

## Abstract

# Use of Artificial Intelligence as a Predictor of the Response to Treatment in Alopecia Areata

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## Abstract

**Background:** Artificial intelligence (AI) has emerged in dermatology with some studies focusing on skin disorders such as skin cancer, atopic dermatitis, psoriasis, and onychomycosis. Alopecia areata (AA) is a dermatological disease whose prevalence is 0.7%-3% in the United States, and is characterized by oval areas of nonscarring hair loss of the scalp or body without evident clinical variables to predict its response to the treatment. Nonetheless, some studies suggest a predictive value of trichoscopic features in the evaluation of treatment responses. Assuming that black dots, broken hairs, exclamation marks, and tapered hairs are markers of negative predictive value of the treatment response, while yellow dots are markers of no response to treatment according to recent studies, the absence of these trichoscopic features could indicate favorable disease evolution without treatment or even predict its response. Nonetheless, no studies have reportedly evaluated the role of AI in AA on the basis of trichoscopic features.

**Objective:** This study aimed to develop an AI algorithm to predict, using trichoscopic images, those patients diagnosed with AA with a better disease evolution.

**Methods:** In total, 80 trichoscopic images were included and classified in those with or without features of negative prognosis. Using a data augmentation technique, they were multiplied to 179 images to train an AI algorithm, as previously carried out with dermoscopic images of skin tumors with a favorable response. Subsequently, 82 new images of AA were presented to the algorithm, and the algorithm classified these patients as responders and non-responders; this process was reviewed by an expert trichologist observer and presented a concordance higher than 90% with the algorithm identifying structures described previously. Evolution of the cases was followed up to truly determine their response to treatment and, therefore, to assess the predictive value of the algorithm.

**Results:** In total, 32 of 40 (80%) images of patients predicted as nonresponders scarcely showed response to the treatment, while 34 of 42 (81%) images of those predicted as responders showed a favorable response to the treatment.

**Conclusions:** The development of an AI algorithm or tool could be useful to predict AA evolution and its response to treatment. However, further research is needed, including larger sample images or trained algorithms, by using images previously classified in accordance with the disease evolution and not with trichoscopic features.

**Conflicts of Interest:** None declared.

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## KEYWORDS

artificial intelligence; alopecia areata; predictor; treatment

## Multimedia Appendix 1

Null.

[\[PNG File , 780 KB-Multimedia Appendix 1\]](#)

## Multimedia Appendix 2

Null.

[\[PNG File , 682 KB-Multimedia Appendix 2\]](#)

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