Near-infrared spectroscopy derived forearm oxygenation does predict rock climbing performance

Dear authors,

Thank you for your insightful comments regarding the manuscript entitled 'Forearm oxygenation and blood flow kinetics during a sustained contraction in multiple ability groups of rock climbers'. The author correctly indicates that the anatomy of the forearm musculature is complex, including the overlapping of many of the wrist and forearm flexors. As such it is difficult to accurately locate specific muscles using only anthropometric markers, and we potentially recorded the activity of more than one muscle. Additionally, we acknowledge that the Flexor Carpi Radialis (FCR) is technically a wrist flexor/deviator, and not a forearm flexor. Nonetheless, our participants performed isometric fingerboard exercise, which would have resulted in activation of the wrist flexors. Moreover, we should not lose sight of the study aim, which was not to delineate between flexor muscles, but rather to determine whether conduit artery forearm blood flow (ultrasound) or the ability to de-oxygenate (near-infrared spectroscopy, NIRS) the forearm musculature could differentiate ability groups (separated by red-point performance grades). Accordingly, we feel that the conclusion remains accurate and does reflect our intended aim.

We agree with the author that further clarification is needed to provide precise NIRS probe placement, with respect to the FCR and the Flexor Digitorum Profundus (FDP). The FCR was located on the anterior side of the forearm by drawing a line from the medial epicondyle of the humerus to the styloid process of the radius. The probe was placed along this line, 33% distal to the medial epicondyle of the humerus. For the FDP, a line on the anterior side of the forearm was drawn from the epicondyle of the humerus to the base of the carpus (lunate) proximal to the ring finger. The probe was placed 33% distal to the epicondyle of the humerus. Recently, our laboratory confirmed the precision of the anthropometric markers described above using brightness mode ultrasound (findings unreported). Nonetheless, we do agree that future studies would do well to use ultrasound to confirm the anatomical markers.

Yours faithfully,

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