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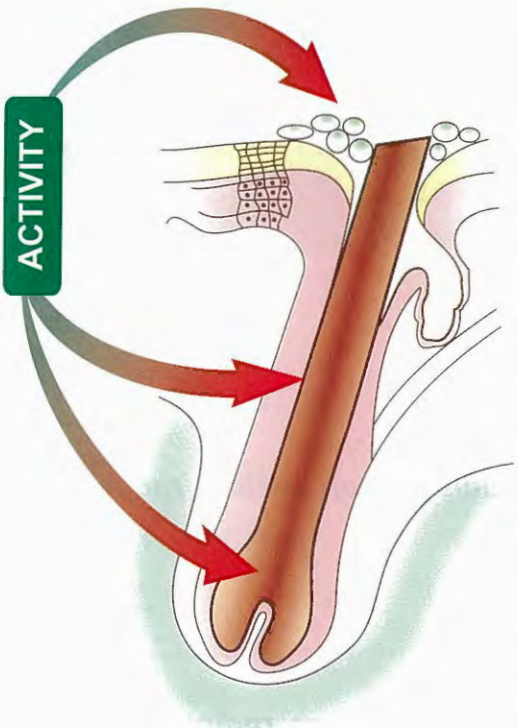

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Contents

J. Appl. Cosmetol. **28,** 139-145 (October/December 2010)

Investigations the Cutaneous Damage of Ancient Natural Mummies. The Case of the Venzone Collection

G. Baggieri
Soprintendenza al Museo Preistorico ed Etnografico "Luigi Pigorini", Roma - Italy

Received: *June, 2010.*

Key words: *Mummy; Laceration; Cutis; Venzone;*

Summary

We observed the seriousness of the lacerations on the cutis of the mummified bodies of the Collection of the Cathedral of Venzone (northern Italy) due to the necessity of the restoration interventions which ended in 2009.
The mummies of Venzone are known worldwide and are considered as an example of natural mummification.

Riassunto

Abbiamo osservato la gravità delle lacerazioni sulla cute dei corpi mummificati appartenenti alla Collezione della cattedrale di Venzone (nel nord d'Italia) a causa della necessità di interventi di restauro finiti nell'anno 2009.
Le mummie di Venzone sono conosciute in tutto il mondo e sono considerate un esempio rilevante di mummificazione naturale. Abbiamo anche valutato aspetti di struttura al microscopio elettronico a scansione.

INTRODUCTION

The Mummy Collection of Venzone is composed of 15 mummies (8 males, 6 females and 1 corpse of uncertain sex). Five of the fifteen mummies are now displayed inside the crypt of the chapel of Saint Michael, near the Cathedral of Venzone. The average age at death is about 70 years. Almost all of these corpses date back to the XVII-XVIII and XIX centuries, except for one mummy that dates back to the XIII century (4-7).

As a whole, this Collection was in very bad condition up until 2009. In fact, all the interventions made in the preceding years had been confined to consolidation, assemblage and cleaning of the deteriorated anatomical parts of the bodies, following the earthquake of 1976. All these operations, even if imperfectly performed, were indispensable to ensure the integrity of the bodies. Only in 2008 we were able to introduce the necessary restoration plan inside the study program which was started in 2003. Moreover, we carried out the radiological exams on all of the mummies which allowed us to see the internal organs in the abdomen, thorax and skull (7-10).

From a preservative point of view, the mummies which underwent a natural mummification present more problems during the process of restoration than the embalmed corpses. In particular, we found difficulty in choosing the most appropriate conservative preparations to use for repairing the corpses, especially because we did not know the final result (14).

Regarding the internal structures, it was sufficient to carry out disinfestation, while we paid particular attention to the choice of the cutaneous preservative treatments and to the selection of the consolidators to use on the cutis. We performed some skin repairs in order to close all the lacerations and holes provoked by infestations and humidity, and that had seriously damaged large portions of cutaneous tissue in all of the fifteen mummies (Fig. 1).

Fig. 1 *Example of laceration.*

The weight of a mummy is approximately 5-10% of the weight of the corpse at the moment of death, while the form of a mummy depends on its antiquity, on the lying position, on the sepulchre, on the climate changes at the moment of death (12; 3) and on the possible use of post-mortem treatments (i.e. tying, sudaria, dresses, unguents, bandages, etc... (12; 10).

The surfaces of the skin appear to be coriaceous, their color having changed as a consequence of the lying position of the single mummy and depending on the sepulchre. In general, the cutis is quite wrinkled to the touch, in every anatomical district. We did not observe any smooth surface, as we might have found after a treatment of the skin with resins, balsams, waxes, or ointments (1; 13; 16).

The wider lesions and lacerations were located at the level of the basins and of the anterior side of the thighs. The lower limbs of some mummies presented large areas of lacerations with marked muscular disintegration (Fig. 2). A loss of cutaneous tissue was present on the surface of calvarium and on the back of some of the mummies.

Regarding the lesions, they are present on all of the mummy surfaces, both on the anterior and posterior side of the bodies. We placed their frequency and importance inside a score which goes from 0 to 3. The 27% of the lacerations have a score from 0 to 1 (lesions from 5 to 10 cm.); 36% of the lesions have a score from 1 to 2 (lesions from 10 to 15 cm.), and 37% of the lesions have a score from 2 to 3 (lesions larger than 15 cm.). Moreover, 50 % of the lacerations was concentrated at the level of the lower limbs.

***Fig. 2** Example of jagged margins in a lacerations of the limb.*

During the first phase of the process of natural mummification there is a sudden dehydration of the corpse; ventilation reduces the decomposition processes which, as a rule, begin with the cellular autolysis (12; 10). Generally this phase happens in the first days after death, reducing the degenerative phenomena of liver, kidneys, glands, bone marrow, and blood which get destroyed both inside the parenchyma and the vascular-nervous structure (9). The muscular disruption need a longer period of time; sometimes the heart and part of the arteries continue to be visible for a long period of time following death (17), probably due to a process of sclerotization. During the decomposition process, there is also the autolysis of the adipose tissue. As we have already observed, we have to keep in mind that climatic conditions and changes can deeply interfere with the degeneration of tissues, modifying both cutaneous and muscular structures. In fact, in the course of years and centuries sudden environmental variations (i.e. humidity and/or temperature) may have provoked small or large lacerations on the cutis, or fray of muscular fibers. Circular and oval lesions have a different genesis, in fact they are provoked by microorganisms, such as parasites, insects, and fungi (10-11; 16) (Fig. 3, 4).

Lacerations are due to climate changes. In fact, the skin absorbs little water particles which evaporate at elevate temperature provoking skin surface tension, and forming fissures with definite margins on the skin, or fissure with jagged edges. It is possible to confuse the fissure that has definite margins with intentional incisions.

***Fig. 3** Definite lesions on the cutis of the arm.*

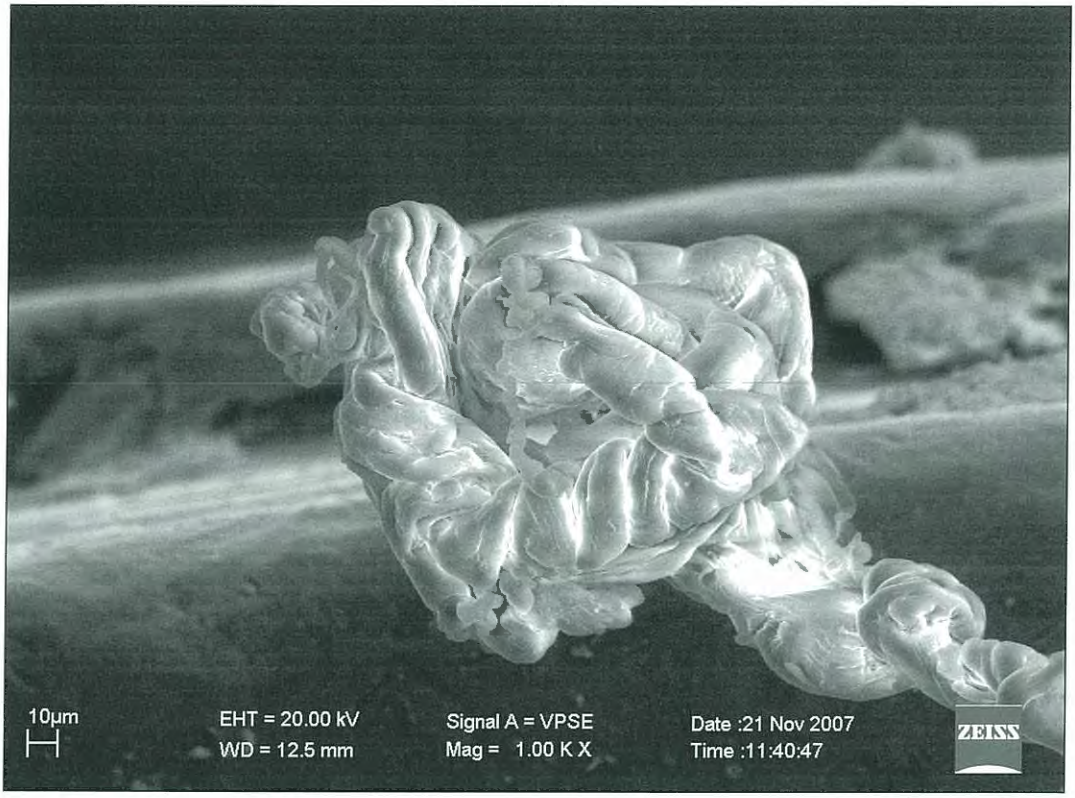

Fig. 4 Rolled up structure of mycelium (SEM 1.000X).

CONCLUSION

We observed a multitude of fissures with definite margins on the upper and lower limbs, and on the neck, while the lacerations on the abdomen and thorax have jagged edges. Therefore, it is possible to locate fissures with definite margins in all of the areas where the muscular fibers contract a relationship with bones, independently from the distensibility, wrinkles and rugae of the cutis.

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Hair growth modulating effect of a novel herbal formulation. A rediscovery of traditional knowledge

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Key words: *Hair growth; Siddha; Minoxidil; Medicinal plants;*

Summary

The hair growth enhancing property of a poly herbal formulation and was studied in comparison with 2% Minoxidil formulation in an experimental animal model.
The study formulation in gel containing extracts of medicinal plants mentioned in traditional Siddha system of Medicine was found to have statistically significant effect on promoting hair growth and the effect is in relative comparison with Minoxidil based formulation.

Riassunto

In questo studio è stata verificata, mediante il lavoro sperimentale condotto su un modello animale, l'attività stimolante la ricrescita dei capelli di una formulazione naturale paragonata ad una soluzione di Minoxidil al 2%.
La formulazione in gel fondata sull'uso di estratti di piante medicinali descritte secondo il sistema della Medicina Siddha, ha dimostrato di avere un'efficacia statisticamente evidente nel promuovere la ricrescita dei capelli paragonabile al Minoxidil.

INTRODUCTION

Hair growth is regulated by complex factors of intrinsic and extrinsic origin (1-5).

Scalp hair is considered to be the most important component of beauty by man from pre-historic times. Hence, the hair growth regulation and promotion has become a very important need of people especially of younger and middle age group all over the world. Male type baldness and alopecia are the most distressing hair problem people face in their life.

Telogen effluvium is another major hair problem that begs immediate treatment intervention.

Wig was made as a substitute and was used by the people to camouflage the baldness and open scalp. However, obviousness of the wig usage in most cases limits its wide acceptance.

Hair weaving or hair transplantation although exist as other modes of management are usually expensive and therefore unaffordable to common man. Minoxidil and other hair enhancing preparations although offer limited remedy, the side effects and drug dependency make these prodncts less acceptable. The above circumstances warrant the search for newer hair growth promoting agents.

To date, there are several external preparations available in the market with tall claims to promote hair growth and reduce hair fall. However, the desired level of satisfaction to the sufferer from these preparations is far from near.

Among the known hair growth promoting agents, Minoxidil based preparations have better clinical acceptance as the claims are based on reliable scientific evidences and clinical trials. However, side effects and continuous Minoxidil dependency to minimize the hair fall limits the satisfaction of the sufferer (6)

The Siddha system of medicine, one of the ancient medical practices in India, acclaims several medicinal plants to possess unique hair growth promoting properties (3-4).

We, in the present study, discuss about the hair growth promoting effect of a poly herbal combination in an experimental animal model to validate the Siddha system of medicine and its relevance for hair loss problems in a scientific way.

MATERIALS AND METHODS

The extracts of the plants were prepared individually in coconut oil using the traditional knowledge and unique methods mentioned in Siddha.

The oil extracts were mixed to get the poly herbal oil which was added as a constituent active ingredient of a hair gel preparation.

The plants used for the study formulation in gel[1] were *Phyllanthus emblica, Bergamiia koenigii, Lawsonia alba, Indigofera tinctoria and Eclipta prostrate*. The effect of poly herbal extract of the above plants in the study gel was studied for its hair growth promoting activity.

Animal Experiment

Wister strain of rats of either sex weighing 120-160 g was used for the study. All animals were provided with food and water ad *libitum*. The animal house was set at 24-25°C with equal proportion of day and night cycle. Approval was obtained from Institutional Ethical Committee of the Dr. MGR-Janaki College of Arts and Science, Chennai, India the site of the experiment.

The study was non-invasive and non sacrificial. The experimental animals were divided into four groups of 6 animals each.

The hair on the dorsal portion of each animal was removed with a standard depilatory cream. The first group of animals were treated with placebo gel, the next group was treated with the study formulation in gel, the third with

[1] *called Keshraksha gel (Kesh means hair, raksha means protection in Sanskrit).*

Minodixil 2% preparation and the fourth group served as control (untreated).

The test materials (either placebo, the study formulation in gel or Minoxidil 2% preparation) was applied in the respective groups of animals once daily on the depilated region for the period of 30 days.

Pattern of hair growth was observed in all animals in each group and Hair Growth Initiation Time (HGIT) and Hair Growth Completion Time (HGCT) were recorded on daily basis. HGIT is referred as the presence of the growth of new hair and the HGCT is referred as the complete coverage of hair in the depilated area which is identical to rest of the part of the body.

The study findings show that the study formulation in gel has reduced the hair growth completion time by 30% as against 53% by 2 % Minoxidil.

The placebo did not have any effect on hair growth completion time in comparison to the control.

DISCUSSION

The present study clearly establishes the fact that the study formulation in gel has significant effect on promoting hair growth. Hair growth initiation time and completion time got reduced by 30% with treatment.

Although the effect of the formulation appears to be relatively lower than 2% Minoxidil, in reality, the activity may be similar, as murine model will give only qualitative indication and direction on the efficacy.

Further, the side effects associated with Minoxidil needs to be considered when the efficacy of the formulation is taken for comparison. Reports on side effects during use of Minoxidil based formulations include allergic reactions on sensitive skin. The placebo did not have any effect in reducing either hair growth initiation time or completion time suggests that the hair growth observed on application of the study formulation in gel may be due to the herbal extracts.

The texture of the hair formed after treatment with the use of study formulation in gel was very soft, silky and shiny. On the contrary, hair formed in the Minoxidil treated animal group was very rapid, long, thin and highly irregular.

We presume that the hair root enhancement due to the study formulation in gel may be the reason for the above phenomena. We have already established in our previous study about the use of a cream and an oil based on the same active compounds in study increases the protein synthesis responsible for hair growth through mRNA expression (7).

TABLE I

Effect of the study formul ation in gel on hair growth

Treatment Groups	In days		% Reduction in HGCT*	t-Test (two tailed)
	HGIT	HGCT		
The Study formulation in gel	15.00	20.66	29.54	Significant ($p<0.05$)
Minoxidil 2%	11.33	14.00	52.27	Significant($p<0.05$)
Placebo	14.83	27.5	6.25	Non Significant($p>0.05$)
Untreated Control	15.66	29.33	-	-

HGIT – Hair Growth Initiation Time, HGCT – Hair Growth Completion Time

* (Mean of control-mean of Keshraksha gel, Minoxidil 2%, Placebo)/Mean of Control x 100

It was well documented in the literature of Siddha system of medicine that the plants Phyllanthus emblica, Bergamiia koenigii, Lawsonia alba, Indigofera tinctoria and Eclipta prostrate are known to promote hair growth and further provide other benefits such as conditioning of hair, reduction of hair fall and prevention of premature graying of the hair (8,9).

The findings of the study clearly reveal that the study formulation in gel has hair growth promoting effect and it relatively comparable to Minoxidil 2% preparation.

Considering legacy of usage of these herbs for various health care practices, the above findings suggests that the study formulation in gel will be safe, effective and economical preparation for managing hair fall problem.

A clinical trial is currently in progress to substantiate the benefits in human volunteers.

Fig. 1 *After depilation- Day 0.*

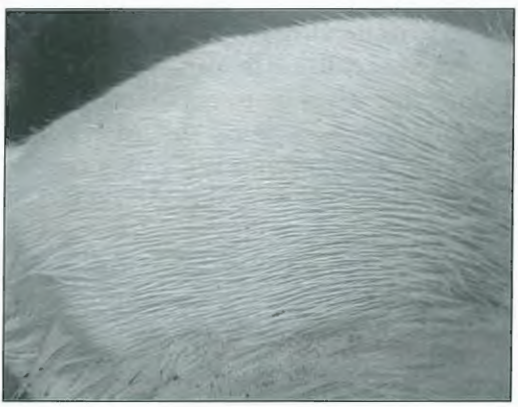

Fig. 2 *Day 15 – Untreated Control.*

Fig. 3 *Day 15 Formulation treated animal.*

Fig. 4 *Day 15 Minoxidil treated animal.*

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Use of a Caffeine Shampoo for the Treatment of Male Androgenetic Alopecia

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Summary

Androgenetic alopecia (AGA) is a common dermatological condition affecting up to 30% of men over the age of 30 and more than 50% over the age of 50. The only drug therapies approved for its treatment are topical minoxidil and finasteride administered systemically.
In last years, many alternative cosmetic substances have been studied for the management of the male baldness, with various results; one of these substances is the caffeine.
We report a use test with dermatological control, intended to check the skin compatibility and to assess the cosmetic efficacy and qualities of a caffeine shampoo for the treatment of male androgenetic alopecia, after application under the normal conditions of use, for 6 consecutive months.

Riassunto

L'alopecia androgenetica è una condizione dermatologica comune che interessa fino al 30% degli uomini oltre i 30 anni, e più del 50% degli uomini oltre i 50 anni.
Gli unici farmaci approvati per il suo trattamento sono il minoxidil topico e la finasteride somministrata per via sistemica.
Negli ultimi anni, molte sostanze cosmetiche sono state studiate per la gestione dell'alopecia maschile, con risultati vari; una di queste sostanze è la caffeina.
Riportiamo uno studio con controllo dermatologico, effettuato per dimostrare la compatibilità e accertare l'efficacia cosmetica e le qualità cosmetiche di uno shampoo contenente caffeina per il trattamento dell'alopecia androgenetica maschile, dopo applicazione in normali condizioni d'uso, per 6 mesi consecutivi.

INTRODUCTION

Androgenetic alopecia (AGA) is by far the most common cause of hair loss in male population. This form of baldness affects approximately up to 30% of men over the age of 30, and more than 50% by the age of 50 years (1).

Hair is lost in a well defined pattern, beginning above both temples; over time, the hairline recedes to form a characteristic ''M'' shape.

Hair also thins at the crown (near the top of the head), often progressing to partial or complete baldness. This progression is well described in the clear scale of Hamilton-Norwood, widely accepted as the method for the clinical assessment of alopecia (2).

A mutual interplay of several factors is involved in the development of AGA: androgens, genetic and age factors. Polygenic heredity seems to be the primary cause, although the male hormone testosterone plays an important role, maybe independent of genetic predisposition.

In the hair follicle cells, the enzyme 5-alpha reductase catalyzes the conversion of testosterone into his active metabolite, dihydrotestosterone (DHT).

This hormone binds to androgenic receptors (AR), and the specific bond triggers cellular processes which reduce the anagen phase of the hair cycle. It is now commonly accepted that male AGA is associated with an increase in 5-alpha-reductase activity leading to an increase in local production of DHT.

The mechanism by which the local DHT increase leads to hair follicle loss is not clearly demonstrated.

Inhibition of cell proliferation in the dermal papilla and a vascular process based on the inhibition in local production of vascular endothelial growth factor (VEGF) have been proposed. The increase in 5-alpha-reductase activity is genetic and depends on androgen receptor polymorphism (3).

To date, only two hair-loss pharmacotherapies are approved by the US Food and Drug Administration: the potassium channel opener Minoxidil and the DHT synthesis inhibitor Finasteride (4).

However, 20-30% of AGA patients receiving these drugs are nonresponders. This fact encourages a search for alternative substances for the management of AGA; one of these is the caffeine.

Caffeine is a well-known substance, but its effect on human hair follicle growth is not yet defined. As a phosphodiesterase-inhibitor, caffeine increases cAMP levels in cells and therefore promotes proliferation by stimulating cell metabolism; a mechanism which would counteract testosterone / DHT-induced miniaturization of the hair follicle (5).

In a male skin organ culture model, caffeine was shown to reserve the inhibiting effect of testosterone on keratinocyte proliferation (6).

Similar results were obtained by testing caffeine in a hair culture organ model (7), and in ex vivo human hair follicles from male patients with AGA (8).

We report the results of a monocentric study to assess the cosmetic efficacy of a shampoo containing caffeine for the treatment of male AGA.

The effectiveness of the follicular penetration of topically applied caffeine via a shampoo formulation has been already studied with good results; Otberg et al demonstrated that caffeine penetrates via the hair follicles and stratum corneum after 2 minutes.

Besides, it was found that the penetration via hair follicles was faster and higher compared with the interfollicular route and that hair follicles are the only pathway for fast caffeine absorption during the first 20 minutes after application (9).

MATERIALS AND METHODS

This study was designed to check the cosmetic efficacy and qualities of a shampoo for the treatment of male androgenetic alopecia, after application under the normal conditions of use, for six consecutive months. The study was performed in open on 30 male subjects, aged from 18 to 55, (mean age of 37 years) with specific inclusion criteria: androgenetic alopecia in the stages of Hamilton-Norwood II-IV, a hair count of the "Hair Pull Test" of at minimum 15 (last shampoo 2 days before), no use of any hair restorer (tablet, capsule, tonic nor shampoo) since the last 6 months, a phototype (Fitzpatrick) I, II, III or IV, no cardiovascular, pulmonary, digestive, neurological, genital, urinary, osteoarticular, psychiatric, haematological, immunological or endocrinal pathology which could interfere directly or indirectly with the study, and no skin affection which could interfere with the study, for example: dermographism, seborrheic dermatitis, recurrent herpes, pityriasis versicolor, psoriasis, important pigmentary disorders (vitiligo, chloasma, chronic lupus erythematous...).

Men suffering from a different cause of alopecia (alopecia areata, psychosomatic alopecia ie Trichotillomania, hair loss due to medication - immunologics, chemo-therapy, etc.-) were excluded from the study, such as men with an unhealthy condition of the scalp (highly expressed eczema, high grade of dandruff...), or suffering from atopy, or usingregularly an hair dye, bleaching products or products for permanent wave, or under general or local medication such as anti-inflammatory, anti-histaminic or anti-allergic treatment.

The experimental conditions adopted (experimental areas, quantity of product applied, frequency and duration of the applications...) reproduced the normal conditions of use advocated: the shampoo was applied at home by test subjects, once per day for six months, in a quantity of 7ml on hair and scalp, kept on the scalp for 2 minutes and then rinsed off.

The constraints for the volunteers during the study were the following ones: no application of any other hair products than the tested one, no intensive sun or UVA exposure (UV lamps), no colouring, hair bleaching, permanent wave during the study, no additional vitamin supply (vitamins B or H) or products which could have an effect on hair, no hair loss treatment by oral route, no medical treatments likely to induce an alopecia (antimitotics, anticoagulants, antithyroid agents, anticonvulsants, beta-blockers, hypocholesterolemic drugs, retinoids...), no application of hair lacquer or gel, no violent brushing and repeated massage of the scalp, no change of diet.

Checking of the skin compatibility was based on: a skin examination of the experimental area, before then after 3 and 6 months of product use, by the Dermatologist Investigator, and the analysis of the sensations of discomfort reported directly by the test subjects to the Investigator or in the daily logs.

The assessment of the cosmetic efficacy based on: a pull-test performed before then after 3 and 6 months of product use, to roughly evaluate the intensity of the hair loss; a dermatological questionnaire by the Investigator, before then after 3 and 6 months of product use, a subjective assessment by the volunteers that, after 3 and 6 consecutive months of product use, answered a questionnaire concerning the cosmetic efficacy of the investigational product.

Appreciation of the cosmetic qualities of the shampoo (perfume, viscosity, dosing of the shampoo, bounciness of hair, combing of hair, etc.) was investigated after analysis of a questionnaire filled in by the test subjects, after 6 months of product use.

The chronology of the study is represented in the Table I below:

TABLE I

The chronology of the study is represented in the table below.

Operations	Experimental time		
	at the beginning	after 3 months of treatment	after 6 months of treatment
Inclusion of the volunteer: Checking of the inclusion and non inclusion criteria and delivering of the information sheet after verbal explanation Signature of the informed consent form by the volunteer	●		
Clinical examination and questioning of the volunteer by the Investigator	●	●	●
Pull-test	●	●	●
Delivery of the virgin daily log	●		
Delivery of the product sample to the volunteer	●		
Return of the completed daily log			●
Subjective assessment		●	●

RESULTS

According to the experimental conditions adopted in this study, Caffeine Shampoo C1[1] showed a very good skin compatibility, after application under normal conditions of use; infact no clinical sign was described by the Investigator, and no sensation of discomfort due to the investigational product was noted by the volunteers included in the study.

Moreover, the product showed a good cosmetic efficacy in the treatment of male androgenetic alopecia. Precisely, the results obtained in the pull-test showed a decrease of 7,17% after 3 months and of 13,15% after 6 months of treatment, of the number of hairs pulled out with pull-test, to indicate an increase of the resistance to the traction strain of the hair and a decrease of hair loss. These results improved going on with the product use; After 3 months of treatment, the percentage of "positive" volunteers (volunteers for whom the number of hair from pull-test decreased with the treatment) is 60%. After 6 months of treatment, the percentage of "positive" volunteers is 70%.

The statistical analysis (Table II, III) showed that:

- Compared to the baseline (20.07 ± 2.73), the number of hairs pulled was significantly lower after 6 months of application of the shampoo (17.43 ± 2.98) [$p<0.001$, two-sided, exact Wilcoxon test].
- The number of hairs pulled significantly decreased already after 3 months of application (18.63 ± 3.19) [$p<0.001$, two-sided, exact Wilcoxon test].

[1] *TRADE NAME: ALPECIN®.*

TABLE II

Number of hairs pulled (pull test) before ap plication of the shampoo, 3 and 6 months afterapplication of the shampoo - Descriptive statistics.

Descriptive Statistics

Number of hairs pulled (pull test)	N	Mean	Standard deviation	Min.	Max.	Percentiles		
						25	50th (Median)	75th
Baseline	30	20.07	2.728	16	25	18.00	20.00	23.00
After 3 months	30	18.63	3.189	14	25	16.00	18.00	21.25
After 6 months	30	17.43	2.979	13	23	15.00	17.00	20.00

TABLE III

Number of hairs pulled (pull test) before application of the shampoo, 3 and 6 months after application of the shampoo – Results of the exact Wilcoxon test.

Test Statistics[b]

	3 monthe vs. baseline	6 monthe vs. baseline
Z	-3.149694[a]	-4.101588[a]
Asymp. Sig. (2-tailed)	001634	.000041
Exact Sig. (2-tailed)	.000951	.000003
Exact Sig. (1-tailed)	.000476	.000001
Point Probability	.000051	.000000

a. Based on positive ranks.
b. Wilcoxon Signed Ranks Test

The results of the pull test are illustrated in Figure 1 and Figure 2.

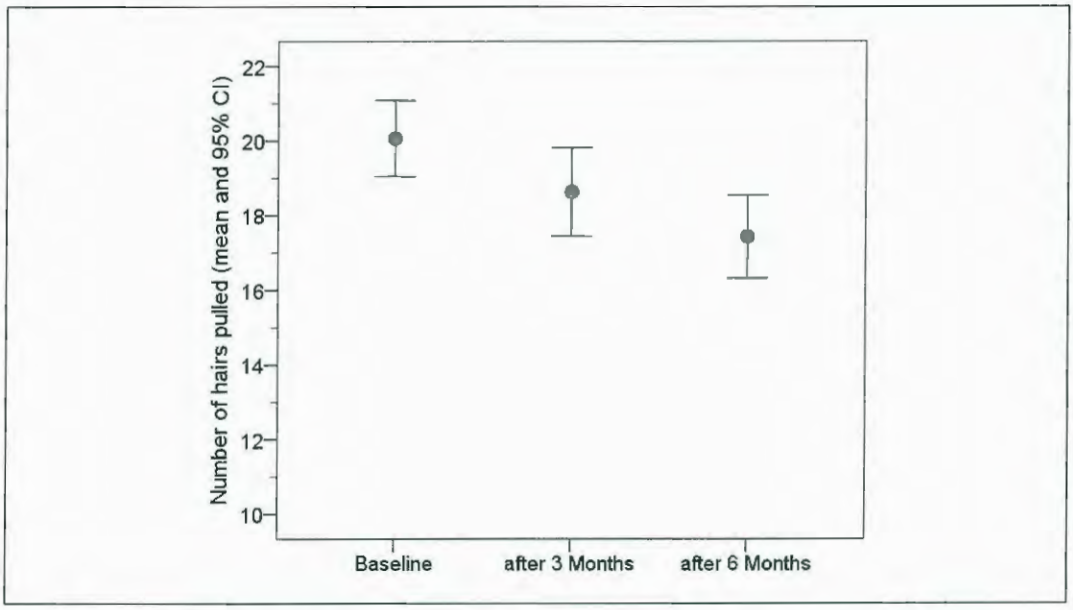

Fig. 1 *Number of hairs pulled (pull test) at baseline, after 3 and 6 months of application of the shampoo (means and their 95% confidence intervals are shown).*

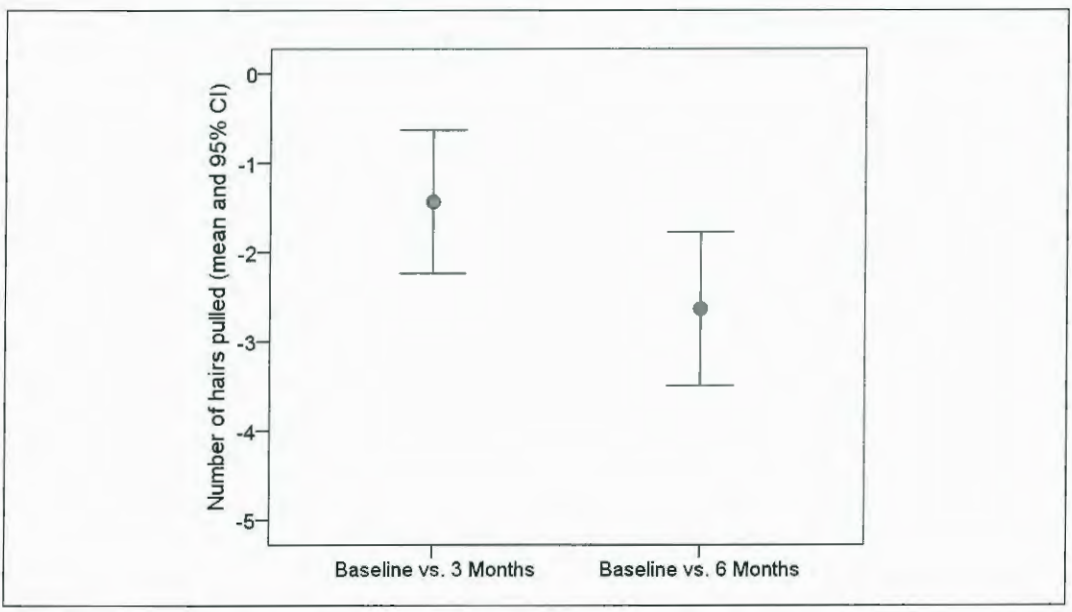

Fig. 2 *Decrease of hairs pulled (pull test) after 3 and 6 months of application of the shampoo compared to the baseline before application of the shampoo (means and their 95% confidence intervals are shown).*

In addition to the pull test, the 'cosmetic efficacy' of the shampoo was assessed by the investigators using the 'dermatological questionnaire' at baseline, after 3 and 6 months of application of the shampoo.

The following (secondary) efficacy variables were evaluated

- the strength of hair (Table IV)
- the progression of the balding (Table V)
- the extent of the falling out of hair (Table VI).

Compared to the baseline, the strength of the hair was significantly improved after 6 months of application of the shampoo ($p<0.001$, two-sided, exact Wilcoxon test) as well as after 3 months of application ($p=0.031$, two-sided, exact Wilcoxon test).

After 3 months of application of the shampoo, the progression of the balding was not changed significantly compared to baseline ($p>0.5$, two-sided, exact Wilcoxon test. However, after 6 months of application of the shampoo the progression of the balding was significantly improved ($p=0.004$, two-sided, exact Wilcoxon test).

Compared to the baseline, the extent of the falling out of hair was significantly reduced after 6 months of application of the shampoo as well as after 3 months of application ($p<0.001$, two-sided, exact Wilcoxon test).

Furthermore, the 'cosmetic efficacy' of the shampoo was assessed by the volunteers using a questionnaire ('subjective assessment') at baseline, after 3 and 6 months of application of the shampoo.

TABLE IV

Strenght of hair.

How do you rate the strength of the hair?		very thin	Thin	Medium	strong	total
Baseline	N	8	13	8	1	30
	%	26.7%	43.3%	**26.7%**	**3.3%**	100.0%
After 3 months	N	7	10	11	2	30
	%	23.3%	33.3%	**36.7%**	**6.7%**	100.0%
After 6 months	N	5	9	13	3	30
	%	16.7%	30.0%	**43.3%**	**10.0%**	100.0%

TABLE V

Progression of the balding.

How do you rate the progression of the balding?		very slight	Slight	Moderate	strong	total
Baseline	N	2	22	6	0	30
	%	**6.7%**	**73.3%**	20.0%	.0%	100.0%
After 3 months	N	2	23	5	0	30
	%	**6.7%**	**76.7%**	16.7%	.0%	100.0%
After 6 months	N	10	15	5	0	30
	%	**33.3%**	**50.0%**	16.7%	.0%	100.0%

The following (secondary) efficacy variables were evaluated

- the intensity of hair loss (Table VII)
- the number of hairs falling out while combing (TableVIII).

Compared to the baseline, the intensity of the hair loss was significantly reduced after 6 months of application of the shampoo as well as after 3 months of application ($p<0.001$, two-sided, exact Wilcoxon test).

TABLE VI

Extent of the falling out of hair.

How do you rate the extent of the falling out of hair?		very slight	Slight	Moderate	strong	total
Baseline	N	0	13	10	7	30
	%	**0.0%**	**43.3%**	33.3%	23.3%	100.0%
After 3 months	N	3	16	8	3	30
	%	**10.0%**	**53.3%**	26.7%	10.0%	100.0%
After 6 months	N	7	12	11	0	30
	%	**23.3%**	**40.0%**	36.7%	0.0%	100.0%

TABLE VII

Intensity of hair loss.

Please evaluate personally the intensity of your hair loss?		very slight	Slight	moderate	severe	total
Baseline	N	1	13	12	4	30
	%	**3.3%**	**43.3%**	40.0%	13.3%	100.0%
After 3 months	N	7	10	12	1	30
	%	**23.3%**	**33.3%**	40.0%	3.3%	100.0%
After 6 months	N	10	12	7	1	30
	%	**33.3%**	**40.0%**	23.3%	3.3%	100.0%

TABLE VIII

Number of hairs falling out while combing.

During daily combing, do you count a high number of hairs in the basin?		very few	few	some	many	total
Baseline	N	0	12	11	7	30
	%	**0.0%**	**40.0%**	36.7%	23.3%	100.0%
After 3 months	N	5	10	12	3	30
	%	**16.7%**	**33.3%**	40.0%	10.0%	100.0%
After 6 months	N	8	10	11	1	30
	%	**26.7%**	**33.3%**	36.7%	3.3%	100.0%

Compared to the baseline, the number of hairs falling out while combing was significantly reduced after 6 months of application of the shampoo as well as after 3 months of application ($p<0.001$, two-sided, exact Wilcoxon test).
Therefore, the subjective evaluation of the cosmetic efficacy showed that 67% of the volunteers are satisfied with the product.
Particularly, after 6 months of treatment, they referred a decrease in hair loss and an improvement of the hair conditions (strength and thickness) and scalp conditions (itching, tension/ dryness).
In other respects, the product was also well appreciated for its cosmetic qualities.

DISCUSSION

Caffeine was shown to have a fast and high penetration via the hair follicles, so that it was possible to formulate a product containing caffeine as a shampoo.
The objective of the present study was to investigate the efficacy of a caffeine shampoo (Caffeine Shampoo C1) for the treatment of male AGA; the skin compatibility and cosmetic qualities of the product were also tested and described.
The experimental conditions adopted (experimental areas, quantity of product applied, frequency and duration of the applications...) reproduced the normal conditions of use advocated and the test performed on a "small scale", reflected the application by the future consumers.
The duration of treatment takes into account the time necessary to show an effect of the product.
The volunteers' opinion was taken into account since it could reflect that of the potential consumers.
As the results, Caffeine Shampoo C1 has shown a very good skin compatibility, after application under normal conditions of use, and a good cosmetic efficacy in the treatment of male androgenetic alopecia. Precisely, the results obtained in the pull-test showed an increase of the resistance to the traction strain of the hair and a decrease of hair loss.
These results improved going on with the product use. Also the Dermatologist Investigator confirmed the good cosmetic efficacy of the product. Particularly a reduction of the premature hair loss in a good percentage of the volunteers was noted, and also an improvement in the structure of the hair, an improvement of the scalp condition, and a reduction of the balding in significative percentage of the volunteers.
The subjective evaluation of the cosmetic efficacy showed that most of the volunteers were satisfied with the product.
Particularly, after 6 months of treatment, they referred a decrease in hair loss and an improvement of the hair and scalp conditions.
In other respects, the product was also well appreciated for its cosmetic qualities (perfume, viscosity etc.).
Finally, we can say that caffeine is a promising substance for the cosmetic treatment of male AGA, and its formulation as a shampoo is effective as well as comfortable for male subjects, who prefer a shampoo to a lotion for daily use.

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Hautfibel. Dermatologische Pflege kompakt. 4th Edition

by W. Raab

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The first edition of Raab`s "Skin primer" appeared in 1976, 34 years ago. This year, the 4th edition was published.

Again, dermatological skin care is the main subject discussed in this book.

Today, a beautiful, healthy skin is even more important than it was in the last century and this book informs about the best ways to keep natural youthful beauty and to restore unpleasant changes.

Raab describes all the important skin changes due to age, premature ageing, skin diseases and metabolic disorders.

In all instances, the dermatologist is called for preventive and therapeutic measures.

In each chapter, advice is given how to approach the patient and how to make him understand what results may be expected from skin care, skin cleansing and skin protection – in addition to medical treatment.

More and more methods are promoted for a rejuvenation of the skin.

The different peelings and fillings are described in a most critical way as unpleasant side effects occur more and more often since not well trained doctors and personal act in this field. The safety and the results of invasive methods of aesthetic dermatology are highly overestimated.

Allergic reactions of the skin are found far less often than diagnosed by the public. The diagnosis of allergy, type I-allergy and contact allergy is easy in most instances and only the results of modern test methods may serve as the basis for future measures.

Today, chronic sun damage is one of the most important changes of skin, especially of the face. Here, only preventive measures may help but in most instances they just start too late. Excessive smoking provokes similar changes as chronic sun exposure. Young persons are difficult to persuade to lead a healthy live in order to prevent premature ageing of their skin.

Age is so far away...

By many women, injections of Botulinum A-toxin are considered to be the way to hide aged or prematurely aged skin. Therefore, the patients ask for injections in short intervals leading to states as "Botophilia" and "Botomania".

"Botox parties" should be banned as they carry the risk for cosmetically unacceptable and dangerous complications. Best results are obtained by a pre-treatment with Botulinum A-toxin followed by fil-

and structure glycoproteins.
From that, the large use of silanols, compounds carrying Si-OH groups, which are important since certain multihydroxy materials can complex by hydrogen bonds with bio-actives making them-bio-available. Thus, specific silanol derivatives can efficiently protect the skin from external aggressions, aging and dysfunction of the cell metabolism. They can provide multiple activities such as restructuring effects, prevention, protection and metabolism stimulation with an excellent skin tolerance, being non-toxic and non-allergenic.
In conclusion, it has been observed that the biological activity of silicon atoms, combined in an organic form, can be modified and oriented by the nature of the molecules bonded to these atoms. Thus, the action of an organic complex of silanol is itself the more physiological, and closer to the natural action of silicon in living cell, since it is bonded to a natural molecule. Therefore, as said above, the new silicium-compounds may be compared with the activity of the natural polyglycosides.
But the manufacturers of personal care products have to formulate also topical compositions that provide superior film properties on keratinous surface with exceptional aesthetic appeal, a silicon derivatives have from all these reasons the incredible large numbers of patents, ranging up 6000 in USA from 2004 to 2006 in the field of silicon chemistry !
As silicone technology advanced, new materials emerged giving incredible feel and performance properties on skin and hair. Among the most used new silicon components is the dimethicone crosspolymer elastomer, comprised of repeating siloxane units (-Si-O-Si-O-) with hydroxycarbon side chain groups, crosslinked internally with a carbon based on moiety.
Selective silicon and silicone compounds have therefore to be considered not only interesting ingredients to ameliorate the feeling sensation when applied on the skin, but also natural compounds capable to effectively help the reconstruction and reparation of the skin connective tissue, stimulating also the cell proliferation and the production of collagen. This may happen because for the high similarity with the extracellular matrix (ECM), the derivatives of silicium are capable of carrying the eventual bounds substance radical into the epidermis and even into the dermis.
Moreover, according with some recent studies it has been also shown as some silicium compounds may positively influence the inter-cellular communications thus acting by the "NICE" approach, which contemporary involves the Nervous, Immune, Cutaneous and Endocrine systems. Naturally for the biological use of all the silicium derivatives it will be necessary to conduct strict *in vitro* and *in vivo* tests to evaluate their efficacy and their bio and eco-compatibility.
In accordance with my friend Tony O'Lenick new cosmetic and medical markers based upon specialty applications, new biological studies and the formulators' creativity will continue to be developed. The efficient product development, based on synergistic blends of dimethicone copolyol compounds with traditional fatty compounds or other organic ingredients, and a better knowledge of the skin functions, connected with the new "NICE" approach, will represent the future of mind-body innovative skin care.
This interesting book, giving all the necessary information to really understand not only the chemistry of the silicon compounds, but also their use to formulate more active and safe personal care products, represents a basic key for all the Cosmetic Chemists and/or Medical Doctors who really wish to understand the skin activity of this interesting family of natural-oriented chemicals.

P. Morganti
Editor-in-Chief

Chitin, Chitosan, Oligosaccharides and Their Derivatives

by Se-Kwon Kim

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Chitin is the most abundant nitrogen-hearing organic compound in nature and the second abundant polymer on earth after cellulose. It is in fact a common constituent not only of the crustacean cuticle but also of the arthropod exoskeleton and occurs in mollusc shells and fungal cell walls.
Generally speaking, worldwide production of chitin has been estimated to be approximately 10^{11} tons/year as a by-product from marine organisms consumed, while its industrial use seems to be no more than 10,000 tons/year. Thus, a considerable quantity of the processed marine fisheries remains as wastes, considered hazardous for their high instability and high polluting effect if disposed off shore. In the sea, chitinous wastes rapidly lead to eutrophication and exert a high biochemical oxygen demand, while on land, it quickly becomes colonized by pathogens and spoilage organisms causing environmental and public health concerns. From these conditions, the high scientific and economical interest to transform this fisheries waste in consumable products of higher value-added.
Industrial chitin is in fact a cationic amino polysaccharide composed of randomly distributed N-acetyl-D-glucosamine and glucosamine units having β-(1→.4) bonds and an easy biodegradability, biocompatibility and capacity to promote the synthesis of hyaluronan. Due to the activity of certain hydrolases, chitin and their oligosaccharide derivatives have an high biological significance in the human body. The resulting chitoligomers may stimulate, in fact, various cells, supporting their every day life, while the released monomers may be phosphorylated and incorporated into hyaluronan, keratan sulphate and chondroitin sulphate, components of the intracellular matrix and connective tissue. Current production' technologies and biomedical applications together with the chemical and physical aspects of chitin and derivatives are reported on this interesting book comprising 7 parts and 42 chapters.
Part I, chapters 1-6, provides an overviews on *The Sources and Production of Chitin and Chitosan,* reporting all the up today methods of production used.
Crustaceous constitute a widespread class of organisms of both marine and land-dwelling species. They possess a protective exoskeleton with a biomineralized structure which consists of an organic matrix, the α-chitin, together with an inorganic mineral, a calcium carbonate and various proteins. This structure has a hierarchical twisted plywood organization with a pronounced crystallographic texture.
Thus, most processes for the production of chitin and derivatives from shellfish wastes use chemi-

cal, enzymatic or fermentative methods to obtain chitin and chitosan compounds. However, other new processing technologies have been studied by the use of fungal proteases to facilitate the proteinization of washed and demineralized shrimp shell powder necessary to release and use hydrolized proteins also. Alternatively, the production of chitin/chitosan from microbial sources appears promising using, for example, *lactobaccilus spp* as an alternative to chemical treatments (HCl and NaOH) to obtain a pure, rather uniform product.

As seen, chitin and chitosan are very beneficial natural resources to be used as a raw material when the economical recycling of wastes is considered. The degree of purity and deacetylation, representing the proportion of deacetylated units both of chitin and chitosan, while the electrostatic and the molecular weight influencing their final characteristics are the parameters to be considered for the different use of these natural biopolymers.

Unlike other natural occurring polysaccharides, cellulose, pectin, alginic acid, carrageenans etc, which are neutral or acidic in nature, chitosan is a weak basic polysaccharide for the presence of D-glucosamine in its structure. However, both chitin and chitosan have a strong positive charges at acid pH, allowing them to bind with negatively charged molecules, such as lipids, collagen, glycosaminoglycans, or structures, as the skin and/or the hair.

The mechanical properties of these biopolymers and the obtainable complexes with other biologically-active molecules give rise to many biological applications, connected with the diversities in the physiochemical properties of the obtained new polyelectrolytes. The variable parameters such as molecular weight, flexibility, functional group structure, charge density, hydrophilicity and hydrophobicity, stereoregularity, and compatibility, as well as reaction conditions like pH, ionic strength, polymer concentration, mixing ratio, and temperature could be, in fact, controlled to achieve the desired bio-chemical properties of the complexes.

In order to understand the biological activities of these chito-olisaccharides (CHPs) it is mandatory to characterize these complexes with respect to their composition oligomers, homologs and isomers. For this purpose analysis by Mass Spectrometry (MS) and NMR spectroscopy are respectively used for detecting from nano/pico to larger quantities of samples, having also the possibility to separate the components of even complex mixtures by mass. MS is the method of choice for structure analysis of higher CHOs, while NMR spectroscopy in combination with FT-IR, XRD and chromatographic methods are considered the best apparatus to determine the chemical structures (sequence and size) for oligosaccharides and polysaccharides. These analytical aspects are all reported and discussed on **Part II**, *Physical and Chemical Aspects of Chitin and Chitosan Derivatives,* **chapters 7-12.**

Chitin and Chitosan display interesting properties and are recognized as bio and eco-compatible compounds, also because their degradation products are nontoxic, non immunogenic, and non-carcinogenic.

Therefore, the physiochemical and biological properties of these natural biopolymers led to their recognition as promising materials for biomedical applications. However, chitosan and chitin can only be soluble in a few dilute acid solutions, which limit their wide applications. Thus the studies to develop chemically modified derivatives especially designed for drug/gene delivery, tissue engineering, and wound -healing applications, such as chitosan-2-iminothiolane with an improved mucoadhesiveness and controlled drug-releasing properties; trimethyl chitosan oligomers, useful for DNA carrier systems, and sugar bond chitosans for tissue engineering applications.

In tissue engineering applications, the cationic nature of chitin/chitosan is primary responsible for

electrostatic interactions with anionic glycosaminoglycans, proteoglycans and other negatively charged molecules, as hyaluronic acid.
This property is of great interest because a large number of cytokines/growth factors are linked to glycosaminoglycans, and a scaffold incorporating a chitin/chitosan glycosaminoglycans complex may retain and concentrate growth factors secreted by colonizing cells. This is the topic of **Part III chapters 13** and **14.**
Chitin and Chitosan and the derivated oligosaccharides have unique properties, inclnding ability to form films, chelate metal ions, and to favor the skin healing process. They stimulate the macrophages and fibroblasts' activities to produce cytokine to obtain an anti-inflammatory action, an angiogenesis stimulation with a granulation and scar formation. All these processes are necessary for a better wound healing. Moreover, some of these oligosaccharides seem to be considered good material for gene delivery and tissue engineering.
Antimicrobial packaging is one of the most promising active packaging systems that have been found highly effective in killing or inhibiting spoilage and pathogenic microorganisms that contaminate food. In this contest chitosan/chitin films seem to show great promise for their applications in food preservation, also if the application for an antimicrobial food-packaging system is limited due to the difficulty availability of suitable antimicrobials, new polymer materials, regulatory concerns, and appropriate testing methods. However, it has been shown how the functional properties of chitin, chitosan, and oligosaccharides films can be improved when these are combined with other film- forming and coating materials.
The antioxidant system defense as well as the body's immune response against pathogens, toxic chemicals, or physical injury are essential to maintain cell homeostasis.
Excessive production of Radical Oxygen Species (ROS) and/or chronic inflammation due to disregulation of immune response can lead respectively to oxidative stress or involve tissue destruction caused by the incompletion of tissues repair.
Recently, it has been reported how chronic inflammation may be associated with an increased risk of malignant transformation by an induction of oxidative stress leading to the oxidation of fatty acids and proteins in cell membranes. Thus, DNA nutrition induced by the excessive production of free radicals and ROS can be the major cause of malignant transformation and age-related diseases.
Removal of free radical and ROS is, in fact, probably one of the most effective defenses of a living body against various diseases. Current approaches to the treatment of inflammation rely on the inhibition of pro-inflammatory mediator production and modulation of the oxidative chain.
Therefore, search for natural anti-inflammatory and/or antioxidants as alternatives to synthetic ones is of great interest among researchers. At this purpose, chitin, chitosan and chito-oligosaccharides have attracted attention due to their unique biological benefits as antioxidative and immuno-enhancing properties with a relatively low toxicity. The understanding of the factors affecting these biological activities would be an added advantage to their better use.
These chitooligomers has been combined with a variety of materials such as alginate, hyaluronan, hydroxyapatite, calcium phosphate and growth factors for potential application in orthopedics, showing morphogenic activities for a correct bone architecture. They, in fact, seem to promote growth and mineral-rich matrix deposition by osteoblasts in culture and allowed osteoconduction.
The process of blood clotting and the subsequent dissolution of the clot, following repair of the injured tissue, is termed homeostasis. To stop bleeding, the injured vessel wall is processed by primary platelet-mediated aggregation. Thus, platelet adhesion to the injured vessel and its consequential

aggregation is the primary process of homeostatic mechanism. From these considerations the use of chitin and chitosan obtained a great impulse being capable to enhance both platelet adhesion and aggregation probably because of the glucosamine presence in their structure. Compared to heparin, the sulfated chitosan has been shown to possess high anticoagulant potency, but, unlike heparin, it does not show anti-platelet activity, cause of excessive bleeding in patients. Moreover, as it has also shown, the chemical modification of chitosan can easily provide more powerful antihypertensive compounds.

Interesting are the chitosan and its derivatives' activities exhibited as antihyperglycemic, antihyperlipidic, antihypocholesterolemic, and anticancer. Recent studies suggested, in fact, that chitosan can improve lipid metabolism by regulating total cholesterol and LDL receptor mRNA expression, increasing the excretion of fecal bile acids. This positively charged molecula should interact with negative surfaces such as cholesterol, bile acids, and lipids. Thus, the chitosan-cholesterol complex transferred to the intestines under alkaline condition, should change into an insoluble gel form to be successively excreted in the feces. However, although the cholesterol-lowering action of oral chitosan was reported by many researchers, the cholesterol-lowering action of chitin seems not clear in spite of exhibiting higher excretion of triglycerides in feces.

About the anti-cancer activity of these sugar-like compounds, injectable chitosan hydrogels have been developed for the treatment of various cancers such as lung, breast, cervical cancer, fibrosarcoma, and mucin-production-associated cancers. Their intratumoral or subcutaneous administration next to the tumor, have resulted in the suppression of angiogenesis and tumor growth *in vivo*, having also the ability in delaying the development of metastasis.

All these considerations are reported on **Part IV**, *Biological Activities of Chitin and Chitosan Derivatives*, **chapters 15-22.**

Lysozyme, normally produced by macrophages hydrolizes chitin/chitosan into oligomers, which activates the macrophages to produce nitric oxide, activates oxygen species, tumor necrotic factor-α, interferon and interleukin-1 (IL-1). The activated macrophages increase their production of lysozyme, chitinase, and N-acetyl-β-D-glucosamidase, which catalyze the total depolymerization to monomers. Finally, the monomeric amino-sugars become available to the fibroblasts, which proliferate under the action of IL-1, for incorporation of chondraitin-4-and-6-sulfate, hyaluronan, and keratan sulfate, thus guiding the ordered deposition of collagen, also influenced by chito-oligomers. Because of this activity at level of human tissue chitin, chitosan and other natural oligosaccharides are used in several clinical disorders and in a multitude of biomedical applications such as biomedical engineering, drug/vaccine and gene delivery. Thus, polymeric nanoparticles of chitin/ chitosan derivatives offer a number of advantages for drug delivery to specific tissues.

Since these natural and safe nano-micelles may be composed of hydrophobic inner core and hydrophilic outer shell, they offer several advantages for drug delivery applications, including hydrophobic cores as microreservoir of hydrophobic drugs, hydrophilic outershell as a defense layer against attack of the reticulo-endothelial system (RES), long blood circulation of drug, and passive targeting against tumor. On the contrary, the synthetic nanopolymers have a complexity of preparation processes, the remnants of surfactants used for their preparation, and their own citotoxity in humans. In view of these limitations, chitosan and the chitooligomers as natural polymers have many advantages owing to their biodegradability. Moreover due to their more easy characterization, the biomedical applications of chitin and chitosan are always inroads also because of their availability as medical grade material.

These and other interesting topics are reported on **Part V**, *Biomedical Application of Chitin and Chitosan Derivatives*, **chapters 23-33.**

There is no doubt that the characterization of chitin and chitosan materials and the realization of more soluble derivatives has been and is until now the subject of many works and debates. Molecular weight and degree of acetylation or deacetylation remain the primary properties of interest, for the need to have standardized materials at reasonable costs.

The most frequent use of these chitooligomers in biomedical research and biomedical products demands that this take place. Thus, chemical derivatization seems the way forward to realize the full potential of chitin and chitosan, first of all, to increase their water solubility. However, the prospect for good purity grade materials and a choice of molecular weight ranges at an affordable price appear today promising and in continuum progress. For these reasons many are the new products appearing and ready to appear in the international market that have commercial applications in the cosmetic industry, in the field of medical devices, and as food supplement for humans and animals.

That because several studies have shown that chitin and chitosan, already value-added products from mushroom and crustacean waste, may be of use in bioconversion for the production of value-added cosmetics and food products, in the preservation of foods from microbial deterioration, in the formation of biodegradable films, and in the purification of water and air.

All these interesting topics are discussed on **Part VI**, *Industrial Applications of Chitin and Chitosan Derivatives*, **chapters 34-39.**

As we have previously seen chitin is an important component in shell of arthropods and fungi widely used as an eliciting agent of cell defense reactions in plant. Thus chitin and chitosan have been used against the plant –affecting pathogens and insects, and to enhance a wide variety of useful metabolities to harvest light for photosynthesis, to protect the cells from damaging effects of high-energy radiation, or to promote defensive action against herbivores and pathogens; even though chitosan has been shown to elicit defense genes in several plant species such as rise and tomato. Moreover it has been shown that chitosan and its derivatives increase the growth rates of roots and shoots of daikon radish, number of flowers in hushes and lisianthus, as well as promote the growth of various crops such as cabbage, chili and sweet basil. However, the mechanism of action of chitosan on plants growth remains unclear, also if several studies have shown that it stimulates some systems involved in their resistance to infection.

These and other interesting topics on the use of chitin and chitosan for the soil enrichment, foliar spraying, coating seed, supplement in hydroponic, and other modalities to increase the plant protection from diseases and /or their better development are reported on **Part VII**, *Agricoltural and Biotechnology Applications of Chitin and Chitosan Derivatives*, **chapters 40-42.**

These final chapters report the interesting conclusions on the biological activities and applications of this full-of-ideas/solutions book *on Chitin and Chitosan Derivatives*.

According to the Author Se-Kwon Kim the book, reporting the fundamental studies of all the today known biomedical and industrial application of these safe biopolymers of natural origin, may be of great utility for researchers, industrial makers and the scientific chemical and medical communities interested to consider the green economy the unique possibility to safeguard the complexity of our living world.

P. Morganti
Editor-in-Chief

Index to Volume 28, 2010

Contents:

Book Reviews

Original Laboratory Studies

General Articles

Special Reports

Author Index

Subject Index

First Announcement of the 10th ISCD International Congress

The 10th International Congress of International Society of Cosmetic Dermatology (ISCD) will be held in Shenyang, China from May 30 to June 1, 2011, on the theme: ***Life Sciences Meet Cosmetology.*** It will be a multidisciplinary congress with the participation of scientists worldwide.

General Information
Date: May 30th--June 1st
Venue: Shenyang Traders Hotel (Shangri-la), China
Official Language: English
Submission deadline: March 31st, 2011

Schedule:

	May 30th 2011	May 31st 2011	June 1st 2011
Morning	Registration	Symposia	Symposia
		Discussion	Discussion
		Symposia	Symposia
Noon		Satellite meeting	Closing Ceremony
Afternoon		Symposia	City Tour
		Discussion	
		Symposia	
Evening	Opening ceremony & Welcome reception	Satellite meeting	

Registration

Currency

All payment should be made in either US dollars or Chinese currency RMB. The rate between US dollar and RMB is US$1 to RMB¥ 6.8.

Registration Fee (In US dollar)

	Before 2011-3-31	2011.3.31 to 11-4-30	After 2011-4-30 And Onsite
Full Participant	200	350	400
ISCD Member	150	300	350
Resident/Student/Nurse	100	250	300
Accompanying Person	100	100	100

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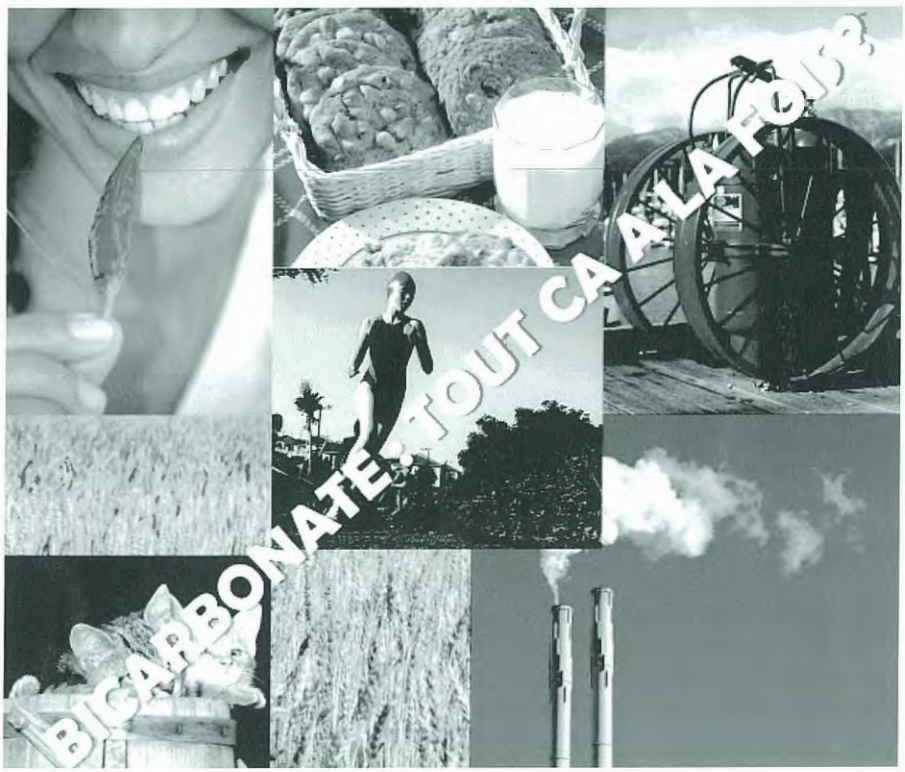

Le bicarbonate, c'est du sérieux !

Comment le bicarbonate peut-il prendre soin de mes dents et booster ma lessive ? Comment peut-il être présent dans les pâtisseries et dans les extincteurs ? Comment peut-il épurer les fumées des incinérateurs et désodoriser mon réfrigérateurs ? Tout cela est-il bien sérieux ? Et bien, oui... l'article suivant vous expliquera comment.

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Note

In copertina / Front cover

Architettura delle fibre di chitina, parte fondamentale dell'esoscheletro dei crostacei.
Foto al microscopio elettronico a scansione (SEM). Su gentile concessione del Prof. Dierk Raabe Max-Planck-Institut fuer Eisenforschung, Max-Planck-Str. 1, 40237 Duesseldorf, Germany.

Architecture of chitin-protein fibers forming the honeycomb structure.
Scanning Electron Microscopy (SEM) micrographs. On kind permission of Prof. Dierk Raabe, Max-Planck-Institut fuer Eisenforschung, Max-Planck-Str. 1, 40237 Duesseldorf, Germany.

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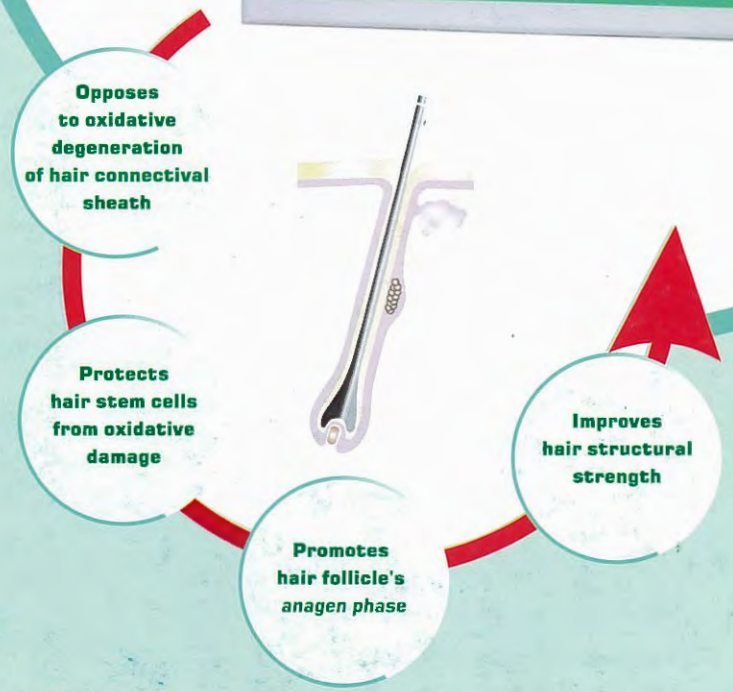

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