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# Pilot data of the effects of mixed martial arts sparring on autonomic brain function

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**INTRODUCTION:**
Automated pupil light reflex (PLR) is a valid indicator of reduced autonomic brain function with and without loss of consciousness. Feasibility of PLR to identify acute changes in autonomic brain function has not yet been examined in a sports setting. As a combat sport featuring repeated sub concussive head impacts, mixed martial arts (MMA) sparring may provide a model to understand acute PLR changes in response to such trauma. Therefore, the purpose of this pilot study was to explore changes in automated PLR following MMA sparring.
**METHODS:**
7 MMA athletes (age = 24±3 years; mass = 76.5±9 kg; stature = 176.4±8.5 cm) took part in their regular sparring sessions (8 rounds x 3 mins:1 min recovery). PLR of both eyes was measured (NPi-300, Neuroptics, USA) immediately pre and post sparring. Variables measured were min and max pupil diameter (mm), constriction velocity (CV, mm·s-1), dilation velocity (DV, mm·s-1), PLR latency (s) and 'NPi' (AU) - a proprietary variable representing overall pupil response. Pre-post comparisons were made for: left eye (L); right eye (R); both eyes averaged together; differences between left and right eyes. Statistical differences were indicated by Bayes factors (BF10) ≥3 on paired samples t tests and Cohen's d.
**RESULTS:**
L NPi improved following sparring (BF10 = 5, d = 1.2; PRE = 4.07±0.3 AU; POST = 4.19±0.3 AU). Minimum L pupil size reduced (BF10 = 8, d = 1.5; PRE = 5.6±1.1 mm; POST = 5.2±1.1 mm). There were no changes in R. Both eyes averaged together displayed improved NPi (BF10 = 4; d = 1.2; PRE = 4.1±0.3 AU; POST= 4.2±0.3 AU), decreased max pupil size (BF10 = 3; d = 1; PRE = 5.8±1.1 mm; POST = 5.4±1 mm), decreased min pupil size (BF10 = 4; d = 1.2; PRE = 3.8±0.9 mm; POST = 3.4±0.7 mm) and reduced PLR latency (BF10 = 3; d = 1.1; PRE = 0.23±0.02s; POST = 0.21±0.01s). Each eye had different min sizes both pre (BF10 = 4 d = 1; L = 3.7±0.9 mm; R = 3.9±0.9 mm) and post sparring (BF10 = 4; d = 1.2; L = 3.3±0.7mm; R = 3.5±0.7 mm). Each eye also had different max sizes (BF10 = 3; d = 1.1; L = 5.2±1 mm; R = 5.6±1 mm) and max CV (BF10 = 3; d = 1.1; L = 4.8±1.1 mm·s-1; R = 5.3±0.8mm·s-1) post sparring.
**CONCLUSION:**
Acute improvements to PLR but increased anisocoria occurs following MMA sparring. Improved PLR may result from high intensity exercise arousal. Future studies require repeat series measurements following MMA sparring to measure the decay of these changes and any PLR decrements potentially masked by arousal.

**Topic:** Training and Testing

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