Advances in Clinical Medicine 临床医学进展, 2024, 14(3), 1437-1442
Published Online March 2024 in Hans. https://www.hanspub.org/journal/acm
https://doi.org/10.12677/acm.2024.143862

Hans汉斯

化妆品过敏相关不良反应的研究进展

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收稿日期：2024年2月27日；录用日期：2024年3月21日；发布日期：2024年3月27日

摘　要

化妆品的广泛使用，造成了越来越多的化妆品不良反应，其中化妆品变应性接触性皮炎、化妆品唇炎、化妆品光感性皮炎及化妆品接触性荨麻疹是化妆品过敏相关不良反应。化妆品中的成分如防腐剂、香精、金属、植物或动物源成分、丙烯酸酯及对苯二胺等可能会导致局部或全身的过敏反应，有些甚至会危及生命。这些化妆品过敏相关不良反应通常是对产品本身的某些成分产生过敏性反应。我们需要识别及监管这些致敏成分，从而降低化妆品不良反应的发病率。本文就化妆品过敏不良反应及常见致敏成分进行综述。

关键词

化妆品，过敏，斑贴试验，不良反应

Research Progress of Cosmetic Allergy-Related Adverse Reactions

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Received: Feb. 27th, 2024; accepted: Mar. 21st, 2024; published: Mar. 27th, 2024

Abstract

The widespread use of cosmetics has caused more and more adverse reactions of cosmetics, among which cosmetic allergic contact dermatitis, cosmetic cheilitis, cosmetic photosensitive dermatitis and cosmetic contact urticaria are adverse reactions related to cosmetic allergy. Ingredients in cosmetics

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文章引用: 王冰霞, 沈晓峰. 化妆品过敏相关不良反应的研究进展[J]. 临床医学进展, 2024, 14(3): 1437-1442.
DOI: 10.12677/acm.2024.143862

such as preservatives, flavors, metals, plant or animal ingredients, acrylates and p-phenylenediamine may cause local or systemic allergic reactions, some of which may even be life-threatening. These cosmetic allergy-related adverse reactions are usually allergic reactions to certain components of the product itself. We need to identify and regulate these allergenic ingredients in order to reduce cosmetic adverse reactions to incidence rate. This article reviews the adverse allergic reactions and common allergic components of cosmetics.

Keywords

Cosmetic, Allergy, Patch Test, Adverse Reactions

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1. 引言

化妆品皮肤不良反应是指使用化妆品引起的皮肤、黏膜、附属器病变[1]。病因包括化妆品成分中的刺激和致敏物质、局部皮肤屏障功能破坏、非法添加违禁成分或限用成分浓度超标、自身敏感体质或患其他导致皮肤敏感的皮肤病以及产品说明书不准确导致使用方法不当或未按说明书正确使用等[2]。既往有研究表明，50%的人群有发生过化妆品不良反应[3]。Lucca 等发现性别、年龄、对药物和食物过敏、家族过敏史、混合使用化妆品、频繁更换化妆品与化妆品不良事件相关[3]。Bilal 等发现混合使用化妆品、频繁更换化妆品及每日使用化妆品数量与化妆品不良事件相关[4]。临床表现为接触性皮炎、光感性皮炎、皮肤色素异常、唇炎、痤疮、接触性荨麻疹、毛发损害、甲损害、化妆品糖皮质激素依赖性皮炎、化妆品不耐受等[2]。其中化妆品变应性接触性皮炎、化妆品光感性皮炎、化妆品唇炎及接触性荨麻疹是常见的过敏反应。本文就化妆品变应性接触性皮炎、化妆品光感性皮炎、化妆品唇炎及化妆品接触性荨麻疹的常见病因及发病机制进行综述。

2. 化妆品过敏性接触性皮炎

化妆品接触性皮炎分为刺激性接触性皮炎和变应性接触性皮炎[2]。其中化妆品变应性接触性皮炎(Allergic contact dermatitis, ACD)是一中 T 细胞介导的 IV 型迟发性超敏反应[5]。ACD 的表现取决于过敏原、接触致敏物质的持续时间和性质及被暴露个体的易感性[6]。第一阶段是致敏阶段，许多细胞参与了过敏性接触性皮炎的启动。皮肤致敏性的四个关键事件是与皮肤蛋白共价结合、角质形成细胞的激活、树突状细胞的激活以及 T 细胞的激活和增殖。在致敏物质的存在下，树突状细胞从皮肤迁移到引流淋巴结，在此启动在血液中增殖和循环的半抗原特异性 T 细胞[7]。第二阶段是诱导，当机体再次暴露在过敏原下，机体识别过敏原、激活 T 细胞，引起细胞因子和细胞浸润的炎症级联反应[8]。有研究表明，化妆品中的化学物质(半抗原)的接触过敏率随年龄的增长而增加，这种与年龄增长的关联不能用暴露史来解释，这可能与对接触性过敏原的调节反应会随着年龄增长而下降有关[9]。

化妆品过敏性接触性皮炎十分常见，在接诊患者时，应该根据患者病史和皮炎的发生部位来进行诊断。对疑似化妆品不良反应的患者，应建议患者使用低过敏性产品，同时完善斑贴试验[10]。常见的导致过敏性接触性皮炎的物质有：防腐剂、表面活性剂、香料混合物、秘鲁香脂、对苯二胺等[11] [12] [13]。因面部接触的化妆品较多，故常表现为面部接触性皮炎，常见的来源包括洗发水、护发素、洗面奶、卸

妆液、睫毛膏、美甲产品、护肤品等[10]。此外，颈部、腋部、外生殖器及全身都可能受到化妆品的影响，具体取决于致病的产品[10]。丙烯酸酯类化合物是甲护理产品中常见致敏原，可以导致过敏性接触性皮炎(ACD)，最常表现为甲周皮炎、面部和颈部的异位皮炎，可能是由于致敏物质通过过敏原的接触转移导致[14] [15]。一项关于个人护理产品(Personal care products, PCPs)的研究表明，ACD 与 PCPs 相关，PCPs 相关接触性皮炎发病率在逐年增加，常见的过敏原是：甲基异噻唑啉酮、香料混合物 I、秘鲁香脂、季铵盐-15 和对苯二胺，相关产品为：保湿剂、洗发水、护发素，女性更多的对护发产品(如染发剂、烫发剂、发胶)，男性更多的对肥皂阳性反应率高[12]。另一项关于在男性 PCPs 研究表明，在男性面部皮炎患者中，最常见的过敏原为甲基异噻唑啉酮、香料混合物 1 和秘鲁香脂。男性面部 ACD 的主要来源为 PCPs [16]。据我国上海的一项研究表明，引起化妆品过敏性接触性皮炎的化妆品主要是护肤品(面霜/乳液、爽肤水/喷雾和面膜)和彩妆产品。化妆品中主要的过敏原是防腐剂甲基异噻唑啉酮(MI)、甲基异噻唑啉酮 + 甲基氯异噻唑啉酮(MCI/MI)、硫柳汞[17]。从化妆品监管角度看，应严格规范上述常见致敏成分，以便最大程度减少化妆品过敏相关不良反应时间的发生。

此外，化妆品中也会添加一些天然成分如植物或动物来源成分，大部分消费者认为这些天然成分是安全的，但某些天然成分仍会导致不良反应[18] [19] [20]。如肉桂、薰衣草、菊科植物、桉树、柠檬、柠檬草、薄荷、橙子、玫瑰、茶树、依兰可以通过水蒸气蒸馏法制成精油，导致 ACD 的发生[19]。有研究也表明，精油可以通过接触空气后被氧化形成氢过氧化物，从而导致 ACD 的发生[21]。此外，众所周知，许多皮肤疾病由于皮肤屏障和皮肤生理紊乱需要应用保湿剂，其中右泛醇和羊毛脂是常见的保湿剂的成分。右泛醇引起的 ACD 较为少见，但它已被证明是一种常见且相关的接触性过敏原[22]。羊毛脂由绵羊的皮脂腺制成，因其润肤特性而被用于化妆品中，其也可以造成接触过敏。有研究发现特应性皮炎与羊毛脂和羊毛脂醇过敏之间存在微弱的正相关关系，这可能是由于频繁接触外用产品中的羊毛脂和特应性皮肤的皮肤吸收增加所致[23]。综上，我们也需要注意这些“天然成分”所导致的 ACD 的发生。

3. 化妆品光感性皮炎

光感性皮炎是一种迟发性超敏反应，当将外源性物质(光变应原)应用于皮肤并随后暴露于紫外线和/或可见光时会发生相应反应[24]。光感性皮炎诊断的首选检查是光斑贴试验[25]。研究表明，紫外线吸收剂被用于防晒霜中，是引起光斑贴试验的主要类别之一。其中，苯二甲酮-3 和奥克立林是最常见的光变应原[26]。研究表明，二苯甲酮-3 局部应用后，可以通过皮肤渗入血液、血脑屏障和血胎盘屏障，在实验动物模型中可能诱发胎儿的生殖毒性和发育异常、内分泌系统紊乱和神经毒性等[27] [28] [29]。因此孕妇、儿童和青少年应谨慎使用含有二苯甲酮-3 的化妆品[27]。研究表明，甲基异噻唑啉酮(MI)是一种防腐剂，与 ACD 有关，常单独使用或与甲基氯异噻唑啉酮(MCI/MI)结合使用。对异噻唑啉酮过敏的患者，在使用 MI 和 MCI/MI 0.5% pet 进行光斑试验，可以观察到光加重的模式[30]。患者有明确化妆品接触史和光照史，皮损主要发生在光暴露部位，我们需要考虑化妆品光感性皮炎可能，同时需要完善光斑贴试验。

4. 化妆品唇炎

唇部化妆品常用来防止唇部干燥、干裂、暗沉和美化唇部。研究表明，唇部护理产品如口红、润唇膏、唇彩、唇线笔等与过敏反应相关。引起化妆品过敏性唇炎的常见致敏成分是蓖麻油、二苯甲酮-3、没食子酸、蜡和松香等[31]。此外，羊毛脂、香料也是常见的致敏原因[10]。研究表明，在患有唇炎、唇周湿疹的患者中，蜂蜡是常见致敏原。蜂蜡是由蜜蜂的腺体产生，常用于唇膏等产品中，在怀疑化妆品唇炎时，可以使用蜂蜡和蜂胶进行斑贴试验[20]。在一项针对唇炎患者的回顾性研究中发现，化妆品中防晒霜、口红、唇膏、香水是其常见原因，患者对防晒霜中二苯甲酮类物质阳性[32]。Kimyon 等报道了使

用唇部化妆品导致的唇部皮炎，在停用化妆品后症状明显缓解[33]。因此，针对反复唇炎患者，我们需要考虑化妆品唇炎的可能，同时完善斑贴试验，避免接触常见的致敏成分，防止不良反应的再次发生。

5. 化妆品接触性荨麻疹

化妆品接触性荨麻疹是常见的化妆品不良反应之一[34]。主要有非免疫性接触性荨麻疹和免疫性接触性荨麻疹两种类型。非免疫性接触性荨麻疹既往没有致敏反应，皮损一般局限于接触部位。免疫性接触性荨麻疹是一种 I 型超敏反应，其发病机制与其他类型速发型超敏反应相同，主要涉及抗原与肥大细胞表面特异性 IgE 分子偶联，其症状由于组胺释放所致[35]。香料、染发剂、防腐剂、护发产品、抗菌剂、防晒霜及植物和动物源化妆品是引起化妆品接触性荨麻疹的常见因素[36]。2019 年报道 1 例因氧化型染发剂的多种成分导致接触性皮炎并伴有接触性荨麻疹[37]。2021 年 Suzuki 等报道了 1 例因含胭脂红的眼影引起的接触性荨麻疹，其致敏原是胭脂红[38]。Sukakul 等报道了 1 例由水杨酸引起的接触性荨麻疹[39]。Elisa 等报道了 1 例在使用含有辛二醇的化妆品后发生的接触性荨麻疹[40]。2021 年报道了 1 例使用 2-苯氧乙醇引起的免疫性接触性荨麻疹[41]。Haltia 等报道了 2 例因靛蓝染发剂引起的接触性荨麻疹[42]。既往有案例报道，使用防晒霜后出现过敏反应。完善斑贴试验后对二苯甲酮-3、二苯甲酮-8 和二苯甲酮-10 有即刻荨麻疹反应，以及对没食子酸丙酯有延迟性过敏反应[43]。化妆品接触性荨麻疹在化妆品不良反应中相对少见，但我们不能对此忽视。

6. 总结和展望

化妆品过敏相关不良反应已经逐渐成为皮肤科的常见疾病之一，其诊断可结合典型临床病史和斑贴试验结果，斑贴试验在诊断化妆品相关过敏反应中尤为重要，可以明确致敏的化妆品及其成分，部分化妆品光感性皮炎目前可以借助光斑贴试验确诊。通过对高致敏成分的监管，可以降低人群化妆品不良反应的发病率。综上，关注化妆品过敏相关不良反应的诊治，是皮肤科医生和相关部门的职责和义务。

参考文献

[1] 国家技术监督局和卫生部联合发布《化妆品皮肤病诊断标准及处理原则(总则)》等 8 项国家标准[J]. 化工劳动保护(工业卫生与职业病分册), 1998(2): 42.

[2] 中国医学装备协会皮肤病与皮肤美容分会护肤品和护肤材料学组, 中华医学会医学美学与美容学分会激光美容学组, 中华预防医学会皮肤性病学分会, 中华医学会皮肤性病学分会美容激光学组. 化妆品皮肤不良反应诊疗指南[J]. 中华皮肤科杂志, 2018, 51(11): 783-786.

[3] Lucca, J.M., Joseph, R., Hussain, A., Kubaish, Z., Mohammad Al-Maskeen, S. and Ali Alokaili, Z. (2020) An Observational Study on Adverse Reactions of Cosmetics: The Need of Practice the Cosmetovigilance System. *Saudi Pharmaceutical Journal*, **28**, 746-753. https://doi.org/10.1016/j.jsps.2020.04.017

[4] Bilal, A.I., Tilahun, Z., Osman, E.D., *et al*. (2017) Cosmetics Use-Related Adverse Events and Determinants among Jigjiga Town Residents, Eastern Ethiopia. *Dermatologic Therapy* (*Heidelb*), **7**, 143-153. https://doi.org/10.1007/s13555-016-0157-y

[5] Mowad, C.M., Anderson, B., Scheinman, P., Pootongkam, S., Nedorost, S. and Brod, B. (2016) Allergic Contact Dermatitis: Patient Management and Education. *Journal of the American Academy of Dermatology*, **74**, 1043-1054. https://doi.org/10.1016/j.jaad.2015.02.1144

[6] Milam, E.C. and Cohen, D.E. (2019) Contact Dermatitis: Emerging Trends. *Dermatologic Clinics*, **37**, 21-28. https://doi.org/10.1016/j.det.2018.07.005

[7] Hardonnière, K., Szely, N., El Ali, Z., Pallardy, M. and Kerdine-Römer, S. (2022) Models of Dendritic Cells to Assess Skin Sensitization. *Frontiers in Toxicology*, **4**, Article ID: 851017. https://doi.org/10.3389/ftox.2022.851017

[8] Nassau, S. and Fonacier, L. (2020) Allergic Contact Dermatitis. *Medical Clinics of North America*, **104**, 61-76. https://doi.org/10.1016/j.mcna.2019.08.012

[9] McFadden, J.P., White, I.R., Basketter, D., Puangpet, P. and Kimber, I. (2013) The Cosmetic Allergy Conundrum: In-

ference of an Immunoregulatory Response to Cosmetic Allergens. *Contact Dermatitis*, **69**, 129-137. https://doi.org/10.1111/cod.12100

[10] Zirwas, M.J. (2019) Contact Dermatitis to Cosmetics. *Clinical Reviews in Allergy & Immunology*, **56**, 119-128. https://doi.org/10.1007/s12016-018-8717-9

[11] Boonchai, W., Winayanuwattikun, W., Limphoka, P. and Sukakul, T. (2019) Contact Allergy to Hair Cosmetic Allergens in Thailand. *Contact Dermatitis*, **81**, 426-431. https://doi.org/10.1111/cod.13373

[12] Warshaw, E.M., Schlarbaum, J.P., Silverberg, J.I., *et al*. (2021) Contact Dermatitis to Personal Care Products Is Increasing (But Different!) in Males and Females: North American Contact Dermatitis Group Data, 1996-2016. *Journal of the American Academy of Dermatology*, **85**, 1446-1455. https://doi.org/10.1016/j.jaad.2020.10.003

[13] Hafner, M., Rodrigues, A.C. and Lazzarini, R. (2020) Allergic Contact Dermatitis to Cosmetics: Retrospective Analysis of a Population Subjected to Patch Tests between 2004 and 2017. *Anais Brasileiros de Dermatologia*, **95**, 696-701. https://doi.org/10.1016/j.abd.2020.04.011

[14] Warshaw, E.M., Voller, L.M., Silverberg, J.I., *et al*. (2020) Contact Dermatitis Associated with Nail Care Products: Retrospective Analysis of North American Contact Dermatitis Group Data, 2001-2016. *Dermatitis*, **31**, 191-201. https://doi.org/10.1097/DER.0000000000000583

[15] Chou, M., Dhingra, N. and Strugar, T.L. (2017) Contact Sensitization to Allergens in Nail Cosmetics. *Dermatitis*, **28**, 231-240. https://doi.org/10.1097/DER.0000000000000301

[16] Warshaw, E.M., Schlarbaum, J.P., Maibach, H.I., *et al*. (2020) Facial Dermatitis in Male Patients Referred for Patch Testing: Retrospective Analysis of North American Contact Dermatitis Group Data, 1994 to 2016. *JAMA Dermatology*, **156**, 79-84. https://doi.org/10.1001/jamadermatol.2019.3531

[17] Qin, O., Cheng, Y., Hu, W., *et al*. (2020) Patch Test in Chinese in Shanghai with Cosmetic Allergy to Cosmetic Series and Products. *Journal of Cosmetic Dermatology*, **19**, 2086-2092. https://doi.org/10.1111/jocd.13249

[18] Knijp, J., Bruynzeel, D.P. and Rustemeyer, T. (2019) Diagnosing Lanolin Contact Allergy with Lanolin Alcohol and Amerchol L101. *Contact Dermatitis*, **80**, 298-303. https://doi.org/10.1111/cod.13210

[19] Bruusgaard-Mouritsen, M.A., Johansen, J.D., Zachariae, C., Kirkeby, C.S. and Garvey, L.H. (2020) Natural Ingredients in Cosmetic Products—A Suggestion for a Screening Series for Skin Allergy. *Contact Dermatitis*, **83**, 251-270. https://doi.org/10.1111/cod.13550

[20] Nyman, G., Tang, M., Inerot, A., Osmancevic, A., Malmberg, P. and Hagvall, L. (2019) Contact Allergy to Beeswax and Propolis among Patients with Cheilitis or Facial Dermatitis. *Contact Dermatitis*, **81**, 110-116. https://doi.org/10.1111/cod.13306

[21] Corazza, M., Amendolagine, G., Borghi, A., Toni, G. and Lauriola, M.M. (2019) Aromatherapy and Occupational Allergic Contact Dermatitis: Two Further Cases Caused by Lavender Oil and Other Essential Oils. *Contact Dermatitis*, **81**, 378-379. https://doi.org/10.1111/cod.13328

[22] Fernandes, R.A., Santiago, L., Gouveia, M. and Gonçalo, M. (2018) Allergic Contact Dermatitis Caused by Dexpanthenol-Probably a Frequent Allergen. *Contact Dermatitis*, **79**, 276-280. https://doi.org/10.1111/cod.13054

[23] Fransen, M., Overgaard, L., Johansen, J.D. and Thyssen, J.P. (2018) Contact Allergy to Lanolin: Temporal Changes in Prevalence and Association with Atopic Dermatitis. *Contact Dermatitis*, **78**, 70-75. https://doi.org/10.1111/cod.12872

[24] Kerr, A. and Ferguson, J. (2010) Photoallergic Contact Dermatitis. *Photodermatology, Photoimmunology & Photomedicine*, **26**, 56-65. https://doi.org/10.1111/j.1600-0781.2010.00494.x

[25] Pralong, P., Ciszynski, M., Moncourier, M., Beani, J.C., Charles, J. and Leccia, M.T. (2022) Contribution of Phototesting in the Diagnosis of Photodermatoses: Retrospective Study of 100 Cases. *Photodermatology, Photoimmunology & Photomedicine*, **38**, 99-103. https://doi.org/10.1111/phpp.12721

[26] Subiabre-Ferrer, D., Esteve-Martínez, A., Blasco-Encinas, R., Sierra-Talamantes, C., Pérez-Ferriols, A. and Zaragoza-Ninet, V. (2019) European Photopatch Test Baseline Series: A 3-Year Experience. *Contact Dermatitis*, **80**, 5-8. https://doi.org/10.1111/cod.13118

[27] Wnuk, W., Michalska, K., Krupa, A. and Pawlak, K. (2022) Benzophenone-3, a Chemical UV-Filter in Cosmetics: Is It Really Safe for Children and Pregnant Women. *Postepy Dermatologii I Alergologii*, **39**, 26-33. https://doi.org/10.5114/ada.2022.113617

[28] Wnuk, A., Rzemieniec, J., Staroń, J., *et al*. (2019) Prenatal Exposure to Benzophenone-3 Impairs Autophagy, Disrupts RXRs/PPARγ Signaling, and Alters Epigenetic and Post-Translational Statuses in Brain Neurons. *Molecular Neurobiology*, **56**, 4820-4837. https://doi.org/10.1007/s12035-018-1401-5

[29] Wnuk, A. and Kajta, M. (2021) Is the Commonly Used UV Filter Benzophenone-3 a Risk Factor for the Nervous System? *Acta Biochimica Polonica*, **68**, 557-563. https://doi.org/10.18388/abp.2020_5741

[30] Villarinho, A., Melo, M. and Teixeira, L.R. (2020) Allergic Contact Dermatitis and Photosensitivity to Methylisothia-

zolinone and Methylchloroisothiazolinone/Methylisothiazolinone: Portrait of an Epidemic in Brazil. *Contact Dermatitis*, **82**, 258-259. https://doi.org/10.1111/cod.13456

[31] Pal, B., Kumari, S., Kumari, A., Singh, S.K. and Babbar, H. (2023) Allergic Contact Dermatitis to Lip Care Cosmetic Products—A Systematic Review. *Cutaneous and Ocular Toxicology*. https://doi.org/10.1080/15569527.2023.2275022

[32] Cheng, H.S., Konya, J., Lobel, E. and Fernandez-Penas, P. (2019) Patch Testing for Cheilitis: A 10-Year Series. *Dermatitis*, **30**, 347-351. https://doi.org/10.1097/DER.0000000000000524

[33] Kimyon, R.S., Liou, Y.L., Schlarbaum, J.P. and Hylwa, S.A. (2019) Everlasting Liquid Lipstick: Reminder to Patch Test Personal Products. *Dermatitis*, **30**, 78-79. https://doi.org/10.1097/DER.0000000000000425

[34] Süß, H., Dölle-Bierke, S., Geier, J., *et al*. (2019) Contact Urticaria: Frequency, Elicitors and Cofactors in Three Cohorts (Information Network of Departments of Dermatology; Network of Anaphylaxis; and Department of Dermatology, University Hospital Erlangen, Germany). *Contact Dermatitis*, **81**, 341-353. https://doi.org/10.1111/cod.13331

[35] Ismail, M. and Maibach, H.I. (2012) The Clinical Significance of Immunological Contact Urticaria to Processed Grains. *Indian Journal of Dermatology, Venereology and Leprology*, **78**, 591-594. https://doi.org/10.4103/0378-6323.100561

[36] Shaji, M., Merin, K.A. and Kameswaran, R. (2022) A Review on Cosmetics Causing Contact Urticaria. *Indian Journal of Dermatology*, **67**, 392-398.

[37] Iwata, J.I., Inomata, N., Sato, M., Miyakawa, M., Kawaguchi, T. and Aihara, M. (2019) Contact Dermatitis with Concomitant Contact Urticaria Syndrome Due to Multiple Ingredients of Oxidative Hair Dye. *Allergology International*, **68**, 114-116. https://doi.org/10.1016/j.alit.2018.05.005

[38] Suzuki, K., Futamura, K., Sato, N., Nakamura, M., Matsunaga, K. and Yagami, A. (2021) Contact Urticaria Caused by Carmine-Containing Eyeshadows; the Causative Allergen Is Carminic Acid Rather than CC38K. *Contact Dermatitis*, **84**, 468-469. https://doi.org/10.1111/cod.13769

[39] Sukakul, T., Kumpangsin, T. and Boonchai, W. (2020) Contact Urticaria Caused by Salicylic Acid in a Chemical Peel Solution. *Contact Dermatitis*, **82**, 121-122. https://doi.org/10.1111/cod.13405

[40] Coelho, E.Q., Wu, S., Nunes, R.S. and Reis, V. (2019) Contact Urticaria Following the Use of a Cosmetic Containing Caprylyl Glycol: A Case Report. *Contact Dermatitis*, **81**, 308-309. https://doi.org/10.1111/cod.13299

[41] Pastor-Nieto, M.A., Peña-Arellano, M.I. and Gatica-Ortega, M.E. (2021) Immunologic Contact Urticaria from Phenoxyethanol in Cosmetics. *Contact Dermatitis*, **85**, 586-587. https://doi.org/10.1111/cod.13911

[42] Haltia, T., Jungewelter, S., Airaksinen, L., Suomela, S., Lindström, I. and Suojalehto, H. (2021) Occupational Asthma, Rhinitis, and Contact Urticaria from Indigo (*Indigofera tinctoria*) Hair Dye. *The Journal of Allergy and Clinical Immunology*: *In Practice*, **9**, 3500-3502. https://doi.org/10.1016/j.jaip.2021.04.047

[43] Tawfik, M.E. and Atwater, A.R. (2019) Anaphylactoid Reaction to Benzophenones, with Recurrence during Patch Testing. *Contact Dermatitis*, **81**, 303-304. https://doi.org/10.1111/cod.13293