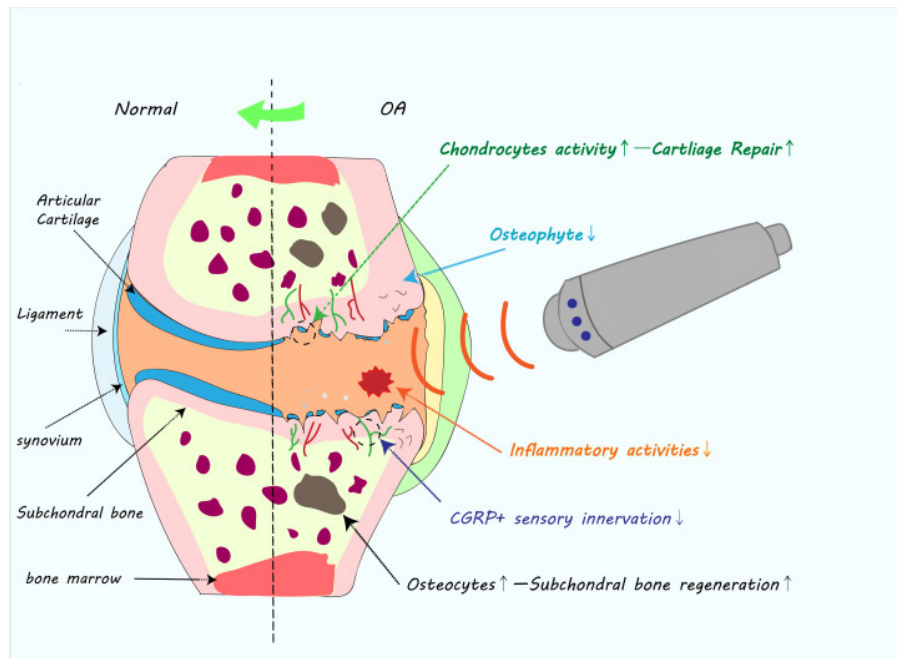


Acoustic/Magnetic Stimulation Healing Array

Background

Percussive massage treatment (e.g., Theragun) has been popularized in recent years for pain reduction and muscle recovery. Studies also show that range of motion can be improved after treatment. The goal is to extend this type of treatment utilizing acoustic waves instead of physical impact to couple into the body. Magnetic stimulation will be used as well. Both have been shown to improve osteoarthritis symptoms by several mechanisms.



Goal

Produce a wearable array of acoustic speakers and magnetic coils to be used for muscle and joint recovery. The arrays will have configurable waveforms and adjustable focusing capabilities. The final version includes a mobile app that wirelessly controls such features and the battery-powered wearable device. Validation of results will be accumulated along the way.

References

- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7675623/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7670564/>
- <https://www.nature.com/articles/s41598-017-09892-w>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7297361/>
- <https://news.nus.edu.sg/novel-medical-device-developed-by-nus-researchers-harnesses-magnetic-field-to-speed-up-muscle-recovery/>

Design

1	source	Single-frequency (CW) voltage source
2	electronics	Small light-weight amplifier
3	output	(a) loudspeaker arrays (b) magnetic-coil arrays

1. First version (simple, preliminary)

1	source	function generator
2	electronics	function generator
3	output	(a) loudspeaker arrays (b) magnetic-coil arrays
4	notes	direct connection

2. Laptop version (medium)

1	source	laptop with CW-generation software
2	electronics	simple amplifier with blue-tooth link
3	output	(a) loudspeaker arrays (b) magnetic-coil arrays
4	notes	remote, direct-110v version

3. Cellphone version (final)

1	source	cellphone with CW-generation app
2	electronics	simple amplifier with Bluetooth link
3	output	(a) loudspeaker arrays (b) magnetic-coil arrays
4	notes	remote, battery-power version

Tasks

1	construction of micro-loudspeaker arrays
2	construction of magnetic-coil arrays
3	amplifier with Bluetooth link capability
4	frequency database for various ailments
5	user interface for frequency selections
6	integration and experiments

Deployments

1	Upper and lower body
3	Shoulders and neck
4	Arms and legs
5	Hands and feet
6	Elbows and ankles
7	Beds
8	Table top