

# Q&A: When the beat goes wrong: A cardiologist explains arrhythmias

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Lohit Garg, MBBS, grew curious about the workings of the heart from a young age. His interest was tinged with personal heartache as he watched several family members battle cardiac disease, especially his grandfather.

"He had a defibrillator, a [heart attack](#), strokes ... Just living with him as a child, I saw his struggles getting care for all of those things," said Garg, assistant professor of medicine at the University of Colorado School of Medicine. "I wanted my [family members](#) to receive high-level care, so I

was always interested in cardiology."

Garg, who is part of the CU Medicine electrophysiology program, also cultivated an interest in physics and electricity in high school. That's what led him down the path of becoming a cardiac electrophysiologist, a specialty dedicated to the most complex arrhythmias.

Three years ago, Garg joined the CU Medicine electrophysiology team, one of the top programs in the nation and the largest in the Rocky Mountain region. The program is an atrial fibrillation Center of Excellence and has AFIB GOLD status from the American Heart Association. His interest in research keeps Garg at the leading edge of new treatments for these complex cardiac surgery procedures. "I'm lucky to work with an amazing team of 12 electrophysiologists," he said. "It's great."

In the following Q&A, Garg explains the potential causes of atrial fibrillation and [ventricular arrhythmias](#) and the surgical treatments available to patients. The interview has been edited for clarity and brevity.

## **What is the primary cause of heart arrhythmias? Is there something that you can pinpoint that causes this problem?**

Unfortunately, there is no single, main reason for [heart](#) rhythm issues. Some people are born with arrhythmias while other people can develop them because of their lifestyle. People who have [high blood pressure](#), diabetes, sleep apnea, obesity, are typically at increased risk for certain types of heart rhythm issues. And lastly, there are people who have had heart attacks, and they are at risk of having life-threatening arrhythmias.

The arrhythmia that we see a lot these days is atrial fibrillation, which is actually a disease of aging. As people get older, there is just more atrial fibrillation out there. There are over 8 million people in the U.S. living with atrial fibrillation now, and that number is expected to be 12 million in the next five to 10 years. I think it's still an underrepresented number because a lot of people don't get diagnosed in time, and they end up having life-changing complications, like stroke.

## **What's the difference between atrial fibrillation, arrhythmias and tachycardias?**

Arrhythmias are just irregular heart rhythms, and they're coming either from the upper chamber or the lower chamber of the heart. The upper chambers are called atriums, and any arrhythmias arising from those top chambers are atrial arrhythmias. In the lower chambers, they are called ventricular arrhythmias. The good news about atrial arrhythmias—although they can cause symptoms such as palpitations, chest pain, discomfort—is that they are not life-threatening.

On the other hand, ventricular arrhythmias are life-threatening, and they are among the most common causes for cardiac death. We hear about athletes dying on the sports field, and there has been a push to install AEDs at gyms, athletic fields and other facilities, and that's the reason—because people are dying from these undiagnosed ventricular arrhythmias.

Then atrial arrhythmias can be further divided into what we see in the younger age group and those include SVT—or supraventricular tachycardia—which is an arrhythmia that affects the heart's upper chambers. SVT, along with tachycardia, are different from atrial fibrillation, which is more of a disease of the aging patient population and people who have other heart disease as well.

As I said, both of them—atrial fibrillation and tachycardia (including SVT)—are generally not life-threatening. The most serious thing that can come from atrial fibrillation is that it significantly increases the risk of stroke.

## **Why is that?**

An atrial fibrillation is a little bit different in the mechanism compared to say, an SVT. So, when we talk about SVT, it's because cells in the upper chamber are misfiring and causing your heart rate to go a little bit faster. Those are very treatable. On the other hand, with atrial fibrillation, we don't really understand the exact reason, but it's an electrical disorganization in the upper chamber or the atriums, and the upper chamber is just quivering rather than contracting.

And when it quivers, the blood pools in different areas and form blood clots in the heart chamber. When the blood clots from this quivering and fluttering, those clots can dislodge and move toward the brain, increasing the risk of stroke.

## **What are the surgical approaches used to treat, say, a ventricular arrhythmia? What surgical procedures do you specialize in?**

I am interested in the full spectrum of heart arrhythmias, but I'm primarily focused on two things. One is [atrial fibrillation](#), and the second is sudden cardiac death in athletes and the younger patient population. I also have interest in complex ablation or complex ventricular arrhythmias.

Let's break it down. In cases of ventricular arrhythmias, we have two goals for our patients. First, to protect them, because as I said, a

ventricular arrhythmia can lead to sudden cardiac death. Protection is absolutely key, so we implant a defibrillator for these patients after they have episodes of ventricular arrhythmias.

Then the second is, even though a patient received a defibrillator and was protected, those defibrillator shocks can sometimes be very uncomfortable.

Some people hate them so much that they want the defibrillator removed. So, the second step is to prevent the arrhythmias from happening altogether, and we can either treat the patient with medications—there are certain medications that are effective—or we can perform a catheter ablation to target why the patient is having ventricular arrhythmias. My personal interest is catheter ablation for these ventricular arrhythmias.

## **What does catheter ablation involve?**

The idea with ablation is to identify what is causing a patient to have arrhythmias, and these can happen because there are cells that are misfiring or there is a short circuit in [scar tissue](#) somewhere in the heart. We try to identify which one it is, and then cauterize the bad cells if they are misfiring or cauterize the scar tissue and break the short circuit that is leading to arrhythmias.

## **Post-ablation, what is the heart's capacity to heal from this procedure? Does the heart muscle have resilience to being cauterized?**

Yes, it does. The first catheter ablation was done around 1985. When we cauterize these tissues, we only cauterize a small amount. If we have to cauterize a lot of scar tissue, it's already scarred. These procedures have

proved to be safe without any long-term side effects to the heart muscle.

**Is there any rhyme or reason why somebody with a perfectly healthy heart and healthy lifestyle may suddenly experience an arrhythmia?**

It's not uncommon. As I said, people are born with certain things in the heart and its electrical system, and as you age, the wires can get a little wonky. It's like the wires in your house—they sometimes trip and you get electrical short circuits. It's the same as you get older. Your body's electrical system can get tripped from exposure to toxins, infection, aging or something else—alcohol, caffeine—something that caused these cells to start misfiring.

What really reduces the risk of arrhythmias—some of the arrhythmias, not all of them—is adhering to a healthy lifestyle. That includes limiting your intake of caffeine and alcohol, getting quality sleep, keeping a healthy weight and engaging in regular exercise.

**Is there any particular surgical procedure that you have found produces better outcomes?**

There are two medical procedures of catheter ablation. Either we can freeze the tissue, which is called cryoablation, or we can burn/cauterize the tissue using radiofrequency ablation.

Our team excels in both, and we have excellent results. The whole team believes in spending time to understand each patient's [arrhythmia](#) before we treat it. And that's the biggest thing is that we're not just cauterizing the tissue; we're intellectually understanding the problem, what is the issue, how to get rid of the problem tissue in the best possible manner. As a surgical team, we believe in taking our time and being extremely

selective in where we cauterize to produce the best possible outcome for the patient.

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