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## Hair Regrowth Outcomes of Contact Immunotherapy for Patients With Alopecia Areata: A Systematic Review and Meta-analysis.

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### Abstract

**IMPORTANCE:** Contact immunotherapy with diphenylcyclopropanone or squaric acid dibutyl ester is a preferred treatment for severe alopecia areata; however, the defined criteria for therapeutic hair regrowth and regrowth rate have been highly heterogeneous across studies.

**OBJECTIVE:** To summarize the clinical outcomes of contact immunotherapy for alopecia areata according to standardized criteria for therapeutic hair regrowth and several prognostic factors.

**DATA SOURCE:** A database search of MEDLINE, Embase, and Cochrane Library was performed for articles published before November 20, 2017, using the search terms areata, totalis, universalis, sensitizer, sensitization, immunotherapy, DPCP, diphenylcyclopropanone, diphenylcyprone, SADBE, and squaric.

**STUDY SELECTION:** Clinical trials or observational studies that investigated contact immunotherapy for alopecia areata and subgrouped the disease into patchy alopecia or alopecia totalis/universalis and reported their hair regrowth rates were included, whereas studies that investigated combination therapy or nonconventional protocol and case series or reviews were excluded.

**DATA EXTRACTION AND SYNTHESIS:** The following data were extracted from each of the studies included in this meta-analysis: study year and setting, sensitizer type, study population, study population composition by disease subtype, defined criteria for therapeutic hair regrowth, and regrowth rate of contact immunotherapy. The incidence of adverse effects and recurrence rate were also recorded. A random effects model was used for data synthesis because of the expected high heterogeneity of the included studies.

**MAIN OUTCOMES AND MEASURES:** The main outcome was therapeutic hair regrowth rate according to the 4-grade criteria for therapeutic regrowth. Secondary outcomes included incidence of treatment-related adverse effects and recurrence rate.

**RESULTS:** Forty-five studies comprising 2227 patients were analyzed. The overall rate of any hair regrowth was 65.5% among patients with alopecia areata (74.6% in the patchy alopecia and 54.5% in the alopecia totalis/universalis subgroups). However, the complete regrowth rate was 32.3% (24.9% in the patchy alopecia and 32.3% in the alopecia totalis/universalis subgroups). Disease extent of 50% or greater (odds ratio [OR], 3.05; 95% CI, 2.26-4.12), atopic history (OR, 1.61; 95% CI, 1.03-2.50), and nail involvement (OR, 2.06; 95% CI, 1.26-3.36) were associated with poorer therapeutic outcome. Recurrence rates were 38.3% among patients receiving maintenance treatment and 49.0% among those not receiving maintenance treatment.

**CONCLUSIONS AND RELEVANCE:** Various factors were associated with the clinical outcomes of contact immunotherapy for alopecia areata, with significant differences in hair regrowth rates according to the level of expected therapeutic regrowth. Quantitative

summarization may improve patient education and lead to better therapeutic adherence and outcomes.

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