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Skin ageing

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What is this covering that we call the skin — this amazing envelope that contains some of the most extraordinary mechanisms in the entire body? It is not just the 'giftwrap of life', but an efficient organ of the body that guards, nourishes and protects it 24 hours a day. Yet we take our skin for granted. The skin is surely the most abused organ of the body. We dig, rub and scratch it. We expose it to all the elements, including extremes of heat, cold, sun, wind, rain and snow. In the name of beauty we scrub it, pull it, bend it, paint it and spray it. In the name of health we massage it with oils, cook it in the sauna, and bake it in the sun. Yet it survives.

Our skin frequently reflects our underlying state of health. Although most skin diseases are confined to the skin alone, some are associated with internal diseases. In fact, the earliest manifestation of diabetes, high cholesterol, thyroid disease, anaemia, AIDS, leukaemia, or cancer may all be found in the skin. As a mirror of our emotions, the skin is without peer: purple with rage, pale with fright, flushed with pride, blushing with shame, and wet with perspiration. All are release mechanisms of the skin that express combinations of inner feelings and skin reactions to tension, anxiety and stress. The skin also assumes enormous importance in the self-image people have; therefore, a major psychological reaction to even a minor skin abnormality is quite common. Because the skin is so easily observed, we often seek attention for what the objective observer may regard as rather trivial. Unlike

other ailments that are internal, skin conditions are easily monitored. Hence, any slight deterioration or improvement may cause a disproportionate reaction. Some people also believe that the skin is the mirror of the soul and may ascribe their diseases or 'visitations' to matters that they may feel guilty about. As a result of these lurking fears and worries, they may require a great deal of explanation and reassurance about what is happening to their skin and why. Today, a youthful appearance is highly prized and sought after. Much research has been devoted to understanding skin ageing and what can be done to retard it. Medical science has kept pace with the growing public demand to look and feel younger, and there have been significant advances in dermatological treatment and surgery. These now provide the opportunity to have wrinkles smoothed, scars removed and veins eliminated. The choice of methods to help you look young are vast; some of them are good, some useless and some bad. But the more you know, the better your choices will be. Beauty is not, of course, only skin deep, and everyone has the right to both look and feel their best and to age gracefully.

The skin is the largest single organ in the human body. At 4 kg and about two square metres, it comprises up to 15% of our total body weight. If more than about one quarter is destroyed by burns, for example, then the body cannot survive. As well as being an extremely waterproof, airtight and remarkably subtle barrier, the skin is also the living interface between us and our environment.

Indeed, the skin is as important an organ as the heart, lungs or brain. Its principle functions are protection, sensation and heat regulation. All living things, however, are fragile and perishable. Everything that functions may break down. The skin is no exception, and being in direct contact with the outside world, it is continually exposed to all manner of injuries. When you consider that it is susceptible to diseases resulting from various internal disorders as well, it is not surprising that its equilibrium, threatened from within and without, is precarious and easily upset. Care

is necessary to keep the skin in good condition and this requires some knowledge of the skin's nature and needs.

The skin is a complicated membrane composed of various layers containing a variety of glands, blood vessels, nerves, lymphatics, muscles and appendages. The most superficial layer is known as the *epidermis*, which is made up of a mosaic of cells varying in thickness from 0.1 mm on the eyelid to more than 1.0 mm on the sole of the foot. The average thickness would be about that of this page. The deeper cells make up what is known as the basal layer, which is only one cell thick. This is the layer where cell reproduction takes place and the regrowth of skin occurs. It normally takes about one month for a cell born in the basal layer to be shed as a used and dead cell at the surface. Within this important basal layer of the epidermis are scattered the melanocytes, the important melanin or pigment-forming cells of the skin. These, according to their quantity, dictate the colour of a person's skin.

The outermost layer of the epidermis is known as the *stratum corneum*. It is a tissue paper–thin layer made up of compacted, little lifeless cells that gradually flake off. This layer is a very effective barrier, preventing the loss of tissue fluids and chemicals, as well as the penetration by dirt, infection and, of course, cosmetic and skin-care products!

Beneath the epidermis is the *dermis*, which is 20 to 30 times thicker than the epidermis and rests upon a thick pad of fatty subcutaneous tissue that acts as a shock-absorber and heat insulator. The dermis, which is made up of specialised connective tissue, is extremely important. Broadly speaking, it is composed of two sorts of fibres. The majority are group bundles forming undulating, interlacing bands that are comprised of a special protein called collagen. Intermingled with these is a network of other fibres, which are thin, sinuous and elastic, composed of a protein called elastin. These fibres make up only 2% of the connective tissue, the remainder consisting of what is called ground substance or hyaluronic acid. This is the gelatinous material between the fibres

that is produced by specific cells known as fibroblasts. It is a unique material comprised of proteins, sugars and electrolytes. The amount of ground substance is greatest in the embryo and from then on it gradually diminishes until old age, when very little remains. Another important difference between the epidermis and the dermis is their ability to regenerate. Whereas the epidermis renews itself every three to four weeks, the dermis is very slow to regenerate. Therefore, damage to the dermis — mainly by sunlight — is to all intents and purposes, permanent. On the other hand because of the very effective barrier to substances applied to the surface of the stratum cornea, penetration of skin care products into the dermis is not possible.

The dermis in turn is supported by the *subcutaneous tissue*, which in reality is a specialised layer of the dermis. It is more loosely arranged and has specialised in the formation of fat. The thickness of the subcutaneous tissue varies greatly in different parts of the body and even between the sexes. Its main function is heat insulation and providing support for the various blood and lymphatic vessels that supply the skin with nourishment and drain away waste products. Through it also run the bundles of nerve fibres that form a complex interlacing network throughout the dermis.

There are a number of both essential and non-essential skin appendages. The essential ones include the various glands and the non-essential ones: the hair and nails. The *sebaceous glands* are a group of specialised cells in the basal layer of the epidermis where sebum is produced. This is an important fatty secretion that is discharged onto the skin surface through a small duct leading into the hair follicle opening. Sebum has a number of functions, one of which is to lightly coat the epidermis with oil and so help retain moisture in the skin. Another is to improve the pliability of the skin. It also has a mild antibacterial and antifungal action. Sebaceous glands occur over the whole skin surface, except on the palms of the hands and the soles of the feet. They are most numer-

ous on the face and the scalp. The activity of these glands varies greatly between individuals and at various ages. During adolescence, there is usually an over-production of sebum, resulting in acne; whereas in the elderly there is an under-production, resulting in dry, non-pliable skin.

Apocrine glands are modified sebaceous glands, found mainly in the armpits, genital area and around the nipples. These are specialised glands that do not function until after puberty. They are stimulated by certain hormonal factors such as the hormonal changes that occur during menstruation or pregnancy, and emotional factors such as stress and sexual arousal. Their secretions are responsible for an individual's characteristic odour and may also have some minor lubricating function.

Sweat glands are a specialised group of cells lying in the dermis. These sweat-producing glands are found over the whole skin surface, with considerable regional variation in density of distribution. They are most numerous on the palms, soles, forehead and armpits. The duct of the sweat gland opens onto the skin surface independently of hair and sebaceous gland openings. On the forehead or armpits there are frequently 200–300 sweat glands per square centimetre, and under extreme climatic provocation an individual may produce two litres of sweat per hour. In this way, sweat glands are able to flood the skin surface with water, which has a cooling effect and hence are very important as part of a heat-exchange mechanism. The closely associated blood vessels dilate or constrict to either dissipate or conserve body heat. This is therefore a very effective thermo-regulatory system, one which maintains a constant internal environment, enabling us to escape the rigid climatic limitations imposed upon cold-blooded animals.

Principle functions of the skin

1. It performs an essential *protective* role. Because of its resilience or ability to resume its previous shape after deformation, it can withstand considerable trauma without

permanent damage. This mechanical barrier is mainly due to the arrangement and nature of the collagen and elastic-fibres. It also constitutes an effective barrier to the passage of substances into or out of the skin. This chemical barrier is provided by the layered cells of the epidermis, which impedes the loss of water and body salts, preventing the penetration of external substances.

2. The skin is a most effective and essential *sensory organ*. This is because it is richly supplied with nerve endings that provide an effective sensory defence against potentially harmful stimuli. It also acts as a 'relay station' between external influences and internal organs via the network of nerve fibres. Of equal importance is its role as an organ of expression. For instance, we may express anxiety by sweating, fear by pallor, anger by flushing, pain as a grimace, or happiness with a smile.

3. The skin acts as a remarkable *thermostat*. This is mainly achieved by the blood vessels and sweat glands. Under normal environmental conditions this may be achieved by varying the diameter of the blood vessels in the skin resulting in changes in the volume of the blood flow. This blood flow can be varied a hundred fold, from maximum constriction to maximum dilatation of the vessels. Increased blood flow is accompanied by increased heat loss, whereas a reduced blood flow retains heat. If, however, blood flow alterations are insufficient to regulate the body temperature, then the sweat glands are activated. This results from extreme external temperature increases, excessive exertion or the fever accompanying an illness. The sweat bathes the skin and its evaporation causes cooling.

4. The skin plays an active part in the body's *defence against microorganisms* such as bacteria, fungi and viruses. The

surface of the skin is never sterile. It is host to a permanent resident colony of various bacteria, which are relatively innocuous. Their presence, however, inhibits the growth of more dangerous organisms on the skin. Further protection is provided by the dryness of the skin surface. Most organisms are relatively intolerant of dry conditions, much preferring humid or moist environments. The continual shedding of the superficial epidermis also discourages bacterial invaders. Sebum, the oily secretion produced by the active sebaceous glands, contains fatty acids that have a strong antibacterial and antifungal action.

5. The skin is an important *barrier against damaging ionising radiation*, such as ultraviolet light (UVL). The only significant defence against the destructive effects of UVL is melanin. Without melanin the epidermis would be a thin, transparent membrane, allowing UVL to damage the sensitive structure of the dermis. Melanin is a complicated large protein produced by special cells, melanocytes, in the basal layer. From there it is distributed throughout the epidermis. The amount of melanin in the epidermis governs the colour of a person's skin, with the more melanin, the darker the skin colour. There is no difference though in the number of melanocytes in white and black skin. The difference is simply one of activity, reflected in the amount of melanin or pigment these cells produce. Various factors may influence this, including sun exposure, pregnancy, various hormonal disorders and drugs.

6. The skin, very importantly, is the largest *immunologically active organ* in the body. It has two major roles, the first being defence against external insults, while the other involves internal immunological surveillance.

The process of skin ageing

Skin ageing or 'senescence' is fortunately a gradual but inevitable process. Initially it leads to maturation, but this is followed by the process of ageing. During these stages, alterations take place in the structure and function of the skin. These physiological events include puberty, pregnancy, the menopause and old age. The assessment of age is primarily visual. The skin being the largest organ in the body is consequently the main target. The concept of age is both subjective and objective. It is also closely related to one's own age and varies accordingly. For example, what constitutes ageing will be different conceptionally whether this is an assessment by children, adolescents or adults.

The biology of ageing is a complex and gradual process. It is controlled by genetic 'intrinsic' and environmental 'extrinsic' factors. The former includes skin colour, antioxidant mechanisms to prevent free radical damage, and cellular mutations with the ability to repair the damage and alterations to immune function, while the latter are those factors that may accelerate these changes. These include excessive calories or lack of adequate nutrients, and also gravitational forces or traction. These may activate enzymes, which generate more free radicals. However, 90% of extrinsic ageing is caused by photo damage; that is, UVA and B radiation on exposed skin. The photo damage generates free radicals and damages nuclear chromosomes, resulting in DNA mutations and increased elastin and collagen damage.

So, when we talk about ageing skin, it is very important to distinguish changes that occur simply with the passage of time from those that are the consequences of sun exposure. Many changes, such as wrinkling, freckling and 'broken capillaries' and that 'leathery look' are the result of what we now term 'photo ageing' or 'chronic extrinsic sun-damage'. Skin changes that are attributable to true chronological genetic ageing include increased dryness, decreased sweating, changes in hair growth and in facial and body contours.

As the skin ages, the rate of cell production and turnover slows down and cell repair is less effective. The epidermis — the outer layer of the skin — becomes thinner, whereas the stratum corneum — the outermost layer of the epidermis — actually becomes thicker. As a result, it dries out, cracks and develops a rough, scaly surface. This thinned epidermis, of course, bends much more easily, therefore allowing wrinkling. Also once thinned, the epidermis admits even more sunlight, causing even more thinning and wrinkling, thus perpetuating the problem. The normal skin of an infant is a beautifully organised structure that has been compared to a carefully arranged, perfectly stacked and well-cemented brick wall. Sun-damage though causes chaos in those cells as if they had been hit by a severe storm. The cells, or bricks, become completely disrupted and begin to look like a dilapidated brick wall. Not only do the cells become disordered, but as mentioned before, so do the nuclei, the control centre that regulates cell growth. Because of this DNA disruption, induced by sunlight, mistakes are made in the copying process as the cells reproduce. They then begin to resemble cancer cells. Eventually, at sites of photo ageing, benign or malignant growths will appear. More than 10,000 Australians develop malignant melanoma each year. About 500,000 are treated for one or more non-melanoma cancer and about 2,000 die of skin cancer annually.

Skin colour also changes. Pigment cells usually become less active as the blood supply decreases so that the skin looks more sallow. Sometimes they become completely inactive, leaving small white spots. On the other hand, particularly in areas of chronic sun-damage or photo ageing, the pigment cells become over-active, producing blotches of excess pigmentation. These are often erroneously called age spots, senile freckles or liver spots! They are among the classical signs of photo ageing and as such might be better called 'premature age spots', to help people understand that they are sun, not age related.

Changes in facial contour occur because of some loss of and redistribution of existing fat in the subcutaneous layer of the skin. Also, facial bones tend to shrink or remodel, which is thought to be due to hormonal changes. Changes in nerve endings may cause the skin to be less sensitive to temperature and even pain. Perhaps this is why the elderly tolerate injections and other minor procedures so well. Scars also tend to be finer and more cosmetically acceptable. Hair on the face and in the nose and ears, become courser and more obvious, while scalp and body hair diminishes and, because of less active pigmentation, turns white. Sweat and oil glands are less active so that the skin becomes drier, and consequently the elderly are often troubled by itching. The skin of the elderly is more easily injured and heals more slowly following injury, and minimal bumping results in considerable bruising. This occurs particularly on the arms and backs of the hands, which are also sites of chronic sun damage or photo ageing.

With chronological ageing the lower layers of the skin, the dermis, also become thinner. Photo ageing is the result of sun penetrating these lower layers where it damages the supportive structural protein — collagen and elastin. Consequently, the skin loses its elasticity and firmness, so it sags and wrinkles. Collagen is the major structural protein in the dermis providing support for the overlying epidermis. It, together with its protein partner elastin, constitutes the bulk of the dermis. Normally, undamaged strands of collagen look like ropes arranged in bundles in an interlocking network. Elastin is also a tough protein that looks like fine elastic bands arranged in a delicate branching network. With accumulated solar damage, the orderly bundles of collagen disintegrate into useless clumps and the delicate elastin fibres condense into a jelly-like substance. Gradually, the supporting framework of the skin becomes reabsorbed and slowly disappears, leaving the skin thin, loose and worn-out! This can be easily demonstrated by what I term the ‘pinch test’. If you pinch up the skin on the back of the hands you can assess a person’s age, or more accurately,

photo age, by how quickly or slowly it snaps back. Fast is young or protected, slow is old or unprotected.

With continued chronological and photo ageing the skin may become host to a large number and variety of growths and colour changes. The majority of these will be benign but often cosmetically unacceptable. Some of these intrinsic chronological or genetic changes are listed below.

Intrinsic chronological changes

- *Wrinkling.* One of the facts of life seems to be that we are genetically pre-programmed for our skin support systems to gradually breakdown as we age. At some point the collagen and elastic gets tired of holding things together and therefore laugh-lines, furrowed brows, jowls, flabby necks and drooping eyelids, not to mention breasts, stomach and buttocks, all appear to sag to some degree. Also, with the passage of time, our bones, fat and muscles gradually shrink and the skin tends to stretch. Together, these changes alter 'the fit' of our skin, contributing to the development of sagging and wrinkling.
- *Broken capillaries (telangiectasia).* These are actually not broken at all, they are simply more visible because the skin has become thinner and the blood vessel more dilated and therefore much more prominent. They mainly affect the face because it is also always exposed to the elements — mainly sun.
- *Skin tags (acrochordons).* These are small, flesh coloured growths that often hang on fine stalks. They are more common on the sides of the neck, eyelids or in creases.
- *Senile warts (seborrhoeic keratoses).* These are the most common skin growths occurring in middle to late life. There is generally a family history for their development. The keratoses are usually brown overgrowths of varying

size and number. They have a greasy or crumbly 'stuck-on' appearance in various shades of brown. They are definitely not warts, nor associated with senility!

- *Liver spots (solar lentigines).* These spots only appear on sun-damaged skin. They are not the same as freckles or 'ephelides', which are common in childhood and tend to diminish in adulthood. They do, however, look like large, more irregular and darker freckles but are evenly coloured throughout. They are caused by over-active pigment cells.
- *Overgrown oil glands (sebaceous adenomata).* These glands are only found on the face and usually several are present. They appear as small, round, lobulated, yellowish lumps under the skin. It is important to recognise these harmless lumps because they can closely resemble a small skin cancer known as a basal cell carcinoma.
- *Blackheads and whiteheads (small sebaceous cysts).* These are quite common on sun-damaged skin and can look similar to those associated with adolescent acne. In this case, however, they are unrelated to acne or of course lack of adequate cleansing. Simply, the pores become narrower with solar damage and eventually then they block and small cysts form.

Extrinsic changes

- more and deeper wrinkles
- coarseness and sallowness of the skin
- irregular pigmentation
- broken blood vessels
- lentigines
- benign growths

- pre-malignant growths
- malignant growths.

Increasing age causes many anatomical, functional and immunological changes in human skin. Consequently, certain dermatological conditions have an increased incidence among the elderly. These include asteatosis (dryness), pruritus (itching), herpes zoster (shingles), rosacea, bullous pemphigoid and skin cancer.

There are also a number of premature ageing syndromes that are inherited, although the defect may not be obvious in the first few years of life, include the following rare diseases — pangeria, progeria, acrogeria, Rothmund-Thomson and Cockaynes syndromes. Some of the symptoms and changes include atrophy, loss of cutaneous fat, wrinkles, hair loss, nail dystrophy, defective pigmentation, sclerosis and ulceration.

Having good skin is largely a matter of luck and genetics. Some people are just born with a lovely complexion, while others, no matter how much money and care they lavish on their skin, are never satisfied. At one time, particularly in ancient cultures, the outward indications of ageing were considered signs of wisdom, experience and distinction. Over the past several centuries however, particularly in Western cultures, this philosophy has slowly changed. Today, a youthful appearance is highly praised and sought after. Consumers spend many millions of dollars annually on skin-care products that deceptively claim to be able to achieve this goal. Medical science has kept pace with this growing demand to look and feel younger. Research into ageing is a popular new field and great advances in cosmetic, dermatological and plastic procedures have occurred.

Management of ageing

'To look good, you have to feel good!' How often have we heard this truism. A healthy, stress-free person certainly seems to radiate a sense of wellbeing and often looks much younger than his or her

years. In order to achieve this, a healthy lifestyle includes a sensible, well-balanced diet, adequate exercise and a positive mental attitude.

Diet

Sensible food habits are an important lifestyle factor to achieve a nutritious diet we much choose a variety of foods from the five basic food groups:

1. Bread and cereals, for energy and fibre
2. Vegetables and fruit, for vitamins and minerals
3. Meat or meat alternatives, for protein
4. Milk and milk products, for calcium
5. Butter or margarine, for vitamin A and energy.

We must avoid over-eating and in particular limit our intake of fat and sugar. It is also important to eat less salt and to drink in moderation, and most importantly, avoid smoking.

Exercise

A fit-looking, physically flexible and agile person obviously looks younger than an obese, sluggish individual. Physically active people benefit in many ways. Not only does exercise improve the skin, it also lowers the risk of coronary artery disease as well as reducing tension or stress. You should select an exercise you enjoy, such as running, swimming, cycling or walking. It should be pursued for at least 20 minutes, three times a week, at a level associated with some breathlessness. This type of aerobic exercise can be commenced quite gradually but should be progressively increased in intensity and frequency to have the desired effect.

A positive mental atttitude

Our emotional state has a profound effect on the appearance of our skin. The first signs of ageing are often the wrinkles induced by stress, sadness or depression. Just look at the way presidents or

prime ministers age while in office, and how quickly they recover when they leave the 'rat race'! There is a direct relationship between one's outlook on life and ageing. Anger, fear, frustration and other stresses appear to weaken the immune system and speed the ageing process. On the other hand, a positive, healthy outlook on life gives one peace of mind and slows the ageing process. So, beauty really does come from within. A relaxed, fit person generally has a smile and serenity, which inevitably makes them look and feel young.

The key to managing stress is first to recognise it. Perhaps you feel depressed, anxious, or have low self-esteem. Or perhaps you feel angry, frustrated, irritable, and constantly exhausted. You may even feel shortness of breath, chest tightness, have difficulty getting to sleep, or develop skin rashes. In order to cope adequately with stress you must first identify the cause and seek out the appropriate skill to help you handle it better.

Skin care routine

Traditionally, the basic daily skin routine has consisted of three steps — cleansing, toning and moisturising. Let us deal with these in detail.

Cleansing

All skin types need to be cleansed for both aesthetic and health reasons. Cleansing removes oily secretions, sweat, skin debris, dirt, cosmetics and a certain number of bacteria and can be carried out most quickly, cheaply and effectively with water and soap. Water alone will cleanse the skin but does so more effectively when used with soap. Together, they have the effect of emulsifying the debris, dirt and grease on the skin, which then can be more easily removed by subsequent rinsing.

If, however, you have dry skin it might be advisable to avoid soap altogether as it tends to have a drying effect on the skin. You will probably find the use of a cleansing cream more suitable. In addition, dry skin should not be washed as frequently as normal or

oily skin. Frequent washing dries the skin by removing normal, oily substances whose purpose is to keep the skin surface soft and pliable. This dry skin routine — that is, the avoidance of soap, less frequent washing and the use of cleansing cream — could benefit elderly people in particular, or those with eczema, or those living in areas of particularly low humidity.

Apart from soap, and indeed as a less drying alternative to soap, cold cream is one of the best and most popular cleansers. In fact, cold cream is the prototype of all modern cleansing creams. The original cold cream dates back to AD150 when it was thought to have been discovered by the great Greek physician Galen. The original formula consisted of a mixture of olive oil, beeswax, water and rose petals. It was termed 'cold cream' because of the cooling effect on the skin when the water evaporated. Since its discovery, cold cream has undergone numerous formulation changes. As a result, we now have a fine, white, glossy cream, of firm consistency that spreads easily and cools the skin. The oil and wax provide a cleansing action by liquefying upon contact with the warm skin and loosening suspended particles of dirt, oily secretions, dead cells and other material on the skin surface. They can then be easily removed with a tissue or cloth, or if left on the skin act as an emollient and relieve excess dryness. All cleansing creams in which a variety of oils, waxes and other ingredients such as alcohol may be included are only variations of the basic cold cream.

Toning

Toning is a waste of both time and money. The products advocated for this basically consist of water, alcohol and glycerine. They are sometimes called toners, astringents, fresheners or clarifying lotions. A number of claims are made for these products — that they cleanse the skin, refine the texture, shrink pores, control oil and help blemishes. However, none of these products cause the oil glands to produce less oil or permanently shrink pores. What these products do best is effectively oil and produce a cool, refreshed

feeling; nothing that soap and water can't do at a fraction of the cost. Their use is clearly not a necessary part of skin care.

Moisturising

Moisturising entails the use of creams, oils or lotions to relieve dryness and make the skin feel smoother. Skin varies in its degree of oiliness from person to person depending on age and the climatic conditions. For example, adolescent skin is oilier than that of the elderly. Also, during the winter and in air-conditioned buildings, the skin tends to become dried out. Conditioning products, usually called moisturisers or emollients, are designed to prevent these drying processes. They are sometimes described as skin foods providing nourishment for the skin. This, of course, is nonsense. The only nourishment possible is from the inner blood supply, as the outer horny skin layer is inert and lifeless. The products are all mixtures of an oil and water. Other ingredients are often added to prevent spoilage, to keep the oil and water well mixed and to provide perfume. The various products available may feel, smell and look different, and prices may vary dramatically, but basically they are all very similar. Modern technology has enabled some refinements to be made, resulting in the manufacture of many elegant preparations. The final product may be quite greasy, which is then promoted by the cosmetic industry as a 'night' or 'nourishing' cream, or the opposite might be a non-greasy vanishing cream, which would be promoted as an 'under make-up' or 'day' or just 'moisturising' cream.

Moisturising creams act by leaving a thin, oily film on the skin that retards the evaporation of moisture from the outer layers. However, it is not possible for externally applied oils or the skin's natural oils to keep the skin hydrated, soft and flexible without the aid of water. This water, however, is the fluid produced by the skin itself as sweat, as well as the fluid emanating from the blood and lymph that surround all the living cells of the body. No drops of water from the outside ever reach the skin's living cells, which is

just as well, otherwise we would become waterlogged after a bath or swimming! Indeed, loss of water, not oil, from the outer layer of the skin is the basic cause of dryness. Wetting the skin for two or three minutes night and morning is clearly not going to replace the water lost by natural dehydration. Even in a temperate climate, invisible perspiration of approximately half a litre daily traverses the skin, quite apart from visible sweat. The only way to prevent the skin from drying out is to trap some of this natural body fluid. This is where the oil in the cream or the skin's natural oil are useful. Commercial creams may also contain substances that attract water up from the dermis into the epidermis. They also act by inhibiting through their impermeability the evaporation of water trapped in the superficial skin cells. They also make the skin look and feel soft by cementing down the rough, scaly surface, and smooth it by decreasing the 'drag' felt when touching the skin. They do not penetrate deeply nor do they prevent wrinkles forming or help remove them.

Sun protection

Most of the visible signs of ageing are actually caused by sun damage and are preventable. The effects of photo damage will occur simply by living in countries with vast amounts of sunlight such as Australia. Exposure occurs daily on the face, neck and hands and frequently also the legs. Actual sun bathing is not required. Simply walking in the streets, hanging out the washing, playing at school and working the land are all sufficient. The effect of this sunlight on the skin is cumulative, that is, each exposure does some damage and the effects gradually become irreversible, with permanent damage occurring. By the age of 20 years, over 80% of individuals have some evidence of permanent skin damage. By the age of 40, all individuals examined show signs of permanent damage in sun-exposed areas. Consequently, the protection of children is vital to prevent premature ageing and skin cancer in adults. Unfortunately, the skin lacks adequate defence mechanisms

against the effects of UVL and this is why it must be protected from outside.This means avoiding sun exposure when it is at its strongest, say between 10 am and 3 pm. It is estimated that avoiding exposure during these hours would reduce the total sunlight received by about 60%. Alternatively, if you are outdoors, you should seek out shade and wear appropriate clothing and broad-brimmed or legionnaire-style hats.

A more convenient form of protection is afforded by chemical sunscreens. Sunlight consists of three types of ultraviolet raiation. UVC is the most harmful but is largely blocked by the ozone layer. However, both UVB and UVA light penetrate the skin. UVB causes sunburn but is blocked out by glass windows. UVA, on the other hand, penetrates deeper, is not blocked out by window glass, and is the main cause of damage to the immune cells causing skin cancer.

Sunscreens are now classified by their SPF (sun protection factor). A minimum of 15 is necessary because it is then broad-spectrum, cutting out both UVB and UVA radiation. SPF30 screens out 96.7% of UV light. However, SPF50 only increases this to 98%, an increase of 1.3%. It is certainly not twice as effective. Using sunscreens that have an even higher SPF is really a waste of money. It is more important to apply adequate amounts of sunscreen and this should be done about half an hour before potential exposure.

It is not necessary to be sunburnt or tanned to develop premature ageing or skin cancer.You only need to stay in the sun a fraction of the time it takes to get sunburnt to get a dose of UVA and UVB which, when accumulated gradually over years, will permanently damage skin cells. Western society's desire to follow the trend and seek a tan is the most significant extrinsic ageing factor. It is to be hoped that there will come a day when instead of brown being beautiful, white will be wonderful or indeed pale will be perfect.

Management options

Topical measures

Tretinoin (retinoic acid) cream is a Vitamin A derivative that was developed three decades ago, initially for the treatment of acne. However, several important derivatives of Vitamin A are used by dermatologists. These include Isotretinoin for the treatment of cystic acne and Etretinate for severe psoriasis. It was found that these drugs have a profound effect on cell differentiation. This means that cells that have become undifferentiated or disorganised can be reorganised again.

How does it work? It has been found that Tretinoin has some remarkable effects on the structure of skin:

- It increases blood flow and new blood vessel formation. This improved skin circulation is essential for a healthier skin.
- Cell differentiation is improved. This means that the epidermal (brick wall) is rebuilt because the cells become uniform and well-ordered again. As a consequence, the epidermis thickens up once again.
- Dermal restructuring occurs with increased production of new collagen just beneath the epidermis. The number of small fibrils that anchor the epidermis to the dermis also doubles after only four months treatment with Tretinoin.
- The number of pigment producing cells is also reduced, with clearing of mottled skin discolouration.

Eventually the uneven, dry patches disappear because of gradual exfoliation of the surface resulting in a smoother skin.

Tretinoin is not a miracle in a tube, nor the fountain of youth or a substitute for good skin-care. However, unlike most other so-called 'cosmecueticals', it is absorbed by the outer layers of the skin and therefore is a prescription item not available as a

cosmetic. There is, in fact, no cosmetic that will either prevent or repair ageing skin.

After four to six months of regular nocturnal use, most will notice the following changes:

- There are fewer fine wrinkles, particularly around the eyes and corners of the mouth.
- Skin colour has improved from a sallow appearance to a rosy glow.
- The skin becomes firmer.
- Fewer lumps are apparent and the skin feels smoother.
- Finally, the pigmented patches and sun-induced freckles are fading.

The main adverse effects appear early and gradually improve as treatment is continued. These include mild redness, dryness and itching of the skin. The skin also may become more sensitive to sun light but this also improves with usage.

The cream should only be used at night and to the entire face. During the day a broad-spectrum sunscreen must be applied. Use a simple, inexpensive moisturiser whenever and wherever necessary but not at night. Wash with a mild soap and water.

Begin the treatment slowly, possibly leaving the cream on only for an hour at night before washing it off, and then gradually increase the time and the frequency depending on how much irritation there is.

It is probably sufficient to use this preparation for only six months of the year, preferably not over the summer months. It must be emphasised that Isotretinoin is a medicament, not a cosmetic. After its development, the cosmetic industry rushed products onto the market containing derivatives such as Retinol, which is a derivative of isotretinoin but has less than 1/10 the strength of the original. Consequently it is not nearly as effective so is not a prescription item.

Also, beware of the of the 'cosmeceuticals' that are extremely well-marketed cosmetic creams, using pseudo-medical terminology to pose as therapeutic preparations.

Removal of common benign growths

- *Cryotherapy.* This uses liquid nitrogen, which freezes the tissue to a temperature of -197° C. It destroys the unwanted tissue and may be used to get rid of common ageing lesions such as seborrhoeic keratoses, solar keratoses and solar lentigines.
- *Electro surgery.* This technique uses a high-frequency alternating electric current to actually dehydrate unwanted growths. This is useful for removing milia (small sebaceous cysts), acrochordons (skin tags), telangiectasia (broken capilliaries), solar lentigines, and seborrhoeic keratoses.
- *Sclerotherapy.* This is the technique of injecting inside superficial, dilated veins, causing them to be obliterated.
- *Excision*. This may be either a shave or excision and suture. This is the method most commonly used for removing larger, elevated growths under local anaesthesia. It also enables lesions to be removed and pathology obtained if necessary.

Rejuvenation procedures

There are several options available for reversing some of the ageing skin changes. These range from relatively simple office procedures to more complicated rejuvenating surgery.

The first and simplest are the so-called *resurfacing techniques* that can be used to improve patchy skin pigmentation, lentigines (freckles), superficial sun spots (keratoses), and fine, superficial wrinkles. Various modalities are available for this, including chemical peels, photo-dynamic therapy, fractional lasers, or dermabrasion.

Botulinum toxin is a *muscle relaxant* that interrupts the nerve transmission to the muscles. It is injected into the skin and will temporarily improve wrinkles and frowning.

Then there are *fillers*, such as hyaluronic acid. This is a connective tissue filler that can enhance volume so is used for deeper wrinkles. One's own fat tissue may also be used as a filler.

Finally, there is *plastic surgery*. If you put your fingers on the skin of your temple you will see how much you can move it and how the skin around your eye is distorted when you do so. This is due to the skin's plasticity, or movability. A plastic surgeon is basically one skilled in the movement of skin and other tissues. Some people imagine that they use plastic instead of sutures and therefore perform 'scar-less' surgery. Being skilled in the movement of skin, plastic surgeons can do what you could not with your temple skin, that is, move it without distorting another part of the skin. They are also able, with sophisticated techniques, to minimise and camouflage scars. They can hide them inside hair-lines, skinfolds and wrinkles so that they are virtually invisible.

Other areas of the body also age, but not as rapidly as the face because they are not normally exposed to UV light for 365 days a year. Surgical improvement to the breasts, stomach, buttocks and legs are also possible. It is important, however, to remember that there are always risks associated with such surgery and that these operations are by no stretch of the imagination, minor.

Hopefully, however, with all this knowledge we have, we should be able to avoid having these not insignificant surgical procedures.