

A pilot study of the efficacy of heart rate variability (HRV) biofeedback in patients with fibromyalgia

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Abstract: Fibromyalgia (FM) is a non-inflammatory rheumatologic disorder characterized by musculoskeletal pain, fatigue, depression, cognitive dysfunction and sleep disturbance. Research suggests that autonomic dysfunction may account for some of the symptomatology of FM. An open label trial of biofeedback training was conducted to manipulate suboptimal heart rate variability (HRV), a key marker of autonomic dysfunction. **Methods:** Twelve women ages 18-60 with FM completed 10 weekly sessions of HRV biofeedback. They were taught to breathe at their resonant frequency (RF) and asked to practice twice daily. At sessions 1, 10 and 3-month follow-up, physiological and questionnaire data were collected. **Results:** There were clinically significant decreases in depression and pain and improvement in functioning from Session 1 to a 3-month follow-up. For depression, the improvement occurred by Session 10. HRV and blood pressure variability (BPV) increased during biofeedback tasks. HRV increased from Sessions 1-10, while BPV decreased from Session 1 to the 3 month follow-up. **Conclusions:** These data suggest that HRV biofeedback may be a useful treatment for FM, perhaps mediated by autonomic changes. While HRV effects were immediate, blood pressure, baroreflex, and therapeutic effects were delayed. This is consistent with data on the relationship among stress, HPA axis activity, and brain function.

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Author Keywords: heart rate variability; biofeedback; fibromyalgia; depression; pain; breathing

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Preliminary results of an open label study of heart rate variability biofeedback for the treatment of major depression

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Abstract: Major depressive disorder (MDD) is a common mood disorder that can result in significant discomfort as well as interpersonal and functional disability. A growing body of research indicates that autonomic function is altered in depression, as evidenced by impaired baroreflex sensitivity, changes in heart rate, and reduced heart rate variability (HRV). Decreased vagal activity and increased sympathetic arousal have been proposed as major contributors to the increased risk of cardiovascular mortality in participants with MDD, and baroreflex gain is decreased. **Study objectives:** To assess the feasibility of using HRV biofeedback to treat major depression. **Design:** This was an open-label study in which all eleven participants received the treatment condition. Participants attended 10 weekly sessions. Questionnaires and physiological data were collected in an orientation (baseline) session and Treatment Sessions 1, 4, 7 and 10. **Measurements and results:** Significant improvements were noted in the Hamilton Depression Scale (HAM-D) and the Beck Depression Inventory (BDI-II) by Session 4, with concurrent increases in SDNN, standard deviation of normal cardiac interbeat intervals) an electrocardiographic estimate of overall measure of adaptability. SDNN decreased to baseline levels at the end of treatment and at follow-up, but clinically and statistically significant improvement in depression persisted. **Main effects for task and session** occurred for low frequency range (LF) and SDNN. Increases in these variables also occurred during breathing at one's resonant frequency, which targets baroreflex function and vagus nerve activity, showing that subjects performed the task correctly. **Conclusions:** HRV biofeedback appears to be a useful adjunctive treatment for the treatment of MDD, associated with large acute increases in HRV and some chronic increases, suggesting increased cardiovagal activity. It is possible that regular exercise of homeostatic reflexes helps depression even when changes in baseline HRV are smaller. A randomized controlled trial is warranted.

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Author Keywords: vagus nerve; depression; heart rate variability; biofeedback; breathing

KeyWords Plus: VAGUS NERVE-STIMULATION; TREATMENT-RESISTANT DEPRESSION; RESPIRATORY SINUS ARRHYTHMIA; AFFECTIVE-DISORDERS; BLOOD-PRESSURE; DISEASE; PLACEBO; ANTIDEPRESSANTS; PREDICTORS; INVENTORY

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Heart rate variability biofeedback increases baroreflex gain and peak expiratory flow

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Abstract: Objective: We evaluated heart rate variability biofeedback as a method for increasing vagal baroreflex gain and improving pulmonary function among 54 healthy adults. Methods: We compared 10 sessions of biofeedback training with an uninstructed control. Cognitive and physiological effects were measured in four of the sessions. Results: We found acute increases in low-frequency and total spectrum heart rate variability, and in vagal baroreflex gain, correlated with slow breathing during biofeedback periods. Increased baseline baroreflex gain also occurred across sessions in the biofeedback group, independent of respiratory changes, and peak expiratory flow increased in this group, independently of cardiovascular changes. Biofeedback was accompanied by fewer adverse relaxation side effects than the control condition. Conclusions: Heart rate variability biofeedback had strong long-term influences on resting baroreflex gain and pulmonary function. It should be examined as a method for treating cardiovascular and pulmonary diseases. Also, this study demonstrates neuroplasticity of the baroreflex.

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Author Keywords: biofeedback; heart rate variability; baroreflex; pulmonary function; neuroplasticity

KeyWords Plus: RESPIRATORY SINUS ARRHYTHMIA; VENTRICULAR-TACHYCARDIA; BARORECEPTOR REFLEX; MYOCARDIAL-INFARCTION; ARTERIAL-PRESSURE; SPECTRAL-ANALYSIS; BLOOD-PRESSURE; ASTHMA; SENSITIVITY; HUMANS

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