CONTRIBUTION OF THE PHOTODYNAMIC THERAPY (PDT)
IN THE TREATMENT OF PHOTOAGING ;
HOW TO CONDUCT A PDT SESSION IN A LIBERAL OFFICE.

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Background : treatments of photoageing skin are numerous, as cosmeceuticals, peelings, intense pulse lights (IPL), lasers, radiofrequency, LED…They all focuses on vasculary, pigmentary, and dermal changes occurring after chronic sun exposure. A more recent technique called photodynamic therapy (PDT), is of interest when photoaging is associated with actinic keratosis: it is then called photodynamic photorejuvenation[1]: in fact, when actinic keratosis are treated by this technique, a certain degree of improvement in the quality of the skin in the treated area, is reported, concerning mottled hyperpigmentation, fine lines, roughness, sallowness, and tightness[3]. In this review, the theory of the PDT and it's main indications in dermatology will be developed[2,5,6]; exemples of protocol of photodynamic photorejuvenation from the litterature will be given[1,4]. Pictures will be shown as results of skin improvements in patients treated by PDT for actinic keratosis, and to focus on the modalities to conduct this treatment in order to develop our dermatological practice.

Material and methods: the theory of the PDT is the onset of a photochemical reaction on the site of a pathologic tissue: the production of reactive oxygen species is then responsible for tissue destruction by cell death (apoptosis). Methylaminolevulinate (MAL,METVIXIA®in France), a precursor of the photosensitizer, Protoporphyrin IX (PP IX), is applied under occlusion during three hours, on the skin to be treated: it enters the heme biosynthetic pathway, better in proliferating cells of photodamaged tissues than in normal tissues, conferring selectivity to the technique. Photosensitivity will occur secondarily, due to the excedent of PP IX not used for heme synthesis, and the reaction is driven by the irradiation of the site to be treated, by 630 nm LED lamp: Aktilite™ from Galderma; this wavelength has a good penetration in the tissues, and corresponds to a pic of absorption by PPIX. But other mono or polychromatic lights(IPL for exemple), adapted to the absorpsion spectrum of PP IX can be used. The PDT session to destroy pre-cancerous and superficial cancerous dermatologic lesions will be illustrated, detailing the environment and conditions to maximize the results, minimize the pain and the side effects during the 48 hours of remaining photosensitivity at the site of the treatment.

Results: The main indications of PDT are the treatment of precancerous lesions, superficial basal cell carcinoma, and bowen desease. The destruction of the actinic keratosis will occur within several days with generally very few side effects and without scar; most part (70 to 100%) of the actinic keratosis heal within three months, some of them requiring a second session; the incidence of complete response for superficial basal cell carcinoma is about 87%; and it is about 86% after one session and 93% after two sessions for bowen desease, with 12% of recurrence at 36 month[5,6]. At the same time the skin in the treated area recovers a better quality and it has been sayed that PDT can prevent carcinogenesis. One or many actinic keratosis can be treated at the same time, allowing to rejuvenate a whole scalp, or face. Other dermatologic conditions has been treated successfully by PDT, such as viral lesions(warts, condyloma, molluscum contagiosum),leishmaniasis, acne, seborrhea, rosacea, lichen planus, lichen sclerosus atrophicus, cutaneous Tcell lymphoma… Concerning photodynamic photorejuvenation, many protocols have been described, for this treatment is not yet well defined. The challenge will be to enhance penetration and then reducing the time of incubation of ALA, and to minimize the side effects, that is the photosensitivity of the treated area during the following 48 hours. Contraindication as photosensitivity or porphyria must be avoided; prevention of herpes simplex is recommended; clear information must be done to the patient and his consent must be obtained. Generally, the MAL is applied on the whole face, just after a soft fractional

resurfacing[4], (or a microneedling[1]), and after incubation from half to one hour, the face is washed in order to stop the reaction, and then exposed to the light for a time corresponding to the fluence needed (about 10 J/cm^2 , that is 2 mn with the red light of Aktilite™); cooling the face during and after the treatment is more comfortable for the patient; avoiding light is recommended during 24 hours; sunscreens are prescribed during 3 weeks. Redness and oedema can be observed the following day, and desquamation can occur during 2 or 3 days. The patient will come for 1 or 2 sessions more, 2 or 4 weeks apart. Maintenance is recommended with 1 session every year.

Conclusion: the photodynamic therapy is a technique used recently in dermatology as an alternative to surgery in order to destroy actinic keratosis and superficial skin carcinoma, without leaving any scar; the improvement of actinic disorders observed consecutively to this treatment leads to count this technique among the tools available for rejuvenation, especially when ageing is associated with actinic keratosis.

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