

Hemodynamics of the sternocleidomastoid measured with frequency domain near-infrared spectroscopy towards non-invasive monitoring during mechanical ventilation: supplement

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Supplementary Information:

Table S1: Healthy volunteer data measured at baseline. All optical values calculated using FD data.

Subject	Sex	Max Force (N)	Baseline μ_a (mm^{-1})		Baseline μ_s' (mm^{-1})		Baseline Chromophores (μM)				Skin+Lipid Layer (mm)	DPF	
			730 nm	850 nm	730 nm	850 nm	Oxy (Hb+Mb)	Deoxy (Hb+Mb)	Total (Hb+Mb)	StO ₂	Ultrasound	730 nm	850 nm
1	M	103	0.026	0.035	0.62	0.55	102.5	42.6	145.1	70.6	3.78	3.57	2.93
2	M	95	0.032	0.041	0.57	0.49	119.1	55.2	174.3	68.3	3.48	3.17	2.46
3	M	94	0.034	0.041	0.53	0.46	114.3	64.1	178.4	64.0	3.40	2.94	2.43
4	M	84	0.042	0.059	0.49	0.38	189.3	62.4	251.7	75.1	2.29	2.50	1.77
5	F	95	0.024	0.026	0.6	0.54	60.9	50.5	111.4	54.6	3.95	3.75	3.89
6	F	57	0.025	0.03	0.62	0.55	81.1	48.2	129.3	62.7	3.63	3.59	3.07
7	M	178	0.041	0.049	0.47	0.38	133.8	78.5	212.3	63.0	3.67	2.56	2.01
8	F	73	0.024	0.027	0.62	0.57	61.5	52.8	114.3	53.8	3.16	3.71	3.32
9	F	79	0.035	0.04	0.56	0.52	103.4	72.0	175.4	58.9	3.28	2.96	2.57
10	F	113	0.023	0.029	0.68	0.58	81.5	40.0	121.5	67.1	5.23	4.00	3.24
Male	Mean	110.8	0.035	0.045	0.54	0.45	131.8	60.6	192.4	68.2	3.33	2.95	2.32
	SD	38.2	0.007	0.009	0.06	0.07	34.0	13.1	40.8	5.0	0.60	0.44	0.45
Female	Mean	83.4	0.026	0.030	0.62	0.55	77.7	52.7	130.4	59.4	3.85	3.60	3.22
	SD	21.4	0.005	0.006	0.04	0.02	17.5	11.8	26.1	5.6	0.83	0.39	0.48
All	Mean	97.1	0.031	0.038	0.58	0.50	104.7	56.6	161.4	63.8	3.59	3.28	2.77
	SD	32.6	0.007	0.011	0.07	0.07	38.28	12.48	46.0	6.80	0.74	0.52	0.64

Table S2: Summary of amplitude, phase, μ_a , μ_s' , and DPF changes during the sustained flexion.

		Sustained Flexion Changes									
		Amplitude (%)		Phase (deg)		μ_a (mm^{-1})		μ_s' (mm^{-1})		DPF	
		730 nm	850 nm	730 nm	850 nm	730 nm	850 nm	730 nm	850 nm	730 nm	850 nm
Males	Mean	-62.1	-19.0	-4.5	-0.4	0.025	0.003	-0.090	-0.037	-0.84	-0.23
	SD	12.2	14.5	0.7	0.3	0.010	0.002	0.025	0.126	0.42	0.57
Females	Mean	-45.7	-14.7	-3.1	-0.8	0.011	0.003	-0.036	-0.008	-0.56	-0.15
	SD	13.2	21.6	1.5	0.8	0.008	0.002	0.045	0.032	0.29	0.12
All	Mean	-53.9	-16.9	-3.8	-0.6	0.018	0.003	-0.063	-0.023	-0.70	-0.19
	SD	15.0	18.0	1.4	0.6	0.012	0.002	0.045	0.091	0.26	0.39

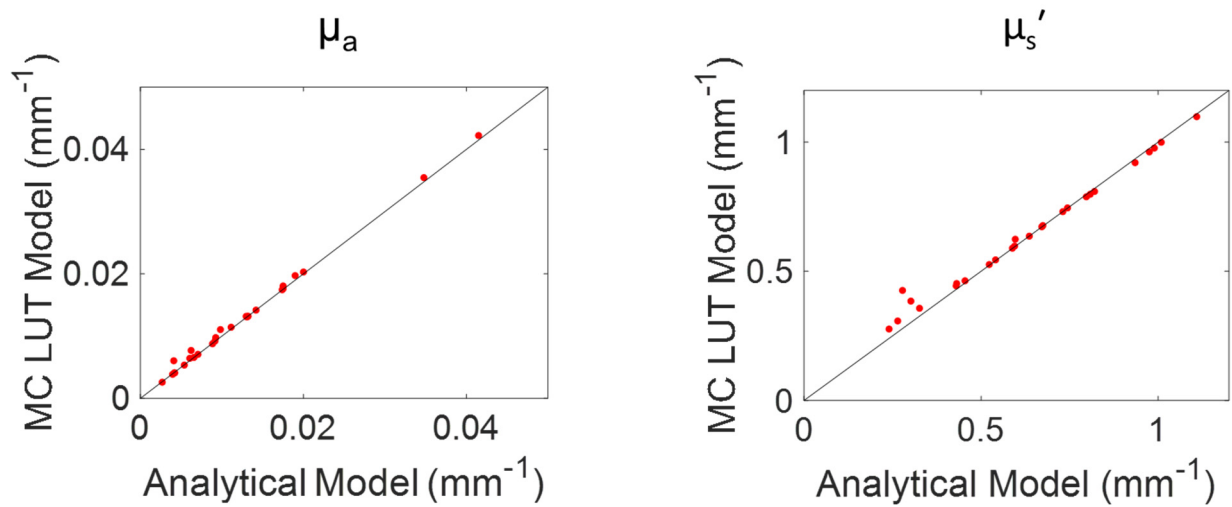


Figure S1: Validation of the MC LUT model was performed by comparing the absorption and reduced scattering extractions from the LUT against the traditional analytical model. 13 different silicone optical phantoms with optical properties similar to the neck were measured at 2 different wavelengths (730 and 850 nm). The average of 20 measurements for each phantom was reported. The percent difference between these two methods was 4.8% and 5.7% for absorption and reduced scattering respectively. The black line in the plots is the identity line.

Intermittent Flexion

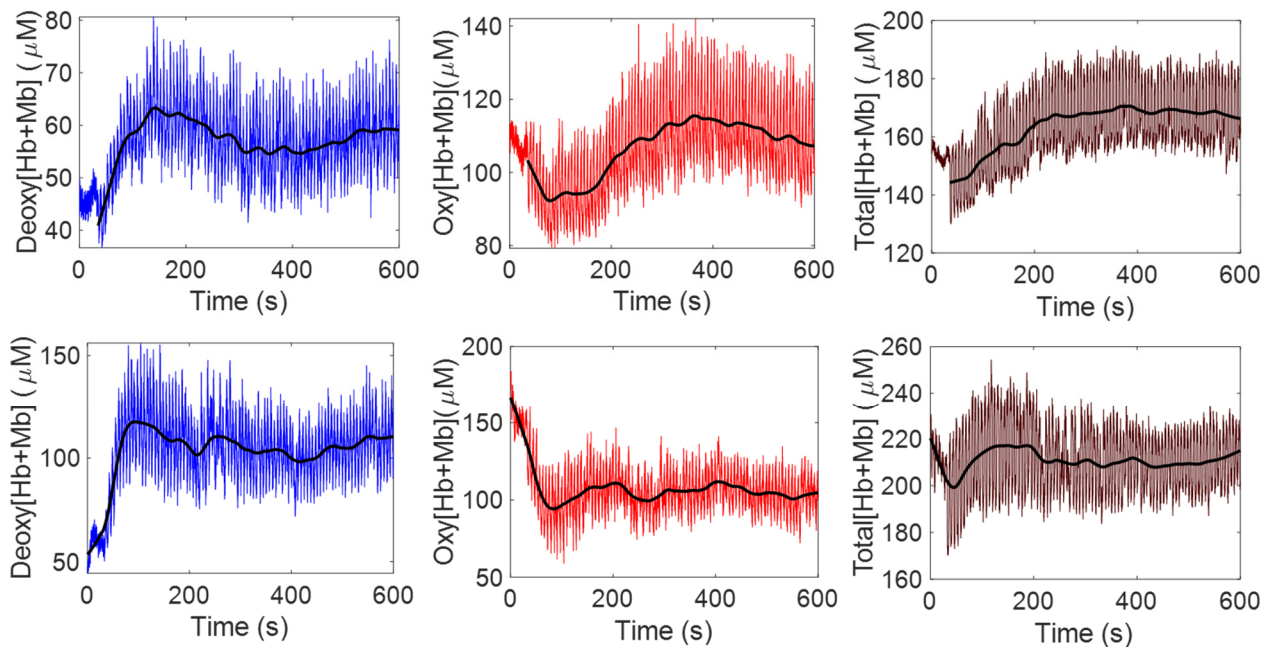


Figure S2: Sample intermittent flexion from two different subjects (subject 1 and 2 top row and bottom row respectively). These samples highlight some of the variation in changes observed from subject to subject. Most notably, in the first subject (top row), oxy[Hb+Mb] had a large rebound (increase) after its local minimum resulting in a more sustained increase in total[Hb+Mb], compared to the second subject (bottom row) which had a smaller increase in oxy[Hb+Mb] resulting in a slight decrease in total[Hb+Mb] following the local maximum.