

Georgia Karkani of [Marie Claire Greece](#) interviews Elaine Chew on music-based cardiovascular therapeutics and diagnostics, and her arrhythmia music in an article titled,

"When she suffered from arrhythmias she used music to create a diagnostic tool for heart problems: Pianist and engineering professor Elaine Chew shares with Marie Claire her remarkable story and the revolution that music is bringing to medicine, just ahead of her [keynote at the Athens Science Festival 2024](#) (16-21/04)."

Read the article in Greek at [www.marieclaire.gr/art-lifestyle/otan-ipefere-apo-arrithmies-chrisimopiise-ti-mousiki-gia-na-dimiourgisi-ena-diagnostiko-ergalio-gia-provlimata-kardias](http://www.marieclaire.gr/art-lifestyle/otan-ipefere-apo-arrithmies-chrisimopiise-ti-mousiki-gia-na-dimiourgisi-ena-diagnostiko-ergalio-gia-provlimata-kardias)

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Below are the questions for the article and answers in English:

***1. How did this scientific journey of yours, that combines music and medicine, start?***

I started combining music and medicine due to my encounters with cardiac arrhythmia, a problem with the electrical activity of the heart. While undergoing treatment, a young cardiologist-in-training told me he had made a guess-the-arrhythmia game for his colleagues by playing them music. I knew that without altering the music, it could only match the heart rate. We can do better. So, while the medical team stuck catheters inside my heart to contain the misfiring cells, I mapped out a way to make [music that matched exactly the rhythms of arrhythmia](#).

Later, I reached out to the consultant who treated me, Professor Pier Lambiase, to get my data and to sound out ideas for music-heart research. It was quickly apparent that cardiologists are more interested in music for its therapeutic potential, music as medicine. Having been a music scientist/engineer for over 25 years, using mathematics to represent what we know about music, and a pianist for far more, I agreed with my cardiologist to embark on research to [decode the effect of music on the heart](#). We started with a study with pacemaker patients and have not looked back ever since.

***2. Could you describe, in short, how music affects our heart? Has there been any research about specific music styles that may promote cardiovascular health? If the heartbeat was a music beat, which style of music would it be?***

Music affects the autonomic nervous system, which regulates the unconscious processes in the body like our heart rate, breathing, and blood pressure. By increasing or decreasing the heart rate and the heart's beat-to-beat variation, music affects the functioning of the heart. This is true for performers of music as well as the listeners.

Researchers have studied the effects of music ranging from classical to rock and heavy metal to world musics like traditional Persian and Indian classical music to discordant music and noise on heart function, mainly for listeners. The specific music that may promote cardiovascular health for a person will depend on the individual and their cardiac condition. Will they react to the music and how? Is the aim to increase or decrease their heart rate, heart rate variability, or blood pressure?

If the heartbeat was a music beat, the music it could be depends on the condition of the heart. A healthy heart beating normally at rest could be music with a regular beat; arrhythmic heartbeats could be [cool jazz](#), a [syncopated tango, or mixed meters](#) in contemporary music.

***3. How do you use, in simple words, music as a diagnostic tool for heart conditions? How did you come up with this idea?***

In our work, music can be a diagnostic tool for heart conditions in two distinct ways. First, by mapping arrhythmic heartbeats to music, we create an aural way to identify and understand the nature of a patient's arrhythmia. Sound is better at encoding the heart's forceful thumps, fluttering, and pounding than visual graphs of ECG. Augmenting ECGs with music (organized sound) can enable clinicians and patients to more readily detect similarities and differences in arrhythmia expressions.

Second, music is a powerful tool for modulating the autonomic nervous system. Heart conditions alter a person's cardiac response to music. By [tracking people's physiology while they are playing](#) or listening to music, the trace of their heart's behavior together with the music provides valuable information that can be used for diagnosing heart conditions and differentiating between the condition's subtypes. These ideas stem from my own experience living with music and arrhythmia.

***4. In which ways could the so-called Musical Medicine bring some breakthrough in the way we detect or even prevent and treat medical conditions, in the near or more distant future?***

In the future, it may be possible to diagnose arrhythmias not only by seeing ECGs, but also by hearing their music. I have repeated the guess-the-arrhythmia game, with music that mirrors the rhythms and forceful thumps of the arrhythmia, in lecture rooms full of cardiologists and it works! They recognize the arrhythmia from the music. The music representation also allows listeners to better understand how the arrhythmia feels. When I have played arrhythmia pieces in concert, the audience have remarked that they had no idea how tiring arrhythmia was until they heard the music.

For treatment and prevention, music is a non-pharmacological, non-invasive, and pleasurable way to modulate the autonomic nervous system. Acute or incessant stress and autonomic malfunction are frequent causes of cardiovascular disorders like arrhythmias; conversely, heart diseases promote autonomic imbalance. In the future, a patient could be asked to listen to, or if they are a musician, to play music to diagnose heart disorder subtypes, treat cardiovascular disorders, and slow or prevent disease progression.

***5. Did you ever encounter any discrimination as a woman scientist?***

There are few Asian female professors in positions of authority. So yes. When people see me, they do not see a professor. I have had a delivery person knock on my office door to hand me a parcel; conference attendees assume I am the student of a white male collaborator for a project I lead; other academics at a faculty function presume I am the wife of the head of department, the other Asian person in the room. These examples are signs of more deeply held unconscious biases that influence work assignments, opportunities, and appointments.

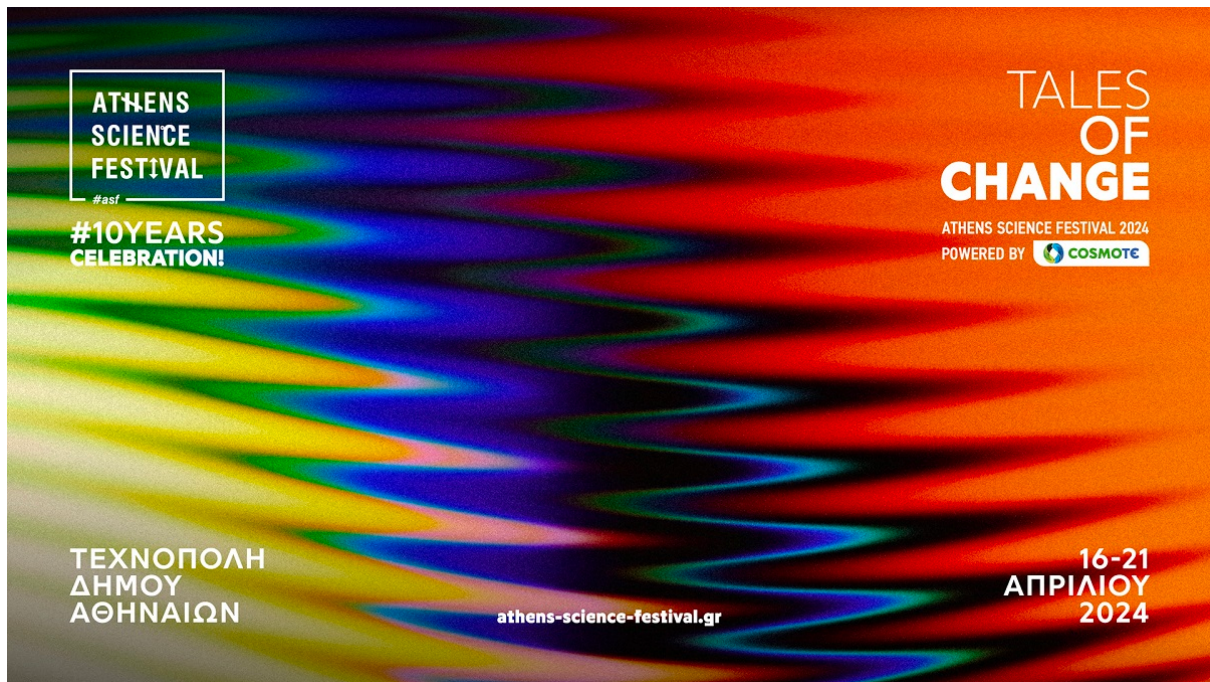
***6. How did you first learn about the Athens Science Festival? Which will be your contribution to this year's festival?***

I learned about the Athens Science Festival from its founder, Theo Anagnostopoulou, who reached out to me after seeing my Breakthrough of the Year (Art and Science category) presentation at the Falling Walls Science Summit. I was impressed by his dedication to communicating science.

At the Athens Science Festival, I will be giving a keynote on music, mathematics, and the heart. The presentation will take the audience from mathematical modeling of tonality to the love theme of Rachmaninoff's Rhapsody on a Theme of Paganini, to cardiac response to music. To let you in on a secret, a grand piano will be involved in the presentation.

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"Elaine Chew | Music, Mathematics, and the Heart", from scientific visualisations of tonal geometry to performer-listener cardio-respiratory signals, Sunday 21/04 at 21.00-21.50, "Miltiadis Evert" Amphitheatre, Technopolis of the Municipality of Athens, 100 Pireos St., Gazi, tel. 213 0109300. Full programme at: [www.athens-science-festival.gr](http://www.athens-science-festival.gr).



The Athens Science Festival 2024 is organized by the educational organization “Science Communication – SciCo”, the British Council and Technopolis of the Municipality of Athens in collaboration with academic, research and educational institutions and with COSMOTE as major sponsor.