The cosmeceutical Pycnogenol®

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Summary

Pycnogenol® (PYC) is the extract of French maritime pine bark (Pinus pinaster), possesses various unique biochemical properties, which in combination designate it as fascinating cosmeceutical. PYC is one of the most potent natural antioxidants with demonstrated ability to neutralise all species of oxygen radicals. Its ability to reduce the vitamin C radical and to protect vitamin E from oxidation helps to prolong the bioactivity of these vitamins. Women suffering from hyper-pigmentation (melasma) experienced significant reduction of pigmentation intensity and affected skin area size after 1 month supplementation with PYC. PYC strongly binds to collagen and elastin and this inhibits their enzymatic degradation, its improvement of microcirculation supposedly supports better oxygen and nutrient supply as well as better detoxification of the skin. These unique properties render PYC a fascinating cosmeceutical to support a healthy and juvenile looking skin. Research has shown that PYC displays a pronounced anti-inflammatory activity. In human volunteers oral supplementation with PYC was able to increase the minimal erythema dose in response to UV exposure. In vitro experiments have established that PYC constituents inhibit NF-kB-controlled expression of inflammatory mediators such as adhesion molecules and cytokines. These findings suggest an application of PYC for protection against photoageing of the skin.

Riassunto

Pycnogenol® (PYC) è un estratto di Pinus Pinaster della costa francese, particolarmente ricco in procianidine. Per la sua forte attività antiossidante è in grado di riciclare e prolungare l'azione della vitamina C, è sicuro nell'uso e privo di effetti allergizzanti se utilizzato per via topica o per via sistematica. Le procianidine si legano in modo stabile alle fibre di collageno della pelle proteggendo PYC dalla degradazione provocata dai radicali liberi o da enzimi. Inoltre l'uso di questo estratto aiuta a prevenire gli effetti "invecchianti" provocati dalla luce del sole, neutralizzando i radicali liberi e riducendo conseguentemente i fenomeni infiammatori. Preso per via orale da volontari sani, PYC è stato in grado di ridurre l'eritema indotto dagli UV in maniera dose-dipendente. Si è visto con uno studio che questo estratto è in grado di interagire con NF-kB espressione dei mediatori dell'inflammazione prevenendone l'ossidazione. In un altro studio si è visto che la forte attività antiossidante esplicata da PYC era in grado di ridurre
i fenomeni di iperpigmentazione in donne colpite da cloasma se utilizzato in dosi di 75 mg/giorno. Sembra, inoltre, che PYC migliori la microcircolazione aumentando la produzione dell'NO endoteliale diminuendo la relativa dilatazione dei capillari. Si verifica così un maggior apporto di ossigeno e di nutrienti che migliorano notevolmente l’aspetto della cute.
**INTRODUCTION**

Pycnogenol® (PYC) is the standardised, water-soluble extract of the bark of the French maritime pine (Pinus pinaster). It consists of the phenolic constituents taxifolin and catechin, and oligomers of the latter, the procyanidins. Furthermore, it contains phenolic acids: p-hydroxybenzoic, protocatechuic, gallic, vanillic, p-coumaric, caffeic and ferulic acid [Rohdewald, 2002]. Pycnogenol® is the trademark of Horphag Research Ltd., UK. PYC is available world-wide as a food supplement, used primarily for its potent antioxidant activity and its values for maintaining a healthy cardiovascular system.

PYC has been demonstrated to inactivate essentially all oxygen free radicals [Elstner & Kleber, 1990], and has been found to be one of the most potent, natural free radical scavengers [Noda et al., 1997]. It is able to reduce the vitamin C radical, and thus recycles vitamin C back to the bioactive form [Cossins et al., 1998]. In presence of PYC, vitamin E is protected against oxidation [Virgili et al., 1998]. Furthermore, it up-regulates intracellular activities of GSH, GSH peroxidase, superoxide dismutase and catalase, thus reinforcing cell-own antioxidant protection [Wei et al., 1997]. Oral supplementation with PYC significantly enhances the antioxidant capacity in humans [Devaraj et al., 2002]. Metabolisation studies have revealed a peak urinary excretion of the smaller constituents 2 hours after consumption, while larger constituents peak around 8 h post consumption [Grosse-Düwelser & Rohdewald, 2000].

PYC has been extensively researched for its safety; it has a very low acute toxicity, no chronic toxicity, no mutagenicity, teratogenicity and perinatal toxicity and it is non allergic [Rohdewald, 2002]. In clinical studies dosages of up to 360 mg PYC have safely been taken. In rare cases a mild stomach discomfort occurs which can be avoided by taking PYC together with food. In addition to being a powerful antioxidant, it possesses two further basic biochemical actions. It also enhances production of endothelial nitric oxide (NO) which is the underlying mechanism for improvement of micro-circulation as well as prevention of platelet aggregation. An improved micro-circulation supposedly is advantageous for the skin as well, as supply with oxygen and nutrients and removal of waste products will be enhanced.

The affinity of PYC to collagen and elastin has been proposed to be the mechanism responsible for strengthening of capillaries as well as for its use as an internal cosmetic.

**RESULTS AND DISCUSSION**

Solubilised collagen, elastin, powdered skin and ovalbumin were incubated with PYC in a concentration of 0.2 mg/ml and unbound PYC was determined photometrically. It was found that it displays a high binding affinity with 33.9% of added PYC being bound to collagen and 41% bound to elastin, respectively. As expected from the ubiquitous presence of collagen and elastin in skin, 37.9% of PYC were found to be bound to powdered skin. As unspecific control protein ovalbumin was tested and only 2.1% of PYC were found to bind [Grimm & Högger, 2002]. This demonstrates the very specific affinity of PYC to the most important structure elements of skin and blood vessels.

To assess protection of collagen and elastin from degradation the free amino groups of these proteins were exhaustively succinylated. Degradation of collagen and elastin was quantified by determination of developing amino groups by colour reaction with 2,4,6 trinitro benzolsulfuric acid at 450 nm. Degradation of collagen by matrix metalloproteinase -1 (MMP 1, collagenase 1) was inhibited by PYC in a dose dependent manner (figure 1) [Grimm & Högger, 2002]. Corresponding results were obtained showing that it inhibits degradation of elastin by MMP-2 and MMP-9.
The cosmeceutical Pycnogenol

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Aesthetic Medicine and Cosmetology between East and West

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Summary

Aesthetic medicine, together with Cosmetic Dermatology, is today a new medical discipline which is widely represented and legally recognized within the Chinese territory. “It is the new science which concerns itself with the role played by beauty in nature for a better life”, as was stated by Professor Peng Qing Xing, in his role as Chairman, at the opening of the 2nd World Congress on Aesthetic Medicine and Cosmetology which has recently taken place in Beijing.

As a matter of fact, Aesthetic/Cosmetic Dermatology has had in China a considerable boost, especially in the course of the last few years, both with the opening of new medical-aesthetic wards in the main hospitals and with the opening of medical dispensaries devoted to this new medical discipline.

An interest for aesthetics and the harmony of the body has always been characteristic of Chinese culture and has always been an integral part of their natural medicine.

This Congress has made the modern trends in Chinese medicine official, a kind of medicine that has always known how to wisely join their great naturalistic tradition to pharmacology's modern advances.

Such was the birth of Cosmetic Medicine with all its related branches, such as Cosmetic Surgery, Cosmetic Dermatology, Dentistry and traditional Chinese Dermocosmetics.

All these new scientific branches naturally stem from the classic branches of Plastic Surgery, maxillofacial Surgery, Dermatology and of traditional Chinese Medicine.

La Medicina Estetica e la Dermatologia Cosmetologica sono nuove branche della disciplina medica ampiamente rappresentate e legalmente riconosciute sul territorio della Repubblica popolare Cinese. Rappresentano "la nuova scienza che pone in evidenza il ruolo che la bellezza svolge per un vivere sano e felice" secondo quanto affermato dal Prof. Peng Qing Xing, in qualità di Presidente, all'apertura del II Congresso Mondiale sulla Medicina Estetica e Cosmetologia tenutosi quest'anno a Pe-chino.

Riassunto
Infatti la Dermatologia Estetico/Cosmetologica ha avuto in Cina un vero e proprio boom. Specialmente nel corso degli ultimi anni, con la apertura di reparti specializzati presenti nei maggiori ospedali e con l’apertura di studi medici specializzati in questa nuova disciplina medica.

Questo Congresso ha posto in evidenza come lo sviluppo della medicina tradizionale cinese abbia saputo coniugare la loro grande tradizione naturalistica con lo sviluppo della moderna farmacologia.

Infatti, l’interesse per l’estetica e per l’armonia del corpo ha da sempre caratterizzato la cultura ed ha sempre fatto parte delle tradizioni cinesi.

È nata così e si è sviluppata la Medicina Cosmetologica con le sue branche quali la Chirurgia Cosmetologica, la Dermatologia, la Odontoiatria Cosmetologica e la Dermocosmesi Cinese. Tutte queste nuove branche scientifiche provengono dalle classiche branche mediche quali la Chirurgia maxillo facciale estetica, la Dermatologia e la Medicina Cinese tradizionale.
MEDICINE & AESTHETICS

The relation between Medicine and Aesthetics, which has always been at the basis of Chinese culture, is now a teaching subject in official Chinese Medicine, too. As much was claimed by both Prof. Peng Qing Xing of Beijing University and Chairman of the Congress and by Prof. Feng-Xinzhong, who is Secretary General and Head of the Department of Dermatology at Shanghai University (1,2) (Fig. 1 and 2).

Evidence of the above statement can be found at the Huangsi Aesthetical Surgery Hospital in Beijing where patients are treated and cured also from an aesthetic viewpoint at the expenses of the Chinese Health Care System.

As a matter of fact, in that hospital as well as in others, there are nurses-beauticians working along physicians specialized in the different branches of medicine who are able to apply, for example, masks for acneic skins to the faces of those patients admitted into day hospital, or to redefine the eyebrows’ contour (Fig. 3). Also, in the same hospital, it is possible to find a pharmacy selling cosmetics produced by the hospital to outside patients, too (Fig.4).

TRADITIONAL CHINESE MEDICINE

Traditional Chinese medicine seeks to treat the whole person rather than an individual disease...
entity. Therapy is based on the interpretation of signs and symptoms encompassing the philosophy of Yin and Yang and to realignment of these forces (3).

The Chinese character Yin indicates the shadowy side of a hill, Yang represents the side which is exposed to the sun.

Yin and Yang oppose each other and, although they look like opponents, they are complementary. Thus, in a healthy body, Yin and Yang are perfectly balanced, whereas in the course of a disease the balance breaks down. Yin and Yang continuously modify themselves in such a way that, in the case of an increase in the body temperature, there will be an increase of Yang, whereas the ensuing perspiration (Yin) will decrease the body fluids and thus consume Yin.

Another fundamental concept in Chinese philosophy and medicine is Qi. This concept has variously been translated into energy, material force, or vital power.

The different translations of the word Qi are due to the difficulty of correctly translating this word which takes on different meanings according to the most different circumstances.

As a matter of fact, Qi represents an energy that manifests itself simultaneously on physical and spiritual level and is in a constant state of flux and in varying states of aggregation.

Traditional Chinese physicians perceive skin diseases as a breakdown in the essential relationship between Yin nourishment and Yang activity. Such a crisis allows the subsequent invasion of the body by several pathogenic factors such as wind, heat and humidity, which further exacerbate the disease damaging Qi, blood and body fluids.

Under such circumstances Chinese herbal therapy, seeks to eliminate hostile pathogens re-balancing Yin and Yang.

As much was learned from the erudite and amusing talk given by Professors Huang Feili and Wang Wei of Beijing University (4).

**NUTRICOSMECEUTICALS & CHINESE FOOD**

The constant link between the body’s beauty and physical and psychic strength was the leit motive of the entire Congress, which paid particular attention to a project of Italian-Chinese cooperation which I explained to an alert audience.

In fact, in China too it was proposed to organize a master in Aesthetic Medicine and Cosmetic Dermatology following the programs that will be developed from this year onwards at the faculty of Medicine - headed by Prof. Renato Lauro (5) - at the University Tor Vergata in Rome. Such talk followed the main topic, on which I gave a talk, concerning nutricosmeceuticals.

The rhythm of life is regulated by our way of life and, consequently, by our diet and by the way we externally treat our body through exercise and the use of appropriate cosmetics.

The cosmetics we use not only have to improve and optimize the skin cells’ turnover, but also make our hair and the whole of our body look more pleasant and harmonious. It is in order to reach these goals that cosmetics and food supplements must be defined as clinically correct, i.e. they must be formulated and controlled in their efficacy both in vitro and in vivo through a number of methods which have been properly validated.

The correct development of these innovative cosmetics and food products undoubtedly represent an important opportunity for both researchers and companies to meet everybody’s expectation: grow old in the best way (6).

My talk raised much attention precisely for the importance that nutrition has always had in Chinese culture. For the Chinese in fact the old Roman proverb *mens sana in corpore sano* has always been valid. As a matter of fact, physicians in old China knew very well and held in high consideration the close relationship
between diet and health.
In the philosophy of Yin, we find that “each of the five main organs reacts to only one out of the five tastes: sour, bitter, sweet, hot and salty that correspond respectively to the liver, the heart, the spleen, the lung and the kidneys, and each organ takes from its corresponding taste the energy to re-generate itself”. Thus the physician had the hard task of accurately choosing the best food for each individual according to his/her ailment. (7).
Food was considered so important that each foodstuff was treated in pharmacology together with all those elements of animal, plant and mineral origin having recognized therapeutic effects. Still nowadays, in modern Chinese pharmacology, all produces from the animal, plant and mineral kingdom are taken into consideration and many of them are used in nutrition science: “take the five cereals as the nourishing basis, the five fruits as complements, the five meats as tonic and the five vegetables as supplements and mix together the Qi and the Wei (the flavors) in your diet: such a mixture is what helps body and mind”.
The search for Taoist harmony is an integral part of Chinese cooking: foodstuffs must be fresh and every dish balanced in its tastes, flavors and even in colors. Foodstuffs must be varied in the course of a meal so that the dry, the smooth and the crunchy, as well as the soft and the saucy, may be there (Fig.5).
What therefore characterizes Chinese culture is that in the course of their history the population has always been able to remain healthy in a balanced way precisely thanks to their nutritional philosophy. Chinese cooking is thus one of the most diversified in the world, like Italian cooking. The dishes available are in fact over 5000, subdivided into four main categories corresponding to as many geographical areas of the country. Northern cooking, known as Mandarin cooking, is typical of Beijing where it is possible to taste the renowned glazed duck; Southern cooking, which is also the most renowned and appreciated, is characteristic of the Canton area; Eastern cooking is typical of Shanghai and of the Yangtze regions and, finally, Western cooking that is characteristic of the Sichuan region and which is undoubtedly the hottest within the Chinese culinary tradition.
Keeping in mind mostly Cantonese cooking that the following proverb was coined: to be born in Suzhou, to live in Hangzhou, to lunch in Juangzhou (Canton) and to die in Liuzhou.
The reason why you should want to be born in Suzhou, considered the Chinese Venice, and live in Hangzhou is easy to imagine if you visit the marvelous gardens of these towns that are immersed in green areas (Fig. 6, 7).
THE AESTHETIC DENTISTRY

Prof. Ronald E. Goldstein, President of the International Federation of Aesthetic Dentistry, also gave a very interesting talk as he brilliantly explained how over the last few years in the United States several medical health providers, such as Dermatologists, Dentists and Plastic Surgeons, have been working in team with beauticians so that their patients may be completely satisfied of the results they obtain (8) (Fig. 8).

It is important not only to cure or substitute a cavity, but it is also very important to keep into its due consideration the gums’ aspect, the regular alignment of the teeth, their color, the lips’ outer look and also the general look of the face. It is for this reason that at his Dental Clinic there are dental technicians, dermatologists, plastic surgeons, cosmetologists and beauticians who work together to obtain the best results, both clinical and aesthetic, so that the patient may be totally satisfied.

The treatments’ final aim is to solve all the medical problems improving the patient’s look both on the short and on the long term.

A whole session was thus devoted to the aesthetics of the mouth and teeth; among those who participated in this session were Philippe Gallon from France, Mariano Flore Rubio from Peru, Sandesh Mayekar from India, So-Ran Kwon from Korea and Luo Yipping from China (9-13).

Healthy and shiny teeth are in fact a fundamental complement to make your smile pleasant and your face aesthetically beautiful.

Mens sana in corpore sano

Such was the general catch-phrase of the Congress which was attended, as Italian guests, by Prof. Enzo Berardesca, Head of the Dermatological Department, S. Gallicano Hospital in Rome, Dr Desanka Raskovic from I.D.I. in Rome and Prof. Luigi Rusciani, who is a renowned dermatologist and plastic surgeon from the Catholic University in Rome (14-16) (Fig. 9, 10).
Enzo Berardesca and Desanka Raskovic explained how two active principles such as phosphatidylcholine and the soluble azelaic acid work simultaneously in the treatment of acne. These two derivatives, inserted into a particular nanostructured emulsion which was patented by MAVI, have resulted active in drastically reducing both surface lipids and the bacterial colonies of *Propionibacterium acnes*, which is the main cause of the development and advancement of acne. Its use turned out to be very interesting also during the summer given its harmlessness that the cosmetic has shown to possess, together with a total lack of side effects due to allergic photosensitization.

Prof. Luigi Rusciani also talked about his personal experiences on the use of a mixture of ascorbic acid, \(\beta\)-glucane and hyaluronic acid having a low molecular weight (Fig. 11).

This new medical-surgical device has shown to possess interesting properties in modifying and improving the aspect of acne scars and stretch marks as well as lengthening the time of duration of the traditional natural skin fillers.

A talk that was completely different from the others was the one given by Prof. Katsuya Takasu, chairman of the Japan Society of Liposuction Surgery. He showed to all the audience how he was able to "get 15 years younger" (17).

While he was talking in playback (?!), he explained in person the surgical interventions that his colleagues have performed on him (face-lift, liposuction of his cheeks, subchin and stomach, redistribution of his hair, peeling with phenol, etc.). Acting under local anesthesia, he described himself the various interventions.

This is how all the wrinkles disappeared from his face, his general look improved and he was able to go back in time, as was evident from the pictures that showed him the way he was before and the way he appeared to us after his intervention.

The participants of the Congress had certainly never been present at surgical operations performed by a plastic surgeon on his/her own person. This unusual presentation has characterized this innovative International Congress of Cosmetic Dermatology, too.

There were many other interesting talks that went from the cosmetic-aesthetic use of natural products that are typical of Chinese culture, to collagen fillings to modify wrinkles and skin scars to surgical operations to increase the volume of the breast or to make the shape of the eye more European-like.

What is interesting to underline is also the collaboration existing in hospitals between the plastic surgeon, the dermatologist and the beautician-nurse in order to obtain better aesthetic results respecting the patient’s health.

The several thousands of people who participated in this Congress crowded the halls and listened to the talks with great interest. Even the exhibition area was well organized. The only Italian company was MAVI from Rome (Fig. 11).
What is interesting to underline is the peculiarity of Cosmetic Dermatology and of Chinese Plastic Surgery that is closely related to their culture and the way the Chinese live a beautiful human body completely immersed in the surrounding nature (18, 19).

It is interesting to visit in all the towns with a Chinese spirit the beautiful parks each full of flowers and plants wisely looked after (Fig. 13), and the way the Chinese conceive their home in the ancient Chinese culture.

**THE CHINESE WAY OF LIVING**

As a matter of fact, the home is organized around the garden in such a way as to make it possible to enjoy it from all different angles (Fig. 13).

A particular hint must be given to the sensations that a European visitor feels every time that he/she arrives in China and makes contact with the crowd.

The Chinese you meet on the street are in great numbers and move quickly, almost running; they take small, quick steps, as graceful as felines. On the street, which is the huge stage of Chinese life, people carry out all their activities from the small hours of the morning until the moment when dusk calls everybody back home.

The old neighborhoods, which are the greatest majority in town, are characterized by very small houses, one onto the other, sometimes separated by narrow alleys where a bicycle can barely pass. In Beijing, but also in Shanghai as in many other cities towns, bicycles come in great numbers and are used by this colorful crowd made up of different ethnic groups.

Older and younger women shield from the sun with small umbrellas that they insert even into the handle of their bicycles. Their complexion in fact must remain perfectly white!

It is also thanks to this way of staying outdoors that skin tumors are less spread throughout the whole of the Far East (Fig. 14).
Without exaggerating, feeling no nervousness nor stress, from dawn to dusk the Chinese strive, commit themselves, produce and consume following an ethic of life that has characterized them throughout the centuries even if - due to the events of recent modernization - a more Western-like way of life is noticeable, with all its faults.

A typically Chinese custom is to take birds in captivity out to converse. What you see in the mornings in the beautiful and well-kept parks in the towns look like a picture painted in light colors. In these parks you meet old people with their cages completely covered to protect their little birds from noises and the confusion. The wicker cages are laid on the lawn. Once the pieces of cloth are removed from the cages the birds are let to communicate and learn how their free companions whistle (Fig. 15).

Fig. 15 A man with his bird

Another custom that is noticeable early in the morning in the parks is a crowd of people of all ages performing Taiji Quan.

Taiji Quan is a particular workout that is carried out by moving very slowly and which is particularly important to safeguard your health and to prevent diseases. As a matter of fact, the slow movement of all muscles moving in harmony with your breath has positive effects on the nervous system and on the cardiovascular, respiratory, osteo-articular and digesting systems and on your basic metabolism.

Chinese Traditional Medicine and Western Medicine represent in China today two different ways of treating pathologies. They can co-exist, but at any rate they must reach the goal of keeping all citizens healthy.

Aesthetic Medicine and Cosmetology also aim at treating the look of the body and the health of the spirit following the ancient Chinese traditions and the technical-scientific progress that took place, especially in the West, in the course of the last fifty years.

This is the fundamental message that was learned from this interesting Congress. About five thousand physicians and paramedics took part and about thirty companies from the dermocosmetic field participated in it. Of these only one was Italian.
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