This letter is in response to the Point-Counterpoint series “The muscle pump is/is not an important determinant of muscle blood flow during exercise” that appeared in the July issue (vol. 99: 371–375, 2005; doi:10.1152/japplphysiol.00381; http://jap.physiology.org/content/vol99/issue1/2005).

Kinetics of restoration of arteriolar tone after exercise

Letter to Editor: In response to the recent Point-Counterpoint, we make a couple of points.

First, the key issue to us is not whether there is a muscle pump effect, but rather under what conditions might it be evident? This has been summarized by Sheriff.

Second, we take exception to the dismissive conclusion by Clifford et al., that in our recent publication (4), “no consideration (was) given to the notion that vasodilation may ebb rapidly.” First, we considered this (page 1581 of Ref. 4), but found no supporting evidence in the literature. Second, both blood flow and pressure were statistically similar across the first four cardiac cycles in recovery for all seven work rates tested, as noted in the paper, statistically validating our assumption. Moreover, direct observations of feed arteries/arterioles after cessation of contractions reveal a time delay or latency of 6–60 s before a reduction in diameter begins (2, 3). Our window of four cardiac cycles clearly fits within this latency period. Finally, the comment by Clifford et al. that “Because vasodilation can occur in the first cardiac beat after contraction . . . it may be reversed just as quickly” reveals a surprising naïveté regarding cardiovascular regulation during exercise transients. Tissue requirements (as \(\dot{V}O_2\)) for \(O_2\) delivery (\(\dot{Q}O_2\)) predict temporal asymmetry between exercise and recovery blood flow kinetics (1). Not only would a rapid reduction in arterial/arteriolar diameter (and flow) during recovery be counterproductive by compromising \(\dot{Q}O_2/\dot{V}O_2\), but if the loss of vasodilation were fast enough, this might require constant readjustment during rhythmic exercise.

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