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Heart rate variability increases following automated acoustic slow wave sleep enhancement

Charmaine Diep [1 2], Suzanne Ftouni [1 2], Sean P A Drummond [1], Gary Garcia-Molina [3], Clare Anderson [1 2]

Affiliations
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Abstract

Acoustic stimulation has been shown to enhance slow wave sleep and in turn, cognition, and now cardiac outcomes in young adults. With the emergence of commercial acoustic devices in the home, we sought to examine the impact of an acoustic, slow wave enhancing device on heart rate variability in healthy, middle-aged males (n = 24, 39.92 ± 4.15 years). Under highly controlled conditions, the participants were randomised to receive closed-loop brain state-dependent stimulation in the form of auditory tones (STIM), or no tones (SHAM), in a crossover design, separated by a 1 week washout period. STIM and SHAM were compared on measures of heart rate variability for the whole night and over the first three sleep cycles. We found an increase in slow wave activity following STIM compared with SHAM. There was a significant increase in high frequency power and standard deviation of the normalised RR-intervals (SDNN) during the STIM condition compared with SHAM (p < 0.05), due to changes observed specifically during N3. In conclusion, heart rate variability appears to improve following acoustic slow wave sleep enhancement.

Keywords: acoustic stimulation; heart rate variability; middle-aged men; slow wave sleep enhancement.

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