Multifunctional Bioproducts Obtained by Innovative Technologies

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For this study the creams, based on collagen or lanolin and active principles from: Viscum album, Ocinum basilicum, Rosa canina, for cosmetical and medical use, were prepared. The active principles from the obtained vegetal extracts were identified on classes and / or compounds by spectrophotometric and chromatographic methods. The choice of the active components, from the selected plants, that will be included in the creams was performed depending on their biocompatibility with the derma and on the obtaining of some complexes with the collageneous protein, with high content of bioactive substances. The biocompatibility was intended to evidence the tolerance and the affinity between the biopreparation and the coetaneous constituents. This affinity was correlated with the biological origin of various used compounds, generally, with the ones which exhibit resemblance or even similarity with the derma constituents.

Keywords: creams, collagen, vegetal extracts, biopreparations

The development of the cosmetics manufacturing industry lead to the widening of the bioproducts with beneficial action on health and beauty [1-9].

The efficiency of a vegetal product, of the extracts obtained from it respectively, is concerning not only on the action of a single active principle, but at the separate and synergic effect of more active principles. Sometimes, even the ballast type substances are influencing the activity of the bioactive principles, tending to increase or prolong it. These facts determine mostly the use of some plant extracts, and even there is the technological possibility to obtain and separate one single active principle as pure substance.

The contribution presents the obtaining procedure of the collageneous based creams with biological active principles and its therapeutical effects. The possibility to make valuable both the vegetal bioactive potential and the crude bovine leather wastes, by developing biopreparations with curative properties is presented. These ones are hydrating, wound healing, dermogenerative, tonifying and relaxing. It is stated that there is a conjugated action of the active principles from the selected extracts and collagen, which might lead to the healing and the good functioning of the conjunctive tissue.

The developed biopreparations have the role to hinder the ageing process by an active protection against sunbeams, hydration and stimulation of the skin metabolism, tonifying, relaxing, vitaminization and protecting action of derma against allergeneous factors. The natural extracts used in creams have a stimulating action, which might be applied and made valuable by treatments in the cosmetic shops, was noticed.

Experimental part

Materials and methods

The obtaining procedure of the creams consists in the following steps:

- preparation of the vegetal extracts from: *Viscum album, Ocinum basilicum, Rosa canina,* by maceration. More specifically, the grinded product and the extractive liquid were introduced in a sealed vessel, left for three days at 25°C temperature, stirring three times a day . The imbibitions and extraction were performed based on osmosis and diffusion. The obtaining of the extracts by maceration was performed taking into account the grinding degree of the plant, plant – solvent contact time, mechanical action, working temperature, separation of the solution and compressing of the plant, filtration after the sedimentation (six days at cold);

- preparation of the collageneous hydrolysis compound from animal derma by high temperature and pressure hydrolysis of the bovine leather derma.

The obtaining technology of the bioactive creams from collageneous hydrolysates with denatured conformational structure is composed from the following steps:

- introduction of the composite formed from collageneous hydrolysates and vegetal extract;
- preservation;
- cream conditioning.

The collagen cream contains also the following components: glycerin, vitamin A oily solution, distilled water, vegetal extract. The chemical composition of the obtained vegetal extracts was set up spectrophotometrically (UV-Vis, IR) and by thin layer chromatography.

Identification reactions for polyphenols, flavones, coumarone, aliphatic and aromatic amines, amino acids, triterpenic saponosides and mucilage. The metals were semi quantitatively determined by inductive coupled plasma emission spectroscopy, with an ICP - AES Liberty type 110 VARIAN, model 1994 with Rapid Quant program.

The obtained extracts were characterized by UV-Vis and IR spectroscopy.

The "fingerprint" spectra of the extracts were carried out, identifying the characteristic peaks, its calibration and stability, time repeatability studies were also performed.

The extracts with the analyzed stability were immersed in the collageneous, macromolecular natural support. The immobilization of the bioactive extract in the creams provides a gradual release of the active principles, due to the controlled release, determined by the collageneous hydrolysate (which is hydrophilic and biocompatible).

The UV-Vis „fingerprint" spectra of the vegetal extracts evidence the characteristic peaks presented in the table 2.

The IR spectroscopy group frequencies for the studied extracts are presented in table 3.

The cream prepared with *Viscum album* active principles were tested in vivo on animals and the one with

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Plant / Compound	Ocinum basilicum	Viscum album	Rosa canina
Organic compounds			
Polyphenols	+ (anetole)	+	+
Flavones		+	+
Coumarone			
Amines		+	
Free Amino acids	+	+	+
Triperpenic Saponosides		+	
Mucilage			
Glucides			+
Volatile oil	0.001-0.002		
Fatty acids			+
Estrargol	0.80		
Linalool	0.1		
Salts os: (mg/kg)			
Silver		0.060	
Titan		0.620	
Zirconium		0.012	
Aluminum		1.251	5-12
Calcium		35.49	35-37
Strontium		0.073	
Barium		6.370	
Silica		2.950	1.0
Manganese		1.580	1.2
Iron		2.670	3-15
Magnesium		67.28	56
Sodium		9.820	2.9
Stibium		0.397	
Borate			8-22
Zinc		4.190	9
Phosphorus		187.4	5.1
Copper		0.043	1.8-3.6
Lithium			
Potassium		1944.2	5.8

Table 1
IDENTIFIED COMPOUNDS IN THE VISCUM ALBUM, OCINUM BASILICUM, ROSA CANINA EXTRACTS

Vegetal extract	*Wavelength(nm)*	*Absorbance*
Viscum album	473,47	0,8036
		0,4607
	507,23	0,3921
	538,51	0,3579
	609,83	1,2875
	666,13	
Ocinum basillicum	663,43	0.0507
Rosa canina	279,13	0,0551

Table 2
CHARACTERISTIC PEAKS IN THE UV-VIS„FINGERPRINT" SPECTRA OF THE VEGETAL EXTRACTS

Rosa canina active components was tested in the cosmetic shops.

Two batches of mice (sample and experimental) were studied for the cream with *Viscum album* active principles using the following experimental technique:

- the animals were shaven on back on an area of 2x2 cm^2;
- it was burnt on back with a metallic disk with de 1 cm diameter, moldy in oil;
- a red burnt area appeared at the leather area, which was inflamed after 5-10 min;
- the mice from the experimental batch were lubricated with the studied cream twice a day (thick layer for 6 days);
- the cream absorption was produced after 2-3 h;
- the mice from the sample batch were not treated;
- the mice were sacrificed in the 7th day after the beginning of the treatment.

Biochemical determinations on the heparin blood (proteins, cholesterol) were done after the sacrifice.

Dermal tissue from every mouse was assayed for the histological experiments. The preparation of the yielded tissue is made according to the following steps: attachment, dehydration, inclusion, sectioning, coloring, inspection.

The cream characterization was done pharmacodinamically, from the point of view of protein substance, humidity, water absorption capacity and water vapor permeability.

Vibration mode	Wave number (cm^{-1})		
	Ocinum basillicum	*Viscum album*	*Rosa canina*
CH	3074-2974	3219-2974	2880-2960
CH_2	2880-2836	2901-2860	
CH_3	1516-1400	1449-1430	1448-1442
CH_2-OH	1300-1254	1269-1266	1260-1300

Table 3
IR GROUP FREQUENCIES OF THE VEGETAL EXTRACTS

Biochemical parameter	*n*	*Sample*	*n*	*Experimental*	*Significance*
Proteins (g/% serum)	4	8.99 ± 0.53	4	8.65 ± 0.8	- 3.78%
Cholesterol (mg/% serum)	4	130.14 ± 2.64	4	171.81 ± 0.99	+32.01 P < 0.001

Table 4
BIOCHEMICAL RESULTS OF THE PLASMA

Conclusions

The obtaining technology of the collageneous creams with biological active components from *Viscum album, Ocinum basilicum, and Rosa canina* was finalized.

The creams with active principles of *Rosa canina* are used in the face cosmetics, with a beneficial action for the seborrhea tenth and acne. They are used in cosmetics for the daily nutrition of the skin, regeneration of the tissues, damaged by thermal agent. The creams produced with *Rosa canina* has a fast wound healing effect, dermoregenerative, of dead cell removal, feeding of the tissues adjacent to the wound. The creams possessing a high absorption degree, hydration, without secondary effects would be successfully used in cosmetics and medicine.

The creams with active components from *Viscum album, Ocinum basilicum* could be used in medicine, due to the beneficial effects in the treatment of eczema, wounds, herpes, frostbites, and hyperkeratosis.

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