

TREATMENT OF MELASMA
USING
COMBINATION INTENSE
PULSED LIGHT
AND TOPICAL THERAPY
WITH MANDELIC ACID

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MELASMA

Melasma is a condition of hyperpigmentation of the skin, seen most often in women between the ages of 20-60 years. As women continue to take post-menopausal estrogen replacement therapy we may continue to see melasma in increasingly older populations.

Melasma most often occurs on the cheeks, mustache area, forehead and neck, but may occur as distally as the arms. Distinction from lentigenes and post-inflammatory hyperpigmentation is sometimes difficult. Sun exposure precipitates and exacerbates melasma, and sunscreens are a mainstay of therapy. Melasma occurs during pregnancy and while on oral contraceptive therapy, and therefore appears to be somewhat hormonally regulated though it is seen in people experiencing no more than the usual, physiologic hormonal fluctuations.

Melasma consists of melanin within melanocytes and keratinocytes in the epidermis, and within macrophages of the dermis. The more superficial type of melasma with epidermal melanin is successfully treated with topical tyrosinase inhibitors, mild steroids, α and β hydroxy acids, and retinoids, often in conjunction with chemical peels. Treatment with Q-switched ruby laser has met with mixed results. Deeper dermal melanin in melasma can prove difficult to treat.

Clinical distinction between the superficial epidermal melasma and the deeper dermal melasma can be made using the Wood's lamp. Epidermal melanin fluoresces more intensely than does dermal melanin when skin is exposed to Wood's lamp light.

Drawbacks of current treatment include rebound hyperpigmentation, especially in constitutively darker-skinned people. Post-inflammatory hyperpigmentation may also occur in skin type IV and above after application of tretinoin. Leukoderma and confetti-type hypopigmentation have been seen after melasma treatment with hydroquinones or isopropylcatechol. Ochronosis, colloid milium, contact dermatitis, erythema, telangiectasis may be complications of topical treatments for melasma.

We discuss here the approach we've taken in treatment of melasma, and suggest that satisfactory to excellent results are obtainable with combined topical therapy and intense pulsed-light treatment. We hypothesize that dermal melanin is broken-up into smaller particles by the intense pulsed-light treatment, making it more easily phagocytized by macrophages. When this is used in conjunction with inhibitors of melanogenesis and sunscreens, further hypermelanization can be controlled.

AVAILABLE TREATMENT

Tyrosinase Inhibitors

Hydroquinones
Azelaic acid
Kojic acid
Licorice P-T (glabridin 10-40%)
Arbutin (dopa competitor)
Melawhite (leukocyte extract with competitive tyrosinase inhibitor)

Inhibition of Melanin Production

Ascorbic acid, magnesium-L-ascorbyl-2-phosphate (reduces o-quinones)
Glutathione (stimulates pheomelanin)

Melanocyte Toxicity-selective

Ammoniated mercury
Isopropylcatechol
N-Acetyl-4-S-cysteaminylphenol (cytostatic)
N-2,4-Acetoxyphenylthio-ethylacetamide
N-Acetylcysteine (increases glutathione)

Suppression of Melanogenesis-nonselective

Indomethacin
Corticosteroids

Chemical Peels

Glycolic acid
Trichloroacetic acid
Mandelic acid
Lactic acid

Retinoids

Tretinoin (keratolytic)

Sunscreens

UVA and UVB coverage

Adapted from Piamphongsant, 1998.

Topical Treatment with Mandelic Acid

Mandelic acid*
Ascorbic acid (Vitamin C)*
 α -tocopherol acetate (Vitamin E)*
(3-carotene (Vitamin A)*
Cholecalciferol (Vitamin D)*
Sunscreens*
Tretinoin (for skin Type III and under)
Hydrocortisone cream (for signs of irritation)

*NuCelle Mandelic Marine Complex (Distributed by: North American Medical, Inc. (800)-877-3131)

Pulsed-light Treatment

Photoderm, with cut-off at 550-650 nm (depending upon intrinsic pigmentation), triple pulse 45 J/cm², 3.5/1.5/0.5, 10/10 DT.

RESULTS

M.O.



Before



After

1 month mandelic acid (NuCelle) bid

L.R.



Before



After

1 month mandelic acid (NuCelle) plus 2% hydroquinone, bid

TREATMENT APPROACH

Topical Therapy

Our approach in treatment of melasma first involves eliminating UVR exposure as much as possible. Sunscreen for both UVB and UVA, used daily is required. Once UV exposure is minimized, a combination of melanogenesis inhibitors, vitamins C, E, and A, and low-potency steroids used. The use of these antioxidant vitamins in our topical therapy appears to improve the overall effectiveness of our initial treatment regimen.

We find that it is very important not to stimulate inflammation through use of retinoids or hydroquinones, whenever possible. These can lead to post-inflammatory hyperpigmentation. We like the results mandelic acid has given our patients in this regard. It does not seem to irritate skin and from our experience, can safely be used even for skin types IV and above.

Occasionally, in patients with skin types III and lower, we will use 2-4% hydroquinone cream to augment pigment reduction. Very mild hydrocortisone cream is also used in patients with easily irritated skin, to reduce inflammation and resultant post-inflammatory hyperpigmentation. Fluorinated steroids are not used.

Mandelic acid was first included in our facial care formulation because of its antimicrobial action. In the past, it has been used as a urinary tract antiseptic, and we believed that this characteristic would be helpful in the care of skin prone to acne.

Over time, observation was made that use of the mandelic acid in the facial care formulations appeared to even out skin hyperpigmentation, and we began using the mandelic acid for treatment of melasma. Its mechanism of action in pigment reduction is not well understood, but we hypothesize that it interferes with tyrosinase function, much like ascorbic acid. With its phenol side-chain it may also interfere with o-quinones in the melanin pathway.

We ask patients to use the mandelic acid products for at least one month, and often 3-6 months, so that we may evaluate their response to topical therapy alone. This allows two things to happen: 1) because topical therapy is far less expensive than intense pulsed light therapy for treating melasma, the most cost effective approach is used, and 2) if intense pulsed-light therapy is required, the potential for post-inflammatory hyperpigmentation from the light therapy is reduced by the pre-treatment with pigment inhibitors.

For more difficult-to-treat melasma, we will augment daily topical pigment inhibition with weekly to biweekly chemical peels using one of TCA, Kojic acid, glycolic acid, or 30-50% mandelic acid.

Topical Therapy Combined with Intense Pulsed-Light

We have achieved good results for melasma for several of our patients who have used the mandelic acid topical treatment alone. However, there is a subset of patients with dermal melasma which prove to be more challenging. For this group we have augmented the topical therapy with PhotoDerm intense pulsed-light treatment. Depending upon the constitutive pigmentation of the patient, we use the PhotoDerm with lower cutoffs varying from 550nm (most lightly pigmented patients) to 645nm (skin types IV and above). Test patches are employed for patients with darker skin types. One or more treatments with the PhotoDerm are given over one to two month intervals. Further improvement of the melasma is often seen after just one treatment.

The mechanism of action of intense pulsed-light therapy for melasma has not been well defined. It is our hypothesis that the intense pulsed-light energy breaks apart, or explodes, the melanosomes in the dermis which have not been reached through topical therapy. In fact, upon treatment with intense pulsed-light therapy, immediate 'graying' of the skin may be seen in those patients with epidermal melasma. In our experience, this portends excellent response to the therapy for the epidermal component. In theory, melanophages may be able to abscond with the smaller melanin/melanosome particles created by pulsed-light more easily than they can with larger, untreated melanin particles.

Studies to histologically evaluate the condition of melanocytes, melanosomes, and free melanin in the skin, before and after intense pulsed-light therapy and followed over time, are necessary to help determine the mechanism of action of intense pulsed-light in treatment of melasma and retinoids.

M.R.



Before

Taken after 4.5 months of mandelic acid (NuCelle) + three 40% glycolic acid peels



After

Taken after 2 months after one PhotoDerm patch test and treatment (550 nm filter, triple pulse, 45 J/cm², 3.5/1.5/0.5, 10/10, 13 pulses total) and 2 more months of mandelic acid (NuCelle).

S.B.



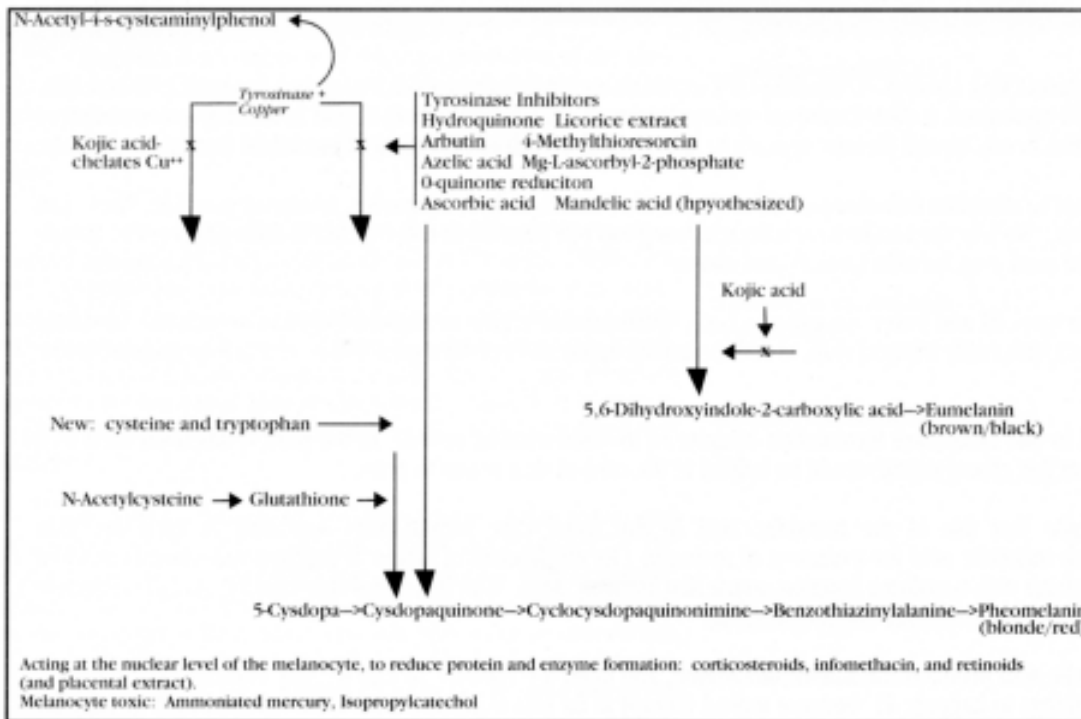
Before

1 month mandelic acid (NuCelle) bid

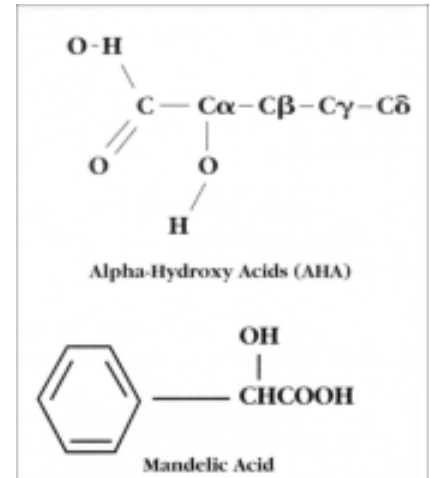


After

Melanin Formation Pathway



Molecular Structure of α -hydroxy Acids



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Penetration Depth of UV and Intense Pulsed Light

