

Table 1-4

## Architectural Properties of Human Lower Limb

Muscle	Mass (g)	Muscle Length (cm)	Fiber Length (cm)	Pennation Angle (°)	PCSA (cm <sup>2</sup> )	$L_f/L_m$ Ratio
Psoas (n = 19)	97.69 ± 33.58	24.25 ± 4.75	11.69 ± 1.66	10.66 ± 3.20	7.73 ± 2.31	0.50 ± 0.14
Iliacus (n = 21)	113.74 ± 37.01	20.61 ± 4.02	10.66 ± 1.86	14.29 ± 5.32	9.88 ± 3.40	0.56 ± 0.26
Gluteus maximus (n = 18)	547.24 ± 162.17	26.95 ± 6.42	15.69 ± 2.57	21.94 ± 26.24	28.17 ± 11.05	0.62 ± 0.22
Glut. medius (n = 16)	273.45 ± 76.86	19.99 ± 2.86	7.33 ± 1.57	20.47 ± 17.34	33.78 ± 14.39	0.37 ± 0.08
Sartorius (n = 20)	78.45 ± 31.13	44.81 ± 4.19	40.30 ± 4.63	1.33 ± 1.76	1.86 ± 0.74	0.90 ± 0.04
Rectus femoris (n = 21)	110.55 ± 43.33	36.28 ± 4.73	7.59 ± 1.28	13.93 ± 3.49	13.51 ± 4.97	0.21 ± 0.03
Vastus lateralis (n = 19)	375.85 ± 137.18	27.34 ± 4.62	9.94 ± 1.76	18.38 ± 6.78	35.09 ± 16.14	0.38 ± 0.11
Vastus intermedius (n = 20)	171.86 ± 72.89	41.20 ± 8.17	9.93 ± 2.03	4.54 ± 4.45	16.74 ± 6.91	0.24 ± 0.04
Vastus medialis (n = 19)	239.44 ± 94.83	43.90 ± 9.85	9.68 ± 2.30	29.61 ± 6.89	20.58 ± 7.17	0.22 ± 0.04
Gracilis (n = 19)	52.53 ± 16.72	28.69 ± 3.29	22.78 ± 4.38	8.16 ± 2.51	2.23 ± 0.81	0.79 ± 0.08
Adductor longus (n = 20)	74.67 ± 28.42	21.84 ± 4.46	10.82 ± 2.02	7.08 ± 3.43	6.50 ± 2.17	0.50 ± 0.07
Adductor brevis (n = 19)	54.56 ± 24.83	15.39 ± 2.46	10.31 ± 1.42	6.10 ± 3.14	4.95 ± 2.11	0.68 ± 0.06
Adductor magnus (n = 17)	324.72 ± 127.82	37.90 ± 7.36	14.44 ± 2.74	15.54 ± 7.27	20.48 ± 7.82	0.39 ± 0.07
Biceps femoris LH (n = 18)	113.37 ± 48.53	34.73 ± 3.65	9.76 ± 2.62	11.58 ± 5.50	11.33 ± 4.75	0.28 ± 0.08
Biceps femoris SH (n = 19)	59.79 ± 22.62	22.39 ± 2.50	11.03 ± 2.06	12.33 ± 3.61	5.06 ± 1.69	0.49 ± 0.07
Semitendinosus (n = 19)	99.74 ± 37.81	29.67 ± 3.86	19.30 ± 4.12	12.86 ± 4.94	4.82 ± 2.01	0.65 ± 0.11
Semimembranosus (n = 19)	134.31 ± 57.56	29.34 ± 3.42	6.90 ± 1.83	15.09 ± 3.43	18.40 ± 7.53	0.24 ± 0.06
Tibialis anterior (n = 21)	80.13 ± 26.63	25.98 ± 3.25	6.83 ± 0.79	9.56 ± 3.11	10.89 ± 3.01	0.27 ± 0.05
Extensor hallucis longus (n = 21)	20.93 ± 9.86	24.25 ± 3.27	7.48 ± 1.13	9.44 ± 2.15	2.67 ± 1.52	0.31 ± 0.06
Extensor digitorum longus (n = 21)	40.98 ± 12.62	29.00 ± 2.33	6.93 ± 1.14	10.83 ± 2.75	5.55 ± 1.68	0.24 ± 0.04
Peroneus longus (n = 19)	57.74 ± 22.64	27.08 ± 3.02	5.08 ± 0.63	14.08 ± 5.14	10.39 ± 3.75	0.19 ± 0.03
Peroneus brevis (n = 20)	24.15 ± 10.59	23.75 ± 3.11	4.54 ± 0.65	11.46 ± 2.96	4.91 ± 2.01	0.19 ± 0.03
Gastrocnemius MH (n = 20)	113.46 ± 31.97	26.94 ± 4.65	5.10 ± 0.98	9.88 ± 4.39	21.12 ± 5.66	0.19 ± 0.03
Gastrocnemius LH (n = 20)	62.24 ± 24.56	22.35 ± 3.70	5.88 ± 0.95	12.04 ± 3.11	9.72 ± 3.26	0.27 ± 0.03
Soleus (n = 19)	275.77 ± 98.50	40.54 ± 8.32	4.40 ± 0.99	28.25 ± 10.05	51.79 ± 14.91	0.11 ± 0.02
Flexor hallucis longus (n = 19)	38.89 ± 17.09	26.88 ± 3.55	5.27 ± 1.29	16.89 ± 4.62	6.85 ± 2.72	0.20 ± 0.05
Flexor digitorum longus (n = 19)	20.27 ± 10.75	27.33 ± 5.62	4.46 ± 1.06	13.64 ± 4.73	4.37 ± 2.02	0.16 ± 0.09
Tibialis posterior (n = 20)	58.44 ± 19.20	31.03 ± 4.68	3.78 ± 0.49	13.71 ± 4.11	14.42 ± 4.94	0.12 ± 0.02

**Abbreviation:** AB, adductor brevis; AL, adductor longus; AM, adductor magnus; BfI, biceps femoris, long head; BFs, biceps femoris, short head; EDL, extensor digitorum longus; EHL, extensor hallucis longus; FDL, flexor digitorum longus; GR, gracilis; FHL, flexor hallucis longus; LG, lateral gastrocnemius; MG, medial gastrocnemius; PEC, pectineus; PB, peroneus brevis; PL, peroneus longus; PLT, plantaris; POP, popliteus; RF, rectus femoris; SAR, sartorius; SM, semimembranosus; SOL, soleus; ST, semitendinosus; TA, tibialis anterior; TP, tibialis posterior; VI, vastus intermedius; VL, vastus lateralis; VM, vastus medialis.

**Source:** Ward, S. R., Eng, C. M., Smallwood, L. H., & Lieber, R. L. (2009). Are current measurements of lower extremity architecture accurate? *Clinical Orthopaedics and Related Research*, 467: 1074–1082.