INTERVIEW TRANSCRIPT

DISCUSSIONS WITH WORLD-LEADING EXPERTS

A Migraine Survival Guide to Weather & Climate Changes

Shivang Joshi, MD, MPH, RPh
Director of Headache Medicine & Clinical Research,
Community Neuroscience Services
Assistant Professor of Neurology
UMass School of Medicine, Massachusetts

Introduction (00:04): Every year for the Migraine World Summit, we ask our viewers exactly what they want to hear about. And one of the top-rated topics every single year is weather. And with weather, it's very frustrating. It feels very out of our control. And even with ongoing research, we still feel like we're a little bit out of options. Some days we're a walking human barometer. Some days we're hiding from light. And then the seasons change, and somehow everything is worse — yet again.

Introduction (cont.) (00:32): Today we have Dr. Shivang Joshi, who is both a neurologist and a pharmacist. And with this unique perspective, he'll teach us exactly how we can cope with weather triggers, especially with climate change making all of these triggers even worse. Dr. Joshi, welcome back to the Migraine World Summit.

Dr. Joshi (00:48): It's truly a pleasure and an honor to be here — especially for this very important topic, which affects everybody, and it affects everybody throughout the world.

Kellie Pokrifka (00:57): So let's start at the beginning. What are some of the most common weather triggers, and what are some of the most unexpected ones? And we're going to go over this pretty quickly.

Dr. Joshi (01:06): Sure. I think when we think about weather, there are multiple aspects to weather changes. It may depend on what part of the world you're in or longitude and latitude. But generally we think about barometric pressure changes. We think about humidity. We think about temperature changes and shifts. We think about sunlight, storms, wind. So there are multiple factors to weather.

Dr. Joshi (01:30): And what I'd like to do today is talk about preventive strategies, which involve tracking in anticipation of changes; maintenance strategies involving lifestyle changes; and also adjusting the environment.

Dr. Joshi (01:45): We'll take a look at coping strategies that are not pharmacological — and then also look at some coping strategies or treatment strategies that involve acute pharmacological treatment, preventive pharmacological treatment — and there may be also mention of nonpharmacological treatment options as well. I do want to put a disclosure that some of the things I might discuss today may not be evidence-based due to the limitations of the studies available. So, especially if I recommend a pharmacological medication, you should discuss with your healthcare provider before initiating any therapy that may be suggested today.

Kellie Pokrifka (02:23): Exactly. Going off of that, I want to make it clear that while we may be saying that some of these strategies are likely placebo, that doesn't mean that you are foolish for believing in them and trusting them. If something is working for you and it's safe, keep doing it. There's no reason to not do it.

Dr. Joshi (02:40): I 100% agree. And part of that could be because studying triggers for migraine is always very difficult to study, and part of that has to do with so much variability. An example of that is let's say if dehydration is a trigger for you — and let's say one day you were dehydrated but it didn't trigger a migraine. But it might be the confluence of multiple triggers: You were dehydrated, you skipped a meal, and there's a storm coming in. It kind of comes together.

Dr. Joshi (03:12): So I think there's a lot of variability in triggers. That's why it's hard to study it. So you might not find good studies that look at strong evidence, but if you find a strategy that works for you, we want you to do that as long as it's not doing any harm. And then certainly there are pharmacological strategies that are kind of like tricks that we use in headache medicine treatment. So I'll recommend those as well.

Kellie Pokrifka (03:37): So a lot of people in our audience are asking: Are weather-triggered migraine attacks more likely to be more difficult to treat? So we know that early morning migraine attacks, menstrual migraine attacks — there's a lot of research saying that they're more difficult to treat. Do you feel that's the same for weather?

Dr. Joshi (03:55): I would have to agree, especially because there's a sense of lack of control and there's a sense of [an] unpredictable nature of some of these headaches. But hopefully today we can empower you to have a little bit more control over those. But I agree, it may be more difficult because of circumstances that may be not under your control all the time. But I think with preparation, you might have an upper edge.

Kellie Pokrifka (04:22): All right. One of our viewers, Ned, he asked: If we know a weather event that tends to be a huge trigger for us is approaching, should we treat preventatively?

Dr. Joshi (04:34): I think there are several different strategies. And then you can treat preventatively as well. So I think knowing ahead of time … There are a couple of strategies that you can do to know ahead of time. For example, if you do a search for AccuWeather — if you go online and type in your ZIP code, you might find a section where it has a migraine index. Just like there's a pollen index, there's a migraine index, there's a smog index.

Dr. Joshi (05:01): Some of these weather apps may have an index, and it'll tell you if the index is high or low. And generally, if it's high, that means the barometric pressure is dropping. And so what that tells you is that if you can anticipate a storm, you may want to take the necessary measures. And they include several of the coping strategies which I'll recommend, as well as keeping some of the medications close by. So if you're better prepared, you have a better way of tackling it.

Kellie Pokrifka (05:29): What are some preventative ways to treat weather-triggered migraine attacks?

Dr. Joshi (05:33): So a simple way of being ahead of the game is tracking it. There are some apps that give you an alert, but if you don't want to do that, you can log into AccuWeather online, and it'll tell you. So that's one way. The other part of it is looking at the humidity. Humidity factors can affect your weather-related headaches as well. Temperature shifts can affect your migraines as well, as well as the presence of direct sunlight.

Dr. Joshi (06:06): Also, storms by themselves have multiple different effects including rain — and in fact, storms will affect many different things including temperature, humidity, and barometric drops. So there are different ways to cope with those. For example, with humidity, in the wintertime, you might want to consider getting a humidifier for indoors. For summertime, you might want to consider getting a dehumidifier.

Dr. Joshi (06:36): And classically, I know the audience is going to really respond well to this: This is a big-time trigger when they shift from an air-conditioned room to going outside, or vice versa. I have a countless number of patients that say, “This always happens when I go from hot to cold or cold to heat.” So those rapid shifts in temperature can be a trigger. So my recommendation is to gradually try to do that, and there are multiple mechanisms that are involved there.

Dr. Joshi (07:05): I'm not going to go into detail, but a lot of it involves muscle tension changes — constriction and then dilation of blood vessels. If you think about one of those unique headaches called ice cream headache where you get a brain freeze — what happens is at the roof of the mouth, you have a lot of blood vessels and nerves, and you get this vasoconstriction followed by dilation and it can create an intense headache.

Dr. Joshi (07:31): So that's kind of a good analogy, but we always hear this all the time: "I shift from an air-conditioned room going outside to my car that's hot and humid." It's that sudden shift that can trigger that. So a gradual shift, if there's a way to do it, would be a good recommendation for that.

Dr. Joshi (07:49): When we think about this from a different scenario in terms of migraine — for example, if you're a diabetic and your sugar fluctuates, or if you have a thyroid condition that's not controlled and your thyroid level fluctuates — anything that disturbs the homeostasis or the balance of the body can cause migraines for some people that are predisposed or sensitive to it. So that's what's happening here.

Dr. Joshi (08:10): The brain doesn't like change when you have sudden shifts that are probably causing homeostasis changes in your body. And so because of that, my other recommendations are other coping strategies like: Maintaining adequate hydration, that's important; you want to have a stable routine, whether it's breakfast, lunch, dinner, or a snack in between; caffeine amount should also remain the same. I don't like to remove caffeine; I think if you like your coffee, one or two is probably OK, unless it's a specific trigger for you. But if you go beyond, like if you're having a pot per day, it might dehydrate you.

Dr. Joshi (08:49): So that's dehydration as a factor. So those are some strategies where you can try to maintain some stability by hydrating well and keeping a stable lifestyle. And the other part of this is stress also, but what does stress do to your body? So if you're stressed out about something, it may affect your sleep pattern; it may affect your dietary habits or your hydration habits. So again, the brain doesn't like change. As much as you can try to keep everything stable, you'll have an upper hand.

Kellie Pokrifka (09:23): So also with prevention, I have heard of a recent study where heat-triggered migraine can be undone by — or the connection between heat changes and migraine can sort of be disappeared almost — by certain CGRP drugs. Is that true?

Dr. Joshi (09:45): Yeah. So there was a very interesting study that pointed out that for every 10 degrees increase in Fahrenheit, there was a 6% increased chance of getting a temperature-related increase in headache. So I think if we think about a mechanism — I don't want to talk too much about mechanism here — but heat causes dilation and has been associated with some CGRP release.

Dr. Joshi (10:12): CGRP stands for calcitonin gene-related peptide, and that's involved in migraine pathophysiology. So we think that what happens is that when you increase CGRP as a result of temperature shifts, this may contribute to some of the headache symptoms. But I think it's a limited study. It needs to be reproduced. You have to have a large population, but that doesn't mean you shouldn't try it. Certainly, CGRP medications are beneficial for most migraine patients in treating their migraines. So I think it's OK to try, certainly.

Kellie Pokrifka (10:57): Are there any other medications that can cause us to be more prone to overheating — whether that's for migraine or some of the more common comorbidities within our population?

Dr. Joshi (11:05): Yeah, sure. And I just want to point out again with the CGRP that this might be most likely a class effect. I mean, further studies would be really helpful. So anything that dampens your brain response to change or increases the threshold for activation of a migraine generally is going to be good for you. And so as far as the mechanism of migraine, we know that there are nerves and blood vessel systems; we call it the trigeminovascular system is activated. And if there are things that we can do — whether it's medications or other ways, where we can dampen the response — that's going to be more beneficial.

Dr. Joshi (11:44): When I think about overheating, I also think about the summertime where we're most dehydrated. So a lot of those scenarios when you're dehydrated, you're at risk of developing heat shock. So that's very important as well.

Dr. Joshi (11:57): So any medications that are anticholinergic that might dry you out — for example, tricyclic antidepressants — or medications that may have diuretic effects when you use them for a longer period of time, or medications that require you to hydrate well on them because they deplete your body of potassium or electrolytes, can certainly [make you] prone to dehydration.

Dr. Joshi (12:21): Now I should mention that there are other medications and other conditions, as you mentioned. For example, the latest trend is using GLP-1 medications. These are medications used for weight loss and diabetes. But they are sometimes associated in the initial stages of metabolic changes, including dehydration. So if you are on some of those medications — which certainly obesity is a comorbid condition with migraine — it can [make you] prone to dehydration. And some of those headaches that occur on those medications are not really related directly to the medications themselves, but they are related to the metabolic effects of the dehydration that occurs as a result of that.

Kellie Pokrifka (13:01): We've talked a lot about different coping strategies, but how do we use pharmacological options to try to prevent or deal with weather-triggered migraine attacks?

Dr. Joshi (13:12): Sometimes no matter what you do — if you hydrate well, if you predict it enough, you've got a humidifier — and it's not working for you … So what's next? And I think I want to break this down in three different ways. One is, what do you do when you have a scenario? What medications can you take? What medications can you take for acute prevention? And what medications can you take for maybe long-term prevention? And then I'll talk about other options, too.

Dr. Joshi (13:44): So for example, there are similarities between people who have headaches when they are flying — so flying-induced headaches — and a majority of those times, those headaches occur when you land. So when the plane is landing — I'm sure all of us, if some of us have kids, and when the plane is landing — the ears don't have the eustachian balance. They're not able to maintain the balance between the ear structures because of the lack of formation of the eustachian tubes. And you hear them crying. You're like, "Why are these kids crying?" So typically, most of the migraine headaches or headaches in general occur during the landing phase.

Dr. Joshi (14:24): So what I recommend to some of my patients that are very sensitive to that — again, this is more of a stylistic approach; there are limited evidence-based data on this, but it may or may not work for you — but it's not much different than treating your acute migraine, but it's what we call a mini-prevention. What you can do is take maybe a longer-acting medication before you fly. Let's say you have a six- or eight-hour flight. What I've recommended is taking an acute gepant medication, whichever one you're on, before you fly. And then two hours or an hour before you land, I've recommended taking an anti-inflammatory medication — whether it's like an ibuprofen liquid gel or naproxen sodium. Then you may continue those for a few days and then reverse that on the flight back. So that's one strategy that works for airplane-related [headaches].

Dr. Joshi (15:19): So needless to say, you can try the same strategy for when you've used your weather app to track that the barometric pressure is changing. You can certainly try taking a medication that has a longer duration of action, whether it's a gepant — or there are some longer-acting triptans that you can use as well. So naratriptan is a longer-acting triptan. And then you could also pair it with longer-acting anti-inflammatory medicines. So if you know that — if you have an immediate headache, the anti-inflammatory medicines like ibuprofen that come in a liquid gel may tend to work a little bit faster.

Dr. Joshi (15:58): But if you want to get a little bit ahead of the game, naproxen tends to be a little bit more longer-acting. But there is another one that's even longer-acting, approximately 12 hours or plus, which is called nabumetone. It is a generic medication, so it's not branded. So you can certainly use that ahead of time. And you can do it for a few days in a row, pre- and post-weather change. So that's something you can use as well.

Dr. Joshi (16:24): So I've mentioned anti-inflammatory medications. I've mentioned triptans. So certainly there are longer-acting and short-acting triptans. The short-acting triptans may work better — or the fast-acting triptans may work better — when you actually get an attack. And certainly you may take your gepant medication as well. So there are no strong contraindications with using them together. Sometimes I will use them together in some of my patients.

Dr. Joshi (16:59): Now, if you want to be on preventative medication, if you take a look at just the migraine medications, certainly there may be some role for CGRP preventative medications. And the CGRP preventative medications come in many different forms. There's the oral tablet that's available, which is atogepant, which is a daily pill. There are three different injectable medications available, and there's one infusion medication [eptinezumab (Vyepti)] that's available as well. So those are the CGRP preventative class of medications. There's also a gepant that's indicated for acute treatment as well as prevention. So those are the migraine treatments for prevention.

Dr. Joshi (17:43): Now, there are out-of-the-box treatments also. So when we think about some of the things that are out-of-the-box, the first one I'm going to mention is acetazolamide, OK? So acetazolamide is a diuretic medication. It's used mainly for patients who have increased intracranial pressure, or the older term is pseudotumor cerebri. So it brings the pressure down in the brain by affecting what happens with your cerebrospinal fluid.

Dr. Joshi (18:15): Now, another place where acetazolamide is commonly used is high-altitude sickness. So if you're going up a mountain, you might be prescribed acetazolamide. The dose recommendation is anywhere from 125 to 250 milligrams, taken twice a day. Generally, you start it maybe a day before, and you continue it a couple of days after. So I have recommended this strategy for some of my patients that are very sensitive to barometric pressure changes. I'll have them, if they can identify that it's coming, take one or two doses around that time.

Dr. Joshi (18:50): Now, certainly by taking it intermittently, you prevent some of the potential side effects. So again, you do want to discuss all your medications with your healthcare provider. Make sure there are no adverse reactions that you may specifically experience. But it might cause some tingling and numbness in your hands and feet. That's why hydration is very important on the acetazolamide.

Kellie Pokrifka (19:12): How many days in advance would you suggest taking that if you see a really bad weather event?

Dr. Joshi (19:17): I think one or two days is reasonable enough. I do have some patients that are on it more than that because barometric pressure is such a big trigger for them. And depending on what region you live in — if you're in Seattle, you have more rainy days. So if you do have to take it more frequently, you have to think about some of the potential effects. You might lose some potassium when you're on the acetazolamide. So you want to make sure you hydrate well with electrolytes and things like that.

Dr. Joshi (19:53): And another medication that is used sometimes — it's not as commonly used as acetazolamide — is spironolactone. So spironolactone is a potassium-sparing diuretic. It blocks aldosterone, so that's what it does pharmacologically. And what it's involved in is fluid and electrolyte shifts in the body. So again, when you have less shift, less change — remember, the brain doesn't like change.

Dr. Joshi (20:27): The other thing that it also maintains is hormonal levels. So secondary uses of it include its estrogen-like effects, so it has an anti-androgenic benefit. So sometimes it's used in patients who have polycystic ovary syndrome [PCOS]. And it does tend to maintain the hormonal levels. But because of its effect on fluid shifts, it also may have a potential benefit for weather-related migraines.

Dr. Joshi (20:57): Because of its effects on hormonal balance, it may also have some benefit on weather-related triggers. So now someone's probably thinking, "Wait, what do my hormones have to do with weather changes?" Remember, we talked about some of the difficult-to-treat migraine headaches are around the menstrual cycle as well as weather changes. I think that again, when you have hormonal changes, any fluctuations in the body — the more change you have in the body, it's going to predispose you to weather-related effects.

Kellie Pokrifka (21:31): What about using steroids for facial pressure when you're feeling all the barometric changes?

Dr. Joshi (21:39): So what steroids do is they help with nasal congestion. So certainly if you're prone to allergies and if the weather-related changes cause nasal congestion — if you have a history of migraine, nasal congestion can be a trigger for migraine patients just because there are some nerves that are involved there. So it wouldn't hurt. I don't think that it would necessarily prevent a weather-related outcome from occurring. Again, there are really not too many studies.

Dr. Joshi (22:13): I don't specifically think that it would stop a migraine. But certainly if congestion is part of your weather-related experience, a nasal steroid when taken ahead of time might work as a preventative for nasal congestion. I don't think it'll work to get rid of your congestion very quickly, like acutely. And I don't encourage getting something like a nasal vasoconstrictor medicine because that causes rebound constriction in the nose area.

Kellie Pokrifka (22:46): That's great to hear. Also, if we have just sinus symptoms in general as a part of our migraine attack, regardless of barometric pressure, will any of these sinus-related medications help at all? Again, when you said taking it preventatively, or is it sort of a wash for that?

Dr. Joshi (23:06): I certainly think that there's a lot of confusion amongst patients regarding sinus headaches and migraines. There are some patients who get diagnosed with sinus headaches when they really are migraines. There's a lot of data to suggest that in fact some of the sinus headaches are actually migraines. So my first recommendation to you would be to treat it as if it's a migraine. You can certainly have migraines and sinus-related effects as well.

Dr. Joshi (23:35): In terms of nonpharmacological options, again, I think there are some patients who may benefit from some of these devices. There are multiple devices, and I don't think that it would hurt. I think the devices — what they do is, again, when we talk about the brain being excitable, I think what a lot of these devices do is they stabilize the trigeminal nervous system excitability or the trigeminovascular system excitability. So I would suggest it doesn't do any harm. So you can certainly try doing it beforehand or during as well.

Dr. Joshi (24:15): Now, other invasive things like a sphenopalatine ganglion [SPG] block — I don't necessarily think that that would be the first thing to go to because it's more invasive. And certainly there are other things that you can try before doing an invasive procedure. And the SPG block generally is used for migraine attacks themselves. Whether or not it has any benefit for barometric [pressure] or weather, I think we still don't have enough data. So I would think [the] less invasive, the better.

Kellie Pokrifka (24:48): And for anyone watching who has had nerve blocks but has not had the SPG block, it is a little weird. It's a little uncomfortable. It's not a needle, but something goes pretty far up

your nose and it feels like you dove into a pool without going *[gestures towards nose]*. But yes, a lot of people get some pressure relief from it. But it's just another option.

Dr. Joshi (25:14): If it works for you in terms of your migraines, anything that works for your migraines has a chance of helping you for weather-related headaches. Because again, what's working for the migraines is working on the mechanism of the trigeminovascular system or other pathophysiology of migraines. So if it works for you, that's fine. But if you want to try something and you haven't tried it, the SPG block wouldn't be the first thing to go to.

Kellie Pokrifka (25:41): Are there any other medication options for any type of weather triggers that you would recommend — whether it's wildfire smoke or sunlight and light sensitivity in general?

Dr. Joshi (25:51): I think in terms of medications, certainly we migrate towards medications that treat migraine. But in terms of out-of-the-box therapies, probably the acetazolamide, the spironolactone. Topiramate is similar to acetazolamide in one aspect in terms of it also has a mechanism of decreasing the pressure in the head. It shares one similar mechanism to acetazolamide, but it also has other mechanisms that treat migraines. So you might get a dual effect being on topiramate.

Dr. Joshi (26:27): Remember, hydration is very important. And if you're on both of those medications, there's a risk of metabolic acidosis. So that's another pharmacological option. But you may encounter patients that are already on topiramate and they still have a barometric trigger. Then you can think about some of these other acute medicines that I mentioned.

Kellie Pokrifka (26:47): A lot of us have so much trouble with seasonal changes. Can you go through a little bit of why that is and what we can actually do about it?

Dr. Joshi (26:55): I agree, and I'm one of those myself. So I think when we think about peaks of when migraines occur, they occur during fall and spring. And so what happens during those times? We think about ragweed being high during the fall season. Also the temperature is shifting. Also the heat is turning on. So if you just turned on the heat, maybe the vents need cleaning. Or once you turn on the heat, all of a sudden everything is dry and you get nosebleeds. And it all comes together. So humidity changes.

Dr. Joshi (27:29): But ragweed, and in terms of allergens in general — for example, pollen in the springtime will trigger histamine in your body. And so this is how things are related. We have these cells in the body called mast cells. They're just kind of floating around. When you have something that triggers them to release its contents — for example, an allergen such as ragweed or pollen — these mast cells degranulate. And when they burst, they release a lot of different things. So one of them is histamine. The other is actually CGRP. Mast cells do contain CGRP and other inflammatory cytokines. Cytokines are inflammatory mediators.

Dr. Joshi (28:14): So one of the recommendations that I give during fall and spring is to just take an antihistamine. And there are various different antihistamines. The next question I might get is: Which one do I use? My personal preference is cetirizine [Zyrtec]. And I do like that because it does work well. It is a little bit more sedating than loratadine [Claritin]. So someone may have a preference for something less sedating. But cetirizine has a unique mechanism where it works in the early phase of an allergic reaction as well as a late phase of an allergic reaction that occurs 11 hours later. I'm not going to go into the specific mechanism that involves the eosinophils.

Dr. Joshi (28:57): And then there are certainly nasal sprays you can do, like even nasal steroids that prevent the allergic response. I think cetirizine works for allergic responses; so does loratadine; so does fexofenadine [Allegra] So there are multiple different options.

Dr. Joshi (29:14): I should caution you that if you have hypertension, you want to make sure you avoid anything that has pseudoephedrine [Sudafed] or phenylephrine [Sudafed PE]. These things might raise your blood pressure. So anything with a "-D" [decongestant] generally has a vasoconstrictor associated with it. So I would recommend avoiding that.

Dr. Joshi (29:36): Another natural thing, since we talk about natural things — is, some people suggest there's a benefit, some people don't but there's really no significant harm — is find your local beehive, and some local honey may be beneficial for allergies.

Kellie Pokrifka (29:54): All right, we have a community question from April, and she is very highly triggered by wildfire smoke — to the fact that even campfire smoke will trigger attacks for her. And especially with climate change making this more and more prevalent, how do we deal with that?

Dr. Joshi (30:09): That's a very important question. Certainly, whether it's campfire or wildfire smoke — or even I should caution you during the winter season, if you have heating in the house that's by wood or something else — to make sure you have a carbon monoxide sensor. It's a hidden cause of headaches and it's silent and may be severe and life-threatening.

Dr. Joshi (30:33): Along the same lines, when you have a campfire, you're still being exposed to carbon monoxide to a certain extent, less so because it's open. But what all this does is affects your oxygen levels to a certain extent, especially if you're asthmatic and you have something called bronchoconstriction or your airways are affected; you're not able to get good oxygenation. And certainly that can affect, again, your homeostasis of the body and be a trigger.

Dr. Joshi (31:04): You may also have the smoke or particles in the smoke act as an allergen for you. So treatment again will be avoidance or a mask — or if you're asthmatic, to make sure you take the appropriate acute treatments for asthma as well as the preventative treatments for asthma, too.

Kellie Pokrifka (31:25): We talked a lot about pressure, and I've heard in our community that wearing different compression garments — whether they're flying or perhaps even during bad barometric pressure days — have helped. Do you feel like this is placebo or threshold theory, or do you feel like it could actually work for us?

Dr. Joshi (31:44): That's a good question. I think when I hear about compression stockings during travel, I think of scenarios where if you're more prone to developing clots in your legs, in your venous system, that this would help prevent something like that. I don't know of a specific mechanism that may prevent barometric-related headaches by wearing compression stockings or other compression things around the body. So I would urge a little more caution into something like that. And certainly there's not enough evidence to suggest that could be something that you would use on a regular basis.

Kellie Pokrifka (32:23): What are some coping hacks we can use for really dry air?

Dr. Joshi (32:27): Yeah, dry air happens a lot, especially if you're in Arizona. I know we have headache meetings in Arizona, and the first thing I notice is my lips get chapped and I'm putting ChapStick on my lips every two hours. I think that's tough. You can start with hydration. But remember, hydration doesn't just mean drinking a lot of water. In fact, too much water can cause dehydration because you're affecting the electrolyte to the water balance in your system.

Dr. Joshi (32:54): So what I would recommend is hydrating with something with electrolytes in it, such as sodium or potassium. Certainly there are a lot of hydration drinks available. You want to make sure you avoid the ones that are high in sugar or artificial sweeteners or artificial dyes because while you're thinking you're trying to help yourself, you're also being counterproductive by hydrating with stuff that might be a trigger for you. So hydrating with other things, electrolytes as well, may be beneficial.

Kellie Pokrifka (33:27): With a few of the medication types we've talked about, you've really discussed fast-acting versus long-acting. Are they completely separate, or are there a few that do both?

Dr. Joshi (33:41): I think a few do both. For example, anti-inflammatory medicines, NSAIDs, like an Advil Liqui-Gels, an ibuprofen liquid gel, may work faster because it dissolves faster in the gut. And then there are longer-[acting] versions that have a longer half-life — and if it has a longer half-life, it means that it lasts longer in your body. Things like naproxen or nabumetone that I mentioned have a longer half-life.

Dr. Joshi (34:10): There are triptans that we use for migraines. There are short-acting ones like sumatriptan or rizatriptan; longer-acting ones like naratriptan or frovatriptan. And when something is longer-acting, you can use it sort of ahead of the time. They won't work rapidly to get rid of the headache once it's there, but they might prevent the next one. So certainly you could combine different things, like a rapid-acting anti-inflammatory with a longer-acting triptan.

Dr. Joshi (34:36): Again, the gepants tend to be a little bit more longer-acting as well. And they tend to work also quicker and longer-acting. And certainly you can take a gepant and an anti-inflammatory medicine together as well. And then you have the traditional migraine preventive medicines which are longer-acting in general.

Kellie Pokrifka (34:57): One of our community viewers, Ahmed, asked: Is being aware of weather changes ahead of time — is that putting us into the fear of an attack, that this is contributing to the attack? Is it helpful to know ahead of time? And also going off of that, with different apps and AI [artificial intelligence] in the future, are there different ways that we can be more aware? And if so, is that a good thing for us — or is that contributing to the constant fear of our next migraine attack?

Dr. Joshi (35:26): I think what he might be referring to is something called anticipatory anxiety, where you don't have a migraine now or a headache now, but then you're waiting for the next one to come. I think that anticipatory anxiety happens if you feel like you don't have anything that you can use to treat it. But I think with our approach to migraine now, which is a toolbox approach, we have so many different options that we can give you the control back.

Dr. Joshi (35:50): So I do think that it's more favorable for you to know when a migraine is about to come, or if you can anticipate it ahead of time so you're more prepared with the options. And certainly having options that you can take early — having options where let's say if the first option doesn't work, you have a second option that you can use to treat it — can be more comforting. So I do agree that there may be some anxiety component, but I think for you, you can certainly individualize it to what works for you.

Dr. Joshi (36:23): In general, I find that my patients find it more beneficial to anticipate it. So that being said, how do you anticipate it? Certainly the *Farmers' Almanac* will tell you about seasons, but what else can you do? You don't have a crystal ball. But I think this is where one thing in the future, we can maybe have AI be a tool. AI will certainly be a great tool for aspects of medicine and other aspects for many different things.

Dr. Joshi (36:53): And I think a scenario I can think of is, imagine you're driving somewhere and you have this AI app or technology, and it tells you, "Hey, by the way, the weather is changing in the next few days, and you haven't refilled your acute medication. And last time you were driving in this area down South and the storms came in, you were more likely to get a migraine. So why don't you think about calling your provider to get that medication or refill that medicine?" Wouldn't that be amazing?

Dr. Joshi (37:27): And wouldn't that be amazing if it could track that over a period of time and sort of build intelligence? So I think AI would certainly be on my wish list of things that could be developed to help in any way possible for migraine.

Kellie Pokrifka (37:45): All right, I'm going to ask for a couple different topics on how we can control different triggers. And you let me know your opinions if they're actually changing things. When we are talking about temperature, there are a lot of different [things] — we can do portable fans, cold rags on our neck or wrist; there are also the patches that can either cool us down or heat us up; and peppermint oil. Are they actually changing our temperature? Is that something we should rely on? Or does that give us sort of a false sense of security and we may be still overheating even if we have peppermint oil on our temples that is making us feel a little bit better?

Dr. Joshi (38:26): So I'm OK with some of those recommendations because they don't really do any harm. But a lot of those recommendations are mostly used for when you have an attack. People will put ice on the back of the head. And I'll also recommend peppermint oil — not necessarily in the temporal area, but I'll also recommend it in the occipital area as well. So I'm OK with that. But I think what's happening here is [that] it's a separate phenomenon. You have an acute migraine attack that's already there, and you can certainly use cold to treat it. And what the cold might be doing is a local vasoconstrictive effect or modulating pain in a different way.

Dr. Joshi (39:10): But when we talk about weather changes and temperature changes, these are the shifts that occur when you go from hot to cold. And for something like that, I don't necessarily think having an ice pack in those areas will work that well because it's shifts that are occurring across the entire body. And so I don't encourage you to go dip yourself in an ice bucket or something like that to lower your body temperature — not recommending that. But I think a gradual transition from cold to heat or heat to cold would be more beneficial — whether it's layering up or layering down — would be the recommendation.

Kellie Pokrifka (39:44): For horrendous days with sunlight, whether we've got snow glare or just beaming sunlight, do different migraine glasses help with that?

Dr. Joshi (39:53): I have heard that some of my patients have a good response to glasses that block out blue light. So there's multiple different brands available; I encourage you to do your research to see what's reputable. They do make versions that are outdoor and they make versions that are indoor. Certainly if you're indoors and you are on a screen a lot, apart from getting glasses, you can adjust the tone on your screen to decrease blue light. But you could also get blue light blocker screen protectors as well. For some patients that are very debilitated, they need something for constant all-around [symptoms]. And I do feel that they can be beneficial for some patients.

Kellie Pokrifka (40:34): So one of our community members, Cherika, she asked: How do you feel climate change will affect migraine, headache disorders, and, specifically, vestibular symptoms?

Dr. Joshi (40:44): I think that when there are barometric pressure changes that are occurring — whether it's a storm coming in or the temperature is changing or you're traveling to a drier environment — certainly anything that affects the homeostasis of your migraines can trigger a migraine for you. So I think being in control by [using] some of the strategies I mentioned, and then thinking about pharmacological treatment, whether it's acute treatment or prevention, can certainly be beneficial.

Kellie Pokrifka (41:13): Dr. Joshi, this has been so helpful. And I think this will give so much empowerment to people like me who feel really powerless when weather triggers come about. Are there any last words you would like to give us or any recommendations that we haven't covered yet?

Dr. Joshi (41:28): Well, lastly, I'd like to just say that we've discussed a lot of things here today. We talked about how the brain doesn't like change. And I hope, based on what I've talked to you about today in terms of what are the factors involved in weather-related changes, the coping skills that you can do that involve not taking medications are beneficial for you. However, if that's not enough for you, there are still other options including pharmacological and nonpharmacological options.

Dr. Joshi (41:59): So basically, there's a toolbox approach, a comprehensive approach to treating migraine patients. And there are more things coming. So there's constant research that's ongoing. I want to just leave you with some hope that this is treatable, and there are many ways to approach it. So hopefully this helps someone out there in the audience that has barometric or weather-related headaches. And hopefully there are more options that are more specific for this in the future. But what I can tell you is that there's a lot of ongoing research for migraine in general.

Kellie Pokrifka (42:39): You're always incredible in your interviews. And where can our audience follow you more?

Dr. Joshi (42:43): Oh, thanks; I'm honored that anyone wants to follow me. I'm pretty active on LinkedIn. So I usually post any conferences that I've been involved with or publications or research. I'm also very active with the Association of Migraine Disorders as well, so you can go to their website. And then also, there are some regional headache societies that certainly I'm very active with. One is the Great Lakes Regional Headache Society, as well as the Headache Cooperative of the Northeast. And the American Headache Society — I'm on several committees, and we're really active in not only engaging clinicians, but also the [American] Migraine Foundation is active in engaging patients as well. So those are the places where you can find me, apart from my practice in Westborough, Massachusetts, which is Community Neuroscience Services.

Kellie Pokrifka (43:37): Dr. Joshi, thank you so much for being on the Migraine World Summit once again.