

Do Redheads Need Less Vitamin D?

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✓ Fact Checked

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STORY AT-A-GLANCE

- › Just 1% to 2% of the global population has red hair, which is caused by a mutation of the melanocortin 1 receptor (MC1R), a gene located on chromosome 16
- › Due to their naturally fair skin and lighter complexion, redheads are able to produce vitamin D more effectively than most people
- › Redheads are at a greater risk for skin cancer even without sun exposure, and are also likely to be more sensitive to temperature changes, pain and painkillers
- › Regardless of whether you possess the MC1R gene, your body needs a certain amount of vitamin D for optimal health, so be sure to check your level, particularly if you live in a northern climate and are experiencing the “winter blues”

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Between 1% to 2%, or just 76 to 152 million people, of the global population has red hair. This unique hair color is caused by a mutation of the melanocortin 1 receptor (MC1R), a gene located on chromosome 16. MC1R is a protein involved in regulating your hair and skin color, as well as eye hue. As a recessive trait, the mutated gene must be inherited from both parents to produce a child with red hair.

Variations in the MC1R gene are responsible for a range of reddish hair color – from “strawberry blond” to brown hair with red hues – and fair skin that may or may not be heavily freckled. Due to the type of melanin their bodies produce, redheads are at a greater risk of developing skin cancer even if they avoid sun exposure.

On the positive side, their pale skin and sensitivity to ultraviolet (UV) light helps redheads produce vitamin D more efficiently than their blonde or brunette counterparts.

The History of Red Hair

While data on the exact distribution of redheads worldwide is unavailable, red hair seems to occur more frequently among northern and western Europeans and their descendants. Jacky Colliss Harvey, author of “A History of the Redhead,” told The Washington Post the MC1R gene originated in Central Asia and “thrives mainly in remote regions and closed communities such as Ireland, Scotland and coastal regions of Scandinavia.”¹

Redhead characteristics, says Harvey, are due to “a mutation in the MC1R gene that fails to produce sun-protective, skin-darkening eumelanin and instead causes pale skin, freckles and red hair.” Indeed, your eye, hair and skin color are determined by a protein called melanin, of which there are two kinds:²

- **Eumelanin** — If you produce mostly eumelanin, you tend to have brown or black hair and dark skin that tans easily. Eumelanin also protects your skin from damage caused by the sun’s UV rays.
- **Pheomelanin** — If you produce mostly pheomelanin, you will likely have blond or red hair, freckles and light-colored skin that tans poorly. Due to the lack of protection from UV radiation afforded by pheomelanin, you will have an increased risk of skin damage caused by sun overexposure.

Professor Jonathan Rees, grant chair of dermatology at Scotland’s University of Edinburgh, and one of a team of scientists to identify the MC1R gene variants in humans,³ suggests Northern European countries are home to a greater proportion of redheads than anywhere else in the world. He believes the biggest concentrations of redheads are found in Ireland and Scotland.

“If you’re in northern Europe, you get used to seeing people with different hair color,” says Rees. “[I]f you just think about Asia, it’s very, very rare to see somebody with red

hair. And in most of Africa, it is exceedingly rare to see somebody with red hair. It is an unusual trait globally."⁴

Redheads May Need Less Vitamin D Than Others

Due to their naturally fair skin, redheads are able to produce vitamin D more effectively than most people.⁵ Even though vitamin D can be obtained naturally through sensible exposure to the sun, modern lifestyles and weather conditions in many parts of the world make it nearly impossible for some to obtain sufficient amounts. Given their genetic predisposition, redheads are able to produce it on their own. Said Harvey:⁶

"As our distant ancestors migrated to settle the cool, gray climes of Northern Europe, redheads had a signal advantage over their darker peers: Their pale skin produced vitamin D more efficiently from the wan sunlight, strengthening their bones and making women more likely to survive pregnancy and childbirth."

The Daily Mail suggests having red hair and pale skin offers an important health advantage to those who possess it:⁷

"Redheads, it would seem, boast a genetic [secret] weapon which enables them to fight off certain debilitating and potentially deadly illnesses more efficiently than blondes or brunettes. A pale complexion permits more sunlight into the skin, where it encourages the production of vitamin D. This helps to prevent rickets, a disease which progressively weakens bone structures, and the lung disease tuberculosis, which can be fatal."

Despite its name, vitamin D is not a regular vitamin. It's actually a steroid hormone obtained primarily from sun exposure. Its ability to influence genetic expression produces many of its wide-ranging health benefits. Vitamin D is so important, research suggests simply increasing vitamin D3 levels in the general population could lower rates of chronic diseases such as depression, diabetes, heart disease, hypertension, obesity and more.

Beyond contributing to strong bones, sufficient amounts of vitamin D can help reduce your risk of several types of cancer. Furthermore, vitamin D strengthens your immune system, which protects you from colds and the flu by helping your body attack and destroy bacteria and viruses.

Sufficient Vitamin D Is Necessary for Optimal Health

Regardless of whether you possess the MC1R gene, your body needs a certain amount of vitamin D to promote and safeguard your health. The **optimal vitamin D level** for general health is in the 40 to 80 nanograms per milliliter (ng/ml) range; 60 to 80 ng/ml appears to be ideal.

While the ideal way to raise your vitamin D is by regularly and sensibly exposing large amounts of your skin to sunshine, that might not be possible where you live. If so, you will want to take an oral vitamin D3 supplement along with vitamin K2 and magnesium, to ensure maximum effectiveness.

You can determine your maintenance dose by measuring your blood level. Ideally, check your vitamin D level twice a year, in winter and summer, when your levels will be at their lowest and highest. As a general guideline, vitamin D experts recommend 4,000 IUs per day for adults, but that applies only if you are already in the therapeutic range. If your levels are low, you may need 8,000 IUs or more per day to start.

Particularly during the winter months, you'll want to keep an eye on your levels. Lack of UV exposure can bring out the "winter blues," leading to feelings of depression. If you notice your mood and energy levels are down, you may not be getting enough vitamin D.

Even if you live in an area receiving year-round sun, you are at risk of missing out on vitamin D from natural sun exposure if you spend most of your time indoors, use topical sunscreens or wear long clothing for religious reasons.

Redheads at Greater Risk for Melanoma

If you possess the MC1R gene, you are at a greater risk of developing melanoma, the deadliest form of skin cancer.⁸ Many have mistakenly assumed the increased risk is related to the fact that fair-skinned people possess the type of melanin that gives them less “natural sunscreen” against the sun’s UV rays. It follows then that the sun would be more damaging to redheads, thereby putting them at increased risk of skin cancer.

The problem with this widely held belief is that melanoma often appears on skin that is not exposed to sun, which suggests there must be another explanation. In fact, research suggests redheads have an increased melanoma risk whether they spend time in the sun or not.

A 2012 study published in the journal *Nature*,⁹ among mice bred to be susceptible to cancer, 50% of those with golden-yellow hair (the “redheads”) developed melanoma within a year based on zero exposure to UV light.

This was a far higher incidence rate than occurred among albino or black mice. Even though the researchers initially thought their lights may have been emitting UV radiation, they realized UV light exposure was not the culprit. Instead, the pheomelanin pigment itself, which they say may contribute to damage from oxidative stress in the skin cells, is what triggers cancer.

With respect to subsequent research, published in *JAMA Dermatology* in 2016,¹⁰ Dr. David Fisher, director of the melanoma program at Massachusetts General Hospital, stated, “It’s been known for several decades that UV chemically excites [MC1R-variant] pheomelanin and triggers release of reactive oxygen species, while the brown-black eumelanin has some capacity to absorb UV and is also very good at quenching antioxidant damage in cells.”¹¹

Sensitivity to Temperature, Pain Are Redhead Characteristics

Redheads are also likely to be more sensitive to temperature changes and pain than those with darker hair and skin. Research^{12,13} conducted at the University of Louisville, in Kentucky, compared the pain tolerance of 30 red-headed volunteers to that of 30

brunettes. The redheads began to feel pain at around 43 degrees F, whereas those with darker hair did not begin to shiver until the temperature dropped near freezing.

The research team believes the MC1R gene may cause a redhead's temperature-detecting response to become overactivated, resulting in them being more sensitive to cold. This study also involved the use of lidocaine, an anesthetic that works to decrease pain by temporarily numbing the area. Its use was shown to be significantly less effective in redheads. The study authors stated:¹⁴

"In summary, redheads are more sensitive to thermal pain than women with dark hair, but do not show differences in baseline electrical pain thresholds. Furthermore, redheads are more resistant to the analgesic effects of subcutaneous lidocaine. These results extend the previous observation that redheads are more resistant to volatile anesthetics.

Mutations of the melanocortin 1 receptor, or as a consequence thereof, therefore seem to modulate pain sensitivity. It remains unclear whether this modulation occurs at a central or peripheral level or both."

If You Possess MC1R You May Need More Anesthetic

Dr. Daniel Sessler, who was previously associated with the University of Louisville and now chairs the department of outcomes research at Cleveland Clinic, suggested the study confirmed anecdotal evidence he'd gathered indicating redheads were more sensitive to certain types of pain. He stated:¹⁵

"After a previous study, we received more than 100 communications from redheads who claimed that anesthesia often failed or that unusually high doses of local anesthetics were required to achieve adequate analgesia. It suggested that the redhead gene may have some role in the pain pathway. That redheads are subject to sunburn and skin cancer must be linked to the difference in pain sensitivity."

Sessler also heard from redheads with respect to dental pain and their anxiety and fear about going to the dentist. As a result, he suggests that if you have red hair and are considering a dental or surgical procedure requiring an anesthetic, you should talk to your doctor about the likelihood that you may be somewhat resistant to anesthetics.

“Because they’re resistant, many redheads have had bad experiences,” Sessler said. “If they go to the dentist or have a cut sutured, they’ll need more local anesthetic than other people.”¹⁶

A study published in the Journal of the American Dental Association¹⁷ involving 144 people, 85 of whom possessed variants of the MC1R gene, found participants with MC1R to be more anxious and fearful, as well as more avoidant, of dental care. The study authors said:

“Participants with MC1R gene variants reported significantly more dental care-related anxiety and fear of dental pain than did participants with no MC1R gene variants. They were more than twice as likely to avoid dental care as were the participants with no MC1R gene variants, even after [we] controlled for general trait anxiety and [gender].”

Other research^{18,19,20} suggests bearers of the MC1R gene are more sensitive to painkillers. Apparently, the same MC1R mutation that is responsible for red hair and fair skin also releases a hormone in the brain that has the ability to mimic endorphins. While endorphins have multiple functions, one of their primary roles relates to providing pain relief.

If you are a redhead, this mimicking ultimately affects how your body receives pain signals from your brain, causing you to have a heightened sensitivity to prescription opioid painkillers. As a result, you may be able to take smaller doses while achieving the same level of pain tolerance as others.²¹

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