Supplemental File 1

Part A: Improved wave speed relationship

Wave speed values from the literature used to guide development of area- and transition distance index-dependent wave speed relation used in the YoungAdult model. Segment numbers refer to Figure 2 in the main manuscript, and area and transition distance index refer to model-based values. Average wave speeds are the final values used to develop the wave speed relation.

Segment Number	Vessel Name	Area (cm^2)	Transition Distance Index	Wave Speed (reference) (cm/s)	Average Wave Speed (cm/s)
2	Ascending Aorta	5.94	0.022	357 (19)[§] 374(16)[§] 364 (20)[§] 370 (10)[¶]	366
6	Right Common Carotid Artery	0.40	0.447	458 (18)[#] 426 (9)[#] 485 (5)[#] 397 (13)[#] 424 (16)[§]	438
32	Aortic Arch II	4.69	0.154	390 (8)[¶] 420 (11)[¶]	405
38	Descending Thoracic Aorta I	4.00	0.240	362 (19)[§] 440 (16)[§] 410 (20)[§] 459 (10)[§] 430 (8)[¶] 490 (11)[¶]	432
46	Left Axillary Artery II	0.39	0.945	481 (1)[#]	481
48	Left Brachial Artery I	0.37	1	801 (1)[#]	801
54	Left Brachial Artery IV	0.14	2.261	904 (22)[#] 991 (3)[#] 1107 (1)[#]	1001
57	Left Radial Artery II	0.04	3.13	1069 (6)[#] 1007[*]	1038
62	Descending Thoracic Aorta II	2.68	0.355	424 (7)[§] 467 (10)[§] 405 (10)[¶] 360 (4)[¶] 446 (21)[¶] 570 (12)[†] 480 (10)[¶]	439

				440 (8)[¶] 360 (4)[¶]	
73	Abdominal Aorta IV	1.40	0.744	480 (4)[¶] 514 (21)[¶] 470 (10)[¶] 450 (8)[¶] 510 (11)[¶] 430 (4)[¶]	476
76	Left Common Iliac Artery	1.31	1	880 (12)[†]	880
80	Left Femoral Artery I	0.42	1.449	926 (24)[#] 1029 (2)[#] 709 (17)[#] 957 (3)[#]	905
94	Left Popliteal Artery I	0.22	2.154	916 (18)[#]	916

[§]Calculated via reported distensibility measured using magnetic resonance imaging (MRI) and $c = \sqrt{(1/\rho D)}$, where c is wave speed, ρ is density, and D is distensibility.

[¶]Calculated via the transit time between two sections a known distance apart using MRI.

[#]Calculated via reported distensibility measured using ultrasonography using $c = \sqrt{(1/\rho D)}$.

[*]Calculated using transit time from the validation portion of this study using applanation tonometry and electrocardiography. Arrival time to the distal end of the brachial and radial arteries was calculated as the time difference between the peak of the QRS complex of the electrocardiogram and upstroke of the pressure waveform obtained using applanation tonometry. The transit time was taken as the difference between the arrival times of the distal ends of the radial and brachial arteries. Finally, the radial wave speed was estimated by measuring the distance between the tonometry sites.

[†]Calculated via the transit time between two sections a known distance apart using simultaneous invasive micromanometer measurements.

Note 1: The vessel names and segment numbers correspond to the vessel names in Supplemental File 2.

Part B: Two-Chamber Elastance Heart Model

The two-chamber left-heart model shown in Figure B1 was used in all presented simulations; it comprised the left atrium and ventricle, mitral and aortic valves, a pulmonary venous resistance (R_{PV} = 0.05 mmHg·s/mL), and a constant pulmonary venous pressure (P_{PV} = 10.8 mmHg). The left atrium and ventricle were modelled as time varying elastance chambers (E_{LA} and E_{LV}, respectively) with source resistance (R_{LA} and R_{LV}, respectively), as described in (14). Heart rate was set to 75 beats per minute.

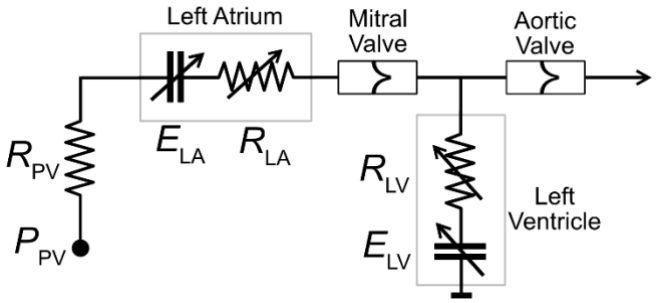

Figure B1. Schematic diagram of the left-heart model

E_{LA} and E_{LV} are defined by two Hill functions using the following parameters: E_{max}, E_{min}, τ_1, τ_2, m_1, m_2, $V_{p=0}$, and $V_{t=0}$; R_{LA} and R_{LV} are related to E_{LA} and E_{LV}, respectively, via a source resistance coefficient K_s (see (14) for further details). The values of these parameters for this study are given in Table B1.

Table B1. Parameter values for the left-heart model

Parameter	Symbol	Units	Left Atrium	Left Ventricle
Maximal elastance	E_{max}	mmHg/mL	0.13	2.48
Minimal elastance	E_{min}	mmHg/mL	0.09	0.07
Systolic time constant	τ_1	s	0.053	0.269
Diastolic time constant	τ_2	s	0.172	0.452
Contraction rate constant	m_1	-	1.99	1.32
Relaxation rate constant	m_2	-	11.2	21.9
Residual volume	$V_{p=0}$	mL	3.0	10.0
Initial volume	$V_{t=0}$	mL	15.8	158.0
Source resistance coefficient	K_s	x 10^{-4} s/mL	2.5	5.0
Onset of contraction		s	0.8125	0.0

The pressure-flow relationship of the mitral and aortic valves (with annulus area A_{ann}) was described by the Bernoulli equation, and the opening/closing dynamics were governed by the valve opening and valve closing rate coefficients K_{vo}, K_{vc} (Table B2) (15).

Table B2. Parameter values for the mitral and aortic valve models

Parameter	Symbol	Units	Mitral Valve	Aortic Valve
Opening pressure coefficient	K_{vo}	-	0.02	0.02
Closure pressure coefficient	K_{vc}	-	0.04	0.02
Annular area	A_{ann}	cm^2	5.1	4.9

Part C: Windkessel compliance

We wished to investigate whether the 2-element windkessel pulse pressure method (23) to estimate total arterial compliance (TAC_{wk}) was sensitive to both conduit arterial (C_{art}) and vascular bed compliance (C_{bed}). Towards this, we performed two experiments using the YoungAdult model: (Exp1) keeping C_{bed} of all beds constant and progressively decreasing C_{art} by multiplying the wave speed of every vessel by a factor (thus maintaining the junction matching); and (Exp2) keeping C_{art} constant and progressively increasing C_{bed} of all beds by the same factor. For each scenario, we calculated the total compliance of every vessel and vascular bed in the YoungAdult model (TAC_m), which is precisely known, and compared it to the corresponding TAC_{wk} using the aortic pressure and flow waveforms produced by the model.

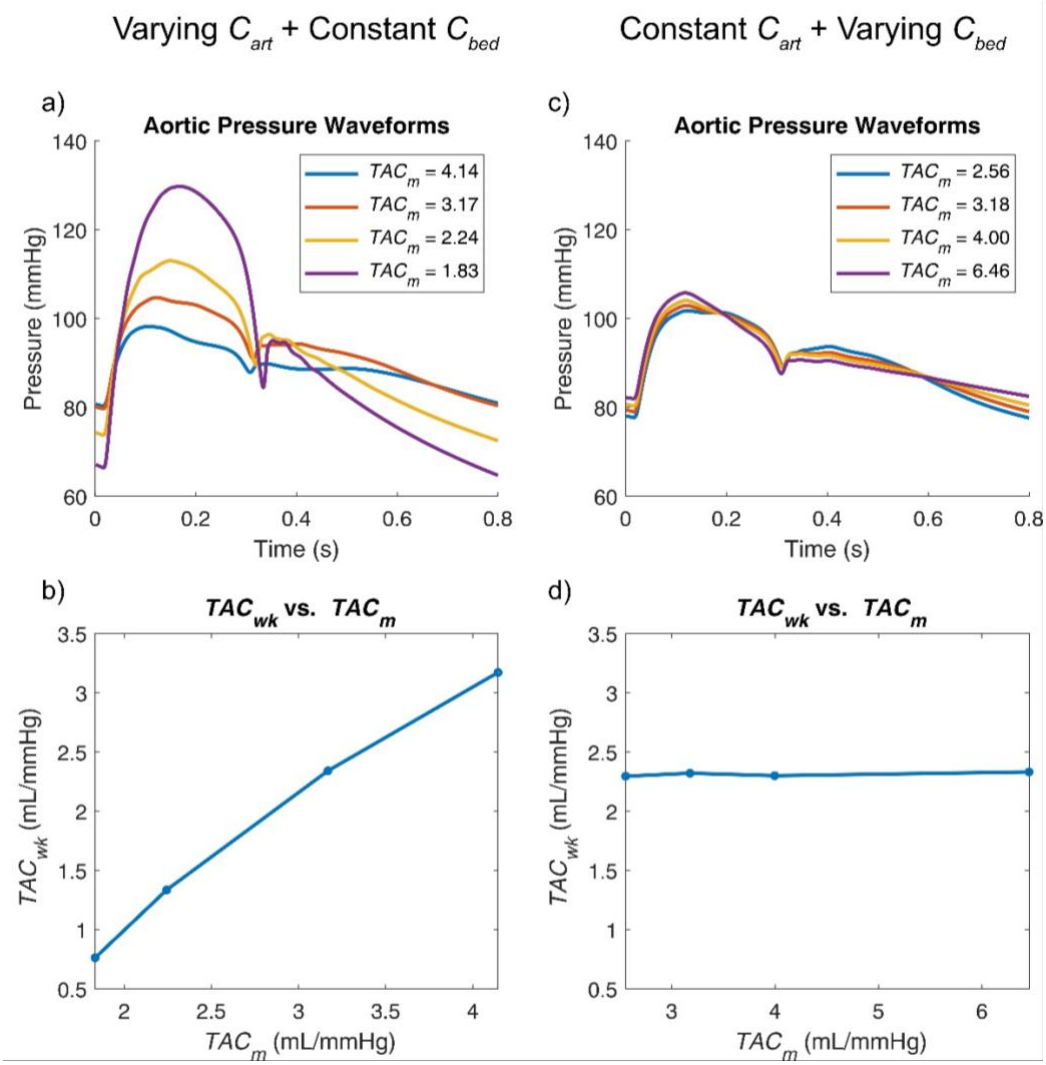

Figure C1: a) Aortic pressure waveforms obtained by keeping vascular bed compliance (C_{bed}) constant but changing arterial compliance (C_{art}). b) Corresponding values of total arterial compliance obtained using the windkessel pulse pressure method (TAC_{wk}) vs. that of the YoungAdult model (TAC_m). c) Aortic pressure waveforms obtained by keeping C_{art} constant and changing C_{bed}. d) Corresponding values of TAC_{wk} vs. TAC_m.

As seen in Figure C1a, when only C_{art} was decreased but C_{bed} was kept constant (Exp1), the aortic pulse pressure increased with a decrease in C_{art} (and consequently, a decrease in TAC_m), with a range of 17–65 mmHg. There was also a good correlation between TAC_{wk} and TAC_m when only C_{art} was decreased but C_{bed} was kept constant; a 56% reduction in TAC_m corresponded to a 76% reduction in TAC_{wk} (Figure C1b). On the other hand, while there was a significant change in the shape of the aortic pressure waveform with an increase in C_{bed} (and consequently, an increase in TAC_m) but constant C_{art} (Exp2), there was not much change in its pulse pressure, with a range of only 24–26 mmHg (Figure C1c). There was also very little change in TAC_{wk} with increasing TAC_m; even an increase in TAC_m by 153% corresponded to only a 1.6% increase in TAC_{wk}. These results suggest that while TAC_{wk} is sensitive to C_{art}, it is insensitive to C_{bed}. This is because TAC_{wk} is entirely dependent on the aortic pulse pressure, which is affected mostly by C_{art} but not significantly by C_{bed}.

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Supplemental File 2: Parameters and connectivity of the one-dimensional segments.

Note 1: In the connectivity table, items labelled with "VB" refer to specified vascular beds in Supplemental File 3
Note 2: Segments with [xN] in the segment name indicate that N identical vessels are included with the same parameters and connectivity

	Segment Name	Segment Abbreviation	Length (cm)	Transition Distance Index	Inlet A_0 (cm^2)	Outlet A_0 (cm^2)	Inlet C_0 (cm/s)	Outlet C_0 (cm/s)	Inlet Segment	Outlet Segment/s
Systemic Arteries										
1	Left Ventricular Outflow Tract	LVot	1.0	0.000	5.940	5.940	369.0	369.0	Left Ventricle	AorticValve, AscAo
2	Ascending Aorta	AscAo	4.0	0.022	5.940	5.940	369.0	369.0	LVot	AoArc(I), BCA
3	Aortic Arch I	AoArc(I)	2.0	0.110	4.964	4.964	375.3	375.3	AscAo	AoArc(II), LCA
4	Brachiocephalic Artery	BCA	3.4	0.110	1.223	1.223	426.1	426.1	AscAo	RCA, RSub(I)
5	Right Subclavian Artery I	RSub(I)	3.4	0.435	0.888	0.888	438.9	438.9	BCA	RVert, RIntTh, RSub(II)
6	Right Common Carotid Artery	RCA	9.4	0.447	0.398	0.398	470.5	470.5	BCA	RICA, RECA(I)
7	Right Vertebral Artery	RVert	14.9	0.628	0.056	0.056	555.1	555.1	RSub(I)	Bas(II)
8	Right Internal Thoracic Artery	RIntTh	8.0	0.260	0.170	0.170	505.2	505.2	RSub(I)	VB:Chest
9	Right Subclavian Artery II	RSub(II)	2.5	0.611	0.711	0.711	448.2	448.2	RSub(I)	RThyrc, RAxil(I)
10	Right Thyrocervical Artery	RThyrc	5.0	0.741	0.253	0.253	490.9	490.9	RSub(II)	VB:RShoulder
11	Right Axillary Artery I	RAxil(I)	3.8	0.741	0.496	0.496	463.6	463.6	RSub(II)	RSubsc, RAxil(II)
12	Right Subscapular Artery etc [x4]	RSubsc	4.0	0.938	0.038	0.038	588.4	588.4	RAxil(I)	VB:RShoulder
13	Right Axillary Artery II	RAxil(II)	1.2	0.938	0.396	0.396	486.7	486.7	RAxil(I)	RHCA, RBrach(I)

14	Right Humeral Circumflex Artery [x2]	RHCA	4.8	1.000	0.170	0.170	898.4	898.4	RAxil(II)	VB:RUpArm
15	Right Brachial Artery I	RBrach(I)	5.1	1.000	0.377	0.377	865.6	865.6	RAxil(II)	RDpBrach, RBrach(II)
16	Right Deep Brachial Artery	RDpBrach	6.2	1.264	0.047	0.047	1014.3	1014.3	RBrach(I)	VB:RUpArm
17	Right Brachial Artery II	RBrach(II)	5.2	1.264	0.361	0.361	926.2	926.2	RBrach(I)	RUlnCol, RBrach(III)
18	Right Ulnar Collateral Artery [x2]	RUlnCol	15.0	1.534	0.079	0.079	992.2	992.2	RBrach(II)	VB:RUpArm
19	Right Brachial Artery III	RBrach(III)	17.2	1.534	0.219	0.219	948.3	948.3	RBrach(II)	RMuscBrach, RBrach(IV)
20	Right Muscular Brachial Artery [x2]	RMuscBrach	5.1	2.425	0.045	0.045	1018.0	1018.0	RBrach(III)	VB:RUpArm
21	Right Brachial Artery IV	RBrach(IV)	7.2	2.425	0.137	0.137	969.1	969.1	RBrach(III)	RRad, RUlnar(I)
22	Right Radial Artery I	RRad(I)	11.7	2.798	0.068	0.068	999.9	999.9	RBrach(IV)	VB:RLowArm
23	Right Radial Branch [x3]	RRadBranch	1.0	3.404	0.010	0.010	1089.4	1089.4	LRad(I)	VB:RLowArm
24	Right Radial Artery II	RRad(II)	11.7	3.404	0.041	0.041	1023.1	1023.1	LRad(I)	VB:RLowArm
25	Right Ulnar Artery I	RUlnar(I)	6.7	2.798	0.073	0.073	996.6	996.6	RBrach(IV)	RInter, RUlnar(II)
26	Right Interosseous Artery	RInter	7.9	3.145	0.028	0.028	1041.3	1041.3	RUlnar(I)	VB:RLowArm
27	Right Ulnar Artery II	RUlnar(II)	17.1	3.145	0.048	0.048	1015.9	1015.9	RUlnar(I)	VB:RLowArm
28	Right Internal Carotid Artery I	RICA(I)	8.9	0.947	0.280	0.280	504.8	504.8	RCA	RICASin, ROpth
29	Right Internal Carotid Artery Branch	RICABranch	2.0	1.420	0.047	0.047	1015.2	1015.2	RICA(I)	VB:Face/Neck
30	Right Internal Carotid Artery II	RICA(II)	8.9	1.420	0.136	0.136	968.1	968.1	RICA(I)	VB:Face/Neck
31	Right External Carotid Artery	RECA	4.1	0.947	0.154	0.154	529.7	529.7	RCA	RECA(II), RSupThy
32	Aortic Arch II	AoArc(II)	3.9	0.154	4.694	4.694	377.3	377.3	AoArc(I)	DTA(I), LSub(I)

33	Left Common Carotid Artery	LCA	13.9	0.320	0.372	0.372	472.9	472.9	AoArc(I)	LICA, LECA(I)
34	Left Internal Carotid Artery I	LICA(I)	8.9	0.954	0.267	0.267	511.7	511.7	LCA	LIntCarSin, LOpth
35	Left Internal Carotid Artery Branch	LICABranch	2.0	1.361	0.044	0.044	1017.6	1017.6	LICA(I)	VB:Face/Neck
36	Left Internal Carotid Artery II	LICA(II)	8.9	1.361	0.127	0.127	970.7	970.7	LICA(I)	VB:Face/Neck
37	Left External Carotid Artery	LECA	4.1	0.954	0.143	0.143	537.8	537.8	LCA	LExtCar(II), LSupThy
38	Descending Thoracic Aorta I	DTA(I)	5.2	0.240	3.995	3.995	383.1	383.1	AoArc(II)	Interc, DTA(II)
39	Left Subclavian Artery I	LSub(I)	3.4	0.500	0.884	0.884	439.3	439.3	AoArc(II)	LVert, LIntTh, LSub(II)
40	Left Vertebral Artery	LVert	14.8	0.653	0.063	0.063	549.8	549.8	LSub(I)	Bas(II)
41	Left Internal Thoracic Artery	LIntTh	8.0	0.315	0.162	0.162	507.5	507.5	LSub(I)	VB:Chest
42	Left Subclavian Artery II	LSub(II)	2.5	0.656	0.708	0.708	448.7	448.7	LSub(I)	LThyrc, LAxil(I)
43	Left Thyrocervical Artery	LThyrc	5.0	0.771	0.252	0.252	491.6	491.6	LSub(II)	VB:LShoulder
44	Left Axillary Artery I	LAxil(I)	3.8	0.771	0.494	0.494	464.3	464.3	LSub(II)	LSubsc, LAxil(II)
45	Left Subscapular Artery etc [x4]	LSubsc	4.0	0.945	0.038	0.038	591.3	591.3	RAxil(I)	VB:LShoulder
46	Left Axillary Artery II	LAxil(II)	1.2	0.945	0.397	0.397	489.7	489.7	RAxil(I)	LHCA, LBrach(I)
47	Left Humeral Circumflex Artery [x2]	LHCA	4.8	1.000	0.170	0.170	898.6	898.6	RAxil(II)	VB:LUpArm
48	Left Brachial Artery I	LBrach(I)	5.1	1.000	0.374	0.374	865.9	865.9	RAxil(II)	LDpBrach, LBrach(II)
49	Left Deep Brachial Artery	LDpBrach	6.2	1.234	0.046	0.046	1014.3	1014.3	RBrach(I)	VB:LUpArm
50	Left Brachial Artery II	LBrach(II)	5.2	1.234	0.358	0.358	926.2	926.2	RBrach(I)	LUlnCol, LBrach(III)

51	Left Ulnar Collateral Artery [x2]	LUlnCol	15.0	1.472	0.078	0.078	992.4	992.4	RBrach(II)	VB:LUpArm
52	Left Brachial Artery III	LBrach(III)	17.2	1.472	0.217	0.217	948.5	948.5	RBrach(II)	LMuscBrach,
53	Left Muscular Brachial Artery [x2]	LMuscBrach	5.1	2.261	0.045	0.045	1018.3	1018.3	RBrach(III)	VB:LUpArm
54	Left Brachial Artery IV	LBrach(IV)	7.2	2.261	0.136	0.136	969.3	969.3	RBrach(III)	LLad, LUlnar(I)
55	Left Radial Artery I	LRad(I)	11.7	2.592	0.067	0.067	1000.1	1000.1	RBrach(IV)	VB:LLowArm
56	Left Radial Artery Branch	LRadBranch	1.0	3.128	0.010	0.010	1089.8	1089.8	LRad(I)	VB:LLowArm
57	Left Radial Artery II	LRad(II)	11.7	3.128	0.041	0.041	1023.4	1023.4	LRad(I)	VB:LLowArm
58	Left Ulnar Artery I	LUlnar(I)	6.7	2.592	0.073	0.073	996.8	996.8	RBrach(IV)	LInter, LUlnar(II)
59	Left Interosseous Artery	LInter	7.9	2.899	0.027	0.027	1041.6	1041.6	RUlnar(I)	VB:LLowArm
60	Left Ulnar Artery II	LUlnar(II)	17.1	2.899	0.047	0.047	1016.2	1016.2	RUlnar(I)	VB:LLowArm
61	Intercostal Arteries etc [x35]	Interc	8.0	0.355	0.058	0.058	552.2	552.2	DTA(I)	VB:Chest
62	Descending Thoracic Aorta II	DTA(II)	10.4	0.355	2.678	2.678	397.6	397.6	DTA(I)	AbdAo(I), Cel
63	Abdominal Aorta I	AbdAo(I)	5.3	0.584	2.309	2.309	403.7	403.7	DTA(II)	SupMes, AbdAo(II)
64	Celiac Artery	Cel	2.0	0.584	0.471	0.471	464.3	464.3	DTA(II)	Hep, Spl, Gas
65	Hepatic Artery	Hep	6.6	0.628	0.162	0.162	508.4	508.4	Cel	VB:Liver
66	Splenic Artery	Spl	6.3	0.628	0.113	0.113	524.1	524.1	Cel	VB:Spleen
67	Gastric Artery	Gas	7.1	0.628	0.237	0.237	492.6	492.6	Cel	VB:Stomach
68	Superior Mensenteric Artery	SupMes	5.9	0.700	0.561	0.561	458.3	458.3	AbdAo(I)	VB:Intestines
69	Abdominal Aorta II	AbdAo(II)	1.0	0.700	1.855	1.855	412.6	412.6	AbdAo(I)	LRenal, AbdAo(III)
70	Left Renal Artery	LRenal	3.2	0.722	0.287	0.287	485.5	485.5	AbdAo(II)	VB:LKidney
71	Abdominal Aorta III	AbdAo(III)	1.0	0.722	1.631	1.631	417.6	417.6	AbdAo(II)	RRenal, AbdAo(IV)
72	Right Renal Artery	RRenal	3.2	0.744	0.290	0.290	485.4	485.4	AbdAo(III)	VB:RKidney
73	Abdominal Aorta IV	AbdAo(IV)	10.6	0.744	1.402	1.402	423.6	423.6	AbdAo(III)	InfMes, AbdAo(V)
74	Inferior Mesenteric Artery	InfMes	5.0	0.978	0.073	0.073	626.8	626.8	AbdAo(IV)	VB:Intestines

75	Abdominal Aorta V	AbdAo(V)	1.0	0.978	1.600	1.600	501.4	501.4	AbdAo(IV)	LCmIliac, RCmIliac
76	Left Common Iliac Artery	LCmIliac	5.9	1.000	1.304	1.304	817.2	817.2	AbdAo(V)	LExIliac, LInIliac
77	Right Common Iliac Artery	RCmIliac	5.9	1.000	1.304	1.304	817.2	817.2	AbdAo(V)	RExIliac, RInIliac
78	Left External Iliac Artery	LExIliac	14.5	1.130	1.125	1.125	878.7	878.7	LCmIliac	LFem(I), LDpFem(I)
79	Left Internal Iliac Artery	LInIliac	5.0	1.130	0.294	0.294	931.6	931.6	LCmIliac	VB:Pelvis
80	Left Femoral Artery I	LFem(I)	6.4	1.449	0.425	0.425	920.9	920.9	LExIliac	LMuscFem(I),
81	Left Muscular Femoral Artery I	LMuscFem(I)	1.0	1.590	0.063	0.063	1002.6	1002.6	LFem(I)	VB:LUpLeg
82	Left Femoral Artery II	LFem(II)	6.4	1.590	0.370	0.370	926.9	926.9	LFem(I)	LMuscFem(II),
83	Left Muscular Femoral Artery II	LMuscFem(II)	1.0	1.731	0.055	0.055	1009.0	1009.0	LFem(II)	VB:LUpLeg
84	Left Femoral Artery III	LFem(III)	6.4	1.731	0.321	0.321	932.9	932.9	LFem(II)	LMuscFem(III),
85	Left Muscular Femoral Artery III	LMuscFem(III)	1.0	1.872	0.048	0.048	1015.3	1015.3	LFem(III)	VB:LUpLeg
86	Left Femoral Artery IV	LFem(IV)	6.4	1.872	0.279	0.279	938.8	938.8	LFem(III)	LMuscFem(IV),
87	Left Muscular Femoral Artery IV	LMuscFem(IV)	1.0	2.013	0.042	0.042	1021.6	1021.6	LFem(IV)	VB:LUpLeg
88	Left Femoral Artery V	LFem(V)	6.4	2.013	0.242	0.242	944.8	944.8	LFem(IV)	LPop(I), LDescGen
89	Left Deep Femoral Artery I	LDpFem(I)	1.5	1.449	0.737	0.737	899.1	899.1	LExIliac	LMedCxFem, LLatCxFem,
90	Left Medial Circumflex Femoral Artery	LMedCxFem	4.5	1.482	0.120	0.120	973.5	973.5	LDpFem(I)	VB:LUpLeg
91	Left Lateral Circumflex Femoral Artery	LLatCxFem	3.6	1.482	0.214	0.214	949.1	949.1	LDpFem(I)	VB:LUpLeg
92	Left Deep Femoral Artery II	LDpFem(II)	11.1	1.482	0.433	0.433	920.3	920.3	LDpFem(I)	VB:LUpLeg
93	Left Descending Genicular Artery	LDescGen	8.2	2.154	0.023	0.023	1049.7	1049.7	LFem(V)	VB:LLowLeg

94	Left Popliteal Artery I	LPop(I)	4.5	2.154	0.223	0.223	948.4	948.4	LFem(V)	LMedSupGen, LLatSupGen,
95	Left Medial Superior Genicular Artery	LMedSupGen	3.5	2.253	0.013	0.013	1075.4	1075.4	LPop(I)	VB:LLowLeg
96	Left Lateral Superior Genicular Artery	LLatSupGen	3.5	2.253	0.014	0.014	1072.8	1072.8	LPop(I)	VB:LLowLeg
97	Left Popliteal Artery II	LPop(II)	2.0	2.253	0.199	0.199	953.2	953.2	LPop(I)	LMidGenSural,
98	Left Middle Genicular and Sural Arteries	LMidGenSural	2.3	2.297	0.011	0.011	1083.8	1083.8	LPop(II)	VB:LLowLeg
99	Left Popliteal Artery III	LPop(III)	2.0	2.297	0.190	0.190	955.2	955.2	LPop(II)	LMedInfGen, LLatInfGen, LPop(IV)
100	Left Medial Inferior Genicular Artery	LMedInfGen	5.2	2.341	0.011	0.011	1085.6	1085.6	LPop(III)	VB:LLowLeg
101	Left Lateral Inferior Genicular Artery	LLatInfGen	4.0	2.341	0.011	0.011	1085.6	1085.6	LPop(III)	VB:LLowLeg
102	Left Popliteal Artery IV	LPop(IV)	3.7	2.341	0.171	0.171	959.6	959.6	LPop(III)	LATib(I), LTibPerTrunk
103	Left Anterior Tibial Artery I	LATib(I)	17.2	2.423	0.059	0.059	1006.0	1006.0	LPop(IV)	LATibPerf, LATib(II)
104	Left Anterior Tibial Perforator Artery	LATibPerf	3.1	2.802	0.013	0.013	1079.2	1079.2	LATib(I)	VB:LLowLeg
105	Left Anterior Tibial Artery II	LATib(II)	17.2	2.802	0.048	0.048	1015.6	1015.6	LATib(I)	VB:LLowLeg
106	Left Tibial Peroneal Trunk	LTibPerTrunk	3.0	2.423	0.117	0.117	976.0	976.0	LPop(IV)	LPTib(I), LPeron(I)
107	Left Peroneal Artery I	LPeron(I)	16.1	2.490	0.037	0.037	1027.6	1027.6	LTibPerTrunk	LPeronPerf,
108	Left Peroneal Perforating Artery	LPeronPerf	2.5	2.844	0.007	0.007	1106.2	1106.2	LPeron(I)	VB:LLowLeg
109	Left Peroneal Artery II	LPeron(II)	16.1	2.844	0.030	0.030	1036.8	1036.8	LPeron(I)	VB:LLowLeg
110	Left Posterior Tibial Artery I	LPTib(I)	16.1	2.490	0.083	0.083	991.0	991.0	LTibPerTrunk	LPTibPerf, LPTib(II)

111	Left Posterior Tibial Perforating Artery	LPTibPerf	3.0	2.844	0.017	0.017	1064.5	1064.5	LPTib(I)	VB:LLowLeg
112	Left Posterior Tibial Artery II	LPTib(II)	16.1	2.844	0.068	0.068	1000.0	1000.0	LPTib(I)	VB:LLowLeg
113	Right External Iliac Artery	RExIliac	14.5	1.130	1.125	1.125	878.7	878.7	RCmIliac	RFem(I), RDpFem(I)
114	Right Internal Iliac Artery	RInIliac	5.0	1.130	0.294	0.294	931.6	931.6	RCmIliac	VB:Pelvis
115	Right Femoral Artery I	RFem(I)	6.4	1.449	0.425	0.425	920.9	920.9	RExIliac	RMuscFem(I),
116	Right Muscular Femoral Artery I	RMuscFem(I)	1.0	1.590	0.063	0.063	1002.6	1002.6	RFem(I)	VB:RUpLeg
117	Right Femoral Artery II	RFem(II)	6.4	1.590	0.370	0.370	926.9	926.9	RFem(I)	RMuscFem(II),
118	Right Muscular Femoral Artery II	RMuscFem(II)	1.0	1.731	0.055	0.055	1009.0	1009.0	RFem(II)	VB:RUpLeg
119	Right Femoral Artery III	RFem(III)	6.4	1.731	0.321	0.321	932.9	932.9	RFem(II)	RMuscFem(III), RFem(IV)
120	Right Muscular Femoral Artery III	RMuscFem(III)	1.0	1.872	0.048	0.048	1015.3	1015.3	RFem(III)	VB:RUpLeg
121	Right Femoral Artery IV	RFem(IV)	6.4	1.872	0.279	0.279	938.8	938.8	RFem(III)	RMuscFem(IV), RFem(V)
122	Right Muscular Femoral Artery IV	RMuscFem(IV)	1.0	2.013	0.042	0.042	1021.6	1021.6	RFem(IV)	VB:RUpLeg
123	Right Femoral Artery V	RFem(V)	6.4	2.013	0.242	0.242	944.8	944.8	RFem(IV)	RPop(I), RDescGen
124	Right Deep Femoral Artery I	RDpFem(I)	1.5	1.449	0.737	0.737	899.1	899.1	RExIliac	RMedCxFem, RLatCxFem,
125	Right Medial Circumflex Femoral Artery	RMedCxFem	4.5	1.482	0.120	0.120	973.5	973.5	RDpFem(I)	VB:RUpLeg
126	Right Lateral Circumflex Femoral Artery	RLatCxFem	3.6	1.482	0.214	0.214	949.1	949.1	RDpFem(I)	VB:RUpLeg

127	Right Deep Femoral Artery II	RDpFem(II)	11.1	1.482	0.433	0.433	920.3	920.3	RDpFem(I)	VB:RUpLeg
128	Right Descending Genicular Artery	RDescGen	8.2	2.154	0.023	0.023	1049.7	1049.7	RFem(V)	VB:RLowLeg
129	Right Popliteal Artery I	RPop(I)	4.5	2.154	0.223	0.223	948.4	948.4	RFem(V)	RMedSupGen, RLatSupGen,
130	Right Medial Superior Genicular Artery	RMedSupGen	3.5	2.253	0.013	0.013	1075.4	1075.4	RPop(I)	VB:RLowLeg
131	Right Lateral Superior Genicular Artery	RLatSupGen	3.5	2.253	0.014	0.014	1072.8	1072.8	RPop(I)	VB:RLowLeg
132	Right Popliteal Artery II	RPop(II)	2.0	2.253	0.199	0.199	953.2	953.2	RPop(I)	RMidGenSural, RPop(III)
133	Right Middle Genicular and Sural Arteries	RMidGenSural	2.3	2.297	0.011	0.011	1083.8	1083.8	RPop(II)	VB:RLowLeg
134	Right Popliteal Artery III	RPop(III)	2.0	2.297	0.190	0.190	955.2	955.2	RPop(II)	RMedInfGen, RLatInfGen,
135	Right Medial Inferior Genicular Artery	RMedInfGen	5.2	2.341	0.011	0.011	1085.6	1085.6	RPop(III)	VB:RLowLeg
136	Right Lateral Inferior Genicular Artery	RLatInfGen	4.0	2.341	0.011	0.011	1085.6	1085.6	RPop(III)	VB:RLowLeg
137	Right Popliteal Artery IV	RPop(IV)	3.7	2.341	0.171	0.171	959.6	959.6	RPop(III)	RATib(I), RTibPerTrunk
138	Right Anterior Tibial Artery I	RATib(I)	17.2	2.423	0.059	0.059	1006.0	1006.0	RPop(IV)	LATibPerf, LATib(II)
139	Right Anterior Tibial Perforator Artery	RATibPerf	3.1	2.802	0.013	0.013	1079.2	1079.2	RATib(I)	VB:RLowLeg
140	Right Anterior Tibial Artery II	RATib(II)	17.2	2.802	0.048	0.048	1015.6	1015.6	RATib(I)	VB:RLowLeg
141	Right Tibial Peroneal Trunk	RTibPerTrunk	3.0	2.423	0.117	0.117	976.0	976.0	RPop(IV)	RPTib(I), RPeron(I)

142	Right Peroneal Artery I	RPeron(I)	16.1	2.490	0.037	0.037	1027.6	1027.6	RTibPerTrunk	RPeronPerf, RPeron(II)
143	Right Peroneal Perforating Artery	RPeronPerf	2.5	2.844	0.007	0.007	1106.2	1106.2	RPeron(I)	VB:RLowLeg
144	Right Peroneal Artery II	RPeron(II)	16.1	2.844	0.030	0.030	1036.8	1036.8	RPeron(I)	VB:RLowLeg
145	Right Posterior Tibial Artery I	RPTib(I)	16.1	2.490	0.083	0.083	991.0	991.0	RTibPerTrunk	RPTibPerf, RPTib(II)
146	Right Posterior Tibial Perforating Artery	RPTibPerf	3.0	2.844	0.017	0.017	1064.5	1064.5	RPTib(I)	VB:RLowLeg
147	Right Posterior Tibial Artery II	RPTib(II)	16.1	2.844	0.068	0.068	1000.0	1000.0	RPTib(I)	VB:RLowLeg
Head/Neck Arteries										
148	Basilar Artery II	Bas(II)	2.0	1.309	0.126	0.113	974.3	979.4	RVert, LVert	RSupCer, LSupCer, Bas(I)
149	Right Superior Cerebellar Artery	RSupCer	1.0	1.407	0.025	0.017	1059.3	1081.0	Bas(II)	VB:Brain
150	Left Superior Cerebellar Artery	LSupCer	1.0	1.407	0.025	0.017	1059.3	1081.0	Bas(II)	VB:Brain
151	Basilar Artery I	Bas(I)	0.5	1.407	0.083	0.063	995.7	1009.9	Bas(II)	RPostCer(I),
152	Right Posterior Cerebral Artery I	RPostCer(I)	0.2	1.431	0.035	0.035	1041.0	1041.0	Bas(I)	RPostComm, RPostCer(II)
153	Left Posterior Cerebral Artery I	LPostCer(I)	0.2	1.431	0.035	0.035	1041.0	1041.0	Bas(I)	LPostComm, LPostCer(II)
154	Right Posterior Communicating Artery	RPostComm	0.4	1.441	0.014	0.014	1091.1	1091.1	RPostCer(I)	RDICAI
155	Left Posterior Communicating Artery	LPostComm	0.4	1.441	0.014	0.014	1091.1	1091.1	LPostCer(I)	LDICAI
156	Right Posterior Cerebral Artery II	RPostCer(II)	5.9	1.441	0.025	0.021	1058.8	1070.5	RPostCer(I)	VB:Brain

157	Left Posterior Cerebral Artery II	LPostCer(II)	5.9	1.441	0.025	0.021	1058.8	1070.5	LPostCer(I)	VB:Brain
158	Right Distal Internal Carotid Artery I	RDICA(I)	0.2	1.799	0.119	0.113	978.4	981.0	RICASin, RPostComm	RAntChor, RDICA(II)
159	Left Distal Internal Carotid Artery I	LDICA(I)	0.2	1.951	0.119	0.113	978.6	981.2	LIntCarSin, LPostComm	LAntChor, LDICA(II)
160	Right Anterior Cerebral Artery I	RAntCer(I)	1.2	1.819	0.039	0.035	1036.7	1041.9	RDICA(II)	RAntCer(II)
161	Left Anterior Cerebral Artery I	LAntCer(I)	1.2	1.971	0.039	0.035	1036.8	1042.0	LDICA(II)	AntComm, LAntCer(II)
162	Right Middle Cerebral Artery (M1)	RMCA(M1)	0.8	1.819	0.079	0.069	999.4	1006.4	RDICA(II)	RMCAsup(M2), RMCAinf(M2)
163	Right Superior Middle Cerebral Artery (M2)	RMCAsup(M2)	7.1	1.858	0.034	0.034	1042.9	1042.9	RMCA(M1)	VB:Brain
164	Right Inferior Middle Cerebral Artery (M2)	RMCAinf(M2)	7.0	1.858	0.034	0.034	1042.9	1042.9	RMCA(M1)	VB:Brain
165	Left Middle Cerebral Artery (M1)	LMCA(M1)	0.8	1.971	0.079	0.069	999.5	1006.6	LDICA(II)	LMCAsup(M2), LMCAinf(M2)
166	Left Superior Middle Cerebral Artery (M2)	LMCAsup(M2)	7.1	2.010	0.034	0.034	1043.1	1043.1	LMCA(M1)	VB:Brain
167	Left Inferior Middle Cerebral Artery (M2)	LMCAinf(M2)	7.0	2.010	0.034	0.034	1043.1	1043.1	LMCA(M1)	VB:Brain
168	Right Anterior Cerebral Artery II	RAntCer(II)	2.4	1.877	0.025	0.023	1059.4	1065.7	RAntCer(I), AntComm	VB:Brain
169	Anterior Communicating Artery	AntComm	0.2	2.029	0.012	0.012	1102.7	1102.7	LAntCer(I)	RAntCer(II)
170	Left Anterior Cerebral Artery II	LAntCer(II)	2.4	2.029	0.023	0.020	1065.9	1072.2	LAntCer(I)	VB:Brain
171	Right Internal Carotid Sinus	RICASin	1.1	1.745	0.132	0.109	973.3	983.0	RICA	RDICAI
172	Right Opthalmic Artery	ROpth	1.1	1.745	0.007	0.007	1132.0	1132.0	RICA	VB:Face/Neck

173	Left Internal Carotid Sinus	LIntCarSin	1.1	1.897	0.124	0.102	976.9	986.6	LICA	LDICAI
174	Left Opthalmic Artery	LOpth	1.1	1.897	0.007	0.007	1136.3	1136.3	LICA	VB:Face/Neck
175	Right External Carotid Artery II	RECA(II)	6.1	1.074	0.118	0.118	970.5	970.5	RECA(I)	RSupTemp, RMaxil
176	Right Superior Thyroid / Ascending Pharyngeal / Lingual / Facial / Occipital Arteries	RSupThy	10.1	1.074	0.050	0.050	1014.6	1014.6	RECA(I)	VB:Face/Neck
177	Left External Carotid Artery II	LExtCar(II)	6.1	1.225	0.119	0.119	976.3	976.3	LECA(I)	LSupTemp, LMaxil
178	Left Superior Thyroid / Ascending Pharyngeal / Lingual / Facial / Occipital Arteries	LSupThy	10.1	1.225	0.036	0.036	1038.2	1038.2	LECA(I)	VB:Face/Neck
179	Right Superior Temporal Artery	RSupTemp	6.1	1.373	0.069	0.069	1005.2	1005.2	RECA(II)	RSupTempFront, RSupTempPari
180	Right Maxillary Artery	RMaxil	9.1	1.373	0.033	0.033	1044.8	1044.8	RECA(II)	VB:Face/Neck
181	Left Superior Temporal Artery	LSupTemp	6.1	1.525	0.069	0.069	1005.5	1005.5	LExtCar(II)	LSupTempFront, LSupTempPari
182	Left Maxillary Artery	LMaxil	9.1	1.525	0.033	0.033	1045.0	1045.0	LExtCar(II)	VB:Face/Neck
183	Right Superior Temporal Frontal Artery	RSupTempFront	10.0	1.672	0.034	0.034	1043.0	1043.0	RSupTemp	VB:Face/Neck
184	Right Superior Temporal Parietal Artery	RSupTempPari	10.1	1.672	0.034	0.034	1043.0	1043.0	RSupTemp	VB:Face/Neck

185	Left Superior Temporal Frontal Artery	LSupTempFront	10.0	1.824	0.034	0.034	1042.9	1042.9	LSupTemp	VB:Face/Neck
186	Left Superior Temporal Parietal Artery	LSupTempPari	10.1	1.824	0.034	0.034	1042.9	1042.9	LSupTemp	VB:Face/Neck
187	Right Anterior Choroidal Artery	RAntChor	3.6	1.809	0.016	0.012	1084.2	1100.6	RDICAI	VB:Brain
188	Right Distal Internal Carotid Artery II	RDICA(II)	0.2	1.809	0.105	0.105	985.1	985.1	RDICAI	RAntCer(I), RMCA(M1)
189	Left Anterior Choroidal Artery	LAntChor	3.6	1.961	0.016	0.012	1084.4	1100.7	LDICAI	VB:Brain
190	Left Distal Internal Carotid Artery II	LDICA(II)	0.2	1.961	0.105	0.105	985.3	985.3	LDICAI	LAntCer(I), LMCA(M1)

Supplemental File 3: Resistance and compliance of the systemic vascular beds.

Note 1: Resistances are pressure-dependent. Values below refer to reference resistances, as described in the Mynard2015 model (https://doi.org/10.1007/s10439-015-1313-8).

Systemic Vascular Beds

	Bed Name	Abbreviated Name	Resistance (mmHg.s/mL)	Arterial Compliance (mL/mmHg)
1	Brain	Brain	5.2	0.2477
2	Face/Neck	Face/Neck	15.8	0.0825
3	Right Shoulder	RShoulder	36.4	0.0357
4	Left Shoulder	LShoulder	35.2	0.0370
5	Right Upper Arm	RUpArm	39.8	0.0326
6	Right Lower Arm	RLowArm	77.8	0.0167
7	Left Upper Arm	LUpArm	39.8	0.0327
8	Left Lower Arm	LLowArm	77.6	0.0167
9	Chest	Chest	8.7	0.1496
10	Right Kidney	RKidney	6.1	0.2129
11	Left Kidney	LKidney	6.1	0.2129
12	Liver (arterial)	Liver	18.9	0.0686
13	Spleen	Spleen	21.4	0.0606
14	Stomach	Stomach	44.0	0.0296
15	Intestines	Intestines	8.2	0.1591
16	Pelvis	Pelvis	20.2	0.0642
17	Right Upper Leg	RUpLeg	24.0	0.0541
18	Left Upper Leg	LUpLeg	24.0	0.0541
19	Right Lower Leg	RLowLeg	35.6	0.0365
20	Left Lower Leg	LLowLeg	35.7	0.0365