

Physiological effects of Radial pressure waves

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Radial pressure waves offer a non invasive treatment solution to long term insertion and soft tissue pathologies. Today there are several working hypothesis for the physical effects of radial pressure waves on :

Pain

Cells metabolism

Blood flow

Muscle tone



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Effect on Pain

The patient experiences a reduction of pain, explained by the Gate Control theory.

- Intensive pulses from the transmitter into the tissue create a strong nociceptor activation of the A- β fibers, which affects interneurons that inhibit the transmission of the pain signals.

Radial pressure waves may impact the nerve surrounding environment

- The pressure wave may generate an Oedema and inflammation process which affect the nerve transmission



Bolt et al 2003
Ochiai et al., 2007
Ohtori et al 2001 .

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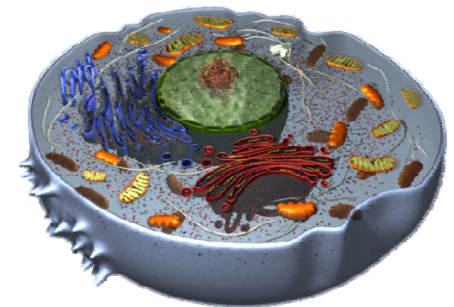
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Effect on Cells metabolism

The mechanical stress of Shockwaves influence the chemical environment of the cells

- Activation of self defense system (production of Cytokines and Free radicals release (NO,CO,O-)
- Acceleration of old and weak cells death process
- Increase of membrane permeability
- Shockwaves influence the tissue on a cellular level. The chemical environment of the cells is affected by free radicals promoting the release of pain and inflammatory inhibiting substances.
- Radial pressure waves play a role on the regulation of the inflammatory process



Neuland & al 2004
Rededing 2004 .

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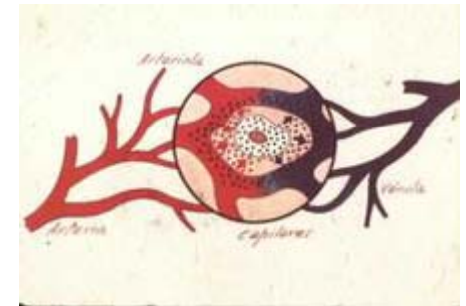
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Effect on blood flow

- The histological changes such as the formation of adhesions, increase in the number of fibroblasts, collagen organization, the increase in capillaries and thickening of the epitenon have been observed in healing tendon.
- Shock waves may be expected to increase the blood circulation in the tissues which are treated. This would increase the oxygen content and significantly reduce the concentration of carbon dioxide in the tissue which may stimulate the healing process.



Orhan & al, 2004
Therman & al, 2002

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Reduced muscle tone

- The “vicious circle”, as well as the strong pathological association between pain and muscle tone, will be broken and lead to restoring a normalized muscular tone.
- Radial shock waves seem to have a counter-irritation and pain modulating effect through GABAergic interneurons in the dorsal horn. In addition to this action, the pressure and vibrations of radial shock waves improve blood circulation and lymphatic drainage.
- The common result of the treatments conducted is a reduction of muscle tone along with a diminished extent of muscle shortening.



Orhan & al, 2004
Therman & al ,2002