Patch testing with palladium and aluminium. Epidemiological and experimental studies

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Lisbeth Rosholm Comstedt defended her thesis on December 2, 2022 at Skåne University Hospital in Malmö. The opponent was Professor Chris Anderson, from Department of Clinical and Experimental Medicine, Linköping University, Sweden. Main supervisor was Professor Cecilia Svedman, Department of Occupational and Environmental Dermatology, Skåne University Hospital, Malmö, Sweden. The thesis can be found at https://lucris.lub.lu.se/ws/portalfiles/portal/128231372/e_spik_ex_Lisbeth.pdf

The aim of the thesis was to investigate the prevalence and significance of contact allergy to palladium from a Swedish perspective. The initial findings made it necessary to also explore the importance of the metal aluminium used in test chamber systems and the effect of aluminium chloride (Al-Cl) in patch test preparations.

In a retrospective study (study I), with 18,306 patch test results obtained from 1995–2016, the prevalence of contact allergy to palladium was showed to following that of nickel. After the introduction of the EU Nickel Directive in 2001, there has been a significant decrease in contact allergy to sodium tetrachloropalladate (Na-PdCl), palladium chloride (Pd-Cl), and nickel sulphate (Ni) among younger females, age 6–30 years. Regression analysis revealed that women with contact allergy to Ni were approximately 36 times more likely to have contact allergy to Pd-Cl compared to females with no allergy to Ni.

The prevalence of isolated palladium (Pd) allergy in the whole study population (men and women) was 1.4% and remained stable from 1995 to 2016.

In an experimental study, study II, 15 females, known to be allergic to Ni and palladium, were patch-tested 4 times with 12 weeks interval with Pd-Cl, Na-PdCl and Ni. Na-PdCl showed less variability in patch test results, compared to Pd-Cl. A seasonal variation was also found. In wintertime, there were significantly higher summarised test scores compared to in late summertime for the 3 metal salts Pd-Cl, Na-PdCl, and Ni.

In a retrospective study (study III) it was shown that the use of Finn Chambers in patients with contact allergy to aluminium could be a risk for false-positive patch test reactions to Na-PdCl and Pd-Cl. No such risk was seen in patients tested with Finn Chamber Aqua.

In an experimental study, study IV, the use of Al-Cl in test preparations with Ni seemed to increase the sensitivity for detecting Ni allergy. When adding 30.0% Al-Cl to Ni 15.0% aqua, the sensitivity increased to 91% from 50.0% in Ni 5.0% in petrolatum. This increase in sensitivity was only seen when adding Al-Cl to Ni and was not seen when adding Al-Cl to methylisothiazolinone and to fragrance mix I.

From left to right: Opponent Professor Chris Anderson, Respondent Lisbeth Rosholm Comstedt, Supervisor Professor Cecilia Svedman.

Conclusions and clinical implications: Patch testing with the test salt Na-PdCl 3% in petrolatum, with two reading days is recommended with suspicions of contact allergy to palladium or as part of a dental series. To avoid false positive reactions, a plastic chamber or Finn Chamber aqua is recommended.

LIST OF ORIGINAL PUBLICATIONS

I. Rosholm Comstedt L, Dahlin J, Bruze M, Åkesson A, Hindsén M, Pontén A, Isaksson M, Svedman C. Prevalence of contact allergy to metals: nickel, palladium and cobalt in Southern Sweden from 1995-2016.' Contact Dermatitis 2020; 82: 218–226.
II. Rosholm Comstedt L, Engfeldt M, Svedman C, Åkesson A, Hindsén M, Bruze M. Variation, and co-variation in patch test reactivity to palladium and nickel salts. Eur J Dermatol 2018 Oct; 28: 668–676.
III. Rosholm Comstedt L, Dahlin J, Bruze M, Hedberg Y, Matura M, Svedman C. Patch testing with aluminium Finn Chambers could give false positive reactions in patients with contact allergy to aluminium. Contact Dermatitis 2021; 85: 407–414.
IV. Rosholm Comstedt L, Siemund I, Dahlin J, Bruze M, Svedman C. Effects of aluminium chloride hexahydrate added to common patch test substances. Submitted October 2022.