CHANGING DERMATOLOGY THROUGH FLUORESCENCE
Innovative photobiomodulation by low energy chromophore-induced fluorescent light energy

The Kleresca® biophotonic platform offers non-invasive treatments for both therapeutic and aesthetic conditions using fluorescent light energy (FLE) to stimulate the skin’s own biological processes and repair mechanisms through photobiomodulation (PBM). Demonstrating high safety and efficacy, our technology triggers documented skin repairing benefits for a number of diseases and conditions6-8,18,25,26.

Biophotonic technology

Biophotonics is the interaction between light (photons) and biological systems (tissue or cells)1-5. The light must be absorbed by the tissue and cells for it to have a biological effect. If the light is transmitted or reflected no effect will take place. The following image shows a representation of the light spectrum with special emphasis in the visible light.

The skin is able to absorb visible light (from 400 to 700 nm) which may trigger a biological effect. Visible light will penetrate the skin in different ways depending on its wavelength. Shorter wavelengths (blue colour) will penetrate only the most superficial parts of the skin (epidermis) whereas longer wavelengths (green, orange red colour) will penetrate deeper into the tissue. Depending on the depth reached in the skin, the different wavelengths of light can get access to a variable selection of biological structures and have different effects14.

What is photobiomodulation (PBM)?

The process of photobiomodulation is based on evidence that photons are able to interact with the biological systems, cells and tissues, which consequently induce molecular pathways, modulating several aspects of cell biology1. The physiological and therapeutic effects of PBM have recently been explored in several tissues and cells30. While the complete cellular and molecular mechanisms of PBM are not fully clarified, it is believed to largely affect cellular metabolism, increase adenosine triphosphate (ATP) and modulate reactive oxygen species (ROS). A change in ROS is known to affect transcription factors responsible for growth, inflammation, cellular proliferation and oxygenation, eventually culminating in augmented tissue repair31.

The clinical and biological documented effects of PBM include2:
- Anti-inflammatory response, especially beneficial for such conditions as acne, rosacea, keratosis pilaris
- Post-interventional inflammation and erythema (e.g. following IPL or laser treatments)
- Increased normalized cell growth for wound healing
- Photorejuvenation
- Scar prevention and recovery
- Increased angiogenesis

More precisely, red and orange light have been shown to induce the dissociation of nitric oxide from the enzyme cytochrome C oxidase, and have been associated with collagen regulation. Yellow light is generally believed to alter ATP production and fibroblast activity. Blue light specifically causes disruption of the endogenous P. acnes, and green and blue light are also believed to be anti-inflammatory through a shift in cytokine production3. In addition to these general effects, the various wavelengths are known to penetrate different depths of the skin, gaining access to a variable selection of biological elements in the skin2,4.

Although not fully elucidated, various mechanisms underpinning the beneficial clinical outcomes observed with PBM have been reported3,22,31,32. Of interest is the ability of PBM to modulate inflammation, alter cellular activation, modulate collagen synthesis and enhance blood flow33.
The photoconverter gel absorbs blue light from Kleresca® Light. The chromophore converts this into fluorescent light energy. Photobiomodulation is initiated, stimulating the skin at the cellular level.

Kleresca® Treatments

Kleresca® PBM treatments are based on photoconverter gels, which are non-absorbing formulations containing light absorbing molecules (chromophores). A thin layer of the photoconverter gel is topically applied on the target-ed skin area, and subsequently illuminated with the Kleresca® Light, to create a biophotonic action in which fluorescence is generated. Afterwards, the exhausted photoconverter gel is fully removed and the skin is cleaned and moisturised.

Together, the photoconverter gel and the light source provide a unique and dynamic photonic output, both in terms of wavelength and energy delivered over a pre-defined treatment cycle time of 9 min.

No UV light or infrared light is emitted or generated. The FLE spectral output generated ranges from 500 to 650 nm, converting the blue light into green, yellow, orange and red wavelengths of the visible spectrum.

Kleresca® biophotonic platform, based on FLE, has been shown in clinical trials to modulate both disease affected and healthy skin, decreasing inflammation and enhancing the skin’s overall texture.

How does it work?

The Kleresca® PBM technology is based on fluorescent light energy (FLE) produced by excited light-absorbing chromophores when illuminated with a multi-LED lamp.

The photo conversion of the gel leads to the production of a dynamic hyper-pulsed multi-wave-length spectrum of fluorescent energy through the phenomenon of Stokes Shift.

These wavelengths have the capacity to penetrate to various depths of the skin and to stimulate the skin tissues and cells.

This hyperfast pulsing of light appears to be the key to its various benefits, like enhancing collagen production and anti-inflammatory effects.

Theories for enhanced collagen production with PBM suggest cytochrome C activation increasing mitochondrial energy production leading to downstream activation of various genes for collagen synthesis.

PBM has also been reported to activate nuclear factor kappa-light-chain-enhancer of activated B cell (NF-κB) – the master regulator of inflammation in normal quiescent cells.

Easy and pleasant treatment

Patients typically describe the three-step treatment as a pleasant experience. It only takes 9 minutes under the lamp. With little to no-downtime, make-up can be applied immediately after the session.

The skin is cleaned and Kleresca® gel is applied.

The gel is illuminated for 9 minutes using Kleresca® Lamp, creating fluorescent light energy that stimulates the skin.

The gel is removed and the skin is cleaned and moisturised.

The light emitted and the fluorescence generated have different benefits on the treated skin.

SHORT PENETRATION: Control of P. acnes bacterial colonization, reduction of microbial induced inflammation, collagen stimulation.

UPPER DERMIS PENETRATION: Fibroblast activation & proliferation, stimulate healing response, skin rejuvenation.

LOWE DERMIS PENETRATION: Vascular activation, general inflammatory reduction, collagen induction and reorganisation.

Kleresca® LAMP BLUE LIGHT FLUORESCENT LIGHT ENERGY
Treatment of acne

Light and laser therapies for the treatment of acne vulgaris are originally based on the observation that P. acnes bacteria synthesize chromophores such as porphyrins, more specifically, coproporphyrin \(9,10\). Porphyrins enable light therapy to exert a selective cytotoxic effect on \(P. acnes\). The excitation of bacterial porphyrins by light absorption induces the production of singlet oxygen and reactive radicals leading to bacterial membrane damage and cell death \(9,11\).

Compared to blue light, which has limited skin penetration, red light can reach deeper sebaceous glands and may have an anti-inflammatory effect through cytokine release. However, the reduced efficacy of red light on porphyrin activation has led to investigation of combination red and blue light with or without IPL, the latter most often used for the generation of pulsed polychromatic light \(12-14\).

Skin rejuvenation

Many different treatment modalities exist to counteract the effects of cutaneous aging. Ablative methods have been the mainstay for non-surgical facial rejuvenation. In recent years, non-ablative techniques have been developed with the aim of achieving facial rejuvenation without epidermal damage \(15\). Photo rejuvenation is a novel non-ablative technique that induces skin rejuvenation synthesis through photobiomodulation \(1,16\).

LED photorejuvenation is a novel noninvasive procedure that is nonthermal, atraumatic, and induces collagen synthesis through biophotomodulatory pathways \(25\). In the Kleresca\textregistered biophotonic platform, the chromophores in the gel act topically to create fluorescent light energy (FLE) by conversion of the LED light and are neither absorbed nor metabolized \(25\).

Studies with the Kleresca\textregistered biophotonic platform have shown to stimulate the skin’s own repairing mechanisms, improving complexion, encouraging the build-up of collagen and wrinkle reduction \(8\). In addition, in vivo preclinical studies have shown favourable effects of the Kleresca\textregistered technology including stimulation of human fibroblast proliferation and increased collagen deposition. In in vitro studies a significant upregulation of 400% of collagen production has been seen applying the Kleresca\textregistered biophotonic platform to human fibroblasts \(5\), which has furthermore been confirmed from biopsies taken during a clinical trial \(8\).
Common treatments of rosacea include topical, oral as well as light-based treatments\(^1\). Whereas most of the treatments for rosacea aim to combat discrete symptoms of the skin condition, either the vascular effect, the erythema, or the inflammation, not many treatments exist, which seem to influence the various factors involved in the occurrence of rosacea.

With the newer knowledge of PBM\(^1,17,19,21,23\), its benefits are becoming more widely documented. These include normalisation of the skin, reduction of inflammation and also stimulation of cells to activate the healing mechanisms that lead to a repairing response of the skin\(^1,17,19,21,23\).

The anti-inflammatory properties and healing response stimulated by FLE have been well documented clinically in both inflammatory lesions of acne vulgaris\(^6\) and in treatment of chronic wounds\(^20\).

These observations support the overall induction of anti-inflammation and induction of a healing response, that also supports the pathophysiology experienced with rosacea.

In addition FLE has been documented to improve microvascularisation, inducing angiogenesis\(^5\). The ability of FLE to induce healthy vasculature and a normalized de-stressed environment in the skin is of benefit in treating rosacea, by improving blood distribution through enhanced lateral blood flow an attenuating erythema and blushing.

Invasive skin treatments are known for delivering good results, but they can have adverse side effects such as erythema, scaling of the skin, pain and swelling. Some of them mean a long downtime for the patient\(^27-29\).

The biophotonic treatment has the potential for possible combinations with lasers and other invasive therapies because of its anti-inflammatory effects which can normalise the skin as well as induce collagen build-up\(^26\).

The treatment has a repairing effect at the cellular level due to the activation of the deeper layers of the skin\(^5,26\). This effect continues over time allowing patients to experience continuous improvements, even after the treatment has ended\(^26\).

Kleresca® Pre-Post Treatment can be used in conjunction with other non-invasive or invasive techniques, to provide an optimal outcome for the patient\(^26\). The treatment helps to normalise and smoothen the treated skin due to the collagen build-up, anti-inflammatory effect and normalisation and de-stressing of the skin\(^26\).

With the biophotonic treatment the patient’s skin can also be prepared before an invasive technique in order to achieve the best response and improve its recovery and reduction of side effects after an invasive technique\(^26\).
For us, science and clinical understanding and interaction with the peer-community is a natural element of business. We are active and expanding our presence in the scientific community through scientific and commercial collaborations, and we aim to create a new gold standard within the industry for the benefit of patients worldwide.

For further product information, please contact info@kleresca.com
Helping people feel good about their skin

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