

B. Emons, M. van Rossum. *The Sound-wave chair: an alternative for exercise of frail older adults*. *Gerontechnology* 2009;8(2):111; doi: 10.4017/gt.2009.08.02.020.00 Sound energy has been used in medical science for more than 2 decades. Physioacoustic method is approved by the FDA (USA) for improving blood circulation, reducing pain and relaxes muscles where applied. Contraindications: expectant mothers, sufferers of acute inflammation and those with severe cardiac, cerebral vascular complaints, acute hernia or hematoma¹. The chair reduces cholesterol levels and osteoporosis⁴ and also decreases motor symptoms of Parkinson's disease². Patients feel the sound as resonance within muscles and other tissues. **Technical description** The sound wave therapy system uses low frequencies (27-113 Hz) and has been incorporated in a reclining chair housing a computer and six audio speakers³. The computer creates and controls low frequency sinusoidal sound waves. The approximate resonance frequencies of the basic muscle groups have been stored in the memory of the computer, which then causes the sound to vary up and down from the fixed pitch. This ensures that at some point the correct resonance frequency is reached and the tissue, resonates (sympathetic vibration). This vibration is produced dozens of times during one therapy session. This type of interval treatment is more effective than continuous stimulation, which may lead to tired and numb muscles after a few minutes. Power pulsation is also used to prevent overstimulation. Continuous stimulation commonly causes numbness and contraction. Power pulsation means that within a fixed time sequence the volume of low frequency sound varies in a linear way to obtain a better muscle relaxation. The computer causes the sound to circulate from the lower parts of the body upwards or in reverse direction. The movement causes a travelling sound pressure inside the body. This pressure activates both blood circulation and the flow of lymphatic fluid. Power pulsation, scanning and direction enable the therapist to create an unlimited amount of different combinations for different therapeutic needs. **User studies** Forty-nine volunteers (35 women, 14 men) from sheltered homes, aged 62-93 yrs were matched for sex, age, body weight, bone mineral density and walking capacity and then assigned randomly to a control group (n=19) and an intervention group (n=30). On the average, subjects had 6 chronic diseases (range: 0-12), used 9 different prescription drugs (range: 0-22), 72% of them used walking aids indoors and 55% outdoors, most often walkers and canes. One subject used a wheelchair but also a walker for shorter distances. Interviews and laboratory tests were performed at baseline and after the intervention. The intervention consisted of 30 min session in the Sound-wave chair, 3-5 times/week for 6 months. The amount of walking increased in the intervention group, but decreased in the control group (p=0.048). In addition the intervention was associated with a decrease in the cholesterol level (p=0.007), and an increase in the average skin temperature of the gastrocnemius muscle during chair sessions at the end of the 6 months intervention period (p=0.004). In total 89% of those in the intervention group reported that they felt pleasant or very pleasant sitting in the chair⁴. The effects found have some similarity to the effects of exercise. Thus, the sound-wave chair can be used as an alternative way of promoting the well-being of frail older adults, especially in situations where subjects are too frail to participate in common exercise programs.



The Sound-wave chair

References

1. FDA. Next Wave Physioacoustic Mattress. Reference K 934886; September 6, 1994; www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm?ID=96576; retrieved June 5, 2009
2. Almeida Q, King L, Ahonen-Eerikainen H. The effects of sound wave vibration therapy on motor symptoms of Parkinson's disease. *NeuroRehabilitation* 2009; 24; in press
3. <http://www.nextwave.fi/>; retrieved June 5, 2009
4. Sakari R, Hietikko A, Katajapuu-Riikomen P, Cheng S. Effects of low-frequency sound-wave therapy on functional capacity, cholesterol level and skin temperature in older men and women. *Clinical Rehabilitation* 2009 (September): manuscript ID CRE-2009-0841.R2

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