Health Medicine And Biotechnology

Bio-Magnetic Device To Enhance Mammalian Tissue Repair (MSC-TOPS-112)

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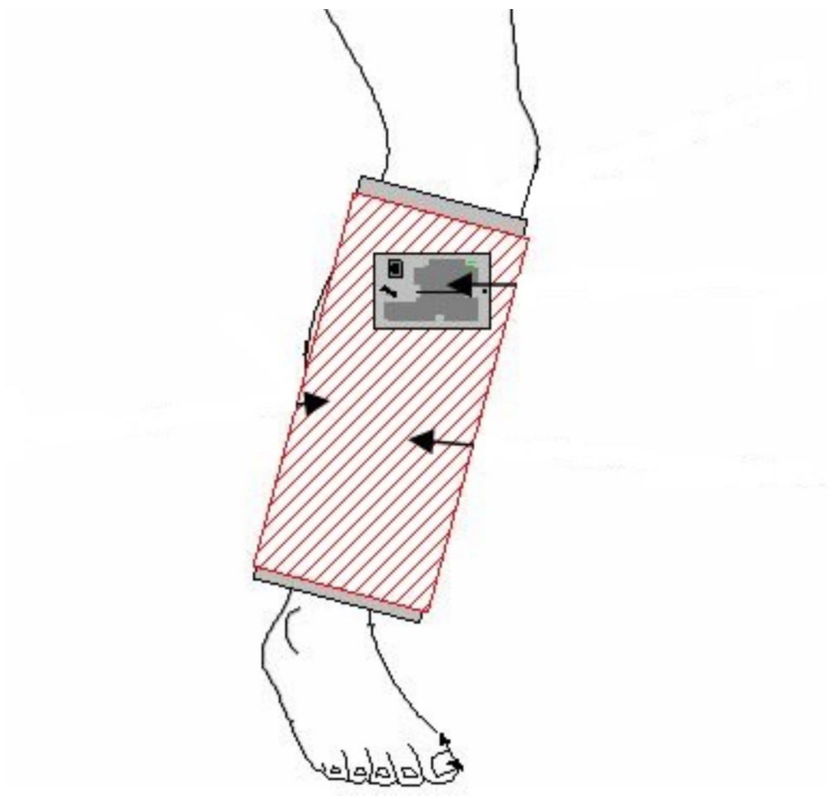
Portable sleeve uses electromagnetism to manipulate blood vessels

Overview

Innovators at NASA Johnson Space Center have designed a therapeutic device that applies a time-varying electromagnetic force to damaged mammalian tissue and is intended to enhance healing. The device is mainly comprised of a sleeve that encircles the affected appendage and operates using an internal electromagnetic coil. The sleeve encircles the target appendage and applies a carefully titrated electromagnetic field for a predetermined amount of time using only a compact commercially available electrical generator, and a 9-volt battery. The device is easily portable and intends to mend soft tissue and enhance the repair of bone fractures. The Apparatus for Enhancing Tissue Repair in Mammals is technology readiness level (TRL) 2 (technology concept and/or application formulated) and is now available for patent licensing. Please note that NASA does not manufacture products itself for commercial sale.

The Technology

Most magnetic therapy research and resulting devices have centered around pulsed unidirectional bioelectric systems. The technology available here for licensing utilizes a square-wave time-varying electrical current, which generates an electromagnetic field, via a wound coil incorporated into a sleeve and encircles the affected appendage. An external and commercially available time-varying compact electrical generator connects to the wound coil within the sleeve and is powered by a 9-volt battery. Prior industry attempts to use electromagnetic therapy on mammalian tissue have historically applied higher than necessary levels of electromagnetism, typically at 50 gauss or more. Researchers found that by inducing a Fourier-curve, time-varying electromagnetic wave at levels within 0.05 0.5 gauss for a pre-determined time-period, was optimum to achieve successful mammalian tissue regeneration. It is theorized that magnetic fields can alter the flow of positively charged calcium ions that interact with the muscles around small blood vessels causing them to relax. This effect in turn, causes constricted blood vessels to dilate, and dilated blood vessels to constrict. Depending upon the type of injury, enhanced tissue repair may occur through the suppression of inflammation, or the increase in blood flow.



Benefits

- Portable: small form-factor requires minimal space for implementation
- Lightweight: requires minimal effort to transport
- Inexpensive: main component generator is commercially available
- Low energy consumption: system runs off of simple 9-volt battery
- Versatile: main component sleeve can be adapted to various mammalian appendages
- Easy to assemble/use: system requires only two connections and two switches

Applications

- Contemporary Medicine: may expedite healing of hard and soft tissue in humans
- Veterinary Medicine: may expedite healing of hard and soft tissue in other mammals

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Technology Details

Category
health medicine and biotechnology

Reference Number
MSC-TOPS-112

Case Number(s)
MSC-23981-1
MSC-23981-2

Papers

Patent(s)
7,179,217 7,601,114

Tags: bio-magnetic | tissue-repair | healing | electromagnetic | portable | square-wave | time-varying | Fourier-curve | mammalian | regeneration | inflammation | calcium ions