



# Assisting healing

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## *Video summary*

### Using these benefits

This is general information. For specific advice one should consult a professional familiar with his or her needs. The scientists have achieved these remarkable results by applying vibration in the range of 35-50Hz, with applications of 15-30 minutes per day. This is about 60-95% of full power in a General Purpose Massager. Usage would need to be done so as not to cause further injury. For example, vibration should be applied away from an injury, then moved closer as the injured part was able to tolerate it.

Please also note that some research involving making deliberate injuries was done on animals such as sheep, mice and rats. Similar effects in humans are likely, but not proven.

### Summary of effects

#### *Healing bone fractures*

There have been a large number of trials investigating the effect of vibration on the healing of bone fractures. Therapeutic applications have generally been in the range of 35-45Hz, with applications of 20-30 minutes per day. Researchers have viewed healing on xrays, measured various blood chemical levels and noted the number of osteoblasts (bone producing cells). All trials showed that the application of vibrations sped up healing remarkably (1-9)

### ***Wound healing***

We found two trials that measured the effect of vibrations on wound healing. The results are illustrated in the following pictures. As healing is an issue for diabetes sufferers due to impaired circulation the researcher were interested about whether vibration's effect of increasing blood flow would help (10,11)

### ***Muscle injury***

A study into the effect of vibration on the healing of muscles used applications of 45 Hz for 30 minutes a day. As shown in the following pictures this resulted in a remarkable increase in the size of muscle fibres and reduction in the amount of fibrosis (12)

### ***Nervous tissue***

Scientist investigating the effect of vibration on the healing of nervous tissue by deliberately injuring the brachial plexus on a large number of mice (13) . What the found was truly remarkable. We've reproduced their summary of findings in an appendix, but in summary the vibration was found to:

- accelerate the formation of new skin and tissues, speeding the closure of wounds
- accelerate the formation of new blood vessels
- increase blood flow and increase the permeability of capillaries allowing more blood to the tissues
- increase the production of Growth Factor and various other growth related hormones.
- promotes the repair and regeneration of nerves
- increase the activity of various other chemicals needed for growth and repair

## **The pictures**

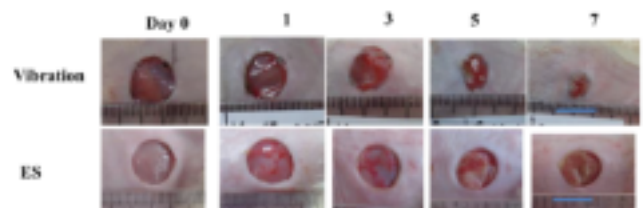
### **Wound healing**

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The two sets of pictures to the right show healing using vibrations compared with healing without vibrations. The vibration applied was 45 hz for 10-25 minutes per day. 45 hz is the vibration applied by our General Purpose Massagers at approximately 75% of full power.



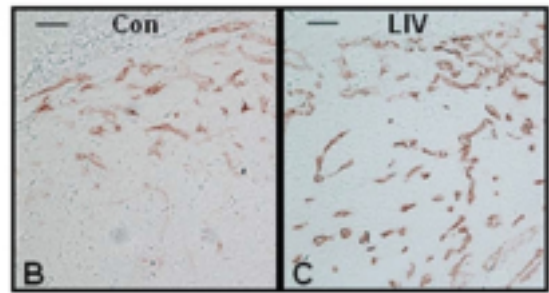
***Vibration was used to help healing the bottom wounds***



***Vibration was used to help healing the top wounds***

### ***Formation of blood vessels (11)***

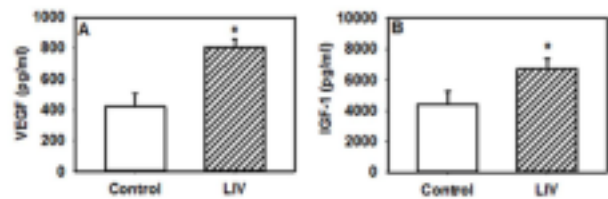
In one of the trials the formation of blood vessels was investigated. In these pictures the darker lines are the blood vessels. It shows that vibration (LIV) cause the growth of a lot more blood vessels.



*Vibration cause the growth of more blood vessels*

### **Level of growth hormones (11)**

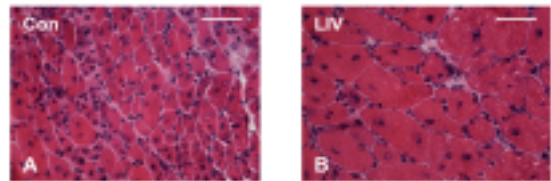
These graphs show the effect of vibration on the levels of various growth hormones. Vibration of 45 Hz for 30 minutes a day caused a remarkable increase.



*Vibration cause the production of a lot more growth hormones*

### **Muscle fibres (12)**

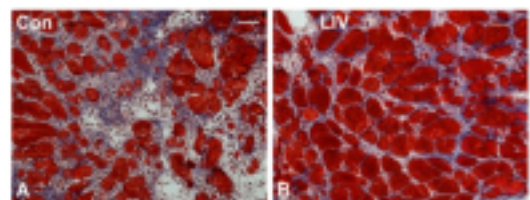
This photo shows the effect on healing muscle of 45 Hz vibration for 30 minutes per day. It shows muscle fibres in cross section. Those receiving vibration have clearly grown much larger.



*Vibration caused the muscle fibres to grow much faster*

### **Fibrosis (12)**

From the same trial. In these photos the lighter staining represents fibrous scar like tissue, while the red is the muscle fibres. This clearly shows that the application of 45 Hz vibration for 30 minutes per day resulted in healing and muscle growth with far less scar tissue.



*Vibration caused the muscle to heal with much less scar tissue*

## **Appendix One: results in the scientist's own words**

The following is a direct summary from the trial testing the effects of vibration on the healing of injured nerves. There are a few technical terms, but overall it's pretty easy to understand (13).

### ***Effect of Mechanical Massage Treatment on Muscles of Limbs***

*Mechanical vibration massage treatment has obvious effect on muscular atrophy induced by nerve root injury. It can dilate capillary, increase volume of blood flow, so as to greatly improve blood supply and nutrition in local tissue; It can make the wall of micrangium rhythmically flatten and restore, accelerating flow of blood; And it can promote contraction and extension of muscle fibers, strengthen muscular tension, elasticity and tolerance, so, it can prevent and cure muscular atrophy.*

### ***Effect of Mechanical Massage on Secretion of NGF (Nerve Growth Factor- a growth hormone)***

*Benign stimulation of mechanical vibration massage can activate the response of nerve immune and neuroendocrine systems, and transmit the signals to the submandibular gland through complicated ways, promoting secretion and storage of NGF in the submandibular gland. Finally, NGF is transported to brachial plexus root injury area through digestive, circulative and nerve systems.*

### ***Effect of Mechanical Massage on Repair of Injured Nerves***

*Mechanical vibration massage can effectively promote the repair of myelin sheath and axes of injured brachial plexus in the rat. It can effectively improve blood circulation of the injured myelin sheath, promote proliferation of SC and survival of the cell body of injured neurons, so as to form a necessary regenerative micro-environment early for repair of nerve, and it induces stress responses of immune and neuroendocrine systems in the rat, promotes secretion of NGF in this gland, and it can improve peripheral nerve units and excite peripheral nerves, so as to accelerate their conduction reflection.*

### ***Effect of Mechanical Massage on Na<sup>+</sup>, K<sup>+</sup>-ATPase Activities***

*Na<sup>+</sup>, K<sup>+</sup>-ATPase activity on the surface of muscular cell membrane is an important limited factor for excitability and contractile strength of muscular cells. After skeletal muscles lose nervous innervation, generation of ATP is hindered, so Na<sup>+</sup>, K<sup>+</sup>-ATPase activity decreases. Under the mechanical massage stimulation, the muscular cells cultured in vitro show increases in stress-related gene expression and protein synthesis, leading to adaptability reconstruction of structures and contractile characters of the muscular cells, which are closely related with activation of Na<sup>+</sup>, K<sup>+</sup>-ATPase, and influences the distribution and functional activity of Na<sup>+</sup>, K<sup>+</sup>-ATPase on the surface of muscular cell membrane. In brief, mechanical vibration massage can promote the regeneration and recovery of the brachial plexus, and effectively slow down the decrease of Na<sup>+</sup>, K<sup>+</sup>-ATPase activities induced by the nerve injury, preventing muscular atrophy, and it promotes the generation of submandibular gland NGF, providing a favorable environment for regeneration of nerve"*

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