

# Redressing Underrecognition of “Cold Drink Heart”: Patients Teaching Physicians about Atrial Fibrillation Triggered by Cold Drink and Food

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## ABSTRACT

In this essay I tell the story of insightful patients from around the world with cold-drink atrial arrhythmias, particularly atrial fibrillation (AF). This common condition has received little research attention and remains unknown to many physicians. The underrepresentation of “cold drink heart” in the literature led me and a colleague a few years ago to publish a case report on this topic in an open-access journal. I included my email address so that physicians and researchers could contact me. Although I sought a physician audience, the report struck a chord with patients. Sixteen individuals have since written me to express their gratitude for having received medical validation of the causal connection they had made between swallowing cold drink or food and their episodes of paroxysmal AF. The validation was all the more important because of their physicians’ prevalent disregard of the link, making them miss out on the opportunity to partner with their patients in AF management by trigger avoidance. I explain here how these patients have handled their cold-drink AF and connect their reports with the few published in the literature. These rich email exchanges illustrate how eager patients can be for an explanation of their medical condition and for an opportunity to manage their symptoms. These communications also remind us about the important role patients play in physician education. These email-writing patients have done us all a great service by teaching about the precipitants, prevention, and underrecognition of cold-drink atrial arrhythmias.

## INTRODUCTION

One of the advantages of supplementing a medical career with clinical research is the quiet satisfaction of knowing that our work improves the care and lives of patients far beyond the limited scope of our own practices. But we never expect to hear from such patients. This explains my surprise when the emails first arrived. Why would patients write to a physician researcher they had never met?

It had nothing to do with any of my hard-won research studies. Our large pragmatic controlled trials and multicenter prospective observational studies never generated even 1 patient letter or email. What precipitated the response of emails was a simple case report in 2016, which my colleague, Lugovskaya, and I<sup>1</sup> did not write for patients. We sought to educate physicians about the causal connection between the rapid ingestion of ice-cold drinks or ice cream and acute paroxysmal atrial fibrillation (AF). I had included my email address so that other physicians and researchers could easily contact me. None have, and so I do not know if the case report ever

reached its intended *medical* audience. But it did reach inquisitive *patients*. Sixteen from around the world have written so far to express their gratitude. One patient even sent me an email *during* his Emergency Department (ED) visit: “This morning I had another episode [of paroxysmal AF], also while drinking a cold smoothie, and voila, here I am at the emergency room.”

## EAGER TO UNDERSTAND WHAT CAUSED THEIR SYMPTOMS

These patients had strongly suspected a direct relationship between their frozen drinks and desserts and their sudden-onset AF, especially when symptoms predictably recurred with subsequent provocations by icy-cold ingestions. The patients were looking for professional confirmation: “Did a cold drink really land me in the [ED]?” one asked. This inquiry drove them to search the Internet, which directed them to our online case report.<sup>1</sup> They were comforted and reassured to learn that they were not the only person with this seemingly unusual condition.

The case report may have had better patient uptake than most research articles because it opened with a story. Narratives are far more palatable to a wider audience than the drier details of research methods and results. But this case report would never have found its way into the hands of so many patients if it had not been published in an open-access journal, like this one. Most patients do not have access to a hospital or university library that shares its paid subscriptions with its members. Reaching patients far and wide with our research findings is another reason to support high-quality open-access publishing.<sup>2</sup>

## THE CASE REPORT PATIENTS FOUND ONLINE

In the case report,<sup>1</sup> Lugovskaya and I told the story of a young healthy man, who was walking home after a long, hot day of hard outdoor labor. He stopped at the local convenience store to purchase an ice-cold slushy drink. As he rapidly gulped down the chilly beverage, he developed a sudden brain-freeze headache and a concurrent episode of acute AF. The co-occurrence of “ice cream headache” with “cold drink heart” directly implicated the rapid cold ingestion as the trigger for both conditions. When the

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uncomfortable palpitations failed to spontaneously resolve (unlike the headache), he sought emergency medical attention, as many of my email correspondents have done. Under medical care, he received an atrial arrhythmia diagnosis—paroxysmal AF (Figure 1)—and restoration to a normal rhythm with the administration of intravenous pharmacotherapy (ibutilide).<sup>3</sup> Interestingly, he landed in the ED for an identical episode 3 summers later, after having stopped at the same convenience store and having bought the same slushy drink—after a long break from ice-cold drinks and paroxysmal AF.

### SIMPLE, TRANSFORMATIVE LIFESTYLE CHANGES

As described in the case report, the protagonist's treating physicians failed to attribute the genesis of AF to the icy beverage.<sup>1</sup> Overlooking the nexus, they failed to advise him to avoid repeated exposure. The patient, however, had connected the dots and afterward avoided rapid ingestion of frozen drinks, except on the 1 fateful repeated occurrence 3 years later. In the report my coauthor and I made it clear that a simple lifestyle change can have big implications: reduce exposure to ice-cold drinks and food and lessen the risk of arrhythmia recurrence.

My correspondents appreciated this point and wrote to tell me of their success with lifestyle changes, akin to many loose, self-run single-subject trials.<sup>4</sup> One email writer speaks for the group: "I am very careful to drink cold drinks very slowly and have not had a symptomatic episode in the past 3 years." Others have gone further in their prevention efforts: "I have fully given up on eating anything cold at all. It may seem extreme, but after

my many [ED] visits for AF, I don't want to do anything that could possibly aggravate it." For many, the resolve is firm, even in face of dietary sacrifices: "But if doing something as simple as avoiding cold stuff can keep me AF-free, then I'm all for trying it, even if it means missing out on the ice cream."

By not recognizing the triggering capacity of ingesting cold stimuli, many physicians are missing the chance to collaborate with their patients in symptom management.<sup>1</sup> This deficit of care, however, is open to correction. Studies are under way for patients with paroxysmal AF to help them identify their triggers and reduce their exposure risk (eg, Clinicaltrials.gov identifier NCT03323099). Research like this could help educate patients and their physicians about the importance of recognizing and reducing AF triggers. Physician education of this sort is needed, as we learn from our informative patients. William Osler's maxim is as fitting today as it was more than 100 years ago: "Listen to your patient; he is telling you the diagnosis."

### EAGER FOR VALIDATION

One emailing patient voiced the frustration common to many in the group when the health care team did not "get it": "I mentioned to the nurses, ED doctors, residents, and cardiologist that this condition [the cold-drink AF] began seconds after experiencing a massive brain freeze, but no one mentioned a correlation there." Another patient writes, "No one seemed to care about the cold-drink link despite my indications this is the obvious only trigger. [They were] more curious about whether I smoke or drink alcohol or caffeine." I saw this with our case report. The patient's

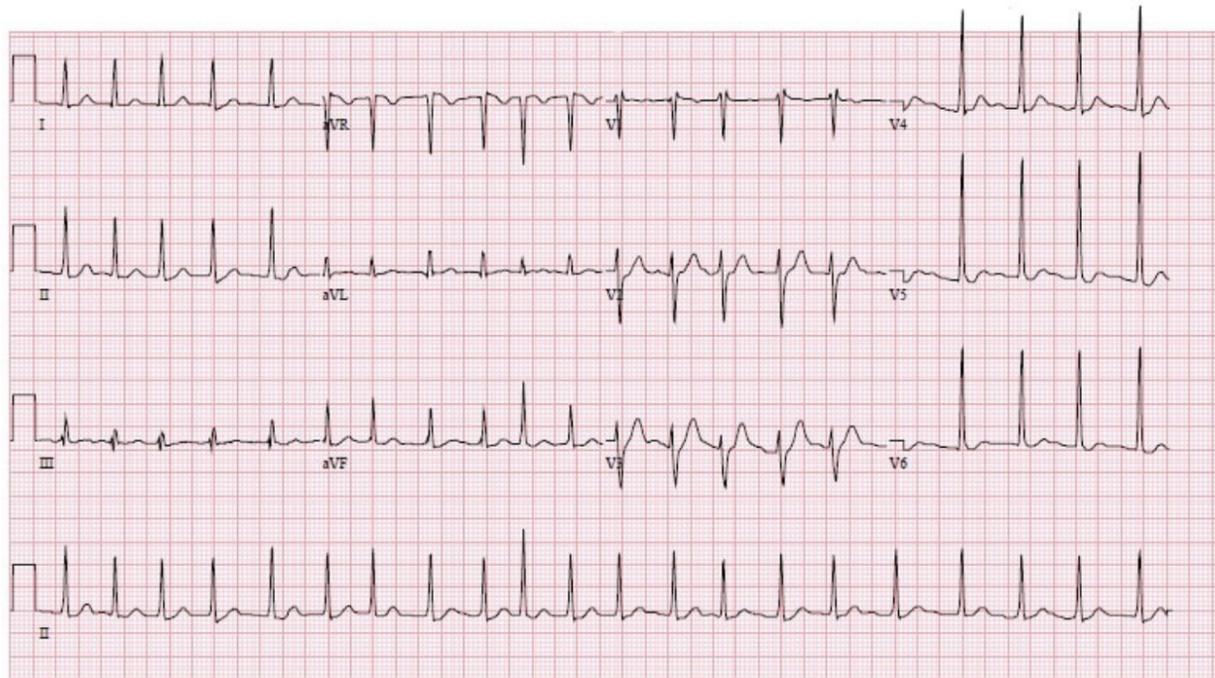


Figure 1. 12-lead electrocardiogram obtained from a young adult man who presented to the emergency department with recent-onset cold-drink atrial fibrillation with rapid ventricular response triggered by rapid ingestion of an ice-cold slushy drink<sup>1</sup>

physicians warned him about the potential harms of drinking caffeinated beverages but gave no advice about cold foods and beverages. Study findings suggest, however, that moderate levels of tea and coffee are safe for people with AF.<sup>5</sup> A third patient articulated his impression that the relationship between AF and cold drinks may seem crazy, which helped him account for the incredulity of his physician. "In 4 of those 5 instances [of paroxysmal AF] I had eaten ice pop, ice cream, or [a] slushy within about 5 minutes of the episodes. I even mentioned this to the doctor after my third episode, and they dismissed it (probably because I sounded like a crazy person)." Another patient admitted that he didn't mention the antecedent cold drink to his physician at the time because he "did not think it important." I imagine that patients often fail to mention the precipitating cold drink because they underestimate its importance, and when they do happen to mention it, physicians often fail to appreciate the importance. Given that patients and physicians both underrecognize the condition means that it is likely to be substantially underdocumented in the health records.<sup>1</sup> This explains why a retrospective study, conditioned as it would be on the happenstance of discussion and documentation, would greatly underestimate the prevalence of what I colloquially call cold drink heart.

It was the 2016 case report<sup>1</sup> that gave these patients the validation they sought and needed. One email sender put it like this: "My attending cardiologist was unsure of the cause, but having found your paper on PubMed, I'm now confident it was indeed the drink." For many medical conditions, we in the medical community have no rational causal explanation and, lacking scientific evidence, may implicate bad genes or bad luck. But when an explanation is ready at hand, we should put it to good use. Life can be chaotic for many of our patients, and much of it is unpredictable, eluding explanation. But explanations can be invaluable. "When your life changes in a heartbeat (no pun intended)," one email sender wrote, "It's good to know why." We should not miss this opportunity to explain the cause of our patient's paroxysmal AF when cold ingestion is the readily identifiable precipitant.

### PATIENTS EDUCATING THEIR PHYSICIANS

Many patients were eager to share what they had learned from our case report with their outpatient physicians. They printed the publication and hand delivered it in clinic. One patient even wanted additional references to strengthen his case: "My claim that the frozen smoothie triggered this [paroxysmal AF] has been dismissed by relevant doctors... but I know this was the proximate cause. Can you point me to any additional info[rmation] I might share with them to bolster my case and open their eyes?" Physician education comes in all forms. Add this to the long list of things we can learn from our patients.

Not all physicians were dismissive that swallowing a cold drink was the cause of their patient's paroxysmal AF. One cardiologist now lightheartedly refers to this patient as "the drinker," after the patient's comical self-designation. The patient explains: "The name 'drinker' stuck when they asked how things were and I told them I was still having issues with drinking. The PA [physician assistant] was all upset because she instantly thought I was referring to getting drunk. Anyway, it was good for a laugh."

The cold-drink connection has helped some patients, in fact, reproduce their symptoms during medical evaluation. "My cardiologist... asked if I could re-create the issue. I was certain I could, even on the Tikosyn [dofetilide]. I grabbed an ice-cold drink and gulped it down. I instantly went into AF." Another joked that a cold drink would have been a better "drug" for inducibility: "I underwent an ablation in January, and the surgeon was unable to trigger AF with adrenaline. I think he needs to have me drink a slushy before putting me under."

### OFFERS TO HELP

The kindness and generosity of these email senders is moving. They were eager to reciprocate the help they received and offered me their stories in hopes these might advance my AF research. "Just letting you know the patient in your case study is not the only one." Their magnanimity is expressed concisely here: "Please contact me if I can further your research...." Another writer set the case report in the larger context of general AF research: "Thanks for your contribution to the field, and if you'd like any further information, please let me know." One patient sent me a thoughtful follow-up on his case 2 years after our initial email exchange: "I wanted to provide a brief update; perhaps it might be useful." Another correspondent offered to help me spread the message, realizing that the topic needs broader dissemination among both patients and physicians: "Contact me if I can be of assistance with your research and in getting the word out."

### EXPANDING WHAT THE LITERATURE TELLS US

My colleagues and I also sought to get the word out. It was this desire to educate physicians about cold-drink AF that initially drove us to publish our case report.<sup>1</sup> We thought this important because so little had been published on the topic—mostly a few case reports, in fact. The first of these was reported in the literature in 1994.<sup>6</sup> A healthy 43-year-old woman had experienced AF with rapid ventricular response while eating frozen yogurt. The relationship between her yogurt dessert and the tachyarrhythmia, however, may have been just coincidental and not causal, since this was a one-time experience and not replicated with similar cold-food ingestions before she underwent treatment with ablation.

Cold-drink ingestion is more likely the culprit when its precipitation of AF is replicated with subsequent exposures. This was the nature of the symptoms in our own case report<sup>1</sup> and in many of the email-writing patients. In some patients with this condition, episodes of paroxysmal AF develop independent of swallowing cold beverages, whereas in other patients they develop only with ingestion of a cold drink or ice cream. One woman made it clear that her AF was brought about exclusively by cold drinks: "[H]istorically every episode of AF has *only* been brought on by drinking cold." One of the earliest published reports to demonstrate the exclusive reproducible nature of the condition was published in 1999.<sup>7</sup> A 55-year-old man related a long history of paroxysmal AF. Each episode occurred when he "drank an ice-cold beverage quickly." He was able to demonstrate the causal relation during electrocardiographic monitoring by drinking an ice-cold soft drink, which "immediately precipitated" AF. A similar pattern of infrequent, but predictably recurrent, paroxysmal AF was

described in 2000 in a young man without cardiac disease with the swallowing of cold shakes and sundaes.<sup>8</sup>

A published report from 2001 tells a similar story. A healthy 42-year-old man had been experiencing transient palpitations “after drinking cold beverages.”<sup>9</sup> The dysrhythmia spells were documented on several occasions to be AF. He figured out the same prevention solution that my corresponding patients discovered. The authors write: “Recently, his episodes of palpitation have been rare because he assiduously avoids swallowing anything cold.” A 2014 report followed a parallel pattern: ice-cold drinks induced AF again and again until “deliberate avoidance” led to a long symptom-free interval.<sup>10</sup>

Unique to the 2001 case report is a family tendency to cold-drink AF, which none of my email-writing patients had mentioned.<sup>9</sup> The 79-year-old father of the 42-year-old man described in the report was found to have his son’s condition after ingesting a shaved-ice drink. No family members besides these 2 had this particular condition (or AF in general).<sup>9</sup> Cold-drink and ice cream triggers of AF are thought to be vagally mediated (like sleep, post-prandial, and late post-exercise states).<sup>11,12</sup> Some studies have found that patients with vagally mediated triggers of AF are more likely to have a family history of AF than those with adrenergic or random triggers,<sup>13,14</sup> although a family tendency to cold-drink AF, in particular, has not been explored, except as described in the 2001 case report.<sup>9</sup>

These several case reports offer helpful patient-specific detail on cold drink heart but are unable to provide an estimate of prevalence of this condition. Fortunately, researchers from the University of California, San Francisco begin to fill this gap with a recently published survey among patients with symptomatic AF.<sup>11</sup> The investigators invited 1295 patients from a separate AF study and from a patient-centered AF advocacy organization to participate in a questionnaire on common triggers of paroxysmal AF. The list of triggers was based on the literature, physician experience, and several patients with AF who served as study advisors. Unlike some studies of acute AF triggers,<sup>12,14-16</sup> cold food and drink were included. Among the 957 survey respondents, 122 (13%) reported that swallowing cold food or drink sometimes or always triggered paroxysmal AF episodes. The prevalence is roughly similar to that of a much smaller Swedish study in which 8 (8%) of 100 adults seeking hospital care for paroxysmal AF reported cold drinks as an AF precipitant on a questionnaire about AF triggers.<sup>17</sup> Neither study reported characteristics of this subpopulation of patients. Authors of other studies, however, suggest that patients with vagally mediated AF are typically younger and less likely to have structurally abnormal atria or cardiac comorbidities than those with sympathetic or random AF.<sup>13,14</sup>

Regarding the demographics of patients with cold-drink AF from my email writers, one cannot infer much from such a small number of cases, but this is all I have to go on for now. Fifteen of the 16 correspondents, to date, were male. They were generally young; among the 9 who mentioned their age, the median was 38 years (range = 27-57 years), although few reported at what age the condition began. One 54-year-old man said his first episode of cold-drink AF occurred when he was 16 years old. Cold drink heart has been reported in adolescents.<sup>18</sup> Most of my email writers

were healthy and free of other cardiopulmonary diagnoses. These patients also tell me how broad-ranging the cold stimuli can be, including chilled water, ice-cold sodas, flavored ice-slushies (as in our initial case report<sup>1</sup>), frozen yogurt, and ice cream—whatever the flavor. These were all nonalcoholic triggers, so physicians can avoid confusing cold drink heart with holiday heart, which is caused by excess alcohol ingestion.<sup>19,20</sup>

### NAMING THIS CONDITION

Cold-drink AF lacks a conventional diagnostic name. It goes by several names in the case report literature, none of which is commonly used: cold-induced, swallow-related AF<sup>18</sup>; cold water swallowing-induced paroxysmal AF<sup>21</sup>; cold-induced AF; or cold-swallow-induced AF.<sup>1</sup> Several case reports do not even name the condition itself but provide only the broader diagnostic category in which it sits, such as vagally mediated AF<sup>8</sup> or swallowing-induced tachyarrhythmia.<sup>22</sup> I prefer to describe this condition as cold-drink AF. Like the term *cough syncope*, cold-drink AF communicates succinctly and explicitly both the most common trigger and the effect. The modifier “induced” is implied; for instance, cough syncope means cough-induced syncope. In cold-drink AF, a cold drink is understood to include non-beverages like ice cream and frozen yogurt. From what we know from the literature today, AF is the prevalent atrial arrhythmia triggered by swallowing cold drink and food, but other atrial arrhythmias could well be possible, as seen in holiday heart.<sup>19,20</sup> “Cold-stimulus AF” is a serviceable name, but the stimulus is not specific and could be misconstrued as exposure to cold weather or the application of a cold ice pack to a swollen ankle. For colloquial use, I prefer cold drink heart, which was inspired by ice cream headache<sup>23</sup> and holiday heart.<sup>19,20</sup>

### WHY OUR WORK MATTERS

These many considerate email senders have reminded me why clinical research matters. Our publications—case reports included—are making a difference in the lives of patients, in our own medical centers and beyond. “Finding your paper changed my life... Can’t say thank you enough!” one writer kindly expressed. What an affirmation.

I have written this essay for physicians, to take what I have learned from these generous patients—about the prevalence, prevention, and underrecognition of cold-drink AF—and share it with physicians. My goal is to help them better understand and care for their patients with cold-drink AF. But I hope this essay finds its way also into the hands of patients with cold drink heart, as our case report did.

If some of my correspondents are reading, thank you for your emails. I appreciate the inspiration that your correspondence has provided. You have reminded me that research publications can have far-reaching beneficial effects, including direct patient education. You also have reminded me the role patients can have in physician education. We will be better able to care for you—and others like you—when we learn to listen to what you have to teach us. ❖

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