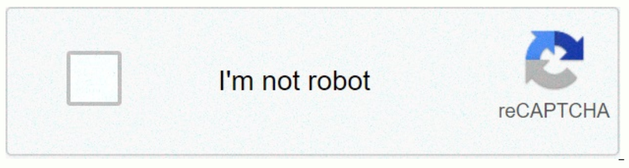

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The biology of skin color answers

Biology skin color: Quiz results 1. Which of these claims about melanin is the most accurate? Melanin is found only in human cells and is not found in other organisms. Human skin cells contain only one type of melanin. The more eemelanin an individual has their own skin cells, the darker their skin. The darker the color of an individual's skin, the more likely ultraviolet (UV) radiation will damage the DNA in their cells. The answers selected: Attempts: 2. Based on the film, which of these claims best describes the pigments in red tomato? Pigments reflect red light and absorb blue and green light. Pigments absorb red light and reflect blue and green light. Pigments will protect DNA in tomato cells from damage caused by uv light. Tomato fruits are of the same type and quantity of pigments as the plant's leaves, trunk, and roots. Selected answers: Attempts: 3. Which of these areas could have the highest amount of UV radiation? area at low altitude, which is usually a cloudy area at high altitude at the equator in an area near the ocean or other large areas of water bodies at the length of the western hemisphere Answers selected: Attempts: 4. Which of the following statements accurately describe changes in human skin color? Select all that applies. The data supports the correlation between UV intensity and skin color variation. Human skin color variations mainly determine the type and amount of melanin present in the skin. Variations in the color of human skin can be quantified or measured. The average indigenous skin color around the world correlates with UV intensity in their environment. Selected answers: Attempts: 5. Darker skin is more common among indigenous peoples living in areas with high UV radiation. Nina Jablonski suggested a hypothesis to explain the selective pressure on darker skin in these environments. Which of these considerations did she base this hypothesis on? Human populations around the world have different versions of the MC1R gene. In general, people with more dark pigmented skin have less folate, nutrients important for human reproduction, circulating in the bloodstream. A higher amount of eifelanin in dark pigmented skin protects circulating folate from the destruction of uv radiation. Melanin in dark pigmented skin protects DNA from UV radiation, which can cause skin cancer. Selected answers: Attempts: 6. Indigenous populations in low UV environments tend to have lighter skin tones. One hypothesis is that, in a low UV environment, selective pressure for dark skin is low. Instead, there is selective pressure for lighter skin that absorbs more UV radiation because UV is required for vitamin D production. Which of these statements best supports this hypothesis? In general, people with lighter skin tend to vitamin D deficiency. Red hair and light skin are the most common people of northern European descent. Indigenous people with darker skin who live at high latitudes have a diet consisting of foods rich in vitamin D. People with lighter skin cannot synthesize enough vitamin D in high UV environments such as Equatorial Africa. Selected answers: Attempts: 7. Rickets, a disease that affects bone development in children, causes vitamin D deficiency. Based on the risk factors discussed in the film, which of these groups of people is at the highest risk of rickets if they do not take vitamin D supplements? Let's say each group spends a lot of time outdoors. adults with dark skin who live close to the equator children with light skin, living close to the equator adults with light skin, living far south of the equator children with dark skin, living far north of the equator Answers selected: Attempts: 8. Skin color for humans is an example of evolutionary compromise: a situation where a trait that has an advantage in one context is a disadvantage in another context. Darkening of the skin protects DNA from damage caused by ultraviolet radiation (an advantage), but makes it difficult for the body to produce vitamin D (deficiency). Based on what you have learned, which of these describe other examples of evolutionary compromises? Select all that applies. Some genetic variations that protect people from malaria, a disease transmitted by mosquitoes, also cause thalassemia of the blood disease. Some garter snakes have mutations that make them resistant to toxins found in their booty, rough skin newts. Snakes with these mutations move more slowly and may not be as good at hunting or avoiding predators. The alle, which caused the body's hair to fall out, made it easier for people to lose heat in a hot environment. This in turn helped people walk and run for longer distances to hunt large animals. The common Mormon butterfly is not toxic to birds and other predators. Some common Mormons have genetic variations that make them like toxic butterflies that disremove predators. In places without predators, common Mormons with these variations do not live as long as other common Mormons. Answers you've chosen: Attempts: Go to the main content support options Find common questions and problems. Check that your correspondence with members of the QUBES team depends on it. Facebook Twitter Pintrest race development was as simple as race politics is complicated by Gina Kirchweger A decade ago, while at the University of Western Australia, anthropologist Nina Jablonski was asked to give a lecture on human skin. As an expert in primate evolution, she decided to discuss the development of skin color, but when she went through literature on the subject she was embarrassed. Some theories advanced before the 1970s used to be racist, and others were less Compelling. White skin, for example, was reported to be more resistant to cold weather, although groups like The Inuit are both dark and particularly resistant to cold. After the 1970s, when researchers were probably more aware of the controversy such studies could kick up, there was very little work at all. It's one of those things all notices, Jablonski says, but no one wants to talk. No more. Jablonski and her husband, George Chaplin, a geographic information systems specialist, have formulated the first comprehensive theory of skin color. Their findings, published in a recent issue of the Journal of Human Evolution, suggest a strong, somewhat predictable correlation between skin color and the strength of sunlight around the world. But they also show a deeper, more amazing process at work: Skin color, they say, is largely a matter of vitamins. Jablonski, now president of the anthropology department of the California Academy of Sciences, begins by assuming that our earliest ancestors had fair skin, like chimpanzees, our closest biological relatives. From 4.5 million to 2 million years ago, early people moved from the rain forest and into the East African savannah. Once on the savannah, they not only had to cope with greater exposure to the sun, but they also had to work harder to collect food. Mammalian brains are particularly vulnerable to overheating: only a change of five or six degrees can cause heat stroke. So our ancestors had to develop a better cooling system. The answer was sweat, which dissi up the heat through evaporation. Early humans probably had little sweat glands like chimpanzees, and they mostly lie on the palms of their hands and the bottoms of their legs. Occasionally, however, individuals are born with more glands than normal. The more they could sweat, the longer they could forage before the heat forced them back into the shade. The more they can forage, the better the chances of having healthy offspring and transfer their sweat glands to future generations. A million years of natural selection later, each person has about 2 million sweat glands spread throughout his or her body. Human skin, which is less hairy than chimpanzee skin, dries much faster, says Adrienne Zihlman, an anthropologist at the University of California at Santa Cruz. Imagine how after a bath it takes much longer for wet hair to dry. Hair skin, however, is particularly vulnerable to sunlight damage. Scientists long assumed that humans developed melanin, a major factor in skin color, to absorb or dissipate ultraviolet light. But what is it about ultraviolet light that melanin protects against? Some researchers pointed to the threat of skin cancer. But cancer usually develops late in life, after the person has already been reproduced. Others pointed out that sun-burned jets would have prevented livestock feeding. But tan is enough to protect the mother against this problem. In preparation for a lecture in Australia, Jablonski found a 1978 study that examined the effects of ultraviolet light on folate, a member of the Vitamin B complex. An hour of intense sunlight, the study showed, is enough to reduce folate levels in half if your skin is light. Jablonski made the next, crucial connection just a few weeks later. At a workshop on embryonic development, she heard that low folate levels are due to nerve tube defects such as spina bifida and anencephaly, in which infants are born without a full brain or spinal cord. Jablonski and Chaplin predicted skin-colored indigenous peoples around the world based on how much ultraviolet light different areas receive. Matt Zang's graphic, adapted from the data of Mr Jablonski and Mr Chaplin Jablonski, later came up with three documented cases where defects in the child's neural tubes were linked to visits to their mothers' tanning studios at the beginning of pregnancy. In addition, she found that folate is very important for sperm development – so much so that the folate inhibitor was developed as a male contraceptive. (It never got anywhere, Jablonski says. It was so effective that it knocked all the folate in the body.) Now she had some intriguing evidence that folate could be a driver of the development of darker skin. But why do some people have light skin? As early as the 1960s, biochemist W. Farnsworth Loomis had suggested that the color of the skin is determined by the body's need for vitamin D. The vitamin helps the body absorb calcium and deposit it in the bones, which is an essential function, especially in fast-growing embryos. (The need for vitamin D during pregnancy may explain why women around the world tend to have lighter skin than men.) Unlike folate, vitamin D depends on ultraviolet light for its production in the body. Loomis believed that people living in the north, where daylight is weakest, developed light skin to help absorb more ultraviolet light, and that people in the tropics developed dark skin to block light, keeping the body from overdose on vitamin D, which can be toxic at high concentrations. By the time Jablonski did her research, Loomis's hypothesis was partially denied. You can never overdose on natural amounts of vitamin D, Jablonski says. There are only rare cases where people take too many cod liver supplements. But Loomis's insight into the fair skin lifted, and is the perfect addition to Jablonski's insight into folate and dark skin. The next step was to find some solid data corathing the skin color light level. By the 1980s, researchers were only able to estimate how much ultraviolet radiation reaches the Earth's surface. But in 1978, NASA launched the Total Ozone Mapping Spectrometer. Three years ago, Jablonski and Chaplin took the spectrometer of the world measurement measurements compared with published data on skin color in indigenous populations from more than 50 countries. Their joy, there was an unmistakable correlation: the weaker the ultraviolet light, the fairer the skin. Jablonski went on to show that people living above 50 degrees latitude have the highest risk of vitamin D deficiency. This was one of the last obstacles in the history of human settlement, Jablonski says. It was only after people learned about fishing, and therefore they had access to vitamin D-rich foods, that they were able to settle in these regions. People have spent most of their history moving around. To do this, they had to adapt their tools, clothes, housing and eating habits to every new climate and landscape. But Jablonski's work indicates that our customizations go much further. People in the tropics have developed dark skin to block the sun and protect their body's folate reserves. People far from the equator have developed fair skin to drink in the sun and produce sufficient amounts of vitamin D during the long winter months. Jablonski hopes that her research will alert people to the importance of vitamin D and folate in their diet. It is already known, for example, that dark-skinned people who move to cloudy climes may develop conditions such as rickets from vitamin D deficiency. More importantly, Jablonski hopes that her work will begin to change the way people think about skin color. We can take a topic that has caused so much controversy, so much suffering, and so many misunderstandings, she says, and completely disarm it. (From Discover, 22nd, February 2001. 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