

Supporting Information

Insights into Bioactive Peptides in Cosmetics

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Table S1. Classification of cosmetic peptides

Type of peptide	Site of action	Name of peptide	Mechanism of action	Cosmetic functionality
Signal peptide	Modulator of dermal extracellular matrix	Pal-KTTKS	Increases the synthesis of fibronectin and collagen type I/III, glycosaminoglycan and elastin production	Anti-wrinkle Anti-aging
		Pal-GHK or Pal tripeptide 1	Provides a retionic acid-like activity Stimulates the synthesis of collagen and glycosaminoglycan	Anti-aging Skin moisturizer Firming agent
	Collagen modulators	Trifluoroacetyl Tripeptide-2	Stimulates extracellular matrix via inhibiting MMP-1, 3, 9 Acts as elastase inhibitors	Anti-aging Anti-wrinkle
		Palmitoyl tripeptide-3/5	Mimics thrombospondin 1 tripeptide sequence and collagen synthesis via TGF- β	Firming agent Skin moisturizer Improve stretch marks
		Tripeptide-10	Promotes the formation of collagen fibers	Anti-aging Firming agent

		Mimics the decorin sequences bound with collagen fibrils	Photoprotection
	Peptamide-6 or phe-val-ala-pro-phe-pro	Mimics the action of TGF- β which facilitates maturation of adipocyte precursor cells into contractile fibroblast Prevents the differentiation of adipocytes	Skin firming agent in treatment of cellulite Anti-aging
	Oligopeptide Tyr-Tyr-Arg-Ala-asp-Ala	Inhibits procollagen-C enzyme which converts procollagen to collagen	Anti-wrinkle Firming agent
	Acetyl tetrapeptide-9/11	Stimulates the synthesis of syndecan, lumican, and collagen type I	Anti-wrinkle Firming agent Anti-aging
	Acetyl tetrapeptide-5	Reduces edema by inhibiting angiotensin-converting enzyme and collagen crosslinking Inhibits glycation thereby preventing the abnormal cross-linking of collagen fibers	Dermatochalasis or baggy eye lids
Elastin modulators	Dipeptide-2/(valyl-tryptophane)	Lymph drainage via ACE inhibition	Baggy eyelids

	Hexapeptide Val-Gly-Val-Ala-Pro-Gly	Downregulates elastin	Firming agent
		Stimulates skin fibrous cells to form vessels and endothelial cell migration	Anti-wrinkle
	Palmitoyl oligopeptide	Increases collagen and hyaluronic acid	Anti-aging
Keratinocytes/epidermal cells	Aquaporin	Increase the thickness of the stratum corneum	Skin moisturizer
			Anti-wrinkles
			Anti-aging
	Growth factors	Inhibits keratinocyte growth,	Anti-wrinkles
	Transforming growth factor (TGFs)	Chemotactic for macrophages and fibroblasts	Post-skin resurfacing
	Hepatocyte growth factors (HGFs)	Promotes neovascularization Promotes cell growth and keratinocyte migration	Photoaging
	Keratinocyte growth factor and insulin-like growth factor		
	Heat shock protein 70	Prevents cells against apoptosis, aging, and UV damage	Anti-wrinkles
			Anti-aging

			Inhibits aggregation and supports the regeneration of denatured proteins		
Modulation of melanogenesis	of	Interferon alpha	Increases the concentration of dendritic cells and CD1a and HLA-DR positive cells	Anti-wrinkles	Anti-aging
		Kinetin (natural plant derived growth hormone)	Inhibits the growth of keratinocytes	Anti-wrinkles	
			Delays the onset of aging features in human fibroblasts	Anti-aging	
		Tetrapeptide (His-D-Phe-Arg-Trp)	Analogue of α -MSH causes the synthesis of melanin	Cosmetic tanning	Vitiligo
			Minimizes DNA damage by enhancing repair of DNA and scavenging ROS free radicals		
		Tripeptide (His-D-Phe-Arg)	Analogue of α -MSH induces melanin synthesis	Cosmetic tanning	Vitiligo
		Ser-Tyr-Ser-Nle-Glu-His-D-p-Phe-Arg-Trp-Gly-	MC1R/ α -MSH signaling pathway	Vitiligo	
			Induces melanin synthesis		
			Anti-inflammatory		

Lys-Pro-Val (Melano-Tan-1)				
Decapeptide		Derived from b-FGF, induces melanin synthesis		Vitiligo
Acetyl hexapeptide-1		Melanin increases via α -MSH regulation		Vitiligo Tanning Hair repigmentation
Tyr-Arg-Ser-Arg-Lys-Tyr-Ser-Ser-Trp-Tyr (decapeptide-12)		Tyrosinase inhibitor		Melasma, postinflammatory hyperpigmentation Lentigo Freckles
Nonapeptide-1		Tyrosinase activation inhibition		Melasma, post-inflammatory hyperpigmentation
Carrier peptide	Collagen and elastin synthesis	GHK-Cu glycyl-histidyl-lysine (tripeptide 1)	Activates acute and chronic wound healing	Anti-aging Skin laxity Wrinkles

			Regenerates collagen by modulating levels of TIMP-1, TIMP-2, and MMP-2	In sunscreens and post-skin resurfacing
			Increases synthesis of dermatan sulfate and chondroitin sulfate	
			Stimulates antioxidant responses	
		Manganese tripeptide complex-1 GHK-Mn	Stimulates matrix protein growth, antioxidant reactions	Wrinkles Anti-aging
		Acetyl hexapeptide 3/8	Offers botox-like through inhibiting SNARE and releasing catecholamine	Firming and toning skin
				Skin hydration
				Periorbital wrinkle
Neurotransmitter -inhibitor peptides	Moisturizing effect	Pentapeptide 18	Inhibits nerve cell activity and catecholamine release	Firming and toning skin
	Stimulating collagen/elastin synthesis			Skin hydration
	Inhibiting melanin synthesis			Periorbital wrinkle
		Pentapeptide 3	Competitive antagonist at acetylcholine receptors	Anti-wrinkle Anti-aging

		Dipeptide diaminobutyroyl benzylamide diacetate	Mimics the effects of waglerin, a neurotoxin derived from the venom of <i>Tropidolaemus wagleri</i> Offers botox-like via acetylcholine receptor	Anti-wrinkle Anti-aging
Enzyme	Moisturizing effect	Soybean amino acids	Inhibits proteinase formation, increases	Anti-aging
inhibitor peptide	Stimulating collagen/elastin synthesis		the length and number of hair roots	Skin moisturizer Hair promoting agent
		Rice peptides	Promotes the expression of hyaluronan synthase 2 genes	Hair conditioning agent Anti-aging
		Silk proteins derived from silkworm <i>Bombyx mori</i>	Shows antioxidant activity Offers high affinity to chelate with copper Inhibits the activity of lipid peroxidation and tyrosinase	Anti-aging