

---

## How does acupuncture work?

### Brief explanation

The needle is a stimulus that facilitates the body's healing processes and in particular, it improves the muscle length and all the negative consequences associated with a shortened muscle. Please refer to the leaflet "piercing the puzzle of persistent pain" for more information.

### Detailed explanation

Acupuncture can have an effect in various parts in the body:

- Local - the part where the needle has been inserted
- Segmental - within the spinal cord
- Central - within the brain
- Autonomic - in the nervous system associated with the stress response

### Local effects

- **Vascular**  
Acupuncture increases blood flow to the area where the needle has been inserted. Acupuncture is like pruning a plant: you produce small injuries to stimulate new growth to replace injured tissues.
- **Promotes healing**  
Acupuncture brings platelet-derived growth factor (PDGF) to the area where the needle has been inserted. PDGF stimulates collagen synthesis. Collagen is the building block for most of the body's soft tissues (muscle, tendon, ligaments, connective tissue)
- **Chemical**  
After the muscle twitches, the local pH becomes less acidic and the intercellular concentrations of substance P, bradykinins and calcitonin gene-related peptide (CGRP) decreases. This influences the healing process and pain.
- **Mechanical**  
Rotating the needle causes a local stretch of the tissue, analogous to wrapping spaghetti around a fork. This activates the myotatic reflex and causes the muscle to relax.
- **Neural**  
Muscle twitches stimulate group 2 proprioceptive (intrafusal) fibres in the muscle spindle and golgi tendon organ. This causes the muscle to relax.
- **Electrical**  
Acupuncture causes increased conductivity in the area. The needle disrupts the cell membrane of the individual muscle fibres and this mechanically discharges a brief outburst of potentials. Inserting the needle generates 500 microamperes/cm<sup>2</sup> of current that lasts for a few days even after the needle has been removed i.e. the tissue becomes a battery and facilitates the body to heal itself.

### Spinal/Segmental effects

- Acupuncture at the spine can influence the remote tissues (muscles, skin, bone) that are innervated by that spinal segment e.g. acupuncture in the neck muscles at the level of C6 & C7 can influence the thumb muscle.

### Central effects

- Acupuncture increases activity of the hypothalamus in the brain. The hypothalamus integrates and balances a wide array of systems in the body.
- The hypothalamus produces oxytocin that is a pain-relieving hormone.
- The hypothalamus causes the pituitary to release adrenocorticotrophic hormone (ACTH) into the bloodstream. ACTH increases the production of anti-inflammatory corticosteroids in the bloodstream.
- Acupuncture decreases activity of the limbic system (emotion centre) in the brain. Pain has an emotional component to it. Please refer to other information leaflets on pain physiology.
- Endocrine  
Acupuncture releases endorphins and enkephalins – the ‘pain-relieving’ and ‘feel good’ hormones.
- Immune  
Acupuncture releases beta-endorphin into bloodstream, Beta-endorphin influences the number and activity of T-lymphocytes and natural killer cells in the body. These cells are the body’s ‘soldiers’.
- Motor cortex  
Acupuncture can excite and inhibit motor regions in the brains associated with overactive or inhibited muscles.

### Autonomic nervous system effects

- Acupuncture can suppress the sympathetic (‘flight, flight, freeze’) activity in healthy humans and stimulate the parasympathetic (‘rest and digest’) system.

### References

- Wang, S., Kain, Z.N., White, P. (2008) Acupuncture analgesia: I. The scientific basis. *Pain Medicine* **106** (2): 602-610.
- Zhao, Z. (2008) Neural mechanism underlying acupuncture analgesia. *Progress in Neurobiology* **85**: 355-375.
- Bradnam-Roberts, L. (2007) A physiological underpinning for treatment progression of Western acupuncture. *Journal of the Acupuncture Association of Chartered Physiotherapists* **Autumn**: 25-33.
- Gunn, C. (1996) *The Gunn approach to the treatment of chronic pain: intramuscular stimulation for myofascial pain of radiculopathic origin* (2<sup>nd</sup> ed.). Churchill Livingstone: London.