

Article

Muscle oxygenation level might trigger the regulation of capillary venous blood filling during fatiguing isometric muscle actions

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Supplementary Materials

Table S1. Single values of fatiguing measurements of type I behavior.

IMA	subject no._arm	baseline value SvO ₂ in %	baseline value rHb in AU	SvO ₂ min. in %	TTF in s	SvO ₂ SS mean in %	rHb SS mean in AU	extent of deoxygenation in pp (%)	extent of rHb decrease in AU (%)	time until min. of rHb before SS in s	time until SvO ₂ SS in s	time until rHb SS in s	SvO ₂ at RP ₁ in %	SvO ₂ at RP ₂ in %	ρ between rHb & SvO ₂
type I															
fatiguing HIMA	01_le	80.74	58.89	65.22	43.08	67.83	43.40	12.91 (10.42)	15.49 (9.12)	15.68	15.50	15.68	-	-	0.86
	06_le	67.54	48.63	60.23	70.48	61.40	47.76	6.14 (4.14)	0.87 (0.42)	9.90	17.13	9.90	-	-	0.40
	07_le	79.43	51.37	69.00	45.03	69.67	43.03	9.77 (7.76)	8.34 (4.29)	13.48	13.30	13.48	-	-	0.81
	17_le	80.40	58.75	68.15	48.93	69.09	45.36	11.30 (9.09)	13.39 (7.87)	15.93	15.93	15.93	-	-	0.99
	25_le	75.92	75.88	63.25	39.15	64.29	58.55	11.63 (8.83)	17.33 (13.15)	11.70	13.68	11.70	-	-	0.57
	02_ri	81.10	66.18	63.00	37.20	63.29	43.71	17.81 (14.45)	22.47 (14.87)	8.08	9.85	10.78	-	-	0.48
	07_ri	78.44	55.07	59.00	46.98	60.74	42.96	17.70 (13.89)	12.10 (6.66)	8.40	14.90	25.05	-	-	0.65
fatiguing PIMA	01_le	82.62	61.28	67.06	47.94	69.26	46.95	13.36 (11.04)	14.33 (8.78)	15.23	17.93	18.13	-	-	0.93
	06_le	73.91	53.99	60.21	48.12	61.03	47.98	12.87 (9.51)	6.01 (3.24)	8.53	14.85	8.53	-	-	0.19
	07_le	80.32	56.38	71.00	31.96	71.75	48.90	8.57 (6.88)	7.48 (4.22)	7.15	20.70	7.88	-	-	0.33
M		78.04	58.64	64.61	45.88	65.84	46.86	12.21 (9.60)	11.78 (7.26)	11.41	15.38	13.70	-	-	0.74*
SD		4.50	7.84	4.13	10.26	4.13	4.68	3.67 (3.09)	6.24 (4.47)	3.44	2.91	5.22	-	-	0.61*

Abbreviations: AU = arbitrary units; IMA = isometric muscle action; HIMA = holding IMA; le = left; min. = minimum; M = arithmetic mean; MVIC = maximal voluntary isometric contraction; no. = number; PIMA = pulling IMA; pp = percent points; rHb = relative hemoglobin amount; ri = right; RP = reversal point; SD = standard deviation; SS = steady state; SvO₂ = capillary venous oxygen saturation of hemoglobin; TTF = time to task failure; ρ = Spearman's rank correlation coefficient.

* calculated by use of Fisher's Z-transformation

Table S2. Single values of fatiguing measurements of type II behavior.

IMA	subject no._arm	baseline value SvO ₂ in %	baseline value rHb in AU	SvO ₂ min. in %	TTF in s	SvO ₂ SS mean in %	rHb SS mean in AU	extent of deoxy- genation in pp (%)	extent of rHb change in AU (%)	time until min. of rHb before SS in s	time until SvO ₂ SS in s	time until rHb SS in s	SvO ₂ at RP ₁ in %	SvO ₂ at RP ₂ in %	ρ be- tween rHb & SvO ₂
type II															
fatiguing HIMA	02_le	72.86	56.87	58.00	43.08	59.07	58.37	13.80 (10.05)	1.50 (0.88)	12.00	17.80	18.70	62.00	62.00	−0.81
	03_le	74.51	76.36	55.00	19.55	55.50	71.71	19.01 (14.16)	−4.64 (−3.33)	5.68	11.45	11.45	59.00	59.00	−0.41
	05_le	70.47	62.94	46.73	45.00	47.86	87.41	22.61 (15.94)	24.47 (21.39)	1.18	12.63	16.95	58.84	56.63	−0.74
	13_le	84.07	83.32	59.88	48.95	61.55	56.20	22.52 (18.93)	−27.12 (−15.24)	4.65	15.13	18.00	60.56	63.04	−0.91
	14_le	78.34	81.32	24.16	43.08	27.56	94.02	50.78 (39.78)	12.70 (11.94)	4.20	18.03	13.53	58.58	55.12	−0.48
	19_le	78.28	63.87	50.00	31.30	51.01	72.92	27.26 (21.34)	9.04 (6.59)	4.30	10.73	11.85	60.00	61.00	−0.91
	21_le	73.03	69.51	21.58	58.73	25.01	85.99	48.02 (35.07)	16.47 (14.17)	6.43	17.70	11.38	58.90	55.94	−0.18
	01_ri	64.01	65.92	50.72	45.03	51.98	83.97	12.03 (7.70)	18.05 (11.90)	4.83	24.93	23.13	58.70	58.36	−0.93
	03_ri	78.02	81.02	44.00	25.45	45.21	92.51	32.81 (25.60)	11.49 (10.63)	4.25	12.00	10.93	57.00	57.00	−0.83
	05_ri	62.27	75.68	37.93	39.15	42.36	106.82	19.90 (12.39)	31.14 (33.26)	6.03	11.40	14.13	55.08	55.50	−0.72
	06_ri	65.78	48.24	54.62	74.38	57.02	57.57	8.75 (5.76)	9.34 (5.37)	8.08	13.98	16.68	60.17	61.64	−0.97
	13_ri	62.38	56.58	48.00	47.00	49.92	72.61	12.46 (7.78)	16.03 (11.64)	15.55	15.13	16.75	59.00	61.00	−0.97
	14_ri	78.62	79.30	26.51	43.08	28.79	88.83	49.83 (39.18)	9.53 (8.47)	5.65	11.80	7.30	55.93	54.63	−0.46
	17_ri	72.72	57.62	55.38	41.13	56.72	65.11	16.00 (11.64)	7.49 (4.88)	7.18	13.90	13.90	61.76	61.84	−0.95
fatiguing PIMA	19_ri	72.05	73.27	41.54	35.23	42.49	97.82	29.56 (21.30)	24.55 (24.01)	2.85	13.68	12.95	55.86	56.59	−0.46
	21_ri	76.89	84.91	43.80	39.13	45.69	88.80	31.20 (23.98)	3.89 (3.45)	5.65	11.63	13.43	55.56	56.51	−0.80
	24_ri	64.92	59.93	41.38	56.78	45.75	87.46	19.17 (12.44)	27.53 (24.08)	5.05	15.48	14.75	58.89	59.37	−0.97
	02_le	80.32	56.38	59.00	47.00	59.00	64.34	21.32 (17.12)	7.96 (5.12)	4.05	13.65	12.00	62.00	63.00	−0.76
	03_le	78.08	79.23	40.00	48.93	43.38	84.29	34.70 (27.09)	5.06 (4.26)	11.83	14.83	18.45	58.00	55.00	−0.55
	05_le	74.91	73.18	50.83	29.38	51.77	82.00	23.14 (17.33)	8.83 (7.24)	6.38	8.10	8.83	57.27	58.25	−0.63
	01_ri	73.99	76.63	54.04	48.93	55.52	75.94	18.47 (13.66)	−0.68 (−0.52)	9.55	25.20	23.38	58.50	60.15	−0.71
	02_ri	69.81	55.88	60.00	58.70	60.70	58.51	9.12 (6.37)	2.62 (1.53)	6.23	16.18	23.88	62.00	62.00	−0.87
	03_ri	78.29	76.83	44.00	54.80	47.81	83.69	30.48 (23.86)	6.87 (5.75)	7.90	17.15	16.25	59.00	60.00	−0.96
	05_ri	66.90	78.99	41.09	33.28	41.64	100.89	25.25 (16.89)	21.89 (22.09)	5.98	19.55	16.63	54.60	56.40	−0.79
	06_ri	79.64	59.07	56.19	66.55	58.26	54.49	21.38 (17.03)	−4.58 (−2.50)	14.03	16.40	17.30	60.30	61.80	−0.87

	07_ri	74.25	49.51	57.00	52.85	58.03	43.18	16.22 (12.04)	−6.32 (−2.73)	8.65	14.50	9.10	60.00	60.00	−0.18
	M	73.28	68.55	46.98	45.25	48.83	77.52	24.45 (18.25)	8.96 (8.24)	6.85	15.11	15.06	58.75	58.91	−0.81*
	SD	5.97	11.21	10.79	12.40	10.09	16.35	11.59 (9.35)	12.39 (10.48)	3.39	3.95	4.35	2.14	2.72	0.52*

Note: Abbreviations can be found on the first page.

Table S3. Single values of MVIC-tests of type I behaviors.

IMA	subject no. arm trial no.	baseline value SvO ₂ in %	baseline value rHb in AU	SvO ₂ min. in %	TTF in s	SvO ₂ SS mean in %	rHb SS mean in AU	extent of deoxygenation in pp (%)	extent of rHb decrease in AU (%)	time until min. of rHb before SS in s	time until SvO ₂ SS in s	time until rHb SS in s	SvO ₂ at RP ₁ in %	SvO ₂ at RP ₂ in %
								type I						
	01_le_1	81.35	57.73	70.13	~4s	-	-	11.22 (13.79)	10.63 (18.42)	-	-	-	-	-
	01_le_2	77.14	53.64	64.6	~4s	-	-	12.54 (16.26)	12.53 (23.36)	-	-	-	-	-
	02_le_1	71.52	54.00	62.29	~4s	-	-	9.23 (12.91)	11.07 (20.50)	-	-	-	-	-
	02_le_2	64.51	54.79	61.64	~4s	-	-	2.87 (4.45)	10.15 (18.52)	-	-	-	-	-
	06_le_1	67.12	49.47	61.26	~4s	-	-	5.86 (8.73)	5.79 (11.70)	-	-	-	-	-
	06_le_2	66.18	51.65	60.36	~4s	-	-	5.82 (8.80)	6.79 (13.14)	-	-	-	-	-
MVIC-	07_le_1	76.32	46.44	71.29	~4s	-	-	5.03 (6.59)	4.87 (10.49)	-	-	-	-	-
test	07_le_2	77.35	48.61	71	~4s	-	-	6.35 (8.21)	6.98 (14.35)	-	-	-	-	-
PIMA	01_ri_1	69.48	64.52	57.43	~4s	-	-	12.05 (17.34)	11.68 (18.10)	-	-	-	-	-
	02_ri_1	67.91	51.31	62.29	~4s	-	-	5.62 (8.28)	5.02 (9.79)	-	-	-	-	-
	02_ri_2	70.36	54.58	62.00	~4s	-	-	8.36 (11.88)	7.94 (14.55)	-	-	-	-	-
	06_ri_1	66.66	45.19	59.76	~4s	-	-	6.90 (10.36)	5.26 (11.64)	-	-	-	-	-
	06_ri_2	68.53	48.00	60.02	~4s	-	-	8.51 (12.42)	7.50 (15.63)	-	-	-	-	-
	07_ri_1	73.95	46.93	60.00	~4s	-	-	13.95 (18.86)	12.93 (27.56)	-	-	-	-	-
	07_ri_2	72.16	46.21	57.64	~4s	-	-	14.52 (20.13)	8.92 (19.30)	-	-	-	-	-
	M	71.37	51.54	62.78	-	-	-	8.59 (11.93)	8.54 (16.47)	-	-	-	-	-
	SD	4.92	5.20	4.53	-	-	-	3.55 (4.64)	2.80 (5.01)	-	-	-	-	-

Note: Abbreviations can be found on the first page.

Table S4. Single values of MVIC-tests of type II behaviors.

IMA.	subject no._arm trial no.	baseline value SvO ₂ in %	baseline value rHb in AU	SvO ₂ min. in %	TTF in s	SvO ₂ SS mean in %	rHb SS mean in AU	extent of deoxygenation in pp (%)	extent of rHb change in AU (%)	time until min. of rHb before SS in s	time until SvO ₂ SS in s	time until rHb SS in s	SvO ₂ at RP ₁ in %	SvO ₂ at RP ₂ in %
type II														
MVIC-test PIMA	03_le_1	69.55	71.04	50.64	~4s	-	-	18.91 (27.19)	2.68 (3.78)	-	-	-	57.19	58.71
	03_le_2	76.22	76.14	57.29	~4s	-	-	18.93 (24.84)	-14.07 (-18.48)	-	-	-	57.46	58.07
	05_le_1	72.89	64.51	53.90	~4s	-	-	18.99 (26.05)	-1.48 (-2.29)	-	-	-	61.69	58.42
	05_le_2	65.74	61.05	50.24	~4s	-	-	15.50 (23.58)	13.10 (21.45)	-	-	-	59.32	58.43
	01_ri_2	63.09	65.87	53.63	~4s	-	-	9.46 (14.99)	9.23 (14.01)	-	-	-	59.12	58.47
	03_ri_1	70.03	67.19	50.64	~4s	-	-	19.39 (27.69)	5.48 (8.16)	-	-	-	57.21	57.93
	03_ri_2	69.67	67.33	49.29	~4s	-	-	20.38 (29.25)	9.45 (14.04)	-	-	-	57.50	58.93
	05_ri_1	64.06	70.48	48.37	~4s	-	-	15.69 (24.50)	7.43 (10.54)	-	-	-	57.48	56.02
	05_ri_2	65.32	73.07	50.19	~4s	-	-	15.13 (23.17)	3.83 (5.24)	-	-	-	56.16	55.38
M		68.51	68.52	51.58	-	-	-	16.93 (24.58)	3.96 (6.27)	-	-	-	58.13	57.82
SD		4.34	4.62	2.81	-	-	-	3.41 (4.12)	8.00 (11.54)	-	-	-	1.66	1.25

Note: Abbreviations can be found on the first page.