**Definition**

The original scientific definition “striae distensae” was made by Roderer in 1773. After in 1867, Koestner analysed from an histological prospective observing the atrophy of the skin tissue and named “striae atrophicae”. At last in 1932 Cushing presented his studies concerning the syndrome of the same name that allowed a fundamental understanding and knowing of its pathogenesis. Thanks to a relevant economic and commercial interests, the study of striae has reached a very important development in the medical and aesthetic field.

The strie or stretch marks are presented on the skin parallel to each other, divided by healthy skin, raised or sunk on surface and have the colour from red/purple to white/mat. They can be several centimetres long and it can reach to 8/10 mm. wide.

From an histological point of view “striae atrophica" means the reduction of the epidermis thickness, to an evident atrophy of the epidermic collagen bundles and to a reduction of the elastic fibres that are situated in the proximity of the sides of the stretch marks and that are thinner and contracted. Inside the stretch marks the atrophic tissue is not vascularised.

**Epidemiology**

Striae is a very common type of aesthetic problem, generally effects the i caucasian race (white) and more rare in the asiatic population (chinese, japanese).

Usually stretch marks mostly will show up between the adolescence phase and third and fourth life decade. It can be manifested in both sex even if it interests prevalently females who can notice the first appearance of stretch marks between the age of 12 and 16, localized on hips, thighs and breasts. The hormonal and biochemical alterations of the pregnancy without any doubt represents the principal reason of stretch marks during gestation, generally beginning from the 7th month of pregnancy, due to a very well known negative action of the estrogens on the synthesis of the collagen. Women are mostly effected in the first pregnancy while for the second time can stretch marks occur much less or in some cases there will be no presence at all. The presence of strie, completely rare in the childhood phase, except for the Cushing syndrome and in some cases of cortico-surrenaliche or streoidea therapy presence, can effect about the 40% of the teenagers and the 80% of women of the age of 40. In the last years it has been noticed a several and constant escalation of this problem regarding also the male population which was very relative in the past years. Today we can see this problem on boys from 16 to 20 years old usually presented on hips, kidney area and arms.

We should also point out that the reason of the stretch marks is about also the mechanical action of the skin and rapid gaining and loosing weight. A simple example can be the presence of abdominal stretch marks during gestation due to the expansion of the skin caused by the weight and the baby that is growing inside the abdomen of his mother or the presence of stretch marks...
on breasts due to variations of the milk production of the mother and the suction of the baby and so to a mechanical action done from the baby. In both cases, the traction effects the collagen fibres which are already mature, causing the breaking of them, who will start a regenerative phenomenon that will concretize on the stria. This phenomenon causes sprain and a debilitation of the dermal capillaries, consequently less blood affluence with evident ischemia. Therefore the less oxygenation and the degeneration of the fibres of the collagen and the consequential less affluence of nutritive substances will create a metabolic suffering responsible of a cutaneous relaxation, as we see on the skin that has stria.

**Pathogenicity of Stretch Marks (Strie)**

Although we must admit that there are still some points that more studies needs to be done on stretch marks, we can say that stretch marks are lesions due to the damage of the epidermal connecting tissue that is manifested initially with an inflammatory phase and become a scar. The appearance of these lesions can depend on mechanical, biochemical, hormonal and genetic functions. So we confirm that stretch marks determines a definitive cutaneous alteration due to mechanical cause (excessive tractions and fast volumetric and/or weight variations) on the skin defined from a weak resistance capacity and constitutional causes. Right after the alteration and degeneration of the collagen fiber there are two different progressive stages of stretch marks. The first stage is distinguished from a very strong enzymatic activity and fibroblasts, with the restoring of the mucopolysaccharide production, that can last for several months and reach maximum 2 years that can be defined regenerative or inflammatory. In this phase the stretch marks reach their maximum extension and assume a colour that can change from paled pink to purple/red. Generally the surface of a stria is smooth and sometimes can generate a slight itching sensation, especially during the first appearance. In this phase the stretch mark is clinically defined as “striae rubrae”.

The second stage is characterized from a disappearance of the intense purple/red colour, change as white pearly colour, while the surface will result weak when touching and when there is a traction, in some cases with few perpendicular roughness on the stria. In this second stage, as they are in phase of recovery or healing, the stretch marks are defined “striae albae”.

**Histology**

The histological analyses of the tissue of the stria is varied depending on the evolution phase of the stria and the localization of the sample if centrally to the lesion or not very inside of the lesion of the tissue. As we analyze epidermis we can see how appears normal initially, and after degenerated as it is suffered by an atrophy and reduced its thickness. The derma, which is the place of the principal structural alterations, can be involved with its every single cellular, intercellular e fibrillar component (collagen and elastic), until to reduce its thickness of 50% and more.
In the early phase (striae rubrae) epidermis has the intercellular spaces dilated and detect a light perivascular infiltration, prevalently linfocitary, while fibroblast reduce their regenerating action. During the evolution of second phase of stria (striae albae) all the alterations generally can result normalized and absorbed. The collagen fibres result to be altered either in the initial phase or the evolution phase, with evident fragmentations and attenuations. To a derma level, the elastic fibres in the first phase are characterized from different alterations, like breakings and extension mostly when the collecting is effectuated centrally to the lesion. In the second phase, they appear to be thicker and they seem to assume a normal aspect, even if with a different orientation in the inside of the tissue. We can easily establish that even the collagen or the elastine, consequently to the appearance of strie, can start a degenerative process similar to the one who characterize the cicatrical tissue.

**Phase One**

As a first phase we reduce the thickness of the corneous skin coat, particularly evident in stretch marks cases. To obtain a better result without creating problems or sensitzations of the tissue, we adopt a particular utensil that has the shape as a bell which contains an internal metal disc on which we apply a special abrasive sponge, particularly soft. So the “bi-one™” machine creates vacuum sent to the inside of the bell that will be applied on the area with stretch marks. The operator will regulate the machine respecting the operative schedules that are in the manual of use; thanks to this vacuum, the skin is lifted up and carried to the abrasive sponge that will start acting reducing the corneous thickness in an extremely smooth and efficacious way. We move the peeling handful for some seconds on the interested area, until the skin become flawless and red , very evident either
to the sight or to touch, which will appear smoother and more elastic. The abrasive sponge is disposable. During this phase, the operator must use the handful close to the skin, without putting pressure that could create unpleasant sensations to the treated patients, we remember that the adhesion of the handful is done by the vacuum produced by the machine. The aim of the peeling is essentially two: the first one, visible after few seconds, is the necessity to reduce the thickness we find between the stretch mark and the integral skin; the second one is to bring a correct cutaneous transpiration of our body brings the 7% of the oxygen necessary to our own functions. The corneous coat usually retard the transpiration because of its own thickness, so in order to reduce it we must bring more oxygen to the inside of the tissue which is already suffering, as under the derma of the stretch marks there is not much vascularisation.

Phase 2 The nutrition

After reducing the hedges constituted from the corneous skin coat, we nourishes the skin, using a square wave stimulation, so that we will be able to encourage the moving of the active ingredients and at the same time create an action to the capillary wall so favouring an important vessel pumping. To obtain these results, we adopt a particular flat handful in two sizes, equipped with steel balls assigned to be in contact with the skin, these steel balls allows the electric impulse transit and a mechanic micro-massage action. We move the handful with circular movements trough the area to treat until the skin becomes more compact, lighter and shining, while the stretch marks in some cases, begin to loose part of the opacity that normally has. With the handful with the steel balls we use "Bi-one step 1", a particular cosmetic rich of ialuronic acid, which is a molecule adopted with a remarkable success in aesthetic surgeries, able to moisturize deeply the skin and give it a turgid light aspect; fitorboside and sericin, able to form an inter-cellular lipid membrane and a slight superficial coat able to reduce the loss of the water and leave the skin more hydrated and elastic; phytolifting, which owns an extraordinary stretching action is able to reduce the scarf of the stria to the sensation of touch and sight, normally much more evident; elastine, which donate elasticity to the skin, very important either to attenuate the deepness of the stretch marks or to prevent that new stretch marks don’t occur; vitamin E, a strong immune-stimulant element able to multiply the reparative property of bio-dermogenesi. The product is applied in small quantities and absorbed in few minutes, usually enough to show a better brightness inside the scarf of the stria; If the product is absorbed so quickly more product is applied for another time. For the breast treatment we substitute the product “Bi-one step 1” with a specific gel called “Bi-one breast”. This cosmetic gel is rich of particular active ingredients: the Volufiline™ and the Bio-Busyl™.

Volufiline™ makes an invigorative action to the adiposity of the breast and Bio-Busyl™ with a restructuring and invigorating action.

In laboratories tests, these components have showed an important increasing of the volume and of the turgidity (check attached test).
Phase 3  The regeneration

The third phase of the treatment is, with no doubt, the most important one. We use a special oval or bell shape handful, which create vacuum. This vacuuming effect permits a slight blood afflux in the treated area, on purpose balanced from the special form of the handful and in the same time it pulls up the cutaneous surface, bringing the skin to a contact with the central nucleus of the handful, which it contains a special generator of bio-compatible magnetic fields.

This exclusive stimulation form, interacts with the sodium and potassium pumping, which are real biological vehicles able to transport inside the cellular membrane, the nutrition of the intra-cutaneous areas encourages the dispatching of the toxins brought from the cellular metabolism. The persisting migration of the ions contributes to raise the derma and hypoderm temperature of two, three degrees, enough to permit an increasing of the cellular mitosis until the 300% more compared to the physiological reproductive cycles on the treated patient (see Van’t Hoff law) furthermore an important reactivation of the primary functions of the fibroblast, thanks to the afflux of blood and oxygen, consequence of the vacuuming action, so that we assist to a hyperaemia of the surface, normally absent in the tissue with strie. So the synergy produced, permit for the first time, to expand one more time the derma, normally attenuated to the 50% from the actual stria, and nourish the cells and oxygen the tissue, encouraging a progressive renovation of the capillary calibre. Viewing the results of the treatment, we can already notice from the first session, a very evident result that we can notice by touching and seeing, even the results are different from patient to patient. More, on every treated patient, we see how the tissue appears to be improved at the beginning of the second session. This will make us think that the cellular reproduction process and the micro-circle reactivation are not limited to the period of one treatment, but actually they try to consolidate in the following hours, showing how the result obtained is clearly due to a regenerative phenomenon of the tissue, and therefore stable and long lasting in time. In this case we can notice that the echography of the muscle tissue, treated with bio-compatible magnetic fields similar to the ones we used, have showed a longer regeneration of several hours after the end of the session. To optimize the treatment, we use a cosmetic called “Bi-one step 2”, an oil with a base of jojoba and corn derivatives, selected because it contains an elevate presence of fatty acids, very important for the protection of the skin. This product is non-fat oil that, thanks to his chemical structure constituted from linear bonds, easily and deeply penetrates into the epidermis, fighting the atrophy process of the collagen and elastic fibres, clearly evident in strie, donating to the skin elasticity and
smoothness. At the end of this phase of the treatment, even if has been used an oily product, the skin appears to be moisturized and never greasy or oily. Trying to expand on the effect having from the third phase of the treatment, its essential to know more about what kind of the biological effects we obtain. Bio-dermogenesi is based on the application of a screened electrode, which does not permit a direct energy transition to the treated skin, to which will be projected inside a huge energy quantity with variable frequency, that will alternate moments of positive valence to moments of negative valence.

Among these, we can start to exam the sodium (Na+) and the potassium (K+) for their biological action as they are able to transfer nutritional factors trough the cellular membrane, certainly able to nourish the cell and to favour the expulsion of the toxins trough the inter-cellular area, produced from the normal cutaneous metabolism. Now let's check the cutaneous tissue with a normal position of the two elements indicated (see drawing no. 01).

At the time of the activation of the distribution, the equipment generates a positive sign signal, so a magnetic field with positive valence, generating the following reactions:

During this phase, the sodium and potassium, move to the inside of the cellular membrane bringing nutritional factors (drawing no. 02).

At the end of this phase, we have the presence of Na+ and K+ almost exclusively to
the inside of the cells (drawing no. 03), in this case they are extremely rich and well nourished, thanks to the increasing of the pumping of these two elements, normally in charge of bringing inside the membrane, the nutritional cellular factors. Thanks to this application, we accelerate the phenomenon of the cell's enrichment, essential to access to the following mitosis.

To this phase follows a distribution with a negative sign that requires for sodium and potassium to the outside of the membrane.

At the end of this phase we have brought the examined ions to the outside of the membrane (see drawing no. 04).

When the distribution of the negative signal is terminated, the sodium and potassium ions are brought to the outside of the cellular membrane allowing the toxins elimination of the cutaneous cells, essential to encourage a better cellular mitosis.

The situation created from the continues and repetitive ionic migration, which is a big cellular nutriment and toxins elimination guaranteed from the higher activity driven from sodium and potassium, overheat unit of the lowed tissue (derma and hypo-derma) brought to 39, 40 centigrade's degrees, due to the attrition generated from the moving ions and to the better hematic afflux, with consequential increasing of the oxygenation of the treated area, it allows to understand clearly what Van't Hoff law contemplates regarding the tissue regeneration.
Until today, the only limit who has been verified on the use of this kind of energy form is due to the fact that these equipments always use a fixes frequency, compatible with more than two /third of the treatable subjects. In some cases though, the frequency used has been detected not to be applicable on some patients and so for this reason it exposed the patients to overdose risks like coetaneous burs, or under dose, with limited or none results at all. To obviate the problem of the limit characterized from this form of energy, Expo Italia invented a device that is able to use a variable frequency. At the moment of the production of the energy, it will be projected from the machine to the patient through an active handful, who will go through the patient until to arrive to the concerned handful and back inside the machine through the red wire.

So this machine produces energy with a variable and constant intensity of frequency, measuring through the feedback, the quantity of energy that can be actually efficacious.

The equation elaborated from the machine, for every value of frequency distributed, is the following:

Intensity of energy distributed - Feedback level = energy biologically active

The micro-processor controller transcribes, in a memory location, the active biological energy dosage, which has been registered for every value of frequency distributed, and automatically sets up the emission on the value who has registered the higher efficacious dosage. Analogously, in the case the level of feedback would be in shortage, because of the characteristics of the treated tissue, the machine will autonomously effectuate a new scan, like mentioned above, to determine which new and right frequency should be used for the treatment. It only will take few seconds to the machine to effectuate the new scan. Logically, if the patient would not hold the referring handful, the machine will not be able to search for the tuning, risking to reduce drastically the potential results of the treatment.

Phase 4  The final massage

The treatment will terminate with a massage, if possible, with a reversion movement along the lymphatic ducts, using the handful with the steel balls that has been used in phase no. 02. As preliminary, we apply “Bi-one step 3”, a cosmetic gel, rich of a low dosage of glycolic acid, able to level off furthermore the cutaneous surface, reducing the difference in height between stria and integral tissue, iaiuronic acid (see phase 3), collagen, present in solvable formulation, that will contribute to form and increase the density of the skin elastine (see phase 3). The matching between the cosmetic and the type of stimulation used, leaves the skin clearly lighter, compact and shining, while the stretch marks progressively become less evident, the scar attenuates, until in some cases, to appear swollen, reddened and raised compared to the cutaneous surface, evident symptom of the reparative action alive. In any case, in the following hours to the treatment, we assist to a phenomenon of skin adjustment, where the collagen fibres star to react donating a better tissue elasticity, absorbing the swollen and accosting the facing of the tissue of the stria to the integral skin, obtaining the wished result, which is a smoother and more compact skin, with less evident stretch marks either to touch or view.

The following treatments series always permit a better levelling of the cutaneous area, since to be able to sun tan the stretch mark, even if with a different number of sessions for each subject. Logically, the pigmentation level of the scarf will be minor and the sun tan progression slower compared to the surrounding skin, since for the hole time of existence of the strie treated, the scarf exposed to sun rays has not been pigmented, so there’s no presence of a production of...
melanin normally existing as sun tan residue took different months before. This data is proved also from the fact that the skin subject to abrasion or pathology like measles and scarlatina, and so to regenerative phenomenon driven, gets sun tan reaching a less intense pigmentation compared to the surrounding skin tissue, until to obtain a levelling of the colour only after several and long sun ray exposures, generally after at least two or three sun tan sessions. For sun tan sessions, we mean a sequence of sun ray exposure, the consequent pigmentation and the following come back to the normal skin colour. Once we consolidate this data, it’s obvious and evident that Bio-dermogenesi is absolutely, the only system, able to sun tan the scarf of the stretch marks again.

The Bio-dermogenesi never gave any kind of problems or any collateral effects on different subjects treated. Even if the treatment expects a soft abrasive application in the first phase, the skin has always appeared to be integral, compact and shining; the vacuum created from the special structure of the handful of the machine and from the control level driven from the machine, determines a mild redness of the tissue, still maintaining always under control a low risk of diffuse oedema, usually very probable when the capillaries who have not been normally active for years, have been stimulated.

At the end of the treatment, the application is complete and balanced, so greatly visually optimized comparing to the cutaneous physiology, allows the patient exposure to sun tan right after the end of the session, also with the use of tanning lamps to be able to appreciate the results by realizing how the scarf of the stretch mark begins to pigment initially with a rosy colour that will become more red to a natural colour until to reach the edge of erythema and than the sun tan.

The skin will be totally safeguarded, matter of fact we do not provide any limitations consequent the use of the machine on sane patients; so any of the patient who will be treated with bio-dermogenesi can continue to use tight clothing, tight jeans, stockings, etc. and they can keep on wash with gloves for remove the hair on skin and use normal exfoliates products for the personal daily care. During the bio-dermogenesi treatment sessions, we suggest to use very good nutrient and hydrating cosmetics, to improve further more the response from the

**The results**

The esthetical and structural benefits of bi-one™ on the treated skin are:

**Immediate**

Right after from the first treatment the stretch marks reduce their deepness of the scar, become smoother and compact with a similar color of the surrounding skin and reduce the opacity, typical of this esthetic problem. The yield of the first treatment is variable, and anyhow evident both when seeing and touching. Generally after the following hours of first treatments the tissue continue to make progressive improvement.

**Concreting**

The biodermogenesi™ is working with increasing and stabilising the sanguineous and lymphatic blood supply so normalising the colouring of the same stretch marks; furthermore favours the cell reproduction starting from the coetaneous stratum right under the scar of the stretch mark, filling the tissue with new cells that give the skin for another time the hydration and raise the stria until reaching to the same level of the surrounded skin. The regeneration is seen integrally on the skin effected by stretch marks, until making possible to get tanned of the stria and create a perfect harmony with the healthy skin.

**Lasting**

The result obtained with biodermogenesi™ is evident, stabilised and lasting. The vassal gymnastic and capillary blood supply, the
reactivating cellular metabolism are stabilized progressively, treatment after treatment, until obtaining a final result that the skin becomes as it was before having stretch marks. The stabilisation of the result is guaranteed because that the stretch marks generally occurs in determinate periods of human life (puberty, gestation, hormone alterations), and does not regenerate for another time unless those written above are present.

**Smoothness**

The stretch marks reduce its thickness progressively until obtaining the same level of the healthy skin. The perception of the esthetic problem is reduced also right after the first treatment until the elimination of it during the treatments, giving a sensation of a smooth, soft and elastic, similar to the surrounded skin.

**Blood-supply**

With the treatment is possible to see the how stretch marks are raised, lost the opaque colour and uniform with the surrounded skin. We know that the colour of the skin is given by the reflex light of the red globules, that demonstrates how during the treatments the micro circular blood supply progressively is reactivated until obtaining the analogue functioning of the healthy tissue around the stretch marks.

**Getting rid of the toxins**

The reactivating of the lymphatic micro circle allows to the treated skin reabsorb and drain easier by the toxins existing in the intercellular space. This phenomenon give more brightness to the skin as it looks like a young and healthy skin.

**Elasticity**

*Bi-one™*

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The regenerative process of the biodermogenesi™ is determined with the production of collagen and elastic fibers in order to permit a stability of the obtained result. The elastic collagen starts to take its specific action inside the skin which gives the correct support that permits the blood supply of capillary and re-activate the fibroblast.

**Hydration**

The re-activation of the cell production, a superior vascolarisation and restart of the lymphatic circulation system are able to guarantee a superior hydration of the tissue that has much more compact and turgid look.

**Tan**

During the cycles of the treatments done with Bi-one™ the reactivation of the cellular metabolism and the restart of the functionality of the fibroblasts make possible to a progressive production of new melanocits which have the action of tanning of the scar of the stretch marks. The biodermogenesi™ is the absolute system of work that permits the stretch marks to get tanned in a natural way.

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