

FOREARM TISSUE TEMPERATURE AND THE CIVD RESPONSE

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Recent work suggests an influence of the mean body skin (Tsk) and deep body temperatures (Tb) on the characteristics of the cold-induced vasodilatation (CIVD) response. Briefly, both the minimum (Tfi,min) and the maximum finger temperature (Tfi,max) during CIVD were higher when Tb was elevated, and the onset time of the CIVD response was reduced at higher Tsk. The question remains, however, about the influence of the forearm tissue temperature on the CIVD response for a given Tsk and Tb. On two different occasions, eleven healthy male subjects pre-conditioned their forearm tissue at two different water temperatures, 20 and 38°C, until steady state forearm muscle temperature was achieved. Following the conditioning period (129 ± 15 and 85 ± 15 min for 20 and 38°C, respectively), the fingers of the conditioned forearm were immersed in a 5°C bath for 30 min to study the characteristics of the CIVD response. During the finger immersion, Tsk and Tb were not different between the two conditions (Tsk = 34.3 ± 0.6°C, Tb = 36.8 ± 0.2°C), but the temperature 3cm deep into the forearm's *flexor digitorum profundus* muscle was different (p<0.05), averaging 23.6 ± 1.7°C and 36.7 ± 0.6°C for the 20 and 38°C conditions, respectively. The arterial blood temperature in the radial artery measured at the wrist level averaged 28.2 ± 2.5 and 35.6 ± 0.9°C for the 20 and 38°C conditions, respectively (p < 0.05). The two forearm conditions caused significant differences in all the CIVD parameters during the 30 min immersion in 5°C water as shown in the Table.

CIVD parameters	Pre-conditioning conditions (mean ± SD)	
	20°C	38°C
Tfi,average (°C)	6.2 ± 0.9	8.3 ± 1.6*
Tfi,max (°C)	7.0 ± 1.1	9.8 ± 1.6*
Tfi,min (°C)	5.0 ± 0.1	5.6 ± 0.3*
Onset Time (min)	7.8 ± 1.4	5.2 ± 0.5*
Peak Time (min)	11.7 ± 5.2	5.9 ± 2.7*
Amplitude (°C)	2.1 ± 1.0	4.4 ± 1.6*

Tfi,average: mean finger temperature from the 5th to 30th minute of immersion

Tfi,max: maximal finger temperature during the first CIVD phase

Tfi,min: minimum finger temperature before the first CIVD phase

Onset Time: time from immersion to Tfi,min

Peak Time: time from Tfi,min to Tfi,max

Amplitude: difference between Tfi,max and Tfi,min * p < 0.05

It was concluded that a low forearm tissue temperature impedes the CIVD response despite normal Tsk and Tb, possibly by decreasing the temperature of the arterial blood to the fingers.

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