

Neurosurgeon seeks to better understand epilepsy using math and music

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Taufik Valiante, a neurosurgeon at Toronto Western Hospital and an associate professor at U of T, says certain music patterns may reduce the likelihood of a seizure. Credit: Krembil Brain Institute

When Taufik Valiante was a child, his baseball coach's son passed away

from severe epilepsy.

"I think that left a pretty indelible mark on me," says Valiante, a senior scientist at the Krembil Research Institute, University Health Network, and an associate professor of surgery in the University of Toronto's Temerty Faculty of Medicine.

Eventually, that experience in his youth led a sensitive, guitar-playing boy who hated the sight of blood to become a [patient advocate](#), neurosurgeon and researcher studying the relationship between [music](#) and epilepsy.

Today, he's researching the connection between music and epilepsy with amazing results. A few years ago, his research team at the Krembil Brain Institute published [a study](#) suggesting listening to a six-minute selection of Mozart's K448, Sonata for Two Pianos in D major every day could reduce seizure frequency in people living with epilepsy by up to 35%.

The research has since grown to examine thousands of compositions from various artists and cultures.

"We're starting to expand this out really broadly and I have some collaborators now at the Max Planck Institute in Germany," says Valiante, an alumnus of U of T's Faculty of Arts & Science who earned his honors bachelor of science from University College in 1988 as well as a Ph.D. in physiology in 1995 and his medical degree in 1997 from U of T.

"Music is a mathematical construct and we think there are specific patterns in certain types of music that cause the brain to be less likely to go into a seizure," he says.

"Epilepsy has provided an incredible opportunity to study the brain and a

lot of credit goes to the patients who are willing to participate in studies to help us understand these things."

As Purple Day approaches on March 26 to raise epilepsy awareness, Valiante recalls a career that started with successfully lobbying for a provincial strategy to improve care and recognition for people living with epilepsy, one of the world's most common but nevertheless stigmatized neurological disorders.

"In my house we were raised to be social activists," he says. "For people living with epilepsy, raising awareness is really important because the more people around them understand, the better their quality of life. And as a patient, you should hear the same thing whether it's Purple Day or visiting my office or on the internet because it reinforces the importance of managing [epilepsy](#)."

"People often talk about a cure—and we're all hoping and working for that—but in the absence of that, it's about, "How do you manage it well?" "

A neurosurgeon at Toronto Western Hospital, Valiante co-directs the Max Planck-University of Toronto Center for Neural Science and Technology, and CRANIA (Center for Advancing Neurotechnological Innovation to Application). At U of T, he holds cross-appointments to the Institute of Biomedical Engineering and the Edward S. Rogers Sr. department of electrical and computer engineering in the Faculty of Applied Science & Engineering.

He says his mother taught her children to "be good at the things we enjoy," which he took to heart. He often picks up his bass guitar to relax, recently sharing tracks in an audio collaboration with a long-time musician patient.

Valiante says he had an epiphany about the relationship between math, physics and the brain during a class at University College with former professor Jack Dainty—a nuclear physicist turned pioneering plant biophysicist.

"That was among my most formative periods in my life. It was my third year and I was taking his plant membrane physiology course and it blew my mind that he could show you something physically exists just by using math and physics," he says.

"By fourth year, I had submitted a proposal on how to use math and physics to study the brain. I got an award for it and that money supported research during the summer after graduating with my bachelor of science."

Valiante says he encourages every student to be open to exploring new subjects and interests without always focusing on how it fits their career plans.

"None of us are smart enough to know how what we do today is going to impact us in the future," he says. "Don't always expect something back except the experience itself. From a purely human point of view, the one behavior that can immediately increase positive emotion and happiness is giving.

"It benefits you as much as the people you help."

Provided by University of Toronto

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