

Probing question: What causes migraine?

March 19 2009, By Alexa Stevenson

Imagine you are talking to a coworker when your vision blurs, and spots of light appear on the periphery. Feeling nauseated, you try to continue the conversation, but you're having trouble remembering the words for things. Twenty minutes later you retreat home to bed, your head filled with a painful throbbing that magnifies every sound and makes light unbearable.

This is a [migraine](#), and it is no ordinary headache. But luckily, according to Stephen Ross, associate professor of neurology at Penn State's College of Medicine, "We know a lot about what causes it. This is not a black hole."

The short explanation, says Ross, is that migraines are caused by a [hereditary tendency](#) for [nerve cells](#) to overreact to normal stimuli. "Your brain is normal," he explains, "Your nerves are normal. It's their reaction that's abnormal."

For [migraine sufferers](#), the cortex, or upper surface of the brain, becomes overly sensitive to changes in the environment. These can include changes in the body's internal condition, such as those caused by stress, hormones or food (caffeine, chocolate and alcohol are common culprits), as well as external changes like hot weather, or the drop in [atmospheric pressure](#) before a storm.

Overreacting nerves cause dilation of blood vessels and inflammation, and according to Ross, "This [overreaction](#) works with the lower parts of the brain, the brain stem, to reduce the suppression of pain pathways,

which leads to the experience of pain.”

This process is set in motion by genetics, though no single gene is responsible for all migraine. Rather, it likely involves multiple genes. “A missing amino acid here, an extra one there,” says Ross, “It is a combination of different factors, and that’s probably why people experience such different things.” Migraine can vary from patient to patient and from attack to attack. For example, not all migraine sufferers experience “aura,” the [visual disturbance](#) that can precede the pain.

Another variable is which changes in the environment will set off an attack. “About three quarters of people can identify specific triggers for their migraines,” notes Ross. Some common triggers are red wine, chocolate, and both the onset and relief of stress. A particular culprit is estrogen, which may explain why migraine is more common in women than in men. It is also more common among sufferers of depression, as insufficient serotonin—a factor implicated in depression—can be a trigger for migraine.

“Any of these triggers will cause an electrical response in the brain,” says Ross. People without the genetic tendency for migraine may experience the same brain response, for instance a dilation of blood vessels. “But,” he notes, “they’re not aware of the dilation, whereas people who have the genetic tendency lose the suppression of pain pathways.”

On the cutting edge of treatment is a new class of medicines called calcitonin-gene related peptide (CGRP) blockers, which are now before the FDA. This would be the first new class of migraine medications in 15 years.

“We all produce CGRP, and in migraine it is thought to be one of the groups of chemicals that carries the signal down the pain pathway,” explains Ross. “So if you block CGRP, the information can’t get

through, and you shut down the attack.”

“We’re constantly adding additional pieces to the puzzle,” he notes. “The hope is that ultimately this will lead to better and better treatments, to stop the pain before people experience it in the first place.”

If you’ve ever had a migraine attack, you’ll no doubt agree that this is a worthy hope indeed.

Provided by Research/Penn State (By Alexa Stevenson)

Citation: Probing question: What causes migraine? (2009, March 19) retrieved 25 April 2024 from <https://medicalxpress.com/news/2009-03-probing-migraine.html>

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