What vibration massage actually does

Proven benefits

*General*
We often get asked what vibration massage actually does. There are many scientifically recognised benefits such as relaxing muscles, increasing blood flow, increasing flexibility, increasing the performance of muscles, speeding recovery, and reducing soreness after exercise. These are discussed elsewhere (1).

*Healing related*
It has been long understood that vibration massage can accelerate healing by increasing blood flow and tissue oxygenation. Until recently further benefits for healing have been largely speculated. This changed following two recent trials (2,3). For reasons that will become obvious they were done with rats and mice. In the first trial rats had their nerves deliberately injured, while in the second trial uniform cuts were made in mice. In both the healing of those treated with vibration massage was compared with those that were not. Extensive testing was done including biochemical analysis and the examination of samples under a microscope. To say the results were remarkable is an understatement. There is a summary of their findings below, followed by a clinical summary then details of each trial. Please make sure you see the pictures taken during the mice trial. They are amazing.

Summary of findings
The application of 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
Clinical summary
As practitioners we are exposed to the documented benefits of various therapeutic devices, usually with nice colorful graphs and so forth. None come close to what these researchers have found. The trials were done on mice and rats, and again for obvious reasons will never be done on humans. Will vibration massage have the same benefits for humans? Most likely yes, but it is not proven. The application of vibration massage is relatively safe, inexpensive and convenient. Our advice to practitioners is that if it is deemed appropriate to take advantage of all the scientifically demonstrated benefits of vibration massage mentioned earlier then do so. If all the extra things happen that is a huge bonus. Would this author use vibration massage to help healing? As long as these extra amazing benefits were not promise and it was safe that would be a resounding yes.

Trial One: the rats with injured nerves

What they did
The researchers injured the bundle of nerves that control the front leg on one side in 144 rats, then divided them into three groups. The first group was allowed to heal normally. The second received injections of a hormone that stimulates nerve growth. The third group received massage with a mechanical vibration massager. Over time the healing of the injured limbs was measured using a battery of tests.

- The diameter of the legs was measured to determine the amount of atrophy (wasting).
- Nerve conduction tests were done.
- The level of various chemicals and hormones were tested for, both in the blood and at the injury site.
- Finally the rats were killed and the injured nerves examined using an electron microscope.

What they found
They found that rats that received the hormone injections had healed better than those that healed naturally. However, they found that those treated with the vibration massager healed much better still. As well as the expected increase in local blood flow improving nutrition to the tissues it was shown that the vibration massage caused a host of other effects. Among these it actually prevented and cured muscle atrophy, improved nerve conduction, and stimulated the body to produce it's own growth hormones. Perhaps it is best here to actually reproduce the summary given by the researchers. There are a few technical terms, but overall it's pretty easy to understand.

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\(^+\), K\(^+\)-ATPase Activities**

Na\(^+\), K\(^+\)-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\(^+\), K\(^+\)-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\(^+\), K\(^+\)-ATPase, and influences the distribution and functional activity of Na\(^+\), K\(^+\)-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\(^+\), K\(^+\)-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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**Trial two: the mice with uniform cuts**

**Trial details**

Slow wound healing is an issue with certain medical conditions so researchers investigated whether vibration could be used to accelerate wound healing. For this trial the mice had an area of their back shaved, then uniform 8mm incisions were made using a tool used for biopsies. The wounds were then covered with a dressing to be as consistent as possible with human wounds. The vibration at 47 Hz was applied using a vibrating plate for 30 minutes, five times per week. 47 Hz is approximately the speed of a DrGraeme General Purpose Massager running at 80% of full speed. For comparison purposes a separate group of mice received no vibration. The wounds were examined Initially, then at 7 and 15 days.

**The results**

The best way to summarise these results is by using a quote from the authors followed by some pictures that speak louder than words.

The major finding of this study is that LIV (low intensity vibration) improves wound healing in part by promoting a pro-angiogenic wound environment. Compared to non-vibrated control mice, LIV treatment increased granulation tissue formation and angiogenesis, and accelerated closure and re-epithelialization. These LIV induced improvements were associated with higher levels of growth factors IGF-1 and VEGF and the chemokine MCP-1 in the wound environment.
The healing of wounds
For the wounds below the one in the bottom row were from mice treated by vibration (LIV) while the ones above healed normally. It can be clearly seen that those treated with the vibration healed much faster

Formation of blood vessels
The pictures below were obtained using a microscope viewing healing tissues stained especially to show up blood vessels. It can be clearly seen that there are many more blood vessels in the tissue from the mice treated with vibration (LIV)

Closure of wounds and formation of new skin
These graphs show the percentage closure of wounds and formation of new skin of those treated with vibration (LIV) compared with those who were not.
Levels of growth hormones
These graphs show the levels of various growth hormones and other chemicals important for healing. Some how the vibration massage stimulated the body to produce dramatically increased levels of growth hormones.

References

1. Blennerhassett G. *The Scientific Effects of Vibration Massage with Clinical Applications*
   http://www.drgaeme.com/Graeme's/Scientific-effects.pdf
2. Mei R Experimental Study on Mechanical Vibration Massage for Treatment of Brachial Plexus Injury in Rats Journal of Traditional Chinese Medicine, September 2010, 190 Vol. 30, No.3
Concluding remarks

Using this information
This information is not specific advice. It is provided for use by professionals in conjunction with their training, and to enable non-professionals to discuss these issues with their practitioner in an informed manner. In the trial with mice vibration of 47Hz was applied by having them stand on a vibrating platform. Regular applications were used over the healing period. In the trial with the rats vibration massage was applied to spots away from the actual injury. The frequency was not given. If one were using vibration massage to assist healing it would be counterproductive to apply it directly to the injury as the mechanical vibration could cause further damage.

Getting a vibration massager

Public
DrGraeme massagers purchase information can be found at the order page on the DrGraeme website http://www.drgraeme.com/Orders.php

Practitioners
Please contact DrGraeme directly for practitioner rates, further information, and possibly a sample massager The email address is graeme@drgraeme.com

DrGraeme Massagers
331 Main St Bairnsdale (P.O. Box 914)
Bairnsdale Victoria 3875  AUSTRALIA
Phone: (Australia) (03) 51161298  (Overseas) +61351161298
Website: www.drgraeme.com
Email: graeme@drgraeme.com