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(G*) (POS-73) Effect of cuff-induced occlusion on muscle oxygenation

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Introduction: Quantification of oxygenation in a contactless manner is of interest in a variety of clinical scenarios, with diabetic wound management being one example. However, the development of such technology requires a reproducible and well-understood model of ischemia, including both inducement and measure effect using a reference standard, which is currently lacking. In our present work, we sought to advance the development of such a model with contact measurement of oxygenation using near-infrared (NIR) during occlusion of the arm.
Material and methods: In this study, we have collected data from 28 healthy volunteers. The subject's hands were placed on a table. One arm was occluded using a blood pressure cuff placed on the upper arm and inflated to 200mmHg for approximately two minutes. The muscle oxygenation signal (SmO2) was acquired using the NIR contact Moxy device (Fortiori Design LLC, Hutchinson, MN) placed on the arm distal to the occlusion. SmO2 was normalized, and the minimum value found, and the percent reduction from the initial to minimum value calculated.
Results: Data collection was performed on 28 subjects in total, with each arm undergoing the ischemia protocol, for a total of 56 signals. 6 signals were excluded due to poor quality, leaving 50/56=89% of the signals, with all 28 subjects represented. The occlusion protocol resulted in an average relative reduction in SmO2 of -77±20%.
Discussion: The SmO2 reduction varied significantly across the dataset, with the variation not explained by any collected metadata. We expect that the reduction would vary with respect to intrinsic physiological properties, as well confounding properties such as BMI. The variability in SmO2 reduction identifies the importance of collecting a broad group of metadata in when contactless technologies are validated against contact NIR during arm occlusion.

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