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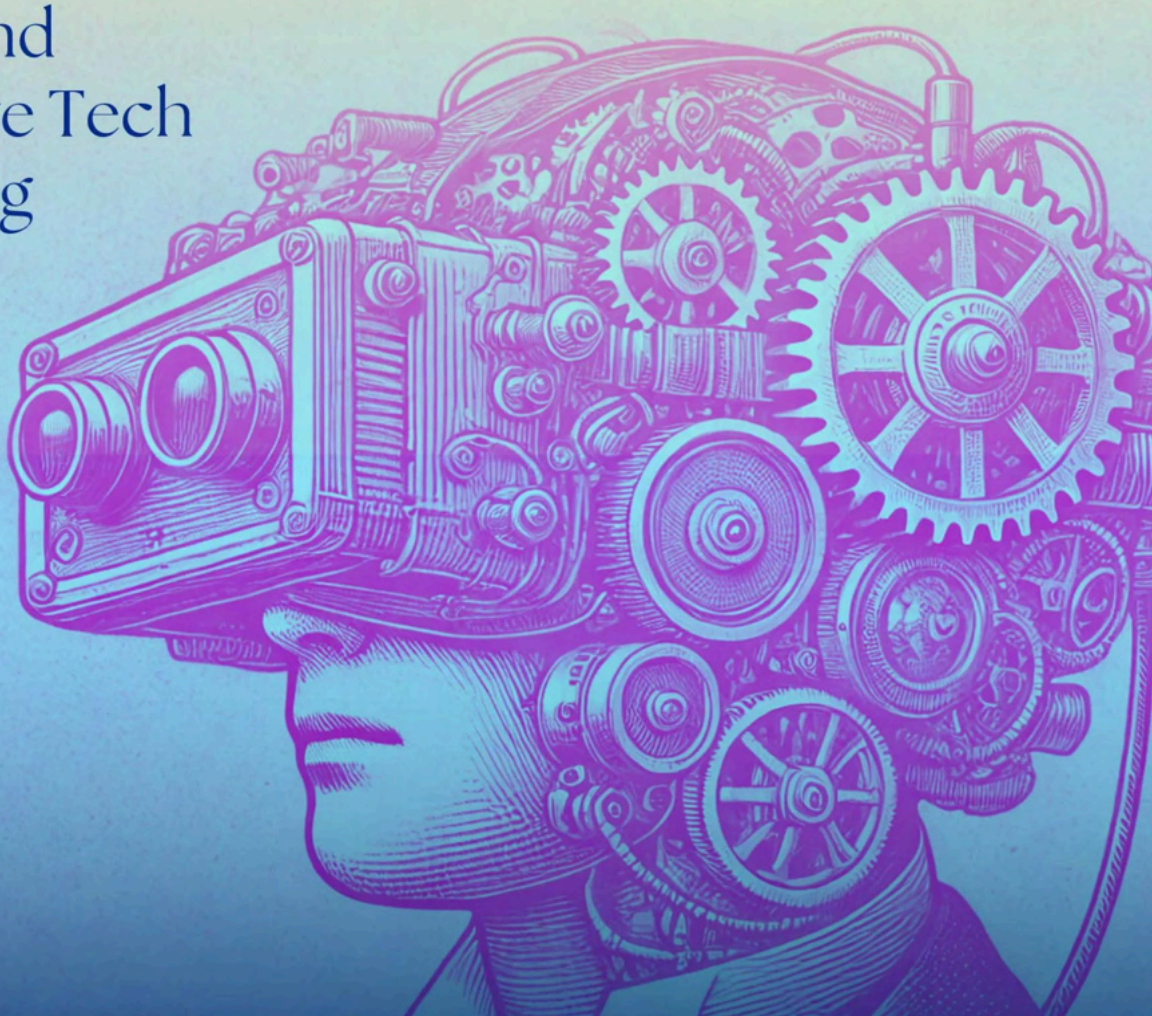
The OUTCOMES

Surgery Meets Sci-Fi

How AI and Immersive Tech Are Saving Lives



PLUS BREAKING DOWN HEALTHCARE'S INVISIBLE WALLS / **PREVENTING ILLNESS IN THE FINAL FRONTIER** / WHAT'S NEXT IN NEUROREHAB / **BRAIN NETWORK PHENOTYPES** / DON'T LOSE SIGHT EARLY DETECTION OF DIABETIC BLINDNESS

From 19th-Century Muscle Stimulation to AI-Driven Recovery

The Evolution of Neurorehabilitation

Feat. Gary Sagiv
CEO of Motion Informatics

From crude electrodes in a Parisian lab to AI-driven devices that transform lives, neurorehabilitation's evolution is one of hope, innovation, and resilience.

What Duchenne did for a few, this innovation is now doing for many —personalized, precise, and powered by artificial intelligence.

In the mid-19th century, a French neurologist named Guillaume Duchenne stood in a dimly lit room in Paris, watching in fascination as a patient's arm twitched. He held crude electrodes to the man's skin, using electrical currents to animate muscles long paralyzed.

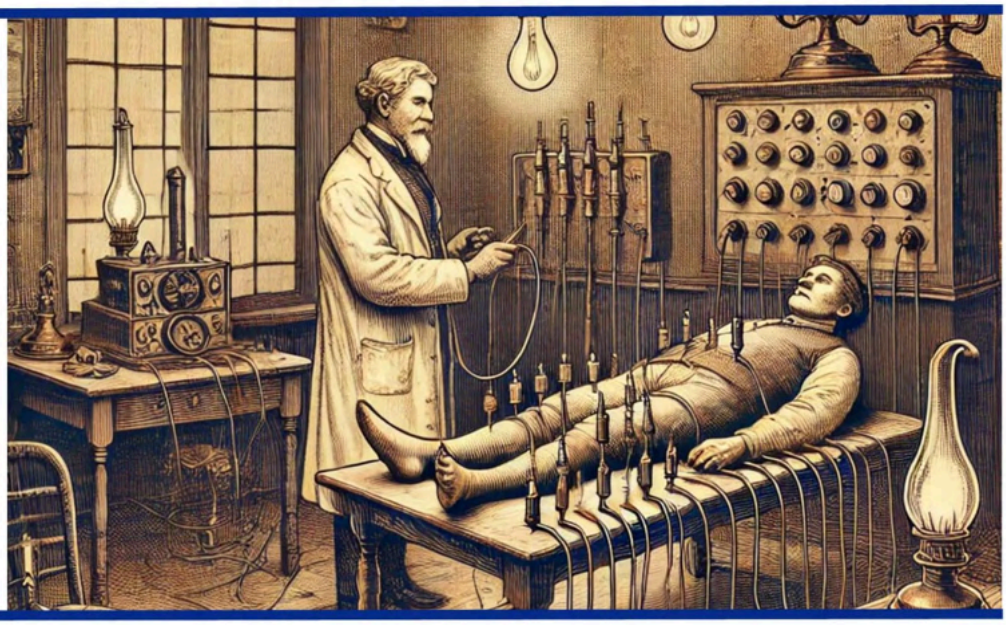
It was a breakthrough—the first time electricity had been used to reawaken dormant muscles. Duchenne's device was little more than an electrical generator, but it sparked a revolution. His work became the foundation for neuromuscular rehabilitation, paving the way for modern treatments that would shape the next 150 years of medical science. Now, imagine a different scene, centuries later: a sleek, high-tech rehabilitation center in California. Here, John, a stroke survivor in his mid-fifties, is undergoing treatment with a device called the Stimel-03, developed by the healthcare startup Motion Informatics. Instead of crude electrodes, sensors adapt to his body in real-time, delivering customized electrical pulses perfectly in sync with his biological rhythms. John watches as his once-paralyzed left leg slowly starts to move. The feedback is instantaneous, the results dramatic. This is neuromuscular rehabilitation in the 21st century—personalized, precise, and driven by artificial intelligence.

In Duchenne's Paris, the world was on the cusp of a technological a revolution. Telegraphs were connecting continents, the first light bulb flickered into existence, and doctors were just beginning to explore the possibilities of electricity in medicine. Duchenne believed that if he could harness electrical currents correctly, he might restore movement in paralyzed limbs.

His discoveries, though primitive, were profound. But Duchenne could not have imagined how his work would echo through the centuries, culminating in devices like the Stimel-03.

While Duchenne was experimenting with electrical stimulation,
half a world away, another transformation was underway—this time in the U.S., where modern medical science was beginning to take root. By the mid-20th century, this small seed of an idea had blossomed into a sprawling field, as doctors sought new ways to stimulate muscles and nerves, particularly in polio survivors. Muscle reeducation and crude electrical devices were the best available options, but recovery was slow, and results were inconsistent.
Today, we have a similar challenge: how do we optimize these treatments, so every patient has the best chance of recovery? Enter the Stimel-03, a sleek, intelligent device that builds on the work of Duchenne and others, adapting electrical signals to match the patient's unique body rhythms. Through BioRhythmIQ technology, the device ensures that the electrical pulses mimic the body's natural patterns, providing real-time neuromuscular stimulation. What Duchenne did for a few, this device is now doing for many, with far more accuracy and personalization.

The Lens of the Present: The Challenge of Customization



One of the enduring challenges of neurorehabilitation has always been its one-size-fits-all approach. In Duchenne's time, patients received the same treatment regardless of the specifics of their injury or paralysis. This persisted for decades, with devices that stimulated muscles generically, producing inconsistent results.

Imagine the frustration of a stroke patient, like John, trying to recover from paralysis. The technology of the past gave vague hope but rarely tangible results. Traditional electrical stimulation devices worked, but they couldn't adapt to the nuances of individual recovery. It was like trying to fix a watch with a hammer—imprecise and often ineffective. What was missing was a tool that could tailor its output to the patient's specific needs.

That's where Motion Informatics comes in. Their device adapts in real-time, syncing with the patient's unique physiology. By doing so, it provides personalized electrical stimulation—delivering just the right amount of energy, at the right moment, to the right muscle. For healthcare professionals, this means faster, more effective recovery. For patients like John, it means regaining independence. After six months with their device, John had regained 80% of his lost mobility. He could walk, unaided, for the first time since his stroke.

John's story is part of a much larger one—a story that began in Paris with Duchenne, but that has been rewritten by every generation of scientists and doctors since. From early experiments with electricity, to crude medical devices in the 1950s, to the AI-driven technology of today, neurorehabilitation has been shaped by a single question: how do we help the human body repair itself?

Motion Informatics is answering that question by integrating technology that Duchenne could only have dreamed of. With BioRhythmIQ, the Stimel-03 constantly monitors the patient's body, providing a level of customization that would have been impossible just a few years ago. But the future looks even more promising. In 2025, Motion Informatics will launch the Spatial StimelMD, which combines AI with augmented reality (AR). Imagine not just stimulating muscles, but watching as they move in real-time. Patients will be able to visualize their own recovery, correcting movements as they happen. With the guidance of AI and the immersive power of AR, the rehabilitation process becomes an interactive experience, empowering patients to take control of their recovery.

We tend to think of technological progress as linear, a steady march toward improvement. But in truth, it's often a conversation across centuries, with past discoveries influencing future innovations. Guillaume Duchenne's work was not a dead-end; it was the beginning of a dialogue that continues today.

We now know more about the human body than Duchenne ever could. We have tools that adapt, learn, and respond to our biological rhythms.

But the question remains: How do we push this even further?

Motion Informatics is betting that AI and AR will be the next leap forward, enabling healthcare professionals to treat patients with even more precision and engagement.

For now, the Stimel-03 is already transforming lives. It's helping people like John to walk again, restoring mobility to stroke survivors, and giving healthcare professionals the tools to tailor treatments to individual needs. But as we look to the future, we see the potential for even more dramatic changes.

Perhaps one day, we'll look back at the Stimel-03 as just another step in a journey that started in that dimly lit room in Paris.

In the end, the story of neurorehabilitation is one of continuous evolution. From Duchenne's early experiments to today's AI-driven devices, we see the same impulse: to help the human body heal itself.

And with each new breakthrough, we move a little closer to achieving that goal.

From Duchenne's dimly lit experiments to AI-powered breakthroughs, the journey of neurorehabilitation continues to redefine what's possible.