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Palladium allergy

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Palladium [chemical symbol: Pd] is a so-called precious metal belonging to the platinum-group metals, that is essential in computers, mobile phones, and LCD monitors. Palladium alloys are used in dentistry (dental implants) and orthopedics (endoprostheses, bone fixation systems) (van Ketel & Niebber 1981, Chow et al. 2014). It is also applied in the electroplating of precision metal objects, e.g., watch parts. Until two decades ago, positive patch tests with palladium were generally considered cross-reactions to nickel, as people did not come into contact with this metal in everyday life (Rebandel & Rudzki 1990). However, due to technological advances and changes in legal regulations (restrictions on nickel in some consumer products), palladium has become more widespread in everyday environment (Faurschou et al. 2011). Among others, due to restrictions on nickel content in jewellery introduced in Europe, palladium has replaced it in alloys known as "white gold" (palladium gold). Palladium is also a basic component of automotive exhaust catalytic converters, from where it can be released into the environment if used improperly. Increased environmental exposure may explain the observed cases of primary sensitization to palladium in which patch tests to nickel remain negative.

Synonyms and names in other languages

CAS 13820-53-6, CAS 7440-05-3; CAS 97660-01-0; Dichloropalladium; Disodium palladium tetrachloride, EC 231-115-6; EC 307-508-4; Enplate activator 440; Palladium; Palladium(II) chloride; Palladium(II) sodium chloride; Palladium chloride; Palladium dichloride; Palladous chloride; Pd

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Clinical symptoms of palladium allergy

In most cases palladium causes skin inflammation (allergic contact dermatitis or eczema) limited to areas directly exposed to palladium by skin contact. Typical symptoms of palladium allergy include patches of itchy rash in the area of contact with metal objects releasing palladium, like jewellery, metal buttons, rivets, zippers, buckles of garments, or areas exposed to contact with palladium-releasing tools. Systemic reactivation of allergic contact dermatitis, i.e., dermatitis due to systemic exposure via ingestion or inhalation, e.g., from orthodontic appliances are possible, but infrequently reported. A case of stomatitis and asthma caused by isolated allergy to palladium released from a dental prosthesis was reported (Kütting & Brehler 1994). Hematogenous eczema due to absorption of palladium at the primary contact site and redistribution to other skin areas via bloodstream is also possible, but no case reports have yet been reported.

Palladium in cosmetic products / toiletries

Palladium and its compounds are only rarely used in cosmetic products. Whether listed as Palladium or as Colloidal Palladium, Palladium is apparently used as a colourant. Lavandula Officinalis Extract Sulfurized Palladium Salt is used as a fragrance.

- INCI: Palladium
- INCI: Colloidal Palladium
- INCI: Lavandula Officinalis Extract Sulfurized Palladium Salt

Only 5 palladium-containing cosmetic products and toiletries are currently listed on INCIDecoder

INCI: International Nomenclature of Cosmetic Ingredients — In the UK, the European Union, and in other global regions, manufacturers of cosmetic products are legally required to list ingredients on product labels / packaging using standardised INCI nomenclature. The Personal Care Products Council cautions that "The designation of an INCI name for a cosmetic ingredient is an essential part of ingredient identification; however, the assignment of an INCI name does not mean that the ingredient has been approved for cosmetics."

Available diagnostic methods and materials

At present, the only validated method of detecting palladium allergy is patch test performed in line with the current guidelines by national or international scientific societies, e.g., European Society of Contact Dermatitis. Patch test material available for testing includes:

- Sodium tetrachloropalladate(II) hydrate 3% pet. [Chemotechnique Diagnostics, cat. number S-017] – recommended by Polish Society of Allergology, part of the Polish Baseline Series; see Kruszewski et al. (2019), Śpiewak et al. (2024)
- Palladium(II) chloride 2% pet. [Chemotechnique Diagnostics, cat. number P-001] – less sensitive than the above test preparation; see Śpiewak et al. (2014)

Please note: Blood tests for palladium allergy (mostly advertised as "lymphocyte transformation tests"), although popular in some countries, have not been approved as a diagnostic tool, and their use in allergy diagnosis is controversial.

Positivity rate

In their review, Faurschou et al. (2011) reported that in dermatitis patients, the median prevalence of palladium allergy was 7.8% (range <1.0-19.0%), and in dental patients it was 7.4% (range 1.3-13.9%). However, Muris et al. (2011) believed that palladium allergy prevalence was probably underestimated by Faurschou et al. (2011) because sodium tetrachloropalladate was not used as the test allergen.

Cross-reactivities, co-positivities, and co-sensitizations

Nickel is the most frequent and best-known cross-reactant of palladium. In the past, positive reactions to palladium were considered to be cross reactions secondary to nickel allergy, due to the similar atomic structures and chemical properties of both metals (Santucci et al. 1996). There are also patients in whom allergy to palladium seems to be the primary clinically relevant event who show cross-reactivity to nickel. Nowadays, however, palladium is increasingly present in the everyday environment and isolated allergy to palladium with a concomitant negative test to nickel is being found (Faurschou et al. 2011).

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