



SKILLS CHECK

Using Fluorescent Light Energy for Dermatologic Therapy

Jennie Tait, AHT, RVT, VTS (Dermatology) Charter Member

Veterinary Allergy Dermatology and Ear Referral (V.A.D.E.R.) Clinic, Morriston, Ontario, Canada

Abstract

Fluorescent light therapy uses a form of photobiomodulation, fluorescent light energy, to repair skin at a cellular and molecular level, which reduces skin healing and infection resolution times. Fluorescent light therapy is administered via a new, easy-to-use, noninvasive treatment tool that targets all layers of the skin simultaneously to promote regeneration, decrease inflammation, kill microorganisms, and more.



Take-Home Points

- Fluorescent light energy (FLE) is safe for use around patients, veterinary staff, and clients.
- FLE decreases skin healing time, including postsurgical healing, and hastens resolution of infected lesions.
- Use of FLE enhances antimicrobial stewardship and decreases the need for systemic treatments by treating only the affected area.
- FLE can be used as monotherapy for bacterial skin infections (e.g., pyoderma) with early intervention.
- FLE sessions typically last no more than 15 minutes and can be scheduled as veterinary nurse appointments, which empowers staff, generates revenue, and improves client compliance.
- Do not use FLE in patients with neoplastic lesions, those with photoaggravated conditions, or those receiving photosensitizing medication.

Veterinary medicine is welcoming a new modality that is changing the landscape of veterinary dermatology by reducing healing times by 50% or more.^{1,2} Fluorescent light energy (FLE) therapy, currently marketed as photobiomodulation via fluorescence (Phovia; Vetoquinol, phoviausa.com), may be new to veterinary medicine, but it has a scientifically proven track record in human medicine for skin regeneration.

HOW DOES FLUORESCENT LIGHT ENERGY THERAPY WORK?

FLE technology uses controlled light from a light-emitting diode (LED) lamp to promote healing of damaged or impaired skin. The lamp generates blue light, which passes through a chromophore gel that splits it into different wavelengths in the visible and near-infrared spectrum. This process is similar to passing light through a prism, and the result is known as polychromatic light. The use of polychromatic light differs from the methodology used in other light therapies.¹

The different wavelengths produced during FLE treatment are blue, green, yellow/orange, and red light. Each wavelength penetrates to a different depth in the skin (epidermis, dermis, and hypodermis), which enables the user to target multiple skin layers and their different functions simultaneously (**FIGURE 1**).²⁻⁴ Violet and ultraviolet (UV) light are not produced, thereby avoiding UV-related damage to cells.

Blue light penetrates the epidermis up to 1 mm deep. At this depth, it stimulates the mitochondria, the “powerhouses” of cells. Stimulating the mitochondria

increases cell function and production of adenosine triphosphate for energy, cyclic adenosine monophosphate for improved cell function, reactive oxygen species for proliferation, and nitric oxide for vasodilation, thereby mediating an immune response and releasing growth factors.

In turn, these all expedite molecular reactions and cascades, resulting in an increased production of several different growth factors (e.g., epidermal growth factor, vascular endothelial growth factor, fibroblast growth

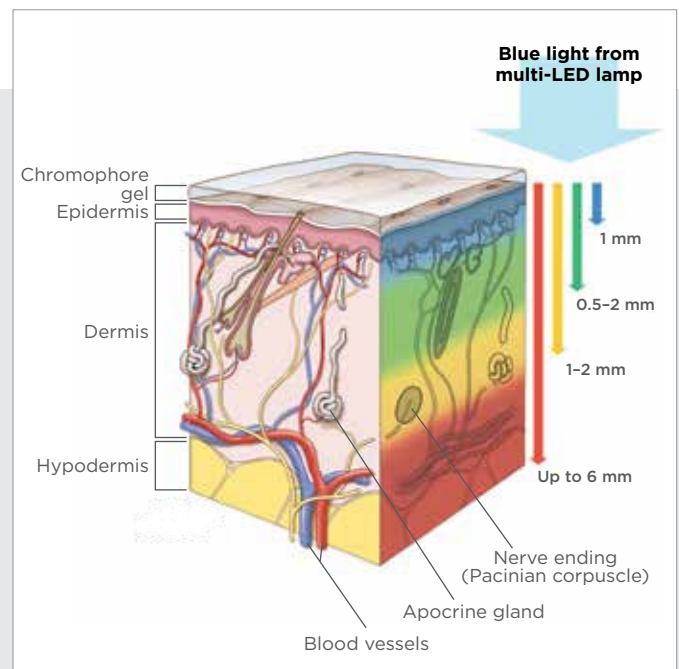


FIGURE 1. Skin layers and structures stimulated by different wavelengths of fluorescent light energy during treatment.
LED = light-emitting diode



factors) that speed healing. Blue light also has antibacterial properties, disrupting biofilms and damaging bacterial cell walls.

Green light penetrates through to the dermis (0.5 mm to 2 mm deep). At this level, it targets fibroblasts in the dermis, which are needed for wound healing, and increases proliferation of keratinocytes in the epidermis.

Yellow/orange light penetrates 1 to 2 mm deep in the dermis. It reduces inflammation and targets blood vessels to increase circulation.

Red light penetrates up to 6 mm deep. It decreases inflammation in the epidermis and dermis, promotes angiogenesis, and increases collagen production up to 400 times. It also can convert collagen I, found in scars, into collagen III, which is much more supple. The result is dramatically faster healing with minimal cicatrization (scar formation).

WHY USE FLUORESCENT LIGHT ENERGY THERAPY?

FLE has many therapeutic applications and advantages (**BOXES 1 AND 2**). Unlike low-level laser therapy (LLLT), FLE therapy uses polychromatic light, allowing it to target multiple layers of the skin at one time versus just a single layer. Ease of use is also a factor: the Phovia lamp, for example, is simple to use with a broad beam, a calibrated depth gauge, and an automatic timer to ensure proper delivery of treatment. Conversely, LLLT has a narrow beam that must be held at a 90° angle and moved accurately to ensure proper administration.

FLE therapy also has the potential to be used as monotherapy for bacterial pyoderma when instituted as an early intervention.¹⁻³ This would be a tremendous step in the right direction for antimicrobial stewardship. The World Health Organization lists antimicrobial resistance as one of the top 10 threats to global health, while the United Nations Interagency Coordination Group on Antimicrobial Resistance reports that drug-resistant diseases could account for 10 million deaths annually by 2050.⁵⁻⁷

Because FLE therapy sessions are quick and can be scheduled as veterinary nurse appointments or even

BOX 1

Indications and Contraindications for Fluorescent Light Energy (FLE) Therapy

FLE therapy is appropriate for most dermatologic presentations, such as:

- Postsurgical healing, including after CO₂ laser cutting or ablation
- Pyoderma associated with many conditions (e.g., multidrug-resistant infection, acral lick granulomas, pyotraumatic dermatitis, fistulas)
- New or nonhealing wounds
- Perianal fistulas
- Furuncles (canine chin furunculosis)
- Interdigital nodular pododermatitis (interdigital cysts)
- Aural hematomas
- Vasculitis
- Idiopathic ulcerative dermatitis
- Alopecia areata

FLE therapy should not be used for patients that:

- Have photoaggravated conditions
- Are undergoing treatment with photosensitizing medication
- Have neoplastic lesions

BOX 2

Advantages of Fluorescent Light Energy (FLE) Therapy

- Mobile and easy to use with minimal training
- Noninvasive and nonpharmacologic
- Dosing not weight dependent
- Decreases the need for systemic medication and associated adverse effects by targeting the affected area only
- Promotes antimicrobial stewardship
- Improved time to healing by 50% or more^{1,2}
- Improves speed to resolution in infected lesions
- Reduces pain and inflammation
- No drug testing concerns for equine patients
- Proven efficacy and safety in human and veterinary medicine



house calls, they can create a new stream of revenue and help improve compliance with rechecks and follow-up. The author has also seen firsthand how FLE therapy improves the quality of patients' lives. Patients not only heal faster but are much more comfortable, enough so that they do not need Elizabethan collars, which clients greatly appreciate as well.

WHAT IS REQUIRED?

The Phovia kit includes:

- A rechargeable, wireless LED lamp
- Jars of gel (6% urea peroxidase)
- Single-use ampules of chromophore dye
- Sterile tongue depressors
- 2 pairs of protective goggles

The lamp, which looks like a large flashlight, contains multiple LEDs and is activated with the push of a button, which starts a timed 2-minute session, culminating in the lamp turning off to end the session. The 2-minute time limit prevents tissue damage. FLE is considered to pose a low risk for eye injury; however, protective goggles are always recommended for anyone present during treatment, and patients should not be allowed to look into the lamp, per Phovia instructions.

Although back-to-back sessions generate a warming sensation of the skin, FLE therapy itself is not painful; therefore, most treatments do not require sedation

unless the location or condition being treated causes patient discomfort.

USING FLUORESCENT LIGHT ENERGY THERAPY: STEP BY STEP

At the author's dermatology referral clinic, most FLE protocols consist of two 2-minute sessions performed back to back, with a 1-minute rest in between, done once a week until resolution. This avoids the need for patients to return for a second treatment in a few days. The author's clinic has had great success with many challenging cases, including cases that have been refractory to treatment in general practice for extended periods of time. Even difficult cases tend to resolve within 4 weeks, and maximum response (plateauing) appears around 8 weeks (**FIGURE 2**). FLE also has a residual effect on cell mitochondria function, with increased molecular activity noted as far as 52 weeks out.⁸

To see a step-by-step video of FLE therapy, visit bit.ly/3tTfbTk. For each FLE therapy session:

- Ensure the area to be treated is readily accessible. You may need to clip the affected site.
- Clean the site with saline-soaked gauze squares to ensure any topical medications have been removed. Gently blot the area dry.
- Thoroughly mix 1 ampule of dye with 1 jar of gel, using a supplied sterile tongue depressor.
- With the same tongue depressor used for mixing,

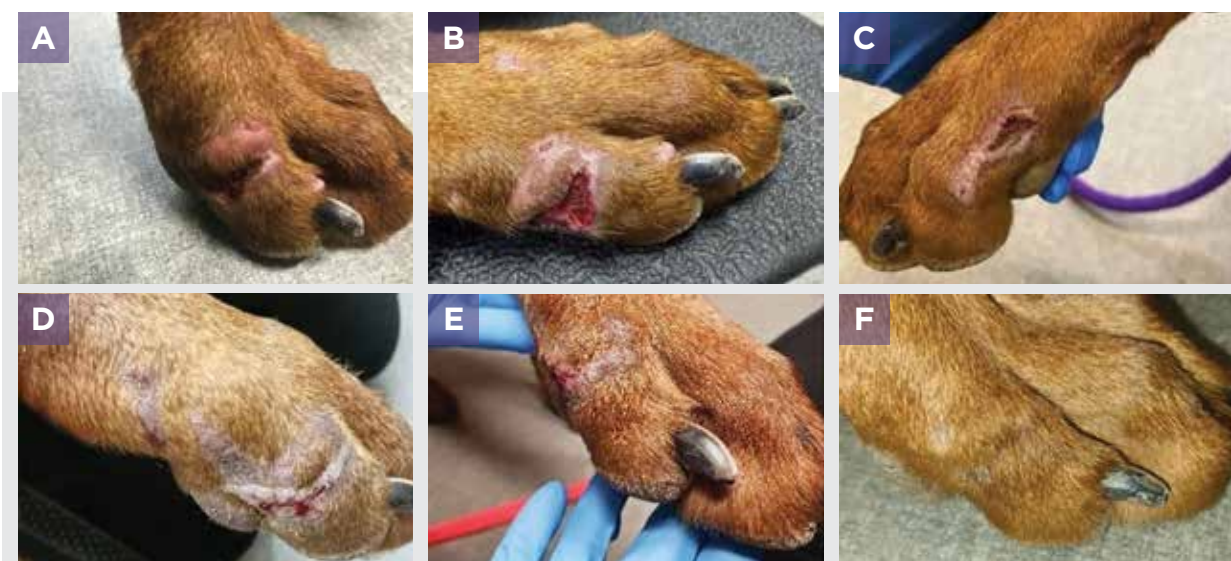


FIGURE 2. Healing progression of nonhealing wounds of unknown origin treated with fluorescent light energy. Methicillin-resistant *Staphylococcus pseudintermedius* had been previously diagnosed. **(A)** Wounds at presentation to the referral clinic (week 1). **(B)** Wounds at the second treatment session (week 1). **(C)** Wounds at the fourth treatment session (week 2). **(D)** Wounds at the sixth treatment session (week 3). **(E)** Wounds at the eighth treatment session (week 4). **(F)** The patient 1 year post-treatment.



apply a 2-mm-thick layer of gel to the area to be treated. One jar covers an area of 50 cm², so you may be able to split it between patients. Ensure that a new sterile tongue depressor is used for each application.

- Press the button on the lamp to start the 2-minute treatment cycle and hold it as close as possible to the skin. The lip of the lamp collar is calibrated to provide a distance of 5 cm from the light source to the skin to ensure both accuracy of placement and ease of use. One lamp can illuminate an area of 50 cm². If you are treating a very large area, consider using multiple lamps at the same time. The lamp will beep and turn off when the 2-minute treatment cycle has ended.
- Finish by cleaning off the spent chromophore gel with saline-soaked gauze squares.
- If performing back-to-back sessions, after removing the spent gel with saline, blot dry and wait at least 1 minute. Then apply fresh gel, apply the FLE for 2 minutes, and remove the spent gel with saline.
- In 7 days, reassess the patient and administer another session if needed.

CONSIDERATIONS AND CONTRAINDICATIONS

Best results are obtained when FLE therapy is implemented as early as possible in a disease process. As with any dermatology patient, it is imperative to treat any underlying condition or clinical signs will recur.

While FLE is a safe treatment option for operators and patients alike, the urea peroxidase gel often bleaches the hair coat, so clients should be made aware of this ahead of time.^{9,10} The bleaching effect will disappear as the affected hair grows and is replaced by new hair.

Other possible side effects include erythema that resolves within 6 to 12 hours, hyperpigmentation, and/or transient pain at the wound site. Anecdotally, hair color change and erythema are most common.

FLE therapy is not indicated for use in animals with neoplastic lesions; those with photoaggravated conditions; or those on medication with photosensitizing agents such as antimicrobials in the tetracycline class, clofazimine, dacarbazine, dapsone, griseofulvin, coal tar, or retinoids.

SUMMARY

The introduction of FLE therapy, although in its infancy in veterinary medicine, is revolutionizing interventions for the management of dermatologic conditions. It is a modality that the author's practice has quickly come to rely on and has the potential to improve the quality of care and quality of life for patients in veterinary practices around the globe. **TVN**

References

1. Marchegiani A, Spaterna A, Cerquetella M. Current applications and future perspectives of fluorescence light energy biomodulation in veterinary medicine. *Vet Sci*. 2021;8(2):20. doi:10.3390/vetsci8020020
2. Marchegiani A, Fruganti A, Spaterna A, Cerquetella M, Tambella AM, Paterson S. The effectiveness of fluorescent light energy as adjunct therapy in canine deep pyoderma: a randomized clinical trial. *Vet Med Int*. 2021;2021:6643416. doi:10.1155/2021/6643416
3. Apostolopoulos N, Mayer U. Use of fluorescent light energy for the management of bacterial skin infection associated with canine calcinosis cutis lesions. *Vet Rec Case Rep*. 2020;8(4):e001285. doi:10.1136/vetreccr-2020-001285
4. Marchegiani A, Cerquetella M, Tambella AM, et al. The Klox Biophotonic System, an innovative and integrated approach for the treatment of deep pyoderma in dogs: a preliminary report. *Vet Dermatol*. 2017;28(6):545. <https://doi.org/10.1111/vde.12468>
5. United Nations Interagency Coordination Group on Antimicrobial Resistance. No time to wait: securing the future from drug-resistant infections. April 2019. Accessed July 16, 2023. cdn.who.int/media/docs/default-source/documents/no-time-to-wait-securing-the-future-from-drug-resistant-infections-en.pdf
6. World Health Organization. Ten threats to global health in 2019. Accessed October 10, 2023. <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>
7. World Bank Group. Drug-resistant infections: a threat to our economic future. March 2017. Accessed July 16, 2023. documents1.worldbank.org/curated/en/323311493396993758/pdf/final-report.pdf
8. Russo A, Møllergaard M, Pellacani G, Nisticò S, Nielsen MCE. Fluorescent light energy combined with isotretinoin: a 52 week follow-up evaluating efficacy and safety in treatment of moderate to severe acne. *Clin Case Rep*. 2021;(9)4:2057-2068. doi:10.1002/ccr3.3944
9. Marchegiani A, Spaterna A, Cerquetella M, Tambella AM, Fruganti A, Paterson S. Fluorescence biomodulation in the management of canine interdigital pyoderma cases: a prospective, single-blinded, randomized and controlled clinical study. *Vet Dermatol*. 2019;30(5):371-e109. doi:10.1111/vde.12785
10. Salvaggio A, Magi GE, Rossi G, et al. Effect of the topical Klox fluorescence biomodulation system on the healing of canine surgical wounds. *Vet Surg*. 2020;49(4):719-727. doi:10.1111/vsu.13415

Jennie Tait

Jennie has over 37 years of experience working in veterinary medicine, including more than 23 years in a dermatology referral setting. She was on the organizing committee and is a chair and former regent for the Academy of Dermatology Veterinary Technicians and is the only VTS (Dermatology) in Canada. She is also the only technician on the executive committee for the Canadian Academy of Veterinary Dermatology and is an experienced international speaker and author in her field. Jennie is currently enjoying the good life of semi-retirement as a care team member at the V.A.D.E.R Clinic in Morriston, Ontario.

