Reply to “Letter to the editor: Applying the blood flow restriction pressure: the elephant in the room”

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REPLY: In their letter, Jessee et al. (6) address an important methodological concern germane to blood flow restriction (BFR) training raised in our recent review (10), namely, the standardization of BFR cuff pressure. Jessee et al. acknowledged that a generalized cuff pressure could potentially bring about adverse cardiovascular outcomes, particularly in those individuals in which a standard cuff pressure results in complete arterial occlusion. To reduce this risk and to ensure that all individuals employing BFR attain a similar reduction in blood flow with cuff inflation, they proposed the implementation of a personalized cuff inflation pressure (PCIP), a cuff-specific pressure tailored to the individual’s arterial occlusion pressure (AOP).

Considerable controversy persists over the proper BFR cuff inflation pressure (3, 7–9). To date, this discussion has been largely fueled by the search for the ideal cuff pressure required for the desired benefits of the maneuver, which are enhanced muscle size and strength. The principal intent of our review (10) was to inform the BFR community of the exercise pressor reflex (EPR) that we had found strikingly absent from the BFR literature. We were pleased to learn that the authors of the letter agreed with the concern proffered in our review, acknowledging that development of an individualized ideal cuff pressure must take into account the extent to which the inflation pressure reduces blood flow, as this would directly affect the magnitude of EPR engagement. Interestingly, the authors of the letter (6) pointed out a recent study (4) in which no differences in skeletal muscle size and strength were reported during BFR training at 40% of AOP when compared with 90% of AOP. Thus they suggested that an individual’s PCIP should error on the side of a lower percentage of their AOP. Theoretically, to do so would lessen the risk of adverse cardiovascular events occurring (events associated with the EPR under certain conditions) while still providing enhanced muscle strength and mass.

The cuff pressure solution offered by the authors of the letter (6) is potentially viable and represents an important step forward in the safe implementation of BFR training. However, several concerns still remain, including the ability to easily and accurately determine an individual’s own PCIP using equipment readily available outside a laboratory or clinical setting. Furthermore, the extent to which the EPR is engaged depends on the level of blood flow necessary to evoke stimulation of the skeletal muscle afferents, and this varies between individuals and across workloads. This uniqueness is likely to be multifaceted, involving individual physiological differences at the afferent, central, and efferent levels of EPR processing. It should be again noted that the EPR is engaged even during mild-intensity exercise in humans (1, 2). Therefore, coupling resistance training exercise with BFR likely exaggerates the level to which the EPR is activated, even with a PCIP at a small fraction of an individual’s AOP. Clearly, there is an immediate need for further research in this area, building on work such as that recently published by Downs et al. (5), specifically designed to systematically determine the hemodynamic response to BFR exercise. The extent to which the EPR is engaged during BFR exercise remains unknown and should be quantified before the mass implementation of BFR exercise as an acceptable training practice and/or rehabilitation therapy, considering our original “call for concern.”

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS

M.D.S., D.S.O., and S.A.S. drafted, edited, and revised manuscript; M.D.S., A.C.K., P.D.L., D.S.O., and S.A.S. approved final version of manuscript.

REFERENCES

