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Tremor Relief with a Wearable Device: Exploring an Alternative to Medication and Surgery

Dr. Lisk:
Welcome to *NeuroFrontiers* on ReachMD. I'm Dr. Jerome Lisk, and joining me to discuss an FDA-registered device engineered to minimize hand tremors associated with essential tremor and Parkinson's disease are co-founders from Steadiwear—the CEO, Mark Elias, and the Chief Marketing Officer, Emile Maamary. How are you guys doing today?

Mr. Elias:
Doing great. Thanks for having us, Dr. Lisk.

Mr. Maamary:
It's a pleasure to be here, Dr. Lisk. Thanks for having us.

Dr. Lisk:
Well, let's start with Emile. What inspired both of you to develop Steadiwear?

Mr. Maamary:
What really inspired us was the fact that tremors are personal to both of us. Several of both Mark and I's relatives suffer with daily activities, like eating and drinking, writing, and buttoning a shirt. And when we compared notes, we were surprised to find that the market still offered patients little beyond medication and invasive surgery, so we asked ourselves whether a lightweight, purely mechanical aid could fill that void.

Dr. Lisk:
That's great. So, Mark, could you elaborate on exactly how Steadiwear works and give us a little bit about your path to developing this?

Mr. Elias:
In terms of the core technology, my background is in earthquake engineering, and to be frank, the glove tech is inspired from earthquake design. When you look at tall buildings, for example, like Taipei 101, they have what's called a tuned mass damper attached to it. It's really just hanging a large mass on cable, so when the building starts to shake because of earthquake or because of winds, the mass is going to swing in the opposite direction and cancel that motion. So we paired that dynamic mass to a glove that sits on top of the hand, and what's really unique about it is that we're capable of absorbing tremor frequencies that cover the whole spectrum for essential tremor and Parkinson's. So what happens is, when you wear the device, the counter mass slides out of phase and creates an equal and opposite force. Because the mechanism is passive, it never needs charging, and it reacts instantly as soon as the tremor starts, so any user would feel a difference within seconds of wearing it.

It's not battery powered. It's incredibly simple to wear and adjust. So an individual can actually put it on and start using it without external help, and that was really a core part of the goal.

Dr. Lisk:
So, Emile, what else do you think makes Steadiwear different than previous technologies? Because I would not have thought to think of earthquake technology when developing a tremor device. How did you guys even think of that?

Mr. Maamary:
For Mark, being a structural engineer, it was something that came to his mind very clearly, and when you compare some of the other options in the market, like a powered exoskeleton or a weighted utensil, they really treat a narrow slice of tremor frequencies, right? Our

device, it's lightweight, so it feels more like a sports glove than a brace, and it allows to accommodate both fast and slow tremors. Even when a patient's tremor changes throughout the day, they don't have to do anything about it, and that makes it great for demonstration. So clinicians don't have to worry about programming or calibrating anything. And because there are no batteries, patients can keep it in their pocket and use it whenever they need to without worrying about charging it or firmware updates or anything complicated like that.

Dr. Lisk:
For those just tuning in, you're listening to *NeuroFrontiers* on ReachMD. I am Dr. Jerome Lisk, and I'm speaking with Steadiwear co-founders, Mark Elias and Emile Maamary.

Mark, I'd like to zero in on the user experience. I know you guys have done a clinical trial in the past. You've had great success with that. Tell us about the user experience prior to the clinical trial, how you guys started off trying this on patients, how you did your clinical trial, and where you are moving on from here.

Mr. Elias:
There's so much involved in the development cycle, and our philosophy is user centric. We sat with people who have tremors—whether it's essential tremor or Parkinson's—in our lab, in clinics, and community centers, and even through surveys, and we really wanted to understand the requirements. We test it and we gather all the feedback we can. For instance, some really important pieces of information from the critiques—a device that weighs heavier than precisely 300 grams will start to feel heavy on the hand. It's a mechanical loading limit that we figured out just through testing and interviews, so our ceiling was 300 grams. We realized the big pattern where users didn't want to plan their day around recharging or trying to think, "Okay, before I use the device, I have to do this," so we made the design entirely mechanical for that reason. All these elements that we designed to the product, they come from what the patient population needs through this process. And each of those requests and comments, they got turned into a requirement, and essentially, the more tests you do and you realize that the critiques start to evolve and reduce over time—that's when you know you're ready.

Dr. Lisk:
So, Emile, can you tell us about the clinical trial with Steadiwear?

Mr. Maamary:
Absolutely. In a controlled pilot with 12 people who have essential tremor, 84 percent reported that everyday tasks, like drinking, eating and writing, became noticeably easier when they were wearing the glove. Independent raters using the FTM scale, or the Fahn-Tolosa-Marin scale, recorded an average of 1.5 point reduction compared to a placebo—enough to shift many participants from moderate to mild severity in their tremors. This data was promising. We are looking forward to conducting a larger multicenter study later, and a parallel protocol for Parkinsonian tremors is in development so we can generate equally robust evidence for that population too.

Dr. Lisk:
So, Mark, you briefly mentioned quality of life with patients and the usability of the device—the ease of usability, which is very important for patients who want to use this with essential tremor or Parkinson's disease. Can you tell us a little bit more about the quality of life that people are responding to and how that's improving with these patients?

Mr. Elias:
We did that really in two phases. The first phase was the study that we mentioned where we're testing the performance of the device in the lab. So we chose three core activities—first of all, writing, secondly, drinking, and thirdly, the intention tremor test to see how that performance varies when you approach a target, so it simulates inserting keys into a lock. So we saw great results there. We asked the participants to take the device home with them and try it and evaluate, are these lab results translating into daily living improvements? And they certainly were. Those lab results seem to be a really great representation, a microcosm of how the device is going to perform in their daily life.

Dr. Lisk:
So, as we approach the end of our program, I'd like to ask you about what is next for the Steadiwear team?

Mr. Elias:
It's a really exciting time for us. At this stage, we have the Steadi-3 in the late stages of production. Any physicians listening can request a free demonstration kit. We do offer that. We want to make it as accessible as possible to individuals who want to try it. If a physician wants to demo the device, there's a recognized CPT code that reimburses the time spent for the demo and the fitting, so clinics don't necessarily absorb any extra cost.

Our larger objective moving forward is to give every person with tremor anywhere in the world a tool that lets them drink a glass of water

or sign a document without a second thought.

Dr. Lisk:
Now, you have the Steadiwear-4 in development, and currently, you're on the Steadiwear-3, so you're on the third version of this device. How is the Steadiwear-4 different from the Steadiwear-3?

Mr. Elias:
The truth is, with the Steadi-3, we had such a leap in the technological advancement that the Stead-4 is really going to be the same Steadi-3 tech, just miniaturized, and we're going to increase the level of forearm control as well for the Steadi-4, so you can expect a much smaller device as well. We don't expect it to look much different than a golf glove, so it won't be sort of protruding much at all from the hands, and it won't look much different than a simple orthosis for hand stability.

Dr. Lisk:
I want to thank my guests, Mark Elias and Emile Maamary, for joining me to discuss wearable technology aimed at mitigating the impacts of hand tremors and two of the top tremor diseases in movement disorders, which is essential tremor and Parkinson's disease, and providing patients with an alternative to medications and invasive procedures. Thanks, guys. We really appreciate you guys being on.

Mr. Elias:
Thank you so much for having us. It's been really fun and such a pleasure.

Dr. Lisk:
For ReachMD, I'm Dr. Jerome Lisk. To access this and other episodes in our series, visit *NeuroFrontiers* on ReachMD.com, where you can Be Part of the Knowledge. Thanks for listening.