NEAR EAST UNIVERSITY
Faculty Of Engineering
Department Of Biomedical Engineering

2012-2013 Academic Year Graduation Project

ELECTRICAL MUSCLE STIMULATOR " BIOSTIMULATOR "

Introduction

-Electrical muscle stimulation (EMS) is an internatonally accepted and proven way of treating muscular injures.

-It works by sending eletronic pulses to the muscle that need treatment and this causes the muscles to exercise passively.

-EMS may be able to directly help with headache and knee pain also.
EMS can be used as a training , therapeutics and cosmetic tool.

-EMS has received increasing attention in the last few years because it has the potential to serve as a strength training tool for healthy subjects and athletes.

-Our project is working on musculoskeletal system and nervous system .

Electricity in human body

-Electricity is flow of electric charges ,(and electric charges come at negative or positive variety, and they are at atomic level) our body because that electrity flow through copper wires,obviously there is no copper wires ,we are not set up for kind of electricty .

-What we have in body is nerves and nerves carry electric current and electric charges in human body ,electric charge in human body are present on charges atoms, we call charges atoms ion,those charges can be either positive or negative,.

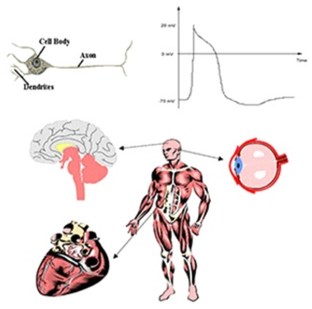
Human Biopotentials

-The human body is beautifully complex consisting of mechanical, electrical, and chemical systems that allow us to live and function.

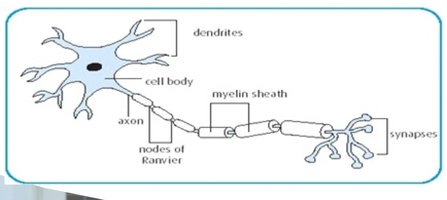
-Elictrical systems include the electrical potentials that propogate down nerve cells and muscle fibers. These potentials are responsible for brain function , muscle movement , cardiac function, eye miovement , sensory function andd many other events in the body.

-These electrical potentials are created by the flow of ions in and out of cells. The flow of these charged ions creates potential differences between the inside and outside of cells.

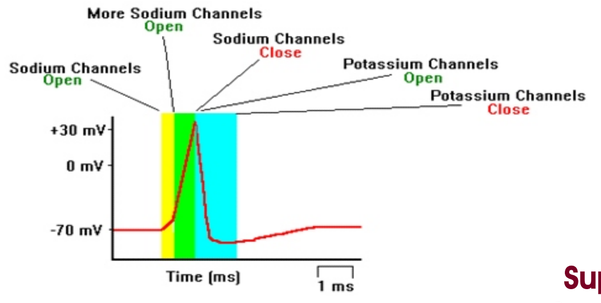
-These potential differences are called biopotentials. Biopotentials can be measured with electrodes and electronic instrumentation to provide insight into the functioning of various biological systems.



-A typical nerve cell is made up of a cell body, an axon, The cell body contains the nucleus of the cell , the axon which is responsible for transmitting he action potential along the cell m and the dendrites which are responsible for receiving inputs to the cell in the form of neurotransmitters.



Nerve cell

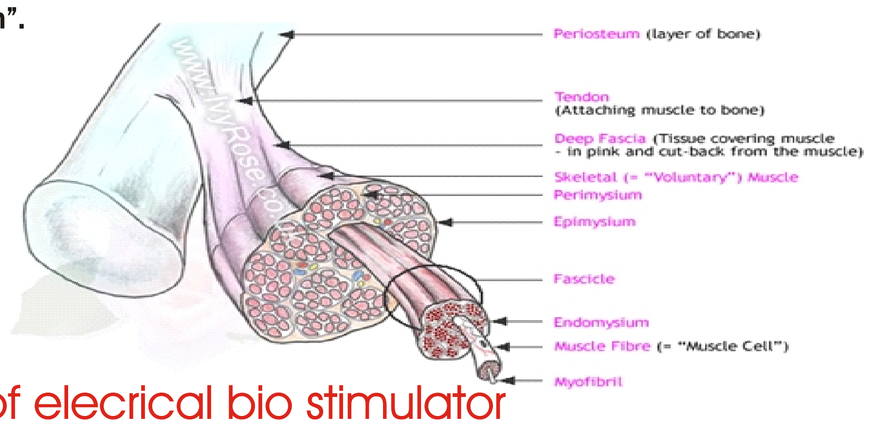


Typical action potential

Structure of muscles

-Skeletal muscles consist of 100,000s of muscle cells that are also known as "muscle fibres". These cells act together to perform the functions of the specific muscle of which they are a part.

-Skeletal muscle is the major part in addition with nerves that our project working in it "stimulation".



Uses of elecrical bio stimulator

1. Relaxation of muscle spasms
2. Prevention of atrophy
3. Increasing local blood circulation
4. Muscle re-education
5. Immediate post-surgical stimulation of calf muscles to prevent venous thrombosis
6. Maintaining or increasing range of motion

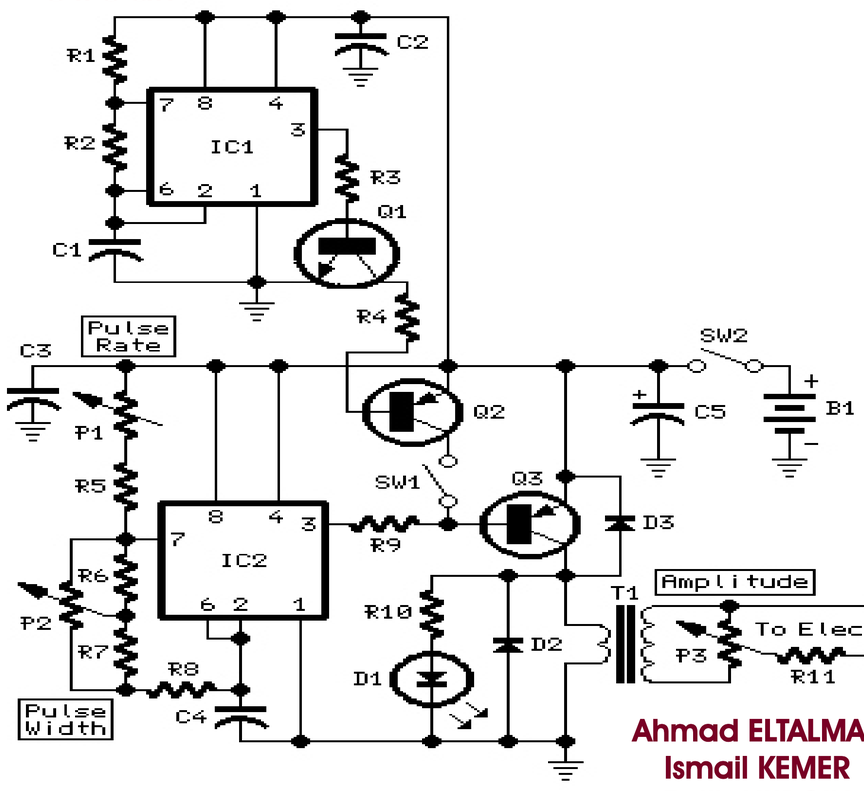
How does it work

-The EMS units send comfortable impulses through the skin that stimulate the nerves in the treatment area.

-Because the stimulation of nerves and muscles may be accomplished by electrical pulses this modality can help prevent disuse atrophy.

-Accordingly, incapacitated patients can receive therapeutic treatment to create involuntary muscle contractions thereby improving and maintaining muscle tone without actual physical activity.

Circuit



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