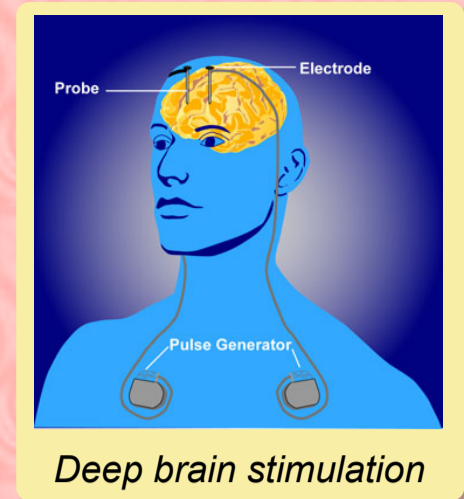


When ELF-EMF (magnetic fields and/or electric currents) and RF-EMF are applied to living tissue for therapeutic effects, the signal characteristics and field strengths are produced and directed carefully. When EMF therapies are appropriately selected and properly executed, they may elicit beneficial effects. Not all studies of EMF modalities show benefit, but many do; some demonstrate no, mixed, or adverse effects.

This map offers links to studies and reports -- of proposed mechanisms, cases, results -- but also brings to mind important questions. What occurs in tissues when ambient EM exposures are high, variable, nonspecific, intermittent, mixed, and cumulative? What can we learn about the effects of uncontrolled exposures by studying the effects of controlled ones?

DARPA GRANTS: ELECTRX PROGRAM



BIOINITIATIVE REPORT 2012 ELECTROMAGNETIC MEDICINE: NON-INDUCTIVE, NON-THERMAL MODALITIES

MAGNET THERAPY OVERVIEW

MECHANISMS, APPLICATIONS, THERAPEUTIC ME

PULSED EMF CONTRAINDICATIONS

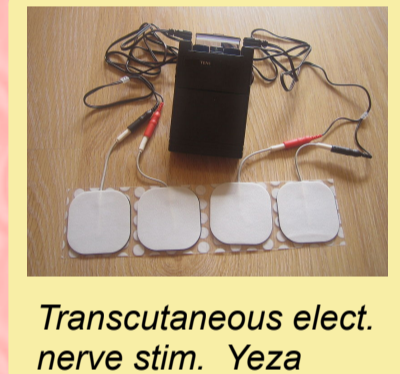
Articles

- [Dr. Pawluk](#)
- ["Ask Your Doctor"](#)
- [Dr. Sircus Overview](#)
- [Deep Brain Stimulation](#)
- [MET in Medical Practice](#)
- [Pulsed EMF, Dr. Pawluk](#)
- [Vagus Nerve Stimulation](#)
- ★ [Deep brain stim, chronic pain](#)
- [Transcranial Magnetic Stimulation](#)
- [Microcurrent Electrical Therapy \(MET\)](#)
- [Transcranial Direct Current Stimulation](#)

Dr. Pawluk sells therapeutic EMF devices.

"In the long run, [weak-field exposures for medical purposes] may be the only way to prove the case for biological plausibility among those who presently choose to deny that weak field low frequency magnetic fields do indeed interact with biological systems." Abraham R. Liboff, Ph.D.

Some devices generate heat for therapeutic effect, but most therapeutic devices are non-thermal.



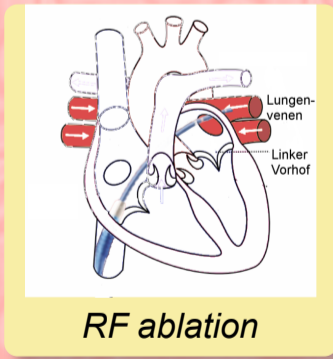
EMF AND THERAPEUTIC MODALITIES: WOUND HEALING, INFLAMMATION, TISSUE GROWTH, AND MORE

Studies

- [RF, Skin tightening](#)
- [ELF, wound healing](#)
- [TENS, sarcoma pain](#)
- [TENS, dysmenorrhea](#)
- [ELF-EMF, NO, wound healing](#)
- [EMFs modulate IL2, cytokines](#)
- [MW, hyperthermia, lung cancer](#)
- [MW hyperthermia, brain tumors](#)
- [EMF plus magnetic nanoparticles](#)
- [ELF electrical stimulation, epilepsy](#)
- [EMFs act via VG calcium channels](#)
- ★ ● [DC, specific frequencies, tinnitus](#)
- [TEAS vs. PEMF, electro-acupuncture](#)
- ★ ● [EL-EMF, modulated, neurogenesis](#)
- ★ ● [RF, factors affecting type of outcome](#)
- [ELF-EMF, variations in exposures, effects](#)
- [RF, targeted to gold nanoparticles, cancer](#)
- ★ ● ["Thomas-EMF" \(freq. modulated\), cancer](#)
- [Tissue softening, freq.-specific microcurrent](#)
- [EMF, vascularization reduced in tumor, necrosis](#)
- ★ ● ["Tumor treating fields", alternating EF, kHz, cancer](#)

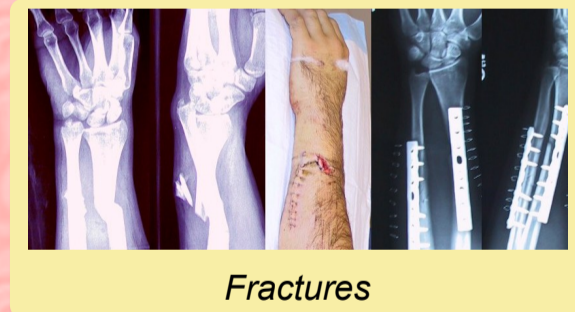
Studies PEMF

- [PEMF upreg. angiogenesis](#)
- ★ ● [Skin rejuvenation, no scarring](#)
- [PEMF upreg. NO, induce perfusion](#)
- [PEMF, plastic surgery, pain, edema](#)
- [No change in treated varicose ulcers](#)
- [PEMF diabetes, upreg. myofibroblasts](#)
- [Angiogenesis, upreg. bone growth factors](#)
- [Corneal injury healing, PEMF many effects](#)
- [PEMF no effect on bone healing, meta-analysis](#)
- [To date, no mechanisms certain, no standards exist](#)
- [Healing colon anastomosis, possible collagen mechanism](#)
- ★ ● [Modifies gene expression, reduce inflammation markers](#)



Other Links

- [Bioelectromagnetics Journal](#)
- [Insurance billing for Alpha-Stim](#)
- [TED Talk, electric fields, cancer](#)
- [BioInitiative, 2007, EMF Therapeutics](#)



Related Maps

- [EMF Bio-Effects Overview](#)
- [EMF: Proposed Mechanisms](#)

MECHANISMS OF THERAPEUTIC TISSUE RESPONSE

Induced NO, vasodilation
Cytokine, neurotransmitter modulation
Stimulation of voltage gated ion channels
Induced angiopoietin, angiogenesis
Induced FGF, **myofibroblasts**, collagen deposition
Induced cellular polarity, migration of elements
Hyperthermia, heat shock proteins, ablation

EM THERAPEUTIC MODALITIES

PEMF
TENS
DBS, VNS, CES
rTMS
ECT
RFA
TEAS
FS Microcurrent
MW Hyperthermia

POSSIBLE INDICATIONS FOR EMF THERAPIES

Fracture non-union
Delayed wound healing
Reduction of post-surgical pain
Reduction of post-trauma pain
Neural stimulation in rehabilitation
Induced fever for cancer therapy
Targeted hyperthermia with nanoparticles
Modulation of depression, anxiety
Cosmetic skin tightening
Tumor and aberrant neural tissue ablation

LEGEND

- Apparent beneficial response
- Studies show either response
- Apparent adverse response
- No response observed