A NEW SUN TO REJUVENATE THE SKIN

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Summary

Sanitation and nutrition will enable humans to live in an average lifespan of 100 years. Thus people is driven to seek treatments from inside (nutriceuticals) and outside (cosmeceuticals).

The skin, in fact, is a target organ of oxidative stress because it serves as a major portal of entry for many oxidizing environmental pollutants and solar radiation.

Many studies, in fact, have demonstrated that the action spectrum for tanning is essentially identical, to that for sunburn, and photocarcinogenesis following UV exposure.

A double-blind clinical study was designed to investigate on 40 photoaged women the clinical effectiveness and tolerance of a lamellar emulsion based on the use of antioxidant and immunomodulant compounds versus its own vehicle, based on the same micro-lamellar emulsion enriched with chitin nanofibrils.

Subjects were evaluated by clinical scores at baseline and at 4 week interval for subjective overall clinical severity signs of photodamaged skin. Moreover by objective methodologies it was controlled also: skin hydration, skin surface lipids, TEWL and skin elasticity.

By the subjective and objective methodologies the active cream based on the use of chitin nanofibrils enriched with lutein, melatonin (luteomin®), and ectoin, was found to be significantly more effective than vehicle in improving fine and coarse wrinkling, mottled hyperpigmentation, roughness and laxity of the skin.

Riassunto

La migliore alimentazione e la vita più sana e igienica incrementeranno la vita media fino a raggiungere i 100 anni d’età. L’allungamento della vita spinge donne e uomini a migliorare il proprio aspet-
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to mediante l’uso di trattamenti esterni (cosmeceutici) ed interni (nutraceutici). La cute è infatti l’or­
gano più visibile ma è anche la maggiore porta d’ingresso di tutti gli inquinanti e delle radiazioni
solari.
E’ stato così condotto uno studio in doppio cieco su 40 donne con evidenti segni di fotodanno cuta­
neo, utilizzando una emulsione lamellare arricchita con antiossidanti ed immunomodulanti il cui vei­
colo era basato sull’uso di nanofibrille di chitina.
La cute di tutti i soggetti trattati con l’emulsione attiva in confronto al veicolo è stata valutata clini­
camente e mediante l’uso di metodologie obiettive.
La cute di tutti i soggetti trattati sia con l’emulsione attiva che con il veicolo, è valutata clinicamen­
te mediante metodologie obiettive, ha rivelato di essere molto più efficace in paragone al solo veico­
lo. Il trattamento topico con nanofibrille di chitina associate a melatonina, luteina (luteomin®) ed
ectoina, sembra possa essere considerato un trattamento di elezione efficace per evitare soprattutto i
cosiddetti danni provocati da fotoinvecchiamento, riducendo la comparsa di rughe, iperpigmentazio­
ni e rilassamento della cute.
INTRODUCTION

The average life expectancy in industrialized countries shows that advanced technologies in medicine, sanitation and nutrition will enable humans to live in an average lifespan of 100 years. Therefore the problem will be to ameliorate the quality of life too (1). Thus people is driven to seek treatments from inside (nutriceuticals) and outside (cosmeceuticals) (2).

The skin, in fact, is a target organ of oxidative stress because it serves as a major portal of entry for many oxidizing environmental pollutants and occupational hazards, being continuously exposed to high oxygen concentration and solar radiation (3-5).

But obtaining a tan is a major motivating factor for many people who spend time to the sun, and one of the principal reasons given for failure to use sunscreens, even when the adverse short term and long term consequences of unprotected sun exposure are well known.

Many studies, in fact, have demonstrated that the action spectrum for tanning is essentially identical to that for sunburn, photocarcinogenesis, and formation of thymidine dimers and other DNA photoproducts following UV exposure (6-8).

Thus, a naturally acquired tan is indeed a marker of UV damage to skin, and tanning cannot be separated from skin injury, by varying the UV sources or selectively screening out portions of the UV spectrum.

Therefore, DNA damage or its repair is a critical initial step both in tanning and skin photoaging (9).

This because of the use of balanced cosmeceuticals and nutriceuticals, capable to evoke an high photoprotective response leading to tanning and enhanced repair capacity for DNA damage (10-13).

At this purpose we verify the activity of an antiaging lamellar emulsion based on the use of chitin nanofibril as skin penetration enhancer, enriched with a network of antioxidant and immunomodulant compounds to be applied topically as: lutein & melatonin (antioxidants), ectoin (immunomodulant) and gelatin-glycine (enriched with hydrolyzed collagen) – moisturizer. Evidence suggest, in fact, that signs of skin aging-wrinkling, sagging, actinic lentigines-may be due, in part, to cumulative oxidative damages (14-16).

We used these active antiaging compounds because of the previous positive obtained results by the use of lutein alone (Fig.1) (17-20) or together with melatonin, ectoin (21-23), gelatin-glycine (24-26) and chitin-nanofibrils (27).

AIMS

A double-blind clinical study was designed to investigate the clinical effectiveness and patient tolerance of a lamellar emulsion based on the use of antioxidant and immunomodulant compounds versus its own vehicle. The carrier was a microlamellar emulsion enriched with chitin nanofibrils, for bettering the enhancement of the active ingredients partitioning.

METHODS

Fourthry subjects (women) medium age 35 ± 4 years with mild-to-moderate photodamaged facial skin were randomly assigned to receive both the lamellar cream or its vehicle.

Each treatment group comprised 20 subjects using a standardized skin care regimen, consisting of a mild facial cleanser and a twice daily application of the given active emulsion (SPF15) or its own vehicle applied for 12 weeks according with the following plan:

PRODUCT 1: active cream A 20 (subjects)
PRODUCT 2: vehicle cream B 20 (subjects)

The active natural compounds used were: chitin nanofibrils as carrier and penetration enhancer,
lutein and melatonin (luteomin®) as antioxidants, ectoin as immunomodulant and gelatin - (hydrolyzed sea collagen) glycine as moisturizer. 
The vehicle used was a lamellar micro-emulsion of chitin nanofibrils added with TiO₂ (SPF 15) (28).

**CLINICAL SCORES EVALUATION (by a Dermatologist)**

Subjects were evaluated by clinical scores at baseline and at 4 week intervals for subjective overall clinical signs severity of photodamaged skin fine and course wrinkling, roughness, actinic lentigines. Moreover a global assessment of improvement, and subjective symptoms of skin irritation were also evaluated.

The individuals signs of photoaging were scored on 1-10 visual analogue scale with separate scores for each sign. At each visit subjects were asked to assess improvement in fine wrinkles texture and color, and overall improvement (0-1 no improvement; 2-4 low improvement; 5-7 good improvement; 8-10 very effective).

The protocol was controlled by a group of expert dermatologists and informed consent obtained from all subjects.

Moreover by objective methodologies it was controlled also: skin hydration, skin surface lipids, TEWL and skin elasticity, respectively by 3C System® (Dermotech – Rome – Italy) (29) and DermaFlex® (Cortex Technology, Handsund, Denmark) (30).
STATISTICAL EVALUATION

The Student's Test was used in evaluation of all the data before and after the treatment period. All the analyses were done using the SAS statistical package, version 5.18 (SAS Institute Inc., Cary, N.C.). Probabilities less than 0.05 were considered significant.

RESULTS AND COMMENTS

By the subjective methodology the active cream “A” was found to be significantly more effective than vehicle in improving fine and coarse wrinkling, mottled hyperpigmentation, roughness and laxity of the skin (Fig.2). The use of the active cream increases from 30 to 50% all the photoaged scores controlled. The hyperpigmentation lesions seen in photoaged skin, known as age spots, lighten or clear in response to topical treatment with active cream. Significant overall improvement was evident after the first month of treatment and, by 4th month, 50% of subjects had a significant skin lightening compared with 12% of patients using vehicle alone.

The same evident results were obtained by the objective measurement demonstrating significant decrease in TEWL (Fig.3) and improvement in moisturizing (Fig.4), superficial lipids (Fig.5) and elasticity of the skin (Fig.6) with continuing improvement, noted one month after discontinuation of treatment also.

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**Fig. 2 Global Clinical scores.**
TEWL MEASUREMENTS OF PHOTOAGED HEALTHY WOMEN TREATED BY AN ANTIOXIDANT/IMMUNOMODULANT LAMELLAR EMULSION BASED ON CHITIN NANOFLIRLS VS ITS OWN VEHICLE

Twice a day application 90 days period  n = 40  t = 22 °C  RH = 50%

All p values are significant as to groups and highly significant as to baseline values

Fig. 3

SKIN HYDRATION OF PHOTOAGED HEALTHY WOMEN TREATED BY AN ANTIOXIDANT/IMMUNOMODULANT LAMELLAR EMULSION BASED ON CHITIN NANOFLIRLS VS ITS OWN VEHICLE

Twice a day application 90 days period  n = 40  t = 22 °C  RH = 50%

All p values are highly significant (p<0.005) as to groups and as to baseline values

Fig. 4
SUPERFICIAL SKIN LIPIDS OF PHOTOAGED HEALTHY WOMEN TREATED BY AN ANTIOXIDANT/IMMUNOMODULANT LAMELLAR EMULSION BASED ON CHITIN NANOFIBRILS VS ITS OWN VEHICLE

Twice a day application 90 days period \( n = 40 \) \( t = 22 ^\circ C \) \( RH = 50\% \)

All p values are highly significant \( (p<0.005) \) as to groups and as to baseline values

Fig. 5

SKIN ELASTICITY ON Volar FOREARM OF PHOTOAGED HEALTHY WOMEN TREATED BY AN ANTIOXIDANT/IMMUNOMODULANT LAMELLAR EMULSION BASED ON CHITIN NANOFIBRILS VS ITS OWN VEHICLE

Twice a day application 90 days period \( n = 40 \) \( t = 22 ^\circ C \) \( RH = 50\% \)

All p values are highly significant \( (p<0.005) \) as to groups and as to baseline values

Fig. 6
CONCLUSION

The contemporary use of antioxidants as lutein and melatonin together with an immunostimulant compound as ectoin and enriched hydrolyzed collagen as moisturizing agent seems to give the better results, when they are used by the right vehicle.

As we have demonstrated elsewhere the nanofibrils of chitin are able to link both idro and lipo-soluble active compounds, increasing their penetration throughout the skin layers and therefore increasing their specific activity (27, 28, 31).

In conclusion from this in progress study and other obtained data it is possible to evidence how the use of antioxidants as lutein and melatonin, enriched with hydrolyzed collagen (moisturizer) and ectoin (immunomodulant) may ameliorate the signs of skin aging neutralizing the majority of the oxidative damages, and reducing both wrinkling and actinic skin hyperpigmentation (32).

In this way we may rejuvenate the skin, controlling the negative effects of UVR and blue light.

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References

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