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# Postinflammatory hyperpigmentation: A comprehensive overview



## Treatment options and prevention

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### Learning objectives

After completing this learning activity, participants should be able to describe currently available medications, surgical treatments, and laser treatments for PIH; list possible side effects for PIH medication, surgical treatment, and laser treatment regimens; and discuss photoprotection methods to alleviate the PIH.

### Disclosures

#### Editors

The editors involved with this CME activity and all content validation/peer reviewers of the journal-based CME activity have reported no relevant financial relationships with commercial interest(s).

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Postinflammatory hyperpigmentation (PIH) occurs after various dermatoses, exogenous stimuli, and dermatologic procedures. The clinical course of PIH is chronic and unpredictable, although the probability of resolution of epidermal hyperpigmentation is better than those of dermal hyperpigmentation. PIH can be prevented or alleviated. When it does occur, the underlying inflammatory conditions should be sought and treated as the first step to reduce the progression of inflammation and PIH (which is an inflammatory consequence). If the inflammatory conditions subsides or there is no evidence of inflammation at the time of diagnosis, the treatments of PIH should be considered as the next step. Understanding the available treatment options helps the physician choose the appropriate treatment for each patient. Having a reproducible model for PIH is essential for the development of treatment modalities. The second article in this 2-part continuing medical education series on PIH specifically addresses the evidence that supports medical and procedural treatments of PIH and other forms of acquired hyperpigmentation. It also describes a PIH model and provides an algorithm for clinical practice along with discussion about the prevention of PIH. (*J Am Acad Dermatol* 2017;77:607-21.)

**Key words:** bleaching agent; botanical; chemical peeling; hydroquinone; hyperpigmentation; laser and light; melanin; photoprotection; sunscreen; trichloroacetic acid.

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Estee Lauder, and Ferndale Laboratories. Drs Silpa-archa and Chaowattanapanit have no conflicts of interest to declare.

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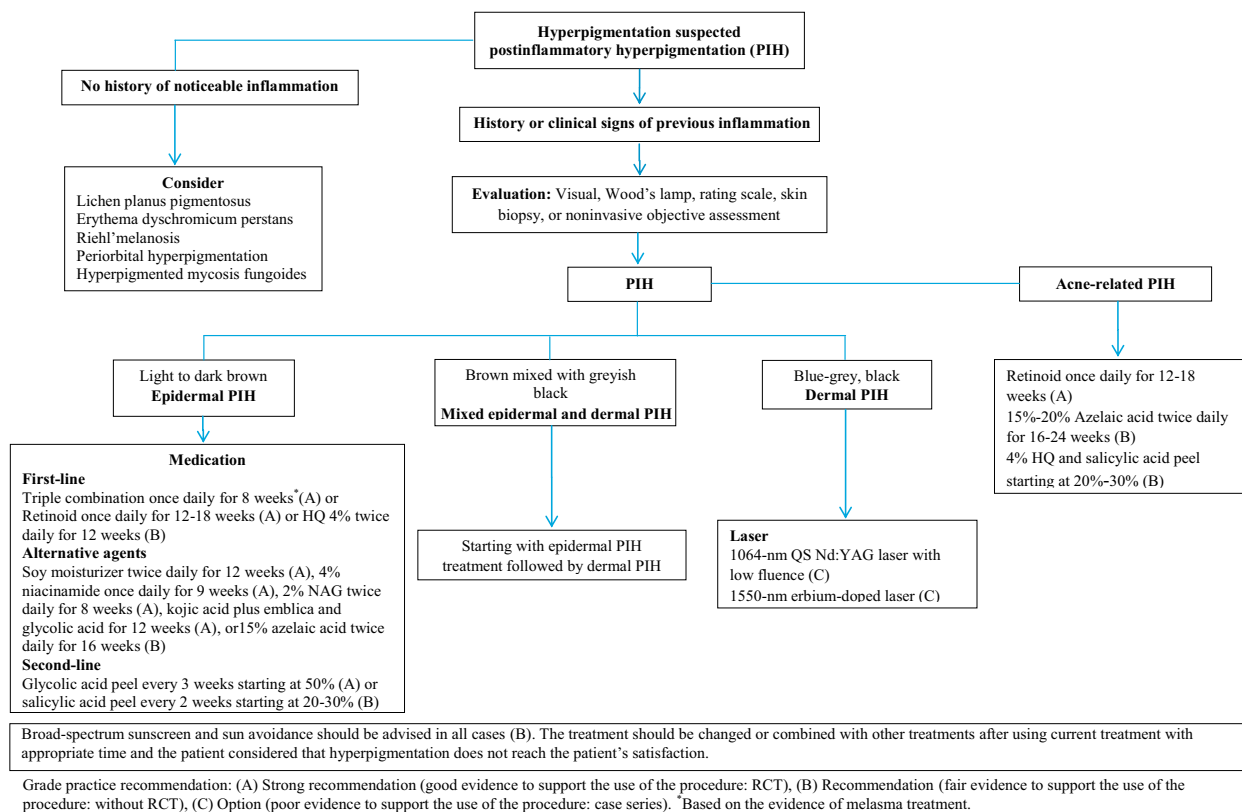
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**Fig 1.** Algorithm for the diagnosis and treatment of postinflammatory hyperpigmentation.

Postinflammatory hyperpigmentation (PIH) is a common skin disorder with significant psychological impact.<sup>1</sup> There is a limited understanding of its pathogenesis and the therapeutic modalities that are used to manage this condition. While there have been numerous studies of hyperpigmentation, few have specifically focused on PIH. In this article, we discuss the available evidence regarding the treatment of PIH and provide an algorithm for clinical practice (Fig 1). If data are not available for PIH, we refer to other commonly acquired types of hyperpigmentation. For future research, a reproducible, controlled stimulus that induces PIH would provide a useful tool for studies to better understand the molecular pathogenesis of this disorder and a criterion standard on which to test various treatment modalities for their efficacies.

## POSTINFLAMMATORY HYPERPIGMENTATION MODEL

### Key point

- **Trichloroacetic acid–induced postinflammatory hyperpigmentation can be used as a model for evaluating treatment interventions and subsequent outcomes**

Isedeh et al<sup>2</sup> created a model of induced PIH using trichloroacetic acid (TCA). This in vivo model was validated versus naturally induced PIH using acne as the causative agent. Validation consisted of comparing the clinical, histologic, and spectroscopic properties of TCA-induced and naturally occurring acne-induced PIH. The acne- and TCA-induced PIH exhibited similar clinical, spectroscopic (colorimetry and spectroscopy), and histologic characteristics starting at day 28.<sup>2</sup> The TCA-induced PIH model can be used for the future study assessing new treatments in PIH.

## MEDICAL TREATMENT

### Key points

- **Small numbers of randomized controlled trials have proven the efficacy in reducing pigmentation for patients with postinflammatory hyperpigmentation**
- **A combination treatment appears to be more effective than monotherapy**

Melanogenesis is a complex process. In melanosome, tyrosinase converts precursor L-tyrosine to L-3,4-dihydroxyphenylalanine (L-DOPA) by hydroxylation. L-DOPA is converted to L-DOPA quinone by an oxidation process, which then transforms to

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