

APPENDIX III

ANTHROPOMETRIC PARAMETERS

Table III.1. MEAN SEGMENT WEIGHTS EXPRESSED AS PERCENTAGES OF TOTAL BODY WEIGHT

SEGMENT	MALES (N = 35)	FEMALES (N = 100)
Head	8.26	8.20
Whole trunk	55.10	53.20
Thorax	20.10	17.02
Abdomen	13.06	12.24
Pelvis	13.66	15.96
Total arm	5.77	4.97
Upper arm	3.25	2.90
Forearm	1.87	1.57
Hand	0.65	0.50
Forearm and hand	2.52	2.07
Total leg	16.68	18.43
Thigh	10.50	11.75
Leg	4.75	5.35
Foot	1.43	1.33
Leg and foot	6.18	6.68

Adapted from Pflagenhoef et al. 1983.

for example (males)

55.10	trunk	
5.77	}	2 arms
5.77	}	
16.68	}	2 legs
16.68	}	
100.00		

**MEAN SEGMENT LENGTHS EXPRESSED AS PERCENTAGES OF
TOTAL BODY HEIGHT**

Table III.2.

SEGMENT	MALES (N = 35)	FEMALES (N = 73)
Head and neck	10.75	10.75
Trunk (hip to shoulder)	30.00	29.00
Thorax	12.70	12.70
Abdomen	8.10	8.10
Pelvis	9.30	9.30
Upper arm	17.20	17.30
Forearm	15.70	16.00
Hand	5.75	5.75
Thigh	23.20	24.90
Leg	24.70	25.70
Foot	4.25	4.25
Biacromial	24.50	20.00
Bi-iliac	11.30	12.00

Adapted from Plagenhoef et al. 1983.

**SEGMENTAL CENTER OF GRAVITY LOCATIONS EXPRESSED AS
PERCENTAGES OF SEGMENT LENGTHS MEASURED FROM THE
PROXIMAL ENDS**

Table III.3.

SEGMENT	MALES (N = 7)	FEMALES (N = 9)
Head and neck	55.0	55.0
Trunk	63.0	56.9
Upper arm	43.6	45.8
Forearm	43.0	43.4
Hand	46.8	46.8
Pelvis	5.0	5.0
Abdomen	46.0	46.0
Thorax	56.7	56.3
Thigh	43.3	42.8
Leg	43.4	41.9
Foot	50.0	50.0
Abdomen and pelvis	44.5	39.0

Adapted from Plagenhoef et al. 1983.

OF

FEMALES
(N = 100)

8.20
53.20
17.02
12.24
15.96
4.97
2.90
1.57
0.50
2.07
18.43
11.75
5.35
1.33
6.68

Table III.4. SEGMENTAL RADII OF GYRATION EXPRESSED AS PERCENTAGES OF THE SEGMENT LENGTHS MEASURED FROM THE PROXIMAL (P) AND DISTAL (D) ENDS*

SEGMENT	MALES (N = 36)		FEMALES (N = 100)	
	P	D	P	D
Upper arm	54.2	64.5	56.4	62.3
Forearm	52.6	54.7	53.0	64.3
Hand	54.9	54.9	54.9	54.9
Thigh	54.0	65.3	53.5	65.8
Leg	52.9	64.2	51.4	65.7
Foot	69.0	69.0	69.0	69.0
Head and trunk [†]	83.0	60.7		

*From Dempster 1955.

†Adapted from Plagenhoef et al. 1983.

Table III.5. MEAN BODY SEGMENT VOLUMES EXPRESSED AS PERCENTAGES OF TOTAL BODY VOLUME

SEGMENT	ROTUND (%)	MUSCULAR (%)	THIN (%)	MEDIAN (%)
Total upper extremity	5.28	5.60	5.20	5.65
Arm	3.32	3.35	2.99	3.46
Forearm plus hand	1.95	2.24	2.23	2.15
Forearm	1.52	1.70	1.63	1.61
Hand	0.42	0.53	0.58	0.54
Total lower extremity	20.27	18.49	19.08	19.55
Thigh	14.78	12.85	12.90	13.65
Leg plus foot	5.52	5.61	6.27	5.97
Leg	4.50	4.35	4.81	4.65
Foot	1.10	1.30	1.46	1.25

From Dempster 1955.

Table III.6. MEAN BODY SEGMENT DENSITIES

SEGMENT	DENSITY (gm/cm ³)
Head and neck	1.11
Trunk	1.03
Thigh	1.05
Leg	1.09
Foot	1.10
Upper arm	1.07
Forearm	1.13
Hand	1.16

From Dempster 1955.

PAGES
MAL (P)

ES
00)

D

62.3
64.3
54.9
65.8
65.7
69.0

PAGES

MEDIAN
(%)

5.65
3.46
2.15
1.61
0.54
19.55
13.65
5.97
4.65
1.25

Y (gm/cm³)

1.11
1.23
1.25
1.09
10
7
1.13
1.16

APPENDIX III

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MEANS AND STANDARD DEVIATIONS (SD) OF THE ROTATIONAL INERTIA OF THE BODY IN SELECTED POSTURES

Table III.7.

POSTURES	AXIS*	ROTATIONAL INERTIA (lb-in-sec ²)	
		Mean	SD
Standing	x	115.0	19.3
	y	103.0	17.9
	z	11.3	2.2
Standing arms over head (layout)	x	152.0	26.1
	y	137.0	25.3
	z	11.1	1.9
Spread eagle shoulders abducted 135° hips abducted 30°	x	151.0	27.1
	y	114.0	21.3
	z	36.6	7.9
Sitting elbows flexed 90°	x	61.1	10.3
	y	66.6	11.6
	z	33.5	5.8
Sitting elbows extended	x	62.4	9.7
	y	68.1	12.0
	z	33.8	5.9
Sitting (tuck position) hips flexed 145° knees flexed 145°	x	39.1	6.0
	y	38.0	5.8
	z	26.3	5.1
Sitting elbows flexed 80° hips flexed 80° knees flexed 168°	x	65.8	10.3
	y	75.2	14.0
	z	34.2	5.6
Relaxed (weightless)	x	92.2	13.3
	y	88.2	13.3
	z	35.9	5.4

*The z axis corresponds to the body's longitudinal axis; the y axis corresponds to the body's ML axis; the x axis corresponds to the body's AP axis.

From Santschi, Du Bois, and Omotu 1963.