

Feature; Facial Skin care
John Woodruff

Following on from last month's feature on sun care and sunscreen products this feature is looking at ways of mitigating sun damage and of delaying the onset of visibly aged skin.

***"Nature gives you the face you have at 20.
Life shapes the face you have at 30.
But at 50, you get the face you deserve"***

- Coco Chanel

The sun can make us feel good and look good but the cumulative effects of sun exposure causes cellular damage, early wrinkling, irregular pigmentation of the skin including solar lentigo or age spots, actinic keratoses and possibly skin cancer. Solar radiation makes skin look old and wrinkled before it should because over time, the sun's ultraviolet light damages the elastin, the skin begins to sag, stretch, and lose its ability to go back into place after stretching. For further details with photographs about skin lesions and melanoma refer to the slideshows on Medicinenet [Ref 1].

Uneven face tone, lack of skin radiance and the appearance of wrinkles are the common signs of ageing and **Rahn** has grouped these into four stages. Group I is mild skin ageing; no wrinkles and smooth, even skin. Group II shows moderate skin ageing and wrinkles only appear during animated facial expressions while Group III is advanced skin ageing and wrinkles are also visible when the face is relaxed. Group IV have severe skin ageing and the entire surface of the skin is covered in wrinkles. **Rahn** has categorised wrinkles as atrophic causing fine lines; dynamic leading to expression lines; elastotic and actinic as wrinkles spread and deepen and finally static due to gravity.

Atrophy or loss of tissue of the dermis increases with age as the skin becomes thinner and has less collagen and elastin fibres. Elastotic wrinkles are permanent and appear primarily on the face, neck and hands and actinic wrinkles become very deep with age, forming a typical pattern across the forehead and round the eyes and mouth and these may eventually join across the cheeks.

Skin tone and texture

Research by Dr Paul Matts [Ref 2] showed that perceived age was very much affected by skin tone. 95% of transmitted light passes through the stratum corneum before being scattered and diffused by the epidermis and reflected back by the collagen layer and there is some absorption by melanin and haemoglobin. Matts said that human appearance was driven overwhelmingly by interaction with visible light and this was affected by skin surface topography and melanin concentration. Exposure to sunlight causes changes in the distribution of melanin, haemoglobin and collagen and uneven distribution of melanin was the main indicator of age.

To combat uneven colouration CellActive-White from **RAHN** contains a watercress extract which complexes copper ions without which the tyrosinase enzyme cannot function efficiently. This action is supported by bio-available zinc, which also modifies the enzyme structure rendering it less effective at producing melanin. Its content of niacinamide inhibits melanosomal transfer and the ECB factor provides greater cell adhesion making it easier for the melanosomes to transfer melanin resulting in more even distribution throughout the skin.

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Based on mastic, an aromatic resin coming from the bark of a tree that grows on the Greek island of Chios, PoreAway [INCI: Pistacia lentiscus gum/pistacia lentiscus (mastic) gum] tightens dilated pores and purifies the skin. It has been rendered water-soluble by **Mibelle Biochemistry** and PoreAway can visibly improve the quality of the skin by refining its texture, reducing cutaneous imperfections and skin shine.

Marine Extracts

Also claiming to improve skin texture and appearance EPS Seamat from **Marine Biotechnologies** is a unique, pure and natural exopolysaccharide produced by marine plankton collected from the temperate and shallow waters of the north coast of Finistère in Brittany, France. It absorbs excess sebum on the skin surface providing an overall anti-shine effect on the skin after 1 hour. From even further west, from the isles of Ouessant, **Algues & Mer** harvests marine algae using a hand cutting method that encourages regeneration and a quick new growth. The brown seaweeds thus collected yield *Ascorphyllum noduosum* extract, which contains sulphated polysaccharides that have anti-inflammatory and skin restructuring properties.

Continuing the marine theme Phytoserum from **Koda** is a blend of sea plants that includes a variety of sea kelp, *Macrocystis pyrifera*, which stimulates epidermal thickening. *Macrocystis pyrifera* is a rich source of 60 minerals and elements that includes iodine, 21 amino acids, 12 vitamins, thiamine and tocopherol and it stimulates skin tightening and a reduction in wrinkles.

A betaglucan called Plerasan Equilibria from **Pleuran** is said to be as effective as steroids in reducing skin redness. Silidine from **Greentech** is *Porphyridium cruentum* exudate and evidence shows that this marine active is able to reduce redness & rosacea. Hydrolyzed Roe is the INCI designation for Aquabeautine from **Aqua Biotechnologies**. It is sourced from salmon hatcheries after hatching is complete and the enzyme present is claimed to smooth skin and even skin tone.

Helionori from **Gelyma** is a concentrated active ingredient prepared from the red seaweed *Porphyra umbilicalis* Kützinger, known as “nori” in Japan. It prevents premature photo-aging and provides a safe marine alternative to synthetic UVA filters. It yields three mycosporine-like amino acids; palythine, porphyra 334 and shinorine and provides natural skin protection against sun burn cells formation as well as the protection of cells and their components such as membrane lipids and DNA from UVA.

Enzymes

Enzymes may be incorporated into skin products to remove dead surface cells and impurities that block pores and are much kinder to skin than chemical peels such as hydroxy acids. The two most commonly used are bromelain, which is derived from pineapple, and papain from unripe papaya fruits. **A&E Connock** provides both of these at a guaranteed strength. **Lipotec** incorporates papain in microcapsules that isolates papain from the rest of the formulation, ensuring release of fresh, intact active when rubbing the product onto the skin.

However careful a person is to limit sun exposure its effects are cumulative but at least it is possible to delay the visible effects of ageing without resorting to Botox

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injections at 40! Effective moisturising and removal of dead skin cells is necessary and delivering effective antioxidants to the deeper layers of the epidermis is recommended.

Avenacare Oat Beta Glucan from **Biovelop** is shown to reduce UV-induced erythema. The soluble fibres of the oats are said to be capable of penetrating their way through the intercellular lipid matrix of skin to the deepest layers of the dermis, where they stimulate the synthesis of collagen to reduce wrinkles. As well as helping to restore vitality to the skin, Avenacare provides soothing, gentle relief for minor skin irritations, wounds and burns. Another material that offers relief from solar erythema is Lysolecithin from **Lucas Meyer** that penetrates deeply into the dermis and quickly reduces redness.

Antioxidants

UV-irradiation not only causes erythema and sunburn but also induces formation of free radicals and activation of skin proteinases. Free radicals and reactive oxygen species may also cause breakdown of skin lipids and proteins. The initiation of proteinase activity results in a breakdown of skin collagen and elastin. These photo-aging processes result in thinner and more wrinkled skin with pronounced lines and a skin with higher sensitivity to environmental stress. Photoprotection by tocopherols and phytosterols is the claim for Lipex PreAct from **AAK**, which is a bioactive emollient derived from rapeseed oil. Its INCI name is canola oil and it contains 900ppm tocopherols and 7000ppm phytosterols. It combines skin protecting and caring activities from natural vitamin E and phytosterols and has emollient and moisturising properties.

AAK also market Lipex Shea Tris; a mixture of shea butter triterpenes that is said to reduce internal and external environmental stress, leading to a better skin tone. It is suitable for all skin types, providing protection for sensitive skin and revitalizing elderly skin. The skin strengthening effect improves skin elasticity and firmness, making the skin smooth and supporting a younger-looking skin. Skin explants treated with a cream containing 0.5% Lipex Shea Tris showed a 26 % increase in epidermal thickness versus placebo and a well defined dermal-epidermal junction, indicating an improved skin barrier and leading to better moisture levels in the skin. The explants also showed an increase of the dermal protein content and the mechanism for improved collagen was further investigated by measuring collagenase activity, which showed a significant reduction.

Anthocyanins are powerful antioxidants and free radical scavengers and are found in grape skins. PhytoCellTec Solar Vitis from **Mibelle Biotechnology** is based on the stem cells of the Gamay teinturier fréaux grape, which is characterised by its red flesh and juice due to its high anthocyanin content. The stem cells are harvested and homogenised together with phospholipids to encapsulate and stabilise oil and water-soluble components into liposomes. **Mibelle** claims that this ingredient protects skin stem cells against UV stress, delays senescence of essential cells, fights photo-aging and provides a vital and healthy-looking skin.

A problem with including antioxidants like vitamins E and C in products is their inherent instability. Various suggestions are made for improving this such as the use

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of a liposomal suspension to protect the material in the delivery vehicle and to ensure good penetration properties on application. A peroxide TLA from **Crestchem** is a good example whereby a lecithin suspension contains approximately 10% tocopherols and a minimum 8% ascorbyl palmitate and is stabilised with citric acid. The suppliers suggest that 0.1% added to a cosmetic emulsion is sufficient to protect the oil phase from rancidity and 1% will provide antioxidant effects within the epidermis.

Activespheres Vit C PMg from **Chemunion** protect vitamin C by encapsulation in sub-micron spheres as a mixture of magnesium ascorbyl phosphate, atelocollagen, sodium chondroitin sulfate and xanthan gum supplied in an aqueous/glycolic solution. The capsules contain 50% by weight magnesium ascorbyl phosphate and skin permeation efficacy is due to their flexibility that can misshape and reshape to their original sizes after crossing the dermal barrier.

Tagra is a company that specialises in microencapsulation of sensitive actives for the cosmetic and pharmaceutical industry and it supplies vitamins E and C in this form as well as other antioxidants and actives such as retinol and resveratrol. The particles have an average size of 40µm and are remarkably stable, only releasing their enclosed active content by friction on application.

Vitamin F, which is a mixture of linoleic acid and alpha-linoleic acid is also said to improve skin properties. Lipex AvoButter from **AAK** is a new material introduced at In-Cosmetics 2012 that delivers Vitamin F from avocado oil and skin repairing lipids from shea butter and avocado oil. The ingredient is semisolid, melting slowly on the skin for improved moisturising.

Avocado is also the source of the principal active, avocado peptides, in Effpulp from **Laboratories Expanscience**. The avocado peptide is said to restore the skin's own natural defences and detoxification systems by repairing and eliminating oxidized proteins. Also, within the skin it stimulates the gene expression of the repairing enzyme, thioredoxin whilst restoring the cell's natural recycling system by the enzyme proteasome. Moisture content and skin plumpness is preserved as avocado peptide stimulates the production and release of hyaluronic acid from the keratinocytes throughout the stratum corneum, epidermis and dermis. It is claimed to restore lost volume and rejuvenate skin, restore firmness and elasticity and to target the first signs of aging in mature, weakened, dehydrated and stressed skin.

Lipodisq is a transport system developed by **Malvern Cosmeceuticals** with the advantage of its very small size, 10 – 40nm; it is able to penetrate the aqueous pores that surround the fatty lamellar layers of the stratum corneum. Lipodisq then becomes trapped and degrades slowly to release its contents into the deeper layers of the skin. The outer layer of the skin therefore acts as a reservoir for the active substance ensuring a more even release profile. A variety of active ingredients are available in Lipodisq format including retinol, sodium ascorbyl phosphate, ascorbyl palmitate, niacinamide and various botanical extracts.

Gattefosse provides a number of different ingredients based on plant extracts for the prevention or reduction in wrinkles under its Gatuline trade name. Gatuline Age Defense is an aqueous extract of *Juglans regia* (Walnut) seed that contains phytic acid, polyphenols, proteins, mineral salts and vitamins that protect the cell's antioxidant

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pool and has bio-stimulating properties. Gatuline InTense is an extract of *Spilanthes acmella* (Paracress) flower in caprylic/capric triglycerides with firming and lifting properties and Gatuline Expression is an aqueous/alcohol extract of the same plant, which provides an immediate skin tightening and lifting effect.

RonaCare Cyclopeptide-5 [INCI: Aqua, alcohol, lecithin, ectoin, cyclotetrapeptide-24, aminocyclohexane carboxylate] from **Merck** provides anti-wrinkle, skin firming and elasticity benefits and its makers claim that it is the first cyclic peptide for cosmetic applications. Different peptides produce different biological effects by signaling cells to perform various functions by attaching to receptors found on the surface of each cell; this is the lock and key mechanism. The cyclic structure of RonaCare Cyclopeptide-5 means that it fits better into the receptor than other peptides for optimum function and its unique cyclic structure gives it high selectivity to particular receptors.

Ellagi-C [INCI: Propanediol, Anogeissus leiocarpus extract] from **Soliance** is marketed as a wrinkle corrector. It is a potent antioxidant that limits the formation of reactive oxygen species (ROS); stimulates collagen synthesis and is an MMP inhibitor. MMP-2 and MMP-9 are the enzymes responsible for collagen IV degradation mainly localised in the dermal-epidermal junction. GemmoNova is a new material from **Jan Dekker** based on cultivated safflower buds, [INCI: Carthamus tinctorius (safflower) bud extract] that is shown to improve collagen and elastin synthesis in in-vivo and ex-vivo trials.

Merck supplies RonaCare Luremin, [INCI: Sorbitol, dihydroxy methylchromone]; a nature-identical active that has similar skin-smoothing properties to retinol but is stable and non-irritating. It is claimed to reduce the activity of collagenase and inhibit the activity of elastase. Similar results are claimed for ITD X50 from **Infinitec** that promises an increase in collagen and elastin synthesis, reducing fine lines and wrinkles by an average 33% in 28 days. ITD X50 is a mixture of pamitoyl-heptapeptide and pantothenic acid-heptapeptide-Cu in a VP/dextran protective coating.

Quick Fixes

Unfortunately however careful a person is to protect the skin wrinkles will eventually occur so to get an instant effect **Rahn** suggests Liftonin Xpress. This mixture of hydroxypropyl methylcellulose, pullulan and porphyridium cruentum extract is described as a balanced polymer network based on edible film technology and it provides a fast, intense and long-lasting physical tightening effect that lasts for up to six hours. In-vivo trials using Liftonin Xpress at 1 – 3% in a cosmetic base show significant short term improvements.

AuraSphere N [INCI: Adipic acid/neopentyl glycol crosspolymer, Aqua, amodimethicone, dimethicone/hydroxypropyl methylcellulose, VP/VA copolymer, phenoxyethanol, caprylyl glycol, chlorphenesin] from **Centerchem Inc.** also has an immediate tightening effect if applied neat and it provides longer-term benefits if regularly applied in a cosmetic cream. EPS Seafill from **Marine Biotechnologies** EPS is a marine exopolysaccharide that tightens and fills in wrinkles in 15 minutes. It is

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said to combine the effectiveness of synthetic molecules with the natural properties of plant extracts.

For those who want a quick reduction in aged looks but are prepared to wait a while Proteolea from **RAHN** is claimed to make users look six years longer in just four weeks! Proteolea contains olive leaf extract, jujube extract and levan and Rahn claims it makes skin visibly and perceivably younger by detoxifying, rejuvenating, moisturising and smoothing. The olive leaf re-activates the proteasome responsible for the degradation of harmful cellular waste; jujube extract strengthens the skins own antioxidant defence system to prevent the formation of oxidised cellular waste and the polysaccharide, Levan, creates a firming and moisturising film on the skin.

Another ingredient promising a quick reduction in aged looks is Derm SRC-PF; a complex containing bamboo extract, pea extract and glucosamine from **Barnet Products**. Bamboo is a source of silica, stimulating collagen, elastin and hyaluronic acid synthesis and is claimed to give face lift-like results without Botox. In vivo testing on 20 people looking 55 years old looked almost 11 years younger after 4 weeks of treatment, claims Barnet.

AcquaCell from **Barnet Products** is a natural complex combining extracts of watermelon rind, Lens esculenta (Lentil) fruit and unripe apple and apple skin in an optimised delivery system. Tests provided by Barnet show that AcquaCell reduces fine lines in 2 hours, increases intracellular water by 85% in 2 weeks, and provides immediate skin hydration. Water melon rind contains citrulline, which is essential to the functioning of filaggrin that forms a critical part of the skin's own water-based moisturising complex. The lentil extract contains vitamin B5 and trisaccharides and apple starch is a source of polysaccharides, sodium lactate and sodium PCA.

Not new but still very effective, Argireline from **Lipotec** is claimed to be the first anti-wrinkle hexapeptide [Acetyl hexapeptide-8] with a botulin-like mechanism of action. It reduces the depth of the wrinkles on the face caused by the contraction of muscles of facial expression, especially in the forehead and around the eyes. **Lipotec** produces a number of peptide-based actives including Snap-7 [INCI: Acetyl heptapeptide-4] and Snap 8 [INCI: Acetyl octapeptide-3], both of which reduce wrinkle depth through a mechanism similar to that from Botulinum toxin. Another material from **Lipotec** is Preventhella, a diaminopropionoyl tripeptide-33 that is said to prevent damage to DNA and proteins caused by solar radiation.

Emulsifiers and other ingredients

Olive oil derivatives are very popular in skin care Olifeel Pearls from **Amedeo Brasca** retain all the anti-oxidant benefits of olive oil in a product with a unique skin feel, plus the ability to thicken the oil phase. **B&C Cosmetic & Food** has several active ingredients derived from olive oil including Beautyolive Crystals. These are based on olive oil unsaponifiables, which creates a crystalline structure that absorbs virgin olive oil; resulting is a semi-transparent glossy wax. It is incorporated for its skin feel and the therapeutic benefits olive oil.

Antiderm from **Kalichem** contains olive oil with a mixture of natural active materials including Copaifera officinalis resin, palmitoyl hydrolysed wheat protein, potassium

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cocoyl hydrolysed wheat and glycyrrhetic acid. Copaiba Balsam is a natural anti-inflammatory remedy from a Brazilian tree and the mix of lipo-proteins and skin conditioning agents are designed to reduce skin redness and the itchiness associated with dry skin. It is recommended for atopic skin conditions and in after sun care and for dry, delicate & sensitive skin.

Cosmetic actives have to be delivered to the skin from suitable cosmetic vehicles. Introduced at In-Cosmetics 2012 was a new emulsifier from **Gattefosse** based on sugar chemistry. Named Sucramulse 163 [INCI: glyceryl stearate, cetyl alcohol, sucrose stearate, sucrose tristearate] it is PEG-free and produces emulsions with a fine and stable structure, making it suitable as a base for a wide variety of formulations. By varying the level of Sucramulse 163 different products can be made, from light lotions to rich body butters, all with a characteristic luxurious texture.

A PEG-free emulsifier is also offered by **Dr Straetmans**: Symbio Solv XC consists of a mixture of naturally derived surfactants and wetting agents and has a comparable performance to PEG-40 hydrogenated castor oil at the same use levels. Its complete INCI listing is caprylyl/capryl wheat bran/straw glycosides, aqua, fusel wheat bran/straw glycosides, polyglyceryl-5 oleate, sodium cocoyl glutamate, glyceryl caprylate.

Also from **Dr Straetmans** is Dermofeel GSC, which is an anionic emulsifier formed by linking stearic acid from rape seed oil and citric acid by a glycerol unit to give glyceryl stearate citrate. The citric acid moiety has a high affinity to the skin's amino acid structures and adheres to the skin to leave a smooth, silky skin feel. It is also often used as a co-emulsifier and to improve the rheology and sensorial profile of the formulation.

UV not only develops free radicals within skin but may also oxidise the components of skin care formulations. Dedraflows from **Creations Couleurs** are hydrogenated polyisobutenes or mixtures of hydrogenated polyisobutenes and other emollients or silicones and are photostable, oxidative stable, chemically inert, odourless and colourless. They prevent the UV-light induced formation of free radicals in the formulation. They vary from very volatile grades without residue that can replace cyclomethicones to extremely viscous grades with substantial residue.

Please note that only the principal ingredients in mixtures have been identified. Also many of the materials mentioned have Ecocert approval and in all instances literature to support claims is available from the suppliers.

Ref 1 <http://www.medicinenet.com/slideshows/article.htm>

Ref 2 Matts, P, High Performance Skin Care, SCS Symposium, Chepstow 2008

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www.creative-developments.co.uk