75th AAN ANNUAL MEETING ABSTRACT

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Abstract Title: A combined heart rate variability biofeedback and progressive aerobic exercise intervention for remediating persistent post-concussive symptoms.

Press Release Title: Slow Recovery from Concussion? Exercise, Breathing Practice May Improve Symptoms

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Objective: Evaluate the combined benefit of heart-rate variability biofeedback (HRVB) and progressive aerobic exercise (PAE) for remediating persistent post-concussive symptoms (PPCS).

Background: Cardio-autonomic dysfunction is a key pathophysiological process underlying PPCS. Therefore, any interventions targeting cardio-autonomic dysfunction should help ameliorate PPCS. Preliminary research suggests PAE and HRVB can improve cardio-autonomic dysfunction and clinical symptoms. However, none have evaluated whether there is a combined benefit.

Design/Methods: Participants were randomized into a six-week intervention consisting of either HRVB, PAE or HRVB+PAE. Concussion symptoms, HRV, cognition, and mood states were assessed pre- and post-intervention. The HRVB group practiced resonant-frequency breathing for 20 minutes, four nights a week. The PAE group completed a three-day-a-week aerobic exercise protocol that gradually increased in intensity and duration. The HRVB+PAE group completed HRVB training four nights a week and PAE three days a week.

Results: Each intervention resulted in significant improvement in concussion symptoms, HRV, cognition, and mood states (ps≤.05). PAE resulted in greater reductions in sleep disturbance, depressive symptoms, and total mood disturbance than HRVB (ps≤.05). HRVB+PAE resulted in the largest improvements in cognition, depressive symptoms, and mood disturbance (ps≤.05), but had no additional benefit beyond HRVB or PAE for concussion symptoms, or PAE for sleep disturbance.

Each intervention improved cardio-autonomic function as indexed by changes in both time and frequency domain measures of HRV (ps≤.05). Surprisingly, HRVB did not result in greater changes on any HRV metric than PAE (ps≥.19). However, HRVB+PAE resulted in greater changes in the time domain (RMSDD) and frequency domain (HF, coherence ratio) metrics beyond HRVB or PAE.

Conclusions: Both HRVB and PAE can help ameliorate cardio-autonomic dysfunction but HRVB+PAE resulted in additive benefits in cardio-autonomic function, cognition, and psycho-affective health beyond HRVB or PAE alone. These interventions are low-cost, easy to implement, and may be a feasible non-pharmacological treatment for PPCS.

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