**APPENDIX 1**

**Table 1**. Relationship between self-reported history of sports-related concussion and sensorimotor function

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | N | No concussion in the 12 months prior to testing | | Concussion in the 12 months prior to testing | | P value |
| **Demographics** | | | |  |  |  |
| Age, years | 188 | 22.9 (4.6) | | 21.0 (4.7) | | **0.017** |
| Height, cm | 188 | 188 (7.9) | | 185 (7.3) | | **0.045** |
| Mass, kg | 188 | 91 (11.3) | | 93 (11.9) | | 0.39 |
| **Stability evaluation Test, degrees/second** | | | | | | |
| Firm – Feet together | 187 | 0.8 (0.2) | | 0.7 (0.2) | | 0.16 |
| Firm – Single leg | 187 | 2.0 (0.7) | | 2.1 (1.0) | | 0.69 |
| Firm – Tandem | 187 | 1.8 (1.2) | | 1.6 (1.0) | | 0.31 |
| Foam – Feet together | 187 | 2.1 (0.7) | | 2.1 (0.6) | | 0.82 |
| Foam – Single leg | 187 | 4.8 (1.6) | | 4.9 (1.8) | | 0.49 |
| Foam – Tandem | 187 | 5.1 (2.9) | | 5.3 (2.9) | | 0.81 |
| Variable | N | No concussion in the 12 months prior to testing | | Concussion in the 12 months prior to testing | |  |
| Right | Left | Right | Left | P value |
| **Muscle cross-sectional area, cm2** | | | | | | |
| MF L2 CSA | 173 | 4.0 (1.0) | 4.0 (1.0) | 3.5 (0.9) | 3.5 (0.9) | 0.28 |
| Average | 4.0 (0.9) | | 3.5 (0.9) | | **0.004** |
| MF L3 CSA | 175 | 7.0 (2.0) | 7.0 (1.9) | 6.0 (2.0) | 5.7 (1.9) | 0.16 |
| Average | 7.0 (1.9) | | 5.9 (1.9) | | **0.002** |
| MF L4 CSA | 175 | 10.3 (2.2) | 10 (2.2) | 8.8 (2.2) | 8.9 (2.2) | 0.91 |
| Average | 10.3 (2.2) | | 8.9 (2.2) | | **< 0.001** |
| MF L5 CSA | 175 | 10.8 (1.8) | 11 (1.7) | 10.1 (1.8) | 10.1 (1.7) | 0.86 |
| Average | 10.8 (1.7) | | 10.1 (1.7) | | **0.032** |
| QL CSA | 174 | 9.1 (2) | 9 (2.4) | 10 (2) | 10.6 (2.4) | 0.15 |
| Average | 9.3 (2.1) | | 10.3 (2.1) | | **0.007** |
| **Muscle relax and contraction, mm** | | | |  | |  |
| MF L2/3 resta | 186 | 23.6 (4.5) | 24.0 (4.0) | 25.0 (4.5) | 25.5 (4.0) | 0.20 |
| MF L2/3 contractionb | 1.8 (1.8) | 2.0 (1.6) | 2.5 (1.8) | 2.2 (1.6) | 0.13 |
| *% Change* | 7.6% | 8.3% | 10.0% | 8.6% |  |
| *Average contraction* | *1.9 (1.4)* | | *2.4 (1.4)* | | ***0.043*** |
| MF L3/4 resta | 186 | 27.0 (4.5) | 27.0 (4.2) | 28.0 (4.5) | 28.6 (4.2) | **0.07** |
| MF L3/4 contractionb | 1.9 (2.0) | 2 (1.7) | 2.5 (2.0) | 2.4 (1.7) | 0.90 |
| *% Change* | 7.0% | 7.4% | 8.9% | 8.4% |  |
| *Average contraction* | *1.9 (1.5)* | | *2.4 (1.5)* | | ***0.05*** |
| MF L4/5 resta | 186 | 30.9 (4.7) | 31 (4.8) | 33.8 (4.7) | 33.5 (4.8) | 0.41 |
| MF L4/5 contractionb | 2.6 (1.9) | 3 (2.0) | 2.9 (1.9) | 3 (2.0) | 0.78 |
| *% Change* | 8.4% | 9.7% | 8.6% | 9.0% |  |
| *Average contraction* | 2.7 (1.7) | | 2.9 (1.7) | | 0.38 |
| MF L5/S1 resta | 186 | 31.9 (5.1) | 32 (5.2) | 34.7 (5.1) | 34.8 (5.2) | 0.89 |
| MF L5/S1 contractionb | 2.7 (2.0) | 3 (2.3) | 3.1 (2.0) | 3.2 (2.3) | 0.50 |
| *% Change* | 8.5% | 9.4% | 8.9% | 9.2% |  |
| *Average contraction* | 2.8 (1.9) | | 3.2 (1.9) | | 0.33 |
| TrA resta | 186 | 4.2 (1.2) | 4 (1.1) | 4.3 (1.2) | 4.4 (1.1) | 0.14 |
| *TrA contractionb* | 1.9 (1.2) | 2 (1.1) | 2.3 (1.2) | 1.7 (1.1) | **0.007** |
| *% Change* | 45.2% | 50.0% | 53.5% | 38.6% |  |
| *Average contraction* | 1.9 (1.0) | | 2 (1.0) | | 0.54 |
| *IO resta* | 186 | 12.4 (2.9) | 12.0 (2.7) | 12.4 (2.9) | 12.0 (2.7) | 0.23 |
| *IO contractionb* | 1.8 (1.8) | 2.0 (1.7) | 2.4 (1.8) | 1.8 (1.7) | **0.005** |
| *% Change* | 14.5% | 16.7% | 19.4% | 15.0% |  |
| *Average contraction* | 1.9 (1.5) | | 2.1 (1.5) | | 0.41 |
| **Cervical proprioception test** | | | | | | |
| Joint position error, degrees | 188 | 3.7 (1.8) | 3.8 (1.8) | 4.3 (1.7) | 4.0 (1.7) | 0.40 |
| 3.8 (1.3) | | 4.1 (1.2) | | 0.13 |
| **Vestibular function (vHIT)** | | | | | | |
| 60 ms | 188 | 1 (0.1) | 0.96 (0.1) | 0.99 (0.1) | 0.96 (0.1) | 0.40 |
| 0.98 (0.1) | | 0.98 (0.1) | | 0.82 |
| 80 ms | 188 | 0.93 (0.1) | 0.92 (0.2) | 0.94 (0.1) | 0.95 (0.2) | 0.51 |
| 0.93 (0.1) | | 0.95 (0.1) | | 0.36 |

Values are reported as the estimated marginal means (EMM) and sd.

CSA = cross-sectional area

a Relaxed muscle thickness; b Difference in muscle thickness between the contracted and relaxed

condition; % change refers to the percentage change in muscle thickness between the relaxed and contracted condition. MF - Mutlifidus muscle; TrA - Transversus Abdominis muscle; IO - Internal Oblique muscle; L4/5- L4/5 zygapophyseal joint; L5/S1-L5/S1 zygapophyseal joint.