

## **PHOTOBIO-MODULATION TREATMENT LIGHT EMITTING DIODES (LED) and LOW ENERGY LASERS (LLL for LOW LEVEL LASER)**

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### **HOW IT WORKS ?**

These devices are cold light sources that act on cells through non-thermal effects called "photobiomodulation". They deliver narrow bands of wavelengths from the visible and infrared spectrum: violet, blue, green, yellow, orange, red or infrared. They do not produce ultraviolet and therefore do not have the harmful effects of UV.

While "classic" lasers destroy a target, LEDs and LLL work through photoreceptors present on various targets by causing non-lethal changes. These targets can be:

- enzymes: the action on the mitochondria which are the "energy factory" of the cell, explains the delayed effects, in particular the anti-inflammatory and repair action.
- but also interfacial water -nanoscopic interfacial water layers- trapped in membranes and certain macromolecules. This latter mode of action explains certain immediate effects of PBM, in particular the analgesic effect or the transient disruption of the cell membrane, the membrane of adipocytes for example.

The effects of the different colors sometimes complement each other, hence the interest of certain associations. Depending on the protocols and parameters used ("colors", combinations of wavelengths, power, irradiation duration, pulsed or continuous wave...), preventive or therapeutic results can be obtained in many fields of medical or aesthetic dermatology. The skin, because of its position on the surface, is one of the most accessible organs for these treatments.

### **INDICATIONS**

There are numerous scientific works and there are currently publications with controlled studies of good quality for many indications. Some are the subject of recommendations by groups of experts; this is particularly the case for certain low-energy lasers for the prevention of radio-chemo-induced mucositis in transplanted leukemia patients or head and neck cancers.

PBM can soften irritated skin and is widely used to surround aggressive acts (Lasers, peels) for which it increases tolerance and optimizes results. LED treatments are useful for skin maintenance and have a soothing effect for "hypersensitive skin". An improvement in skin texture with a lightening of the complexion is often noted. This treatment does not eliminate rosacea but reduces the reactivity of skin with erythrosis and rosacea.

For acne vulgaris, LED sessions often can avoid the use of conventional oral treatments, especially when there is a contraindication (allergy, sun exposure, etc.). They

are particularly active on inflammatory acne. They can also be combined with other treatments to optimize the results and act on the associated scars. Maintenance sessions are sometimes necessary. Other acneiform pathologies (rosacea, hidradenitis, folliculitis) can also benefit from this technology.

The improvement in skin texture explains the use of PBM for skin rejuvenation, scars and stretch marks.

The effects on facial rhytides, although verified by studies with objective measurements, are often moderate and it is better to consider PBM in prevention as seen with sun protection, an excellent prevention for wrinkle in the long term. However, certain subjects sometime have really visible effects even on installed wrinkles.

The improvement of stretch marks and scars is sometimes delayed and variable, depending on the individuals with subjects "very good responders" or not. There is no complete disappearance. It is often interesting to combine them with other techniques, in particular with fractionated laser or radiofrequency. The prevention of hypertrophic scars with LEDs is very useful before or immediately after a surgical act on the certain corporal zones with risk.

Other indications are

- Prevention and treatment of radiodermatitis
- Healing: delayed healing, colonized wounds, chronic diabetic foot ulcers
- Photo-protection: prevention of sunburn, pathologies with photosensitivity
- pain especially from herpes
- Inflammatory skin diseases: psoriasis, atopic dermatitis with often rapid effects on lesions that sometimes were resistant to conventional treatment
- Hair loss
- Cellulite and body remodeling by immediate emptying of adipocytes.

### **EXCELLENT TOLERANCE**

The PBM is non-invasive, painless and very well tolerated

Wearing opaque glasses during the session can be difficult for claustrophobic subjects

In case of allergy to the sun, especially to the visible part of the spectrum, this technique should be avoided.

"Pulsed" mode should be avoided in epileptic subjects.

Very rare burns

### **FREQUENCY OF SESSIONS**

According to indications, from 1 session per week to 1 per month

4 to 8 sessions according to indications.

For chronic pathologies (alopecia for example) maintenance sessions are often necessary from 1 per month to 3 per year.

### **SESSION PROCEDURE**

- no makeup

- The eyes will be protected by special opaque glasses

- The doctor (or his assistant under the doctor's directive) makes the adjustments according to the desired effects

- Exposure to the chosen light(s) according to the indications from 5 minutes to more than 30 minutes

- No anesthesia is necessary (no pain) unless the session is combined with an aggressive technique: rollerblading, lasers, etc.

## **AFTER THE SESSION**

No side-effects in general, sometimes slight heating of a few minutes

Adverse effects are theoretically possible and probably linked to individual susceptibilities: photo-allergy, minimal burns

It is therefore a gentle, painless but effective technique if it is well mastered. It should not be reduced to just managing the irritating effects of aggressive procedures. PBM brings considerable help often for the most difficult cases when other classic techniques have proven insufficient.

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