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Inventor(s)	Cavaco Paulo; Artur Manuel et al.

Peptide composition and respective uses

Abstract

The current application discloses a composition that comprises at least one peptide with a sequence length of 6-12 amino acids, where 2-5 of those amino acids are cysteines for the treatment and cosmetics of animal hair, in preference human hair. There are several hair styling methods that involve breakage and reestablishment of disulfide bonds, allowing relaxation and straightening of the hair. However, the most effective methods currently used to modulate hair contain harmful chemicals. Thus, there is a constant demand for formulations that efficiently model the hair fiber without damage. Thus, the present invention aims to provide a composition for treatment of the hair, including animal and human hair, without the use of chemicals harmful to the hair fiber and consumer health and uses of said compositions in shampoo, lotion, serum, cream, conditioner, foam, elixir, oil, aerosol or mask.

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Background/Summary

CROSS-REFERENCE (1) This application is a divisional of 18/334,287, filed Jun. 13, 2023, which is a continuation of U.S. application Ser. No. 18/194,372, filed Mar. 31, 2023, which is a continuation of U.S. application Ser. No. 16/439,889, filed Jun. 13, 2019, now U.S. Pat. No. 11,642,298, issued May 9, 2023, which is a continuation of U.S. application Ser. No. 15/030,313, filed Apr. 18, 2016, now U.S. Pat. No. 10,709,655, issued Jul. 14, 2020, which is a U.S. National Stage Entry of International Application PCT/IB2014/065375, filed Oct. 16, 2014, which claims priority to Portuguese Application No. 107244, filed Oct. 18, 2013, all of which are hereby incorporated by reference in their entirety.

SEQUENCE LISTING

(1) The instant application contains a Sequence Listing which has been submitted electronically in XML format and is hereby incorporated by reference in its entirety. Said XML copy, created on

TECHNICAL HELD

(2) The current application corresponds to a composition that comprises at least one peptide, based on keratin and keratin associated proteins, containing 2 to 5 cysteines with the purpose of treatment and cosmetics of animal hair, in preference human hair.

BACKGROUND

(3) Human hair has a significant social role in most of the various world cultures, particularly for female population. Thus, there is a constant desire to improve and change hair characteristics, such as its natural texture. There are several differences in hair characteristics between different human ethnicities, as well as between individuals of the same ethnicity, such as length, thickness, color and texture.

(4) Hair is composed of approximately 65% to 95% protein. The remaining constituents include water, lipids, pigments and trace elements. The majority of the proteins present in human hair correspond to keratin and keratin-associated proteins.

(5) Human hair fiber's structure consists of cuticle, cortex and medulla. The cuticle constitutes about 15% by weight of the hair and consists of overlapping layers of cells, similar to a system of scales, with high content of cysteine. It provides a protective character to the hair fiber. The cortex is the middle region of the hair being responsible for the strength, elasticity and hair color. It is composed of several cell types and represents about 80% of the weight of the hair. The medulla corresponds to a central beam of cells and is absent in some hairs.

(6) Keratins and mainly keratin-associated proteins have high sulfur content, present in the cysteine amino acid. The presence of sulfur is essential to the hair structure, as it allows the formation of disulfide bonds between amino acids of the polypeptide chains, due to oxidation of cysteine. The existence of these bonds is largely responsible for the structure and texture of the hair.

(7) There are several hair styling methods that involve breakage and reestablishment of disulfide bonds, allowing relaxation and straightening of the hair. However, the most effective methods currently used to modulate hair contain harmful chemicals such as sodium hydroxide, potassium hydroxide, lithium hydroxide, guanidine hydroxide, ammonium thioglycolate or sodium sulfate. These methods can damage the scalp and the hair fiber, leading to its weakening and reducing its tensile strength. Formaldehyde, an extremely toxic chemical, is also used in hair straightening products. Other hair treatments that do not involve so much damage to the hair and the consumer are usually very expensive, time-consuming and/or have low efficacy. Thus, there is a constant demand for formulations that efficiently model the hair fiber without damage.

(8) Peptides, proteins, amino acids and its derivatives have also been used in compositions for personal care products, namely hair conditioning and strengthening. For example, the document WO 00/23039 discloses a composition for hair treatment containing intermediate filament proteins, namely artificial keratin. The document EP 0488242 discloses a hair treating agent containing 3% to 10% by weight of cysteine and salts thereof, a polyhydric alcohol or a saccharide containing four to twenty carbon atoms, three or more hydroxyl groups in the molecule and no aldehyde or ketone group,

(9) The current invention is distinguished by the use of peptides, while the other applications refer the use of, respectively, proteins and amino acids in isolation and together with other types of compounds. The peptides in this innovation peptide can penetrate into the Human hair in order to improve hair fiber resistance.

(10) The document WO 00/51556 discloses a hair treatment composition that contains four or more discrete amino acids selected from histidine, lysine, methionine, tyrosine, tryptophan or cysteine. This document describes peptides without referring sequences and providing a composition essentially based on histidine, lysine, methionine, tyrosine, tryptophan or cysteine.

(11) The document PT 103484 describes a formulation for cosmetic applications that uses hydrophobic binding domains and/or carbohydrates, in order to enhance its properties and to repair

hair damage. The binding domains used are hydrolyzed milk protein, a model of human surfactant protein as well as biologically active and synthetic peptides. The current invention is distinguished by the innovative use of synthetic peptide sequences analogous to keratin proteins instead of surfactant proteins. Furthermore, it does not rely on hydrophobic binding domains and/or carbohydrates, but in other interactions, namely disulfide bonds.

(12) Enzymes have also been used as activating agents for hair treatment, such as in the document WO 00/64405. The document WO 2012/13593 discloses a cosmetic kit for hair conformational change that acts specifically in the disulfide bonds of the hair keratin, through enzyme activating agents and proteolytic enzymes.

(13) As described in the last document there are hair treatments that include actions at the level of the hair disulfide bonds. Below we highlight some examples.

(14) The document WO 97/11672 reports a method for permanent hair processing using tris(2-carboxyethyl)phosphine (TCEP), and other water-soluble tertiary phosphines to break disulfide bonds, whose reaction occurs in acidic environment. The document U.S. Pat. No. 5,635,170 discloses a composition for permanent shaping of hair based on a keratin reducing agent, which contains N-glycyl-L-cysteine and/or L-cysteinyl-glycine. The pH range of this composition is 6.5 to 9.0. The document WO 2008/081348 refers a method and composition for permanent modulation of hair, through the use of 1% to 30% of N-alkyl-2-mercapto acetamide as a keratin reducing agent. It also contains at least one cationic surfactant for permanently shaping hair and the resulting process. The document WO 2006/001536 describes an agent for permanent hair processing that contains a derivative of mercaptocarboxylic acid, which allows processing and reduction of hair keratin in the acidic and neutral range of the pH. The document US 2010/0272666 discloses a hair cosmetic composition for hair treatment, containing 5 to 50 amino acids, without containing cysteine or its derivatives. Thus, this invention is distinguished by the existence of specific amino acid sequences, which contain cysteine, allowing the formation of disulfide bonds that stabilize and protect the hair fiber.

(15) In a previous article by Fernandes et al. (Fernandes, Lima, Loureiro, Gomes, & Cavaco-Paulo, 2012), it is performed the toxicology evaluation of a peptide sequence for hair care use, containing 13 amino acids with two cysteines in its composition. However, in this article it is not mentioned or suggested that the percentage of cysteine in a peptide sequence may have some effect on the resistance of the hair. Also, in the present innovation, the number of amino acids of each peptide sequence is 6 to 12.

SUMMARY

(16) Thus, the present invention aims to provide a composition for treatment of the hair, including animal and human hair, without the use of chemicals harmful to the hair fiber and consumer health and that does not present the drawbacks found in the state of the art.

(17) The compositions described in the current invention, after prolonged use, provide hair with soft, shiny, undamaged texture and with the desired features. The peptide compositions with a specific number of amino acids and cysteines act synergically providing resistance to strength, toughness and elasticity to the hair. Therefore, the compositions of the current invention are particularly relevant for hair treatment, hair dying, hair perms, etc.

(18) The present application describes a peptide composition for hair treatment, in particular human or animal hair, which comprises at least one peptide with 6-12 amino acids length (namely 6, 7, 8, 9, 10, 11, 12 amino acids), where 2-5 of those amino acids correspond to cysteine, preferably 2, 3, 4 or 5 of those amino acids are cysteines and dermatologically suitable excipients, which penetrates the hair, increasing its resistance and reducing its breakage.

(19) In the embodiment, for improved results, the peptide (or peptides) of the peptide composition for hair care can comprise 10-11 amino acids.

(20) In the embodiment of the peptide composition for hair care treatment, the referred peptides can also contain a percentage of hydrophobic amino acids, not higher than 60%, and preferably less

than 41% for better results. Preferably, the composition can also comprise at least one hydrophobic amino acid selected from the following list: phenylalanine, alanine, leucine, methionine, isoleucine, tryptophan, proline, valine or their mixtures.

(21) In yet another embodiment, the amount of cysteine of the peptide composition for hair treatment may vary from 10% to 50% of the total of amino acids of the peptide sequence, preferably 20-30%, and even more preferably 25%.

(22) In an embodiment of the composition, with better results of the peptide (or peptides) of the peptide composition for hair treatment, the sequence of peptide(s) can comprise at least one sequence of the following list with a degree of homology greater than or equal to 90%: SEQ. ID NO: 1-SEQ. ID NO: 1239, preferably with a degree of homology greater than or equal to 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, 100%.

(23) In an embodiment, improved results for the peptide (or peptides) of the peptide composition for hair treatment can comprise at least one of the sequences of the following list with a degree of homology equal or greater than 90%: SEQ.ID NO:5, SEQ.ID NO:75; SEQ.ID NO:94; SEQ.ID NO:409; SEQ.ID NO:411; SEQ.ID NO:412; SEQ ID. NO:432; SEQ.ID NO:618; SEQ.ID NO:717; SEQ.ID NO:951; SEQ.ID NO:1088; SEQ.ID NO:1131; SEQ.ID NO:1149, preferably with a degree of homology equal or greater than 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, 100%.

(24) In other embodiment, the concentration of the peptide of the peptide composition for hair treatment can vary between 0.001%-20% (w/w), preferably 0.01-5% w/w).

(25) In yet other embodiment, the peptide composition for hair treatment can comprise at least one excipient, selected from the following list: surfactants, emulsifiers, preservatives, thickeners, organic polymers, humectants, silicones, oils, fragrances, vitamins, buffers.

(26) In another embodiment, the peptide composition for hair treatment can compose at least one anionic surfactant selected from the following list: alkylbenzene sulfonates, ammonium lauryl sulfate, ammonium lauryl sulfate, ammonium xylenesulfonate, sodium C14-16 olefin sulfonate, sodium cocoyl sarcosinate, sodium laureth sulfate, sodium lauryl sulfate, sodium lauryl sulfoacetate, sodium myreth sulfate, sodium xylenesulfonate, TEA-dodecylbenzenesulfonate, ethyl PEG-15 cocamine sulfate, dioctyl sodium sulfosuccinate, or any mixture thereof.

(27) In an embodiment, the peptide composition for hair treatment can comprise at least one amphoteric surfactant selected from the following list: cocamidopropyl betaine, coco betaine, cocoamphoacetate, cocoamphodipropionate, disodium cocoamphodiacetate, disodium cocoamphodipropionate, lauroamphoacetate, sodium cocoyl isethionate, or any mixture thereof.

(28) In other embodiment, the peptide composition for hair treatment can comprise at least one cationic surfactant selected from the following list: quaternary ammonium compounds, behentrimonium chloride, behentrimonium methosulfate, benzalkonium chloride, betrimonium chloride, binnamidopropyltrimonium chloride, cocotrimonium chloride, dicetyldimonium chloride, dicocodimonium chloride, dihydrogenated tallow dimethylammonium chloride, hydrogenated Palm trimethylammonium chloride, laurtrimonium chloride, quaternium-15, quaternium-18 bentonite, quaternium-22 hectonite, stearylalkonium chloride, tallowtrimonium chloride, tricetyldimonium chloride, or any mixture thereof.

(29) In yet other embodiment, the peptide composition for hair treatment can comprise at least one non-ionic surfactant selected from the following list: decyl glucoside, laureth-10 (lauryl ether 10), laureth-23, Laureth-4, PEG-10 sorbitan laurate, polysorbate-(20, 21, 40, 60, 61, 65, 80, 81), PPG-1 trideceth-6, sorbitol, steareth-(2, 10, 15, 20), C11-21 pareth-(3-30), C12-20 acid PEG-8 ester, or their mixtures.

(30) In yet other embodiment, the peptide composition for hair treatment can comprise at least one emulsifier selected from the following list: caprylic/capric/diglyceryl succinate, C10-15 pareth-(2,4,6,8) phosphate, C14-16 glycol palmitate, C18-20 glycol isostearate, cetareth-(4-60), cocamidopropyl lauryl ether, deceth-(3-10), DTPA-hydrogenated cocoate, dipentaerythrityl hydroxystearate, dipentaerythrityl hydroxyisostearate, dipentaerythrityl hexacapratelylcaprylate,

dodoxynol-(5,6,7,9,12), nonoxynol-(1-35), octoxynol-(1-70), Octyldodeceth-(2,5,16,20,25), Palm kernel glycerides, or any mixture thereof.

(31) In other embodiment, the peptide composition for hair treatment can comprise at least one preservative selected from the following list: butyl paraben, diazolidinyl urea, DMDM hydantoin, ethyl paraben, imidazolidinyl urea, iodopropynyl butylcarbamate, isobutyl paraben, methyl paraben, methylchloroisothiazolinone, methylisothiazolinone, phenoxyethanol, propyl paraben, sodium benzoate, or any mixture thereof.

(32) In other embodiment, the peptide composition for hair treatment can comprise at least one thickener selected from the following list: aluminum stearates/isostearates/myristates/laurates/palmitates, glycol distearate, hydrogenated castor oil, hydrogenated castor oil hydroxystearate, hydrogenated castor oil isostearate, hydrogenated castor oil stearate, hydrogenated castor PEG-8 esters, PEG-150 distearate, or any mixture thereof.

(33) In other embodiment, the peptide composition for hair treatment can comprise at least one natural polymer derived selected from the following list: carboxymethyl hydroxyethyl cellulose, carboxymethyl hydroxypropyl guar, cellulose, ethyl cellulose, hydroxy-butyl methylcellulose, hydroxyethylcellulose, hydroxymethylcellulose, lauryl polyglucose, or any mixture thereof.

(34) In other embodiment, the peptide composition for hair treatment can comprise at least one humectant selected from the following list: 1,2,6 hexanetriol, dipropylene glycol, glycerin, hexylene glycol, panthenol, phytantriol, propylene glycol, sodium PCA, sorbitol, triethylene glycol, polyglyceryl sorbitol, glucose, fructose, polydextrose, potassium PCA, hydrogenated honey, hyaluronic acid, inositol, hexanediol beeswax, hexanetriol beeswax, hydrolyzed elastin, hydrolyzed collagen, hydrolyzed silk, hydrolyzed keratin, erythritol, capryl glycol, isoceteth-(3-10, 20, 30), isolaureth-(3-10, 20, 30), laneth-(5-50), laureth-(1-30), steareth-(4-20), trideceth-(5-50), or any mixture thereof.

(35) In other embodiment, the peptide composition for hair treatment can comprise at least one cationic polymer selected from the following list: polyquaternium-10, polyquaternium-7, polyquaternium-11m guar hydroxypropyltrimonium chloride, or any mixture thereof.

(36) In other embodiment, the peptide composition for hair treatment can comprise at least one silicone selected from the following list: amodimethicone, amodimethicone, trideceth-12, cetrimonium, chlotide mixture, behenoxy, dimethicone sparingly, cetearyl methicone, cetyl dimethicone, cyclomethicone, cyclopentasiloxane, dimethicone, dimethicone copolyol, dimethicone copolyol, dimethiconol, hydrolyzed wheat protein hydroxypropyl polysiloxane, stearoxy dimethicone sparingly, stearyl dimethicone, trimethylsitylamodimethicone, lauryl methicone copolyol, or any mixture thereof.

(37) In yet other embodiment, the peptide composition for hair treatment can comprise at least one organic oil selected from the following list: mineral oil, paraffin, petrolatum, or any mixture thereof.

(38) In yet other embodiment, the peptide composition for hair treatment can comprise at least one protein selected from the following list: cocodimonium hydroxypropyl hydrolyzed casein, cocodimonium hydroxypropyl hydrolyzed collagen, cocodimonium hydroxypropyl hydrolyzed hair keratin, cocodimonium hydroxypropyl hydrolyzed keratin, cocodimonium hydroxypropyl hydrolyzed rice protein, cocodimonium hydroxypropyl hydrolyzed silk, cocodimonium hydroxypropyl hydrolyzed soy protein, cocodimonium hydroxypropyl hydrolyzed wheat protein, cocodimonium hydroxypropyl silk amino acids, cocoyl hydrolyzed collagen, cocoyl hydrolyzed keratin, hydrolyzed keratin, hydrolyzed oat flour, hydrolyzed silk, hydrolyzed silk protein, hydrolyzed soy protein, hydrolyzed wheat protein, hydrolyzed wheat protein, keratin, potassium cocoyl hydrolyzed collagen, TEA-cocoyl hydrolyzed collagen, TEA-cocoyl hydrolyzed soy protein, or any mixture thereof.

(39) In other embodiment, the peptide composition for hair treatment can comprise at least one vitamin selected from the following list: retinol, retinyl palmitate tocopherol acetate, or any

mixture thereof.

(40) In other embodiment, the peptide composition for hair treatment can comprise at least one ester emollient selected from the following list: butyl myristate, butyl stearate, C12-15 alkyl benzoate, caprylic/capric triglyceride, cetyl octanoate, cetyl stearate, cetearyl stearate, decyl oleate, dimethyl lauramine isostearate, glyceryl stearate, glyceryl adipate, glyceryl arachidate, glyceryl arachidonate, glyceryl behenate, glyceryl caprate, glyceryl caprylate, glyceryl caprylate/caprate, glyceryl citrate/lactate/linoleate/oleate, glyceryl cocoate, glyceryl diarachidate, glyceryl dibehenate, glyceryl dierucate, glyceryl dihydroxystearate, glyceryl diisopalmitate, glyceryl diisostearate, glyceryl dilaurate, glyceryl dilinoleate, glyceryl dimyristate, glyceryl dioleate, glyceryl dipalmitate, glyceryl dipalmitoleate, glyceryl diricinoleate, glyceryl distearate, glyceryl erucate, glycol stearate, isocetyl stearate, isopropyl myristate, isopropyl palmitate, isopropyl stearate, isostearyl stearate, octyl palmitate, octyl stearate, propylene glycol dicaprylate/dicaprate, sorbitan benzoate, sorbitan caprylate, sorbitan isostearate, Sorbitan laurate, sorbitan tristearate, stearyl stearate, tocopheryl linoleate, or any mixture thereof.

(41) In other embodiment, the peptide composition for hair treatment can comprise at least one alkanolamide selected from the following list: acetamide MEA, cocamide DEA, cocarnide MEA, lactamide MEA, lauramide DEA, lauramide DEA, propylene glycol, lauramide MEA, lecithinamide DEA, linolearnide DEA, linolearnide MEA, linoleamide MIPA, myristamide DEA, myristamide MEA, myristamide MIPA, oleamide DEA, oleamide DEA, oleamide MEA, oleamide MIPA, soyamide DEA, stearamide MEA, or any mixture thereof.

(42) In yet other embodiment, the peptide composition for hair treatment can comprise at least one amine selected from the following list: behentamidopropyl dimethylamine, cocamidopropyl dimethylamine, isostearamidopropyl dimethylamine, lauramidopropyl dimethylamine, myristamidopropyl dimethylamine, oleamidopropyl dimethylamine, palmitamidopropyl dimethylamine, stearamidopropyl dimethylamine, tallamidopropyl dimethylamine, or any mixture thereof.

(43) In yet other embodiment, the peptide composition for hair treatment can comprise at least one pH adjuster selected from the following list: ascorbic acid, citric acid, sodium hydroxide, triethanolamine, or any mixture thereof.

(44) In yet other embodiment, the peptide composition for hair treatment can comprise at least one salt selected from the following list: calcium chloride, magnesium chloride, magnesium sulfate, potassium chloride, potassium glycol sulfate, sodium chloride, or any mixture thereof.

(45) In yet other embodiment, the peptide composition for hair treatment can comprise at least one aliphatic alcohol selected from the following list: behenyl alcohol, cetearyl alcohol, cetyl alcohol, isocetyl alcohol, isostearyl alcohol, lauryl alcohol, myristyl alcohol, stearyl alcohol, C30-50 alcohols, lanolin alcohol, or any mixture thereof.

(46) In another embodiment, the peptide composition for hair treatment can comprise at least one UV filter/sunscreen selected from the following list: benzophenone-(2, 3, 4, 5, 6, 7, 8, 9, or 10), benzophenone-4, benzyl salicylate, benzylidene camphor sulfonic acid, bornelone, ethyl cinnamate, ethylhexyl methoxycinnamate (octyl methoxycinnamate), octoxynol-40, octoxynol-20, octyl methoxycinnamate, octyl salicylate, oxybenzone, phenyl ketone, PEG-25 PABA, polyacrylamidomethyl benzylidene camphor, or any mixture thereof.

(47) In other embodiment, the peptide composition for hair treatment can comprise at least one natural oil selected from the following list: coconut oil, jojoba oil, olive oil, palm Oil, safflower oil, sesame seed oil, shea butter, sweet almond oil, wheat germ oil, or any mixture thereof.

(48) In yet other embodiment, the peptide composition for hair treatment can comprise at least one amine oxide selected from the following list: cocamine oxide, lauramine oxide, or any mixture thereof.

(49) In other embodiment, the peptide composition for hair treatment can comprise at least one chelate selected from the following list: diisopropyl oxalate, disodium EDTA, disodium EDTA-

copper, HEDTA, oxalic acid, potassium citrate, sodium citrate, sodium oxalate, TEA-EDTA, tetrasodium EDTA, trisodium EDTA, trisodium HEDTA, or any mixture thereof.

(50) In other embodiment, the peptide composition for hair treatment can comprise at least one fatty acid selected from the following list: arachidonic acid, capric acid, coconut fatty acid, lauric acid, linoleic acid, linolenic acid, myristic acid, palmitic acid, pantothenic acid, stearic acid, caproic acid, caprylic-(4, 6, 9) carboxylic acid, isostearic acid, or any mixture thereof.

(51) In other embodiment, the peptide composition for hair treatment can comprise at least one agent antimicrobial/antibacterial selected from the following list: glyoxal, triclosan, or any mixture thereof.

(52) In other embodiment, the peptide composition for hair treatment can comprise at least one PEG-modified material selected from the following list: PEG-150 pentaerythrityl tetrastearate, PEG-(2, 3, 4, 6, 8, 12, 20, 32, 50, 150, 175) distearate, PEG-10 castor oil, PEG-10 cocamine, PEG-10 cocate, PEG-10 coconut oil esters, PEG-10 glyceryl oleate, PEG-10 glyceryl pibsa tallate, PEG-10 glyceryl stearate, PEG-10 hydrogenated lanolin, PEG-10 hydrogenated tallow amine, PEG-10 isolauryl thioether, PEG-10 isostearate, PEG-10 lanolate, PEG-10 lanolin, PEG-10 laurate, PEG-10 oleate, PEG-10 olive glycerides, PEG-10 polyglyceryl-2 laurate, PEG-10 propylene glycol, PEG-10 sorbitan laurate, PEG-10 soya sterol, PEG-10 soyamine, PEG-10 stearamine, PEG-10 stearate, PEG-10 stearyl benzonium chloride, PEG-10 tallate, PEG-10 tallow aminopropylamine, PEG-100, PEG-100 castor oil, PEG-100 hydrogenated castor oil, PEG-100 lanolin, PEG-100 stearate, PEG-40 hydrogenated castor Oil, PEG-60, PEG-55 propylene glycol distearate, or any mixture thereof.

(53) In other embodiment, the peptide composition for hair treatment can comprise at least one polymer selected from the following list: carbomer, dodecanedioic acid/cetearyl alcohol/glycol copolymer, hydrogenated C6-14 olefin polymers, hydrogenated ethylene/propylene/styrene copolymer: polyacrylic acid, polymethyl methacrylate: polymer, polyvinyl acetate, polyvinyl alcohol, PPG, PPG-25-laureth-25, PPG-5 pentaerythrityl ether, PPG-75-PEG-300-hexylene glycol, polyvinylpyrrolidone, PVP/VA (polyvinylpyrrolidone/vinyl acetate copolymer), sodium carbomer, TEA-carbomer, poloxamer (100-407), poloxamine, polyacrylamidomethylpropane sulfonic acid, polyethylene terephthalate, or any mixture thereof.

(54) In other embodiment, the peptide composition for hair treatment can comprise at least one antistatic agent selected from the following list: apricotamidopropyl ethyldimonium ethosulfate, apricotamidopropyl ethyldimonium lactate, cocamidopropyl ethyldimonium ethosulfate, cocamidopropyl ethyldimonium lactate, lauramidopropyl ethyldimonium ethosulfate, lauramidopropyl ethyldimonium lactate, linoleamidopropyl ethyldimonium ethosulfate, linoleamidopropyl ethyldimonium lactate, myristamidopropyl ethyldimonium ethosulfate, myristamidopropyl ethyldimonium lactate, oleamidopropyl ethyldimonium ethosulfate, olearnidopropyl ethyldimonium lactate, stearamidopropyl ethyldimonium ethosulfate, stearamidopropyl ethyldimonium lactate, or any mixture thereof.

(55) In other embodiment, the peptide composition for hair treatment can comprise at least one alcohol selected from the following list: SD alcohol 40, witch hazel, isopropanol, or any mixture thereof.

(56) In yet other embodiment, the peptide composition for hair treatment can comprise fragrances, oils or any mixture thereof.

(57) In other embodiment, the peptide composition for hair treatment can be used in medicine, veterinary and/or for cosmetics, preferably for the treatment of hair, mainly for animal or human, particularly for treating diseases of the scalp, particularly scalp irritation, alopecia areata, lichen planus, folliculitis keloid of the neck, trichorrhexis nodosa, trichodystrophy, pili torti, trichorrhexis

(58) invaginata, moniletrix, uncombable hair syndrome.[0058] In other embodiment, the composition may comprise a dye agent linked to the N or C-terminal of the referred peptides.

(59) In yet other embodiment is the use of the described composition for hair coloring.

- (60) Other aspect of the embodiment is the use of the described composition as a hair strengthener or as fixer of perms and/or curly hairs.
- (61) It is also described in this application shampoo, lotion, serum, cream, conditioner, foam, elixir, oil, aerosol or mask comprising the composition presented in this application.
- (62) The present application discloses a composition for hair treatment that comprise, in whole or in part, one or more peptide sequences of 6 to 12 amino acid residues based on keratin and keratin-associated proteins having 2 to 5 cysteine residues, preferably having 3 to 5 residues of cysteine, for treatment and cosmetics of the hair, preferably human hair, chemically pre-treated or not. Thus, the presence of cysteine in the peptide sequence (higher than 10%, preferably more than 15%) in combination with a percentage of hydrophobic amino acids ensures that the peptides can have a lasting fixation in the hair, improving the human hair properties such as elasticity and strength.
- (63) Surprisingly, the described peptide compositions in which the peptide(s) comprising 2 to 5 cysteines allow penetration of the peptide(s) and enhance the properties of hair, preferably 3-5 cysteines. Thus, described peptide(s) containing 2-5 cysteine in order to allow hair penetration and enrichment of the hair properties, such as elasticity, resistance, reduce eventual hair damage, as well as improve and change hair characteristics.
- (64) The peptide compositions described in the present application surprisingly enrich and improve the properties and characteristics of the hair, such as elasticity, strength and appearance, repairing damaged keratinous fiber. Therefore, formulation's high cysteine content is used to improve and/or change its characteristics, such as hair curl or uncurl. The sequence of peptides can have also preferably a percentage of hydrophobic amino acids not exceeding 60%, improving even further the results. Examples of hydrophobic amino acids are phenylalanine, alanine, leucine, methionine, isoleucine, tryptophan, proline, valine, and others.
- (65) In the context of the present description, the peptide composition can also be applied to the hair and in particular to the human hair as, but not limited to, aqueous solution or conventional shampoo or conditioner. It can also be used as a lotion, foam, aerosol, gel, mask, and application formulation with or without subsequent rinsing.
- (66) The concentration of peptide to be used depends on several features such as the condition of the hair, the origin and the formulation of the hair care product.
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Description

DETAILED DESCRIPTION

- (1) It should be understood that the detailed description and specific examples are indicative of preferred embodiments of the invention and are provided to be illustrative only. This patent is not limited to those mentioned applications.
- (2) The present application describes a composition for hair treatment that comprises different peptides, which are based in the structure of keratin and keratin associated proteins.
- (3) The compositions described in the present application allow surprisingly the dermo-cosmetic treatment of animal hair, including human hair, chemically pre-treated or not. The composition described in the present invention, through the use of specific peptides, allows the preparation of keratinous fiber damages, due to the high binding capacity of the keratin peptides, including through disulfide bridges.
- (4) The described compositions improve the properties and characteristics of the hair, such as elasticity, resistance and appearance, repairing putative damages of the hair.
- (5) The peptides here defined are peptide sequences which bind with a certain affinity to the hair. The peptides used in this invention are composed by 6 to 12 amino acids and are constituted by a minimum of 2 and a maximum of 5 cysteines, preferably 3-5 cysteines.
- (6) The peptide composition for hair treatment described allows a resistance increase due to the

presence of the cysteine-rich peptide, which leads to the resistance of the hair even after several rinsing.

(7) Every peptide can be used together or separately, as well as all or part of the peptide sequence in the hair composition. Each peptide sequence contains amino acids with sulfur, specifically cysteine, which interacts with the hair and allows the formation of intermolecular cross-linking, stabilizing the keratinous fiber.

(8) The peptide composition described uses a high content on cysteine in order to enrich the hair properties, such as improve elasticity and resistance, reduce putative damage of the hair, improve and/or change hair characteristics. Regarding the interaction with the keratinous fibers, the cysteine is 10% to 50% of the total amount of amino acids of the peptide sequence. Additionally, the number of amino acids of the peptide sequence is preferable from 6 to 12.

(9) The peptides can be used separately or in combination of two or more peptides. The concentration of the peptide to be used depends on several characteristics, such as hair condition, origin and the formulation of the product for hair treatment. The content of the hair composition of the present invention is as example 1-0.001% (w/w) in mass.

(10) The peptides of the present invention can be prepared by conventional methods of peptide synthesis, well known in the state of the art.

(11) Additionally, many companies provide customized services for peptide synthesis.

(12) An embodiment of the current invention describes peptides that link to the hair, and which sequence of amino acids includes cysteines where the sequence is selected from the group between the sequences ID NO: 1 to sequence ID NO: 1239.

(13) The sequence of the 1239 peptides referred is listed in the table of the FIG. 1,

(14) As example of hair, it was used virgin human hair tresses, acquired from the International Hair Importers and Products, Inc. (New York), The term virgin hair is applied to all the hair that was never subject or was at least 10 years without making any chemical treatment. Several different hair samples such as African, Asian and Caucasian hair are commercially available in several companies, such as the company mentioned above. Optionally, the hair samples can be treated, for example, using hydrogen peroxide to bleach the hair, needed for techniques such as hair dying.

(15) In the context of this invention, the peptides can be applied to the hair, such as the human hair in the form of, but not limited to, aqueous or conventional preparation of shampoo or conditioner. It can also be in the form of lotion, foam, spray, gel, mask, formulation applied with or without subsequent rinsing.

(16) This invention can be prepared by peptide coupling with an agent of these preparations directly or via a spacer.

(17) This coupling interaction can be performed by covalent or non-covalent bonds, such as hydrogen bond, electrostatic interactions, hydrophobic interactions or van der Waals interactions. The spacer can be used to separate the peptide from the preparation agent, ensuring that the agent does not interfere with the peptide linkage to the hair.

(18) The present invention can be understood more clearly and accurately by reading the following examples, which are indicative of preferred embodiments of the invention. They are provided for illustration in greater detail of the present invention, without introducing any limitation and without being limited to those applications.

EXAMPLES

(19) The examples that are within the scope of the claims represent different embodiments of the invention; all other examples are comparative examples.

Example 1

(20) The present application treats human hair through several commercial formulations with and without the use of the peptides from the sequence ID NO: 5. As The hair was supplied from International Hair Importers and Products, Inc. (New York).

(21) The tests were performed with in human hair after 8 treatments of bleaching, at 50° C., in 0.1

M Na₂CO₃/NaHCO₃ buffer, at pH=9, 10% H₂O₂, for 1 hour.

(22) Several formulations were tested: hair serum with 15% PCG; hair mask.

(23) The mask used in this application was a basic commercial formulation with water, denaturing alcohol, propylene glycol, ether dicaprylic, cetylstearyl alcohol, behentrimonium chloride, cetyl ester, polysorbate 20, hydrolyzed wheat protein, hydrolyzed wheat starch, benzyl alcohol and fragrance.

(24) The hair serum used in this application was a basic commercial formulation with water, denaturing alcohol, propylene glycol, polysorbate 20, hydrolyzed wheat protein, hydrolyzed wheat starch, crosslinked polymer alkyl acrylate/C10-30, triethanolamine, benzyl alcohol, fragrance.

(25) Each of the formulations was tested with and without the peptide sequence ID NO:5, which contains in the sequence 15% of cysteine. The formulations containing the peptide SEQ ID NO:5 had a concentration of peptide of 0.1 mg/mL, in a ratio 1:1 (v/v).

(26) To demonstrate the effect was also tested: a peptide whose sequence does not contain cysteine, with approximately 41% hydrophobic amino acids; a peptide which contains in its sequence 8% cysteine, with approximately 58% hydrophobic amino acids.

(27) The hair mask was applied to the hair after 8 bleaching treatments, being left to act for 15 minutes, mimicking the procedure indicated in commercial masks. Posteriorly, the hair was washed. The serum was applied to the hair after 8 bleaching treatments, being left to act for 1 hour at 37° C. Posteriorly, the hair was not washed, as in typical commercial procedures the serum should be applied in dry hair. The hair was also tested after 5 applications.

(28) The peptide from the sequence ID NO: 5 was able to penetrate in the hair fiber for all the formulations.

(29) After the treatment, mechanical tests were performed, using a cell with 2.5 N maximum load and a deformation rate of 1.5 mm/min. Each hair was individually mounted in the tensile jig by means of a paper template with a fixed gauge length of 20 mm.

(30) TABLE-US-00001 TABLE 1 Young modulus of virgin hair without treatments and after 8 times bleaching treatments. Hair type Young modulus (MPa) Virgin hair 6579 Hair after 8 time bleaching 5294 Serum(with a 15% cysteine and 50% 7149 hydrophobic amino acids peptide) Serum for comparison(with a 41% 6180 hydrophobic amino acid without cysteine peptide) Serum for comparison 6456 (with a 8% cysteine and 58% hydrophobic amino acid peptide) Serum for comparison (without peptide) 6034

(31) TABLE-US-00002 TABLE 2 Young modulus for different types of hair treatment. Young modulus Young modulus after 1 after 5 application applications Type of treatment (MPa) (MPa) Serum (with a 15% cysteine 7149 7318 and 50% hydrophobic amino acid peptide) Serum for comparison 6034 6112 (without peptide) Mask (with a 15% cysteine 6175 7075 and 50% hydrophobic amino acid peptide) Mask for comparison(without 5514 5685 peptide)

(32) The peptide in these treatments is the peptide from sequence ID NO: 5, The formulations which contain the sequence ID NO:5 induce an increase in mechanical resistance of the damaged hair. After 5 applications, the hair treated with the sequence ID NO: 5 maintain the high resistance, having a higher increase in the resistance than without the peptide.

Example 2

(33) This example discloses the treatment of human hair with peptides containing cysteine, and in this case the peptide containing the sequence ID NO: 409, based in the assumption that small peptides are able to penetrate in the hair fiber cuticle.

(34) The hair was supplied from International Hair Importers and Products, Inc. (New York). Hair fibers were pre-treated by bleaching. The formulation was tested in different hair types: virgin hair washed, with the cuticle intact and absence of chemical damages; hair after 8 bleaching treatments, at 50° C. in 0.1 M Na₂CO₃/NaHCO₃ buffer, at pH=9, 10% H₂O₂, for 1 hour.

(35) The incorporation of the peptides was performed by direct application in the hair surface. The mechanical resistance tests were performed after the treatment of the hair with the peptide.

(36) The measurements of mechanical resistance were performed using a cell with 2.5 N maximum load and a deformation rate of 1.5 mm/min. Each hair was individually mounted in the tensile jig by means of a paper template with a fixed gauge length of 20 mm.

(37) As for the results obtained for the mechanical test showed that compared to the control, i.e., virgin hair without bleaching or peptide treatment (Young modulus: 4142 ± 590 MPa), bleaching reduced the Young modulus (2478 ± 567 MPa), while the treatment with the peptide sequence ID NO: 409 after bleaching increased the Young modulus to higher valued than the virgin hair with no treatment (5649 ± 1022 MPa).

Example 3

(38) This example discloses the treatment of human hair with a composition comprising peptides. In this example, the peptide with the sequence ID NO: 412 was tested. The hair was supplied from International Hair Importers and Products, Inc. (New York).

(39) The formulation was tested in different hair types: virgin hair washed, with the cuticle intact and absence of chemical damages; hair after reduction treatment, at 37° C. in phosphate buffer at pH=8, with 3M GndHCl and 0.05M DTT for 2 hours.

(40) For the treatment with the peptide SEQ ID NO: 412, concentrations of 0.01% (w/w) were used.

(41) The average of the Young's modulus for relaxed hair is 3002 MPa, while for relaxed hair fiber after peptide treatment at 0.01% is 4190 MPa. The Young modulus value for virgin hair without treatment is 5214 MPa.

(42) In the maximum load test, for the relaxed hair fiber, the maximum resistance was 96 MPa, while for the hair fiber relaxed after peptide treatment 126 MPa and for the virgin hair with no treatment 203 MPa.

(43) Regarding hair stretching, the relaxed hair has an average of 51%, while after treatment with the peptide sequence ID NO: 412, has a stretching of 72%. For virgin hair, the average of hair stretching is 58%.

(44) Therefore, it is evident that the peptides are capable to prevent the hair surface degradation and consequently, the hair treated with these peptides has a longer life span.

Example 4

(45) In order to assess the interactions between the keratin and some peptides, a keratin solution was prepared. This procedure was performed by immersing African hair, acquired from the International Hair Importers and Products, Inc. (New York), in a solution containing 8 M urea, 0.2 M sodium dodecyl sulfate and 0.5 M sodium bisulfite. The mixture was heated to 50 ° C. for 24 h in a shaker bath. The solution was dialyzed for several days against double-distilled water. The keratin solution was then concentrated using AMICON with a 3 kDa cut-off. The keratin was then conjugated with Alexa Fluor 647 carboxylic acid, succinimidyl ester in DMSO anhydrous 5%.

(46) The reaction was incubated for 1 h 30 min at room temperature and in the dark. The Alexa Fluor 647 that did not link to the keratin solution was separated by centrifugation in AMICON with a 3 kDa cut-off for 1 h at 25° C. and 5000×g.

(47) The keratin was then diluted to 1 µg./mL in blocking buffer (3% BSA in tris-buffered saline (TBS) with 0.05% Tween 20). The peptides tested were SEQ.ID NO: 179, SEQ. ID NO:75, SEQ.ID NO:432, SEQ.ID NO:951, SEQ.ID NO:1108, SEQ.ID NO: 1131 and a peptide containing 13 amino acids, including 2 cysteines (X3CX5CX3), where X represents one of known amino acid residues, with the exception of cysteine residue that is represented by the letter C. This peptide is similar to the one tested in Fernandes et al (Fernandes, Lima, Loureiro, Goines, & Cavaco-Paulo, 2012).

(48) Several peptides in a concentration of 15 fmol/mm², were attached to a glass through a hydrophilic linked moiety, and were then incubated with the keratin, marked with Alexa Fluor 647, for 2 hours at 37° C.

(49) After incubation, the glasses were rinsed in successive washing solutions: TBS+0.1% Tween

20 and blocking buffer with 3%BSA in TBS+0.1% Tween 20, for 3 minutes in each solution.

(50) The imaging of the glasses was performed in Agilent G2565CA Microarray Scanner System. Three replicas of each peptide incubation were performed and analyzed.

(51) TABLE-US-00003 TABLE 3 Normalized intensity levels of peptide sequences. Hydrophobic Intensity level amino (average \pm Number of Cysteine acids standard Sequence amino acids content content deviation) SEQ. ID 10 20% 50% 0.990 ± 0.014 NO: 179 SEQ. ID 10 30% 60% 1.000 ± 0.000 NO: 75 SEQ. ID 10 30% 40% 1.000 ± 0.000 NO: 432 SEQ. ID 10 40% 30% 1.000 ± 0.000 NO: 951 SEQ. ID 11 46% 18% 1.000 ± 0.000 NO: 1108 SEQ. ID 11 46% 9% 1.000 ± 0.000 NO: 1131 X.sub.3CX.sub.5CX.sub.3 13 15% 38% 0.184 ± 0.084

(52) The peptides SEQ.ID NO:75, SEQ.ID NO:432, SEQ.ID NO:951, SEQ.ID NO:1108, SEQ.ID NO:1131, with percentage of cysteine ranging from 30% to 46%, such as and percentage of hydrophobic amino acids ranging from 9% to 60% were able to obtain an intensity of 1, indicating a very high affinity to keratin. The peptide SEQ.ID NO:179, with 20% and 50% of cysteine and hydrophobic content, respectively showed a slightly inferior but still very high intensity ($0.990+0.014$). These peptides were compared with a peptide similar to the one described in Fernandes et al. (Fernandes, Lima, Loureiro, Gomes, & Cavaco-Paulo, 2012) containing 2 cysteines in a 13 amino acids sequence. The reduced percentage of cysteine (15%) and higher number of amino acids in the sequence (13 amino acids) lead to a decrease in the intensity to 0.184 ± 0.084 , showing an inferior affinity to keratin. This suggests that the higher number of amino acids difficult the reaction of the peptide with the hair keratins, This inferior affinity to keratin leads to less fixation of the peptides in the hair in posterior treatments and consequently providing less improvements in the recovery of the hair characteristics.

(53) The sequences of peptides are described by one letter code of amino acids. The code is as follows:

(54) TABLE-US-00004 List of peptide sequences Amino acid—One Letter Code
Histidine—H Arginine—R Lysine—K Isoleucine—I Phenylalanine—F Leucine—L Tryptophan—W
Alanine—A Methionine—M Proline—P Valine—V Cysteine—C Asparagine—N Glycine—G
Serine—S Glutamine—Q Tyrosine—Y Threonine—T Aspartic acid—D Glutamic acid—E
SEQ. ID NO: 1 APCAPRPSG SEQ. ID NO: 2 EACVPSVPCP SEQ. ID NO: 3 ESCGTASGCA SEQ. ID NO: 4 GLCAGTSACL SEQ. ID NO: 5 GVCGPSPPCI
SEQ. ID NO: 6 HGCTLPGACN SEQ. ID NO: 7 HSCTLPGACN SEQ. ID NO: 8 KDCLQNSLCE SEQ. ID NO: 9 LPCLPAASCG SEQ. ID NO: 10 LPCYFTGSCN
SEQ. ID NO: 11 NFCLPSLSCR SEQ. ID NO: 12 NPCATTNACD SEQ. ID NO: 13 NPCATTNACE SEQ. ID NO: 14 NPCATTNACS SEQ. ID NO: 15 NPCGLRARCG
SEQ. ID NO: 16 NPCGPRSRCG SEQ. ID NO: 17 NPCSTPASCT SEQ. ID NO: 18 NPCSTSPSCV SEQ. ID NO: 19 PACTSSSPCS SEQ. ID NO: 20 SKCHESTVCP
SEQ. ID NO: 21 SPCVPRTVCV SEQ. ID NO: 22 SSCSVETACL SEQ. ID NO: 23 SVCSSGVNCR SEQ. ID NO: 24 TACPLPGTCH SEQ. ID NO: 25 TNCSPRPICV
SEQ. ID NO: 26 TSCVPPAPCT SEQ. ID NO: 27 TTCTSSNTCE SEQ. ID NO: 28 VPCVPSVPCT SEQ. ID NO: 29 ATCGPSACIT SEQ. ID NO: 30 GPCISNPCGL
SEQ. ID NO: 31 GPCLSNPCTS SEQ. ID NO: 32 GSCVTNPCGP SEQ. ID NO: 33 LTCFSITCSS SEQ. ID NO: 34 NPCSTPSCTT SEQ. ID NO: 35 PSCVTAPCAP
SEQ. ID NO: 36 SDCSSTHCSP SEQ. ID NO: 37 SLCLPPTCHT SEQ. ID NO: 38 SLCNLGSCGP SEQ. ID NO: 39 SPCLVGNCW SEQ. ID NO: 40 TACLPGTCAT
SEQ. ID NO: 41 TSCLPALCLP SEQ. ID NO: 42 TSCSSRPCVP SEQ. ID NO: 43 TTCGGGSCGV SEQ. ID NO: 44 VNCRPELCLG SEQ. ID NO: 45 YVCQPMACLP
SEQ. ID NO: 46 AFSCISACGP SEQ. ID NO: 47 GSVCSAPCNG SEQ. ID NO: 48 GVVCGLDLCAS SEQ. ID NO: 49 GVVCGLDLCVS SEQ. ID NO: 50 LTGCLLPCYF
SEQ. ID NO: 51 NEDCKLPCNP SEQ. ID NO: 52 NFSCVSACGP SEQ. ID NO: 53 PPTCHTACPL SEQ. ID NO: 54 PQPCATACKP SEQ. ID NO:

55 SEDCLPCNP SEQ. ID NO: 56 SLGCRSSCSS SEQ. ID NO: 57 SLSCRTSCSS
SEQ. ID NO: 58 SSSCPLGCTM SEQ. ID NO: 59 TGSCNSPCLV SEQ. ID NO:
60 TSSCPLGCTM SEQ. ID NO: 61 VGSCGSSCRK SEQ. ID NO: 62 VGVCGGSKR
SEQ. ID NO: 63 VSNCNWFCEG SEQ. ID NO: 64 ACGPRPGRCC SEQ. ID
NO: 65 ACGPRPSRCC SEQ. ID NO: 66 CAPRPSCGPC SEQ. ID NO: 67
CEPCSAYVIC SEQ. ID NO: 68 CGLRARCGPC SEQ. ID NO: 69 CGPRPGRCCI
SEQ. ID NO: 70 CGPRPSRCCI SEQ. ID NO: 71 CGPRSRCGPC SEQ. ID NO:
72 CGTSQKGCCN SEQ. ID NO: 73 CHGCTLPGAC SEQ. ID NO: 74
CHSCTLPGAC SEQ. ID NO: 75 CLPCLPAASC SEQ. ID NO: 76 CLPPTCHTAC
SEQ. ID NO: 77 CLSNPCTSCV SEQ. ID NO: 78 CLVGNCWCE SEQ. ID
NO: 79 CNPCSTPASC SEQ. ID NO: 80 CNPCSTPSCT SEQ. ID NO: 81
CNPCSTSPSC SEQ. ID NO: 82 CNSPCLVGNC SEQ. ID NO: 83 CRTSCSSRPC
SEQ. ID NO: 84 CSLKEHCSAC SEQ. ID NO: 85 CSRPICVPC SEQ. ID NO:
86 CSSTMSYSCC SEQ. ID NO: 87 CSTPASCTSC SEQ. ID NO: 88 CSTPSCTTCV
SEQ. ID NO: 89 CTSCVPPAPC SEQ. ID NO: 90 CTSSNTCEPC SEQ. ID NO:
91 CVPPAPCTPC SEQ. ID NO: 92 CVPPSCHGCT SEQ. ID NO: 93 CVPPSCHSCT
SEQ. ID NO: 94 DCKLPCNPSCA SEQ. ID NO: 95 DCKLPCNPSCS SEQ. ID NO:
96 PCGTSQKGCC SEQ. ID NO: 97 PCLSNPCTSC SEQ. ID NO: 98 PCLVGNCWCE
SEQ. ID NO: 99 PCNPCSTPSC SEQ. ID NO: 100 PCSTPSCTTC SEQ. ID NO:
101 PCTTCGPTCG SEQ. ID NO: 102 PCVPPSCHGC SEQ. ID NO: 103
PCVPPSCHSC SEQ. ID NO: 104 SCCLPSLGCR SEQ. ID NO: 105 SCSEELQCCQ
SEQ. ID NO: 106 SCSPCSTTCT SEQ. ID NO: 107 ASCSTSGTCG SEQ. ID
NO: 108 ASCYIPVGCQ SEQ. ID NO: 109 ASCYVPVSCQ SEQ. ID NO: 110
AVCTLPSQC SEQ. ID NO: 111 DLCPTSVSCG SEQ. ID NO: 112 EICWEPTSCQ
SEQ. ID NO: 113 ETCGEPTSCQ SEQ. ID NO: 114 ETCNETTSCQ SEQ. ID
NO: 115 ETCWRPNSCQ SEQ. ID NO: 116 GYCGYRPFCE SEQ. ID NO: 117
KTCWEPASCQ SEQ. ID NO: 118 KTCWEPTSCQ SEQ. ID NO: 119 LDCVDTTTCK
SEQ. ID NO: 120 LGCGYGSFCG SEQ. ID NO: 121 NSCGYGSFCG SEQ. ID
NO: 122 NYCPSNTMCE SEQ. ID NO: 123 PACVTSYSCR SEQ. ID NO: 124
PDCHVEGTCL SEQ. ID NO: 125 PDCRVEGTCL SEQ. ID NO: 126 PICSESPSCS
SEQ. ID NO: 127 PICYIFKPCQ SEQ. ID NO: 128 PLCYISNSCQ SEQ. ID NO:
129 PPCGQPTPCS SEQ. ID NO: 130 PPCHIPQPCV SEQ. ID NO: 131
PSCGRLASCG SEQ. ID NO: 132 PSCSESSICQ SEQ. ID NO: 133 PSCSEVTSCP
SEQ. ID NO: 134 PSCSTSGTCG SEQ. ID NO: 135 PSCSVSSGCQ SEQ. ID
NO: 136 PSCTESDSCK SEQ. ID NO: 137 PSCYQTSSCG SEQ. ID NO: 138
PTCFLLNSCQ SEQ. ID NO: 139 PTCSTVSSCQ SEQ. ID NO: 140 PTCWLLNNCH
SEQ. ID NO: 141 PTCYQRTSCV SEQ. ID NO: 142 PTCYRRTSCV SEQ. ID
NO: 143 PTCYVVKRCP SEQ. ID NO: 144 PVCFEATICE SEQ. ID NO: 145
PVCFEATVCE SEQ. ID NO: 146 PVCSRPAACS SEQ. ID NO: 147 PVCSWVPACS
SEQ. ID NO: 148 QTCNESSYCL SEQ. ID NO: 149 QTCWEPTSCQ SEQ. ID
NO: 150 SFCRLGYGCG SEQ. ID NO: 151 SFCRRGSGCG SEQ. ID NO: 152
SLCGYGYGCG SEQ. ID NO: 153 SLCSTEVSCG SEQ. ID NO: 154 SNCFGQLNCL
SEQ. ID NO: 155 SPCGQPTPCS SEQ. ID NO: 156 SSCDQSSSCA SEQ. ID
NO: 157 SSCGQSSSCA SEQ. ID NO: 158 SVCPEPVSCP SEQ. ID NO: 159
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SEQ. ID NO: 162 TPCYQQSSCQ SEQ. ID NO: 163 VTCSRQTTCI SEQ. ID
NO: 164 YGCGYGSFCG SEQ. ID NO: 165 YGCGYGSFCR SEQ. ID NO: 166
YGCIHSTHCG SEQ. ID NO: 167 AACEPSACQS SEQ. ID NO: 168 AACEPSPCQS
SEQ. ID NO: 169 AACTMSVCSS SEQ. ID NO: 170 ADCLGGICLP SEQ. ID
NO: 171 ALCLPSSCHS SEQ. ID NO: 172 ALCSPSTCQL SEQ. ID NO: 173

APCLALVCP SEQ. ID NO: 174 APCLSLVCTP SEQ. ID NO: 175 APCLTLVCTP
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NO: 178 ASCLSFLCRP SEQ. ID NO: 179 ASCVSLLCRP SEQ. ID NO: 180
AVCEPSPCQS SEQ. ID NO: 181 AVCLPVSCQS SEQ. ID NO: 182 AVCVPVRCQS
SEQ. ID NO: 183 AVCVPVSCQS SEQ. ID NO: 184 DLCSPSTCQL SEQ. ID
NO: 185 DSCGSSSCGP SEQ. ID NO: 186 DSCVQSNCFP SEQ. ID NO: 187
FNCSTRNCSS SEQ. ID NO: 188 GGCGSYGCSQ SEQ. ID NO: 189 GSCGFGSCYG
SEQ. ID NO: 190 GSCSSRKCF S SEQ. ID NO: 191 GVCLPSTCPH SEQ. ID
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PACVISTCPR SEQ. ID NO: 202 PGCLNQSCGS SEQ. ID NO: 203 PPCGTAPCLT
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NO: 206 PRCTRPICEP SEQ. ID NO: 207 PSCPVS SCAQ SEQ. ID NO: 208
PSCQPSVCVP SEQ. ID NO: 209 PSCSVSNCYQ SEQ. ID NO: 210 PSCSVSSCAQ
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213 PTCVISSCPR SEQ. ID NO: 214 PTCVISTCPR SEQ. ID NO: 215 PTCYQTICFR
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NO: 218 PVCNKPVC FV SEQ. ID NO: 219 PVCPTPTCSV SEQ. ID NO: 220
PVC RSTYCV P SEQ. ID NO: 221 PVCSKSVCYV SEQ. ID NO: 222 PVC SRPACYS
SEQ. ID NO: 223 PVCYVPTCSE SEQ. ID NO: 224 QFCLSKSCQP SEQ. ID
NO: 225 RPCERTACQS SEQ. ID NO: 226 RSCQTSFCGF SEQ. ID NO: 227
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SGCQPSSCLA SEQ. ID NO: 235 SHCQPPHCQL SEQ. ID NO: 236 SICQPATCVA
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NO: 239 SPCLVSSCQP SEQ. ID NO: 240 SPCQQSSCQE SEQ. ID NO: 241
SPCQQSYCV P SEQ. ID NO: 242 SPCSPAVCVS SEQ. ID NO: 243 SRCQQPSCQP
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NO: 253 SSCTAVVCRP SEQ. ID NO: 254 SSCYQPFCRS SEQ. ID NO: 255
SSCYRPICGS SEQ. ID NO: 256 SSCYRPTCGS SEQ. ID NO: 257 SVCMSGSCQA
SEQ. ID NO: 258 SVCSDQGCDQ SEQ. ID NO: 259 SVCSDOGCGL SEQ. ID
NO: 260 SVCSDQGC GQ SEQ. ID NO: 261 SVCSDQGCSQ SEQ. ID NO: 262
SVCSDQSCGQ SEQ. ID NO: 263 SVC SHQGCGQ SEQ. ID NO: 264
SVC SHQGCGR SEQ. ID NO: 265 SVCVPVSCR P SEQ. ID NO: 266 SYCRQASCVS
SEQ. ID NO: 267 TACEPSACQS SEQ. ID NO: 268 TICTASPCQP SEQ. ID NO:
269 TSCPETSCLP SEQ. ID NO: 270 TSCQMTNCEQ SEQ. ID NO: 271
TSCQPVHCET SEQ. ID NO: 272 TSCQPVLC KS SEQ. ID NO: 273 TSCQPVLCVP
SEQ. ID NO: 274 TSCVGFVCQP SEQ. ID NO: 275 TSCVSNPCQV SEQ. ID
NO: 276 TTCFQPTCVS SEQ. ID NO: 277 TTCFQPTCVT SEQ. ID NO: 278
TTCFQPTCVY SEQ. ID NO: 279 TTCISNPCST SEQ. ID NO: 280 TWCQGSSCQP
SEQ. ID NO: 281 VGCQSSVCVP SEQ. ID NO: 282 VPCQPSTCVF SEQ. ID
NO: 283 VSCEPSPCQS SEQ. ID NO: 284 VSCGGPICLP SEQ. ID NO: 285
VSCKPVL CVA SEQ. ID NO: 286 VSCPSTSCR P SEQ. ID NO: 287 VSCQSSVCMP
SEQ. ID NO: 288 VSCTRIVCVA SEQ. ID NO: 289 VTCEPSPCQS SEQ. ID

NO: 290 VTCTTVCRP SEQ. ID NO: 291 YGCGYEGCRY SEQ. ID NO: 292
AGSCQPSCSE SEQ. ID NO: 293 ALLCRPLCGV SEQ. ID NO: 294 ALVCEPVCLR
SEQ. ID NO: 295 ATICEPSCSV SEQ. ID NO: 296 ATTCEPSCSV SEQ. ID NO:
297 ATVCEPSCSV SEQ. ID NO: 298 EGTCLPPCYL SEQ. ID NO: 299
FSTCRPSCSG SEQ. ID NO: 300 GFVCQPMCSH SEQ. ID NO: 301 GLDCGYGCGY
SEQ. ID NO: 302 GLGCGYGCGY SEQ. ID NO: 303 GLGCSYGCGH SEQ. ID
NO: 304 GLGCSYGCGL SEQ. ID NO: 305 GSGCGYGCGY SEQ. ID NO: 306
GTGCGYGCGY SEQ. ID NO: 307 GVSCHTTCYR SEQ. ID NO: 308 GYACNFPCSY
SEQ. ID NO: 309 GYGCGYGCGF SEQ. ID NO: 310 HSPCQASCYV SEQ. ID
NO: 311 HTSCSPACQP SEQ. ID NO: 312 HTSCSSGCQP SEQ. ID NO: 313
IRWCHPDCHV SEQ. ID NO: 314 IRWCRPDCHV SEQ. ID NO: 315 ISSCGTGCGI
SEQ. ID NO: 316 KGGCGSGCGG SEQ. ID NO: 317 KGGCGSSCSQ SEQ. ID
NO: 318 LVTCQDSCGS SEQ. ID NO: 319 LVTCQESCQP SEQ. ID NO: 320
MSICSSACTD SEQ. ID NO: 321 MSICSSACTN SEQ. ID NO: 322 MSVCSSACSD
SEQ. ID NO: 323 PAICEPSCSV SEQ. ID NO: 324 PASCQKSCYR SEQ. ID
NO: 325 PIYCRRTCYPH SEQ. ID NO: 326 PNQCQTLQVE SEQ. ID NO: 327
PQPCVPTCFL SEQ. ID NO: 328 PSACQSGCTS SEQ. ID NO: 329 PSPACEPSCSE
SEQ. ID NO: 330 PSPACEQASYI SEQ. ID NO: 331 PSPACEQSGCIS SEQ. ID NO:
332 PSPACEQSGCTD SEQ. ID NO: 333 PSPACEQSGCTS SEQ. ID NO: 334
PTACQPTCYQ SEQ. ID NO: 335 PTACQPTCYR SEQ. ID NO: 336 PTPCSTTCRT
SEQ. ID NO: 337 PTSCQKSCYR SEQ. ID NO: 338 PTSCQPSCES SEQ. ID
NO: 339 PTSCQTSTL SEQ. ID NO: 340 PVICEPSCSV SEQ. ID NO: 341
PVSCVPVCSG SEQ. ID NO: 342 PVTCVPRCTR SEQ. ID NO: 343 PVYCRRTCYPH
SEQ. ID NO: 344 PVYCRRTCYY SEQ. ID NO: 345 PVYCVPVCSG SEQ. ID
NO: 346 QPGCESPCEP SEQ. ID NO: 347 QQSCVSSCRR SEQ. ID NO: 348
QTSCGSSCGQ SEQ. ID NO: 349 QTTCHPSCGM SEQ. ID NO: 350 QTTCRPSCGV
SEQ. ID NO: 351 RGGCGSGCGG SEQ. ID NO: 352 RLACYSLCSG SEQ. ID
NO: 353 RPACYRPCYS SEQ. ID NO: 354 RPFCFRRCYC SEQ. ID NO: 355
RPICRPICSG SEQ. ID NO: 356 RPLCYRRCYC SEQ. ID NO: 357 RSPACEQASYV
SEQ. ID NO: 358 RVSCHTTCYR SEQ. ID NO: 359 SAICRPTCPR SEQ. ID
NO: 360 SDSCKRDCKK SEQ. ID NO: 361 SEGCGSGCGG SEQ. ID NO: 362
SFLCRPACSR SEQ. ID NO: 363 SGGCGSGCGG SEQ. ID NO: 364 SGGCGSSCGG
SEQ. ID NO: 365 SGSCQAACGQ SEQ. ID NO: 366 SLLCHPVCKS SEQ. ID
NO: 367 SLLCHPVCRS SEQ. ID NO: 368 SLLCRPACSP SEQ. ID NO: 369
SLLCRPACSR SEQ. ID NO: 370 SLLCRPICRP SEQ. ID NO: 371 SLLCRPMCSR
SEQ. ID NO: 372 SLLCRPTCSR SEQ. ID NO: 373 SLLCRPVCP SEQ. ID
NO: 374 SLLCRPVCRP SEQ. ID NO: 375 SLLCRPVCRS SEQ. ID NO: 376
SLLCRPVCSR SEQ. ID NO: 377 SNPCQVTCR SEQ. ID NO: 378 SRGCGSGCGG
SEQ. ID NO: 379 SRSCQSPCYR SEQ. ID NO: 380 SRSCQSSCYR SEQ. ID
NO: 381 SSGCGYGCGY SEQ. ID NO: 382 SSGCPMACPG SEQ. ID NO: 383
SSICQPICSE SEQ. ID NO: 384 SSPCHTSCYY SEQ. ID NO: 385 SSPCQPTCYV
SEQ. ID NO: 386 SSPCQQSCYV SEQ. ID NO: 387 SSPCQTSCYR SEQ. ID
NO: 388 SSSCQQSCRV SEQ. ID NO: 389 STVCQPACGV SEQ. ID NO: 390
TDNCQETCGE SEQ. ID NO: 391 TQPCYEPCLP SEQ. ID NO: 392 TSSCGTGCGI
SEQ. ID NO: 393 TSSCQPSCGR SEQ. ID NO: 394 TSSCTTPCYQ SEQ. ID
NO: 395 TSVCLPGCLN SEQ. ID NO: 396 TTVCLPGCLN SEQ. ID NO: 397
VANCQAPCST SEQ. ID NO: 398 VDDCPESCWP SEQ. ID NO: 399 VKRCPSVCPE
SEQ. ID NO: 400 VSSCQPSCSE SEQ. ID NO: 401 YEGCRYGCGH SEQ. ID
NO: 402 YGRCRHGCHS SEQ. ID NO: 403 YGYCRPSCYG SEQ. ID NO: 404
YRDCQKTCWE SEQ. ID NO: 405 YRGCQEICWE SEQ. ID NO: 406

YRGCQETC SEQ. ID NO: 407 YRGCQQTWCW SEQ. ID NO: 408
YRSCRPSYCG SEQ. ID NO: 409 GGVCGPSPPC SEQ. ID NO: 410 GVCGPSPPCI
SEQ. ID NO: 411 VCGPSPPCIT SEQ. ID NO: 412 CGPSPPCITT SEQ. ID NO:
413 CAPIYCRRTC SEQ. ID NO: 414 CAPSPCQASC SEQ. ID NO: 415
CAPSPCQPAC SEQ. ID NO: 416 CAPVYCRRTC SEQ. ID NO: 417 CASSPCQQAC
SEQ. ID NO: 418 CASSSCQPAC SEQ. ID NO: 419 CASSSCQQSC SEQ. ID
NO: 420 CCGNFSSHSC SEQ. ID NO: 421 CCGYGGLGCG SEQ. ID NO: 422
CCNYYGNSCG SEQ. ID NO: 423 CCNYYRNSCG SEQ. ID NO: 424 CCSRNFSSCS
SEQ. ID NO: 425 CDAGSCQPSC SEQ. ID NO: 426 CDPCSLQEGC SEQ. ID
NO: 427 CDPSPCEPSC SEQ. ID NO: 428 CDPVICEPSC SEQ. ID NO: 429
CDQGLCQETC SEQ. ID NO: 430 CEATTCEPSC SEQ. ID NO: 431 CELPCGTPSC
SEQ. ID NO: 432 CEPALCEPSC SEQ. ID NO: 433 CEPPCGTAPC SEQ. ID NO:
434 CEPPCSAPSC SEQ. ID NO: 435 CEPRSCASSC SEQ. ID NO: 436
CEPSACQSGC SEQ. ID NO: 437 CEPSCSVSNC SEQ. ID NO: 438 CEPSCSVSSC
SEQ. ID NO: 439 CEPSPCQSGC SEQ. ID NO: 440 CEPTACQPTC SEQ. ID
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CCQPTCVTSCC SEQ.	ID	NO:	1021 CCQPYCHPTCC SEQ.	ID	NO:	1022
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CCRPACCETTC SEQ.	ID	NO:	1037 CCRPACCQNTC SEQ.	ID	NO:	1038
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CGGSCCGSSCC SEQ.	ID	NO:	1083 CGLENCCCPSC SEQ.	ID	NO:	1084

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CRPLCCQTTCC SEQ.	ID NO:	1183	CRPQCCQSVCC SEQ.	ID NO:	1184

CRPQCCQTTC SEQ.	ID NO:	1185	CRPRCCISSCC SEQ.	ID NO:	1186
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SCGCSQCNCCK SEQ.	ID NO:	1237	SCGCSQCSCCK SEQ.	ID NO:	1238
VCCCVPACSCS SEQ.	ID NO:	1239	VCCCVPACSCT		

(55) The present invention is of course in any way restricted to the embodiments herein described and one with ordinary skill in the area can provide many possibilities to modifications and substitutions of technical characteristics by equivalent ones, depending on each situation, as defined in the claims.

(56) The preferred embodiments described above may obviously be combined. The following claims define further preferred embodiments.

Claims

1. A hair composition comprising: a keratin peptide fragment having about 15% to about 30% cysteine amino acid content, wherein the keratin peptide fragment comprises a peptide sequence at least 90% identical to SEQ ID NO: 412 or SEQ ID NO: 409; wherein the hair composition is a lotion or cream.
2. The hair composition of claim 1, wherein the peptide sequence of the keratin peptide fragment is at least 95% identical to SEQ ID NO: 412.
3. The hair composition of claim 1, wherein the peptide sequence of the keratin peptide fragment is at least 95% identical to SEQ ID NO: 409.
4. The hair composition of claim 1, wherein the peptide sequence of the keratin peptide fragment is identical to SEQ ID NO: 412.
5. The hair composition of claim 1, wherein the peptide sequence of the keratin peptide fragment is identical to SEQ ID NO: 409.
6. The hair composition of claim 1, wherein the keratin peptide fragment forms one or more

molecular interactions with hair.

7. The hair composition of claim 6, wherein the one or more molecular interactions is one or more disulfide bonds.
 8. The hair composition of claim 1, wherein the total number of cysteine amino acids in the keratin peptide fragment is 2 cysteine amino acids.
 9. A hair composition comprising: a keratin peptide fragment having about 15% to about 30% cysteine amino acid content, wherein the keratin peptide fragment comprises a peptide sequence at least 90% identical to SEQ ID NO: 412 or SEQ ID NO: 409; and at least one excipient comprising propylene glycol, polysorbate 20, hydrolyzed wheat protein, hydrolyzed wheat starch, potassium sorbate, or an alcohol, or a combination of two or more thereof, wherein the total number of cysteine amino acids in the keratin peptide fragment is 2 cysteine amino acids.
 10. The hair composition of claim 9, wherein the at least one excipient further comprises ether dicaprylic, cetyl ester, behentrimonium chloride, or tocopherol, or a combination of two or more thereof.
 11. The hair composition of claim 9, wherein the at least one excipient further comprises potassium hydroxide, acrylate, or phenoxyethanol, or a combination of two or more thereof.
 12. The hair composition of claim 9, wherein the peptide sequence of the keratin peptide fragment is identical to SEQ ID NO: 412.
 13. The hair composition of claim 9, wherein the peptide sequence of the keratin peptide fragment is identical to SEQ ID NO: 409.
 14. A hair composition comprising: a keratin peptide fragment having about 15% to about 30% cysteine amino acid content, wherein the keratin peptide fragment comprises a peptide sequence at least 90% identical to SEQ ID NO: 412 or SEQ ID NO: 409; and at least one excipient comprising an oil and/or an alcohol, wherein the total number of cysteine amino acids in the keratin peptide fragment is 2 cysteine amino acids.
 15. The hair composition of claim 14, comprising the oil and the alcohol.
 16. The hair composition of claim 14, wherein the peptide sequence of the keratin peptide fragment is identical to SEQ ID NO: 412.
 17. The hair composition of claim 14, wherein the peptide sequence of the keratin peptide fragment is identical to SEQ ID NO: 409.
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