

# Mayo Clinic Q&A - Regenerating damaged skin Transcription

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## SUMMARY KEYWORDS

aging, skin, regenerative medicine, cells, vitamin c, senescence, age, mayo clinic, senescent cells, talk, stem cells, genes, technology, reset, regenerate, accumulate, product, mammal, damaged, collagen

## SPEAKERS

Dr. Saranya Wyles, Dr. Halena Gazelka, Narrator

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**N** Narrator 00:00  
Coming up on Mayo Clinic Q&A,

**D** Dr. Saranya Wyles 00:03  
Skin has this natural form to regenerate. It turns over every month, so every 30 days we have new skin. And it's a good thing because if we were to get a wound or a cut, our body knows the signals to try to repair that.

**N** Narrator 00:17  
Even though our skin regenerates, it is subject to damage as we age like age spots, discolored blotches and wrinkles. While some of these effects of aging aren't reversible, some can be treated with a regenerative medicine approach, using therapeutics to restore, replace and repair damaged skin.

**D** Dr. Saranya Wyles 00:35  
So, regenerative medicine is the idea that we can reestablish form and function, and now we're starting to talk about reprogramming and our ability to be able to get ahead, turn back the clocks and maybe fight disease earlier on.

**D** Dr. Halena Gazelka 00:49  
Welcome everyone to Mayo Clinic Q&A. I'm Dr. Halena Gazelka. Regenerative Medicine is an emerging field that looks to repair, replace or restore diseased cells, tissues or organs. One

specialty that's a natural fit for regenerative medicine, is dermatology. Why? Because our skin is the largest organ that regenerates in the body. Joining us to discuss regenerating damaged skin is Dr. Saranya Wyles, a Mayo Clinic dermatologist who specializes in regenerative medicine. Welcome to the program, Saranya.

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Dr. Saranya Wyles 01:24

Thank you, Dr. Gazelka. It's good to be here with you.

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Dr. Halena Gazelka 01:26

I am so excited to talk to you about this because I didn't even know there were dermatologists who specialized in regenerative medicine.

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Dr. Saranya Wyles 01:34

Absolutely. It's a new field, and we're bringing it to reality. So, essentially the skin, as you said, is the largest organ that has that regenerative potential. So, we're excited to see where we can take it.

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Dr. Halena Gazelka 01:47

Can you explain what it means to say that skin regenerates? And can you explain why skin is capable of doing so?

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Dr. Saranya Wyles 01:54

Absolutely. So, let's start with what is the goal of regenerative medicine. So, regenerative medicine is the idea that we can re-establish form and function. So, how we are born, the natural skin that we have, that baby skin, and as we age that sort of shifts and changes over time. So, how do we bring these concepts whether using the regenerative medicine toolkit which includes stem cells, and PRP, or platelet rich plasma, and the new kid on the block is exosomes. So, how do we utilize all of these different regenerative technologies to get that skin to go back to regenerating or restoring that form and function? You asked about how and why the skin can regenerate. So, the skin has this natural form to regenerate, it turns over every month. So, every 30 days, we have new skin. And there are two different populations of stem cells that are actually in our skin. So, one is that it's called epidermal stem cells that's in the top layer of our skin. And then the other one is the bulge stem cells, or it's in the hair follicles. So, that can contribute to both hair regeneration and skin regeneration. So, through these populations, we turn over our skin naturally every month. And it's a good thing because if we were to get a wound or a cut, our body knows the signals to try to repair that.

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Dr. Halena Gazelka 03:13

When you said, you had me at baby skin, I have two little grandsons, and their skin is so soft. I'm going to be your, I'm a happy patient of yours if you can make my skin like that again.

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Dr. Saranya Wyles 03:25

I know, don't they just have the best softer skin.

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Dr. Halena Gazelka 03:28

That's true. So, Saranya what are senescent cells, and are they found in the skin, and where do they tend to accumulate?

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Dr. Saranya Wyles 03:36

Yeah, so before we talk about cellular senescence or senescent cells, let's take a step back the 30,000 foot view, if you will. And that's to look at longevity. So, longevity is the idea that we can live without the consequences that we all witness in our lives from features of aging. It seems inescapable, right? My grandmother, for example, she spent the majority of her last decade fighting age related dementia, so she struggled with poor quality of health or health span. That's how well we live as opposed to lifespan. That's how long we live. So, it's this bringing this idea of longevity into skin aging is where we can talk about senescent cells. So, senescent cells are the cells that accumulate with age. And actually, it actually happens to children as well. So, even babies, right after conception and even preconception, we start to experience how aging can play a role. And they are actually able to clear it. So, you know, when we have senescent accumulation, it's a conserved mechanism. So, if we were to look at different cell cycles, so we have cells that are building blocks of our body, they can proliferate or divide, they can die off, and then they can go under senescence, where it's this sort of irreversible cell state, we call them the zombie cells. So, these cells they can start to accumulate, and when you're younger and you accumulate them, it's actually, you know, it's a cancer evading mechanism. So, it's evolutionarily conserved, a cell gets a mutation, and your body can put it into senescence. So, it stops right there earlier on in its tracks, and the immune system can come and clear it away. But as we age, we start to lose that ability to quickly clear senescence. So, that's when we start to accumulate a lot of the secondary sequela that can come with senescent cells. So, it's sort of thought about as a biomarker for aging.

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Dr. Halena Gazelka 05:33

So, what do senescent cells have to do with things like scarring and wrinkles?

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Dr. Saranya Wyles 05:38

Yeah, so senescent cells they have, they can participate in pathology. So, especially in a lot of disease states, like fibrosis, which is a part of how scarring occurs, we see that senescent cells start to play a role. So, they're not just, you know, taking on the stage becoming the so called zombie cell. But they also are standing there with a message. They start sending signals to

every cell around them. I kind of think of them as a rotten apple. So, you know, have you heard like a rotten apple spoils the cart. So, you know, senescent cells in our body actually hover around 1%. So, there's not a lot of them. But it is enough to spoil the cart. So, the cells that they are next to they will tell fibroblasts, who are making normal healthy collagen, they'll tell them to, you know, stop doing that. So, it's the signals that they're secreting, even though they're a lower population, that can really harm our natural process of collagen regeneration and things like that.

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Dr. Halena Gazelka 06:36

So, tell us a little bit about how regenerative medicine can help turn back the clock on skin conditions.

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Dr. Saranya Wyles 06:42

Yeah, so if we think about nature and how, you know, we actually get two resets in our lifetime. So, we get a true reset of going back, turning back the clock at conception. So when we're first born, and that embryo starts to make different types of cells, we get a reset, and then around 50 cell state cycle, we get another reset. So, that's actually when we start to make progeny, our grandchildren are actually made when we were babies as well. So, those eggs at that time get a reset, too. So beyond that, we start to age, and I actually think aging is a privilege. You know, I don't like the phrase anti-aging. So, it's a good thing that we get to do this. But when we think about turning back the clocks, recently about in 2006-2007, there was a Japanese scientist, Shinya Yamanaka, and he discovered a Nobel Prize winning technology. It's a very elegant experiment, actually. So, he had these different combinations of genes that he started to put together different permutations combinations. And he finally unlocked the four genes that we would take to reset that clock to go back in time again. So, if you were to take a skin fibroblasts, say from your arm, and you added these genes, it would actually turn them back and make it into a pluripotent stem cell. So, it would go from your skin back into a stem cell. So, that was very exciting technology. And now, we're start starting to talk about reprogramming and our ability to be able to get ahead, turn back the clocks and, and maybe fight disease earlier on.

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Dr. Halena Gazelka 08:19

Where can I get some of these genes?

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Dr. Saranya Wyles 08:21

Yeah, so we're working on them in the lab. You know, I mean, if we were to take your biopsy from your skin right now and get some of the fibroblasts, we could make a 20-year-old Dr. Gazelka.

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Dr. Halena Gazelka 08:33

Oh, I'm stepping right on over Saranya, what is skin biopsying, and what time do you have for

Oh, I'm stopping right on over. Saranya, what is skin biohacking, and what tips do you have for that?

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Dr. Saranya Wyles 08:41

Yeah, so the aging science field, discovered that aging is not rigid. You know, just like we talked about reprogramming, we kind of think about aging on this continuum, and there's no going back, but it's actually flexible is pretty malleable. And nature has bent and twisted these controls that we can hack into or utilize to kind of get back into a healthier state. So, for example, let's talk about mammals. So, we can look at the shortest living mammal. It's called the tiny shrew, and it lives less than a year. And then we can look at the longest living mammal which is called the bowhead whale, and it lives up to 200 years. So, that's a 200x fold difference in lifespan, right, within the same mammals. So now, what is the difference and how come these different species are able to hack into these different lengths of life? And if we were to look at that they actually found certain genes that we can knock down and actually extend lifespan. So, nature has built in these control knobs within us and now we're, as longevity leaders and kind of aging scientists, we're looking at how we can hack into that and maybe reduce the insults. You asked about skin biohacking. The major, you know, UV radiation tends to be the number one kind of insult to how we age from an extrinsic cost. So, really making sure you're wearing sunscreen is the best thing that you can do. Actually sun damage can cause these thymidine dimers, or they're basically different types of DNA damage that can go directly into how we're aging, and the aging repair mechanisms get damaged. So, I would say making sure that, you know, if you're not wearing sunscreen, at least making sure you're protected, so you don't get a sunburn, because the sunburn now switches you into the inflammation phase. And so, that is an additional, you know, the chronic inflammation aging that we're talking about. So, those are different ways that we can really reduce our skin aging is to make sure we prevent that UV radiation exposure, and stopping smoking is another one.

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Dr. Halena Gazelka 10:54

Saranya, what are the latest trends in utilizing longevity science for our skin health?

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Dr. Saranya Wyles 11:00

Yeah, so skin health and skin health span is now really coming to the forefront. So, we're talking about not only understanding chronological age, so I think that idea of chronological age is going to fade into history. We're going to now be talking about molecular aging. So, how do we all age at different root causes of aging? So, for instance, we talked about cellular senescence being a biomarker for aging. There's different ways our mitochondria get damaged, our telomeres get shortened. So, those are the different ways, or the hallmarks of aging. So, the root causes. So, instead of, you know, doing different treatments like Botox and fillers and other anti-aging, if you will, treatments, it's now going to be about biostimulation. So, how do we target root causes and kind of reset our molecular aging clock so, we kind of go back to why we're aging and slow that down at an earlier standpoint. So, in terms of the latest trends, you know, the regenerative medicine toolkit offers some really exciting technology. The newest kid on the block is exosomes. So, these are topical exosomes, they can come from different sources, so they can come from mesenchymal stem cells, or cells that are naturally in our body. They can come from platelets, and we're actually doing a study here at the Center for

Aesthetic Medicine and Surgery using platelet derived exosomes, it's actually Mayo Clinic technology. And we are actually very excited to share some of these results. So, we just had our first publication, and so I think it's these new technologies within regenerative medicine that are going to look directly playing against that root cause of aging.

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Dr. Halena Gazelka 12:53

Fascinating. You mentioned a couple of things that would help maintain healthy skin not smoking, wearing sunscreen, are there other tips that you have for maintaining healthy skin? And is there anything that can be done at this point that is not just research to repair damaged skin?

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Dr. Saranya Wyles 13:11

Yeah, so I think, you know, antioxidant. So, how the skin age is through different oxidative stressors. So, the way we can directly combat that is by antioxidant properties. So, Vitamin C Serum is a commonly used serum that actually targets superoxide dismutase, these different enzymes that attack and accumulate with oxidative stress. So, if we reduce that with vitamin C, which actually plays two roles in the skin, so not only is it helpful for antioxidant activity, it also is a cofactor during collagen synthesis, so it helps build and make new collagen in our skin. So, I always recommend to my patients to wear a vitamin C serum in the mornings. And then at night, you can certainly do something like a retinol or retinoid to see, that's again to help boost your collagen turnover. So, those are different ways that you can start to build on that healthy skin. earlier on. You know, we've heard of the concept of rejuvenation or regenerating or rejuvenating your skin. The new idea is actually the idea of prejuvenation. So, it's starting early, starting in your 20's. Starting in your 30's, even before that if you can, and making sure you're kind of investing in a good sunscreen that you wear every day, investing in a good moisturizer so you keep that barrier intact, in a good vitamin C serum. And then now these new products like exosomes are coming through the forefront so we can see at what point would it be beneficial to start utilizing that at an earlier stage. So, it's an exciting time.

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Dr. Halena Gazelka 14:53

One of the questions I always have Saranya, you look at this myriad of products when you go into one of the larger, you know, drugstores, makeup stores, etc. And how do you really know whether you're getting a good vitamin C product?

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Dr. Saranya Wyles 15:09

That's a fantastic question. I think with vitamin C, you really want to keep in mind that it can expire. So, it's actually, it can oxidize. So, if you've looked at the vitamin C bottles, they actually come in a dark container. And that's because with exposure to air, they can actually turn color and, and kind of turn into a non-usable product. So, with vitamin C, their lifespan is really between four to six weeks. So, you really want to make sure you get a product that is within it and replace the product frequently. Some of them depending on the container may say a little bit longer, but my advice would always be able to get a smaller quantity and replace

it frequently. And then also, you know, their prices vary significantly. So, really, you know, targeting that 15-20%, ascorbic acid type of vitamin C, that's really your goal range. So, once you're there, you know, the more important thing would actually be to replace the vitamin C frequently than to go for the higher end product.

**D** Dr. Halena Gazelka 16:12

That's very good to know. This has been a fascinating conversation, Saranya. We have covered zombie cells, 200-year-old whales, molecular aging, and now vitamin C. Thank you for being here.

**D** Dr. Saranya Wyles 16:24

Thank you for having me. It was a pleasure to be here.

**D** Dr. Halena Gazelka 16:27

Saranya, do you have any last thoughts you want to share with our listeners?

**D** Dr. Saranya Wyles 16:31

Yeah, I think that this is a very exciting time in science and medicine. You know, this is a convergence of longevity and aging science and regenerative medicine. There's a lot of hype out there, too at the same time. You know, you'll be hearing about stem cells and a lot of promise that comes around with it. So, I would just advise you to really ask about the research that's being done and really know the science and then decide on a product that would be best fitting for you. So, at Mayo Clinic, you know, we have Mayo Clinic technology, and we are making sure that we validate all of these studies well before we deploy them out. So, you know, looking for good science is a very important thing in a world where we're faced especially in the cosmeceuticals and beauty industry there's a lot out there. So, just make sure you ask the right questions.

**D** Dr. Halena Gazelka 17:23

Excellent advice. Thank you, Saranya.

**D** Dr. Saranya Wyles 17:25

Thank you.

**D** Dr. Halena Gazelka 17:27

Our thanks to Dr. Surendra Wyles, Mayo Clinic dermatologist and regenerative medicine

specialist for being here today to talk to us about how regenerative medicine can affect skincare and skin health. What a fascinating topic. I hope that you learned something. I know that I did. And we wish each of you a very wonderful day.

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**Narrator 17:48**

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