Synopsis of Original Research Paper

Analysis on the utility of basophil activation test in the diagnosis of hair dye and cosmetics allergy and the mechanism of prurigo reaction caused by hair dye

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The incidence of hair dye and cosmetics allergy have increased considerably among young people. Contact hypersensitivity commonly occurs with hair dye exposure, manifesting as urticaria or eczematous eruptions in localised exposed areas. However, in some cases, prurigo can be diffusely occurred. Neither the histopathology nor molecular mechanisms of hair dye-induced prurigo have been elucidated.

Basophil activation test (BAT) is a safe, ex vivo assay to confirm allergy diagnosis. In this study, we first examined the utility of BAT for diagnosing hair dye allergy by analyzing the results of BAT performed in four cases (two cases, contact eczema; one case, contact urticaria; one case, prurigo) that have positive patch test reactions to p-phenylenediamine (PPD). Basophils isolated from two cases (one case, contact eczema; one case, contact urticaria) were non-responder. Responder basophils from two residual cases (one case, contact eczema; one case, prurigo) did not respond to PPD. Therefore, in cases of delayed-type reaction against PPD including prurigo, PPD and PPD specific IgE-induced basophil activation might not be involved. However, the utility of BAT in diagnosis of immediate-type PPD allergy such as contact urticaria could not be elucidated in this study.

We further showed the histological features of hair dye-induced prurigo, including the characteristics of an immune cell infiltrate. The histopathology exhibited hyperkeratosis, acanthosis, and subcorneal collection of neutrophils. Immunohistochemical staining revealed moderate basophil infiltration in subcorneal microabscesses with infiltration of CD4+ cells, IL-17+ cells, and Foxp3+ cells beneath microabscesses and perivascular area in upper dermis. Together, whereas basophil activation was not observed following exposure to PPD, basophil was infiltrated in central portion of the lesions. Further studies are necessary to reveal the role of basophils in hair dye-induced prurigo.