Topical 8% glycolic acid and 8% L-lactic acid creams for the treatment of photodamaged skin. A double-blind vehicle-controlled clinical trial.


Dermatology Clinical Investigations Unit, Massachusetts General Hospital, Boston, USA.

Abstract

OBJECTIVE: To evaluate the efficacy and tolerability of 2 widely used topical alpha-hydroxy acids at low concentrations, 8% glycolic acid and 8% lactic (L-isooform) acid creams, in the treatment of photodamaged skin.

DESIGN: A single-center, 22-week, double-blind, vehicle-controlled, randomized clinical trial assessed the overall severity of photodamage on the faces and forearms of volunteers, based on 7 individual clinical components of cutaneous photodamage.

SETTING: The study was performed in an outpatient clinical research unit at the Massachusetts General Hospital, Boston.

PATIENTS: Seventy-four women, aged 40 to 70 years, with moderately severe photodamaged facial skin were enrolled in the study. One subject withdrew from the study early because of skin irritation, and 6 subjects withdrew from the study for personal reasons.

INTERVENTIONS: Glycolic acid, L-lactic acid, or vehicle creams were applied twice daily to the face and outer aspect of the forearms.

MAIN OUTCOME MEASURES: Improvement in alpha-hydroxy acid-treated photodamaged skin as determined by patient self-assessments and physician evaluations of efficacy and irritancy.

RESULTS: The percentage of patients using either 8% glycolic acid or 8% L-lactic acid creams on the face achieving at least 1 grade of improvement (using a scale from 0 through 9) in overall severity of photodamage was significantly greater than with the vehicle cream (76% glycolic acid, 71% lactic acid, and 40% vehicle; \( P < .05 \)). On the forearms, after 22 weeks, treatment with glycolic acid cream was superior to the vehicle in improving the overall severity of photodamage and sallowness (\( P < .05 \)). L-Lactic acid cream was significantly superior to the vehicle in reducing the overall severity of photodamage (\( P < .05 \)), mottled hyperpigmentation (\( P < .05 \)), sallowness (\( P < .05 \)), and roughness on the forearms (\( P < .05 \)) at week 22.

CONCLUSIONS: Topical 8% glycolic acid and 8% L-lactic acid creams are modestly useful in ameliorating some of the signs of chronic cutaneous photodamage. These agents are well tolerated and available without prescription.

PMID: 8651713 [PubMed - indexed for MEDLINE]
Publication Types, MeSH Terms, Substances

Publication Types:

- Clinical Trial
- Controlled Clinical Trial
- Randomized Controlled Trial
- Research Support, Non-U.S. Gov't

MeSH Terms:

- Administration, Topical
- Adult
- Aged
- Dosage Forms
- Double-Blind Method
- Female
- Glycolates/administration & dosage*
- Humans
- Lactates/administration & dosage*
- Lactic Acid
- Middle Aged
- Skin Aging/drug effects*
- Vehicles

Substances:

- Dosage Forms
- Glycolates
- Lactates
- Vehicles
- Lactic Acid
- glycolic acid

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Full Text Sources:

- HighWire Press - PDF
- Ovid Technologies, Inc.

Medical:

- Skin Aging - MedlinePlus Health Information

Molecular Biology Databases:

- HYDROXYACETIC ACID - HSDB
- LACTIC ACID - HSDB

Supplemental Content
Related citations

- **Efficacy of 0.1% tazarotene cream for the treatment of photodamage: a 12-month multicenter, randomized trial.** [Arch Dermatol. 2002]
  
  Efficacy of 0.1% tazarotene cream for the treatment of photodamage: a 12-month multicenter, randomized trial.
  

- **Use of topical ascorbic acid and its effects on photodamaged skin topography.** [Arch Otolaryngol Head Neck Surg. 1999]
  
  Use of topical ascorbic acid and its effects on photodamaged skin topography.
  

- **Histological effects of tazarotene 0.1% cream vs. vehicle on photodamaged skin: a 6-month, multicentre, double-blind, randomized, vehicle-controlled study in patients with photodamaged facial skin.** [Br J Dermatol. 2004]
  
  Histological effects of tazarotene 0.1% cream vs. vehicle on photodamaged skin: a 6-month, multicentre, double-blind, randomized, vehicle-controlled study in patients with photodamaged facial skin.
  

- **Review Interventions for photodamaged skin.** [Cochrane Database Syst Rev. 2005]
  
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  Review Topical tretinoin research: an historical perspective.
  

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  PubChem chemical substance (submitted) records that are classified under the same Medical Subject Headings (MeSH) controlled vocabulary as the current articles.

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  Histological effects of tazarotene 0.1% cream vs. vehicle on photodamaged skin: a 6-month, multicentre, double-blind, randomized, vehicle-controlled study in patients with photodamaged facial skin.


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  Review Topical tretinoin research: an historical perspective.


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Topical 8% glycolic acid and 8% L-lactic acid creams for the treatment of photodamaged skin. A double-blind vehicle-controlled clinical trial.

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• NCBI Newsletter
• NCBI FTP Site
Topically applied lactic acid increases spontaneous secretion of vascular endothelial growth factor by human reconstructed epidermis

1. M. Rendl1,
2. C. Mayer1,
3. W. Weninger1,2,
4. E. Tschachler1,3

Article first published online: 23 DEC 2001
DOI: 10.1046/j.1365-2133.2001.04274.x

Author Information

1. Division of Immunology, Allergy and Infectious Diseases, Department of Dermatology, University of Vienna Medical School, Währinger Gürtel 18–20, A-1090 Vienna, Austria

2. Center for Blood Research, Department of Pathology, Harvard Medical School, Boston, MA, U.S.A.

3. Centre de Recherches et Investigation Epidermiques et Sensorielles, Neuilly, France

*Correspondence: Dr Erwin Tschachler. E-mail: erwin.tschachler@akh-wien.ac.at

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2. Article first published online: 23 DEC 2001
3. Accepted for publication 15 February 2001
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Abstract

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Keywords:

• alpha-hydroxy acids;
• angiogenesis;
• lactic acid;
• skin equivalent;
• vascular endothelial growth factor

Background Alpha-hydroxy acids (AHAs) are widely used for the treatment of hyperkeratotic skin disorders and photodamaged skin.

Objectives To investigate the effect of lactic acid (LA) on the secretion of cytokines by keratinocytes (KCs) of human reconstructed epidermis.

Methods Creams containing 1·5%, 3% or 5% LA or vehicle controls were topically applied on to human epidermal equivalents (EEs). After 24 h, EEs were analysed for morphology and for the presence of apoptotic cells. Secretion of vascular endothelial growth factor (VEGF), angiogenin (ANG) and interleukin (IL)-8 was measured in the supernatants by enzyme-linked immunosorbent assay.
Results LA led to a concentration-dependent increase in apoptotic cells as determined by cell morphology and terminal deoxynucleotidyl transferase-mediated deoxyuridine triphosphate nick end-labelling. VEGF secretion was increased 2.5- and 2.8-fold \((P < 0.05)\) over vehicle control after treatment with 1.5% and 3% LA, respectively. No significant increase in VEGF secretion was detected with 5% LA. In contrast to VEGF, secretion of ANG was decreased by LA in a concentration-dependent manner (0.5-fold for 5% LA; \(P < 0.01)\). No significant changes in IL-8 secretion were found with any of the concentrations tested.

Conclusions Our data demonstrate that the topical application of AHAs modulates the secretion of cytokines by KCs. Regulation of KC-derived growth factors and cytokines by AHAs might represent a mechanism contributing to their therapeutic effects in disorders such as photoageing.
The Effects of Topical L(+)-Lactic Acid and Ascorbic Acid on Skin Whitening

1. Walter P. Smith

Article first published online: 24 DEC 2001
DOI: 10.1046/j.1467-2494.1999.196561.x

International Journal of Cosmetic Science
Volume 21, Issue 1, pages 33–40, February 1999

Additional Information (Show All)

How to Cite


Author Information

1. Walter Smith Consultants & Dermac Laboratory Inc., 23 Hoyt St., Stamford, CT, USA

Publication History

1. Issue published online: 24 DEC 2001
2. Article first published online: 24 DEC 2001
Synopsis

Subjects with medium to dark skin and many exhibiting facial age spots or discolorations participated in this twelve week study to evaluate the skin whitening ability of lactic and ascorbic acid. Using clinical and biophysical test methods we observed prolonged treatment with 8.8% L(+) lactic acid resulted in no significant effects on skin pigmentation. However treatment with L(+) lactic acid supplemented with ascorbic acid (1%) did produce a whitening effect which becomes apparent after three months. These effects were demonstrated clinically by the test panelists, and trained clinicians, and with objective instrumental methods. We observed a general skin lightening and did see a modest preferential lightening of age spots with the combination of acids.
The inhibitory effect of glycolic acid and lactic acid on melanin synthesis in melanoma cells

1. Akiko Usuki,
2. Akiko Ohashi,
3. Hirofumi Sato,
4. Yasunobu Ochiai,
5. Masamitsu Ichihashi,
6. Yoko Funasaka

Article first published online: 3 NOV 2003

DOI: 10.1034/j.1600-0625.12.s2.7.x

Experimental Dermatology

Volume 12, Issue Supplement s2, pages 43–50, October 2003

Additional Information (Show All)

How to Cite Author Information Publication History

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Keywords:
- α-hydroxy acid;
- glycolic acid;
- lactic acid;
- melanin;
- tyrosinase

Abstract α-Hydroxy acids (AHAs) such as glycolic acid (GA) and lactic acid (LA) have been reported to be effective in treating pigmentary lesions such as melasma, solar lentigines, and postinflammatory hyperpigmentation. The mechanism of this effect might be due to epidermal remodeling and accelerated desquamation, which would result in quick pigment dispersion. However, the direct effect of AHAs on melanin synthesis has not yet been well studied. To elucidate such a direct effect of AHAs on melanogenesis, we performed melanin assays, growth curve determinations, Northern and Western blotting for melanogenic proteins [tyrosinase, tyrosinase related protein (TRP)-1 and TRP-2], and tyrosinase and, 4-dihydroxyphenylalaninechrome tautomerase enzyme activity assays using mouse B16 and human melanoma cells. GA or LA (at doses of 300 or 500 µg/ml) inhibited melanin formation in similar dose-dependent manner, without affecting cell growth. Although the mRNA and protein expression or molecular size of tyrosinase, TRP-1 and TRP-2 were not affected, tyrosinase activity was inhibited. To see whether GA and/or LA directly inhibit tyrosinase catalytic function, the effect of GA and LA on human tyrosinase purified from the melanosome-rich large granule fraction of human melanoma cells was performed. GA or LA were shown to inhibit tyrosinase enzyme activity directly, but this effect was not due to the acidity of GA or LA, because adjusting the pH to 5.6 (the pH of GA and LA at concentrations of 2500 µg/ml), did not affect tyrosinase activity. Taken together, these results show that GA and LA suppress melanin formation by directly inhibiting tyrosinase activity, an effect independent of their acidic nature. GA and LA might work on pigmentary lesions not only by accelerating the turnover of the epidermis but also by directly inhibiting melanin formation in melanocytes.
Topical 8% Glycolic Acid and 8% L-Lactic Acid Creams for the Treatment of Photodamaged Skin

A Double-blind Vehicle-Controlled Clinical Trial

Matthew J. Stiller, MD; John Bartolone, PhD; Robert Stern, MD; Shondra Smith, MD; Nikiforos Kollias, PhD; Robert Gillies, PhD; Lynn A. Drake, MD


Abstract

Objective
To evaluate the efficacy and tolerability of 2 widely used topical α-hydroxy acids at low concentrations, 8% glycolic acid and 8% lactic (L-isoform) acid creams, in the treatment of photodamaged skin.

Design
A single-center, 22-week, double-blind, vehicle-controlled, randomized clinical trial assessed the overall severity of photodamage on the faces and forearms of volunteers, based on 7 individual clinical components of cutaneous photodamage.

Setting
The study was performed in an outpatient clinical research unit at the Massachusetts General Hospital, Boston.

Patients
Seventy-four women, aged 40 to 70 years, with moderately severe photodamaged facial skin were enrolled in the study. One subject withdrew from the study early because of skin irritation, and 6 subjects withdrew from the study for personal reasons.

Interventions
Glycolic acid, L-lactic acid, or vehicle creams were applied twice daily to the face and outer aspect of the forearms.

Main Outcome Measures
Improvement in α-hydroxy acid—treated photodamaged skin as determined by patient self-assessments and physician evaluations of efficacy and irritancy.

Results
The percentage of patients using either 8% glycolic acid or 8% L-lactic acid creams on the face achieving at least 1 grade of improvement (using a scale from 0 through 9) in overall severity of photodamage was significantly greater than with the vehicle cream (76% glycolic acid, 71% lactic acid, and 40% vehicle; P<.05). On the forearms, after 22 weeks, treatment with glycolic acid cream was superior to the vehicle in improving the overall severity of photodamage and sallowness (P<.05). L-Lactic acid cream was significantly superior to the vehicle in reducing the overall severity of photodamage (P<.05), mottled hyperpigmentation (P<.05), sallowness (P<.05), and roughness on the forearms (P<.05) at week 22.
Conclusions
Topical 8% glycolic acid and 8% L-lactic acid creams are modestly useful in ameliorating some of the signs of chronic cutaneous photodamage. These agents are well tolerated and available without prescription.

(Arch Dermatol 1996;132:631-636)

Author Affiliations

From the Dermatology Clinical Investigations Unit, Massachusetts General Hospital (Drs Stiller, Smith, Kollias, Gilli)