VOLUME 6
ISSUE 4
2025

ISSN 2563-7673 (PRINT)
ISSN 2563-7681 (ONLINE)

CANADIAN DERMATOLOGY TODAY

EDITORIAL BOARD

Jensen Yeung, MD, FRCPC

Associate Professor, Department of Medicine, University of Toronto, Toronto, ON
Medical Director, PERC Dermatology, Women's College Hospital, Toronto, ON
Investigator, Probity Medical Research, Waterloo, ON

Chih-ho Hong, MD, FRCPC

Clinical Assistant Professor, Department of Dermatology and Skin Science, University of British Columbia, Vancouver, BC
Director, Dr. Chih-ho Hong Medical Inc. and SkinFIT MD, Vancouver, BC

Melinda Gooderham, MSc, MD, FRCPC

Medical Director, SKiN Health Investigator
Probity Medical Research Assistant, Waterloo, ON
Professor, Queen’s University, Kingston, ON

TABLE OF CONTENTS

Canadian Dermatology Today is published 4 times per year in English and French.

To learn more please visit **canadiandermatologytoday.com**

The content in Canadian Dermatology Today qualifies for Section 2 (self-learning) credits towards the maintenance of certification. For information on how this activity fits in the Royal College Maintenance of Certification (MOC) Program, please visit the Royal College's website (royalcollege.ca/moc). For more personalized support, please contact the Royal College Services Centre (1-800-461-9598) or your local CPD Educator.

If you would like to contribute to a future issue of Canadian Dermatology Today please email us at **info@catalytichealth.com**.

Ebglyss™ in moderate-to-severe atopic dermatitis (AD)

Ebglyss (lebrikizumab injection) is indicated for the treatment of moderate-to-severe atopic dermatitis in adults and adolescents 12 years of age and older with a body weight of at least 40 kg, whose disease is not adequately controlled with topical prescription therapies or when those therapies are not advisable.

Ebglyss can be used with or without topical corticosteroids.

EFFICACY DATA (week 16)

In ADvocate 1:

- The percentage of EASI 75 responders* and IGA (0,1) responders through week 16 was **>3 times higher with Ebglyss** vs placebo (EASI 75: 59% [n=283] vs 16% [n=141], respectively; IGA (0,1): 43% [n=283] vs 13% [n=141], respectively; *P*<0.001 for both; co-primary endpoints)[1,2]
- The percentage of patients with ≥4-point improvement in Pruritus NRS score at week 16 was **>3 times higher with Ebglyss** vs placebo (46% [n=263] vs 13% [n=130], respectively; *P*<0.001 ; secondary endpoint)[1,2]
- The percentage of EASI 90 responders* through week 16 was **>4 times higher with Ebglyss** vs placebo (38% [n=283] vs 9% [n=141], respectively; *P*<0.001; secondary endpoint)[1,2]

MAINTENANCE OF RESPONSE (week 16 to 52)

ADvocate 1 and 2 pooled data with Ebglyss 250 mg Q4W:

- 291 Ebglyss patients achieving EASI 75 or IGA 0,1 at week 16 without having received any rescue therapy were re-randomized to either Ebglyss 250 mg Q2W, Ebglyss 250 mg Q4W, or matching placebo (Ebglyss withdrawal) up to 52 weeks[1]
- 118 patients were re-randomized to Ebglyss 250 mg Q4W[1]

81.7% (94/115) of patients who were EASI 75 responders at week 16 maintained their response through week 52.[1,3]

76.9% (59/77) of patients who were IGA 0,1 responders at week 16 maintained their response through week 52.[1,3]

Visit ca.lilly.com/en/ebglyss/hcp or scan the QR code to learn more about Ebglyss

Clinical use:

No data are available to Health Canada; therefore, Health Canada has not authorized an indication for pediatric use in patients <12 years of age and in adolescents who weigh <40 kg.

Relevant warnings and precautions:

- Hypersensitivity: Hypersensitivity reactions have been reported following the use of Ebglyss. If a systemic hypersensitivity reaction (immediate or delayed) occurs, Ebglyss should be discontinued immediately, and appropriate therapy initiated.
- Helminth Infections: It is unknown if Ebglyss will influence the immune response against helminth infections by inhibiting IL-13 signalling. Treat patients with the pre-existing helminth infections before initiating treatment with Ebglyss.
- Conjunctivitis and Keratitis: Advise patients to report new onset or worsening eye symptoms to their health professional.
- Vaccinations: Avoid concurrent use of live vaccines in patients treated with Ebglyss.
- Pregnancy: It is preferable to avoid the use of Ebglyss during pregnancy. Women of reproductive potential should be advised to use effective contraception.
- Breast-feeding: A decision must be made to either discontinue breast-feeding or discontinue Ebglyss, considering the benefit of breast-feeding for the child and the benefit of therapy for the woman.

For more information:

Please consult the Product Monograph at https://pi.lilly.com/ca/ebglyss-ca-pm.pdf for important information relating to adverse reactions, drug interactions, and dosing information that have not been discussed in this piece. The Product Monograph is also available by calling 1-888-545-5972.

ADvocate 1 and ADvocate 2: Two identically designed, 52-week, randomized, double-blind, placebo-controlled, Phase 3 trials in adolescents and adults 12 years of age and older with moderate-to-severe AD not adequately controlled by topical medication(s) and who were candidates for systemic therapy. Patients received either Ebglyss 250 mg (with a loading dose of 500 mg at baseline and week 2, n=564) or placebo (n=287) Q2W up to week 16. Patients who responded at the end of this 16-week induction period were re-randomized to receive Ebglyss 250 mg Q2W (n=113), Ebglyss 250 mg Q4W (n=118), or placebo Q2W (n=60) for 36 additional weeks (maintenance period).
*Responder was defined as a subject with a 75% reduction in EASI, or an IGA 0 or 1 ("clear" or "almost clear") and a reduction of ≥2 points on a 0-4 IGA scale, from baseline to week 16, respectively.

EASI=Eczema Area and Severity Index; IGA=Investigator's Global Assessment; NRS=Numeric Rating Scale; Q2W=every 2 weeks; Q4W=every 4 weeks.

References: 1. Ebglyss™ (lebrikizumab). Product Monograph. Eli Lilly Canada, Inc. June 24, 2024. **2.** Silverberg JI, Guttman-Yassky E, Thaçi D, *et al*; for ADvocate1 and ADvocate2 Investigators. *N Engl J Med.* 2023;388(12):1080-1091. **3.** Blauvelt A, Thyssen JP, Guttman-Yassky E, *et al. Br J Dermatol.* 2023;188(6):740-748.

doi.org/10.58931/cdt.2025.64149

ABOUT THE AUTHOR

Trang Vu, MD, PhD, FRCPC, FAAD

Dr. Trang Vu is a board certified dermatologist in Canada and the U.S. She works as a community dermatologist in Edmonton, Alberta. She received her PhD at McMaster University, her MD at the University of Toronto and completed her residency at the University of Alberta. She works at Stratica Dermatology where she focuses on medical and surgical dermatology and Clinical trials.

Affiliations: Stratica Dermatology, Edmonton, AB

Drug Survival of Biologics for Psoriasis in Canada: Real-World Patterns and Implications

Trang Vu, MD, PhD, FRCPC, FAAD

Biologic therapies have transformed psoriasis management, and real-world data are essential for understanding long-term treatment success. Drug survival—how long patients remain on biologics—varies across drug classes and is generally higher in biologic-naïve patients. Canadian studies demonstrate that biologics from the interleukin (IL)-12/23, IL-17 and IL-23 classes exhibit longer persistence rates. However, drug survival alone is not a comprehensive measure of efficacy, because it may not account for dose modifications or interval adjustments that frequently occur in clinical practice. As drug survival reflects the duration of time on a single therapy, it may not adequately capture the rate at which patients switch between biologic treatments. The switch rate captures how often patients change biologics within classes or to a different class, reflecting treatment modification due to inefficacy or side effects. Although Canadian data on biologic switch rates are limited, U.S. findings show that IL-23 inhibitors have the lowest rates. Collectively, the evaluation of drug survival, therapeutic modifications, and switch rates in real-world settings offers a comprehensive framework to inform dermatological clinical practice in Canada.

Introduction

Psoriasis is a chronic, systemic inflammatory disease that significantly impairs quality of life.[1] The advent of biologic therapies targeting key immunologic pathways, including tumour necrosis factor-alpha (TNF-α), interleukin (IL)-12/23, IL-17, and IL-23 has revolutionized the management of psoriasis.[1,2] However, randomized controlled trials often include highly selected populations and have limited durations. Thus, drug survival, which is the length of time a patient remains on a biologic in real-world practice, serves as a valuable proxy for long-term effectiveness, safety, tolerability, patient satisfaction, and healthcare access.[2,3] Understanding trends in drug survival, therapeutic modifications, and drug switch rates in Canadian practice can guide treatment selection, counselling, and health economic planning.[4] This review summarizes Canadian data on drug survival and treatment changes among psoriasis biologics.

Canadian Real-World Data on Psoriasis Biologic Drug Survival

Several Canadian real-world studies have evaluated drug survival across biologic classes. A multicenter retrospective review (2005–2014) of 398 patients reported 5-year drug survival rates of approximately 75% for ustekinumab, 51% for adalimumab, 42% for etanercept, and 38% for infliximab (**Table 1**).[5] Ustekinumab showed significantly higher drug survival compared to the TNF-α biologics.[5] Another long-term study reported that approximately 60% of patients remained on either ustekinumab or adalimumab after 11 years, likely reflecting that they were among the first approved for the treatment of psoriasis in Canada and the resulting availability of longer-term data.[4]

Four IL-17 inhibitors are approved in Canada for the management of psoriasis: ixekizumab (IL-17A), secukinumab (IL-17A), brodalumab (IL-17RA), and bimekizumab (IL-17A and IL-17F). Canadian patient support program data (2016–2020) for ixekizumab showed 1- and 2-year drug survival rates of 90.4% and 85.6%, respectively.[6] Patient support program data from the PURE registry for secukinumab showed 1-, 2-, and 5-year survival rates of 82.4%, 70.7%, and 53%, respectively.[7] Patient support program data for brodalumab showed 1-year drug survival of 73.4% and 2-year drug survival rates of 65.3%.[8] Canadian multicenter data for bimekizumab demonstrated persistence of 84% at 8.5 months and 77.1% at 2 years.[9,10] Secukinumab has the most extensive drug survival data, with follow-up extending up to 5 years; however, the PURE study includes both Canadian and Latin American patients, whereas the data for the other IL-17 inhibitors reviewed in this manuscript are exclusively from Canadian cohorts.[7] Drug survival rates for IL-17 biologics are summarized in **Table 1**.

Three IL-23 inhibitors—risankizumab, guselkumab, and tildrakizumab—are approved in Canada for psoriasis management A single-centre study found risankizumab had an 86% survival rate at 260 days,[11] while Italian data reported 90.7% at 36 months.[12] Guselkumab showed 80% survival at 1 year and 67% at 2 years across two Canadian centres.[13] Recent Canadian patient support program data for tildrakizumab showed 88% 1-year survival (summarized in **Table 1**).[14] As a newer class, IL-23 inhibitors have comparatively limited drug survival data available from Canadian cohorts; however, global studies demonstrate that IL-23 biologics exhibit the most favourable drug survival compared to other biologic classes.[3]

The decision to stop or switch to a different biologic is often multifactorial. Many factors impact drug survival, including lack of efficacy, adverse events, patient decision, and co-morbid psoriatic arthritis being more commonly reported.[4,8]

Patient Factors Impacting Psoriasis Biologic Drug Survival

The drug survival studies reviewed in this manuscript highlight that biologic-naïve psoriasis patients show higher drug survival rates than biologic-experienced patients. While the exact mechanisms for this are not clear, several hypotheses have been proposed.[7,15,16] First, biologic-naïve psoriasis patients may have more intact or unmodified immune pathways, fewer anti-drug antibodies, and less disease chronicity, leading to early and sustained responses.[15] In addition, younger age, individuals with a lower

Biologic	Class	Health Canada Approval Date	1-year DS	2-year DS	5-year DS	Refs
Ustekinumab	IL-12/23	2006			75%	5
Adalimumab	TNF-α	2008			51%	5
Etanercept	TNF-α	2004			42%	5
Infliximab	TNF-α	2001			38%	5
Bimekizumab	IL-17	2022	84% (8.5 mo)	85.6%		9,10
Broadalumab	IL-17	2018	73.4%	65.3%		8
Ixekizumab	IL-17	2016	90.4%	85.6%		6
Secukinumab	IL-17	2015	82.4%	70.7%	53%	7
Risankizumab	IL-23	2020	86% (260 days)			12
Tildrakizumab	IL-23	2018	88%			14
Guselkumab	IL-23	2017	80%	67%		13

Table 1. Drug survival data for the different biologics approved in Canada are shown; *courtesy of Trang Vu, MD, Ph.D, FRCPC, FAAD.*

body mass index, and non-smoking status were the other factors identified with better biologic responses.[16] Thus, previous biologic use, older age, obesity, and smoking may negatively impact the effectiveness of biologic agents. These insights can guide clinicians in tailoring treatment plans to maximize efficacy based on individual patient characteristics.[16]

Biologic Dosing and Interval Changes

Drug survival measures how long a patient remains on a biologic but may not capture important treatment modifications such as dose escalation or shortened dosing intervals. These adjustments often reflect partial response or waning efficacy. Consequently, relying soley on drug survival may overestimate real-world effectiveness by overlooking nuanced changes in dosing required to maintain disease control.

The Canadian study by Gooderham et al. (2005–2019) analyzed long-term treatment patterns in 1,149 moderate-to-severe psoriasis patients across 13 centres. It found that approximately 50%–60% of patients underwent a treatment change, including biologic switching, dose escalation, or interval adjustments. Dose optimization—such as increasing the dose or shortening dosing intervals—was associated with significantly longer drug survival, particularly for etanercept and infliximab, where median survival extended from approximately 21–28 months without adjustment to 55–61 months with dose optimization. Detailed analysis of treatment change was limited for adalimumab, guselkumab, ixekizumab, secukinumab, and ustekinumab because patients were undergoing treatment during the time of analysis. In a single-centre study of psoriasis patients on guselkumab, 11.2% reported an interval adjustment.[4] Canadian real-world data from the PURE registry shows that approximately 15.4% of psoriasis patients on secukinumab underwent dose escalation due to inadequate response. Up-dosing regimens, such as increasing the dose or shortening intervals, led to improved disease control in over half of these patients after 15 months, with half maintaining the adjusted regimen for more than a year without new safety concerns. Patients requiring secukinumab up-dosing tended to have higher body weight. These findings support dose optimization as a viable strategy for enhancing treatment effectiveness in Canadian clinical practice.[7] Although dose interval shortening and dose escalation have been observed anecdotally with all biologics, supporting data for the other agents remain unavailable.

Psoriasis Biologic Switch Rates

A related and equally important concept to drug survival is the switch rate. Switch rate refers to the proportion of patients who change from one biologic to another, indicating treatment modification. In contrast, drug survival offers a broader assessment of real-world therapeutic performance over time by measuring how long a patient remains on a therapy, encompassing effectiveness, tolerability, and adherence. High switch rates may indicate suboptimal biologic outcomes and serve as a useful metric to help guide treatment selection.

No Canadian study has compared real-world biologic switch rates for all currently available psoriasis biologic therapies. However, this important question has been assessed in a United States retrospective cohort analysis.[17] The study included 7,997 patients with plaque psoriasis treated with IL-23 inhibitors (36.1%), TNF-alpha inhibitors (28.6%), IL-17 inhibitors (23.2%) and IL-12/23 inhibitors (12.1%). Importantly, the study excluded psoriatic arthritis and ankylosing spondylitis. This study assessed the switch rate, which they defined as the proportion of patients who switched to a new targeted therapy (e.g., biologic, apremilast) within 24 months. Overall, switch rates were 14.4% at 12 months and 26.0% at 24 months. Significant differences emerged between biologic classes. IL-23 inhibitors had the lowest switch rates–6.4% at 12 months and 12.7% at 24 months–whereas TNF inhibitors had the highest, at 24.8% and 39.1% over the same time points. After adjusting for patient characteristics, IL-23 inhibitors remained associated with the lowest risk of switching. Patients on TNF inhibitors were 4.2 times more likely to switch compared to IL-23 users, while those on IL-17 and IL-12/23 inhibitors were 2.4 and 2.2 times more likely, respectively, to switch. Among patients switched, most transitioned to newer-generation therapies, with 35.2% switching to IL-17 inhibitors and 37.4% to IL-23 inhibitors.[17] These findings highlight the persistence of IL-23 inhibitors in clinical practice and the growing preference for newer biologic classes when switching is necessary.

Conclusion

While randomized controlled trials remain essential for establishing efficacy and safety, real-world drug survival data provide practical insights into long-term effectiveness, tolerability, and adherence. Canadian evidence reveals promising 2-year data for most biologic classes (**Table 1**). In real-world settings, many patients require dose adjustments for their biologics, such as up-dosing and interval shortening, which can extend drug survival of a biologic and maintain efficacy. However, Canadian data on switch rates are sparse, and reliance on international data may not reflect unique Canadian healthcare factors affecting biologic use, such as access, funding, or prescribing patterns.

Correspondence

Trang Vu, MD, Ph.D, FRCPC, FAAD
Email: tvu2@ualberta.ca

Financial Disclosures

T.V.: None declared

References

1. Gooderham MJ, Bissonnette R, Kalia S, Papp KA, Guenther LC, Gulliver WP, et al. Baseline characteristics of Canadian patients in the Psoriasis Longitudinal Assessment and Registry (PSOLAR). J Cutan Med Surg. 2023;27(6):594–600. doi:10.1177/12034754231191509
2. Mourad AI, Gniadecki R. Biologic drug survival in psoriasis: a systematic review & comparative metaanalysis. Front Med (Lausanne). 2021;7:625755. doi:10.3389/fmed.2020.625755
3. Motedayen Aval L, Yiu ZZN, Alabas OA, Griffiths CEM, Reynolds NJ, Hampton PJ, et al. Drug survival of IL23 and IL17 inhibitors versus other biologics for psoriasis: a British Association of Dermatologists Biologics and Immunomodulators Register cohort study. J Eur Acad Dermatol Venereol. 2025;39(10):17851795. doi:10.1111/jdv.20739
4. Gooderham MJ, Lynde C, Turchin I, Avadisian M, Labelle M, Papp KA. Real-world, long-term treatment patterns of commonly used biologics in Canadian patients with moderate-to-severe chronic plaque psoriasis. J Dermatol. 2022;49(1):95-105. doi:10.1111/1346-8138.16214
5. Marinas JE, Kim WB, Shahbaz A, Qiang JK, Greaves S, Yeung J. Survival rates of biological therapies for psoriasis treatment in realworld clinical practice: a Canadian multicentre retrospective study. Australas J Dermatol. 2018;59(1):e11e14. doi:10.1111/ajd.12548
6. Gulliver W, Gooderham MJ, Zhu B, Jossart C, Montmayeur S, Burge R, et al. Treatment persistence of ixekizumab in adults with moderate-to-severe plaque psoriasis participating in the Canadian Patient Support Program. Dermatol Ther (Heidelb). 2022;13(1):235-244. doi:10.1007/s13555-022-00853-4
7. Papp KA, Gooderham M, Lynde C, Brassard D, Al-Mohammedi F, Prajapati VH, et al. Effectiveness and safety of secukinumab updosing in patients with moderate to severe plaque psoriasis: data from the PURE registry. Arch Dermatol Res. 2024;316(7):362. Published 2024 Jun 8. doi:10.1007/s0040302403122w
8. Gaudet V, Turchin I, Lynde CW, Kelly V, Sajic D, Hassan S, et al. Brodalumab for plaque psoriasis in the Canadian realworld setting: a retrospective cohort analysis of up to 4 years. Dermatol Ther (Heidelb). 2025;15(4):949962. doi:10.1007/s13555025013693
9. Lovegrove F, Asiniwasis R, Cunningham N, Lipson J, O'Toole A, Purdy K, et al. Bimekizumab for psoriasis treatment: a Canadian realworld multicenter study. JAAD Int. 2025;21:5557. Published 2025 Jun 6. doi:10.1016/j.jdin.2025.04.011
10. Sood S, Rimke A, Rankin BD, Abduelmula A, Georgakopoulos J, Maliyar K, et al. Twoyear realworld drug survival of bimekizumab for adult patients with plaque psoriasis: a multicenter retrospective study. Poster presented at: the GRAPPA Network meeting. 2025 July 10-12; Bogota, Columbia. https://www.grappanetwork.org/wp-content/uploads/2025/08/BIME-2-YEAr.pdf
11. Mansour M, Maliyar K, Sachdeva M, Bagit A, Mufti A, Walsh S, et al. 53842 Real-world drug survival of risankizumab at a tertiary care psoriasis clinic in Toronto, Canada. J Am Acad Dermatol. 2024 Sep;91(3):AB294. doi:10.1016/j.jaad.2024.07.1168.
12. Gargiulo L, Ibba L, Malagoli P, Amoruso F, Argenziano G, Balato A, et al. Effectiveness, tolerability, and drug survival of risankizumab in a real-world setting: a three-year retrospective multicenter study—IL PSO (ITALIAN LANDSCAPE PSORIASIS). J Clin Med. 2024;13(2):495. Published 2024 Jan 16. doi: 10.3390/jcm13020495.
13. Lytvyn Y, Zaaroura H, Mufti A, AlAbdulrazzaq S, Yeung J. Drug survival of guselkumab in patients with plaque psoriasis: a 2-year retrospective, multicenter study. JAAD Int. 2021;4:49-51. Published 2021 Jul 8. doi:10.1016/j.jdin.2021.05.003
14. Prajapati VH, Bellefontaine N, Gopalan D, Mangaser R, Chan P, Sauder MB. Tildrakizumab treatment patterns in adults with moderate-to-severe plaque psoriasis: a retrospective analysis from the Canadian Patient Support Program. Dermatol Ther (Heidelb). 2025;15(8):2047-2059. doi: 10.1007/s13555-025-01434-x
15. Warren RB, Smith CH, Yiu ZZ, Ashcroft DM, Barker JNWN, Burden AD, et al. Differential drug survival of biologic therapies for the treatment of psoriasis: a prospective cohort study from the British Association of Dermatologists Biologic Interventions Register (BADBIR). J Invest Dermatol. 2015;135(11):2632-2640. doi:10.1038/jid.2015.208
16. Hjort G, Schwarz CW, Skov L, Loft N. Clinical characteristics associated with response to biologics in the treatment of psoriasis: a meta-analysis. JAMA Dermatol. 2024;160(8):830-837. doi:10.1001/jamadermatol.2024.1677
17. Armstrong AW, Patel M, Li C, Garg V, Mandava MR, Wu JJ. Realworld switching patterns and associated characteristics in patients with psoriasis treated with biologics in the United States. J Dermatolog Treat. 2023;34(1):2200870. doi:10.1080/09546634.2023.2200870

PrCABTREO™

THE **FIRST + ONLY TRIPLE COMBINATION** TREATMENT INDICATED IN ACNE‡

NOW COVERED
BY THESE PUBLIC FORMULARIES
(CRITERIA MAY APPLY)†
ON • QC • NS • SK • NIHB

CABTREO (clindamycin phosphate, adapalene, and benzoyl peroxide) is indicated for the topical treatment of acne vulgaris in patients 12 years of age and older.

C CLINDAMYCIN

A ADAPALENE

B BENZOYL PEROXIDE

ONCE-DAILY TOPICAL GEL

Consult the Product Monograph for complete details on recommended dosing and administration.

Scan here to learn more about CABTREO ›

Consult the Product Monograph at https://bauschhealth.ca/wp-content/uploads/2024/08/CABTREO-PM-E-2024-08-01.pdf for contraindications, warnings, precautions, adverse reactions, interactions, dosing and conditions of clinical use. The Product Monograph is also available by calling 1-800-361-4261.

NIHB=Non-Insured Health Benefits.
† Consult the respective formularies for full coverage details and restrictions.
‡ Comparative clinical significance unknown.
Reference: CABTREO Product Monograph. Bausch Health.

BAUSCH Health
bauschhealth.ca

MADE IN CANADA*
* Made in Canada with domestic and imported parts.

REVIEWED BY PAAB

PrCABTREO™
(Clindamycin Phosphate, Adapalene and Benzoyl Peroxide) Gel
1.2%, 0.15%, 3.1% w/w

doi.org/10.58931/cdt.2025.64150

ABOUT THE AUTHOR

Vincent Richer, MD, FRCPC

Dr. Vincent Richer practices medical and cosmetic dermatology at Pacific Derm in Vancouver. He holds positions as Clinical Assistant Professor at the University of British Columbia's Department of Dermatology and Skin Science. He trained at Université de Montréal in Medicine and Dermatology and completed a fellowship in Photobiology and Cutaneous Laser Surgery at UBC.

Affiliations: Dermatologist, Pacific Derm, Vancouver, B.C.
Clinical Assistant Professor, UBC Department of Dermatology and Skin Science, Vancouver, B.C.

Rheomodulation of Calcium Hydroxyapatite: Implications for Cosmetic Treatment and Prevention of Complications

Vincent Richer, MD, FRCPC

Introduction

Hyaluronic acid (HA) dermal fillers are the most widely used injectable category worldwide for the treatment of cosmetically relevant volume depletion of the face. Their varied physical properties and reversibility make them highly versatile, safe, and capable of delivering outstanding cosmetic outcomes in the right hands. Unfortunately, an overreliance on HA dermal fillers as a treatment modality has led to overuse, resulting in unnatural outcomes. Heavily publicized on social media and via celebrity commentary, this trend has swung the pendulum toward "filler fatigue", a growing tendency among cosmetic patients to avoid HA dermal fillers in their treatment plans, whether or not such a caution is warranted.

This presents an opportunity for dermatologists who perform cosmetic procedures to consider widening their scope of treatment to include biostimulators, if they have not already done so. While biostimulators do not fully replace HA gels, which remain important tools for focal revolumization, contouring, and structural support, they introduce a distinct mechanism of action that provides both revolumization and skin quality improvements to patients in a progressive manner. As of 2025, the two major biostimulators available in Canada are poly-L-lactic acid (Sculptra®) and calcium hydroxyapatite (Radiesse®). In this article, we will build on the outstanding article by Dr. Malika Ladha on calcium hydroxyapatite (CaHA)[1] by outlining the clinical and safety implications involved in adjusting product rheology through dilution and hyperdilution of CaHA. We invite you to review her article, as we sought to avoid duplicating its content.

CaHA: From "Filler" to Skin Quality Treatment

CaHA has been commercially available in Canada for several years under the brand name Radiesse® (Merz Aesthetics, Canada). It is supplied in a 1.5 cc syringe containing 30% CaHA and 70% carboxymethylcellulose (CMC) carrier gel.[2] The Radiesse+® formulation contains lidocaine for increased patient comfort during treatment. According to the product monograph, it is classified as an injectable implant indicated for subdermal implantation in correcting moderate to severe facial wrinkles and folds, restoring and/or correcting the signs of facial fat loss (lipoatrophy) in people with human immunodeficiency virus, and for rejuvenating the hands.[2] As of 2025, it is also approved for treating moderate to severe wrinkles of the décolleté, albeit in a hyperdilute form (see below). Prior to the development of high-concentration, highly cross-linked, high-G' HA gel dermal fillers, CaHA stood alone as a very high-G' product, making it well-suited for supraperiosteal injections aimed at structural revolumization of the zygoma, mandible (**Figure 1**), and chin.

Injection yields immediate revolumization, largely from the CMC carrier gel, which will recede over the following weeks. During this time, CaHA microspheres come in physical contact with dermal fibroblasts, stimulating the production of type I and type III collagen, elastin, proteoglycans, and other components of the extracellular matrix.[3]

Effect of "Dilution" and "Hyperdilution" on Rheology of CaHA

By diluting CaHA (1:1 with diluent, yielding 3 mL) or hyperdiluting it (any dilution beyond 1:1, such as 1:2 with diluent yielding 4.5 mL or 1:3 with diluent yielding 6.0 mL) and administering it via subdermal injection, this mechanism of action can also be harnessed to improve skin quality. The diluent typically includes 0.5 mL of lidocaine, with the remaining volume made up of normal saline. This preparation is carried out using 3, 5, or 10 mL syringes and connectors, the process of which is described in detail in Dr. Ladha's article.[1]

One of the most critical concepts to grasp when using CaHA as a biostimulator (rather than a traditional filler) is that rheomodulation occurs rapidly, even with small amounts of diluent.[4] Common sense may suggest that doubling the volume with a 1:1 dilution would simply halve the product's G' and "stiffness": this is not the case. Diluting CaHA at a 1:1 dilution producing 3 mL total, reduces its G' by more than tenfold (**Figure 2**). At this concentration, CaHA can still provide both modest revolumization as well as improvement in skin quality of the treatment area. In contrast, hyperdiluted CaHA (e.g., 1:2, 1:3 or greater), yields a product with negligible G' that behaves more like a liquid than a gel, provides negligible revolumization, yet improves skin quality.

On-label Indication of Hyperdilute CaHA in Canada: Treating the Décolleté

In 2025, Radiesse® received an on-label indication for the treatment of moderate to severe chest wrinkles. Though dilution and hyperdilution of CaHA have long been common practice, this marks the first Health Canada-approved indication for the use of hyperdilute CaHA.

In the trial leading to approval,[5] 117 patients were enrolled and received 1–3 treatments of CaHA diluted at 1:2 (1.5 mL CaHA combined with 3.0 mL diluent, totalling 4.5 mL of product per treatment) injected across the décolleté area. Over 80% of the treatments were performed via cannula (25G, 50 mm), through three port sites. Sixteen weeks after the final treatment, the responder rate was 78.4%. Patients initially rated as severe (4/5 on the photonumeric scale; very severe [5/5] were excluded) achieved the best outcomes, with 89.3% demonstrating at least a 1-grade improvement.

Based on the author's experience, the ideal candidates for this treatment present with primarily textural, crêpe-like skin changes (**Figure 3**). Though deep etched-in rhytides can be softened, they may be more effectively addressed when combined with highly cohesive, low G' HA gels superficially injected with a needle during the same session. As the décolleté is susceptible to significant photodamage, pairing 1:2 CaHA injections with intense pulsed light, vascular

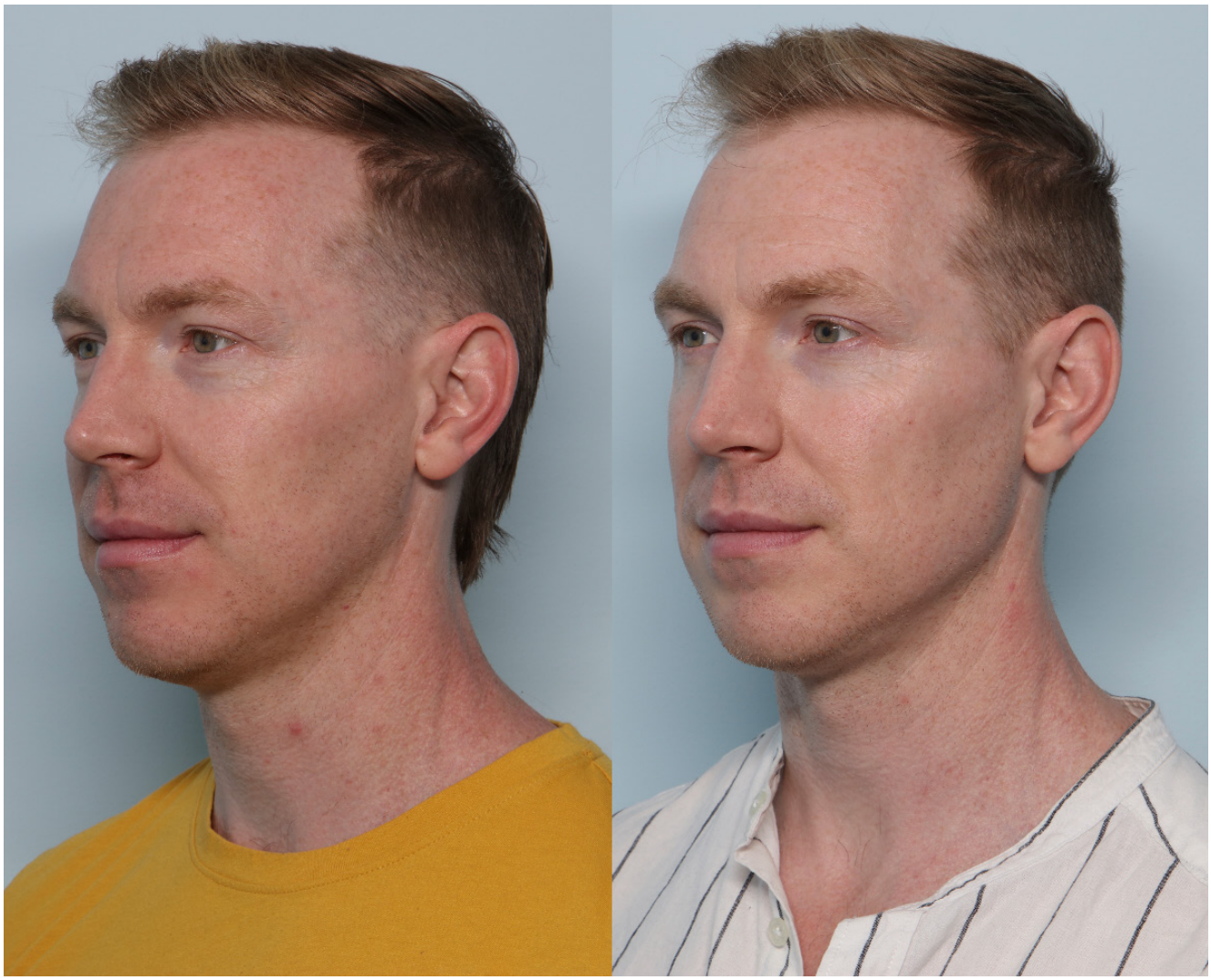

Figure 1. Jawline definition enhancement observed 3 months after administering 1.5 mL of CaHA per side to the mandible. For the horizontal segment of the mandible, 0.5 mL of CaHA was injected on bone using a needle, while the remaining 1.0 mL was injected subdermally via cannula to both the vertical and horizontal segments of the mandible; *photo courtesy of Vincent Richer, MD, FRCPC.*

laser, or laser resurfacing offers a high-yield combination approach, providing significant clinical improvement in one treatment visit.

Adverse Events with CaHA and the Mitigating Effects of Hyperdilution

When discussing the side effect profile of dermal fillers and biostimulators with patients, we group them into three categories: **1)** expected or probable local effects of treatment, **2)** nodules, and **3)** vascular compromise.

- **Local effects:** Treatment may cause pain from needle insertion, a sensation of pressure/sharpness from cannulas, purpura/ecchymosis, edema, and tenderness to touch.

These effects can be mitigated with gentle technique, patient distraction (verbal, vibratory, other), use of anesthetics (topical or injected at cannula port sites), avoidance of alcohol or medications/supplements that promote bruising when not medically necessary, and using acetaminophen instead if needed. We tend to

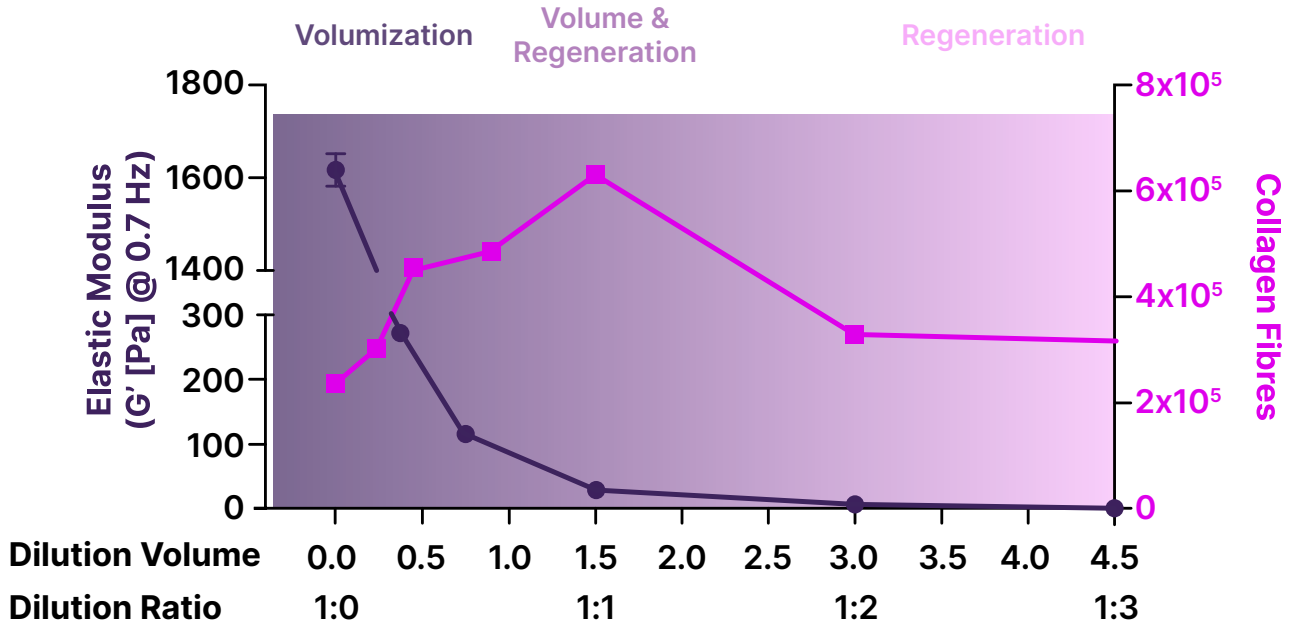

Figure 2. This graph highlights the rapid decline in elastic modiolus (G') as diluent is added to the syringe containing CaHA. Superimposed are in-vivo collagen measurements data, demonstrating the regenerative effect of CaHA when used as a biostimulator; *adapted from McCarthy et al. Dilutional rheology of Radiesse: implications for regeneration and vascular safety. J Cosmet Dermatol. 2024;23(6):1973-1984. doi:10.1111/jocd.16216.*

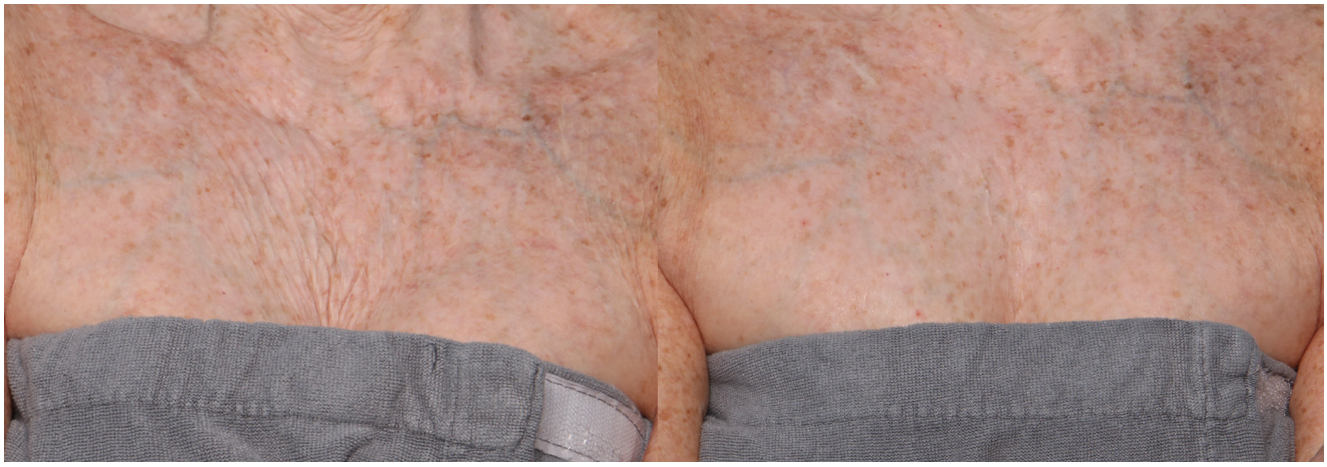

Figure 3. Improvement of crêpe-like texture of the décolleté observed 9 weeks after two treatment sessions, each using two syringes of CaHA (1:2 hyperdilution) per treatment; *photo courtesy of Vincent Richer, MD, FRCPC.*

overprepare patients by advising them to "expect a bruise" so they can plan their treatment around important social or professional engagements.

- **Nodules:** Nodules can present as product accumulation, focal biostimulation or "delayed-onset nodules" (DONs), the latter which are thought to have an immune or infectious origin, and may be described to patients as a foreign body reaction.

A nodule of product accumulation refers to visible and/or palpable CaHA below the skin. It may appear clinically as a nodule, or simply be palpated without affecting the cosmetic outcome. Such nodules typically become evident once edema/bruising from the procedure subside. They may result from excessive product deposition during needle injections or from overlapping passes when fanning with a cannula. Additionally, fibrous septae within the dermis and subcutis may segregate the product, even when distribution feels uniform during injection. Depending on the severity of the cosmetic concern and the patient's level of distress, watchful waiting and massage may be performed at this phase. A published strategy includes injecting normal saline followed by vigorous massage or the use of a focal vibration tool to promote resolution of this situation.[6] The putative mechanism is product dispersion (CaHA and CMC gel). To minimize the risk of product accumulation nodules, dilution or hyperdilution of CaHA is a sound strategy: the significantly lowered G' of the product alters its physical properties, making it behave more like a liquid than a gel.

A nodule may also appear weeks to a few months following an otherwise unremarkable treatment recovery. Although considered "late onset," these nodules are not clinically inflammatory and appear distinct from the DONs observed with HA dermal fillers. We hypothesize these nodules represent focal biostimulation: localized accumulation of collagen and elastin in an area of prior focal product accumulation that was previously clinically unnoticed. In our experience, saline injection for resuspension has been ineffective in this scenario. A published algorithmic approach recommends using intralesional triamcinolone acetonide as a second-line option,[7] and we have found that injecting a very small amount of triamcinolone acetonide (2 mg/cc) to be effective in this scenario (n=3). Generous massage immediately after CaHA-CMC treatment is a viable strategy to minimize the risk of both product accumulation and focal biostimulation nodules.

- **Vascular compromise:** The adoption of CaHA into clinical practice has been limited by valid concerns regarding vascular compromise, given the absence of an injectable reversal enzyme. Published protocols for managing vascular events with CaHA[8] focus on restoring tissue oxygenation through other means (massage, aspirin, hyperbaric chamber) similar to approaches used for vascular events that occur with HA. Interestingly, these protocols also recommend injecting hyaluronidase, with the aim of increasing tissue permeability to oxygen.

Vascular events associated with CaHA have been reported primarily with the undiluted product. Experimental models of occlusion have examined the occlusive potential of dilute and hyperdilute CaHA, suggesting that the odds of a vascular occlusion, especially with hyperdilute CaHA, is greatly reduced.[9] In clinical practice, the author limits CaHA use to areas with a lower risk of vascular occlusion (avoiding the nose, forehead, and nasolabial fold) and employs subdermal cannula injections to further mitigate risk.

Common Off-label Uses of CaHA

One of the most common indications for CaHA in the author's practice is revolumization and improving elasticity in the lateral cheek—covering the preauricular region, extending from inferior to the zygoma, down to the mandible, and lateral to soft tissue that may be contributing to the development of a jowl. CaHA diluted 1:1 is injected via cannula using a fanning technique, often through a single port site, with contralateral access to optimize injection ergonomics. Patients notice some immediate revolumization from the CMC carrier gel, followed by the biostimulating effects of CaHA over 6–12 weeks, resulting in subtle volume and increased elasticity (**Figure 4**). We encourage

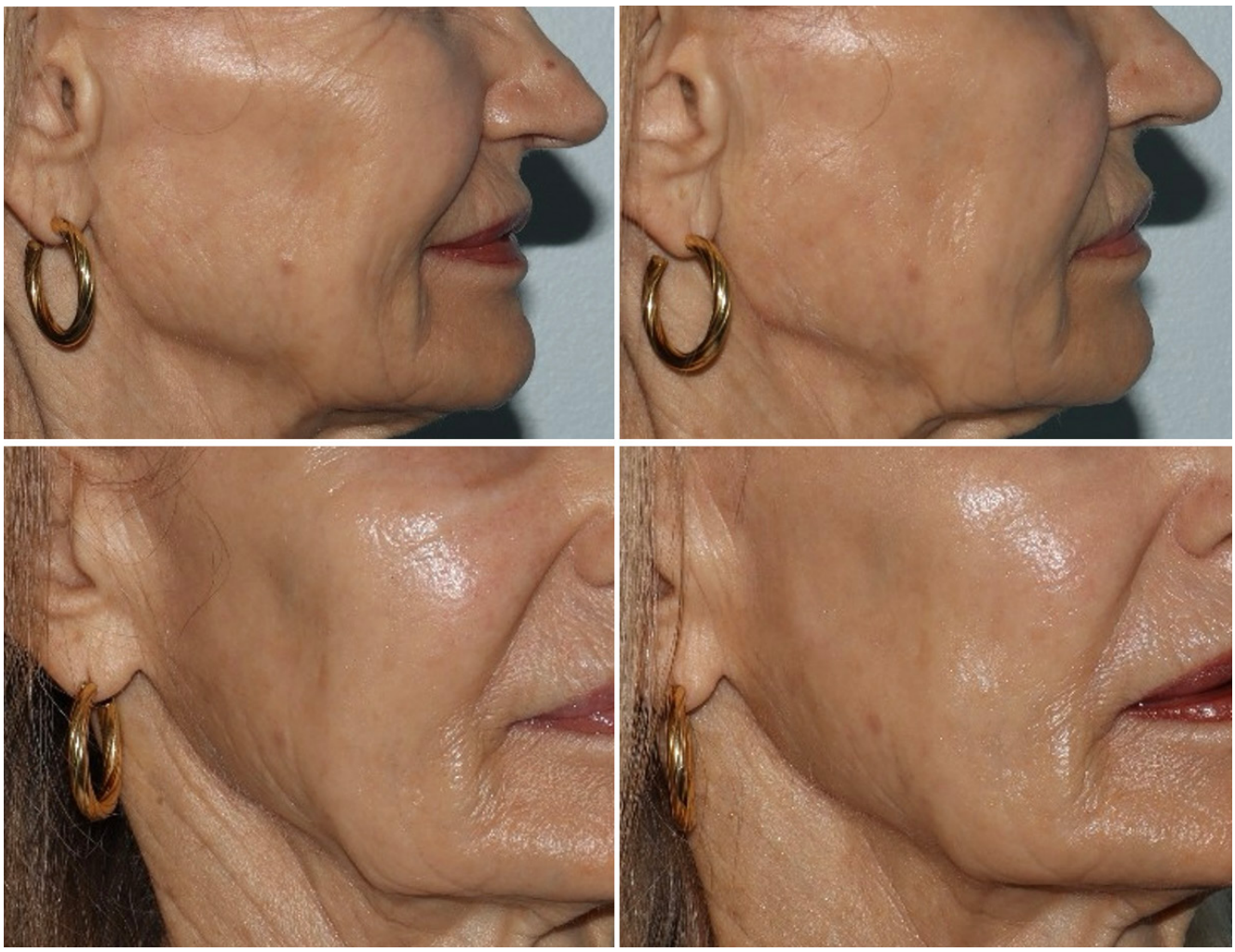

Figure 4. Lateral cheek revolumization and improvement in skin quality in a patient with severe volume depletion, observed 3 months after treatment with dilute CaHA (1:1),using one syringe per cheek. Note how the restoration of proportions subtly camouflages the jowl; *photo courtesy of Vincent Richer, MD, FRCPC.*

patients to touch their skin and pull it taut before the treatment, as the tactile improvement is often striking at their follow-up visit.

Hyperdilute CaHA has also become increasingly popular in the treatment of neck skin.[10] This anatomical site poses a challenge for treatment due to its particularly thin epidermis/dermis and minimal subcutaneous tissue. For patients with very thin skin, a hyperdilution of 1:3 (total reconstitution of 6.0 mL total) or greater is recommended. In younger patients with thicker skin, or those who show only a modest response after the 1:3 hyperdilution and experience no treatment-emergent issues, the author also considers using a 1:2 hyperdilution at this site. As was mentioned for the décolleté, the ideal candidates exhibit textural, crêpe-like skin changes, mild skin laxity, and minimal etched-in horizontal neck lines (**Figure 5**). Patients with severe laxity are better suited for surgical management, and horizontal lines may benefit from combination treatments such as HA injections. A challenge of treating this site is achieving even product distribution due to the ergonomics of treatment delivery. Multiple approaches are described in the literature; we recommend an approach that involves tracing down the midline and using three cannula port sites–two positioned laterally and inferiorly on the neck, and one at the midline between the chin and the thyroid cartilage (**Figure 6**).

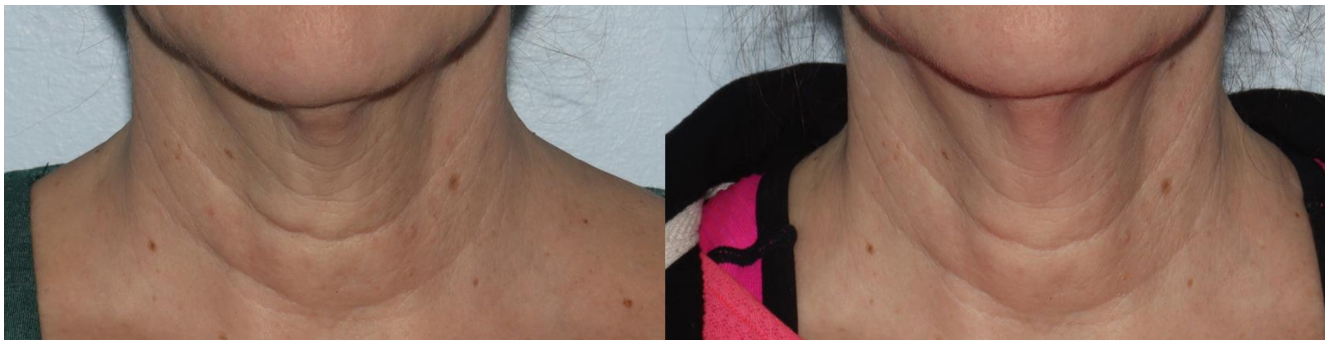

Figure 5. Softening of the crêpe-like texture of the upper neck observed 4 months after a single treatment using one syringe of hyperdilute CaHA (1:3 dilution). Note the persistence of horizontal "necklace" lines, which may require an additional treatment modality, such as HA, for further improvement; *photo courtesy of Vincent Richer, MD, FRCPC*.

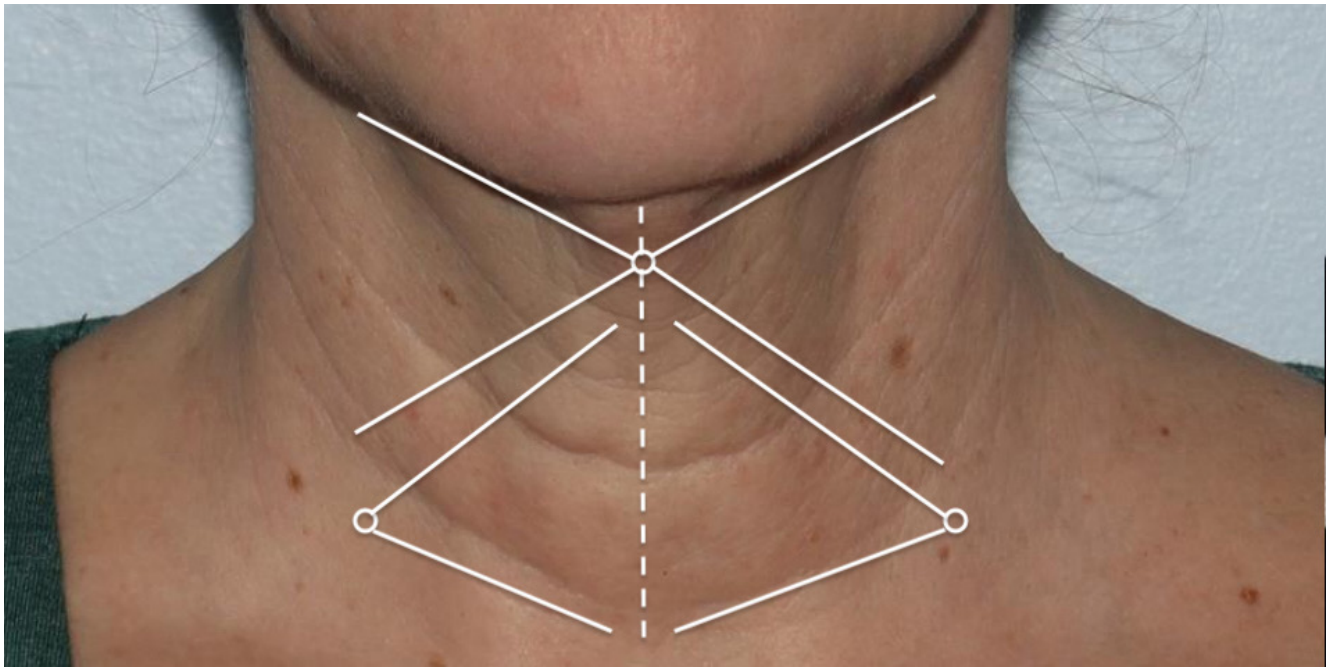

Figure 6. The author's preferred injection pattern for treating the neck with hyperdilute CaHA using a cannula, colloquially referred to as "the bowtie"; *photo courtesy of Vincent Richer, MD, FRCPC*.

The inferior treatment triangles can be accessed from the ipsilateral side, while the superior "bowtie" triangles are best approached from the contralateral side to optimize injector ergonomics. Carefully bending the cannula within its sterile cap can also aid navigation in this area. Similar to décolleté treatment, achieving clinically acceptable outcomes may require 2–3 sessions.

Keys to Success When Using CaHA as a Biostimulator

1. **Managing expectations and timelines:** Clinical results develop gradually over several weeks to a few months. For patients requiring more advanced correction, 2–3 treatments may be needed.

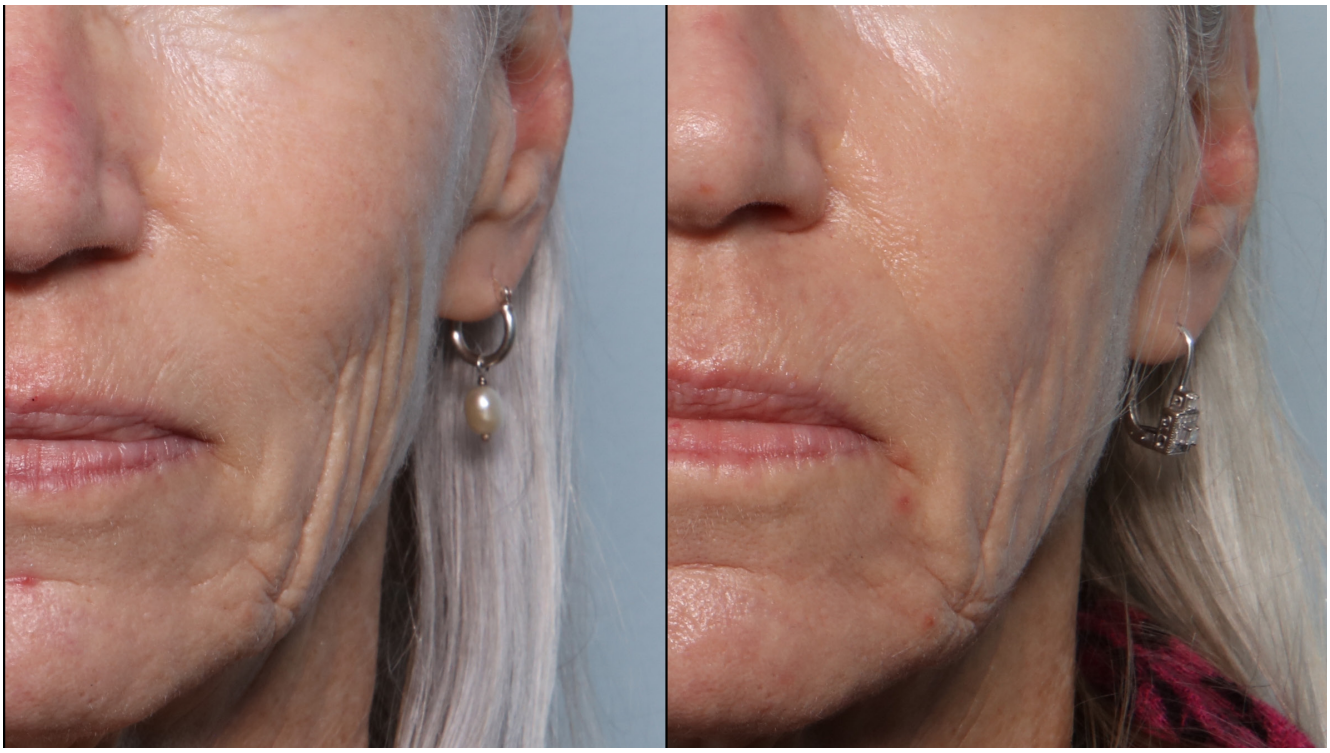

Figure 7. Combination treatment using high-density fractional thulium 1927 nm laser resurfacing with dilute CaHA (1:1) injected via cannula to the lower cheek rhytides; *photo courtesy of Vincent Richer, MD, FRCPC.*

2. **Treatment guideline—One 1.5 mL syringe per 10 × 10 cm² area:** This recommendation, frequently mentioned in position papers and trials on CaHA biostimulation, is often a footnote that may be overlooked. A practical rule of thumb is to use one syringe of CaHA per 100 cm² area, with larger surface areas requiring require more than one syringe per treatment session.
3. **Injection technique:** This treatment lends itself well to cannula injection. The cannula outline should remain visible under the skin, ideally positioned in the subdermal layer to maximize CaHA's biostimulatory effect. This also avoids overly superficial needle injections. Massage for a few minutes after the procedure is recommended to help ensure even product distribution.
4. **Combination treatments:** Same-day device-based treatments for skin quality or further skin tightening can improve outcomes with fewer sessions (**Figure 7**). In general, device treatments are delivered prior to injection of CaHA.

Blending CaHA with HA Dermal Fillers and Beyond

For several years, physicians worldwide have been modifying the rheological properties of CaHA by combining it with agents beyond lidocaine or normal saline. Some approaches have used platelet-rich plasma, platelet-rich fibrin, or other biologically-derived products to potentially boost the regenerative potential of CaHA. When CaHA is mixed with HA fillers and diluent, the formulation has been termed a "blend" or "hybrid". The objective is to provide greater short- to medium-term revolumization than the CMC carrier gel alone, while still benefiting from the biostimulatory effects of CaHA. This technique has been studied clinically for applications such as cheek revolumization, jawline enhancement, hand rejuvenation, and various other indications.[11]

Health Canada is expected to approve a fixed-dose hybrid product containing HA and CaHA (HarmonyCa®, Allergan Aesthetics) in the near future. The product is already available in

Brazil and in several countries across Europe and the Middle East.[12] Its introduction will further expand the CaHA-based therapeutic options that we can offer our patients.

Correspondance

Vincent Richer, MD, FRCPC
Email: vincent.richer@ubc.ca

Financial Disclosures

V.R.: Speaker, Consultant and/or Subinvestigator: AbbVie/Allergan Aesthetics, Galderma and Merz Aesthetics.

References

1. Ladha M. Diluted and Hyperdiluted calcium hydroxyapatite for skin tightening [Internet]. Can Dermatol Today. 2022 Mar. 1 [cited 2025 Sep. 25];3(1):16–19. Available from: https://canadiandermatologytoday.com/article/view/3-1-ladha.
2. Radiesse® Injectable Implant. Merz Aesthetics, Inc: Franksville, WI, USA. Product Monograph. [updated May 4, 2011, cited September 25, 2025]. Available from: https://www.merzcanada.com/files/radiesse-volumizing-filler-ifu.pdf
3. González N, Goldberg DJ. Evaluating the effects of injected calcium hydroxylapatite on changes in human skin elastin and proteoglycan formation. Dermatol Surg. 2019;45(4):547-551. doi:10.1097/DSS.0000000000001809
4. McCarthy AD, Soares DJ, Chandawarkar A, El-Banna R, Hagedorn N. Dilutional rheology of Radiesse: implications for regeneration and vascular safety. J Cosmet Dermatol. 2024;23(6):1973-1984. doi:10.1111/jocd.16216
5. Pavicic T, Kerscher M, Kuhne U, Heide I, Dersch H, Odena G, et al. A prospective, multicenter, evaluator-blinded, randomized study of diluted calcium hydroxylapatite to treat decollete wrinkles. J Drugs Dermatol. 2024;23(7):551-556. doi:10.36849/JDD.8261
6. McCarthy AD, Berkowitz S, Chernoff WG. Successful treatment of noninflammatory CaHA nodules using focused mechanical vibration. Aesthet Surg J Open Forum. 2024;6:ojae018. Published 2024 Mar 21. doi:10.1093/asjof/ojae018
7. McCarthy AD, van Loghem J, Martinez KA, Aguilera SB, Funt D. A structured approach for treating calcium hydroxylapatite focal accumulations. Aesthet Surg J. 2024;44(8):869-879. doi:10.1093/asj/sjae031
8. van Loghem J, Funt D, Pavicic T, Goldie K, Yutskovskaya Y, Fabi S, et al. Managing intravascular complications following treatment with calcium hydroxylapatite: an expert consensus. J Cosmet Dermatol. 2020;19(11):2845-2858. doi:10.1111/jocd.13353
9. Soares DJ, Fedorova J, Zhang Y, Chandawarkar A, Bowhay A, Blevins L, et al. Arterioembolic characteristics of differentially diluted CaHA-CMC gels within an artificial macrovascular perfusion model. Aesthet Surg J. 2025;45(6):645-653. doi:10.1093/asj/sjaf028
10. De Almeida AT, Figueredo V, da Cunha ALG, Casabona G, de Faria JR, Alves EV, et al. Consensus recommendations for the use of hyperdiluted calcium hydroxyapatite (Radiesse) as a face and body biostimulatory agent. Plast Reconstr Surg Glob Open. 2019;7(3):e2160. Published 2019 Mar 14. doi:10.1097/GOX.0000000000002160
11. Fakih-Gomez N, Kadouch J, Felice F, Haykal D, Muñoz-Gonzalez C. The hybrid filler technique: a 5-year retrospective analysis. Aesthet Plast Surg. 2025;49(3):618-626. doi:10.1007/s00266-024-04387-2
12. Braz A, de Paula Eduardo CC, Pierce A, Grond A, Kutikov A, Nakab L. A novel hybrid injectable for soft-tissue augmentation: analysis of data and practical experience. Plast Reconstr Surg Glob Open. 2024;12(9):e6190. Published 2024 Sep 19. doi:10.1097/GOX.0000000000006190

The chair

"It's like somebody is stabbing you with needles. Every movement was agonizing. Any time anything touched it, I wanted to scream..."*

Hidradenitis suppurativa (HS) is a debilitating, chronic inflammatory skin disease that causes significant burden on patients' lives.[1]

Timely and accurate diagnosis matters. HS is underdiagnosed, underrecognized by patients, and often misdiagnosed.[2]

Can we let this continue?

Learn more

TheUnbearableHomeHS.ca

Inspired by **patients.**
Driven by **science.**

MEMBER OF INNOVATIVE MEDICINES CANADA

*Actual patient. May not be representative of all patients.

1. Johnston LA, et al. Practical guidelines for managing patients with hidradenitis suppurativa: an update. *J Cutan Med Surg*. 2022;26:2S–24S.
2. Global Hidradenitis Suppurativa Atlas. Global Report on Hidradenitis Suppurativa 2023. Accessed February 6, 2025. Available from: https://ilds.contentfiles.net/media/documents/Global_Report_on_Hidradenitis_Suppurative_HS_2023.pdf

doi.org/10.58931/cdt.2025.64151

ABOUT THE AUTHOR

Christina M. Huang, MD, FRCPC

Dr. Christina Huang is a board-certified dermatologist in Toronto with broad interests encompassing medical, surgical, and cosmetic dermatology. She completed medical training at Queen's University followed by a Dermatology Residency at the University of Toronto, where she served as Chief Resident. Dr. Huang has authored numerous peer-reviewed publications in the field and received training under world renowned dermatologists from Canada, the United States, and Asia. She is a fellow of the Royal College of Physicians and Surgeons of Canada and a member of the Canadian Dermatology Association.

Affiliations: Sage Dermatology, Toronto, ON
Oakville Dermatology and Aesthetics, Toronto, ON

YouTube as a Source of Patient Information for Soft Tissue Filler

Christina M. Huang, MD, FRCPC

Introduction

With the dawn of the Internet era, information has become readily available and accessible to people worldwide. Over 70% of adults search the Internet for healthcare-related information.[1] Among the most popular platforms is *YouTube*, a free video sharing platform that has quickly become one of the most widely used sources of online information, with over 2 billion video views daily and over 30 million subscribers.[2,3] A 2018 Health Information National Trends Survey reported that more than 33% of patients watched health-related videos on *YouTube*.[4]

Dermal fillers are medical device implants approved for various cosmetic concerns such as moderate to severe facial rhytids, augmentation of facial features, lipoatrophy, and correction of contour deficiencies.[5] According to the 2020 Plastic Surgery Statistics study, dermal fillers ranked as the second most common cosmetic procedure, after botulinum toxin A injections.[6] The popularity of dermal fillers continue to rise due to general societal acceptance, their non-invasive nature, and the increased availability of biocompatible and durable materials. The latter facilitates immediate and predictable results with minimal downtime. Education about fillers may involve a visual and auditory component to better help patients contextualize the process and set appropriate expectations. Particularly for first-time filler patients, *YouTube* may be a first line resource.

While online videos can be a valuable educational tool, information on the Internet is not always accurate and may originate from unreliable sources. Numerous studies have evaluated the accuracy and content of *YouTube* videos related to patient information.[7-10] Studies have also investigated the quality of videos regarding botulinum toxin A injections.[11] However, there is a lack of literature regarding filler content on this platform. This study aims to objectively assess the accuracy, quality, and completeness of *YouTube* videos on dermal fillers. The findings will help inform dermatologists and other injectors regarding the utility of *YouTube* as a tool for patient education.

Search Strategy

The *YouTube* search engine (**www.youtube.com**) was accessed on a single date with a cleared-cache web browser using the keywords "filler," "dermal filler," "cheek injectables," "lip injectables," "cosmetic filler," and "facial filler." The search was sorted by the default setting of "relevance", to replicate a typical search attempt by an average viewer. The titles and descriptions of the videos were reviewed in ascending order until 100 videos were collected. Videos were excluded from the study if they were duplicates, non-English, non-audio, or unrelated to dermal fillers.

Data Extraction

For each video, the following metrics were recorded: Uniform Resources Locator (URL), title, duration, number of views, number of likes, number of dislikes, and comments. Based on these metrics, the overall popularity of each video was calculated using the Video Power Index (VPI) = [(view ratio x like ratio)/100], where view ratio = views/day, and like ratio = (likes x 100)/(likes + dislikes). The video upload source was categorized as "dermatologist," "non-dermatologist physician," "non-physician health care worker," or "other," which included influencers, independent users, and media. The nature of the video was also classified as "educational," "patient experience," "demonstration," or "promotional."

Quality Assessment

Quantitative assessment of video content was determined using the modified DISCERN criteria. The modified DISCERN score was used to evaluate for clarity, reliability, bias, reference supplementation, and uncertainty of content.[7,12] The maximum score was five, with higher scores indicating more reliability (see **Table 1**).

To determine the overall effectiveness of the video as a patient education resource the Global Quality Scale (GQS) was applied (see **Table 2**). This scale provides an overall rating of each video based on the quality, flow, and usefulness of the information for patients. Videos were rated on a 5-point scale, with one indicating the worst and five indicating the best quality.

Statistical Analysis

Data collected from the *YouTube* video assessments were compiled into a centralized database designed specifically for the study using Microsoft Excel. All statistical analyses were performed using GraphPad Prism (Version 7, GraphPad Software, USA), with $p<0.05$ considered statistically significant. Descriptive statistics were used to summarize data (mean, standard deviation [SD], range) in a table format. Categorical variables were reported as frequencies and relative frequencies. Continuous variables were reported as means and SDs.

Video Demographics

Of the 100 videos initially identified, 98 were included in the review. Two videos were excluded as they were either removed from *YouTube* later or were non-dermal filler-related. At the time of evaluator review, videos had been online for an average of 891 days (SD:722.24; range: 1–3,375 days). The total duration of all videos was 63,277.[8] seconds with a mean length of 646 seconds (SD: 513, range: 56–3,112 seconds). The videos amassed a total of 47,634,824 views, with a mean of 486,070 views per video (SD: 1,961,096; range: 11–19,097,381 views). The mean number of likes was 5,933 (SD: 17,506; range: 1–126,000) and the mean number of dislikes was 366 (SD: 1,923; range: 0–1,900 dislikes). Across all videos, there was a total of 581,387 likes and 35,914 dislikes. Video comments ranged from 0 to 22,156, with a mean of 613 and a total of 60,068 comments (SD: 2,347). The mean number of subscribers for each video reviewed was 716,802 (SD: 2,408,362; range: 446–20,300,000) with a combined total of 70,246,621 subscribers for all videos. The calculated VPI across all videos was 771.66 (SD: 1,819.14; range: 6.15–11,333.83). A summary of the video demographics can be found in **Table 3**.

Modified DISCERN criteria (maximum score of 5)
1. Are the aims clear and achieved?
2. Are reliable sources of information used? (i.e., publication cited, speaker is dermatology/plastic surgeon injector?
3. Is the information presented balanced and unbiased?
4. Are additional sources of information listed for patient reference?
5. Are areas of uncertainty mentioned?

Table 1. Modified DISCERN criteria; *adapted from Singh et al. 2019 and Radonjic et al. 2019.*

Global Quality Scale (maximum score of 5)
1 = Poor quality, poor flow of the video, most information missing, not at all useful for patients.
2 = Generally poor quality and poor flow, some information listed but many important topics missing, or very limited use to patients.
3 = Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients.
4 = Good quality and generally good flow. Most of the relevant information is listed, but some topics not covered, useful for patients.
5 = Excellent quality and flow, very useful for patients.

Table 2. Global Quality Scale; *adapted from Singh et al. 2019 and Radonjic et al. 2019.*

	Mean ± standard deviation (SD) (*range*)	Total
Duration (seconds)	646 ± 513 (56–3,112)	63,277.80
Views (*n*)	486,070 ± 1,961,096 (11–19, 097,381)	47,634,824
Likes (*n*)	5,933 ± 17,506 (1–126,000)	581,387
Dislikes (*n*)	366 ± 1,923 (0–1900)	35,914
Comments (*n*)	613 ± 2,347 (0–22,156)	60,068
Subscribers (*n*)	716,802 ± 2,408,362 (446-20,300,000)	70,246,621
Video Power Index	772 ± 1,819 (6–11,333)	--

Table 3. Video Demographics; *courtesy of Christina M. Huang, MD, FRCPC.*

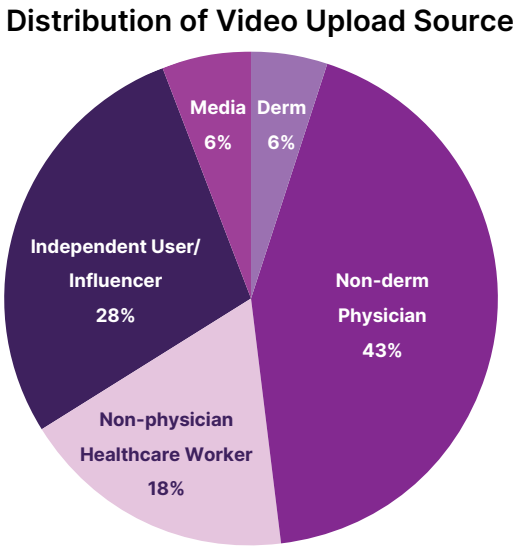

Figure 1a. Distribution of video upload sources; *courtesy of Christina M. Huang, MD, FRCPC.*

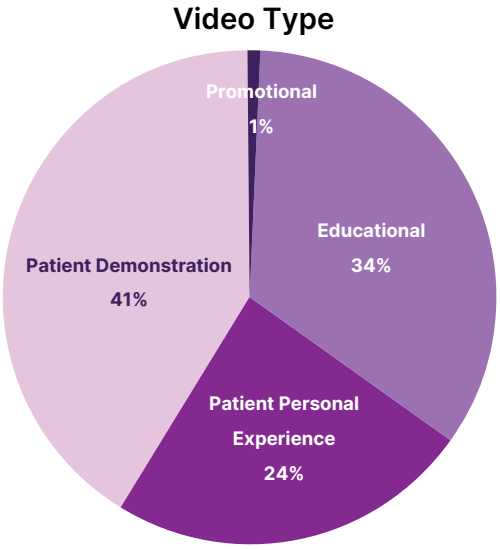

Figure 1b. Distribution of video Type; *courtesy of Christina M. Huang, MD, FRCPC.*

DISCERN	**Mean:** 1.47/5 **Standard deviation (SD):** 0.94; **Range:** 0–4
Global Quality Score	**Mean:** 1.82/5 **SD:** 1.05; **Range:** 1–5

Table 4. Mean Quality Scores; *courtesy of Christina M. Huang, MD, FRCPC.*

Video Source and Classification

Of the 98 included videos, 43% (42/98) were uploaded by non-dermatology physicians, while only 5% (5/98) were uploaded by board-certified dermatologists. Approximately 18% (18/98) of the videos were created by non-physician healthcare workers and 34% (33/98) were created by other sources (influencers/independent users/media) (**Figure 1a**). In terms of content classification, 41% (40/98) of videos were classified as "patient demonstration," 34% (33/98) were "educational," 24% (24/98) were "patient experience," and 1% (1/98) were "promotional" (**Figure 1b**).

Objective Outcome Measures of Videos

Across all videos, the mean DISCERN score was 1.19 out of 5 (SD: 0.94; range: 0–4), and the mean GQS score was 1.82 (SD: 1.05; range: 1–5) (**Table 4**). No videos achieved the maximum DISCERN score, and only three received a perfect score on the GQS. As illustrated in **Figure 2**, there were significant differences found between *YouTube* uploader groups in quantitative video content scores (DISCERN: p=0.03, GQS: p=0.004). Subgroup analysis revealed that of the GQS, videos uploaded by dermatologists had significantly higher GQS scores compared to those uploaded by non-dermatology physicians, non-physician healthcare workers, and other sources (influencers/independent users/media). Dermatologist-uploaded videos scored significantly higher on the DISCERN scale than those from influencers/independent users/media. There were no significant differences in VPI and the objective quality scores.

Discussion

This study evaluated the accuracy, quality, and popularity of *YouTube* videos on soft tissue fillers, highlighting both the strengths and shortcomings of the platform as a patient education resource. The most striking finding was the wide reach of filler-related content, with more than 47 million cumulative views across fewer than 100 videos. With hundreds of thousands of likes, dislikes, and comments recorded, the data

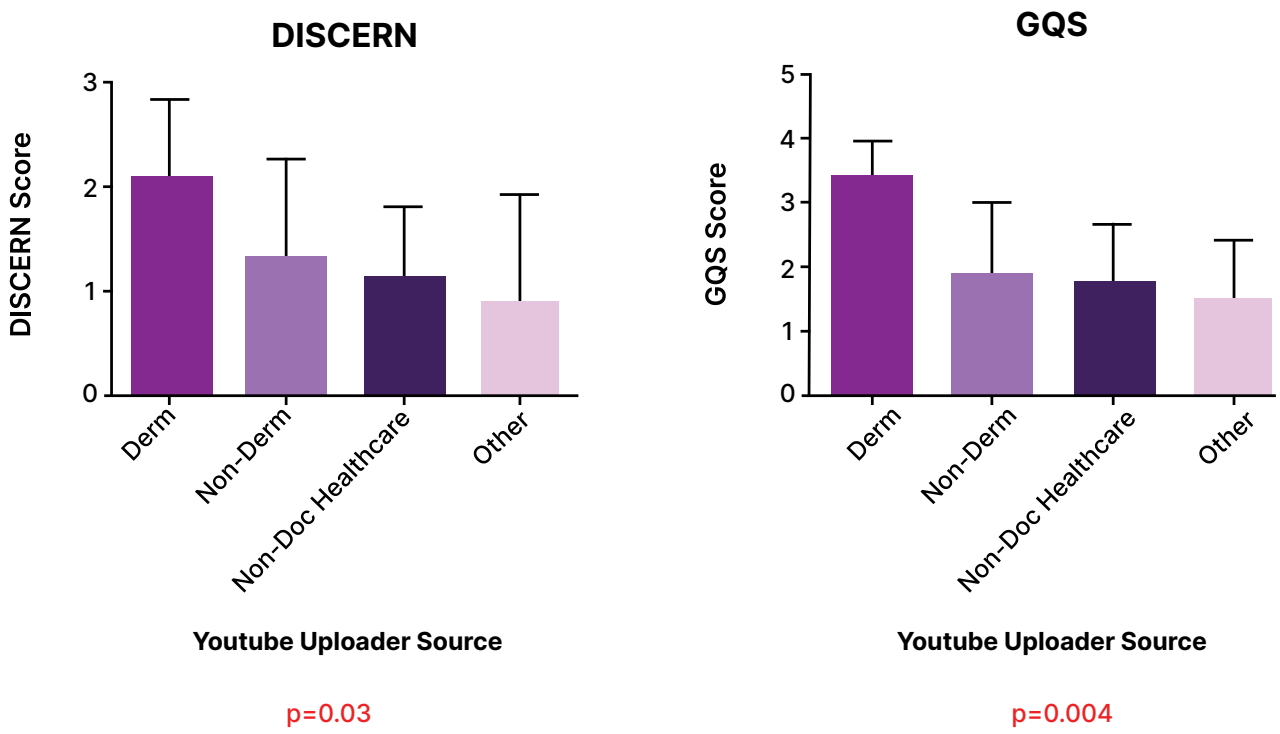

Figure 2. Quantitative video content scores between YouTube Uploader groups *courtesy of Christina M. Huang, MD, FRCPC.*

clearly demonstrate that the *YouTube* platform facilitates active viewer participation, reinforcing its role as a highly visible and interactive space for disseminating information.

Despite the substantial reach of filler-related content, video popularity, as measured by VPI, did not significantly correlate with objective quality scores. This disconnect between popularity and educational value mirrors findings from prior analyses of health-related *YouTube* content, where viewer engagement is often driven by entertainment value, production quality, or personal narratives, rather than the accuracy or comprehensiveness of the information.[13] Consequently, patients who rely on video popularity as a surrogate marker for reliability may be at risk of encountering inaccurate information.

Overall, the quality of filler-related content on *YouTube* was poor, with both DISCERN and GQS scores averaging below 2, indicating that most videos failed to provide comprehensive and reliable information. These findings are consistent with previous research published in other medical and cosmetic domains.[2,14] Particularly in cosmetic dermatology, inadequate information can pose a risk, as patients' perceptions of safety and expectations of realistic outcomes can be heavily influenced by what is seen online and in the media.

Among the different uploader groups, videos created by dermatologists scored significantly higher on both the DISCERN and GQS metrics compared to other sources, which is unsurprising given their extensive training in cutaneous health. However, these high-quality contributions represented only 5% of the total sample. This imbalance indicates that most of the online *YouTube* discussion related to fillers is shaped by individuals without specialized expertise in the skin, which may increase the likelihood of misinformation.

Given *YouTube*'s growing prominence as a healthcare information resource, there is a need for greater engagement by dermatologists and certified specialists. Previous studies in dermatology-related social media have demonstrated that professional participation enhances the accuracy and reliability of content

while simultaneously improving public trust and patient education.[14] A stronger presence of dermatologist-created videos on fillers could help counteract misinformation and ensure patients encounter evidence-based content.

Conclusion

Although *YouTube* videos on dermal fillers reached over 47 million viewers and generated high engagement rates, the overall quality of most videos was poor, as demonstrated by the low mean scores on the DISCERN and GQS assessments. Furthermore, most videos were uploaded by non-dermatologists and non-physicians, which may contribute to the inaccuracy of information presented in the available videos. While online videos can be valuable educational tools, information on the internet is not always reliable, may come from uncertified sources, and could set inappropriate patient expectations. This highlights the need for high-quality dermal filler videos on the *YouTube* platform to support informed decision-making and safe patient care.

Correspondence

Christina M. Huang, MD, FRCPC
Email: chuang@qmed.ca

Financial Disclosures

C.M.H.: Advisory boards: AbbVie, Amgen, Galderma, Neutrogena, Sanofi, Sun Pharma, UCB; **Honorarium:** AbbVie, Amgen, Arcutis, Celltrion, Galderma, JAMP, Pfizer, Sanofi, Sun Pharma, UCB

References

1. Fox S, Purcell K. Chronic disease and the Internet. Pew Research Center, Washington, DC: Pew Internet & American Life Project; 2010 Mar 24: [cited October 8, 2025]. Available from: https://www.pewresearch.org/internet/2010/03/24/chronic-disease-and-the-internet/
2. Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, Gramopadhye AK. Healthcare information on YouTube: a systematic review. Health Informatics J. 2015;21(3):173-194. doi:10.1177/1460458213512220
3. Gokcen HB, Gumussuyu G. A quality analysis of disc herniation videos on YouTube. World Neurosurg. 2019;124:e799-e804. doi:10.1016/j.wneu.2019.01.146
4. Langford A, Loeb S. Perceived patient-provider communication quality and sociodemographic factors associated with watching health-related videos on YouTube: a cross-sectional analysis. J Med Internet Res. 2019;21(5):e13512. Published 2019 May 17. doi:10.2196/13512
5. U.S. Food & Drug Administration. FDA-Approved Dermal Fillers. 2020: [updated November 9, 2020, cited October 8, 2025]. Available from: www.fda.gov/medical-devices/aesthetic-cosmetic-devices/fda-approved-dermal-fillers.
6. American Society of Plastic Surgeons. 2024 Plastic Surgery Statistics. 2024: [cited October 8, 2025]. Available from: www.plasticsurgery.org/news/plastic-surgery-statistics.
7. Radonjic A, Hing NN, Harlock J, Naji F. YouTube as a source of patient information for abdominal aortic aneurysms. J Vasc Surg. 2020;71(2):637-644. doi:10.1016/j.jvs.2019.08.230
8. Erdem H, Sisik A. The reliability of bariatric surgery videos in YouTube platform. Obes Surg. 2018;28(3):712-716. doi:10.1007/s11695-017-2911-3
9. Chen HM, Hu ZK, Zheng XL, Yuan ZS, Xu ZB, Yuan LQ, et al. Effectiveness of YouTube as a source of medical information on heart transplantation. Interact J Med Res. 2013;2(2):e28. Published 2013 Nov 21. doi:10.2196/ijmr.2669
10. Azer SA, Algrain HA, AlKhelaif RA, AlEshaiwi SM. Evaluation of the educational value of YouTube videos about physical examination of the cardiovascular and respiratory systems. J Med Internet Res. 2013;15(11):e241. Published 2013 Nov 13. doi:10.2196/jmir.2728
11. Patel M, Patel MM, Cristel RT. Quality and reliability of YouTube for patient information on neurotoxins. Facial Plast Surg. 2020;36(6):773-777. doi:10.1055/s-0040-1719100
12. Singh AG, Singh S, Singh PP. YouTube for information on rheumatoid arthritis—a wakeup call?. J Rheumatol. 2012;39(5):899-903. doi:10.3899/jrheum.111114
13. Osman W, Mohamed F, Elhassan M, Shoufan A. Is YouTube a reliable source of health-related information? A systematic review. BMC Med Educ. 2022;22(1):382. Published 2022 May 19. doi:10.1186/s12909-022-03446-z
14. Mueller SM, Hongler VNS, Jungo P, Cajacob L, Schwegler S, Steveling EH, et al. Fiction, falsehoods, and few facts: cross-sectional study on the content-related quality of atopic eczema-related videos on YouTube. J Med Internet Res. 2020;22(4):e15599. Published 2020 Apr 24. doi:10.2196/15599

For patients with moderate-to-severe plaque psoriasis

Consider

Pr ILUMYA®
tildrakizumab
Injection 100 mg/mL

for the

Treatment Journey

Now publicly covered in Quebec*, Ontario, Alberta, Manitoba, Saskatchewan, and the Atlantic provinces (restrictions may apply)

Enrol your patients in the Sun Patient Support Program for ILUMYA® designed to help you and your patients every step of the way

PrILUMYA® (tildrakizumab injection) is indicated for the treatment of adult patients with moderate-to-severe plaque psoriasis who are candidates for systemic therapy or phototherapy.

Please consult the Product Monograph at https://sunpharma.com/wp-content/uploads/0056-ca-m131-en-pm-non-annotated-level-III-change-importer.pdf for important information about:

- Relevant warnings and precautions regarding infections, pretreatment evaluation for tuberculosis, hypersensitivity reactions, vaccinations, fertility, and use in pregnant and nursing women
- Conditions of clinical use, adverse reactions, drug interactions and dosing instructions

The Product Monograph is also available by calling our medical information department at 1-844-924-0656.

* Official Mark of the Régie de l'assurance maladie du Québec. For treatment of persons suffering from a moderate-to-severe form of chronic plaque psoriasis: In the presence of a score ≥ 12 on the Psoriasis Area and Severity Index (PASI) and where at least 10% of the body surface area (BSA) is affected, or in the presence of large plaques on the face, palms or soles or in the genital area; AND where a phototherapy treatment of 30 sessions or more during three months has not made it possible to optimally control the disease, unless the treatment is contraindicated, not tolerated or not accessible or where a treatment of 12 sessions or more during one month has not provided significant improvement in the lesions; AND where a treatment with two systemic agents, used concomitantly or not, each for at least three months, has not made it possible to optimally control the disease. Except in the case of a serious intolerance or contraindication, these two agents must be: Methotrexate at a dose of 15 mg or more per week OR cyclosporine at a dose of 3 mg/kg or more per day OR acitretin at a dose of 25 mg or more per day.

The initial request is authorized for a maximum period of four months. When requesting continuation of treatment, the prescriber must provide information making it possible to establish the beneficial effects of the treatment, specifically: An improvement of at least 75% in the PASI score compared to the baseline value; or an improvement of at least 50% in the PASI score and at least 50% in the body surface area affected, compared to the baseline values; or a significant improvement in lesions on the face, palms or soles or in the genital area compared to the pretreatment assessment.

Requests for continuation of treatment are authorized for a maximum period of 12 months.

Authorizations for tildrakizumab are given for 100 mg at weeks 0 and 4, then every 12 weeks thereafter.

Accessed at https://www.ramq.gouv.qc.ca/sites/default/files/documents/non_indexes/liste_med_2024-07-04_en.pdf on January 31, 2025.

REFERENCE:
Current ILUMYA® Product Monograph, Sun Pharmaceutical Industries Limited.

REVIEWED BY PAAB

SUN PHARMA

PM-CA-ILY-0077

doi.org/10.58931/cdt.2025.64152

ABOUT THE AUTHOR

Benoit Cyrenne, MD

Dr. Benoit Cyrenne completed his medical school at Yale University in 2018, graduating cum laude. He then completed residency training at the University of Toronto where he was named Co-Chief Resident in his final year. Following graduation, he joined the faculty in the Division of Dermatology as a Clinician-Teacher at Women's College Hospital and Sunnybrook Health Sciences Centre. His clinical and research interests lie in auto-inflammatory dermatoses, severe cutaneous adverse reactions to medications and cutaneous T-cell lymphoma.

Affiliations: Division of Dermatology, Department of Medicine, University of Toronto, Toronto, ON
Women's College Hospital, Toronto, ON
Sunnybrook Health Sciences Centre, Toronto, ON
Toronto Dermatology Centre, Toronto, ON

An Emerging Fungal Pathogen: *Trichophyton Indotineae*

Benoit Cyrenne, MD

Introduction

Dermatophytoses are common fungal infections of the skin and other keratinized structures such as hair and nails. These infections, caused by the dermatophyte fungi, affect approximately 25% of people worldwide.[1] Dermatophyte fungi include species from three genera: *Trichophyton, Epidermophyton*, and *Microsporum*, and may be categorized as anthropophilic, zoophilic, or geophilic. Most cases of dermatophytosis in Canada are attributable to *T. rubrum*.

Over the past decade, there have been an increasing number of reports of terbinafine-resistant dermatophyte infections. Most of these cases are attributable to *Trichophyton indotineae*, a newly described pathogen. Initially described in South and South-East Asia, *T. indotineae* has quickly become a worldwide health concern, with isolates detected in more than 40 countries.[2,3] Epidemiological data reviews have revealed that *T. indotineae* had been circulating in Oman, Iran, India, and Australia as early as 2004, with an increasing number of cases occurring after 2014 due to an outbreak in India.[4]

Recent reports suggest that most new dermatophyte infections in India are attributable to this new pathogen.[5] The development of terbinafine resistance has been attributed to overuse of topical medications containing fixed-dosed combinations of corticosteroids and antifungal agents, which are widely available over-the-counter in parts of Asia and Africa.[6,7] This highly virulent, treatment-resistant fungus may present with chronic, extensive disease and atypical presentations, resulting in significant difficulties for both diagnosis and treatment.

Diagnosis

Initially classified as *Trichophyton mentagrophytes* genotype VIII within the *T. mentagrophytes/interdigitale* complex, *T. indotineae* was reclassified as its own species in 2020.[8] Due to its morphologic similarity, *T. indotineae* may be misidentified as *T. interdigitale* or *T. mentagrophytes*. Screening tests such as urease and hair perforation can aid differentiation, as *T. indotineae* typically yields a negative result, while both *T. mentagrophytes* and *T. interdigitale* are usually positive.[5] Definitive identification of *T. indotineae* requires advanced diagnostics, such as sequencing of the internal transcribed spacer region, matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF MS), or quantitative PCR.[3,6]

Given the difficulty of identifying *T. indotineae* via traditional methods, physicians should maintain a high degree of suspicion in patients not responding to standard antifungal therapies or who present with atypical features. Potassium hydroxide (KOH) smears offer a rapid and cost-effective method for the identification of fungal infections in patients with atypical presentations, especially in the setting of topical corticosteroid usage. Additionally, KOH smears offer a method of assessing treatment response.

Clinical Presentation

T. indotineae can present with several atypical features compared to the more common dermatophyte infections. Skin infections may be extensive, with generalized or widespread skin lesions. The lower extremities, groin, and buttocks are the most common sites of infection, and cases of erythroderma have also been described, especially in immunocompromised hosts.[9-11] The majority of patients exhibit involvement of multiple sites simultaneously, and may present with concurrent tinea corporis, tinea cruris, tinea manuum, tinea pedis, and tinea unguium.[3,12] Less commonly, *T. indotineae* may present with facial and scalp infections, with the ear being a particularly frequently affected area. Involvement of the face may be subtle, showing only minimal scaling or poorly defined borders. Newborns and infants have been observed with both tinea corporis and tinea cruris.

Lesions may display a wide range of morphologies. Some may lack characteristic features classically associated with tinea corporis, including an absence of erythema, lack of central clearing, or may show significant hyperpigmentation. Patients may also present with eczematous, pustular, pityriasis rosea-like, or pseudo-imbricata type lesions. Atypical presentations have been associated with topical corticosteroid use. Patients report severe pruritus, often accompanied by a burning sensation.[3] Pruritus may persist even after clinical and mycological cure.[12]

Transmission of *T. indotineae* occurs via person-to-person contact.[7,13] In contrast to other dermatophytes, *T. indotineae* appears to spread quickly within households, often affecting multiple household members simultaneously. Although fomites have been proposed as a mechanism of intra-household transmission, this link is not yet firmly established.[5,7,12] Sexual transmission has also been described as a method of infection.[5] While *T. indotineae* is considered anthropophilic, several reports of infections in animals, such as dogs, have been documented, suggesting that animals may serve as reservoirs and contribute to human transmission.[13]

In Ontario, most *T. indotineae* cases have been associated with recent travel and/or contact with persons who have travelled to endemic regions such as South Asia.[5] While comorbidities such as diabetes mellitus and immunosuppression are typically associated with extensive or recurrent dermatophytosis, these patient factors do not appear to be strongly associated with *T. indotineae* infections, and have been described only in a small proportion of cases.[1]

Drug Resistance

The rapid spread of *T. indotineae* has resulted in significant therapeutic challenges due to its resistance to typical treatment regimens for superficial fungal infections. Dermatophytes typically demonstrate high rates of sensitivity to terbinafine, which combined with its excellent

penetration of keratinized structures such as skin, hair, and nails, has resulted in topical or oral terbinafine being recommended as first-line therapy in the management of dermatophytosis. *T. indotineae*'s resistance to terbinafine is a public health crisis.

Terbinafine is a fungicidal agent that inhibits squalene epoxidase, an enzyme that catalyzes a key step in the ergosterol biosynthesis pathway necessary for the fungal cell membrane. Multiple single nucleotide variants in the SQLE gene have been detected in *T. indotineae* isolates. These mutations modify terbinafine's binding site on squalene epoxidase, reducing the size and hydrophobicity of the binding pocket.[10] In vitro testing has shown that *T. indotineae* had an increase in the mean inhibitory concentration (MIC) of terbinafine consistent with clinical reports of high rates of failure to standard doses. However, the absence of clearly defined breakpoints limits the usefulness and generalizability of MIC values, as even low MICs have not reliably predicted clinical responses.[3,10,11]

T. indotineae has also demonstrated resistance to azole antifungals including fluconazole, with consistently high MIC values reported. Similar to terbinafine, azole antifungals block ergosterol biosynthesis, inhibiting lanosterol 14-α demethylase. Resistance to fluconazole has been attributed to an overexpression of drug-efflux pumps and duplication of the CYP51B gene.[3,5] Resistance to other azole antifungals, such as itraconazole and voriconazole, have been more rarely described, but have also been attributed to amplification via tandem repeats of the CYP51B gene.[13]

Management

T. indotineae poses a unique challenge for dermatologists, given its atypical presentations, multiple drug resistances, and high relapse rates. Standard therapies, including topical antifungals and oral terbinafine, are not effective, and thus effective management requires new strategies.[14]

Terbinafine has historically been the first-line topical and systemic agent for dermatophytosis, typically administered at 250 mg daily. Increasing resistance to terbinafine standard regimens for tinea corporis was first noted in 2016. To address this, Increasing the dose to 250 mg twice daily and extending the treatment duration has been posited.[3,12] Given the rapidly rising incidence of terbinafine-resistant infections, a twice-daily 250 mg regimen of terbinafine is now recommended as the standard dose therapy.[12]

Itraconazole has been found to be the most effective oral antifungal agent for managing *T. indotineae*.[11,12,14] When prescribed for the treatment of either tinea cruris or tinea corporis, itraconazole is typically administered at a dose of 100 mg per day for 7 days. However, due to the increase in treatment failures and frequent relapses associated with *T. indotineae* infection, higher doses and longer treatment durations have been explored.[12] Despite this, a 2022 randomized clinical trial in India found no significant difference in treatment response rates between 100 mg and 200 mg daily dosing.[15] Higher response rates were noted with itraconazole regimens of 400 mg per day; however, these are relatively contraindicated due to the increased associated costs and a higher risk of adverse effects, including hepatotoxicity.[15] As adequate serum levels and skin penetration are achieved with 100 mg daily itraconazole, higher doses are rarely indicated. Additionally, super-bioavailable formulations have been developed to improve absorption without requiring an acidic environment for absorption, which also has been demonstrated to be effective in the management of *T. indotineae*.[12]

When treating *T. indotineae* with itraconazole, extended treatment lengths are recommended given the high rate of relapse rates associated with fixed-length regimens. Patients typically require a minimum of 6 weeks of therapy to achieve both clinical and mycological cure, and treatment courses of up to 20 weeks have been described.[12,15] Treatment should continue until there is a complete cure with resolution of all clinical lesions and confirmation of a negative KOH smear.

Fluconazole has been reported to be ineffective in the management of *T. indotineae*, consistent with in vitro data demonstrating high MIC values. Cure rates have reported to be as low as 42% after an 8-week course of daily dosed fluconazole.[14] Given the published data,

fluconazole is not recommended for the treatment of terbinafine-resistant dermatophytoses.

Resistance to itraconazole has been documented in over 20% of *T. indotineae* cases.[16] In infections resistant to both terbinafine and itraconazole, voriconazole or posaconazole may be effective options.[9,12,13,17] However, optimal dosing and treatment lengths for these agents is not known.[13] Studied voriconazole regimens include 200–800 mg per day for up to 3 months,[17] though the use of voriconazole should be limited to reduce the risk of resistance. Voriconazole is associated with adverse effects such as visual disturbances and option neuropathy, requiring ophthalmologic monitoring for long-term use.[13] Posaconazole has been reported to be effective in recalcitrant cases of *T. indotineae* at a dose of 300 mg per day for 1–3 months.[3,13,17]

While topical therapy is typically ineffective against *T. indotineae*, topical voriconazole 1% has demonstrated efficacy after systemic terbinafine failure.[18] Topical antifungals may also serve as adjunctive therapies in combination with systemic agents. *In vitro* studies have demonstrated significant synergy when itraconazole is combined with other antifungal agents; however, early evidence suggests no additional benefit from combining topical luliconazole with systemic itraconazole in the management of disseminated tinea corporis.[12] Additionally, keratolytic agents such as Whitfield's' ointment may aid in the treatment of hyperkeratotic lesions.[3]

Even with effective therapy, *T. indotineae* infections demonstrate high rates of relapse. Data suggests that most patients experience relapse after treatment, regardless of the agent or regimen used. The underlying cause has not been fully determined, but has been theorized to be due to a novel virulence factor.[10] Predicting which patients will experience a relapse is challenging, as factors such as lesion count, sites affected, total affected body surface area, and comorbidities have not been associated with increased risk.[10,12] Relapses should be treated with the same regimen as prescribed for the initial infection.[12]

Conclusion

Trichophyton indotineae represents a significant and growing global public health concern due to its atypical clinical presentations, chronic relapsing infections, and high rates of antifungal resistance. Its rapid worldwide spread has heralded a shift in the management of dermatophytosis, with increased reliance on second- and third-line agents such as itraconazole, voriconazole, and posaconazole, as well as prolonged treatment courses. New antimicrobial stewardship programs are needed to help guide clinicians in accurate diagnosis and effective treatment, while mitigating emerging resistance.

Correspondence

Benoit Cyrenne, MD
Email: benoit.m.cyrenne@gmail.com

Financial Disclosures

B.C.: Honoraria: AbbVie, Sun Pharmaceuticals, UCB, RBC Consultants, Novartis, Arcutis Canada, BMS, Sanofi

References

1. De Marco A, Liguori G, Cafarchia C, Triggiano F, Ciccarese G, Poli MA, et al. Cutaneous infections caused by trichophyton indotineae: case series and systematic review. J Clin Med. 2025;14(4):1280. Published 2025 Feb 14. doi:10.3390/jcm14041280
2. Verma SB, Khurana A, Bosshard PP, Kargl A, Singal A, Saraswat A, et al. "Trichophyton indotineae" is an inaccurate and pejorative term. Indian J Dermatol Venereol Leprol. 2025;91(2):277-280. doi:10.25259/IJDVL_1793_2024
3. Gupta AK, Susmita, Nguyen HC, Liddy A, Talukder M, Wang T, et al. Trichophyton indotineae: epidemiology, antifungal resistance and antifungal stewardship strategies. J Eur Acad Dermatol Venereol. Published online July 4, 2025. doi:10.1111/jdv.20810
4. Jabet A, Brun S, Normand AC, Imbert S, Akhoundi M, Dannaoui E, et al. Extensive dermatophytosis caused by terbinafine-resistant Trichophyton indotineae, France. Emerg Infect Dis. 2022;28(1):229-233. doi:10.3201/EID2801.210883
5. McTaggart LR, Cronin K, Ruscica S, Patel SN, Kus JV. Emergence of terbinafine-resistant Trichophyton indotineae in Ontario, Canada, 2014–2023. J Clin Microbiol. 2025;63(1):e0153524. doi:10.1128/JCM.01535-24
6. Palepu S, Treat JR. Presumed Trichophyton indotineae Infection in children: a call for heightened clinical awareness. Pediatr Dermatol. 2025;42(5):1097-1098. doi:10.1111/PDE.15933
7. Uhrlaß S, Verma SB, Gräser Y, Rezaei-Matehkolaei A, Hatami M, Schaller M, et al. Trichophyton indotineae—an emerging pathogen causing recalcitrant dermatophytoses in India and worldwide—a multidimensional perspective J Fungi (Basel). 2022;8(7):757. Published 2022 Jul 21. doi:10.3390/jof8070757
8. Kano R, Kimura U, Kakurai M, Hiruma J, Kamata H, Suga Y, et al. Trichophyton indotineae sp. nov.: a new highly terbinafine-resistant anthropophilic dermatophyte species. Mycopathologia. 2020;185(6):947-958. doi:10.1007/S11046-020-00455
9. De Marco A, Liguori G, Cafarchia C, Triggiano F, Ciccarese G, Poli MA, et al. Cutaneous infections caused by Trichophyton indotineae: case series and systematic review. J Clin Med. 2025;14(4):1280. Published 2025 Feb 14. doi:10.3390/JCM14041280
10. Caplan AS, Todd GC, Zhu Y, Sikora M, Akoh CC, Jakus J, et al. Clinical course, antifungal susceptibility, and genomic sequencing of Trichophyton indotineae. JAMA Dermatol. 2024;160(7):701-709. doi:10.1001/jamadermatol.2024.1126
11. Chowdhary A, Singh A, Kaur A, Khurana A. The emergence and worldwide spread of the species Trichophyton indotineae causing difficult-to-treat dermatophytosis: anew challenge in the management of dermatophytosis. PLoS Pathog. 2022;18(9):e1010795. Published 2022 Sep 29. doi:10.1371/JOURNAL.PPAT.1010795
12. Khurana A, Sharath S, Sardana K, Chowdhary A. Clinico-mycological and therapeutic updates on cutaneous dermatophytic infections in the era of Trichophyton indotineae. J Am Acad Dermatol. 2024;91(2):315-323. doi:10.1016/J.JAAD.2024.03.024
13. Gupta AK, Wang T, Mann A, Polla Ravi S, Talukder M, Lincoln SA, et al. Antifungal resistance in dermatophytes–review of the epidemiology, diagnostic challenges and treatment strategies for managing Trichophyton indotineae infections. Expert Rev Anti Infect Ther. 2024;22(9):739-751. doi:10.1080/14787210.2024.2390629
14. Singh S, Chandra U, Anchan VN, Verma P, Tilak R. Limited effectiveness of four oral antifungal drugs (fluconazole, griseofulvin, itraconazole and terbinafine) in the current epidemic of altered dermatophytosis in India: results of a randomized pragmatic trial. Br J Dermatol. 2020;183(5):840-846. doi:10.1111/BJD.19146
15. Khurana A, Agarwal A, Agrawal D, Panesar S, Ghadlinge M, Sardana K, et al. Effect of different itraconazole dosing regimens on cure rates, treatment duration, safety, and relapse rates in adult patients with tinea corporis/cruris: a randomized clinical trial. JAMA Dermatol. 2022;158(11):1269-1278. doi:10.1001/JAMADERMATOL.2022.3745
16. Leeyaphan C, Saengthong-Aram P, Laomoleethorn J, Phinyo P, Lumkul L, Bunyaratavej S. Therapeutic outcomes in patients with trichophyton indotineae: a systematic review and meta-analysis of individual patient data. Mycoses. 2025;68(4):e70048. doi:10.1111/MYC.70048
17. Sonego B, Corio A, Mazzoletti V, Zerbato V, Benini A, di Meo N, et al. Trichophyton indotineae, an emerging drug-resistant dermatophyte: a review of the treatment options. J Clin Med. 2024;13(12):3558. Published 2024 Jun 18. doi:10.3390/jcm13123558
18. Gueneau R, Joannard B, Haddad N, Alby F, Jullien V, Schlatter J, et al. Extensive dermatophytosis caused by terbinafine-resistant Trichophyton indotineae, successfully treated with topical voriconazole. Int J Antimicrob Agents. 2022;60(5-6):106677. doi:10.1016/j.ijantimicag.2022.106677

Canada's largest single-day event for early-career dermatologists.

Come join us at the

2026

Rising Stars in Dermatology Symposium

Saturday, April 18th, 2026

The Omni King Edward Hotel
Toronto, ON

Scan the QR Code to register today!

catalytic health
medical minds meet here

doi.org/ 10.58931/cdt.2025.64153

ABOUT THE AUTHOR

Lauren Lam, MD, BScH, FRCPC

Dr. Lam is the Vice President of the Canadian Hidradenitis Suppurativa Foundation and a Canadian Board Certified Dermatologist subspecializing in Hidradenitis Suppurativa Deroofing Procedures based in Calgary, Alberta. She is proud to serve her community, especially in treating atopic dermatitis in underserved populations, such as rural patients, the elderly, and patients of diverse ethnicities.

Affiliations: Beacon Dermatology, Calgary, AB

Atopic Dermatitis in Skin of Colour Patients: A Clinically Practical Literature Review Summary

Lauren Lam, MD, BScH, FRCPC

Introduction

The growing interest in understanding the nuances of dermatologic conditions across diverse ethnicities continues to gain momentum amongst practising dermatologists and residents. It is encouraging to see residency programs evolving to encompass a wider range of cases, both common and rare, from various ethnic backgrounds.

Atopic dermatitis is a common condition that every dermatologist encounters in their practice. However, its nuances in presentation amongst patients of varying skin tones can present significant challenges in diagnosis and management.

To gather the most up to date, clinically applicable knowledge in atopic dermatitis patients with skin of colour, a literature review of all systematic reviews published in the last 5 years on this topic was conducted. Three papers were chosen: Napolitano et al.,[1] Adawi et al.,[2] and Gan et al.[3] The most clinically relevant aspects of these papers are summarized below.

Immunologic Profiles

Interleukin (IL)-13 has been identified as a key interleukin at play in atopic dermatitis. Interestingly, IL-13 expression has been found to be comparable across ethnic groups. However, nuances do exist in levels of expression of other interleukins implicated in atopic dermatitis.

Pediatrics

Pediatric patients show greater epidermal hyperplasia and cellular infiltration compared with adults. They also express higher levels of T-helper (Th)17, Th9/IL-9, IL-33, innate markers, IL-31, and IL-33 than adults. This increase is thought to be responsible for the phenotypic similarities to psoriasis observed in pediatric patients.[1]

African American

Studies have shown that the skin of African American patients has lower levels of ceramide, a lower pH in the stratum corneum, and higher trans-epidermal water loss compared with other ethnicities.[2] This results in increased xerosis. African American patients also tend to have increased Th2 and Th22 pathways.

Asian

Chinese patients have been shown to have higher levels of Th2, Th17/IL-23, and Th22 in small studies.[1] The increased involvement of the latter 2 pathways may explain why Chinese patients can occasionally present with a psoriasiform thickening, as highlighted in the morphology section.

Morphology

In general, patients with skin of colour may exhibit other morphologic features beyond the classic morphology described in the Hanifin and Rajka criteria. For example, primary morphological features such as lichenification, greater papular involvement, perifollicular accentuation, hyperkeratosis, xerosis, and annular lesions are more likely to be observed.[3] Secondary skin changes that are more likely to be observed include infraorbital fold dyspigmentation, palmar hyperlinearity, and Dennie-Morgan lines.[3]

Unfortunately, patients with skin of colour are more likely to present with greater disease severity in both pediatric and adult populations. This is a result of delays in diagnosis due to unfamiliarity with their unique morphology, and health care disparities.[2] Adawi et al. proposed adding these unique morphologic features to the Hanifin and Rajka criteria when assessing a patient with skin of colour to enhance diagnostic accuracy (**Table 1**).

Another attribute that may contribute to misdiagnosis and delays in treatment is the underappreciation of erythema, leading to an under-representation of severity. Gan et al. suggested that patient symptoms, such as itch intensity, could be used as markers of disease and treatment response in conjunction with the Eczema Area and Severity Index (EASI) scores. Another study suggested that increasing erythema scores on the EASI scoring system by one level in skin of colour patients may help account for the under-representation of easily appreciable erythema to the eye.[3]

African American

African American patients tend to have involvement of the extensor and truncal surfaces,[3] and occasionally, lesions can appear lichenoid (**Figure 1**). Studies have also shown that these patients experience more severe pruritus and prurigo nodularis compared with White ethnicities.[3]

Asian

White dermatographism can be seen more commonly in Asian patients. Occasionally, the diagnosis may be unclear because the eruption in some Asian patients can appear more psoriasiform in nature. In these cases, if a skin biopsy shows features of both spongiotic and psoriasiform dermatitis, it is critical to establish the other major criteria of atopic dermatitis to confirm the correct diagnosis and treatment.

Treatments Supported by Data from Published Studies Focusing on Skin of Colour Patients

Regrettably, non-White ethnic groups have historically been under-represented in clinical trials. Gan et al. comprehensively reviewed the literature for studies focusing specifically on treatments for patients with atopic dermatitis who have skin of colour. The treatments included topical, phototherapy, oral, biologic, Janus kinase (JAK) inhibitors, and emollients. The findings are summarized below by category.

Topical

Topical Steroids and Calcineurin Inhibitors

Unfortunately, no data exists comparing response rates to topical steroids in atopic dermatitis across different ethnic groups.[3] However, sub-analyses of pivotal trials have shown that pimecrolimus 1% cream and crisaborole ointment showed similar efficacy among all racial groups.[3] Pooled data on tacrolimus

Major Criteria (≥3 required)	Minor Criteria (≥3 required)
• Pruritus • Typical morphology and distribution • Flexural lichenification • **Extensor papular involvement, lichenification or psoriasiform thickening of skin in skin of colour patients** • Extensor eruptions in infants and children • Chronic or chronically relapsing dermatitis • Personal or family history of atopy (asthma, allergic rhinitis or AD)	• **Dyspigmentation (post-inflammatory hypopigmentation and hyperpigmentation)** • **Psoriasiform scaling** • **Perifollicular accentuation** • **Secondary papular involvement/prurigo nodule formation** • Xerosis • Ichthyosis, palmar hyper linearity, or keratosis pilaris • Immediate (type I) skin test reactivity • Raised serum IgE • Early age of onset • Tendency toward cutaneous infections (especially S. aureus and herpes simplex) or impaired cell-mediated immunity • Tendency toward non-specific hand or food dermatitis • Nipple eczema • Cheilitis • Recurrent conjunctivitis • Dennis-Morgan infraorbital fold • Keratoconus • Anterior subscapular cataracts • Orbital darkening • Facial pallor or facial erythema • Pityriasis alba • Anterior neck folders • Itch when sweating • Intolerance to wool and lipid solvents • Food intolerance • Course influenced by environment or emotional factors • White demographism or delayed blanch

Table 1. Proposed Hanifin and Rajka criteria for Atopic Dermatitis, adjusted for characteristics more frequently seen in atopic dermatitis patients; *adapted from Adawi W., et al., 2023*.

showed comparable efficacy in Asian patients to studies conducted in Western countries.[3]

Ruxolitinib Cream

In the pivotal Phase III study, ruxolitinib 1.5% cream, a JAK 1 and 2 selective topical approved in the United States for mild-moderate atopic dermatitis, significantly improved itch, sleep, and quality of life across various races and ethnicities.[3] In addition, it provided greater itch reduction than topical triamcinolone, while not having the associated risk of hypopigmentation.[3]

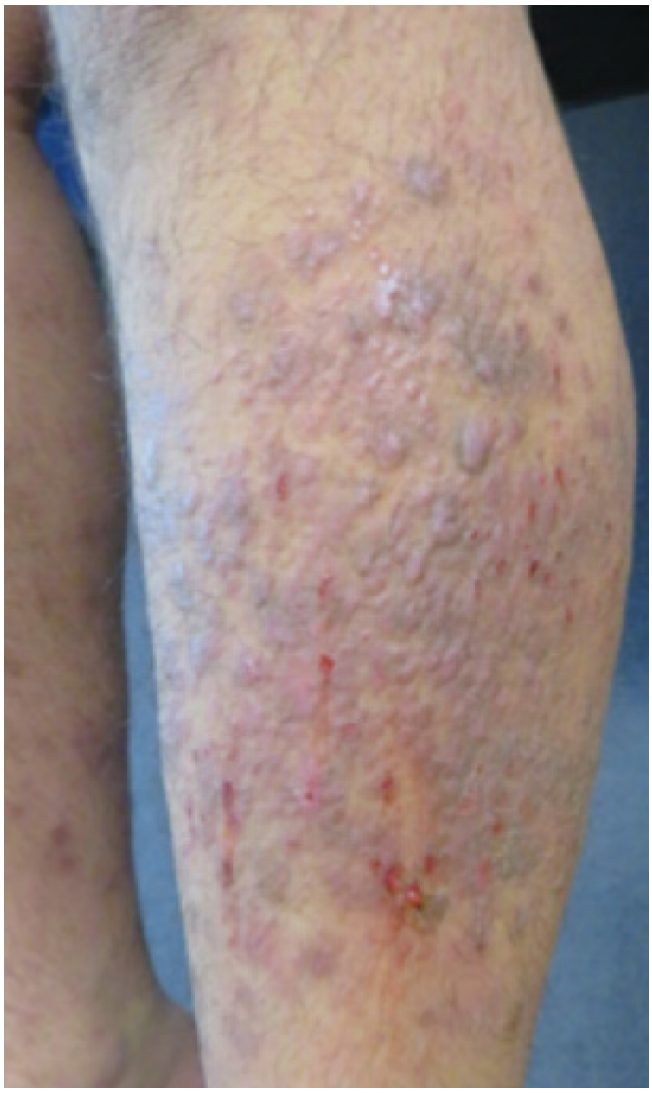

Figure 1. Lichen planus-like morphology in an atopic dermatitis patient; *courtesy of Gan et al., 2023.*

Among the patients in the study with Black ethnicity, 38.1% of those using ruxolitinib cream achieved a >2 Investigator's Global Assessment (IGA) score versus 11.5% of those using vehicle cream.[3] For patients with White ethnicity, 57.3% of those using ruxolitinib cream achieved a >2 IGA score versus 12.3% of those using vehicle cream.[3] Among Asian patients, 56.3% of those using ruxolitinib cream achieved a >2 IGA score versus 5% of those using vehicle cream.[3]

In the entire study, 29% of the patients were of Black ethnicity, and 8% were of Asian ethnicity, providing a greater representation of non-Caucasian ethnicities than historically seen in prior atopic dermatitis studies.[3]

Roflumilast Cream

Roflumilast 0.15% cream, is a topical phosphodiesterase 4 (PDE4) inhibitor that is approved in Canada for atopic dermatitis.[3] IgA 0 or 1 score was achieved in roflumilast-treated patients in INTEGUMENT-1 at week 4 compared with placebo, regardless of race (32.3% in White patients vs. 13.3%, 25.8% vs. 11.5% in Black patients, 33.7% vs. 21.8% in Asian patients, 33.2% vs. 13.7% in "Other" patients).

Phototherapy

Patients with skin of colour often have richer pigmentation; therefore, higher treatment doses are often needed. However, there is a corresponding greater risk of dyspigmentation and developing melasma. Thus, it is important to inform patients about these risks prior to initiating phototherapy, since inducing a new dermatologic condition is undesirable.[3]

Oral

Cyclosporine

The bioavailability of cyclosporine (CsA) in patients of Black ethnicity is 20–50% lower than that in those of White ethnicity. This difference is due to more frequent expression of cytochrome P450 (CYP) 3A5 and the resultant increased metabolism of CsA.[3] Thus, higher doses may be required to achieve a therapeutic effect.[3] Of note, Black ethnic groups demonstrate the highest rates of gingival hypertrophy and hypertrichosis while taking CsA.[3] This would be a worthy point to mention during counselling.

Azathioprine

Thiopurine methyltransferase (TMPT) is the key enzyme involved in the metabolism of azathioprine (AZA). TMPT activity is lower in patients of Black ethnicity, which pre-disposes them to higher than intended drug levels within the body.[3] Gene mutations that impair TMPT function differ among Black (TMPT*3C, *8), East Asian (*3C) and White (*3A) ethnicities.[3] This variation is important to consider when determining which

target genes to test for in a patient's specific ethnicity before starting AZA.[3] For those with heterozygous mutations, treatment should start at 30–70% of the target dose. Those with homozygous mutations should consider other agents, a 10-fold reduction in daily dosing, or dosing 3 times a week.[3]

Methotrexate

There is an ethnic predisposition for methotrexate-induced alopecia in people of Black ethnicity, possibly due to single-nucleotide polymorphisms in the methotrexate cellular pathway.[3]

Mycophenolate Mofetil

There are no studies with mycophenolate mofetil that compare pharmacokinetics amongst different ethnicities.[3]

Dapsone

Those with glucose 6 phosphate dehydrogenase (G6PD) deficiency, which is more common in Black and Asian ethnicities, have an increased risk of hemolytic anemia when treated with dapsone.[3]

Biologics

Dupilumab

In the pivotal Phase III studies SOLO-1 and SOLO-2, there were comparable efficacy and safety profiles for dupilumab treatment in subgroup analyses amongst Asian, Black, Indian, and White ethnicities, although Black ethnicities were under-represented.[3] A higher baseline risk for allergic conjunctivitis was also observed in Asian ethnicities.[3]

Tralokinumab

The pivotal Phase III ECZTRA 1 and 2 studies on tralokinumab treatment did not include subgroup analyses between ethnic groups. However, beyond these studies no disparities in clinical response were reported across ethnic groups.[3]

Lebrikizumab

No direct comparison of efficacy between ethnicities was performed in the pivotal Phase III ADvocate 1 & 2 studies of lebrikizumab.[3] However, ADmirable, a Phase IIIb open label study dedicated to atopic dermatitis patients with skin of colour (Skin Phototype IV, V and VI) showed that 69.2% and 44.9% of patients were able to achieve EASI 75 AND 90 at Week 16, respectively. There were no new safety signals in this study.[4]

JAK Inhibitors

In general, Phase III studies on JAK inhibitors for atopic dermatitis lacked ethnic subgroup analyses.[3]

Upcoming Treatments

Tapinarof Cream

Tapinarof is currently approved for atopic dermatitis in the United States, and has recently been approved in Canada for use in psoriasis, but has not yet received approval for use in atopic dermatitis.

Nemolizumab (IL-31)

Phase III studies on nemolizumab (IL-31) conducted in Japan and Western countries show similar reductions in EASI and pruritus, although each trial used different scoring systems for pruritus.[3]

Failed Trials

IL-12/23

Despite the increased IL-23 signalling in Asian patients with atopic dermatitis, as mentioned in the immunologic profile section, a randomized study of 79 Japanese patients with atopic dermatitis demonstrated no meaningful efficacy for ustekinumab.[3] Data supporting ustekinumab efficacy in atopic dermatitis is scant regardless of skin type.[3]

IL-17

Secukinumab did not significantly reduce epidermal thickness of lesional skin in 41 patients of Asian ethnicity, despite the increased IL-17

signalling identified in Asian patients, as mentioned in the immunologic profile section.[3]

IL-22

Fezakinumab, an IL-22 monoclonal antibody inhibitor, showed no significant difference in efficacy despite biopsy-proven increases in Th22 predominance among study patients.[3]

In general, these failed trials may indicate that immunologic signalling pathways in atopic dermatitis are more complex than a single target of blockade. Further studies are required to elucidate its clinical significance beyond morphologic nuances between ethnicities.[3]

Emollients

Although urea, glycerine, and propylene glycol are emollients, they can be irritating and worsen skin sensitivity, especially in Asian patients, who were found to have the most sensitive skin according to a skin sensitivity test.[3] Squalene was found to be less irritating.[3]

Conclusion

In summary, the current understanding of atopic dermatitis and its nuances between ethnicities remains incomplete. However, this article highlights clinically helpful and relevant differences in morphologic appearance and pharmacologic metabolism that every dermatologist can add to their arsenal in tailoring their treatment for atopic dermatitis in patients with skin of colour. With increased representation of patients with skin of colour in future atopic dermatitis studies, our understanding can continue to expand.

Correspondence

Lauren Lam, MD, BScH, FRCPC
Email: drlaurenlam@gmail.com

Financial Disclosures

L.L.: AbbVie, Amgen, Arcutis, Beiersdorf, Bioderma, Boehringer-Ingheim, Bristol-Meyers-Squibb, Celltrion, Eli Lilly, Janssen, JAMP, Incyte, Kenvue, LEO Pharma, L'Oreal, Novartis, Pfizer, Sanofi, Sun Pharmaceuticals, UCB

References

1. Napolitano M, Fabbrocini G, Martora F, Genco L, Noto M, Patruno C. Children atopic dermatitis: diagnosis, mimics, overlaps, and therapeutic implication. Dermatol Ther. 2022;35(12):e15901. doi:10.1111/dth.15901
2. Adawi W, Cornman H, Kambala A, Henry S, Kwatra SG. Diagnosing atopic dermatitis in skin of color. Dermatol Clin. 2023;41(3):417-429. doi:10.1016/j.det.2023.02.003
3. Gan C, Mahil S, Pink A, Rodrigues M. Atopic dermatitis in skin of colour. Part 2: considerations in clinical presentation and treatment options. Clin Exp Dermatol. 2023;48(10):1091-1101. doi:10.1093/ced/llad162
4. Alexis A, Moiin A, Waibel J, Wallace P, Cohen D, Laquer V, Kwong P, Reck Atwater A, Schuster C, Proper J, Silk M, Pierce E, Pillai S, Rueda M, Moore A. Efficacy and Safety of Lebrikizumab in Adult and Adolescent Patients with Skin of Color and Moderate-to-Severe Atopic Dermatitis: Results from the Phase IIIb, Open-Label ADmirable Study. Am J of Clin Derm. 2025;26:803-817. Doi:10.1007/s40257-025-00970-8

Canadian Dermatology Today
Science for the Real World

canadiandermatologytoday.com

Canadian Dermatology Today is published four times per year in both English and French (ISSN 2563-7673) under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) license by Catalytic Health in Toronto, Ontario, Canada.

Register for future digital and print issues by visiting us at catalytichealth.com/cdt

Looking for more?
All back issues are available online at canadiandermatolgytoday.com