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Management of ageing skin

Advice for patients regarding home skin care and cosmeceuticals

Patients, friends and family are constantly asking me what products to use on their skin. Essentially they all want to know the same thing – how to reverse (or at least minimise) the effects of ageing. They are understandably confused by the huge number of 'cosmeceutical' products on the market and easily misguided by flashy advertising campaigns and pushy sales reps. Often they end up spending large sums of money on a variety of products and treatments only to be disappointed by poor results.

The aims of effective home skin care are straightforward:

- Minimise sun damage (photoageing)
- Exfoliate regularly
- Reverse some pre-existing age related changes
- Even out pigmentation

What causes skin to age?

Before talking about the management of ageing skin it is useful to understand the mechanism of ageing. Skin ageing comprises two concurrent processes: Intrinsic "chronological" ageing and Extrinsic "photoageing".

Although intrinsic ageing is largely caused by genetic factors, the effects of gravity, facial expression and hormonal changes are also important. In this form of ageing although skin may appear superficially unblemished, it is thin, wrinkled and loses elasticity (causing it to sag). Histological features comprise atrophy of the epidermis, dermis and subcutaneous tissues. The effects of this type of ageing are predominantly treated surgically.

Extrinsic photoageing is caused primarily by sun damage, specifically the effects of ultraviolet (UV) light on the skin. Free radicals generated by UVA (315-400nm) and UVB (280-315nm) light are believed to be responsible for the majority of cellular damage observed in this form of ageing. This cell damage includes DNA mutations, structural and enzymatic protein alterations, lipid peroxidation and activation of metalloproteinases which break down collagen in the dermis. These cellular changes cause skin to appear dull, thick, leathery, wrinkled, rough and sallow. Other observable features may include telangiectasia, mottled hyperpigmentation and premalignant or malignant skin lesions. Histological features include a thickened stratum corneum and thinning of the lower epidermis with cellular atypia and irregular dispersion of melanin. Dermal changes include elastosis (abnormal elastic fibres) and loss of collagen and normal vasculature. The effects of photoageing are predominately managed non-surgically with skin products, non-ablative office 'treatments' and ablative resurfacing.

Sunscreens

Sunscreens and other barrier methods of avoiding sun exposure are essential for minimising extrinsic photoageing. It is futile for your patients to spend time and money in an effort to treat the effects of ageing if they aren't using a broad spectrum sunscreen daily in conjunction with other methods of avoiding sun exposure. Barrier methods include hats, protective clothing, driving gloves and avoiding the midday sun. It is important to remind your patients that sun damage does occur in the absence of sunburn.

There are two categories of sunscreen, chemical and mineral. Chemical sunscreens are filters. These chemicals are absorbed into the skin before acting to prevent sun damage from within. Mineral sunscreens such as titanium dioxide and zinc oxide sit on the surface of the skin and act as a physical barrier against the suns rays. In this regard they are considered superior. As these minerals are inert, they are much less likely to cause irritation or allergy. As such they are used in sunscreens for children or for people with 'sensitive' skin. There are a number of invisible zinc sunscreens commercially available. The main problems with mineral sunscreens are that they are often thick and uncomfortable to wear, and they give rise to unattractive whitish sheen when applied to skin.

When choosing a sunscreen preparation it is important to make sure it is truly broad spectrum (that is it covers both the UVA and UVB spectrum). Although most sunscreens cover UVB, only a few cover UVA. These include titanium dioxide, zinc oxide, avobenzone (aka Parsol 1789 or butylmethoxydibenzoylmethane), Mexoryl SX and Tinosorb.

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Another important factor to consider is the sunscreen's Sun Protection Factor (SPF). Whilst a moisturiser containing SPF 15 may be adequate for a patient who works indoors and has only brief, incidental sun exposure, a sunscreen with a SPF of 30 is considered necessary for anyone who has longer sun exposure. Patients often need to be reminded that sunscreens need to be applied liberally to all exposed areas (including for example, the chest and dorsum of the hands) and reapplied regularly.

Interestingly there is now growing recognition that excessive sun avoidance can lead to vitamin D deficiency, even in Australia. Hence advice on sun protection needs to take into account the patient's lifestyle and skin type.

Cosmeceuticals

Cosmeceuticals are home skin care products and treatments whose active ingredient is promoted as having a beneficial physiological effect. However, as these products aren't classified as therapeutic drugs they aren't subjected to rigorous trials and testing. The efficacy of cosmeceuticals is dependent upon a variety of factors including the main active ingredient (particularly its chemical structure, form, concentration and stability in the product base) as well as its packaging (as many of these products are light sensitive).

Unfortunately it can be very difficult to assess the efficacy of these products as accurate labeling is not mandatory for manufacturers and distributors. Fortunately there are several products whose efficacy is beyond doubt, and others whose effectiveness is supported by sound clinical evidence (including pre and post treatment biopsies). These evidence-based cosmeceuticals are discussed below.

Tretinoin is a hormone which binds to retinoic acid receptors on skin cells. Regular treatment with tretinoin over several months can lead to partial reversal of extrinsic photoageing. Histological changes observable in the epidermis include thinning of the stratum corneum, reversal of atypia and uniform dispersion of melanin. Dermal changes include increased collagen synthesis and angiogenesis. Clinically observable changes in skin texture and pigmentation may be evident after 1-2 months of daily use. Improvement in fine wrinkling may be evident after 4 months of daily use. Some patients may experience irritation and redness with tretinoin, necessitating less frequent application or use of lower concentrations. As tretinoin is potentially teratogenic, it should not be used during pregnancy. It is only available by prescription, either in standard commercial preparations (such as Retin A or Retrieve), or in variable preparations through a compounding pharmacist. Tretinoin should not be confused with retinoids, retinols or derivatives of vitamin A which are widely available in 'over the counter' preparations. Evidence for the efficacy of these substances continues to evolve. Recent clinical trials of retinoids tazarotene (Tazorac) and adapalene (Differin) appear promising. These retinoids appear to cause less skin irritation then tretinoin.

Alpha Hydroxy Acids (AHA) such as glycolic acid and lactic acid are primarily used as chemical exfoliants. At low concentrations they cause desquamation of the stratum corneum by disrupting cellular adhesion. Higher concentrations cause epidermolysis. Long term use of these substances leads to increased collagen and elastin synthesis, and increased glycosaminoglycan concentration in the dermis. Clinically, concentrations less than 10% lead to improved skin texture and pigmentation, whilst higher concentrations lead to improvement in fine wrinkling. AHA are considered safe in pregnancy and cause less skin irritation than tretinoin. AHA are available 'over the counter' in concentrations of 2-20%. Many AHA products available from pharmacies display the AHA concentration on the label (eg. Neostrata). Concentrations of 20-70% are used in office 'peels'. They may be used alone (especially in younger patients) or in combination with tretinoin and depigmenting agents.

Depigmenting agents block melanin production, reducing the intensity of lentigos, freckles and melasma. Patients need to be informed that results may not be apparent for several months, and pigmentation may return within 6 months of discontinuing treatment. Patients should avoid sun exposure when using these substances as sun exposure increases melanin production.

Hydroquinone, the most commonly used depigmenting agent, is available in 'over the counter' concentrations of up to 2% in Australia. Concentrations over 4% require prescription. 'Over the counter' sales have been banned in the USA due to concerns about possible carcinogenic potential (animal studies have demonstrated an association between oral hydroquinone intake and subsequent development of cancers). For these reasons, I now limit hydroquinone use to a maximum of 6 months or use kojic acid thereafter in its stead. Kojic acid, a by-product of the rice wine industry, also blocks melanin production. As it tends to be chemically unstable, kojic acid isn't commonly used in commercial preparations. I source kojic acid from a compounding pharmacist, usually at concentrations of 4-8%. Both hydroquinone and kojic acid are more effective when used in combination with tretinoin or glycolic acid. If refractory to the above treatments, darker pigmentation may require treatment with Intense Pulsed Light (IPL) or laser.

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Exfoliation involves the removal of the most superficial layer of the epidermis, the stratum corneum. This layer is acellular, giving the skin a dull appearance. There are two types of exfoliants, chemical exfoliants such as tretinoin and AHA, and mechanical exfoliants which include scrubs and microdermabrasion.

There are countless other cosmeceuticals. Many of the active ingredients used in these products could prove to be effective cosmeceuticals in the future. However to support their use clinically, high quality trials are required to establish their efficacy and effectiveness. Although some substances known to be beneficial in wound healing are also being used in cosmeceuticals, there may be no correlation between their role in wound healing and their effectiveness in treating ageing. Other substances that are useful in-vitro become unstable and ineffective when exposed to light and air. Some examples of cosmeceuticals which may prove to be beneficial include retinoids, retinols, copper, growth factors, vitamins C and E, amino acids, Coenzyme Q10, hyaluronic acid, carotenes, alpha lipoic acid and other antioxidants. As these substances aren't harmful and may yet prove effective, I don't mind if my patients want to use these in conjunction with sunscreen and other evidence based cosmeceuticals.

What I do

Although patients frequently consult me for advice on skin care alone, I usually use the above treatments in combination with surgical rejuvenation or non-surgical office treatments. I recommend all patients use a sunscreen in the morning, usually combined with a moisturiser. I don't mind what brand they use as long as it's broad spectrum and has an appropriate SPF. At night I prescribe tretinoin, glycolic acid and depigmenting agents either alone or together in various combinations (in an emollient base). I work with an experienced compounding pharmacist who formulates each product (at the required concentrations) for each individual patient immediately prior to use. I usually recommend that my patients start at a moderate concentration every second or third night, gradually increasing the frequency of use as tolerated. Alternatively one can use a combination of commercial preparations. This simple, evidence based approach has led to overwhelmingly good feedback from my patients.