The Human Skin

Let us take a journey into our skin to uncover the deeper meanings hidden within.

Human skin is not simply a waterproof covering of the internal organs. It also contributes to our physical appearance and biological health. In fact, the skin is the body's largest organ and is incredibly complex. It can easily compete with other organs with its magnificence. Our skin fulfils many different functions. It is home to our body's first line of defense; it protects the body from cold and heat, as well as germs and toxic substances. The skin is very important to our health and wellness. It is a chemical factory, a construction site, a liquid reserve and a combat zone. It is like wearing a beautiful dress, an amazing armor, and an extremely delicate sensor at the same time. Let us take a journey into our skin to uncover the deeper meanings hidden within.

First Dimension : Analytical Thinking

SCIENTIFIC UNDERSTANDING OF THE HUMAN SKIN

Have you ever thought about why everything you touch has a distinct 'feel' to it?

When you touch an object, even gently, it presses on one or more nerves in your skin. This interaction results in a signal. The nerves in your skin then transmit this signal to your brain where it is processed so that you know how the object feels.

Nerves cover every inch of your skin. Each nerve in your skin has a specific function. You have nerves that detect warmth, coolness, pressure and pain.

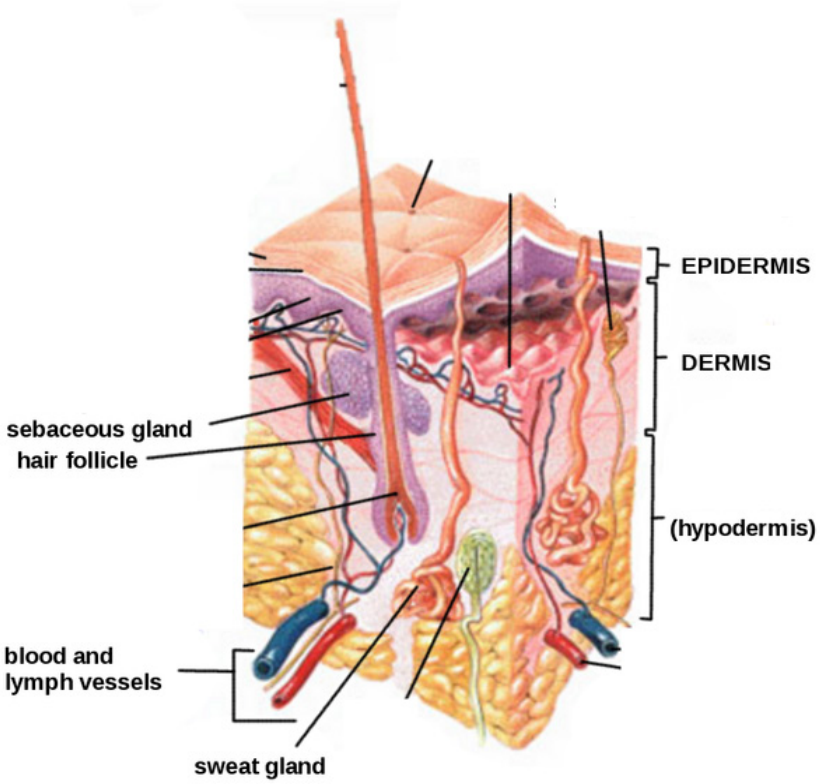
Did you know?

Your skin makes up about 7 per cent of your body weight. Even though it is only a few millimeters thick, it is your largest organ. In adults, the skin weighs about 4.5-5 kg (10-11 pounds) and covers an area of about 2 square meters.

The skin is made of two main layers, the **epidermis** and the **dermis**. The term 'dermis' comes from the Greek term 'derma', which means 'skin', while the suffix 'epi' means 'over.' Accordingly, the **epidermis** is the outer layer, and the **dermis** is the inner, thicker layer of the skin. The epidermis provides a waterproof cover and determines our skin tone. What's more, the epidermis is avascular, meaning it does not have blood vessels, whereas the dermis- the thicker layer- is vascular. Being avascular, the epidermis receives nourishment through the vessels in the dermis.

This is why you don't bleed if you scratch the outer surface of your skin, but you do if you cut the inner layer- the dermis. In addition to **blood** and **lymph vessels**, the dermis also contains **hair follicles**, **sweat glands** that produce sweat, and **sebaceous glands** that produce **sebum**, a substance that keeps the hair and skin greased.

There is also another layer beneath the dermis that is known as the **hypodermis**. The hypodermis is not considered part of the skin; however, it plays an important role in keeping the skin attached to the underlying bones and muscles. The hypodermis is the layer beneath the skin where fat is stored and where the nerves that are sensitive to pressure are anchored.



1. Protection

The skin works to protect the body in several ways:

***a. Keratin-** a type of protein that is a basic component of hair and nails. It is also found in the outer layer of the skin cells. Keratin helps the skin and underlying tissues and organs stay protected from heat, scratches, chemicals, bacteria and viruses.*

***b. Lipids (fats)** in the skin prevent evaporation of water from the skin surface. Without the presence of lipids in the skin, it would easily become dehydrated.*

***c. Sebum**, an oily substance produced by sebaceous glands in the skin, keeps the skin and hair from drying out. What is more, it contains chemicals that kill bacteria.*

***d. The pH of the skin** is acidic, preventing the growth of some types of bacteria.*

***e. Melanin**, the pigment that gives the skin its color, helps guard the skin against the harmful effects of the Sun's ultraviolet rays.*

2. Thermoregulation

Thermoregulation is the regulation of a constant body temperature. The skin participates in the process of thermoregulation by:

a. Releasing sweat

When you exercise, for example, your body temperature rises. Sweat glands in your skin increase the production of sweat and the release of the sweat from the surface of your skin helps lower your body temperature. Conversely, when your body temperature drops, your sweat glands reduce the production of sweat, thus preserving heat.

b. Adjusting the flow of blood in blood vessels beneath the surface

When your body temperature rises, blood vessels in your skin become wider (they dilate) resulting in more blood to flow through them. As a result, more heat is lost from the body and the body cools down. Conversely, when you feel cold, blood vessels in your skin become narrower (they constrict), resulting in less blood flow and less heat loss.

The cells in your skin are linked to your brain. When your skin detects a fall in temperature for example, a message is relayed to your brain where the signal is processed as 'I'm feeling cold'.

3. Cutaneous (skin) Sensations
(Tactile, thermal and pain sensations)

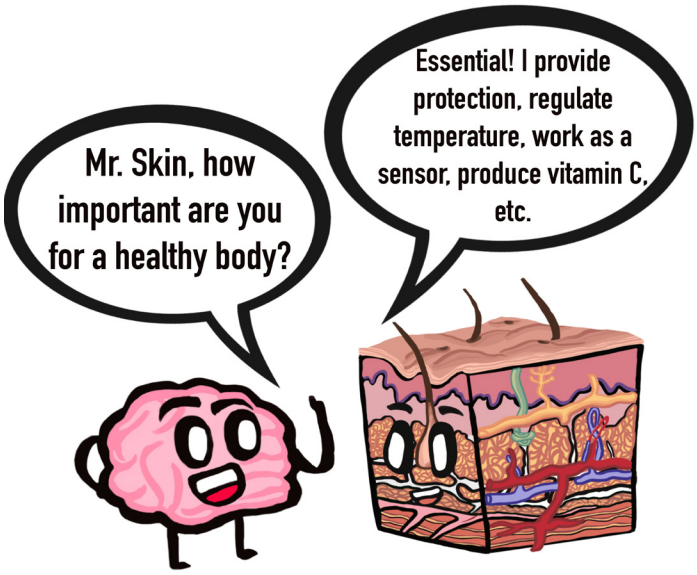
a. Tactile sensations: *These are the sensations of touch, pressure, vibration and tickling.*

b. Thermal sensations: *These are the sensations of warmth and coolness.*

c. Pain sensations: *These sensations indicate the presence of damage to the skin's tissues*

4. Storage of Blood

The skin has a large network of blood vessels that house 8-10% of the total blood of the body.



5. Excretion and absorbtion

Excretion: Excretion is the process of removing substances from the body. Through your skin, you excrete about 400 ml of water per day, in addition to 200 ml of sweat, tiny amounts of salts, carbon dioxide, ammonia and urea.

6. Production of Vitamin D

Vitamin D is an important vitamin needed for the absorption of calcium. It is manufactured in the skin when the skin is exposed to the sun. Without sufficient vitamin D, bone growth in children is affected, resulting in soft and deformed bones and a disease known as Rickets.

How is the skin designed to heal itself?

Have you ever noticed how healing occurs when you get injured? In the process of healing, blood clots form, preventing further loss of blood. Cells migrate across the wound, blood vessels supply the wound with microbe-fighting immune cells, and special cells called fibroblasts produce a skin-building substance called collagen. After new cells are made, the scab (made of dried blood) falls off and the skin is restored to normal. What is remarkable about this process is that no one knows what the trigger for regeneration and skin healing is. Contracture, a process that brings the edges of the healing wound together, appears to occur simultaneously. Scientists have been unable to explain how cells know when and where to end the 'self-healing' process.

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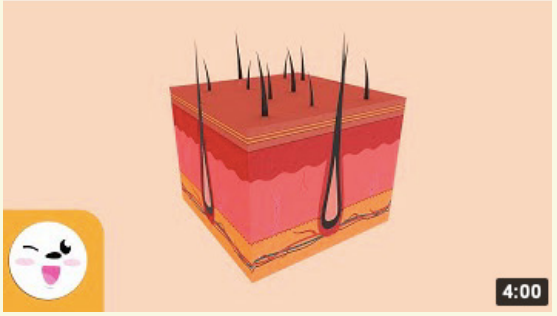

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Second Dimension : Analogical Thinking

HUMAN SKIN VS. IT'S BIOMIMICS

The human skin has many complex functions. Therefore, it is difficult to compare it to any man-made object. We will compare it to three man-made objects which are somehow mimics of certain features of the human skin.

Synthetic Skin

First, we will compare our skin to artificial skin- a synthetic substitute called Biobrane™. Biobrane™ is comprised of two layers, mimicking the two layers of human skin. The uppermost layer is thin, made of silicone and dotted with miniscule holes. The inner layer is made of nylon, a type of plastic. To keep the area moist and to promote the process of healing, a thin layer of water is placed between the two layers. This flexible material is designed for closing wounds and covering mild burns. Its function is simply to provide external protection from infection. It cannot regulate temperature or produce vitamin D; just as it cannot detect sensations such as pain, pressure, coolness or warmth.

Bio-mimicking Self-Repairing Textiles

Second, we can compare the self-healing properties of the skin to a recently invented self-repairing material. Researchers at Penn State University recently came up with a remarkable self-healing material that repairs itself when ripped.

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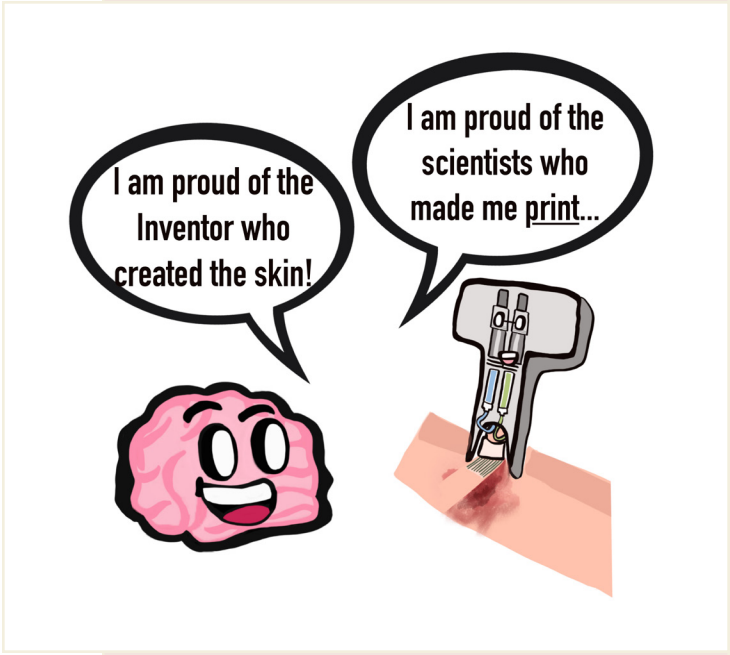
They developed a coating for textiles that can repair holes and provide greater protection from harmful substances. The invention can be described as "bio-mimicking" as it mimics squid ring teeth. Scientists have discovered that squid teeth contain a protein that plays a major role in repairing broken teeth. The protein has soft and hard parts that work together in the self-repairing process. The soft parts help the broken fibers fuse back together in water while the hard parts keep the structure strong. This unique property of squid teeth proteins inspired scientists to develop an artificial coating using the same proteins.

The new Nano Cure Tech clothing line from Imperial Motion is the latest range of self-repairing products. Although the fabric is only capable of repairing small holes rather than slices and tears, it is considered revolutionary. If successful, this fabric might threaten the survival of the clothing industry by giving people the opportunity to own long-lasting clothes.

For the sake of better understanding, we may also compare our skin's miraculous property of healing an open wound to that of the comparatively very simple task of mending a broken roof. In the following example, you will understand that while it may appear to be a much more complicated task, the process of repairing a broken roof is much easier than the process of synchronizing the roles of the many cells involved in skin repair.

Let us imagine for a moment that a tornado damaged the roof of your house. How would you go about repairing it? Let us say you decide to hire a construction company. The construction workers that need to repair the gaping hole need to look at the original blueprints of the house in order to return the roof to its original condition. They would need to gather the required materials and

follow the necessary procedures of repairing the roof. Similarly, when you are putting a Lego brick house together, you follow the color-coded, numbered instructions. You use the materials provided and construct the house according to the steps in the manual.



Upon reaching the final step, and putting the last brick in place, you know that the process of construction is completed. You determine that you have completed the construction of your Lego house through your magnificent human brain, the organ where images and numbers are processed and where connections between the Lego bricks in your hand and the images in the instruction manual are made.

What construction manual or blueprints do your skin-healing cells follow? What consciousness allows them to comprehend that the job is completed? Who instructs them to begin the healing process, and who relieves them of their duties when they are no longer needed?

In short, there is no man-made product that can mimic all the properties of the human skin. However, we have several different products that each mimic different properties of the skin. What is more, they cannot compete, either individually or collectively, with the skin in terms of complexity and beneficial outcomes.

Third Dimension :
Critical Thinking

EXPLORING THE MAKER OF THE HUMAN SKIN

Let us reflect on the manufacturing of artificial skin. What does it take to produce it? Do you believe that this flexible, multifunctional material can be the product of long years of random events? What about about self-healing fabric? Why did we have to wait for thousands of years to come up with such a fabric? Can anyone without intelligence, knowledge, expertise or experience create it? The answer to these questions is quite obvious.

We know for sure that these inventions did not emerge by accident. They were the products of very hard work. Neither animals nor humans with no education could make artificial skin, or self-healing fabric. It takes very high intelligence, a great amount of accumulated knowledge, power and a strong will to make them. Even though each of these technologies was invented by a certain person or team of people, in reality, they are the products of the collective intelligence and accumulated knowledge of humanity as a whole. We appreciate these inventions and praise their inventors by rewarding them with higher pay and status in society. We would not think of denying or ignoring them.

Reflection Questions:

What does it take to invent artificial skin?

Do you believe that this flexible, multifunctional material can be the product of long years of random events?

Why did we have to wait for thousands of years to come up with self-healing fabric?

Can anyone without intelligence, knowledge, expertise or experience create it?

What about human skin? As we explained above, it is far beyond artificial skin and self-healing fabric in terms of its complexity and beneficial outcomes. Indeed, it is beyond the scope of the human mind to comprehend the many features that determine the miraculous nature of our skin. If a scientist were to produce a substitute that could somehow mimic all the functions of the human skin, he/she will most likely be greatly appreciated and awarded the Nobel Prize. That is because we know that it is extremely difficult to come up with such an organ even though we already know what it is made of.

In reality, scientists only have to imitate the already existing skin rather than invent something new. If they cannot even copy it, we wonder how our body came up with its largest organ. Is it possible that it just appeared by itself? Was it formed through the random assembling of blind and unconscious atoms and molecules? Or is it possible that it was made by 'nature' which has no intelligence, conscience or knowledge?

You do not have to be a genius to know the answers to these questions. Any human being with basic intelligence and knowledge would confirm that it takes a great amount of power and knowledge to produce something similar to human skin. Moreover, the more we learn about the incredible properties of our skin, the more we can become certain in our judgement.

"It is beyond the scope of the human mind to comprehend the many features that determine the miraculous nature of our skin."

Let us now revisit the skin's remarkable ability to protect us against the external environment. Remember, our skin is the first line of defense against harmful bacteria and virus. The skin houses an incredible combination of T-cells and immune cells that are designed to attack and annihilate bacteria, viruses, fungi, parasites and cancerous cells.

Can our skin have developed this remarkable ability to fight external harm on its own? How does our skin know how to function in combination with our immune system's defender cells to keep harmful bacteria and viruses at bay? Who is the army commander that sets the soldiers in motion to defend the human body from invasion and harm?

The skin of a new-born baby is even more intricately tailored to its given role. It is coated with a waxy white substance called vernix that acts like a natural moisturizer and protector of the skin before and after the baby's birth. Vernix is produced by the sebaceous glands in the baby's skin at 28 weeks of gestation. Vernix is a combination of water, lipids (fats) and proteins that prevent a baby's skin from becoming wrinkly and provides additional protection from changes in temperature and from bacteria and viruses. Without vernix covering a new-born baby's skin at birth, it would quickly dry out when exposed to the air.

Who instructs the skin of a baby in its mother's womb to produce vernix? And who manages the production of vernix? Can the sebaceous glands in the developing baby's skin decide to do this on their own at 28 weeks of pregnancy? How do the unconscious cells know it is time to produce this substance?

" Can our skin have developed this remarkable ability to fight external harm on its own? "

YOUTUBE CORNER

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Did you know that the developing baby also swallows some vernix as it is growing in its mother's womb? Amazingly, this substance also contains components called complex branched chain fatty acids that protect the baby's developing gut (digestive system). Who determines that it not only safe but also beneficial for the baby to swallow the vernix? Who makes the unborn baby swallow it? Who designed the components of this substance and administered its usage to secure such remarkable benefits?

Consider the beauty our skin endows us with. Imagine how ugly we would be if we did not have skin? Indeed, human beauty is largely determined by the skin's texture. The attractiveness of the human face in particular is attributed to the texture of its skin. Many people fall in love with the beauty their loved ones' skin. Think about the very lucrative skin products industry as well as the plastic surgery business. People pay billions every year to regain or enhance their beauty by going through cosmetic surgery. They would never trust anyone with no education or experience for a plastic surgery procedure. What about the original source of our beautiful skin? If it takes many years of studies to learn how to remove wrinkles from the human face, do we not need much greater knowledge and power to come up with the original version?

In the process of reflecting on these questions, it becomes clear that our skin, like the rest of our organs, has a wise and knowing Maker. Indeed, the more we study our amazing skin and its miraculous properties, the more we realize that its Maker has a great amount of knowledge, wisdom, and power. As we learn more about the skin, we want to know more about its Maker.

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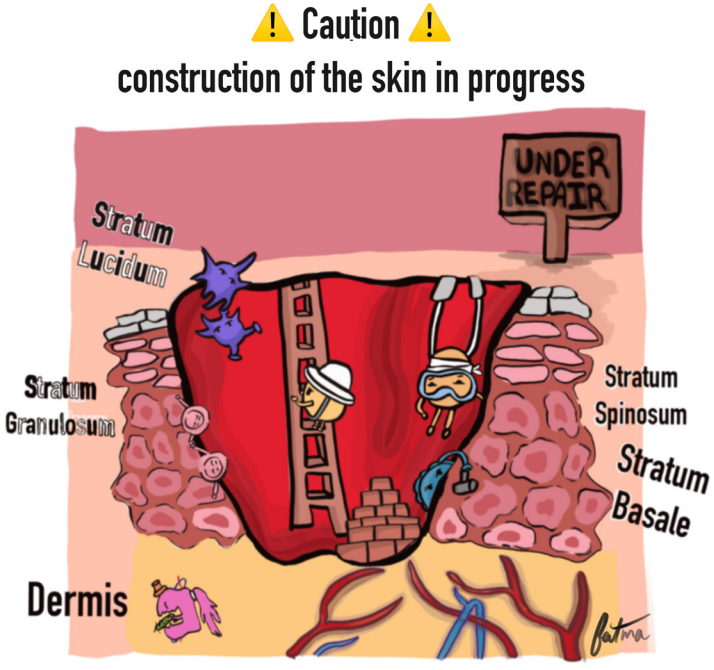

Fourth Dimension : Meditative Thinking

REFLECTING ON THE ATTRIBUTES OF THE MAKER

Clearly, unconscious nature and blind chance have nothing to do with our skin's ability to self-heal, regulate our body temperature, and keep microbes at bay. So how is this happening? What is the Hidden Hand behind the skin's elegant functions? Now that we are sure about His existence, how can we get to know Him better? Who is the Maker of our skin? What can we know about Him? It seems like He speaks about Himself through the functioning of the human skin. Indeed, the more we reflect on our wondrous skin, the more we learn the attributes of its Maker.

Your skin serves as the interface between your physical body that houses your internal self and the external world. Your sense of touch helps you navigate the world around you. Indeed, your sense of touch is among the very first senses you use when you enter this world.

The smooth flow of sand between your fingers, being tickled as a child, your mother or father's warm embrace or even a reassuring tap on the shoulder by your favorite teacher are all wonderful tactile sensations that add a sense of warmth and meaning to your life. Your skin is a tool that not only protects your body from harm but also connects you to living beings and non-living objects around you.

The flawless processes that govern your skin cannot be the product of your cells. How is it possible for cells, which are made up of unconscious atoms and molecules to know, reflect, evaluate and accordingly make choices? The skin cells cannot make the skin; they are

themselves being made and renewed; they are like building blocks: Who would believe that the bricks of a wall made the wall? Wouldn't that be a ridiculous claim? Look at the carbon, hydrogen, nitrogen, oxygen, calcium and phosphorus atoms that make up our cells- they are themselves dependent on the forces that bring them together and pull them apart according to each cell's individual blueprint. Who is in charge of these forces?

Once more, your skin is a living organ that has many amazing properties- so amazing that scientists are still far from coming up with anything similar to it. They would first need to know how to make a single living cell. There are millions of different cells which are the basic building blocks of animals, plants and bacteria. The cells that make up all living organisms have similar properties, but they also have unique features that distinguish them from one another. Thus, whoever creates one cell, must be the Maker of all cells including your skin cells.

Moreover, your skin does not work in isolation. It is one of ten systems in your interconnected body. You cannot have one system function without the others. Indeed, trillions of cells, 78 different organs, ten integrated systems, and more than 60,000 miles of blood vessels work together to keep you alive. All your organs and body systems work like a single entity. Your skin could not function without a functioning heart, brain and nervous system. Your skin needs nutrients from your digestive system to stay healthy and beautiful. Thus, it is obvious that the Maker of the skin is also the One who makes all other organs and body systems.

If we further reflect on the skin, we will realize that the skin is connected to many other things beyond the body. The nutrients for the skin come from animals and plants. The oxygen comes from Photosynthesis. The water comes from oceans and underground reservoirs and involves the Water Cycle. Thus, it is clear that the Maker of the skin is the Maker of the whole world, including all animals and plants. This is because all forms of living beings in the ecosystem rely on other living and non-living beings for food, nutrition, and energy.

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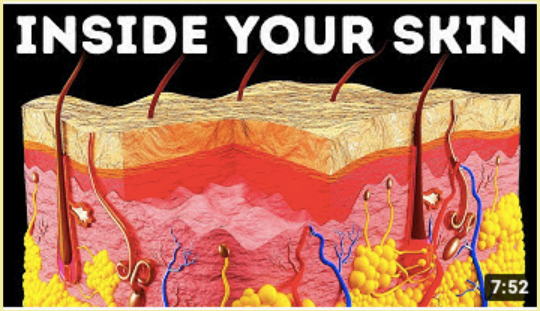

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"He shows His oneness by making every human face unique."

Therefore, the Maker of your skin is the Maker of the entire planet and the Sun. Since the Sun is connected to other stars in our galaxy, the Maker of the skin must be the Maker of our galaxy. Since our galaxy depends on other galaxies, the Maker of the skin must be the Maker of all galaxies. Indeed, the skin depends on the entire universe at the biological, chemical and atomic levels. Thus, the Creator of the skin can only be the one who creates, controls, and sustains the entire universe; He is the one whose power, knowledge and wisdom encompasses all things.

The more we observe our skin and its amazing functions, the more we realize that our Maker is All-Knowing and All-Wise. He knows our need for skin. He knows our need for an organ that keeps harmful organisms and excess moisture at bay. What would happen if our skin were not waterproof? Fluid would seep out of our body, resulting in dehydration and death.

Our Maker reveals His infinite knowledge, wisdom, and power to us through the perfection of the skin. Indeed, He is aware of our need for the cells, tissues and organs that make up our skin. He connects our skin to the other functioning systems of our body. The miracle of the skin covering our bodies cannot be attributed to anything other than the Creator of the universe. He communicates His kindness to us through the granting of such an amazing and vital organ at no charge. He reveals to us that He knows our needs and that He cares and loves us.

He shows us the beauty of His kindness, generosity and love through the beauty and the exceptional functions of our skin. He shows His oneness by making every human face unique. Indeed, only the One who creates and remembers all human faces can make your face different than all the others. He prints the sign of His oneness on the skin of on our fingerprints as well. He gives us each ten fingers with ten unique designs that are different from those of the entire human race since Adam, the first human on earth. In short, our skin is evidence that our Maker is All-Seeing, All-Knowing, All-Powerful, All-Wise, Most-Merciful, Most-Kind, and Most-Beautiful.

Fifth Dimension : Moral Thinking

RESPONDING WITH BETTER CHARACTER

The skin, with its multiple functions, is a truly amazing organ. Scientists do not even completely understand the complex tasks that the skin appears to perform. Here are some fascinating facts worth remembering to help you better appreciate your skin and sense of touch:

1. You lose around 30 to 40 thousand dead skin cells

2. Your skin releases as much as three gallons of sweat to cool you down in hot weather.

3. Your skin is renewed every 28 days.

4. Your skin sometimes gives signals about your health by changing color.

5. The goose bumps you have when it is cold actually help you retain a layer of warm air

6. In blind people, the visual cortex is rewired to respond to stimuli received through touch and hearing, so they literally 'see' through touch and sound.

7. You have a special system for feeling emotional and social touches.

8. You also have a special system that is designed in a way for you to know exactly where pain is in the body. Your skin is packed with millions of specialized nerve endings that are programmed to detect pain. People who can't feel pain don't live long.

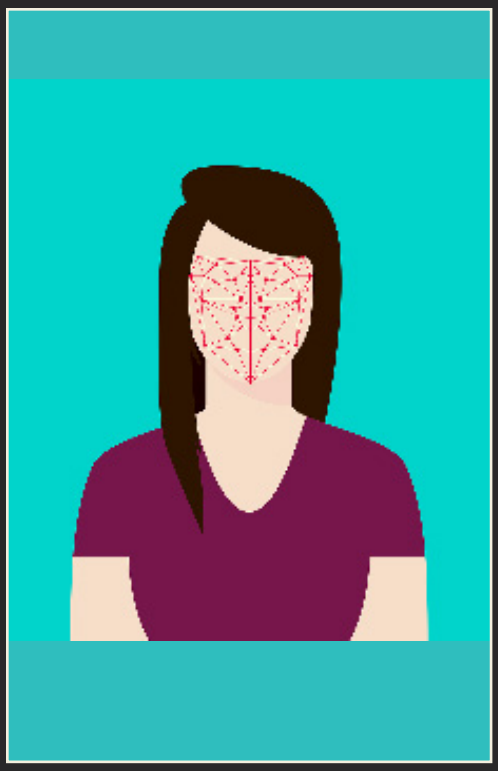
9. Affectionate touch is mysteriously crucial for a baby's development. In fact, babies who are not hugged and touched can die, even if they receive proper nutrition.

THE VALUE OF A FACE

Let us reflect for a moment on the value of our skin. Think about what it means to suddenly lose our skin or sense of touch. Indeed, there are many people around the world who have lost their precious skin to fire. Let us read and reflect on the following touching story:

Carmen Tarleton used to work as a registered nurse.She helped many disfigured patients without knowing that one day she would be one of them. In the summer of 2007, she was the victim of a brutal attack perpetrated by her ex-husband using a baseball and chemicals. She sustained a horrific injury to her face. Her eyelids and left ear were damaged. She was almost completely disfigured and most of her body was burned. She was in a coma for three months and went through 38 surgeries to repair her face. Although she regained her health, her face was beyond recognition. She decided to have a face transplant. However, the surgery cost of 350 thousand dollars was beyond her budget.

Furthermore, she would be required to take medicine for the rest of her life to prevent complications. That was an additional 40 thousand dollars a year. With donations, she was able to sign up for the face transplant. It took 14 months to find a donor. She eventually went through a very long surgery to transplant a new face. It was not an easy job to remove a human face from one person and attach it to the face of another person like a mask. The team of experts had to perform delicate work for hours. They had to reattach muscles, nerves and blood vessels. The highest risk was the reaction of the body to the transplanted tissue. Although she remains disfigured, Tarleton's condition has improved significantly. After the surgery, she expressed her appreciation by saying that she was 'thrilled' with the outcome.



" She helped many disfigured patients without knowing that one day she would be one of them. ? "

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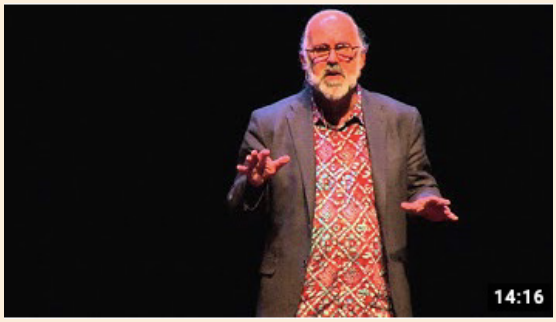

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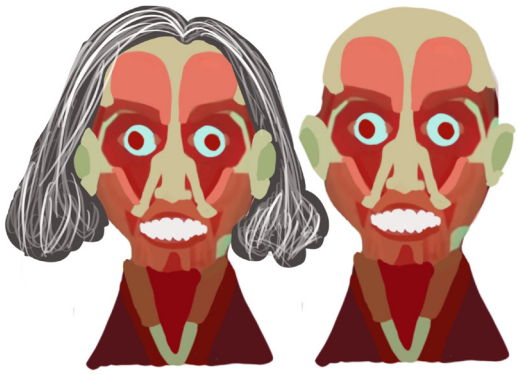
Aren't you thrilled to have healthy skin? If the total cost of a face transplant exceeds millions of dollars, how much do you think it would cost to build the skin of your whole body from scratch? If such a high price is paid to doctors for face transplantation, what price should we pay to the One who creates the skin of our face and entire body? The Maker of our skin continues to renew it and sustain it for us every day. Since we praise the doctors for their great knowledge and ability to perform a face transplant, we should surely appreciate the One who creates our skin, elegantly attaches it to our body and makes them grow together without any pain.

The flawless design of your skin is one of the many signs that point to your Maker's infinite knowledge and flawless creation. The One who created you, has also blessed you with a healthy skin to experience the wonders of the world. Your skin is made especially for you by the Most-Generous and the Most-Merciful. Imagine what life would be like if everyone had exactly the same face? How would you differentiate between your parents and complete strangers? How would you find your parents if you lost them in the crowd? Indeed, life would be miserable without unique identifiers such as our faces and voices. Thus, your skin is not just designed to protect your physical body. It is designed to guard your interpersonal relationships as well.

Shouldn't we be grateful to the Maker of this amazing gift? Should we not praise the Maker of such incredible beauty? Especially when we remember that our skin cells are replaced on a monthly basis! Of course, we should offer our sincere and deep appreciation. But how?

What if we had see-through skin?



We should offer our appreciation through good words and fine deeds. We should remember that He is the One who continues to bless us with healthy skin that functions in marvelous ways. We should be mindful of and thankful for this amazing gift.We should remember that neither our skin nor our body belongs to us. They are given to us as a trust. Therefore, we cannot use them as we wish. We need to use them as per the wish and guidance of their Owner, who knows what is best for us. We should never treat others as inferior to us just because we think we have a better skin color. First of all, the value of a human being is not based on his/her skin color. It is based on his or her very existence as a human being.

Second, we cannot claim to be superior due to our skin color because neither the skin nor its color belongs to us. How can you claim that you are better because of something that you do not own? Furthermore, according to what criteria have you decided that one color is better than the other? This brings us to the third point: if you happen to like your skin color and prefer it to other colors, then be grateful to its Maker but do not belittle the valuable gifts of the Most-Generous and Most-Kind Maker. Remember that perceiving others as inferior due to their skin color is in fact a disapproval of the Maker's choices since they are all His artifacts.

Just as our Maker adorned our bodies with skin to beautify us and shelter our inner tissues and organs from harm, we can beautify our soul and shelter our hearts from all that is harmful in return. For this purpose, we need to wear a strong armor of beautiful character to protect inner selves. For instance, we need to stay away from bad habits that destroy our character and soul. Moreover, let's keep in mind that the One who creates, sustains, and protects our body in such remarkable and meaningful ways would not let it be destroyed forever. He will protect our body and soul from permanent destruction through death. With His infinite mercy and power, He will grant us eternity. Therefore, we need to respond to His generous gifts with good character by expressing our appreciation and gratitude and showing that we are worthy of His eternal blessings.

YOUTUBE CORNER

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TEST YOUR KNOWLEDGE

I.UNDERSTANDING SCIENCE TERMS

Complete the following sentences with a word or words from the Science Terms that will make the sentence correct.

Hypodermis *Dermis* *Epidermis* *Thermoregulation* *Vernix* *Contracture*

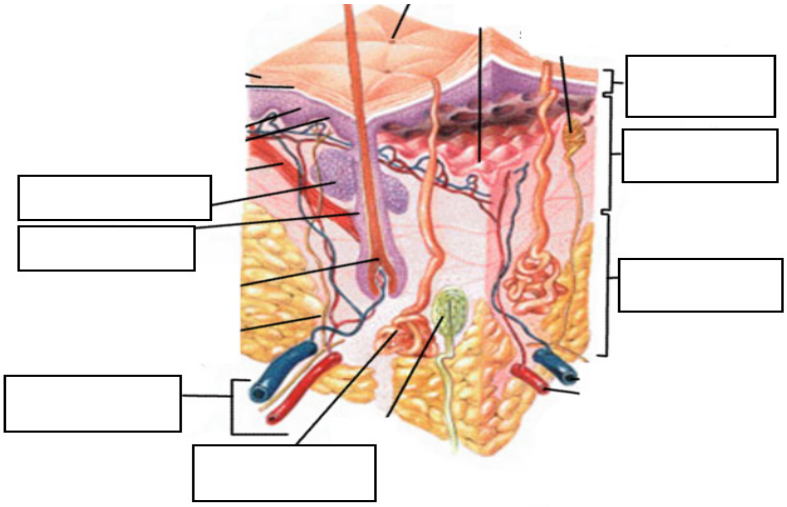
1. _____ is the process of maintaining a constant body temperature.

2. _____ is a simultaneous process that brings the edges of a wound together.

3. The _____ contains hair follicles and sebum-producing glands.

4. The _____ is avascular but the _____ is vascular.

Label the following diagram:



II.CHECKING FACTS

Determine whether each of the following is true or false.

1. The pH of the skin is alkaline._____
2. The skin emerged by chance through the random coming together of atoms and molecules. _____
3. The skin is responsible for the production of Vitamin E._____
4. Your fingertips are the least sensitive parts of your body._____
5. Your skin is like a self-repairing fabric for your body._____

III. UNDERSTANDING CONCEPTS

Write a short answer for each question or statement.

1. What is the intended function of Keratin?

2. What is the intended function of fibroblasts?

3. List two things which make our skin superior to Biobrane™?

4. Can you experience tactile sensations if you have nerve damage? Why or why not?

5. List two things you have learned about the Maker of the skin.

IV. APPLYING CONCEPTS

Write a paragraph to answer each question.

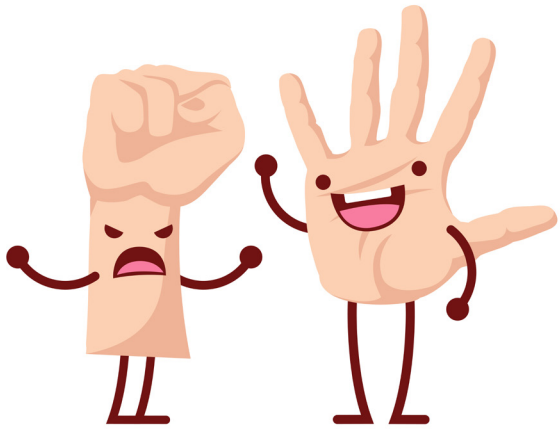
1. How can you reach a conclusion that the properties of your skin is not from its underlying cells, molecules, or atoms?

2. Why do you think our skin is a precious gift? Describe two things which make you appreciate the value of this gift.

3. The One who creates our skin has to be the Creator of the universe. Why?

4. How can you show your gratitude to the One who granted you the gift of skin?

5. Derive two moral lessons from studying human skin.



V. THINK-THANK GAME

In this "think-thank" game, we want you to think about the human skin and give thanks to their Maker. We also call it the "play to praise" game. The goal of this game is to think of at least five things about the skin that you are thankful for.

Number of players:

At least two.

Directions:

Player 1 repeats an appreciation phrase loudly and quickly. Player 2 responds, without pausing, with something to be thankful for. This is repeated five times.

To win:

Player 2 needs to respond five times (without pausing) with different things about the skin to be thankful for in order to win the game.

Here is an example of two rounds of this game:

1. Player 1 repeats the appreciation phrase loudly and quickly. For example: "Thanks to the Maker of the skin."

2. Player 2 responds, without pausing, with something about the tongue to be thankful for. For example: "For making the skin protect our body from heat and cold."

3. Player 1 repeats the appreciation phrase again loudly and quickly. For example: "Thanks to the Maker of the skin!"

4. Player 2 responds, without pausing, with another thing about the eyes to be thankful for. For example: "For making the skin protect our body from germs!"

This should be continued for another three rounds until Player 2 wins or loses.