

Feature: Skin Care 2006

John Woodruff

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If a person exposes her or his face to the sun, frowns, laughs or otherwise expresses emotions then the face will develop expression lines, character lines, laughter lines, crows feet and visible signs of ageing, collectively known as wrinkles. In 1941 Maison de Navarre wrote that if it were possible to create a product to remove and eliminate these lines then the inventor would reap a rich reward.

Various approaches are available for achieving this desirable result. Improving skin moisture content keeps it plump and supple; increasing collagen and elastin content provides a similar result; removing dead skin cells with keratolytic agents is said to stimulate new cell proliferation and there are many other suggestions for preventing wrinkle formation and for their long term improvement. However emphasis now is on their rapid reduction, even if the effect is only transitory, and this is achieved by three main mechanisms. The application of a film forming material that tightens skin as it dries; the prevention of facial muscle contractions by interfering with the "switching" mechanism that causes muscle movement, and softening the appearance of wrinkles by the use of light diffusing materials and makeup. There are also various electro-mechanical devices but these do not form the basis of this article.

Looking back thirty years US Patent 3,949,741 (1976) describes a pressure-sensitive adhesive appliance that is tightly applied to wrinkle-prone areas of the human face so that the skin under the appliance is flattened and smoothed. The appliance remains in place for at least four hours and is removed in a manner to strip dead skin cells from the skin. Moving on, US Patent 4,938,969 (1988) describes a topical formulation comprising ascorbic acid, tyrosine and zinc sulfate formulated in a hydrophilic ointment or cream base, which is claimed to stimulate fibroblast proliferation and to promote the production of collagen and elastin, thereby promoting the supporting role of the associated dermal tissues and reducing the depth and intensity of fine lines and wrinkles.

Cause and effect of skin blemishes are well described in US Patent 5,554,597 (1996), which claimed uses of topical compositions comprising a 2-hydroxycarboxylic acid and related compounds to alleviate or improve skin lines; blotches; blemishes; nodules; wrinkles; pigmented spots; atrophy; precancerous lesions; elastotic changes characterised by leathery, coarse, rough, dry and yellowish skin; and other skin changes associated with intrinsic aging or skin damages caused by extrinsic factors such as sunlight, radiations, air pollution, wind, cold, dampness, heat, chemicals, smoke and cigarette smoking. Thereafter patents making claims to improve wrinkles came very frequently and were based on all manner of ingredients, from botanical extracts to polypeptides. A pressure-sensitive patch having dissolved in the adhesive a mixture of a Vitamin C ester and Vitamin E in glycerine and a polydiorganosiloxane adhesion-adjusting agent plus one or more members selected from the group consisting of moisturising agents, skin collagen synthesis promoting agents and exfoliating agents appeared in USP 6,180,133 (2001).

Facial expressions are the result of muscle contractions: the contraction-relaxation cycle is due to variations in the concentration of cytoplasmic calcium. In the presence of calcium, the contractile proteins of striated muscle have an ATPase activity which provides the energy required for contraction. Conversely, the relaxation of striated muscle takes place when a new ATP molecule binds to the contractile proteins. USP 6,908,925 (2005) claims that contractile muscle fibre plays an essential role in the formation of wrinkles, and that modulating the neural motor influx and controlling the contraction of muscle fibres serves an essential function in the formation of wrinkles. The patent then describes various potential agents that are active inside the cell that have an effect on the release of the intracellular calcium reserves or inhibit the formation of the calcium/calmodulin complex. Of those described the phenylalkylamines, verapamil and nimodipine, are preferred by the applicants.

USP 6,974,799 (2005) describes pharmaceutical, personal care and cosmetic compositions containing a tripeptide and a tetrapeptide useful for treating visible signs of aging including wrinkles, stretch marks and dark circles and USP 6,919,306 claims a method for skin care by orally administering an ingestible carrier and N-

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acetylglucosamine obtainable by hydrolysis of chitin by which the moisture and tension of skin can be improved and the rough skin and fine wrinkles can be prevented or ameliorated.

Using make-up to cover wrinkles has always been a reasonably successful method and there have been advances in the way this is done. A paper presented at the IFSCC Congress, 2005, Optical rejuvenating makeup using an innovative shape controlled hybrid powder, was given by Katsuhiko Yagi, who described how the optimum powder shape for covering the appearance of wrinkles was derived. At the same event Yukari Sakazaki, described developing beauty-enhancing makeup by controlling light reflected from skin and how an optically designed foundation significantly improved the attractiveness of the facial skin tested.

USP 6,586,013 (2003) discloses an encapsulated optically-activated particle that is able to both scatter and absorb light in a diffuse manner in order to reduce the visual perception of skin imperfections, including cellulite, wrinkles, shadows, and skin discoloration. The material described is available from **Lipo Chemicals, Inc.** under the trade name Lipolight OAP/PVA. For this approach **Grant Industries** offers Gransil PSQ-W, an aqueous suspension of polymethylsilsesquioxane powder that has a spherical shape and an average particle size of 5 microns. It is readily water-dispersible with a soft, powdery feel, and is an effective light diffusing agent for wrinkle correction. Also intended to improve the appearance of wrinkles by light diffusing technology is Gransil ORB, INCI; Dimethicone, Cyclopentasiloxane, Polysilicone-11, Nylon-12, Silica, PEG-10 Dimethicone, Polysorbate 40, Isohexadecane, Ammonium polyacryloyldimethyl taurate. It also absorbs sebum giving a matt appearance to the skin and increases skin moisture. Most suppliers of pigments and specialities for makeup provide materials with a similar action.

Returning to “instant” wrinkle reducers, there have been numerous launches of new ingredients said to be effective in this regard. Argireline, **Lipotec**, INCI: Hexapeptide-3, was described in the IJCS, 2002, 203 – 330, as a safe alternative to Botulinum neurotoxins for inhibiting facial muscle activity. Botulinum toxins paralyse by selectively blocking acetylcholine release at the neuromuscular junction. This is achieved by cleaving a protein called SNAP-25. Argireline inhibits neurotransmitter release by forming a protein complex with the calcium ions and as well as the instant effect regular topical applications of 3% of Argireline solution in a suitable carrier is said to reduce wrinkle depth by 27% within thirty days. The solution is 0.05% active and the material is also available as a powder, but is much more difficult to handle in powder form.

Two peptide-based products from **Pentapharm** are Vialox and Syn-Ake. Vialox is Pentapeptide-3 and paralyzes facial muscles within 10 to 15 minutes of application. Syn-Ake is Dipeptide diaminobutyroyl benzylamide diacetate, a tripeptide said to mimic the activity of the Temple Viper and again, it inhibits muscle contractions and appears to smooth facial skin. Grantox, **Grant Industries**, is a mixture of Cyclopentasiloxane, Polysilicone-11, Aqua, Barium sulfate, Aminobutyric acid, Ginseng extract, Portulaca extract, Centella extract, Isohexadecane, Ammonium polyacryloyldimethyl taurate & Polysorbate 80. It is said to combine the filling properties of silicone elastomer technology, with a synergistic array of actives to relax the skin by reversible inactivation of nerve electric signal transmission by ion channels, to optimise optical diffusion and utilise the viscosity of silicone and organic film-formers for extended coverage, to provide soothing botanical extracts for a more youthful appearance and to have a light diffusing action to hide and soften wrinkles.

A natural-based material that attenuates facial muscle contractions is Gatuline Expression, **Gattefosse**. It is extracted from the upper parts of *Acmella oleracea* and studies have revealed a list of key compounds present. The important ones are isobutylamides of polyenic and polyenylic acids including spilanthol, which is the molecule mainly responsible for the activity of Gatuline Expression. Dermotenseur, **LIBiol**, claims to combine the hydrating action of Quillaja and the firming action of Kigelia to act synergistically for a more notable and durable skin toning and tightening effect. Quillaja is rich in flavonoids containing reducing sugars such as

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glucose, galactose, xylose and rhamnose making it an excellent hydrating agent. The fruit pulp of the *Kigelia* tree is traditionally employed to increase develop the bust and increase its firmness. The peptides contained in this extract have a mechanical tightening action on the skin and are said to improve cellular reactivation.

Over centuries a number of astringent film-forming materials have been used with varying degrees of success for both long-term amelioration and short-term hiding; gum Arabic, casein, sodium silicate, albumin, bovine serum, alum and various film-formers being typical examples of the latter. Wrinkle reduction by skin tightening film-formers is an instant and well proven method and is still very popular with many more materials now available.

Pronalen Flash Tense, **Provital**, is a protein hydrolysate obtained from germinated wheat seeds. Many other hydrolysed protein materials are available and most will have a tightening effect and also have moisturising properties. Liftiline and Tensine, **Silab**, are protein materials from *triticum vulgare* with instant smoothing claims. A third material from this supplier is Polylift; described as a polymer of *prunus amygdalus dulcis* (sweet almond), it is said to provide a more elastic film than with a higher spreading capacity than other hydrolysed proteins.

A mix of hydrolysed wheat protein produced by enzyme hydrolysis and the polysaccharides dextran, dextrin and mannitol is the basis of Vegetens OR, **Sensient LCW**. The wheat protein is strongly absorbed to the skin surface forming a homogenous film and on drying, it has a tightening effect. The polysaccharides have strong moisture retention properties and hydrate the epidermis, increasing its thickness and rendering it more supple. NutriLayer, **Eastman Chemical Co.**, is extracted from non-GMO organically grown rice. It contains rice bran wax, squalene and phytosterols, plus tocopherols and tocotrienol and is suggested as a means of delaying the onset of wrinkles as well as for rapid skin improvement.

Liftessence, **Lucas Meyer**, is an extract of the tree fern *Cyathea cumingii* that grows in New Zealand. The extract contains a high molecular weight polysaccharide in association with a highly branched polysaccharide that forms an elastic film, which immediately tightens the skin when topically applied at 2% in a suitable carrier. **Rahn** suggests Liftonin, a natural astringent obtained from oak apple with silicilic acid and minerals from a millet extract, which is said to gently tone and tighten the skin. Also from oak, in this case the cork oak, *Quercus suber*, is Suberlift, **Vincience**. The extract contains both hydrophilic and hydrophobic polymers that give an instant smoothing effect on topical application when used at 3% in the final product.

Argatensyl, **Laboratoires Sérobiologiques**, is composed of high molecular weight proteins extracted from Argane and rendered water-soluble that has an immediate tightening effect on skin. The INCI names are Argania spinosa kernel extract and sodium cocoyl glutamate. The same company also supplies Liftensyl, INCI; Soy protein phthalate, a film-forming polymer with instant effect that also leaves the skin feeling smooth.

Pepha-Tight, **Pentapharm**, INCI: Pullulan and Algae extract, is derived from micro-algae produced under laboratory conditions to ensure consistency and purity. When used at 5% in a suitable base the tightening effect is virtually immediate. In-vitro tests show a protective effect on human skin fibroblasts against oxidative stress, and that Collagen-1 synthesis from normal human skin fibroblasts can be increased. Also from Pentapharm is Pentacare NA, a mixture of galactomannans obtained from the seeds of *Ceratonia siliqua* (locust bean gum) combined with hydrolysed protein from wheat gluten. It forms a film on the skin and following the evaporation of the water, the film contracts giving a tightening effect, thus reducing the perception of wrinkles.

NAB® Siberian Ginseng Extract, **Arch Personal Care**, is a 25% active, aqueous extract consisting primarily of complex polysaccharides and associated glycoproteins from the root *Eleutherococcus senticosus*. When applied to the skin in a cosmetic vehicle, these compounds form a film on the skin that will tighten and smooth the treated skin immediately. This perceivable phenomenon is due to physical changes in the polymer structure of

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the polysaccharides as they dry on the skin and it is claimed the sensation of smooth skin will last for hours without flaking or leaving the skin feeling overly tight.

Synthetic polymers are also useful: **ISP** offers Aquaflex XL-30, INCI: Polyamide-1, a high molecular weight water-soluble polymer with a rapid tightening effect. A detailed study of the action of this material and other polymers is available from the supplier which describes many different test protocols and ways of quantifying the results. A mixture of polymer and protein material forms the basis of Sesaflex, **Seppic**, which is recommended for use at 10% for immediate rejuvenation of ageing skin. It is a combination of acrylates copolymer, VP/polycarbamyl polyglycol ester and hydrolysed sesame protein with PG-propyl methylsilanediol.

Not quite the same as wrinkle removal but still designed to give rapid improvement to the eye area, Eyeliss, Sederma, is principally a mixture of hesperidin methyl chalcone and dipeptide-2 with palmitoyl tetrapeptide-3. It is said to decrease capillary permeability and the formation of oedema in the eye area, to restore tissue elasticity and firmness and to promote an increase in contraction of lymphangions, necessary to ensure lymphatic drainage in the eye area. Hesperidin in association with glucose also forms the basis of Glycosyl Hesperidin from **Hayashibara** and this is also recommended for the treatment of dark circles under the eyes.

The suppliers of all the ingredients described have provided evidence of the efficacy of the materials named. Most "instant" wrinkle removers also hydrate the skin and give some longer term improvement. It is also possible to formulate single products that combine instant effect with continued improvement, provided the material is regularly applied. The nature of the vehicle is also important and this may vary from a simple aqueous lotion to a gel or an emulsion. Whatever the choice of product form one or more of the ingredients named will be found suitable for this application.

Instant wrinkle removers are required because of age and neglect. There are many ingredients offered to cosmetic formulators to delay their onset but they have to be used as a preventative rather than a cure, although long-term use will usually result in an improvement. First must come UVB and UVA protection; secondly is the use of suitable free radical scavengers, and many anti-oxidants are available from synthetic and natural sources. Improving the structural proteins of the dermis and epidermis is the claimed function of many ingredients and constant moisturising is as important as other preventative measures.

A few of the more recent offerings include RonaCare VTA, a blend of rutinyl sulfate, magnesium ascorbyl phosphate and L-hydroxy proline in liposome form. This multi-functional material is claimed to stimulate the synthesis of collagen, protect hyaluronic acid against enzyme degradation and to stimulate the production of glycosaminoglycans to plump out skin and increase its firmness. Regu-Age, **Pentapharm**, is primarily a mixture of oxido reductases, glycine soja protein and hydrolyzed rice bran protein and both in-vivo and in-vitro studies show it to be effective in removing dark circles under the eyes and reducing the appearance of fine lines.

Vincience offers a number of peptides claimed to provide long term improvements to facial skin including Collaxyl, INCI; Hexapeptide-9, a collagen peptide consisting of exactly the same sequence of amino acids as human collagen. In the skin it works as a soluble messenger that rapidly activates regeneration to the skin and is greatly beneficial following UV or physical damage. **Corum Inc.** also produces various peptides including Corum 8806, INCI; Palmitoyl hexapeptide, which is claimed to stimulate fibroblast proliferation, impart a firming effect and to smooth out wrinkles while strengthening the skin's natural barrier function

Riboxyl, **Lucas Meyer**, INCI; Ribose, is said to stimulate oxygen production within cells and the increased energy available means that cells recover their metabolic energy potential and the fibroblasts are able to stimulate the synthesis of macromolecules of dermis which restructures skin, erases wrinkles and enhances elasticity. Pulpactyl, **Silab**, is rich in oligosides from Southernwood and has been developed to compensate for

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the adipose tissue loss associated with skin ageing. Pulpactyl provides a lipofilling effect by stimulating adipogenesis and the swelling of fat cells. In vivo tests show an increase in the density of adipose tissue in the face and an improvement in tone and elasticity of the skin. Symglucan, Symrise, is a solution of oat beta-glucan in water the molecular size of which is small enough to penetrate skin that is said to stimulate collagen growth, thus plumping out wrinkles.

There are many other materials designed to protect the skin from environmental factors and no doubt regular use from ones early twenties onwards will effectively delay the onset of wrinkles but a quick fix is always going to be required for those who did not invest in the long term benefits of UV and antioxidant protection, as well as those people who laugh a lot.