

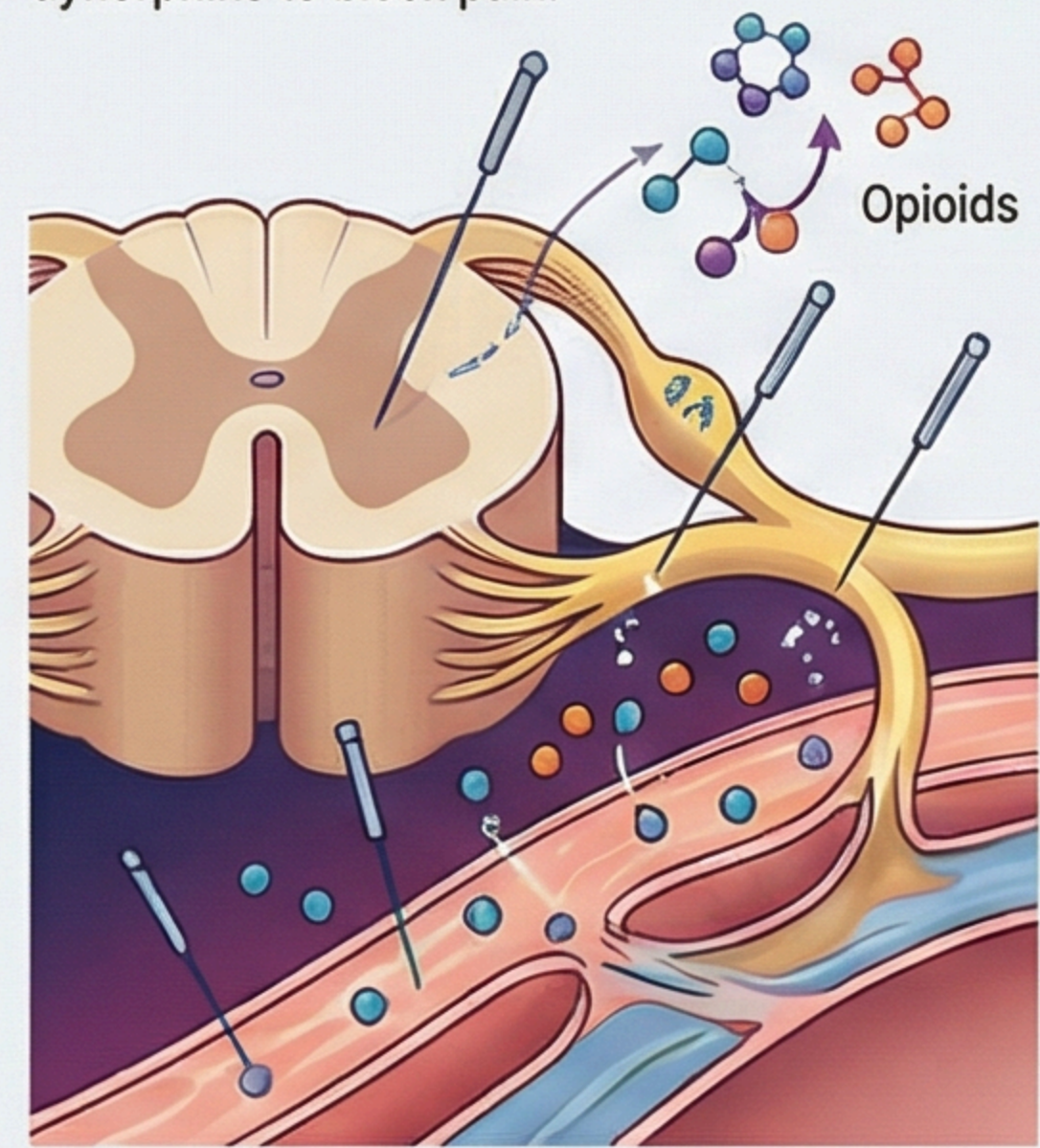
The Science of Relief: How Electroacupuncture Blocks Pain

This visual guide explains the multi-level biological mechanisms by which electroacupuncture (EA) alleviates neuropathic and inflammatory pain, targeting specific frequencies and acupoints to regulate neurotransmitters and suppress inflammation across the nervous system.

SPINAL AND PERIPHERAL MECHANISMS

Activation of Endogenous Opioids

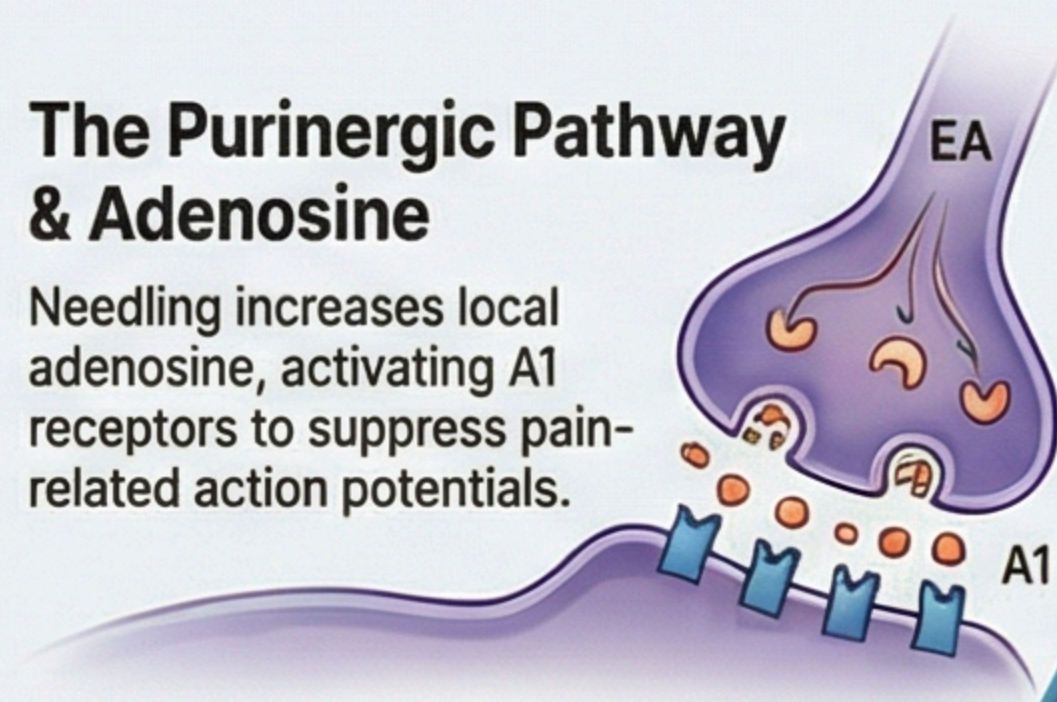
EA triggers the release of natural enkephalins, endorphins, and dynorphins to block pain.



EA Frequency	Opioid Mediator Released	Primary Receptor Activated
Low (2 Hz)	Enkephalins & endomorphins	Mu (μ) Delta (δ)
High (100 Hz)	Dynorphins	Kappa (κ)

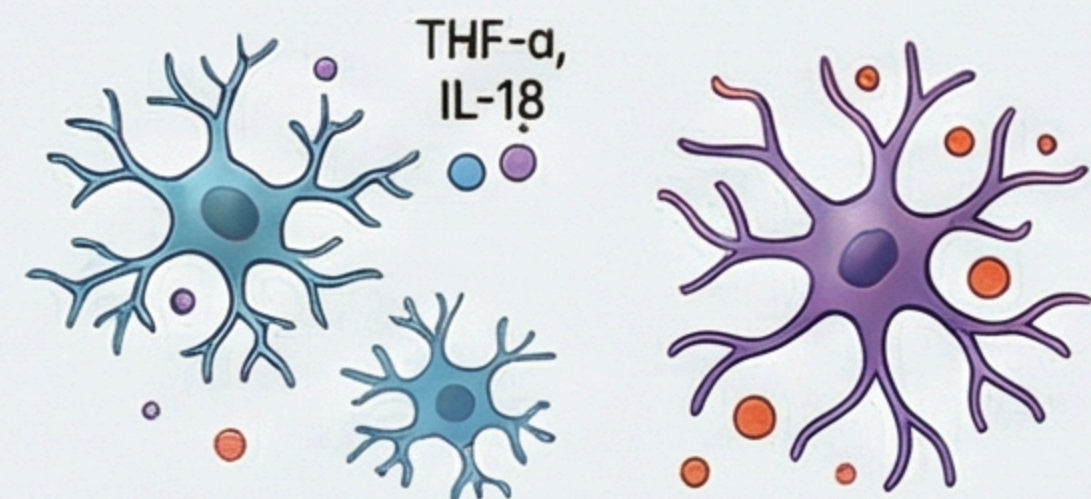
The Purinergic Pathway & Adenosine

Needling increases local adenosine, activating A1 receptors to suppress pain-related action potentials.



Glial Cell and Cytokine Regulation

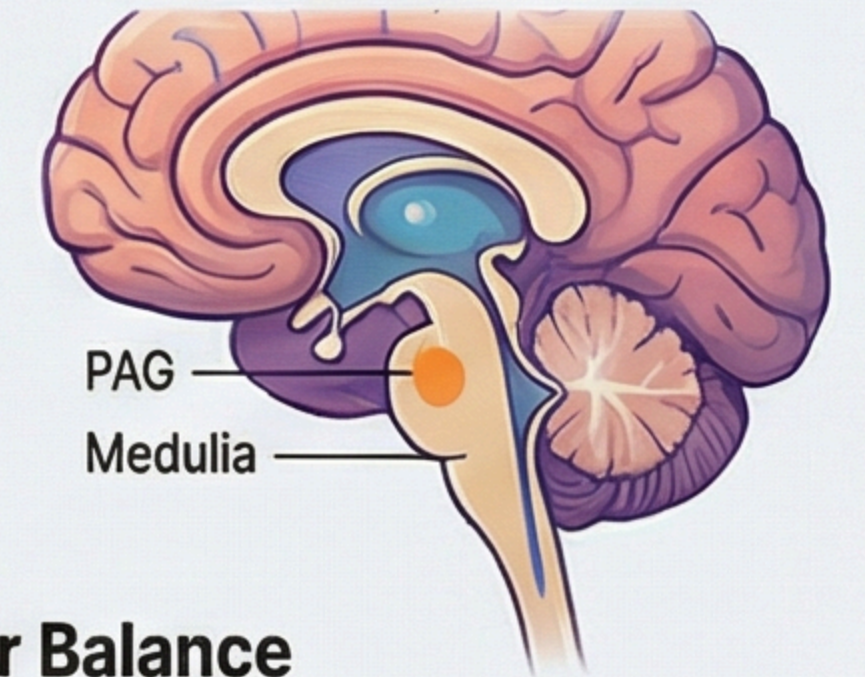
EA inhibits overactive microglia and astrocytes, reducing pro-inflammatory cytokines like TNF- α and IL-1 β .



SUPRASPINAL AND SYSTEMIC MECHANISMS

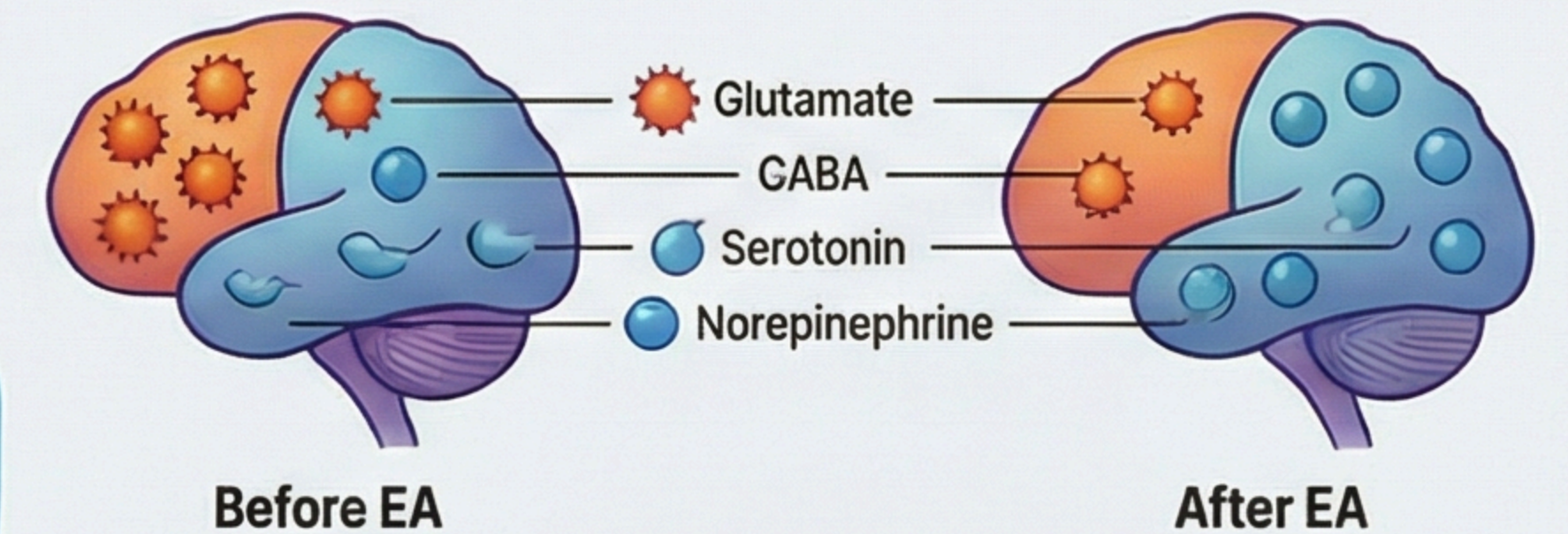
Descending Pain Inhibitory System

Stimulates the PAG and medulla to send inhibitory signals down the spinal cord.



Restoring Neurotransmitter Balance

EA decrease excitatory Glutamate while increasing inhibitory GABA, Serotonin, and Norepinephrine levels.



Reversing Maladaptive Neuroplasticity

Targeted stimulation can reverse harmful structural changes in the brain's somatosensory cortex.

