye precursors *p*-phenylene diamine (PPD) or toluene-2,5-diamine (PTD)	Dermal and inhalation	Acutely toxic by ingestion, inhalation and skin contact, Local irritation in contact with skin and eyes, Sensitization after dermal contact
Perms and relaxing substances	Thioglycolic acid, its salts and esters	Dermal	
Hair bleaches	Persulphate salts	Dermal and inhalation	Acutely toxic by ingestion, inhalation and in contact with skin, Local irritation in contact with skin and eyes, Sensitization after dermal contact, Respiratory irritation and sensitization

Carcinogenicity

- **Hairdressing occupation** probably carcinogenic to humans (**IARC Group 2A**) *(International Agency for Research on Cancer (IARC) classification (2010):*
  - Hairdressers exposed to a mixture of chemicals: no single chemical could be pointed out, but
  - aromatic amines (permanent hair dyes) are considered to have the highest carcinogenic potential among hairdressing chemicals
- **Personal use of hair dyes** not classifiable as to its carcinogenicity to humans (**IARC Group 3**)

- The **risk for consumers** using hairdressing products has been deemed acceptable by the *Scientific Committee on Consumer Safety* (SCCS)
- SCCS risk assessment however **does not cover risk for professionals** in daily contact with hairdressing products at work

Carcinogenicity

Previous meta-analyses (published from 2008-2010, and 2016)

Inconsistent results

- 20-30% higher risk for **bladder cancer** in hairdressers in comparison to the general population or non-exposed occupations
- increased frequency of **laryngeal cancer** and **multiple myeloma** in hairdressers

Limitations

- epidemiological studies included spanned several decades (1950s to early 2000s)
- during this period ingredients in hair products changed significantly
- in the 1980s, carcinogenic aromatic amines were banned for use in hair dyes

Carcinogenicity – results and conclusions

We conducted a systematic review of epidemiological studies published in the last two decades, investigating carcinogenic (and reprotoxic) effects among hairdressers to provide an updated review (only studies in which cancer was diagnosed in a period starting from 1995 onwards were selected).

- very scarce literature data (only 4 studies found)
- 1 study from New Zealand found significantly higher risk for bladder cancer in hairdressers in comparison to general population
- association of hairdressing profession with lung and bladder cancer was not confirmed in 3 studies from EU (Italy, France, Spain)

- Based on the available insufficient evidence an **increased risk of carcinogenic effects cannot be completely ruled out** in hairdressers

Reproductive toxicity

Adverse effects on reproductive system investigated in the studies

- Infertility and menstrual disorders
- Congenital malformations (abnormalities present at birth)
- Poor neonatal health indicators
  - Low APGAR score (Appearance, Pulse, Grimace, Activity, and Respiration score- assessment of newborn health status 1 and 5 minutes after birth)
  - Low birth weight
- Maternal perinatal adverse effects
  - Premature birth
  - Fetal loss
  - Prolonged labor
  - Postpartum hemorrhage
  - Pregnancy induced hypertension/eclampsia
  - Placental disorders

Reproductive toxicity

Previous studies (published from 1960 do 2000)

- slightly increased **overall risks** (up to 20%) of several adverse reproductive outcomes among hairdressers
- most consistent results for **premature birth and low birth-weight**
- no single chemical could be pointed out

Reproductive toxicity – results and conclusions

We conducted a systematic review of epidemiological studies published in the last two decades, investigating reprotoxic (and carcinogenic) effects among hairdressers to provide an updated review.

Only studies in which adverse reproductive effects were diagnosed in a period starting from 1995 onwards were selected.

- scarce literature data (6 studies found)
- none of the 6 studies investigating outcomes including menstrual disorders, congenital malformations, fetal loss, small-for-gestational age children, and preterm delivery showed a significantly increased risk in hairdressers
- 2 studies from USA found increased frequency of:
  - heart wall defect in children with father working as hairdresser/barber
  - poor neonatal or maternal health indicators in mothers working as hairdressers (low Apgar score, pregnancy induced hypertension, slowed labor with delayed delivery, postpartum haemorrhage)

- There is **no clear indication that the hairdressing trade is still associated with adverse effects on reproduction,** particularly in EU studies, but **reprotoxic risk cannot be completely ruled out**

Occupational exposure of hairdressers to airborne hazardous chemicals

Kezic S, Nunez R, Babić Ž, Hallmann S, Havmose MS, Johansen JD, John SM, Macan M, Symanzik C, Uter W, Weinert P, Turk R, Macan J, van der Molen HF.

Occupational Exposure of Hairdressers to Airborne Hazardous Chemicals: A Scoping Review. Int J Environ Res Public Health 2022

Occupational exposure of hairdressers to airborne hazardous chemicals - results

- Respiratory and systemic adverse health effects are caused by inhalation and skin exposure to hairdressing chemicals
- Occupational exposure is, therefore, a critical factor in health risk assessment and management in hairdressing trade
- In this scoping review 23 articles covering inhalation exposure were included.
- Studies were performed in fifteen countries, of which (only) 5 originate from the EU.

Occupational exposure of hairdressers to airborne hazardous chemicals - results

Chemicals measured in hair salons: air concentrations for > 50 chemicals with a broad range of toxicity

Formaldehyde (8 studies)

- Hair smoothers and straighteners
- Category 1B carcinogen

Ammonia (5 studies)

- Hair dyes
- Rhinitis, asthma

Volatile organic solvents (5 studies) Toluene (4 studies)

- Hair sprays, waxes, fixers…
- Total VOC as a parameter of indoor air quality
- Neurotoxic, respiratory irritation, STOT, reprotoxic, cancer?

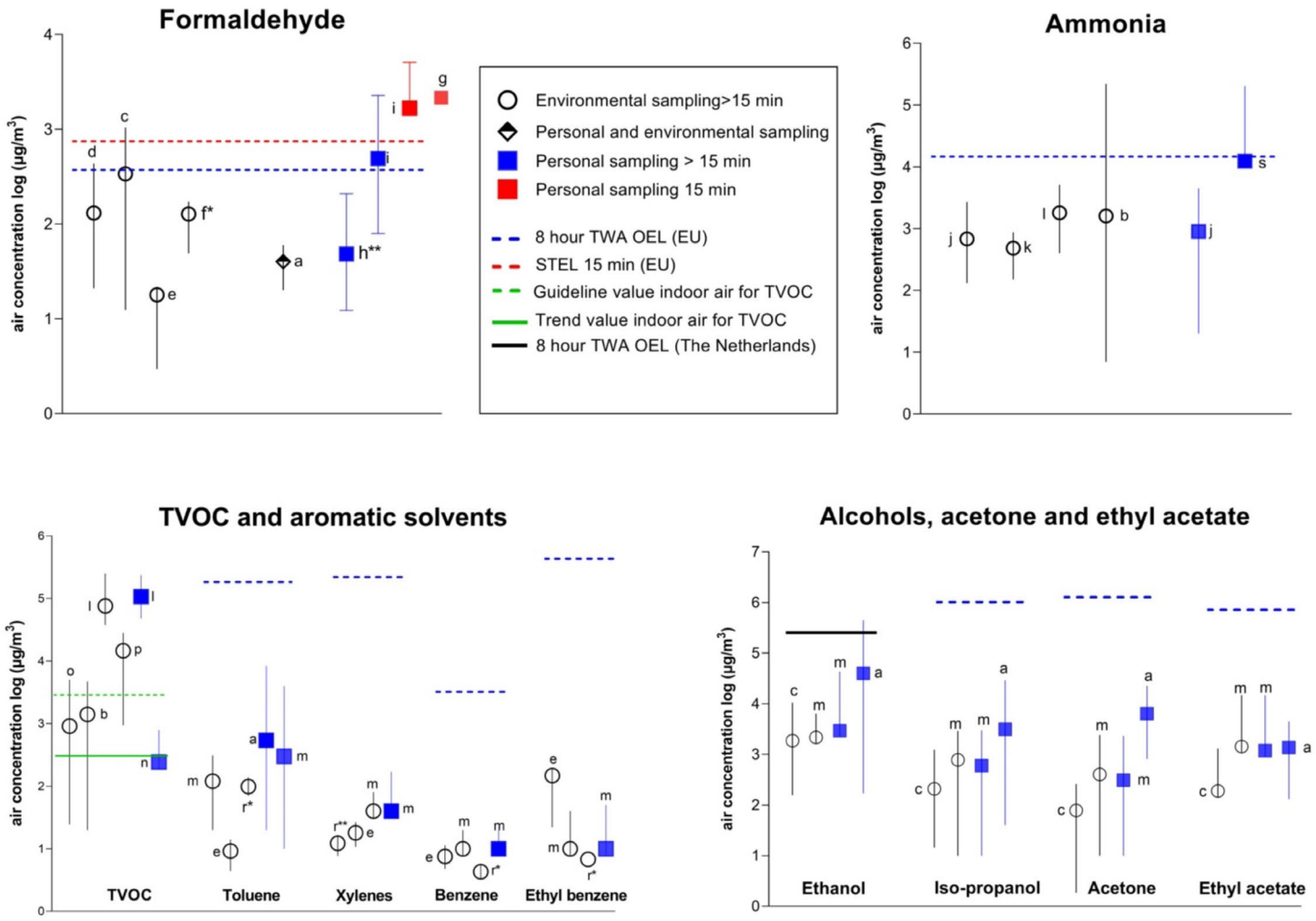
Particulate matter

- COPD

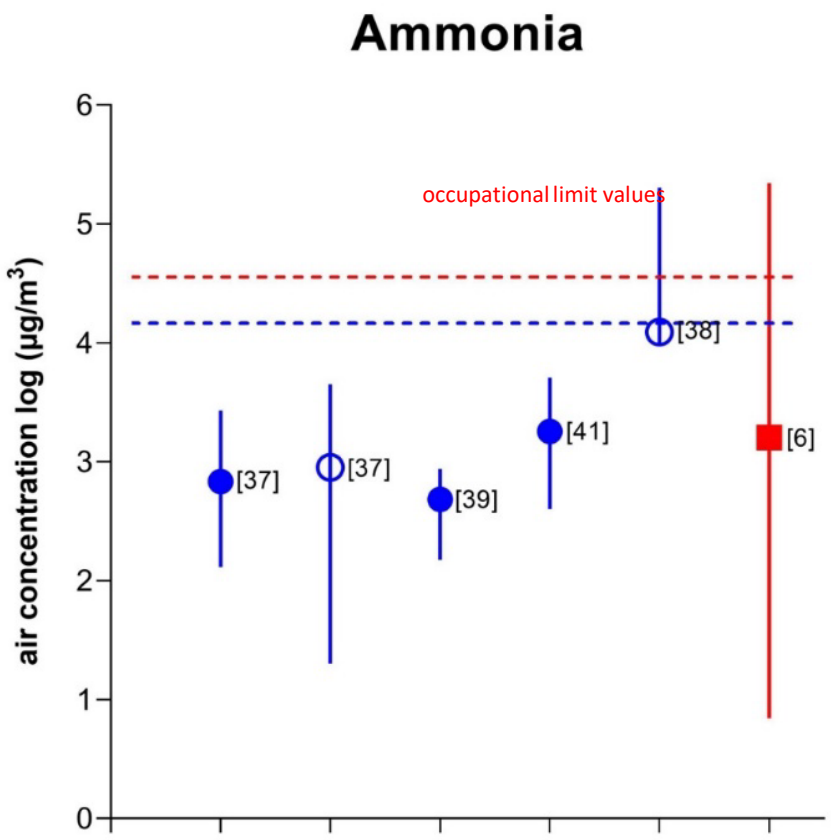
Persulfates

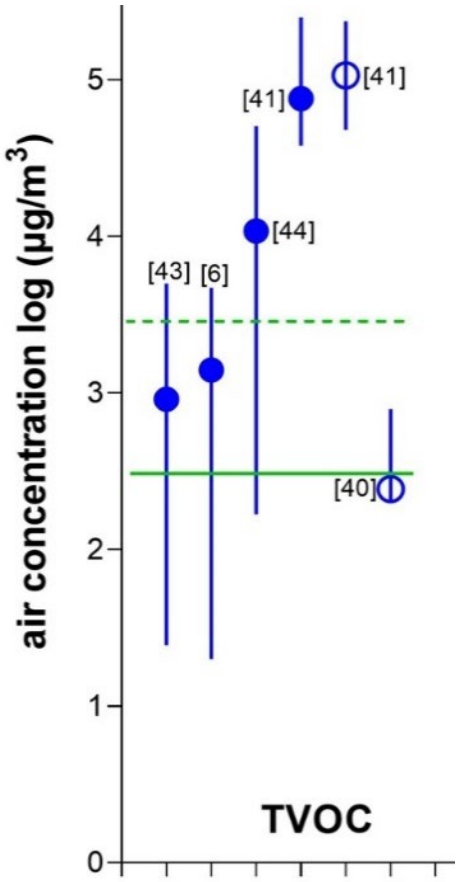
- Bleach products
- Rhinitis and asthma, strong sentisizer

Results on airborne concentrations



Air concentrations in some salons exceeded limit/guidance values





The effect of working conditions on the airborne concentrations

- ventilation (mechanical, AC, open doors/windows)
- size of the salon
- number of customers and hairdressers
- type of hairdressing activities and applied products, which depends on local safety regulations and the specific needs of the clients
- length of product application

Occupational exposure of hairdressers to airborne hazardous chemicals - conclusions

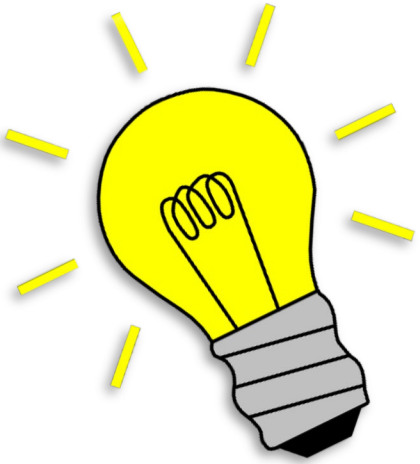
- Hairdressers are exposed to a wide spectrum of hazardous chemicals, often simultaneously
- Very few studies are performed in the EU countries
- For exposure to formaldehyde, ammonia, and TVOC exceeding OELs or guidance values for indoor air was reported
- Airborne concentrations depend on salon characteristics such as ventilation and number of customers, but also on used products that are often specific for the country or clientele.
- Exposure to organic solvents, known to be able to exert a wide range of health effects, often exceeded the proposed target or guidance levels for indoor air quality. Combined exposure to organic solvents with known endocrine and reproductive effects is of concern as a majority of hairdressers are of reproductive age

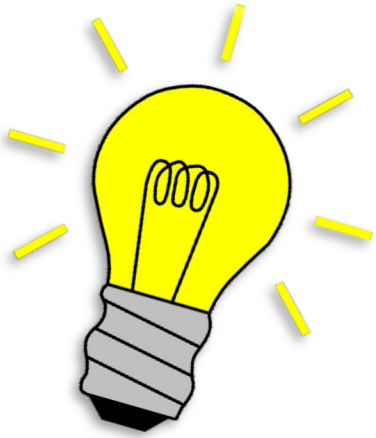
Prioritisation of product groups with respiratory/systemic effects aiming to improve health and safety in hairdressing

Product category	Substances	Relevant respiratory/systemic effects	Route of exposure	Prioritisation
Bleaches	**Persulfates**	Respiratory irritation and sensitization	Skin, airways	**Setting of EU OELs**
Oxidative hair dyes, colorants	**PPD, PTD, ME-PPD**	CMR?	Skin, airways, systemic absorption	**Studies on individual exposure and CMR potential**
Perms and relaxing substances	**Thioglycolates**	Respiratory irritation	Skin, airways, systemic absorption?	**Studies on internal exposure and reprotoxic effects, setting of biological exposure limits?**
Detergents	**Cocamide DEA**	Carcinogenicity (IARC 2B)	Skin, systemic absorption?	**Studies on individual exposure and toxicokinetics**

Thank you

Q/A - Discussion





Lunch break

REGION

Prevention

Jeanne Duus Johansen

Skin and Allergy Department, University of Copenhagen

National Allergy Research Centre and Research Centre for Hairdressers and Beauticians

Prevention

- **S** : Substitution (e.g. of substances by other agents)
- **T**: Technical measures (e.g. suitable room ventilation)
- **O**: Organizational measures (e.g. distribution of tasks such as wet work)
- **P**: Personal measures (e.g. supply suitable gloves)

Types of prevention

Primary prevention

PREVENT OR DELAY DISEASE

Risk assessment carried out in each salon

Use STOP principle

Secondary prevention

PREVENT DISEASE PROGRESSION

Intervene in risk situations

Reduce consequences of disease

Tertiary prevention

RESTORING HEALTH

New EU strategic framework on safety and health at work 2021-2027: Vision ZERO

SKIN

Problems identified in hairdressing trade

and

solutions

Jeanne Duus Johansen

Hand eczema: a major problem

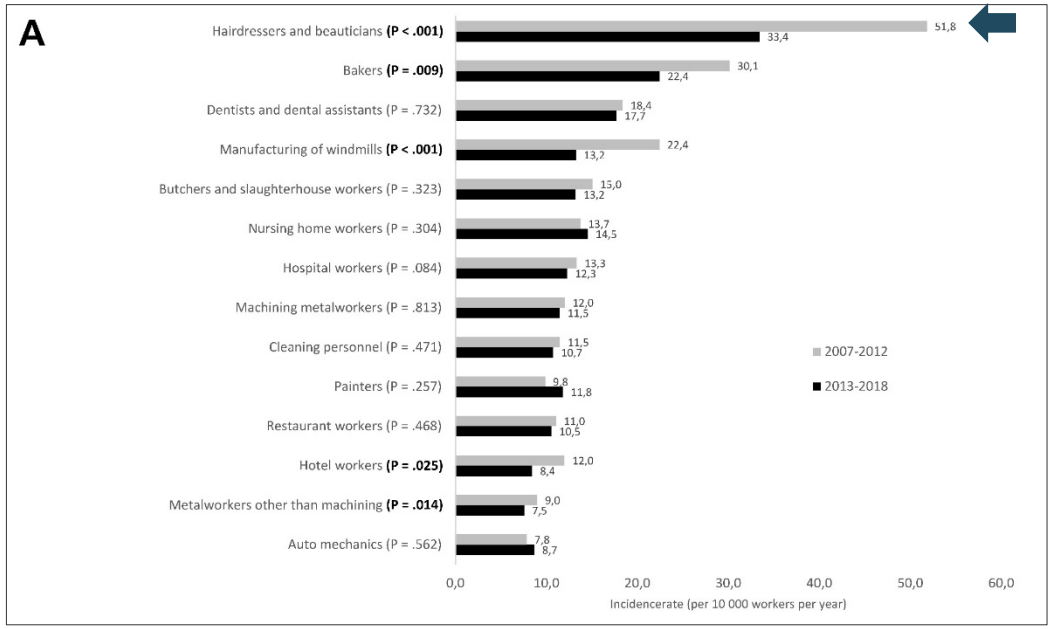
- Life-time: 38.2% of hairdressers develop hand eczema across Europe

Contact Dermatitis. 2022;86:254–265.

- Affects career: leaving the trade

- Socio-economics

Hairdressers: Top of statistics of occupational hand eczema



Contact Dermatitis. 2021;85:421–428.

Hand eczema

- Early onset, often under 25 years of age
- During apprenticeship or just after

Cohort 1985-2007; follow-up 2020:

- 68% of cases onset in apprenticeship
- >90% of hand eczema cases occurred within the first 8 years from start of apprenticeship.

JEADV2022,36,263–270

Swedish study of 7738 hairdressers

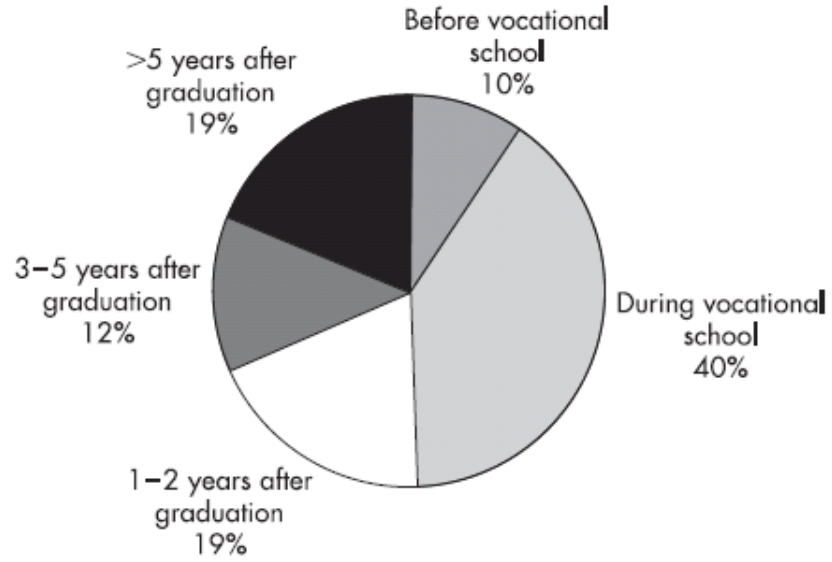
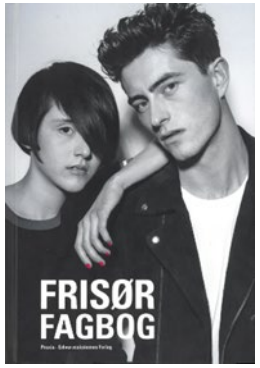


Figure 1 The proportion of hairdressers who reported onset of hand eczema during different time periods.

Lind ML.Occup Environ Med. 2007 Mar;64(3):191-5

Prevention: during apprenticeship

- At schools: skin protecting program
- Tested in 2008 and implemented at Danish schools in 2011 and by executive order in 2015:
  - Using gloves
  - Organization of work
  - Skin care
- Part of the textbook
- Part of the exam



Box 1 Special skin protection program for hairdressers

Use gloves when you wash, dye, bleach, and perm[10 24]
Cut before you dye the hair[25 26]
Mix in a separate, ventilated cabinet[27]
Disposable gloves must be clean, new, and dry[28]
Never reuse disposable gloves[28]
Use cotton gloves underneath protective gloves[29]
Use gloves for as long as nescessary, but as shortly as possible[29 30]
Use an unscented, lipid rich moisturizer[31–33]
Do not wear rings when you work[34]
Use gloves when doing wet work in your spare time[35]
Use warm gloves outside when it's cold[36]

Adapted from Bregnhøj A, Menné T, Johansen JD, Søsted H. Prevention of hand eczema among Danish hairdressing apprentices: an intervention study. Occup Environ Med. 2012

Comparing before and after introduction:
Those educated in 2004-2007 with 2015-2018

2135 hairdressers

Result: Risk of hand eczema reduced by 50%
In the hairdressers being educated.

Risk of hand eczema if trained after implementation of the skin protection program	aOR (95%CI)
All hairdressers	
Hand eczema ever (since beginning hairdressing training)	0.55 (0.40-0.77)
Within one year of the survey	0.61 (0.42-0.90)
***Current* hairdressers only**	
At the time of the survey	0.31 (0.12-0.95)

Contact Dermatitis 2022 Aug 26. doi: 10.1111/cod.

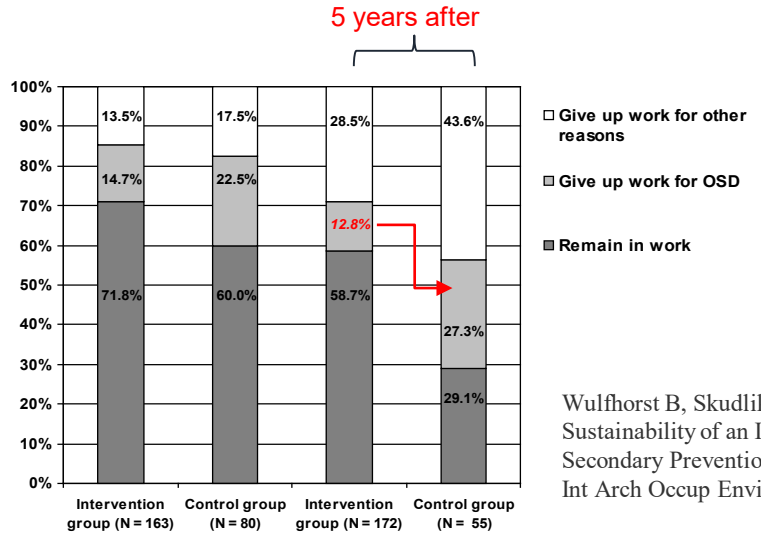
Improved knowledge of skin protection and compliance.

PREVENTION OF SKIN DISEASE IS IMPORTANT EVEN IN EARLY CAREER STAGES

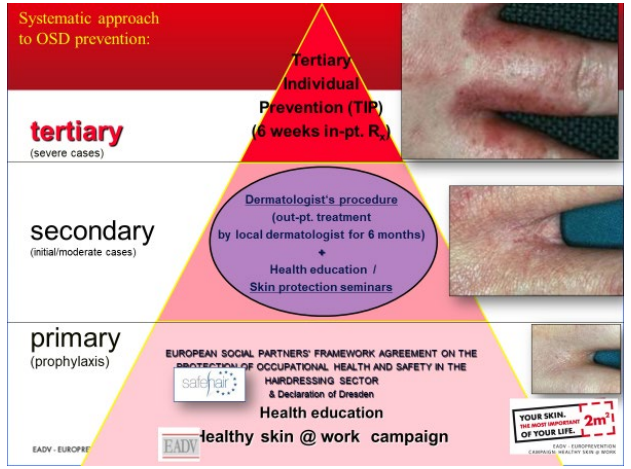
IT SHOULD BE CONSIDERED TO IMPLEMENT SIMILAR MANDATORY EDUCATIONAL PROGRAMS ACROSS THE EU

Secondary (SIP)/tertiary prevention (TIP): Early diagnosis and intervention

- Fast track to dermatologist: diagnosis and treatment + health education
- InterdiSciplinary
- Proven success in hairdressers: fewer give up work due to hand eczema



Wulfhorst B, Skudlik C, John SM et al (2010) Sustainability of an Inter-disciplinary Secondary Prevention Program in Hairdressers. Int Arch Occup Environ Health 83:165-171



SUGGESTED: SIP AND TIP PROGRAMMES IMPLEMENTED ACROSS THE EU

Personal protection: a relevant measure in hairdressers

- 4% of Croatian apprentices used gloves at hair washing

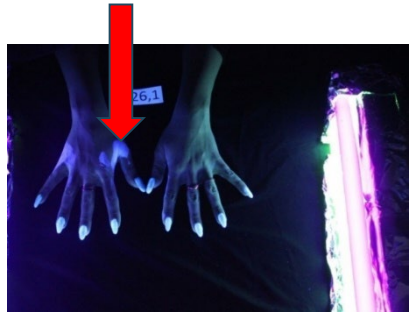
  Samardžić T, et al Contact Dermatitis. 2016 Jul;75(1):25-31

- Reuse of gloves: 20%
  - 2 out of 3 only took a new pair, when old were torn
  - 4 out of 10 turned their gloves inside out and reused them

  Lysdal SH et al. Contact Dermatitis. 2012 Jun;66(6):323-34

- Contamination at removal of gloves
  - 100% of hairdressers (43/43) in an experiment got contaminated hands when removing their gloves

  Oreskov KW et al. Contact Dermatitis. 2015 Jun;72(6):362-6



How to remove gloves:

Gloves should be:

- Single use
- Clean
- Intact
- Worn as long as necessary, as short as possible

- Right material (CEN standard)
- Be removed in an appropriate way

Wet work: a pivotal risk factor for occupational hand eczema

Irritants:

water; detergents, chemicals, mechanical forces

Wet work (2 hours):

significantly increased risk of hand eczema

Hand washes: (10) -20 times/day

Waterproof gloves: 2 hours (with no recovery)

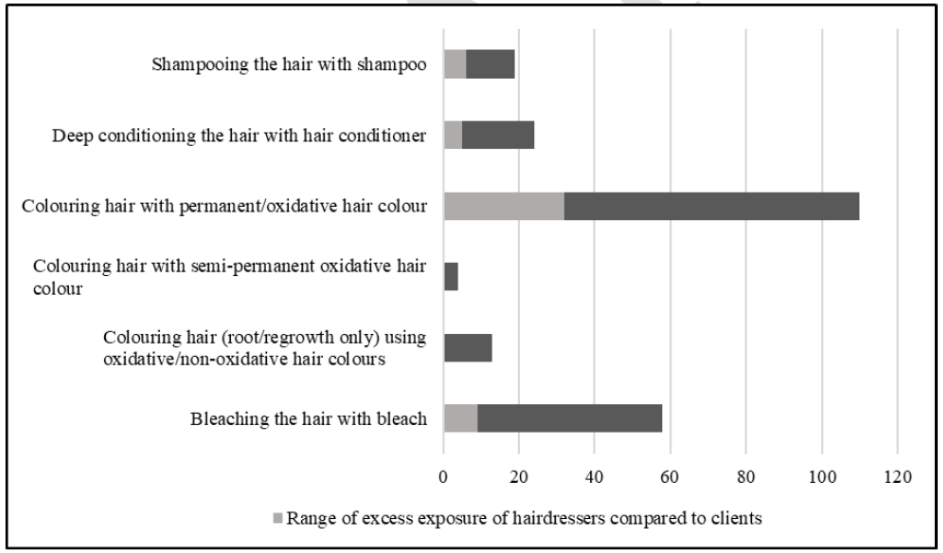
INITIATIVES TO REDUCE WET WORK FOR THE INDIVIDUAL HAIRDRESSER & USE OF PROTECTIVE GLOVES

Risk assessment: Exposure of hairdressers

- Hairdressers more exposed than consumers
- Dependent on task 4-78 times
- Cocktail effects

- Not represented by consumers
- Substantial safety problems
- Adequate starting point for specific tailoring of preventive measures

Factor by which hairdressers are more exposed than consumers



Contact Dermatitis.2022;86:333–343

RISK ASSESSMENT OF HAIR COSMETIC PRODUCTS: URGENT RE-EVALUATION

Table 4: Synopsis of results: The most relevant product groups to focus on to improve health and safety in the hairdressing trade

Product category	Substances	Relevant health effects	Route of exposure (skin, airways, systemic absorption)	Inhalational occupational exposure levels (OELs)	Prioritisation*	
					Skin	Respiratory/ systemic
Bleaches	Persulfate salts: ammonium, potassium, sodium	skin, airways and eye irritation, skin and respiratory sensitization	skin, airways	0.1 mg/m^3 (ACGIH)		a
Oxidative hair dyes, colorants	Toluene-2, 5-diamine (sulfate)	eye irritation, skin sensitization, hepatotoxicity	skin, airways, systemic absorption	n/a		b
	p-Phenylen-ediamine	skin sensitization, myotoxicity		0.1 mg/m^3 (US OSHA)		b
	2-Methoxymethyl-*p*-phenylenediamine (ME-PPD)	skin sensitization		n/a		c
Cosmetic glues	2-Hydroxyethyl methacrylate (HEMA)	eye irritation, skin sensitization, renal toxicity	skin	n/a		c
Perms and relaxing substances	Cysteamine hydrochloride (cysteamine-HCl)	skin and respiratory irritation, skin sensitization	skin, airways, systemic toxicity	n/a		d
	Glyceryl thioglycolate		skin	2 mg thioglycolate/m^3		e

DRAFT

		skin, airways and eye irritation, skin sensitization	airways, systemic absorption	(DFG MAK values) 4 mg/m^3 as TGA(NIOSH)		
	Ammonium thioglycolate			n/a		e
Detergents	Cocamide DEA	skin and eye irritation, skin sensitization, hepatorenal toxicity, carcinogenicity (IARC 2B), Annex III/60 Cos. Reg.	skin, systemic absorption	n/a		d
	Cocamido propylbetaine	skin and eye irritation, skin sensitization		n/a		
	Sodium laureth sulfate	skin and eye irritation	skin skin	n/a		
Film-forming	PVP-copolymers (Polyvinylpyrrolidone (PVP))	eye irritation, skin sensitization	skin	n/a		

DRAFT

AIRWAY (asthma)
&
GENERAL TOXICITY
(cancer; reproductive effect)

Jeanne Duus Johansen

Prevention of airway and general toxicity

- Increasing awareness on risk factors and prevention measures in the workplace is a prerequisite for effective application of occupational health and safety STOP principle in hair salons

- Educational programs focused on safety and health at work should be implemented from vocational schools to continuous workers' training.

STOP principle for prevention of airway and general toxicity

- **S**ubstitution of products
  - Choose low VOC formulas
  - Paste/liquid formulations of hair bleach instead of powder
  - Formaldehyde-free hair straighteners,
  - Pump sprays rather than aerosols…
- **T**echnical measures
  - Monitor salon air concentration, especially after changing the product or procedure
  - Install adequate ventilation and (local) exhaust

Stop principle for prevention

- **O**rganizational measures
  - Provide nail bars with additional local ventilation
  - Provide safety data sheets and information on protective measures at the workplace
  - Distribution of tasks among workers reducing the length and intensity of exposure.

- **P**ersonal measures
  - Provide adequate protective gloves
  - Implement and maintain good work hygiene practice

General remarks

- Both, inhalation and skin exposure can lead to local and general toxic effects
- Skin damaged by irritation or allergic reaction is more permeable for exogenous substances increasing the risk for local as well for general toxic effects
- Therefore, maintenance of a proper skin barrier is crucial.

- Combined and/or aggregate exposure to chemicals in hair salons is often seen and should be considered in health risk assessment
- Precautionary principle should be applied to protect individuals, such as women of reproductive age, pregnant and breastfeeding workers or individuals with predisposing diseases such as atopic dermatitis or asthma

Risk assessment of chemicals: Research

European **P**artnership for the **A**ssessment of **R**isks from **C**hemicals (PARC)

Lead from France (Anses)

7 years partnership – 400 millions euros co-funded 50/50

Member states and research institutions: 28 countries/200 partners

implementation of a programme of research and innovation activities in relation with the assessment of risk from chemicals.

SUPPORT FROM SOCIAL PARTNERS: FOCUS ON OCCUPATIONAL EXPOSURES (HAIRDRESSERS) AND NEW MODELS FOR SKIN SENSITIZATION

Thank you

Exposure assessment to hazardous chemicals in hairdressers: methodology

Sanja Kezic
Amsterdam UMC, Coronel Institute

Source: wikimedia commons

Daily exposure to a large variety of chemicals

Skin **Lungs**

Local effects

Skin: dermatitis

Respiratory system: rhinitis, asthma, COPD

Systemic effects: target organ toxicity, reproduction effects, cancer

Exposure assessment

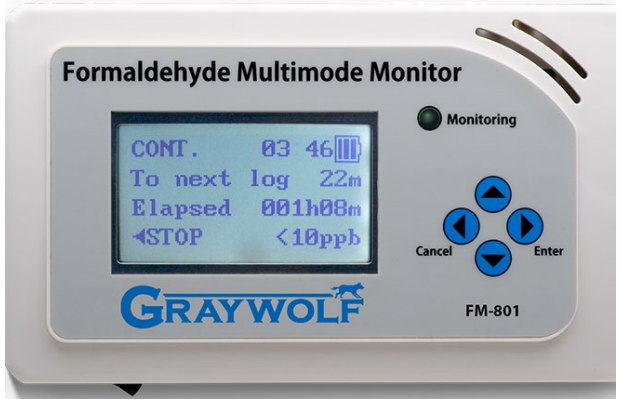
Which chemicals?

Which exposure route?

Exposure pattern (duration, dose, exposed skin area)?

Inhalation exposure: methods applied in the reviewed studies

Environmental (static) monitoring (EM)

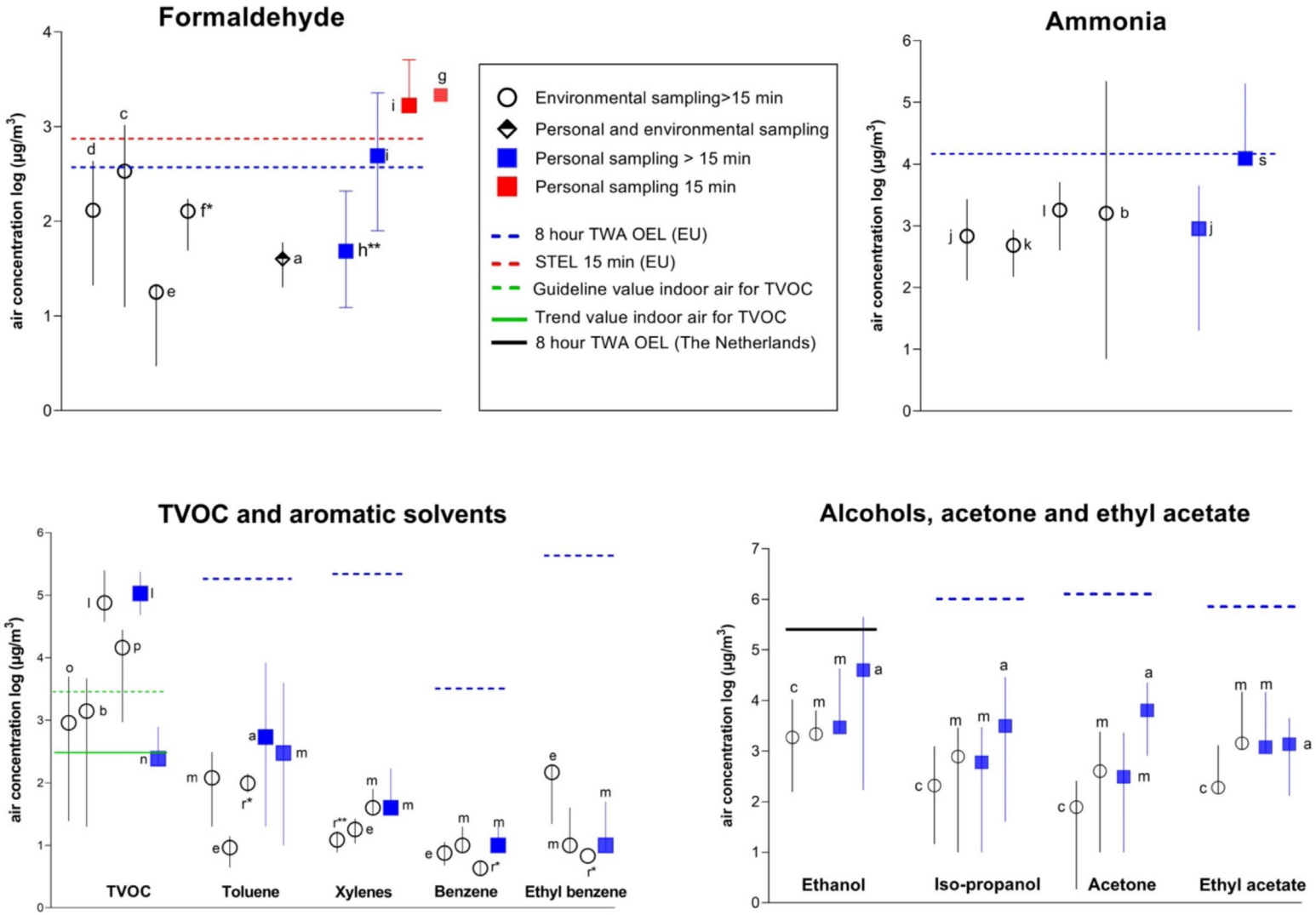


Does not provide information on personal exposure but is used to identify problems and priorities in the workplace

Personal monitoring (PM)

Data can directly be compared with occupational limit values

Air concentrations measured in reviewed studies



Dermal exposure

No OEL for dermal exposure
Very few studies that provide quantitative data on dermal exposure

Frequency of procedures and exposed skin area using certain products by observations or questionnaires/interviews

➔ **Comparison with consumer exposure**

➔ **Estimate the (internal) dose** if the concentration of a chemical in the product and dermal absorption rate are known

Challenges in estimating dermal exposure and dose

- Concentration of the chemical of interest in used products is often unknown and change in time
- Dermal absorption rates are unknown for many chemicals (***in vitro*** **and** ***in silico QSARS*****)(SkinPerm)**
- Degree of protection by gloves?
- Aggregated exposure i.e. exposure to the same chemical *via* different products
- Often hair products (or wet work) may damage skin which will underestimate the systemic absorption
- Data on release of chemicals from used tools (e.g. nickel from scissors) are scarce

Predictiong of exposure: models and tools

- ConsExpo
- Consumer Exposure Model (CEM): models a range of exposure scenarios and routes
- PACEM (Probabilistic Aggregate Consumer Exposure Model) aggregate consumer exposure from personal care and household cleaning products)
- SprayExpo model (levels of inhalation and dermal exposure to aerosols with spray applications)
- ECETOC (European Center for Ecotoxicology of Chemicals Targeted Risk Assessment) TRA tool for the prediction of worker exposure (screening level)
- STOFFENMANAGER® tool (Quantitative exposure assessment of the inhalation exposure)

- Many of them intended for consumer exposure (ConsExpo, CEM, PACEM)
- Input parameters required are often not available or difficult to obtain

Poor evaluation for occupational exposure in terms of predictive ability and reliability

Roadmap of the International Society of Exposure Science for exposure models

Strategic objectives

(1) improvement of models and tools
(2) development of new methodologies and support for understudied fields
(3) improvement of model use and
(4) regulatory needs for modelling

*Schlüter et al. Exposure modelling in Europe: how to pave the road for the future as part of the European Exposure Science Strategy 2020–2030. J Expo Sci Environ Epidemiol **32**, 499–512 (2022).*

Biological monitoring

- Provides information on different routes, aggregate exposure
- May directly be used for risk assessment (internal exposure)
- Useful for evaluation of exposure models

BM becomes more suitable in occupational settings due to development on less invasive sampling (tape stripping, hair)

However,

- Ethical and practical constraints
- Lack of biological limit values

Needs and future directions

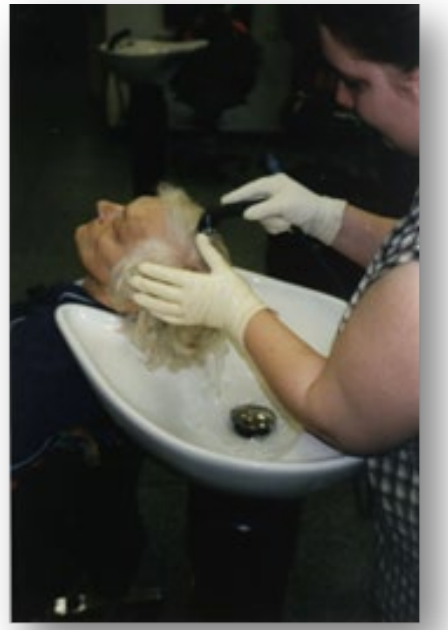
- EU harmonized OELs for inhalation exposure
- OELs for dermal exposure
- Development of protocols for BM and Biological Limit Values
- Broad identification of hazardous chemicals e.g. by non-targeted mass spectroscopy to detect chemicals in the air, hair products and in the skin (non-invasive tape stripping)
- Development of feasible methods for measuring dermal exposure
- Evaluation of predictive models

Thank you

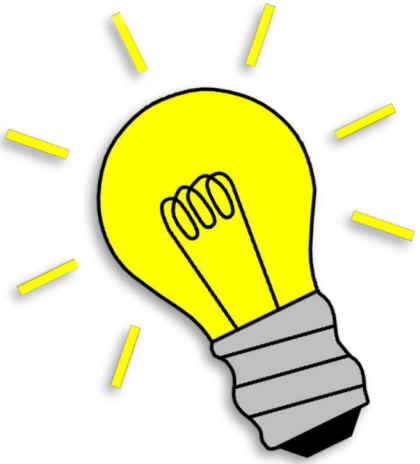
Summary (1)

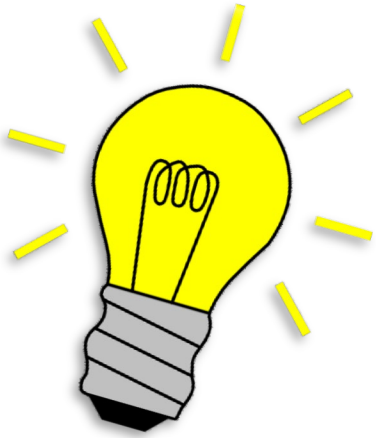
- Hairdressers are exposed **between 4 and 78 times more than consumers** to a wide spectrum of health risks linked to the use of cosmetic products.
- Occupational risks of hairdressers are not sufficiently addressed by current preventive measures.
- Risk communication in the salons is pivotal.
- Current risk assessment methodology of the SCCS need to be re-considered in view of current findings on occupational exposure of hairdressers.
- Occupational exposure of hairdressers need to be taken into account by safety regulations.

Summary (2)



Q/A - Discussion





Thank you

Department of Dermatology, Environmental Medicine, Health Theory, University of Osnabrück (Germany)

Coronel Institute of Occupational Health, Department of Public and Occupational Health, Amsterdam UMC, University of Amsterdam (Netherlands)

Institute for Medical Research & Occupational Health (Croatia)

Gentofte Hospital, Copenhagen, University of Copenhagen (Denmark)

Department of Medical Informatics, Biometry and Epidemiology (IMBE), University of Erlangen/Nürnberg (Germany)

UNI europa global union

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