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**Fabric with active principles and relevant recharging method of the active principles**

The fabric consists of lycra fibres and microfibres and it has long the fibres a glycoprotein (9) and an exapeptide (10). The woof of this fabric and the active principles given to these two substances (9,10) prevent and/or give the first cures to the diabetic foot.

**FIG. 1**
The present invention refers to a fabric with active principles and to a recharging method of said principles having the main aim to prevent and/or to give the first cures to the diabetic foot. Between the diabetes complications are known the problems to the feet caused to ulcers, accidental injuries, micro-traumas, wounds also light, callosity and infections. Are known the grave damages and the risks of grafting of important complications from light wounds in the diabetic patient. The persons with these pathologies have a reduced flux of blond in the inferior arts, in particular from the knee to the foot, owing to a stricture of the arteries. Moreover, the diabetes gives a progressive destruction of the nerves that arrive to the foot and to a skin degeneration, that becomes dry and inflexible, so easy to be subjected to wounds. The concomitance of these events determines infections often careless and minimal realized to the diabetic patient, this due also to a minor sensibility of the nervous terminations of the foot. The degenerative forms created to a light wound are, owing to the complications given to the metabolic, circulatory and neurological alterations, not to disregard as they easily evolve in serious pathologies, unfortunately favourite to long times for healing the wounds in the diabetic patient, with consequent increasing of risk of bacterial, viral and mycotic infections. The complications of a normal disregarded ulceration are one of the more frequent causes of admission to hospital for this pathology. The non-prevention and non-care of that known as diabetic foot determines the claudication and, in the grave cases, the amputation of the art. A consistent percentage of diabetic persons are subjected to ulcerations to the feet that prolong in the time can grow worse. To have an idea of the problem are cited the data of the Health World Organization where are counted in one hundred and twenty million the diabetic persons in year 1996 and it is estimated in three hundred million the number of diabetic persons in year 2025, where on an average the 15% will have ulcerations to the feet with complications. Always from the cited sources are known data that counted that for one hundred diabetic patients with amputations eighty-four have had as cause of the amputation an ulceration to a foot grows worse in time. Moreover, over the 50% of all the amputations of the lower limbs regards diabetic patients. Currently are not known local preventive applications to be constantly used to prevent, cure or reinforce the defences of the foot of the diabetic patient so to avoid the complications previous described. The sole forms of prevention in this delicate sector are given prevalently based onto mode of behaviour as the careful test of the food, the sanitary education for observation of hygienic rules, the using of correct shoes and the application of topical remedy at the appearing of the first ulcerations. The invention, instead, realizes a therapeutic remedy able to prevent the formation of ulcerations and to favour the recovery of wounds eventually formed. The invention creates a fabric, for specific application in this pathology, impregnated with substances with synergetic action and gradual release, and a recharging method of said active substances when these have lost their efficacy in time. The recharging of the active principles to the fabric permits a reusing of the specific fabric and it permits to have a set of clothes with controlled release of the active substances. The invention consists of a fabric 1 in lycra fibres and micro-fibres (known with the trade "meryl"), in variable percentages for application of this kind, that in actuation has the form of stocking 2, pantyhose 3, sock 4, winding bandage with closed border 5, bandage or plaster 6. This type of fabric, with new application for the specific pathology of the diabetic foot, has the characteristic to have fibres with minor or equal subtlety to ten micron. So the fibres of this fabric are of inferior diameter to that of the silk, that have a subtlety of the fibres of twelve micron, of the cotton with subtlety of the fibres of thirteen and half micron, of the cashmere with fibres diameter dimension of fifteen micron and of the wool with fibres diameter dimension of seventeen micron. The application of this characteristic of the invention is of big importance for the diabetic foot such as more the thread is thin minor are the damages to abrasion of the fabric onto the skin. So an extremely smooth fabric is obtained that no obstruct the venous flux, to not worsening the occlusive peripheral arterypatia and to favour the local microcirculation. Unlike to the other synthetic fibres, moreover, it has capacity of humidity absorption, low rate of water retention and, differently to the natural fibres, quick time of drying. These characteristic have like resulting capacity to oppose the formation of fungus and to limit the bacteric growth. To the fabric 1 are then added active substances with application method to the fabric and recharging method of new conception. To the fabric 1 is bound a glycoprotein 9 (pseudalteromon- ones ferment extract, known with the trade "antarcticine") synthesized to a bacteria (pseudalteromonas antarctica NF3) of the species Gram-negative, with composition of the fat acids and to the proteinic outline typical of the alteromonas family. This substance during the cellular growth produces a glycoprotein exopolymer composed of the 76-86% of proteins and to 8-14% of sugar, in base of the used means. This active substance have had use, previous to the invention, like a cosmetic humectant and emollient ingredient and like a substance with crioprotective property. Said active principle, of new and original application in the treatment of the diabetic foot, has important property that opposed the dryness of the skin typical of the diabetic patient. It gives, in fact, the coesion between the spinous and germinativum stratum favouring the madding and the folding of the interkeratocitil liquids, so as estimated through the compression studies of the isotherms and of the multilayer of the Langmuir balance. Moreover, said substance stimulates the growth of the
human skin fibroblast in the tests in vitro without the growth of the keratinociti, so acting onto the micro-ulcerations of
the skin to their first turning up and onto all the cute surface, from the knee to the foot. Moreover, the active principle
given to the cited substance increases the formation of elastin and of collagen type I and type IV with increasing of the
cute hydration of at least the 45% in the twelve subsequent hours in comparison with a sample of skin not treated or
treated with cream with the only placebo effect. This substance is inserted in the wet fabric in a quantity of at least 1
mg/ml. To the fabric 1 is then added, without order of insertion to the fabric but with modality of charge and recharge
following described, an exapeptide 10 from the alpha chain (known with trade "serilenses"). This peptide increases
the adhesion of the cells, favours the cellular proliferation and betters the microcirculation such as it favours the angiogenesis.

This active substance is added to the wet fabric 1 in quantity at least of 0.05 mg/ml. Also this last substance is never
previous used for the use in pathology such that of the diabetic foot. Both these substances are previous used in the
cosmetic field. So they do not present toxicity problems and they are not to be considered drugs to be prescribed with
prescription. In particular do they have, such the made tests has certified, cytotoxicity on human fibroblasts, cytotoxicity
on keratinocity, they have no given toxicity prove in the tests of hemolysis, in the tests of genotoxicity, i.e. in the Ames
tests, and they are not irritating as valuing with the wet-cam for the valuation of the potential ocular irritation. The used
substances in the described concentrations do not create irritation to the skin, sensitization phenomenon, ocular irritation
and oral and skin toxicity. These substances 9 and 10 are moreover bound to the fabric 1 essentially for coulomb bond,
being they with prevalent positive charge whereas the fabric has fibres with negative charge for own constitution. The
substances 9 and 10 are mixed into microcapsules 11 soluble in water. The fabric 1 is then washed in water at 50°C.

Ending this working the water is discharged and the fabric is wet with clean water to which is added a mordanting
assistant 12, the nylofixam PM (known with trade "clariant") that has the function to bound the substances contained in
the microcapsules 11 to the aminic group of the fabric 1, by means of the polarization that favours the union between
the fabric 1 and the substances 9 and 10 into the microcapsules. The fixer 12 is then added in proportion of 4% of the
weight of the fabric 1 to treat. Then are introduced in the bath the microcapsules 11 in the dose previous described and
in total quantity of the 6% of the weight of the fabric. After ten minutes is added a cationic product 13, i.e. softenol 70
(known with trade "lautex") that contributes also it to bound the microcapsules 11 with the fabric 1. The "lautex" is added
in percentage of 2% of the weight of the fabric. After ninety minutes the bath is let out and the fabric 1 is centrifuged and
dry, ready to be used. In the version for the domestic use the microcapsules 11 and the fixers 12 and 13 to the fabric 1
are sold in pres-dosed packaging, to can use the stocking 2, the pantyhose 3, the sock 4, the winding bandage 5, the
bandage or plaster 6. To actuate the recharging of the active substances 9 and 10 to the fabric 1 for domestic three
grams of substances 9 and 10 in microcapsules 11 are brought and they are dissolved into 300-500 ml. of water, after
to have washed the used fabric 1, at a temperature inferior to 40°C. The pantyhose, or the sock or the other forms of
the fabric 1 are then left in soaking for 15-20 minutes. These products are then dry in air. After this treatment the fabric
1 have an uniform distribution of the active principles. With pre-determined times are provided rechargings, also
conserving the active principles effectiveness till the third days of use. The invented product conserves the active principles
also after three washings. However, it is suggested the daily washing and the recharging after three days from the first
use with the method above described. The simple application of a cream with active principles does not reach the useful
results for the diabetic foot pathology such as the results obtained with the invention such as the friction of the foot with
the conventional pantyhose creates, during the walk, frictions that take off the cream instead of makes it to absorb to
the skin of the foot and neither the occlusive bandages with cream and gauzes are not to be used if no with the patient
in bed. The invention is so to be used in the daily without constraints and/or changing to the style of life of the patient.
The invention in the application in the form of application also winding bandage 5, cicatrizant bandage or plaster 6 have
application also remedy for the bedsores and/or light wounds.. The cicatrizant action, the better of the micro-circulation
and the effect on the derma determine a quick healing of these woods without collateral effects. The invention is illustrated
in a merely indicative way in the drawings of sheets 1 and 2. In sheet 1 figure 1 is view of an example of production like
a stocking. In the same table 1 the figure 2 is view of an application like a stock. Figure 3 is view of the version like a
pantyhose. Figure 4 is view of the version of winding bandage with closed profile. Figure 5 is view of the version of
bandage or plaster. In sheet 2 are illustrated some sequences of the recharging phase of the active principles of the
invention. In detail figure 6 is view of the immersion phase. Figure 7 is view of the invention soaks in water with the active
principles.

**Claims**

1. Fabric with active principles and relevant recharging method of the active principles **characterized in that** a fabric
(1) consists of lycra fibres and micro-fibres and it has distributed long the fibres a glycoprotein (9) and an exapeptide
(10) and that the wool of said fabric and the active principles given to these two substances prevent and/or give the
first cures to the diabetic foot.
2. Fabric with active principles and relevant recharging method, as to the previous claims, **characterized in that** the fabric (1) with the substances (9, 10) have the production form of a stocking (2), of a pantyhose (3), of a sock (4), of a winding bandage with closer border (5) of a bandage or plaster (6) so to realize a continuous and persistent contact with the skin of the diabetic patient.

3. Fabric with active principles and relevant recharging method, as to previous claims, **characterized in that** the fabric (1) can have in the woof thin silver yarns (7) for a anti-bacteric and bacteriostac function.

4. Fabric with active principles and relevant recharging method of the active principles, as to the previous claims, **characterized in that** the active principles (8, 9) are mixed into microcapsules (11) soluble in water.

5. Fabric with active principles and relevant recharging method, as to the previous claims, **characterized in that** to have the concentration of glycoprotein (9) to the wet fabric (1) in quantity of at least 1 mg/ml.

6. Fabric with active principles and relevant recharging method of the active principles, as to the previous claims, **characterized in that** to have the concentration of exapeptide (10) to the fabric in quantity at least of 0,05 mg/ml.

7. Fabric with active principles and relevant recharging method of the active principles, as in the previous claims, **characterized in that** the recharging or the first charging of the washed fabric is actuated bathing with clean water the fabric (1) to which is added a fixer (12), the nylofixam PM, in proportion of 4% of the weight of the fabric (1) to be treated, with the subsequent putting in water of soluble capsules (11) containing the active principles (8, 9) in total quantity equal to 6% of the weight of the fabric and, at the end, after ten minutes, is added the softenol 70 in percentage of 2% of the weight of the fabric and after ninety minutes the bath is discharge and the fabric (1) is centrifuged and drying, prompt to be used.

8. Fabric with active principles and relevant recharging method of the active principles, as to the previous claims, **characterized in that** to provide, for the recharging in domestic use, the use of three grams of the substances (9, 10) into the microcapsules (11) dissolve into 300-500 ml. of water at a temperature inferior to 40°C and soaking of the fabric (1) for at least feethen minutes.

9. Fabric with active principles and relevant recharging method of the active principles, as to the previous claims, **characterized in that** it is used like a remedy for the bedsores or for the light wounds.