

RAPID RECOVERY • INJURY PREVENTION • DRUG-FREE PAIN RELIEF

WEARTECH™

THE WORLD'S MOST ADVANCED TECHNOLOGY & DELIVERY SYSTEM
FOR MICROCIRCULATION AT THE CELLULAR LEVEL



Sport-Z™

DC STIMULATOR

A NEW STANDARD IN RECOVERY
PERFORMANCE & DRUG-FREE PAIN RELIEF

FEATURING

Intelligent Textiles®
for Sports Medicine

SCIENTIFIC WHITE PAPER | For Athletes & Sports Medicine Professionals

Sport-Z™ DC Stimulator

A New Standard in Recovery, Performance & Drug-Free Pain Relief

Presented by WearTech™

Featuring Intelligent Textiles® for Sports Medicine



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1. Executive Summary

The Sport-Z™ DC Stimulator represents a fundamental shift in how athletes approach recovery, pain management, and performance. As the world's first and only **FDA-cleared device** to deliver **direct current (DC) microcurrent therapy below sensory threshold**, Sport-Z™ operates on a biological level—**not just a neurological one**.

By mimicking the body's own electrochemical healing signals, Sport-Z™ enhances **ATP production, reduces inflammation, improves circulation**, and promotes **drug-free pain relief**—even while you sleep.

Unlike traditional TENS devices that use AC to mask pain through sensory stimulation, Sport-Z™ operates silently, **below the sensory threshold**, and with profound **biological effects**. This whitepaper explores the science, clinical validation, and performance applications of this innovative technology.

2. Introduction

Athletic performance doesn't end at training—it's what happens between sessions that determines how far the body can go. Traditional modalities (ice, compression, stretching, massage) have value but often fall short of promoting **deep tissue regeneration** or addressing the **cellular basis of fatigue, edema, and pain**.

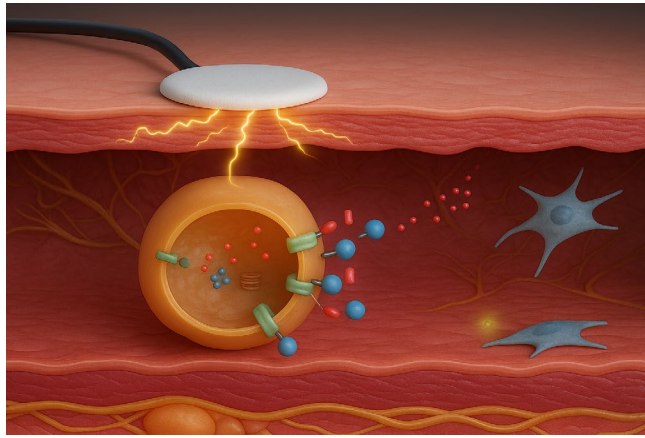
The **Sport-Z™ DC Stimulator** introduces an entirely new category of recovery: **sub-sensory, biologically intelligent therapy** that mirrors the body's natural healing signals. Using **ultra-low direct current (DC) in microamperes**, it engages directly with the **cell membrane** to support **ion exchange, ATP synthesis, protein synthesis**, and **tissue repair**—all without discomfort or sensory stimulation. Designed for **passive use**, Sport-Z™ promotes deep, cellular healing and pain relief at the source.

3. Mechanism of Action

This precise form of stimulation initiates a cascade of **bioelectric events** beginning at the **cell membrane** and extending through **intracellular signaling pathways**.

Through the **modulation of membrane potential**, **voltage-sensitive ion channels** are triggered, leading to **increased calcium influx, insulin receptor activation**, and ultimately the **upregulation of processes vital to tissue regeneration**. The result is **enhanced protein synthesis, fibroblast proliferation**, and the targeted release of **vascular endothelial growth factor (VEGF)**, which collectively contribute to **accelerated healing and improved functional recovery**.

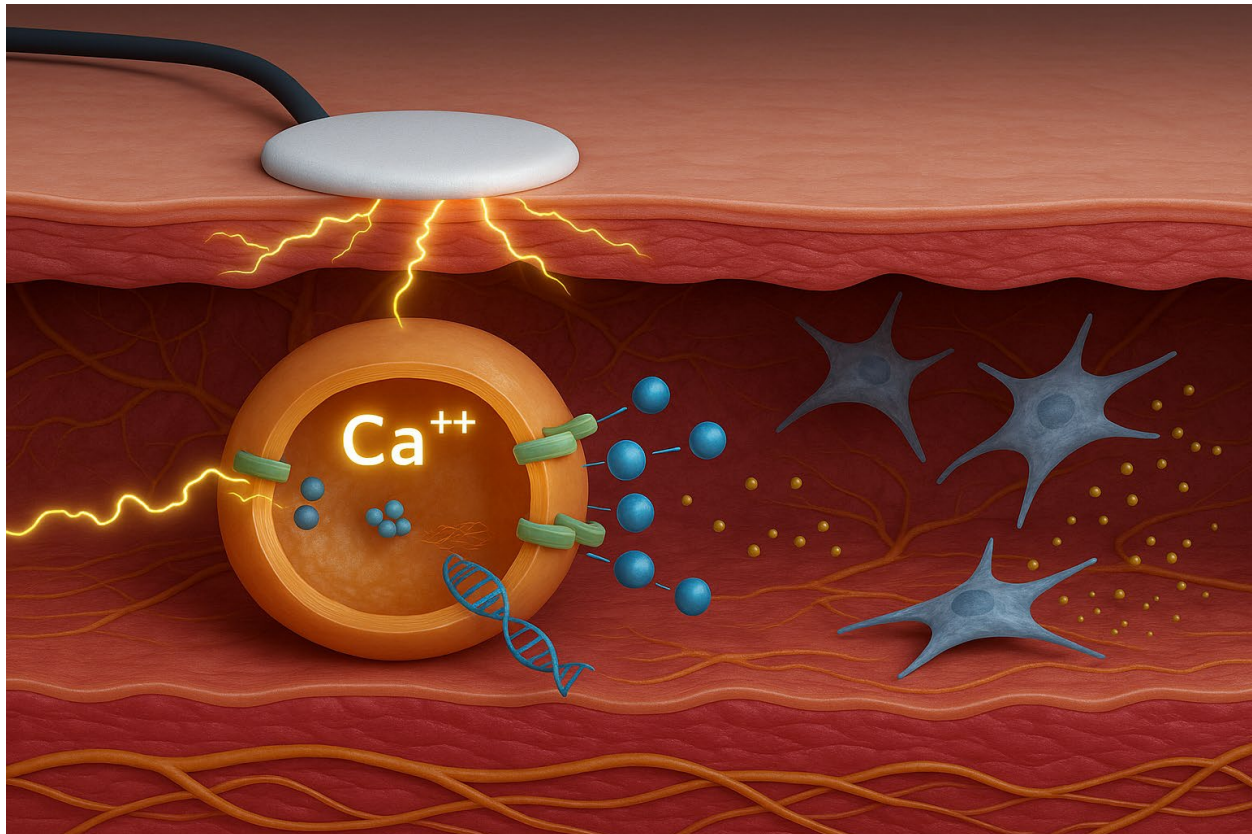
This section outlines the **10-step bioelectrical cascade** initiated by Sport-Z™ that underpins its **regenerative effects**.



- 1) Electrical current applied
- 2) Cell membrane potential is altered
- 3) Voltage sensitive channels in cell membrane are opened
- 4) Increased Ca^{++} uptake
- 5) Increased intercellular Ca^{++} level
- 6) Insulin receptor sites are uncapped
- 7) Increased insulin binding occurs
- 8) Enhanced protein and DNA synthesis results
- 9) Enhanced fibroblast formation
- 10) Healing promote by the release of VEGF

Key physiological effects of DC microcurrent therapy include:

- ⚡ **ATP Production** – Up to 500% increase in mitochondrial energy (Cheng et al.)
- 🩸 **Improved Microcirculation** – Enhances capillary perfusion and oxygenation
- ❄️ **Reduced Edema** – Supports lymphatic drainage and fluid balance
- 🧬 **Protein Synthesis** – Triggers muscle repair and tissue remodeling (Kolimechkov, Choo)
- 🧠 **Pain Modulation** – Engages endogenous opioid and neurochemical pathways without discomfort (Yi, Iijima)



✦ *Studies confirm that DC microcurrent enhances **membrane transport**, facilitating **nutrient uptake**, **waste removal**, and **ion homeostasis**, accelerating regeneration without discomfort.*











4. Clinical Evidence

Recent clinical studies demonstrate the potential of Sport-Z™ in a wide range of pain and recovery contexts.







- **Yi et al. (2021)** – Microcurrent significantly improved pain, ROM, and grip strength post-rotator cuff repair
 - **Calcaterra et al. (2024)** – RCT: DC microcurrent reduced acute knee pain and improved joint function over 3 weeks
 - **Doe et al. (2023)** – Accelerated recovery in a hamstring tear case using microcurrent therapy without interrupting PT
 - **Golaszewski et al. (2009, 2011)** – fMRI evidence of increased motor cortex excitability after whole-hand microstimulation
 - **Wang et al. (2023)** – Ongoing meta-analysis protocol on knee OA pain and function via microcurrent
 - **Armstrong, Lampe, Peters, Houghton, and Cosmo** – Historical foundation in wound healing, edema reduction, and pain relief
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4a. Scientific Mechanisms Validated by Research

Validated Biological Effects of DC Microcurrent Therapy

-  **Boosts ATP Synthesis** – Up to 500% increase in cellular energy production supports tissue repair and regeneration (Cheng, Kolimechkov, Choo)
 -  **Activates Protein Synthesis** – Stimulates muscle remodeling, growth, and post-exercise recovery (Kolimechkov, Choo)
 -  **Enhances Membrane Transport & Ion Homeostasis** – Improves cellular metabolism and restores electrochemical balance
 -  **Neurochemical Modulation** – Engages opioid, serotonin, and dopamine pathways; increases motor cortex excitability (Iijima, Golaszewski)
 -  **Improves Perfusion & Microcirculation** – Accelerates reoxygenation and vascular recovery post-exertion (Piras, Smith)
 -  **Reduces Inflammation & Edema** – Supports lymphatic drainage and fluid balance for faster recovery
 -  **Supports Cardiovascular Efficiency** – Enhances heart rate recovery and systemic oxygen kinetics (Smith et al., 2025)
 -  **Stimulates Hormonal Response** – Triggers catecholamine release and lipolysis (Choo et al., 2023)
 -  **Biological Pain Resolution** – Reduces pain at the source without sensory stimulation or medication (Yi et al., 2021)
 -  **Sleep-Compatible Use** – Sub-sensory stimulation enables overnight recovery with no discomfort
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5. Product Applications for Athletes

-  **Improves Circulation** – Enhances blood flow post-training (Piras, 2021)
-  **Accelerates Muscle Recovery** – Promotes protein synthesis and regeneration; Relieves DOMS - Delayed Onset Muscle Soreness (Kolimechkov, Choo)
-  **Reduces Edema & Inflammation** – Helps manage swelling and pain from overuse or injury
-  **Drug-Free Pain Relief** – Proven in RCTs and clinical case studies (Yi, Calcaterra, Doe)
-  **Boosts ATP for Healing** – Energizes tissue repair and reduces cellular fatigue
-  **Passive Use During Sleep** – Sport-Z™ works silently, while the body rests






6. Competitive Comparison

Feature	Sport-Z™ DC	TENS/NMES	Compression Boots
Current Type	DC (µA)	AC (mA)	Mechanical
Cellular Healing	✔ Yes	✗ No	✗ No
Sensory Activation	✗ None	✔ Tingling	✔ Pressure
Overnight Use	✔ Yes	✗ No	✗ No
FDA Cleared	✔ Yes	✔ Yes	⚠ Depends
Drug-Free Pain Relief	✔ Proven	⚠ Temporary	⚠ Temporary
Muscle Recovery	✔ Validated	✗ Limited	⚠ Moderate

7. Wearable Innovation: Intelligent Textiles® - World’s First Garment Electrodes

Intelligent Textiles® by WearTech™ are the world’s **first full-surface garment electrode system** designed specifically for sports medicine and recovery. Developed in partnership with the **U.S. Air Force Research Laboratory**, these high-performance textiles offer an unmatched blend of scientific precision, wearable comfort, and functional design.

Woven from **silver-nylon and Dacron fibers**, Intelligent Textiles® deliver **exceptional conductivity** with less than **1 ohm per cm²** of skin resistance - far superior to traditional carbon or silver chloride electrodes (typically 40–80 ohms). These **full-coverage electrodes** wrap entire regions of the body delivering **more complete, deeper electrical penetration**. The **family of Intelligent Textiles®** includes:

-  Gloves
-  Sleeves and stockings
-  Socks
-  Leggings
-  Wraps and orthopedic bracing

To ensure optimal conductivity and comfort, **TheraCream™** is required. This proprietary, skin-conditioning enhancer promotes deeper signal penetration by making the skin more "electricity-friendly," improving both comfort and therapeutic outcomes.

Key Features

- ⚡ **Highly Conductive** – Silver-fiber electrodes offer <1 ohm/cm² resistance
 - 📊 **Consistent Performance** – Maintains conductivity for over 90 days
 - 🧤 **Comfortable Compression** – Form-fitted design promotes user compliance
 - 🔄 **Durable & Washable** – Long-lasting, reusable for repeated daily use
 - 🧴 **TheraCream™ Required** – Enhances signal delivery and comfort
 - ✅ **FDA & ISO Cleared** – Clinically safe and biocompatibility tested
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8. Conclusion

The **Sport-Z™ DC Stimulator** offers a next-generation solution for athletes, professionals, and recovery specialists seeking a **non-invasive, drug-free, and clinically supported** approach to injury prevention and rehabilitation.

This is not just about feeling better—it's about healing better. Validated by **peer-reviewed research, legacy clinical studies, and real-world use by the U.S. Air Force and elite professionals, Sport-Z™ stands at the forefront of biologically intelligent recovery.** It's not about pushing harder—it's about **recovering smarter.**

9. References (*Curated and Recent*)

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