22/05/2019

EUROGENETICA ANTI-AGEING

Personal report:

Anti-Ageing

by Eurogenetica

www.nutrigene.it

Name:	
Age:	
Gender:	

"Your skin reflects your inner health – in fact the appearance of your skin comes mostly from processes inside the body"

YOUR RESULTS

Welcome to your **Skin Healthy Ageing DNA** analysis

The skin is the largest organ of the body. An average man's skin covers more than 2 square yards and weighs 10 pounds. In just 1 square inch of skin there are approximately 30 million cells, 100 fat glands, 600 sweat glands, 65 hairs, numerous muscles, and thousands of nerve endings. The human skin ranges in thickness from 0.5 millimetre in the eyelid to more than 2 millimetres in the palms and soles.

- The skin performs a complex role in human physiology:
- Protects the rest of the body from toxins, injuries, the sun, and temperature extremes in the external environment
- Preserves the stability of the body's inner environment and keeps it in place
- Helps the body to regulate heat
- Communicates information about physical and emotional states
- Provides identification through unique finger- and sole-prints

The appearance, elasticity and ageing of skin is affected by both genes and environment and the way that they interact. Environmental features include diet, lifestyle, physical activity, sun exposure, etc. We also all have common genetic variants that affect processes important to our skin health however because genes do not act alone, by making suitable changes in diet, lifestyle, etc. we can exert some control over our apparent genetic destiny – with simple adjustments to our lives we can make significant improvements in our long term skin health, and even reduce / reverse effects of ageing that have already appeared.

Healthy skin, Healthy ageing, Anti-ageing

Areas covered by this test:

- **Skin structure and ageing**
- **Oxidative Stress, Detoxification & Inflammation**
- **Advanced glycation end products (AGEs)**
- **Vascular tone & water retention**

Skin health, blood & lymph circulation and conditions such as cellulite are interlinked at several levels. They involve complex processes that include microcirculation, local fat

accumulation, hormonal factors, altered matrix metabolism, oxidative stress, inflammatory changes, and alterations in lymphatic drainage.

The panel provides information about the potential effect of your individual genetic variation on your overall skin health and well-being. Since we focus especially on research regarding gene x environment interactions the genetic information leads to specific personal modifications to your diet and lifestyle which can help with healthy skin ageing and prevent or combat processes such as cellulite, water retention, etc.

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Skin Structure

We have looked at genes associated with the generation and maintenance of skin structure. Skin is “dynamic” it is constantly being broken down and rebuilt in response to external and internal stimuli (e.g. sunlight and metabolic oxidation). Skin surface appearance is determined by the elasticity and resilience of the underlying protein fibre structure, mainly cross-linked collagen and elastin fibres. The genes we test include collagen, elastin and enzymes involved in the delicate remodelling process. Variations in these genes can have small effects on this process which can have significant long-term consequences for skin ageing, but which can be ameliorated by taking protective measures.

Oxidative Stress, Detoxification & Inflammation

These processes are normal features of everyday activity in the cell. Exposure to the sun increases generation of free radicals in the skin due to the activity of UV light on skin cells. Free radicals are also generated as part of the normal oxidative metabolic processes of energy production in the cell. Free radicals are extremely reactive molecules which can cause damage to all cellular components including DNA, proteins and lipids. The body has developed several protective mechanisms including enzymes which mop-up these free-radicals before they can cause their damage. We can also limit free-radical production by taking care over what we eat and by avoiding tobacco smoke (including passive smoking) and, as much as possible, environmental pollution.

We have tested you for variations in several genes which are involved in these protective mechanisms. The variations may affect the efficiency of free-radical protection and specific advice for you on how to overcome this is given.

Inflammation is a normal function that is a vital part of many important processes such as wound healing, protection against infection and repairing damage caused by UV light. It is an extremely complex set of processes mediated in large part by various protein molecules called cytokines which may have either pro-inflammatory or anti-inflammatory actions. Many of the genes that produce these cytokines are polymorphic and the variations can affect the activity of the proteins leading to individual variations in inflammatory responses between different people.

Although having a protective role it is important that the inflammatory response is well controlled because over-inflammation can have consequences such as accelerated skin ageing. The inflammatory response can be modulated by nutrition and dietary supplementation, we have tested for variations in several cytokine genes and used the results to help to design appropriate protective measure unique for your particular make-up.

Sensitivity to Refined Carbohydrates & Glycation

Individual genetic variation affects your sensitivity towards refined carbohydrates – an increased sensitivity coupled with over consumption of refined carbohydrates raises the likelihood of overweight and obesity. Carbohydrate sensitivity can also result in higher levels of glycaemia, glycation, an increased probability of developing insulin resistance and eventually type 2 diabetes. These processes also contribute to the development of non-enzymatic modification of proteins in the formation of advanced glycation end products (AGEs) which are implicated as detrimental in various processes important for skin health, vascular tone, cellulite and physiological ageing. Once formed, AGEs tend to gravitate toward dermal collagen and elastin. Common symptoms of skin with glycation issues include premature ageing, such as wrinkling and sagging; weakened elastin and collagen; and a reduced ability for skin to quickly rehabilitate. The presence of AGEs also make the skin more vulnerable to oxidative stress, smoking and UV exposure.

The total state of oxidative stress on the healthy body, and the accumulation of AGE-related damage is proportional to the dietary intake of refined carbohydrates which is also affected by individual genetic sensitivity to these macromolecules. AGEs affect nearly every type of cell and molecule in the body, and are thought to be one factor in ageing and some age-related chronic diseases. They are also believed to play a causative role in the vascular complications of diabetes mellitus. They have a range of pathological effects, including increasing vascular permeability, inhibition of vascular dilation by interfering with nitric oxide, oxidising LDL, increasing inflammation and enhancing oxidative stress.

Vascular tone & water retention

Vascular tone is the contractile activity of vascular smooth muscle cells in the walls of small arteries and arterioles and is the major determinant of the resistance to blood flow through

the circulation. Thus, vascular tone plays an important role in the regulation of blood pressure and the distribution of blood flow between and within the tissues and organs of the body. When this tone is normal, the blood vessels are considered to be functioning at optimal levels.

Reduced nitric oxide production has been linked to vascular tone which appears to improve when diet is rich in omega-3 fatty acids, irrespective of genotype but is thought to be even more critical for those with impaired endothelial function as associated with individuals with the *NOS3* variation. Cold-water fatty fish (salmon, halibut, mackerel, tuna) and their oils are excellent sources of omega-3 fats. Plant sources include canola oil, flaxseed, walnuts, and their oils.

The *ACE* gene codes for an enzyme that has a key role in cardiovascular health because it is closely involved in the regulation of the processes of vasoconstriction and vasodilation. The *ACE* gene contains an "Insertion/Deletion" polymorphism (allele "I" = Insertion; allele "D" = Deletion), that influences enzyme activity. The gene *AGT* (Angiotensinogen) is involved in the regulation of blood flow, blood pressure and electrolyte balance. *ACE* and *AGT* play a key role in the maintenance of cardiovascular homeostasis because they are important in the regulation of vasoconstriction and dilation. Recent studies have linked these genes to salt-sensitive increases in blood pressure.

Results

Gene	Variant	Result		Action
Skin Structure:				
MMP1	rs495366 (A/G)	GG	**	You have two copies of the G version of the gene which is associated with increased breakdown of collagen.
MMP3	rs3025058 (-/A)	5A/6A	*	You have one copy of the 5A version of the gene which is associated with increased breakdown of collagen.
COL1A1	rs1800012 (G/T)	GG		Normal expression
ELN	rs2071307 (A/G)	GA	*	The A allele is associated with reduced elasticity
Oxidative Stress, Detoxification & Inflammation:				
SOD2	rs4880 (C/T)	CT	*	Increase antioxidant intake through diet
CAT	rs1001179 (C/T)	CC		Normal expression
GPX1	rs1050450 (C/T)	TT	**	Reduced activity version of the enzyme, important to have adequate levels of selenium
NQO1	rs1800566 (C/T)	CC		Normal expression
EPHX	rs1051740 (T/C)	CT	*	T allele with higher activity: reduce grilled meat. Try to reduce exposure to external pollutants such as cigarette smoke and urban pollution (do not carry out strenuous exercise (e.g. jogging) in polluted outdoor areas).
GSTM1	INS/DEL	I		Normal expression
GSTT1	INS/DEL	I		Normal expression
IL6	rs1800795 (G/C)	GG		Normal expression
TNF	rs1800629 (G/A)	GG		Normal expression
Carbohydrate sensitivity & glycation				
ACE	rs4341 (I/D)	DD	**	MEDIUM sensitivity Limit intake of refined carbohydrates: glycemic load <80 / day; consume at least 28 g/day fibre
PPARG	rs1801282 (C/G)	CC	**	
TCF7L2	rs7903146 (C/T)	CC		
ADRB2	rs1042713 (A/G)	AA		
FTO	rs9939609 (A/T)	TT		
FABP2	rs1799883 (C/T)	CT	*	
Hypertension and vascular tone				
ACE	rs4341 (I/D)	DD		Sensitive to salt, <1,600 mg / day sodium
AGT	rs699 (C/T)	CC	**	
NOS3	rs1799983 (G/T)	GT	*	T allele: associated with reduced basal NO production
BDKRB2	rs1799722 (C/T)	CC	**	Lower expression. With ACE DD may increase risk of raised blood pressure

Skin Structure

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Gene	Result	Effect
MMP1	GG	You have two copies of the G version of the gene which is associated with increased breakdown of collagen.
MMP3	5A/6A	You have one copy of the 5A version of the gene which is associated with increased breakdown of collagen.
COL1A1	GG	Normal expression
ELN	GA	The A allele is associated with reduced elasticity

You have two copies of the G allele in the MMP1 gene and are heterozygous for MMP3 which is associated with overexpression of these enzymes and increased breakdown of collagen fibres as part of the normal skin repair process in response to damage. These variants are particularly affected by smoking and UV light. Various antioxidants such as astaxanthin have been shown to reduce excess MMP expression and can be useful for maintaining skin health. Your COL1A1 genotype is associated with normal collagen structure.

The ELN A allele is associated with reduced elasticity and distensibility, especially after middle-age, from around 50 yrs old

- Avoid tobacco smoke, including passive. If you live in a polluted urban area try to get out regularly
- Always use a good quality UV screen when in sunlight
- Various antioxidants such as astaxanthin have been shown to reduce MMP expression and can be useful for maintaining skin health.
- Keep your skin hydrated

Oxidative Stress, Detoxification & Inflammation

The gene *SOD2* codes for an enzyme called manganese superoxide dismutase. This enzyme is important in protecting the cell environment from internally generated oxidative free radicals, especially those generated during energy production. Each cell in the body during normal metabolism generates large quantities of free radicals; these are highly reactive species which can damage cell components such as lipid membranes, proteins and DNA. However they are rapidly removed by the several protective mechanisms, one of which involves SOD2. Together with catalase (CAT) and glutathione peroxidase (GPX, a selenoprotein), these enzymes constitute a primary defense against oxidative stress.

Free radicals are considered by many scientists to be involved in the ageing process. The coenzyme Q10 reductase (NQO1) enzyme converts coenzyme Q10 (ubiquinone) to its reduced form, ubiquinol, which scavenges free radicals in the mitochondria and lipid membranes. Individuals with a SNP in the NQO1 gene have slower reduction of ubiquinone to ubiquinol, resulting in very low blood and tissue levels of this key antioxidant. CoQ10-depleted skin tissue may be particularly more prone to the damage by free radicals because of its constant exposure to environmental oxidants such as sunlight and pollution.

EPHX1 codes for an enzyme that is involved in Phase I (activation) of removing toxins, such as carcinogens from food and smoke. GSTM1 & GSTT1 (glutathione S-transferases) are involved in phase II of the detoxification process by which toxins are removed from the body (via the conjugation of toxic molecules with glutathione, facilitating their elimination). According to genetic variation the enzyme activity is either present (Insertion or "I") or absent (Deletion or "D").

Both IL6 and TNF are cytokines involved in the inflammatory process as part of the body's normal immune response and genetic in these genes variation (*IL-6*-174 G/C and *TNF*-308 G/A) affects the amounts of cytokines produced.

Gene	Result	Effect
SOD2	CT	*
CAT	CC	
GPX1	TT	**
NQO1	CC	

Gene	Result	Effect
EPHX1	CT	*
GSTM1	I	
GSTT1	I	
IL6	GG	
TNF	GG	

Your genetic test results indicate the possibility of a moderately reduced capacity to neutralise free radicals. You have one copy of the C allele in the SOD2 gene, this codes for a form of this enzyme which while active in the mitochondria may lead to less protection against oxidative stress in the cell cytoplasm. You carry two copies of the T allele in the GPX1 gene, the enzyme produced will be the lower activity variant and it is recommended that levels of selenium in the diet are increased above RDA. You have normal expression of the CAT & NQO1 genes.

You carry the T allele in your EPHX1 gene, which codes for the fast activity enzyme which can lead to increased production of reactive intermediates during the detoxification process. In your case you have the INS (Insertion) versions in both genes, which means that the GST enzymes are produced normally. Your results show that you have normal expression for both IL6 and TNF.

- Your genetic test results indicate the possibility of a reduced capacity to neutralise free radicals. Dietary anti-oxidants are very important sources of protection from free radicals and other types of oxidative stress. In order to support your body's own protection mechanism it is important for you to ensure that you reach your goals for vitamins A, C and E and selenium.
- With your results it is advisable to limit your consumption of grilled or smoked meat to 1-2 servings per week. Try to reduce exposure to external pollutants such as cigarette smoke and urban pollution (do not carry out strenuous exercise (e.g. jogging) in polluted outdoor areas).
- It is not necessary to increase cruciferous vegetable consumption to compensate for the absence of GSTM1 & GSTT1. You can follow the standard recommendation for cruciferous: 1-2 servings per week
- Your recommended intake of selenium 105 mcg / day, this is higher than the standard recommendation

Recommended Micronutrient Doses	
Nutrient	**Your Recommended Daily Intake**
Vitamin A	5,000 IU / 1500 µg
Beta carotene	7 mg
Vitamin C	250 mg
Vitamin E	200 IU / 180 mg
Selenium	105 mcg / day
Omega-3	1.6 g
Cruciferous vegetables	1-2 servings per week
Alpha Lipoic Acid	150 mg

Sensitivity to Refined Carbohydrate & Glycation

Sensitivity = **3.6/10**

Nutritional advice:

Max 8% total calories
Max GL = 80
Fibre = 28 g

Carbohydrates are our main source of energy, but not all carbohydrates are the same. The consumption of refined carbohydrates in particular should be restrained because these are quickly absorbed into the blood stream causing peaks in glucose levels that in the long term can lead to higher levels protein glycation. Refined carbs are contained in all products produced using refined flour from which important components, like fibre, have been removed. In fact the increased use of fibre in the diet is recommended because it slows down sugar absorption, making it more gradual and dampening glucose peaks and reduction in glycation. You are advised to make sure that you reach your daily recommended levels of fibre and to remain below your personal limit for refined carbs intake.

Various studies have examined the relationship between genes, environment and lifestyle and how this affects glucose transport & metabolism, glycemia, glycation and insulin sensitivity. Genes for which there is strong evidence have been included in this panel. Based on them, recommendations are provided for optimising levels of refined carbohydrates & fibre in your daily nutrition.

Gene	Result	Effect
ACE	DD	** Increased sensitivity
PPARG	CC	** Increased sensitivity
TCF7L2	CC	Normal sensitivity
ADRB2	AA	Normal sensitivity
FTO	TT	Normal sensitivity
FABP2	CT	* Intermediate sensitivity

You have a **MEDIUM sensitivity** to carbohydrates – this is an overall measure of the potential effects of your combined genotype on aspects such as carbohydrate metabolism and assimilation, short term glucose fluctuations and longer term insulin sensitivity.

Based on the combined genotype of all genes related to carbohydrate metabolism we offer the following nutritional advice:

- Max 8% total calories **from refined carbohydrates**
- Max glycemic load = 80 / day
- Fibre = >28 g / day

You are advised to make sure that you reach your daily recommended levels of fibre and to remain below your personal limit for refined carbohydrates intake.

WHAT IS GLYCEMIC LOAD AND GLYCEMIC INDEX?

Carbohydrates serve as one of the body's main sources of energy. How your body responds to the various carbohydrates in foods depends on the Glycemic Index (GI) of the food. Glycemic Index is a rating scale that defines carbohydrate-rich foods on a scale from 0 to 100. Foods are ranked according to how much they raise blood-glucose levels after eating. High GI foods are rapidly digested and absorbed, which may result in large swings in blood glucose levels. Low GI foods are digested and absorbed more slowly, and may result in more stable levels of blood glucose. Glycemic Load (GL) is a reference that takes into account the Glycemic Index of a food and the amount of the food that you need to eat to measure the full impact on your blood glucose levels. The higher the Glycemic Load, the greater the increase in blood glucose. To maintain long term health, consider consuming foods with a lower GL to help keep blood glucose levels steady in order to promote optimal health and well-being.

- **Consume whole grains. The fibrous coat of the hull or skin from grains slows down the digestion and absorption of carbohydrates. An example of a whole grain product is whole-wheat flour, bulgur and brown rice.**

- **Choose long-grain, brown rice as a staple because this variety of rice has the lowest GI compared to other rice.**

- **Pasta has a low GI, but a large portion can result in a high GL.**

Hypertension and vascular tone

The *ACE* gene codes for an enzyme that is closely involved in the regulation of the processes of vasoconstriction and vasodilation. The *ACE* gene contains an "Insertion/Deletion" polymorphism (allele "I" = Insertion; allele "D" = Deletion), that influences enzyme activity. Recent studies have demonstrated and association between the genotypes I/D and I/I and dietary salt sensitivity affecting blood pressure. Angiotensinogen is involved in the regulation of blood flow, blood pressure and electrolyte balance. Angiotensin (a small peptide formed by the action of renin and ACE on angiotensinogen) is part of the renin-angiotensin system. ACE and AGT play a key role in the maintenance of cardiovascular homeostasis because they are important in the regulation of vasoconstriction and dilation. Recent studies have linked these genes to salt-sensitive increases in blood pressure.

NOS3 produces nitric oxide (NO), a cell signalling molecule implicated in vascular smooth muscle relaxation and plays a key role in the regulation of vascular tone, peripheral resistance and has vasoprotection by suppressing platelet aggregation, leukocyte adhesion and smooth muscle cell proliferation.

Bradykinin is one of the peptides known as kinins. This peptide has been recognized as a significant vasodilator and may influence edema. Bradykinin is an endothelial dependent vasodilator and acts via the Bradykinin B2 receptor (BDKRB2). It is associated with vasodilation and blood pressure control. Efficiency of muscular contraction and cell hydration. The C allele is associated with lower receptor mRNA expression and is associated with increased thirst and fluid loss.

Gene	Result	Effect
ACE	DD	Normal for salt
AGT	CC	**
NOS3	GT	*
BDKRB2	CC	**

Your genetic tests reveals that you have the D/D genotype at ACE gene and C/C genotype at AGT gene, and therefore a possible predisposition to hypertension when salt (specifically sodium) consumption is excessive. You are advised to limit your salt intake to a maximum of 4.0 g/day, equivalent to about 1,600 mg/day sodium.

The NOS3 T allele is associated with lower NO production and this is aggravated by tobacco smoke. Omega-3 fatty acids have been shown to improve endothelial function, reducing vasoconstriction, especially in carriers of the T. The BDKRB2 CC genotype is associated with lower expression, this can add to the effects of the ACE D and NOS3 T allele, increasing the risk of higher blood pressure, independent of salt, and lower vascular tone and fluid retention.

WHY IS SALT (SODIUM) IMPORTANT FOR YOUR HEALTH?

Salt is made up of sodium and chloride. It's the sodium content that's of most concern because it can cause high blood pressure in those genetically-susceptible. Historically, government agencies have stressed the importance of reducing sodium intake at or below

2300 milligrams (mg) per day. This amount of sodium translates as 1 teaspoon of salt per day and includes all the salt we add to our foods and the prepared foods we consume. In general, our commercial foods tend to be highly salted for flavour and it's a good idea for all of us to be aware of how much salt we ingest on a daily basis. However, for those susceptible to salt-sensitive high blood pressure, it's essential to cut back on salt and its sodium content.

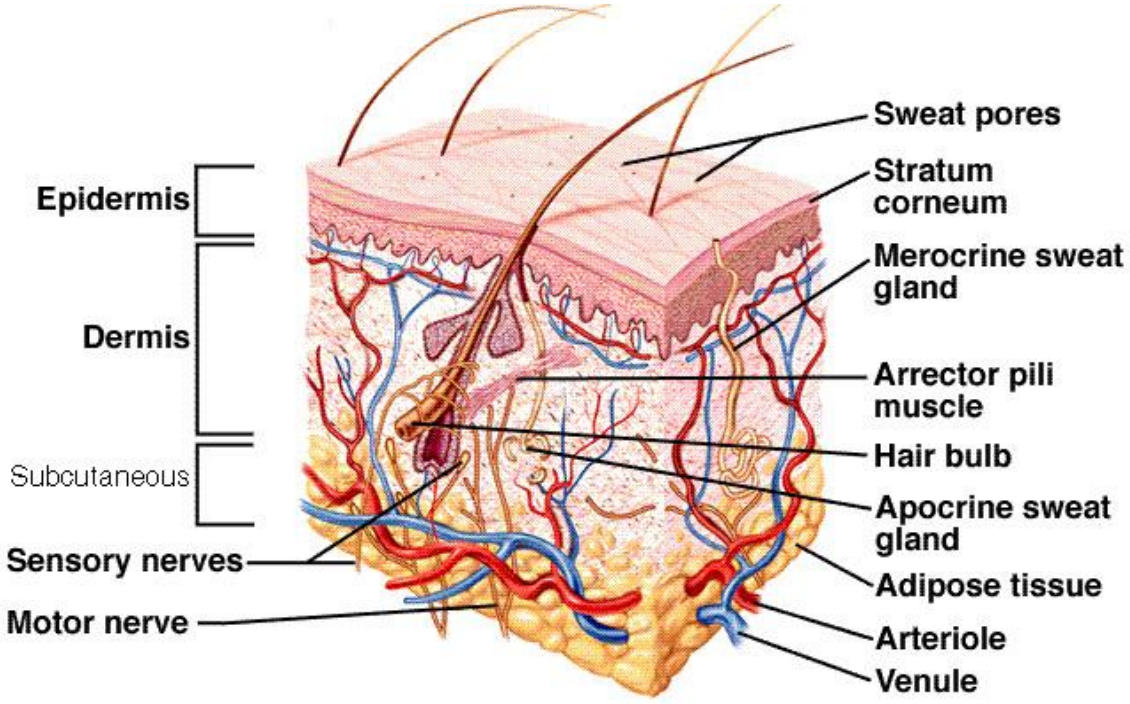
- **Taste your food before salting it. You may not need the extra salt!**
- **Know where the hidden salt in foods is. Assume most convenience foods are high in salt content.**
- **Consider adding herb mixes to your food to enhance the flavour of your food without adding salt.**
- **Keep hydrated.**
- **Keep an eye on your blood pressure**

APPENDIX 2: General Information

BASIC FACTS ABOUT SKIN

The skin is the largest organ of the body. An average man's skin covers more than 2 square yards and weighs 10 pounds. In just 1 square inch of skin there are approximately 30 million cells, 100 fat glands, 600 sweat glands, 65 hairs, numerous muscles, and thousands of nerve endings. The human skin ranges in thickness from 0.5 millimetre in the eyelid to more than 2 millimetres in the palms and soles.

STRUCTURE OF THE SKIN



The skin is usually described as having three layers. The outer layer is called the epidermis. Below that is the dermis, and underlying these is a layer of fat-producing cells called the subcutaneous tissue.

FUNCTION

The skin performs a complex role in human physiology:

- Protects the rest of the body from toxins, injuries, the sun, and temperature extremes in the external environment
- Preserves the stability of the body's inner environment and keeps it in place
- Helps the body to regulate heat
- Communicates information about physical and emotional states
- Provides identification through unique finger- and sole-prints

EPIDERMIS

Though paper thin, the epidermis is composed of many layers of cells. In the basal layer (the living epidermis), new cells are constantly being reproduced, pushing older cells to the surface. As skin cells move farther away from their source of nourishment, they flatten and shrink. They lose their nuclei, move out of the basal layer to the horny layer (the dead epidermis), and turn into a lifeless protein called keratin. After serving a brief protective function, the keratinocytes are imperceptibly sloughed off. This process of a living cell's evolution, called keratinization, takes about 4 weeks.

Keratinocytes, or dead skin cells, constitute about 95 percent of the epidermal cells and function as a barrier, keeping harmful substances out and preventing water and other essential substances from escaping the body. The other 5 percent of epidermal cells are melanocytes, which manufacture and distribute melanin, the protein that adds pigment to skin and protects the body from ultraviolet rays. Skin colour is determined by the amount of protein produced by these cells, not by the number of melanocytes, which is fairly constant in all races.

Hair and nails are specialized keratin structures and are considered part of the epidermis. While animals use fur and claws for protection and defence, these corresponding structures are largely cosmetic in humans. The skin, however, is uniquely human, since it can betray emotion by blushing (embarrassment), turning red (anger), blanching (fear), sweating (tension), and forming goosebumps (terror).

DERMIS

The dermis, or the "true skin," is composed of gel-like and elastic materials, water, and, primarily, collagen. Embedded in this layer are systems and structures common to other organs such as lymph channels, blood vessels, nerve fibres, and muscle cells, but unique to the dermis are hair follicles, sebaceous glands, and sweat glands.

Like the epidermis, the hair follicle manufactures a keratin structure, hair. These follicles are found everywhere on the body except for the palms and soles, though most of the hairs produced are fine, light hairs that, quite unlike the hair of the scalp, are scarcely visible to the naked eye. The sebaceous glands are attached to the hair follicles and through the follicles excrete an oily substance called sebum, which both lubricates and protects the skin. On most of the skin surface sebum appears constantly and imperceptibly, but in areas with a higher concentration of sebaceous glands, such as the face and back, there are wide variations in the amount of sebum produced.

There are two distinctive sweat-producing glands, the apocrine and the eccrine. The apocrine gland is best known for producing body odour but otherwise has no known physiological function and is apparently a holdover from times past. In the ear it forms a portion of what we see as earwax. It is also present under the arms, around the nipples and navel, and in the anal-genital area.

The eccrine glands are an advanced and extensive system of temperature control. Several million of these glands are distributed over the entire body, with the highest concentration in the palms, soles, forehead, and underarms.

Sweat, a dilute salt solution, evaporates from the skin's surface to cool the body. Excessive sweating without replacement of lost water can cause heat stroke. Eccrine glands sweat in response to physical activity and hot environments, but emotional stress and eating spicy foods can also cause perspiring.

The dermis also regulates heat through a network of tiny blood vessels. In hot weather these vessels dilate to give off heat, causing the skin to flush. In cold weather, they constrict, conserving heat, causing pallor. The blood in these vessels nourishes the skin and provides protection for the cellular and fluid systems. Like the eccrine glands, blood vessels in the dermis are responsive to emotional stress, causing the colour changes mentioned previously.

Nerve endings in the dermis are the source of the body's sense of touch. They sense heat, cold, and pressure, providing both pain and pleasure.

SUBCUTANEOUS TISSUE

The subcutaneous tissue is another layer of connective tissue below the dermis, specializing in the formation of fat. It is unevenly distributed over the body, and there are wide individual differences in distribution. In addition to providing protection and insulation, the subcutaneous tissue serves as a depository for reserve fuel to be drawn upon whenever the amount of calories taken in is less than the amount burned up through activity. It is also instrumental in manufacturing vitamin D.

Why Do We Age?

Over the years wrinkles develop and we begin to notice our skin ageing. These wrinkles are a result of damaged supporting tissue, the dermis. The dermis contains water, fat and cells, which aid in the production of two very important fibres, collagen and elastin. It is these fortifying fibres that give the skin firmness and elasticity.

As we age, the dermis retains less water and fat - the skin ceases to look plump, fewer supporting fibres are produced - the skin is less resilient, oil flow slows considerably - the skin is drier, and tiny capillaries beneath the skin close off - the skin receives less oxygen and minimal nutrients. Cell renewal rate also slows, therefore the development of new cells takes longer, while old cells remain longer on the surface of the skin. The result of this rather simple process is, older looking skin showing visible creases, spots and sags.

Protecting your Skin

We all need to protect and look after our skin on a daily basis. There are many factors that influence ageing and the awareness of these factors is essential if we are to avoid or at least monitor them. Stress, pollution, drugs, alcohol, cigarette smoking, improper nutrition, lack of sleep and ultra violet radiation play havoc on our lifestyle, which in turn stresses the skin tremendously and causes free radicals to attack the body.

Free radical damage contributes greatly to the ageing process by destroying healthy cells and damaging tissue. Free radicals are molecules of oxygen with unpaired electrons that desperately roam the body in search of normal healthy cells to latch onto. Once this attachment process takes place, oxidation begins - rather like metal rusting during weather exposure. Oxidation occurs most readily in fats, therefore cell membranes rich in fat, are prime targets.

Nutrition

Proper nutrition is essential for healthy, youthful skin. It is recommended that you eat a wide variety of foods to ensure nutrition needs are met. The daily food pyramid is an important role in helping to achieve a well-balanced diet. This nutritional guideline gives a practical overview of all the food groups and outlines the suggested daily consumption of each. Fats, oils and sweets should be used sparingly, while fruits and vegetables should be consumed as often as possible - at least five servings per day.

It is important however not to restrict fats altogether as the body requires these essential fatty acids and fat-soluble vitamins for proper functioning. Fats provide energy and contribute significantly to the taste of food and to deprive ourselves would result in nutrient imbalance and unhealthy 'bingeing'.

Skin problems are often a sign of vitamin deficiency. Certain B-complex deficiencies - riboflavin- B2, thiamine- B1 and biotin, cause scaling and redness of the skin, particularly around the mouth and nose. Good sources of riboflavin, thiamine and B6 are found in lean beef, chicken, eggs, rye flour and milk.

Zinc deficiencies may cause similar problems. Foods containing the best sources of zinc include meats, eggs and seafood (oysters contain abundant sources of easily absorbed zinc), however good sources include roasted pumpkin and sunflower seeds, brazil nuts, Swiss and cheddar cheeses, peanuts and dark turkey meat. Vitamin C and zinc are important in the production of collagen. It has been suggested that a diet lacking in zinc may contribute to the appearance of age spots on the skin in later years.

Antioxidants, which include selenium and vitamins A,C and E, are of vital importance in the combat against ageing and free radicals. These important substances neutralise free radicals by pairing up their electrons. There is also sufficient evidence to suggest that vitamins E and C can decrease the level of free radicals in the blood.

Antioxidants also increase the skins cell renewal rate, normalise cell growth and stimulate blood flow and collagen formation. Synthetic forms of vitamin A have been proven to aid in the treatment of cancer, precancerous skin growths, wrinkles and acne, and vitamins A,C and E are known to reduce harmful damage to the skin from sun exposure. Good sources of vitamin A include fresh fruit and vegetables, while nuts, seeds and oils provide excellent sources of vitamin E. Vitamin C is found in citrus fruits, potatoes, broccoli and Brussel sprouts.

Drink plenty of water - Water is required by the body to hydrate and replenish cells. The body's water component is approximately 60-70%. It uses water to transport nutrients around the body and for dissolving and eliminating toxins. Aim to consume 1-2 litres of either bottled or filtered water per day, to assist in achieving a smooth glowing appearance.

Sun Exposure and Heat

Sun exposed areas of the skin seem to show more wrinkles, spots, blemishes and pigment changes than covered areas. This ageing and discolouration of the skin is believed to be caused by sun damage to the dermal connective tissue, resulting in the skins loss of elasticity and collagen.

Dermal connective tissue that has been affected by ultra violet radiation (UVR) is not as firm or as resilient as normal connective tissue, therefore the surrounding blood vessels lack support. The blood vessels then widen and become visible on the surface of the skin as broken veins. Crimson patches or senile purpura, as they are technically called, are often present on the skin of elderly folk. These localised patches result from a slight knock or bump to the area affected by broken veins. The veins bleed into the skin, creating a visible skin alteration. Heat from other sources, such as hairdryers or heaters can also cause broken veins on the surface of the skin.

To protect your skin from the sun's harmful rays, slather sunscreen on all exposed areas whenever you step outside. Choose a sunscreen with a sun protection factor (SPF) of 15 or higher, and one which blocks both UVA and UVB rays - a broad spectrum sunscreen. Ultra violet radiation can also penetrate and damage skin through clouds and glass, therefore remember to apply sunblock during winter and while driving. Sit in the shade whenever possible and avoid heat on the surface of the skin.

Stress and Sleepless Nights

The effects of stress and a few too many sleepless nights can show visibly on your face. From deeply etched frown lines to dark circles and puffiness under the eyes, it is relatively easy to neglect your skin to the point where it looks and feels worn-out.

The body requires at least 6-8 hours sleep per night depending on individual needs. During sleep the body and skin repair and rejuvenate, therefore you should nourish your skin with a good moisturiser before bed to feed your face while it works hard during the night to keep you youthful. Avoid stressful situations and learn to take 'time-out for yourself'. Constant crying and rubbing the eyes can damage the delicate eye tissue, causing lines and wrinkles. Stress related acne and blemishes may also show up on the skin in times of depression.

Learn to relax your facial muscles so as to avoid expression lines. Gentle facial massage stimulates nerve endings and nourishes the skin by increasing the flow of oxygen through the blood, ensuring a healthy facial glow.

Smoking, Drugs and Alcohol

Smoking, drugs and alcohol encourage the invasion of free radicals, therefore these substances must be avoided whenever possible. Red wine consumed in moderation however, can be very beneficial to the skin due to a good supply of grape antioxidants.

Smoking, on the other hand, deprives the skin of normal blood flow and also interferes in the healing process following cosmetic surgery on the skin. A smoker's face tends to show more lines and wrinkles than the face of a non-smoker; the skin may appear slightly grey, have a leathery or rugged appearance or a subtle gauntness.

In the battle for reducing the rate of skin ageing, inhibitors of proteolysis, scavengers of singlet oxygen, reducing agents and anti-adhesion compounds will efficiently flank specific inhibitors of the effects of every other factor described above, such as sunscreens, ozone scavengers, metal chelators, antibiotics, dampers of electromagnetic fields and glucose-binding peptides.