Importance of current in treatment and Uses

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Why Electric Current is Used in Treatment?

Electric current can stimulate nerves and muscles

It can reduce pain (Gate control theory + endorphin release)

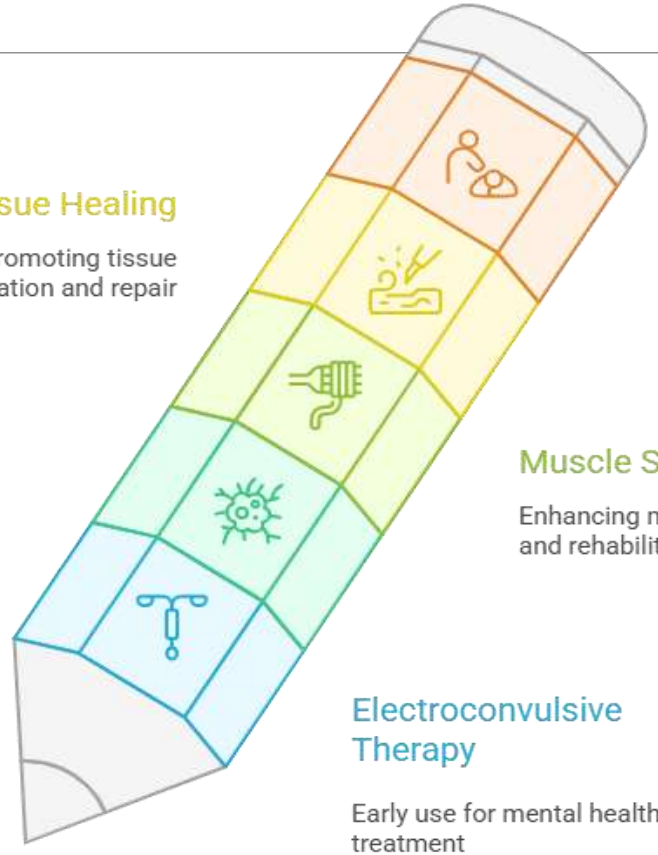
Promduces heat inside tissues (deep heating)

Helps in healing of wounds, bones, and tissues

Can carry medicine inside the body (iontophoresis)

Safe when proper dosage (intensity, frequency, duration) is used

The Role of Electrical Current in Medicine



Tissue Healing

Promoting tissue regeneration and repair

Pain Alleviation

Reducing pain through electrical modulation

Nerve Stimulation

Modulating nerve activity for therapeutic effects

Muscle Stimulation

Enhancing muscle function and rehabilitation

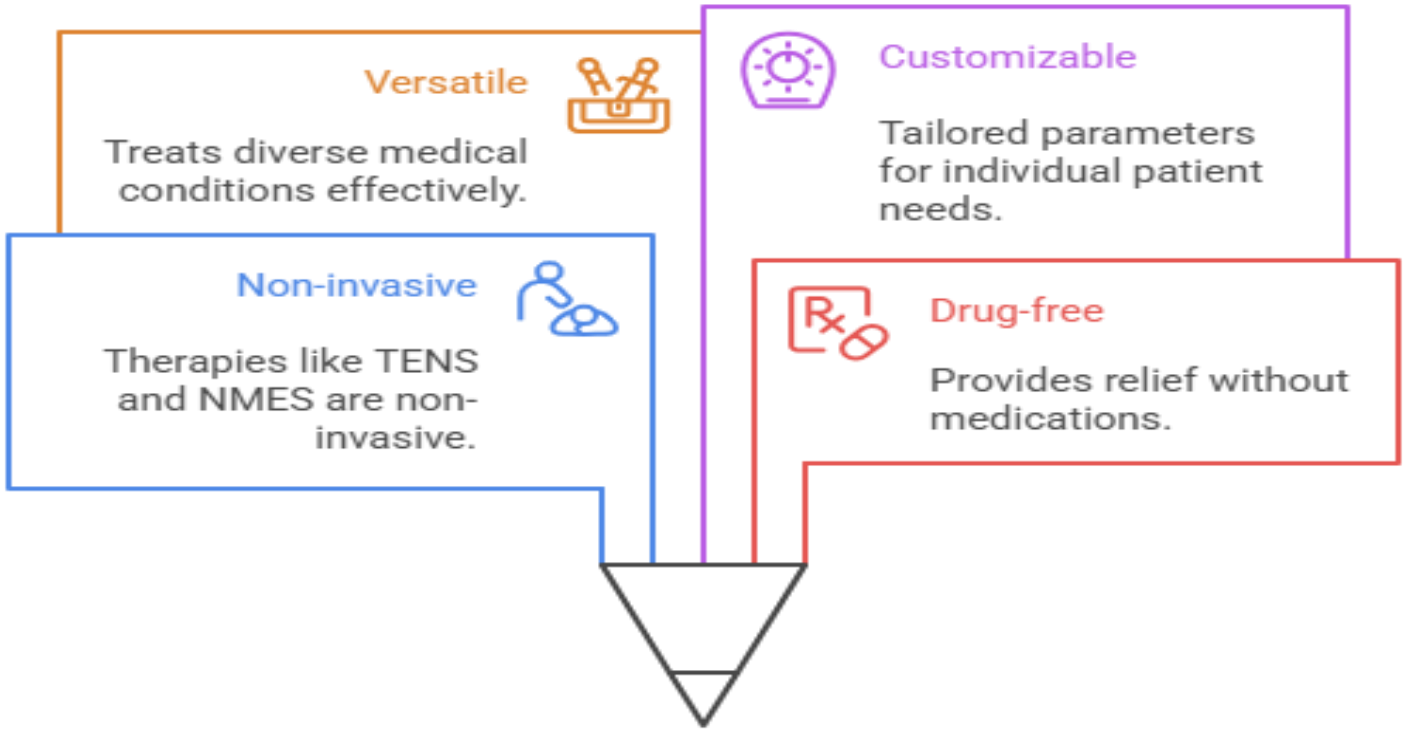
Electroconvulsive Therapy

Early use for mental health treatment

Key Parameters of Therapeutic Currents

Parameter	Unit	Effect on body
Intensity	mA or µA	Strength of stimulation
Frequency	Hz	Low (1–10 Hz) → muscle contraction Medium (50–100 Hz) → pain relief High (>1000 Hz) → deep heat
Pulse duration	µs or ms	Longer → stronger muscle contraction
Waveform	—	Sinusoidal, rectangular, triangular, etc.

Pathways to Healing



Main Types of Currents Used in Medical Treatment

Type of Current	Common Name	Frequency	Main Therapeutic Uses
Low Frequency (<1000 Hz)			
Faradic current	Faradic	50–100 Hz	Muscle strengthening (healthy innervated muscles)
Interrupted Direct Current (IDC)	Modified DC	1–100 Hz	Muscle re-education, prevent atrophy
TENS	Transcutaneous Electrical Nerve Stimulation	1–200 Hz	Pain relief (back pain, arthritis, post-op)
IFT (Interferential Therapy)	Interferential	4000 Hz (beat 0–150 Hz)	Deep pain relief, swelling reduction
Galvanic (Direct Current)	Continuous DC	0 Hz	Iontophoresis, wound healing
Medium Frequency (1–150 kHz)			
Russian Current		2500 Hz (burst 50 Hz)	Strong muscle strengthening (athletes)
High Frequency (>100 kHz)			
Shortwave Diathermy (SWD)		27.12 MHz	Deep heating (joints, muscles)
Microwave Diathermy (MWD)		2450 MHz	Superficial deep heating
Ultrasound (not current but related)		1–3 MHz	Very deep heating + micro-massage

Detailed Uses and Importance

Treatment	Current Used	Physiological Effects	Clinical Conditions Treated
Pain Relief	TENS, IFT	Gate control, endorphin release, block pain signals	Chronic pain, arthritis, low back pain, phantom pain
Muscle Strengthening	Faradic, Russian, IDC	Causes muscle contraction without voluntary effort	Muscle weakness, post-stroke, disuse atrophy
Muscle Re-education	Interrupted DC, Faradic	Improves nerve–muscle connection	Post-paralysis, Bell's palsy, foot drop
Oedema/Swelling Reduction	IFT, High Voltage Pulsed Current (HVPC)	Pumping action, improves circulation	Acute ankle sprain, post-surgery swelling
Wound Healing	Microcurrent (µA), HVPC	Increases ATP, protein synthesis, attracts cells	Diabetic ulcers, bed sores, non-healing wounds
Bone Healing	Pulsed Electromagnetic Field (PEMF), Microcurrent	Stimulates osteoblasts, increases calcium uptake	Non-union fractures, delayed union
Iontophoresis	Continuous Galvanic DC	Drives medicine (drug ions) through skin	Local delivery of dexamethasone, lidocaine, etc.
Deep Heating	SWD, MWD	Increases blood flow, relaxes muscle, reduces stiffness	Frozen shoulder, osteoarthritis, muscle spasm

TENS – Most Commonly Used Worldwide

High frequency TENS (80–150 Hz, low intensity) → Conventional TENS → quick pain relief

Low frequency TENS (2–10 Hz, high intensity) → Acupuncture-like TENS → long-lasting relief (hours)

Electrodes placed on painful area or over nerve

Completely safe, patient can use at home

Quick Comparison Table

Want to…	Best Current to Use
Relieve pain instantly	TENS or IFT
Build big muscles	Russian current
Heal chronic ulcer	Microcurrent or HVPC
Reduce fresh swelling	IFT or HVPC
Deliver medicine through skin	Galvanic (Iontophoresis)
Heat deep joint	Shortwave Diathermy

Applications of Electrical Current in Medicine

THANK YOU