











$<0.01$ ) in the functioning of the frontal lobe (statistical power = 75%). There was a *significant* ( $p < 0.05$ ) improvement with an average statistical power of at least 72% in the functional status of the thyroid gland and cardiac ventricles. The liver, kidneys, and intestines did not achieve statistical significance over this period.

In summary, the overall data in this pilot investigation demonstrated that the Silent Nights patch worn on the right temple nightly 1 hour before sleep for 2 weeks produced *considerable improvements* in the *objective* and *subjective* measures of sleep and caused an impressive improvement in the *physiologic functional status* of different parts of the *brain* and *adrenal glands* with significant enhancement on the functioning of the *cardiac ventricles* and *thyroid gland*. Therefore, the *hypothesis was accepted as true*.

In future studies double-blind placebo-controlled protocols will be used to further investigate the efficacy of these organic nanopatch devices on improvement of sleep.

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#### References

- [1] <http://www.healthcare.philips.com/main/homehealth/sleep/actiwatch/default.wpd>. Retrieved June 2011.
- [2] <http://www.lifewave.com/silentnights.asp>. Retrieved June 2011.
- [3] H. Nazeran, and E. Haltiwanger, "Nanoscale wearable devices reduce quantitative and qualitative measures of neuromuscular pain," *Journal of Medical Implants and Devices*, 5 (2), 103, 2011.
- [4] H. Nazeran, and S. Greenberg, "Nanoscale carnosine patches improve organ function," SBEC 2010. International Federation of Medical and Biological Engineering Proceedings 32, pp 138-141, 2010.
- [5] H. Nazeran, and S. Greenberg, "Nanoscale glutathione patches improve organ function," SBEC 2010. International Federation of Medical and Biological Engineering Proceedings 32, 134-153, 2010.
- [4] T. Budzynski, H. Budzynski, K. Maret, and H. Tang, "Heart Rate Variability Enhancement Through Nanotechnology: A Double Blind Randomized-Control Pilot Study. *Journal of Neurotherapy: Investigations in Neuromodulation,*" *Neurofeedback and Applied Neuroscience*. 12 (1), 45-55, 2008.
- [5] H. Nazeran, "Heart rate variability signal parameters quantify skin cooling effect of energy patches during rest and exercise in young healthy individuals," *Biomedical Engineering Recent Developments*. Wilson, Tran, Vossoughi, Editors, 13-19, 2007.
- [6] G. Litscher, L. Wang, D. Schiora, D. Rachbauer, et al, "Biological effects of painless laser needle acupuncture," *Medical Acupuncture*, 16(1), 24-29, 2004.
- [7] G. Litscher and L. Wang, "Biomedical engineering meets acupuncture, development of a miniaturized 48-channel skin impedance measurement system for needle and laser acupuncture," *Biomedical Engineering Online*, 9:78, 2010.
- [8] G. Litscher, "Bioengineering assessment of acupuncture. part 1: thermography," *Crit Rev Biomed Eng*. 2006; 34(1):1-22.
- [9] G. Litscher and L. Wang, "Biomedical engineering meets acupuncture, development of a miniaturized 48-channel skin impedance measurement system for needle and laser acupuncture," *Biomedical Engineering Online*, 9:78, 2010.
- [10] G. Litscher, "Bioengineering assessment of acupuncture. part 1: thermography," *Crit Rev Biomed Eng*. 2006; 34(1):1-22.
- [11] G. Litscher, "Bioengineering assessment of acupuncture. part 2: monitoring of microcirculation," *Crit Rev Biomed Eng*. 2006; 34(4):273-294.
- [12] G. Litscher, "Bioengineering assessment of acupuncture. part 3: ultrasound," *Crit Rev Biomed Eng*. 2006; 34(4):295-326.
- [13] G. Litscher, "Bioengineering assessment of acupuncture. part 4: functional magnetic resonance imaging," *Crit Rev Biomed Eng*. 2006; 34(4):327-345.
- [14] G. Litscher, "Bioengineering assessment of acupuncture. part 5: cerebral near-infrared spectroscopy," *Crit Rev Biomed Eng*. 2006; 34(6):439-457.
- [15] G. Litscher, "Bioengineering assessment of acupuncture. part 6: monitoring—neurophysiology.," *Crit Rev Biomed Eng*. 2007; 35(1):1-38.
- [16] G. Litscher, "Bioengineering assessment of acupuncture. part 7: heart rate variability," *Crit Rev Biomed Eng*. 2007; 35(3-4):183-95.
- [17] Komori M, Takada K, Tomizawa Y, Nishiyama K, et al. Microcirculation responses to acupuncture stimulation and phototherapy. *Anesthesia and Analgesia*, 108(2), 635-640, 2009.
- [18] Ancoli-Israel S, Cole R, Alessi C, Chambers M, et al., "The Role of Actigraphy in the Study of Sleep and Circadian Rhythms," *Sleep*, 26 (3): 342-390, 2003.
- [19] <http://www.bmedical.com.au/shop/actiwatch-2-minimitter-philips.html>. Retrieved June 2011.
- [20] J. M. Van De Water, T. W. Miller, R. L. Vogel, et al., "Impedance cardiography: the next vital sign technology?," *Chest*, 123:2028-33, 2003.
- [21] L. A. H. Critchley, "Impedance cardiography. The impact of new technology," *Anaesthesia*, 53:677-8, 1998.
- [22] G. Cotter, A. Schachner, L. Sasson L, et al (2006). Impedance cardiography revisited. *Physiol Meas*. 27:817-27, 2006.
- [23] <http://www.fda.gov/cdrh/pdf/p970033.html>. Retrieved June 2011.
- [24] T. Morimoto, Y. Kinouchi, T. Iritani, S. Kimura S et al., "Measurement of the electrical bioimpedance of breast tumors," *Eur Surg Res*, 22:86-92, 1990.
- [25] <http://www.beinbalance.com.au/our-services/eis-body-scanning.htm>. Retrieved September 2011.
- [26] A. C. Parrott, and I. Hindmarch, "The Leeds Sleep Evaluation Questionnaire in psychopharmacological investigations - a review," *Psychopharmacology (Berl)*, 71(2): 173-9, 1980.