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First Trimester Values

Table 1A

Combined Data Comparing Menstrual Age with Mean Gestational Sac Diameter, Crown-Rump Length, and Human Chorionic Gonadotropin (HCG) Levels

Menstrual Age (d)	Menstrual Age (wk)	Gestational Sac Size (mm)	Crown-Rump Length (mm)	HCG Level (First IRP), Mean (U/L)	HCG Level (First IRP), Range (U/L)
30	4.3	—	—	—	—
31	4.4	—	—	—	—
32	4.6	3	—	1,710	(1,050–2,800)
33	4.7	4	—	2,320	(140–3,760)
34	4.9	5	—	3,100	(1,940–4,980)
35	5	5.5	—	4,090	(2,580–6,330)
36	5.1	6	—	5,340	(3,400–8,450)
37	5.3	7	—	6,880	(4,420–10,810)
38	5.4	8	—	8,770	(5,680–13,660)
39	5.6	9	—	11,040	(7,220–17,050)
40	5.7	10	0.2	13,730	(9,050–21,040)
41	5.9	11	0.3	15,300	(10,140–23,340)
42	6	12	0.4	16,870	(11,230–25,640)
43	6.1	13	0.4	30,480	(13,750–30,880)
44	6.3	14	0.5	24,560	(16,650–36,750)
45	6.4	15	0.6	29,110	(19,910–43,220)
46	6.6	16	0.7	34,100	(25,530–50,210)
47	6.7	17	0.8	39,460	(27,470–57,640)
48	6.9	18	0.9	45,120	(31,700–65,380)
49	7	19	1.0	50,970	(36,130–73,280)
50	7.1	20	1.0	56,900	(40,700–81,150)
51	7.3	21	1.1	62,760	(45,300–88,790)
52	7.4	22	1.2	68,390	(49,810–95,990)
53	7.6	23	1.3	73,640	(54,120–102,540)
54	7.7	24	1.4	78,350	(58,100–108,230)
55	7.9	25	1.5	82,370	(61,640–112,870)
56	8	26	1.6	85,560	(64,600–116,310)
57	8.1	26.5	1.7	—	—
58	8.3	27	1.8	—	—
59	8.4	28	1.9	—	—
60	8.6	29	2.0	—	—
61	8.7	30	2.1	—	—
62	8.9	31	2.2	—	—
63	9	32	2.3	—	—
64	9.1	33	2.4	—	—
65	9.3	34	2.5	—	—
66	9.4	35	2.6	—	—
67	9.6	36	2.8	—	—
68	9.7	37	2.9	—	—
69	9.9	38	3.0	—	—
70	10	39	3.1	—	—
71	10.1	40	3.2	—	—
72	10.3	41	3.4	—	—
73	10.4	42	3.5	—	—
74	10.6	43	3.7	—	—
75	10.7	44	3.8	—	—
76	10.9	45	4.0	—	—
77	11	46	4.1	—	—
78	11.1	47	4.2	—	—
79	11.3	48	4.4	—	—
80	11.4	49	4.6	—	—
81	11.6	50	4.8	—	—
82	11.7	51	5.0	—	—
83	11.9	52	5.2	—	—
84	12	53	5.4	—	—

IRP, international reference preparation.

Reproduced with permission from Nyberg DA, Hill LM, Bohm-Velez M. *Transvaginal Ultrasound*. St Louis, MO: Mosby-Year Book; 1992; Hadlock FP, Shah YP, Kanon DJ, et al. Crown-rump length: reevaluation of relation to menstrual age (5–18 weeks) with high-resolution real-time US. *Radiology*. 1992;182:501; and Robinson HP. "Gestational sac" volumes as determined by sonar in the first trimester of pregnancy. *BJOG*. 1975;82:100; and data from Daya S, Woods S. Transvaginal ultrasound scanning in early pregnancy and correlation with human chorionic gonadotropin levels. *J Clin Ultrasound*. 1991;19:139.

Table 1B Relationship between Mean Sac Diameter and Menstrual Age

Mean Sac Diameter	Predicted Age in Days	95% CI
2	34.9	34.3–35.5
3	35.8	35.2–36.3
4	36.6	36.1–37.2
5	37.5	37.0–38.0
6	38.4	37.9–38.9
7	39.3	38.9–39.7
8	40.2	39.8–40.6
9	41.1	40.7–41.4
10	41.9	41.6–42.3
11	42.8	42.5–43.2
12	43.7	43.4–44.0
13	44.6	44.3–44.9
14	45.5	45.2–45.8
15	46.3	46.0–46.6
16	47.2	46.9–47.5
17	48.1	47.8–48.4
18	49	48.6–49.4
19	49.9	49.5–50.3
20	50.8	50.3–51.2
21	51.6	51.2–52.1
22	52.5	52.0–53.0
23	53.4	52.9–53.9
24	54.3	53.7–54.8

Table 2 Predicted Menstrual Age from Crown-Rump Length Measurements

Crown-Rump Length (mm)	Menstrual Age (wk)	Crown-Rump Length (mm)	Menstrual Age (wk)
0.2	5.7	4.2	11.1
0.3	5.9	4.4	11.3
0.4	6.0	4.6	11.4
0.4	6.1	4.8	11.6
0.5	6.3	5.0	11.7
0.6	6.4	5.2	11.9
0.7	6.6	5.4	12.0
0.8	6.7	5.5	12.1
0.9	6.9	5.6	12.2
1.0	7.0	5.7	12.3
1.0	7.1	5.8	12.3
1.1	7.3	5.9	12.4
1.2	7.4	6.0	12.5
1.3	7.6	6.1	12.6
1.4	7.7	6.2	12.6
1.5	7.9	6.3	12.7
1.6	8.0	6.4	12.8
1.7	8.1	6.5	12.8
1.8	8.3	6.6	12.9
1.9	8.4	6.7	13.0
2.0	8.6	6.8	13.1
2.1	8.7	6.9	13.1
2.2	8.9	7.0	13.2
2.3	9.0	7.1	13.3
2.4	9.1	7.2	13.4
2.5	9.3	7.3	13.4
2.6	9.4	7.4	13.5
2.8	9.6	7.5	13.6
2.9	9.7	7.6	13.7
3.0	9.9	7.7	13.8
3.1	10.0	7.8	13.8
3.2	10.1	7.9	13.9
3.4	10.3	8.0	14.0
3.5	10.4	8.1	14.1
3.7	10.6	8.2	14.2
3.8	10.7	8.3	14.2
4.0	10.9	8.4	14.3
4.1	11.0	—	—

Reproduced with permission from Hadlock FP, Shah YP, Kanon DJ, et al. Fetal crown-rump length: reevaluation of relation to menstrual age (5–18 weeks) with high-resolution real-time US. *Radiology*. 1992;182:501–505.

Table 3 Reference Values for Crown-Rump Length Compared with Gestational Sac Size

Gestational Sac (mm) ^a	Crown-Rump Length (mm) ^b		
	Percentiles		
	5th	50th	95th
10	0	4	8
11	0	5	9
12	0	5	10
13	1	5	10
14	1	6	11
15	1	7	12
16	1	7	13
17	2	8	14
18	2	8	15
19	2	9	15
20	3	10	16
21	3	10	17
22	4	11	18
23	4	12	19
24	5	12	20
25	5	13	21
26	6	14	22
27	6	15	24
28	7	16	25
29	7	17	26
30	8	18	27
31	9	18	28
32	9	19	29
33	10	20	31
34	11	21	32
35	12	22	33
36	12	23	34
37	13	25	36
38	14	26	37
39	15	27	38
40	16	28	40
41	17	29	41
42	18	30	43
43	19	31	44
44	20	33	46
45	21	34	47
46	22	35	49
47	23	37	50
48	24	38	52
49	25	39	54
50	26	41	55

^aStandard deviation = $0.9185 + 0.1599 \times$ gestational sac size.

^bCrown-rump length = $0.012 \times$ gestational sac size² + $0.9708 + 0.192 \times$ gestational sac size.

Adapted from Grisolia G, Milano V, Pilu G, et al. Biometry of early pregnancy with transvaginal sonography. *Ultrasound Obstet Gynecol*. 1993;3:403–411.

Amniotic Fluid Index

Table 4A Amniotic Fluid Index (AFI) Values in Centimeters during Normal Pregnancy

Gestational Age (wk)	5th Percentile	10th Percentile	50th Percentile	90th Percentile	95th Percentile
18	4.6	5.1	6.8	9.7	11.1
19	5.1	5.6	7.4	10.4	12
20	5.5	6.1	8	11.3	12.9
21	5.9	6.6	8.7	12.2	13.9
22	6.3	7.1	9.3	13.2	14.9
23	6.7	7.5	10	14.2	15.9
24	7	7.9	10.7	15.2	16.9
25	7.3	8.2	11.4	16.1	17.8
26	7.5	8.4	12	17	18.7
27	7.6	8.6	12.6	17.8	19.4
28	7.6	8.6	13	18.4	19.9
29	7.6	8.6	13.4	18.8	20.4
30	7.5	8.5	13.6	18.9	20.6
31	7.3	8.4	13.6	18.9	20.6
32	7.1	8.1	13.6	18.7	20.4
33	6.8	7.8	13.3	18.2	20
34	6.4	7.4	12.9	17.7	19.4
35	6	7	12.4	16.9	18.7
36	5.6	6.5	11.8	16.2	17.9
37	5.1	6	11.1	15.3	16.9
38	4.7	5.5	10.3	14.4	15.9
39	4.2	5	9.4	13.7	14.9
40	3.7	4.5	8.6	12.9	13.9
41	3.3	4	7.8	12.3	12.9

Data from Magann EF, Sanderson M, Martin JN, et al. The amniotic fluid index, single deepest pocket, and two-diameter pocket in normal human pregnancy. *Am J Obstet Gynecol.* 2000;182(6):1581–1588.

Table 4B Maximal Vertical Pocket (SDP) Values in Centimeters during Normal Pregnancy

<i>Gestational Age (wk)</i>	<i>5th Percentile</i>	<i>10th Percentile</i>	<i>50th Percentile</i>	<i>90th Percentile</i>	<i>95th Percentile</i>
18	2.7	2.9	4.1	5.9	6.4
19	2.8	3.1	4.3	6.1	6.6
20	2.9	3.2	4.4	6.2	6.7
21	2.9	3.3	4.5	6.3	6.8
22	3	3.3	4.6	6.3	6.8
23	3	3.4	4.6	6.3	6.8
24	3.1	3.4	4.7	6.3	6.8
25	3	3.3	4.7	6.3	6.8
26	3	3.3	4.8	6.4	6.8
27	3	3.3	4.8	6.4	6.9
28	3	3.3	4.8	6.4	6.9
29	2.9	3.3	4.8	6.4	6.9
30	2.9	3.3	4.8	6.4	6.9
31	2.9	3.2	4.8	6.5	7
32	2.9	3.2	4.8	6.6	7.1
33	2.9	3.2	4.82	6.6	7.2
34	2.8	3.2	4.8	6.6	7.2
35	2.8	3.1	4.7	6.6	7.2
36	2.7	3.1	4.7	6.6	7.1
37	2.6	2.9	4.5	6.5	7
38	2.4	2.8	4.4	6.3	6.8
39	2.3	2.7	4.2	6.1	6.6
40	2.1	2.5	3.9	5.8	6.2
41	1.9	2.2	3.7	5.4	5.7

Data from Magann EF, Sanderson M, Martin JN, et al. The amniotic fluid index, single deepest pocket, and two-diameter pocket in normal human pregnancy. *Am J Obstet Gynecol.* 2000;182(6):1581–1588.

Basic Ultrasound Biometry

Table 5 Predicted Fetal Measurements at Specific Gestational Age (GA)

GA (wk)	Biparietal Diameter (cm) ^a	Head Circumference (cm) ^b	Femur Length (cm) ^c	Abdominal Circumference (cm) ^d
12	1.7	6.8	0.7	4.6
13	2.1	8.2	1.1	6.0
14	2.5	9.7	1.4	7.3
15	2.9	11.1	1.7	8.6
16	3.2	12.4	2.1	9.9
17	3.6	13.8	2.4	11.2
18	3.9	15.1	2.7	12.5
19	4.3	16.4	3.0	13.7
20	4.6	17.7	3.3	15.0
21	5.0	18.9	3.6	16.2
22	5.3	20.1	3.8	17.4
23	5.6	21.3	4.1	18.5
24	5.9	22.4	4.4	19.7
25	6.2	23.5	4.6	20.8
26	6.5	24.6	4.9	21.9
27	6.8	25.6	5.1	23.0
28	7.1	26.6	5.4	24.0
29	7.3	27.5	5.6	25.1
30	7.6	28.4	5.8	26.1
31	7.8	29.3	6.1	27.1
32	8.0	30.1	6.3	28.1
33	8.3	30.8	6.5	29.1
34	8.5	31.5	6.7	30.0
35	8.7	32.2	6.9	30.9
36	8.8	32.8	7.1	31.8
37	9.0	33.3	7.2	32.7
38	9.2	33.8	7.4	33.6
39	9.3	34.2	7.6	34.4
40	9.4	34.6	7.7	35.3

^aBiparietal diameter = $-3.08 + 0.41 \times GA - 0.000061 \times GA^2$ (standard deviation, 3 mm).

^bHead circumference = $-11.48 + 1.56 \times GA - 0.0002548 \times GA^2$ (standard deviation, 1 cm).

^cFemur length = $-3.91 + 0.427 \times GA - 0.0034 \times GA^2$ (standard deviation, 3 mm).

^dAbdominal circumference = $-13.3 + 1.61 \times GA - 0.00998 \times GA^2$ (standard deviation, 1.34 cm).

Data from Hadlock FP, Deter RL, Harrist RB, et al. Estimating fetal age: computer assisted analysis of multiple fetal growth parameters. *Radiology*. 1984;152:497-501.

Table 6 Reference Values for Abdominal Circumference

Menstrual Age (wk)	Abdominal Circumference (cm)				
	Percentiles				
	3rd	10th	50th	90th	97th
14.0	6.4	6.7	7.3	7.9	8.3
15.0	7.5	7.9	8.6	9.3	9.7
16.0	8.6	9.1	9.9	10.7	11.2
17.0	9.7	10.3	11.2	12.1	12.7
18.0	10.9	11.5	12.5	13.5	14.1
19.0	11.9	12.6	13.7	14.8	15.5
20.0	13.1	13.8	15.0	16.3	17.0
21.0	14.1	14.9	16.2	17.6	18.3
22.0	15.1	16.0	17.4	18.8	19.7
23.0	16.1	17.0	18.5	20.0	20.9
24.0	17.1	18.1	19.7	21.3	22.3
25.0	18.1	19.1	20.8	22.5	23.5
26.0	19.1	20.1	21.9	23.7	24.8
27.0	20.0	21.1	23.0	24.9	26.0
28.0	20.9	22.0	24.0	26.0	27.1
29.0	21.8	23.0	25.1	27.2	28.4
30.0	22.7	23.9	26.1	28.3	29.5
31.0	23.6	24.9	27.1	29.4	30.6
32.0	24.5	25.8	28.1	30.4	31.8
33.0	25.3	26.7	29.1	31.5	32.9
34.0	26.1	27.5	30.0	32.5	33.9
35.0	26.9	28.3	30.9	33.5	34.9
36.0	27.7	29.2	31.8	34.4	35.9
37.0	28.5	30.0	32.7	35.4	37.0
38.0	29.2	30.8	33.6	36.4	38.0
39.0	29.9	31.6	34.4	37.3	38.9
40.0	30.7	32.4	35.3	38.2	39.9

Adapted from Hadlock FP, Deter RL, Harrist RB, et al. Estimating fetal age: computer-assisted analysis of multiple fetal growth parameters. *Radiology*. 1984;152:497-501.

Table 7 Reference Values for Head Circumference

Menstrual Age (wk)	Head Circumference (cm)				
	Percentiles				
	3rd	10th	50th	90th	97th
14.0	8.8	9.1	9.7	10.3	10.6
15.0	10.0	10.4	11.0	11.6	12.0
16.0	11.3	11.7	12.4	13.1	13.5
17.0	12.6	13.0	13.8	14.6	15.0
18.0	13.7	14.2	15.1	16.0	16.5
19.0	14.9	15.5	16.4	17.4	17.9
20.0	16.1	16.7	17.7	18.7	19.3
21.0	17.2	17.8	18.9	20.0	20.6
22.0	18.3	18.9	20.1	21.3	21.9
23.0	19.4	20.1	21.3	22.5	23.2
24.0	20.4	21.1	22.4	23.7	24.3
25.0	21.4	22.2	23.5	24.9	25.6
26.0	22.4	23.2	24.6	26.0	26.8
27.0	23.3	24.1	25.6	27.0	27.9
28.0	24.2	25.1	26.6	28.1	29.0
29.0	25.0	25.9	27.5	29.1	30.0
30.0	25.8	26.8	28.4	30.0	31.0
31.0	26.7	27.6	29.3	31.0	31.9
32.0	27.4	28.4	30.1	31.8	32.8
33.0	28.0	29.0	30.8	32.6	33.6
34.0	28.7	29.7	31.5	33.3	34.3
35.0	29.3	30.4	32.2	34.1	35.1
36.0	29.9	30.9	32.8	34.7	35.8
37.0	30.3	31.4	33.3	35.2	36.3
38.0	30.8	31.9	33.8	35.8	36.8
39.0	31.1	32.2	34.2	36.2	37.3
40.0	31.5	32.6	34.6	36.6	37.7

Adapted from Hadlock FP, Deter RL, Harrist RB, et al. Estimating fetal age: computer-assisted analysis of multiple fetal growth parameters. *Radiology*. 1984;152:497-501.

Table 8 Reference Values for Femur Length

Menstrual Age (wk)	Femur Length (cm)				
	Percentiles				
	3rd	10th	50th	90th	97th
14.0	1.2	1.3	1.4	1.5	1.6
15.0	1.5	1.6	1.7	1.9	1.9
16.0	1.7	1.8	2.0	2.2	2.3
17.0	2.1	2.2	2.4	2.6	2.7
18.0	2.3	2.5	2.7	2.9	3.1
19.0	2.6	2.7	3.0	3.3	3.4
20.0	2.8	3.0	3.3	3.6	3.8
21.0	3.0	3.2	3.5	3.8	4.0
22.0	3.3	3.5	3.8	4.1	4.3
23.0	3.5	3.7	4.1	4.5	4.7
24.0	3.8	4.0	4.4	4.8	5.0
25.0	4.0	4.2	4.6	5.0	5.2
26.0	4.2	4.5	4.9	5.3	5.6
27.0	4.4	4.6	5.1	5.6	5.8
28.0	4.6	4.9	5.4	5.9	6.2
29.0	4.8	5.1	5.6	6.1	6.4
30.0	5.0	5.3	5.8	6.3	6.6
31.0	5.2	5.5	6.0	6.5	6.8
32.0	5.3	5.6	6.2	6.8	7.1
33.0	5.5	5.8	6.4	7.0	7.3
34.0	5.7	6.0	6.6	7.2	7.5
35.0	5.9	6.2	6.8	7.4	7.8
36.0	6.0	6.4	7.0	7.6	8.0
37.0	6.2	6.6	7.2	7.9	8.2
38.0	6.4	6.7	7.4	8.1	8.4
39.0	6.5	6.8	7.5	8.2	8.6
40.0	6.6	7.0	7.7	8.4	8.8

Adapted from Hadlock FP, Deter RL, Harrist RB, et al. Estimating fetal age: computer-assisted analysis of multiple fetal growth parameters. *Radiology*. 1984;152:497-501.

Table 9 Reference Values for Abdominal Circumference (AC), Head Circumference (HC), Biparietal Diameter (BPD), and Femur Length (FL)

GA (wk)	AC (mm)			HC (mm)			BPD (mm)			FL (mm)		
	Percentiles			Percentiles			Percentiles			Percentiles		
	5th	50th	95th	5th	50th	95th	5th	50th	95th	5th	50th	95th
14	76	86	97	97	105	113	27	30	32	13	16	18
15	84	95	107	106	115	123	30	32	35	16	18	21
16	92	104	117	116	125	134	32	35	38	18	21	23
17	100	113	127	126	135	146	35	38	41	20	23	26
18	109	123	138	136	146	157	38	41	45	23	26	29
19	118	133	150	146	157	170	41	44	48	25	28	32
20	127	144	162	157	169	182	44	48	52	28	31	35
21	137	155	174	168	181	195	47	51	55	30	34	37
22	147	166	187	179	192	207	50	54	59	33	36	40
23	157	178	200	190	204	220	53	57	62	35	39	43
24	168	189	213	201	216	233	56	61	66	38	42	46
25	178	201	226	212	228	246	59	64	69	41	44	49
26	189	213	239	222	240	258	62	67	73	43	47	51
27	199	225	253	233	251	270	65	70	76	45	50	54
28	210	237	266	243	262	282	67	73	80	48	52	57
29	220	248	279	253	272	293	70	76	83	50	55	59
30	230	260	292	262	282	304	73	79	86	52	57	61
31	240	271	305	270	291	314	75	82	89	54	59	64
32	250	282	317	278	300	323	78	84	92	56	61	66
33	259	292	329	285	308	331	80	87	94	58	63	68
34	268	302	340	292	314	339	82	89	97	60	65	70
35	276	312	350	297	320	345	84	91	99	62	67	72
36	284	320	360	302	325	350	85	93	101	64	68	74
37	291	328	369	305	329	354	86	94	102	65	70	75
38	297	336	377	307	331	357	88	95	103	66	71	77
39	303	342	384	309	333	358	88	96	105	67	73	78
40	307	347	390	309	333	359	89	97	105	69	74	79

Note: $\text{Log}_{10}(\text{AC} + 9) = 1.3257977 + 0.0552337 \times \text{GA} - 0.0006146 \times \text{GA}^2$ (SD = 0.02947); $\text{Log}_{10}(\text{HC} + 1) = 1.3369692 + 0.0596493 \times \text{GA} - 0.0007494 \times \text{GA}^2$ (SD = 0.01887); $\text{Log}_{10}(\text{BPD} + 5) = 0.9445108 + 0.0509883 \times \text{MA} - 0.0006097 \times \text{GA}^2$ (SD = 0.02056); and $\text{FL}^5 = -1.1132444 + 0.4263429 \times \text{A33} - 0.0045992 \times \text{GA}^2$ (SD = 0.1852).

GA, gestational age; MA, menstrual age.

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Table 10 Normal Biometric Ratios of Head Circumference (HC)/Abdominal Circumference (AC), AC/Femur Length (FL), and Biparietal Diameter (BPD)/FL

GA (wk)	HC/AC ^a			AC/FL ^b			BPD/FL ^c		
	5th	50th	95th	5th	50th	95th	5th	50th	95th
14	1.13	1.23	1.34	4.93	5.51	6.16	1.75	1.92	2.11
15	1.12	1.22	1.33	4.73	5.29	5.92	1.66	1.82	2.00
16	1.11	1.21	1.32	4.57	5.11	5.71	1.58	1.74	1.91
17	1.10	1.20	1.31	4.43	4.95	5.54	1.52	1.67	1.83
18	1.09	1.19	1.30	4.32	4.83	5.40	1.47	1.61	1.77
19	1.08	1.18	1.29	4.23	4.73	5.29	1.42	1.56	1.71
20	1.07	1.17	1.28	4.16	4.65	5.20	1.39	1.52	1.67
21	1.06	1.17	1.27	4.11	4.59	5.13	1.36	1.49	1.64
22	1.05	1.16	1.26	4.07	4.55	5.08	1.34	1.47	1.61
23	1.04	1.15	1.25	4.04	4.52	5.05	1.32	1.45	1.59
24	1.03	1.14	1.24	4.03	4.50	5.03	1.30	1.43	1.57
25	1.02	1.13	1.23	4.02	4.50	5.03	1.29	1.42	1.56
26	1.01	1.12	1.22	4.03	4.50	5.03	1.29	1.41	1.55
27	1.00	1.11	1.21	4.04	4.51	5.04	1.28	1.41	1.54
28	0.99	1.10	1.20	4.05	4.53	5.06	1.28	1.40	1.54
29	0.98	1.09	1.19	4.07	4.55	5.09	1.28	1.40	1.54
30	0.97	1.08	1.18	4.10	4.58	5.12	1.27	1.40	1.53
31	0.96	1.07	1.17	4.12	4.61	5.15	1.27	1.40	1.53
32	0.95	1.06	1.16	4.15	4.64	5.18	1.27	1.39	1.53
33	0.94	1.05	1.16	4.17	4.67	5.22	1.27	1.39	1.52
34	0.94	1.04	1.15	4.20	4.69	5.24	1.26	1.38	1.52
35	0.93	1.03	1.14	4.21	4.71	5.27	1.25	1.37	1.51
36	0.92	1.02	1.13	4.23	4.73	5.28	1.24	1.36	1.50
37	0.91	1.01	1.12	4.23	4.73	5.29	1.23	1.35	1.48
38	0.90	1.00	1.11	4.23	4.73	5.29	1.21	1.33	1.46
39	0.89	0.99	1.10	4.22	4.71	5.27	1.19	1.30	1.43
40	0.88	0.98	1.09	4.19	4.69	5.24	1.16	1.28	1.40

^aHC/AC = 0.3668952 - 0.0096 × GA (SD = 0.064) (modified formula to fit published tabular data).

^bLog (AC/FL) = 1.3260806 - 0.0693157 × GA + 0.0023154 × GA² - 0.0000248 × GA³ (SD = 0.02942).

^cLog (BPD/FL) = 1.0205449 - 0.0865895 × GA + 0.0028771 × GA² - 0.0000321 × GA³ (SD = 0.02458).

GA, gestational age.

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Table 11 Estimated Fetal Weight (in Grams) Based on Femur Length (FL) and Abdominal Circumference (AC)

FL (cm)	AC (cm)													
	15	15.5	16	16.5	17	17.5	18	18.5	19	19.5	20	20.5	21	21.5
3	325	340	356	373	390	409	428	448	469	491	514	538	563	590
3.1	334	350	366	383	401	420	440	460	481	504	527	552	578	604
3.2	345	360	377	394	413	432	452	472	494	517	541	566	592	619
3.3	355	371	388	406	424	444	464	485	507	531	555	580	607	634
3.4	366	382	399	418	436	456	477	498	521	544	569	595	622	650
3.5	377	394	411	430	449	469	490	512	535	559	584	610	637	666
3.6	388	405	423	442	462	482	503	526	549	573	599	625	653	682
3.7	400	417	436	455	475	495	517	540	564	588	614	641	669	699
3.8	412	430	448	468	488	509	531	555	579	604	630	657	686	716
3.9	424	442	461	481	502	524	546	570	594	620	646	674	703	733
4	437	456	475	495	516	538	561	585	610	636	663	691	720	751
4.1	450	469	489	509	531	553	576	601	626	652	680	709	738	769
4.2	464	483	503	524	546	569	592	617	643	670	697	726	757	788
4.3	478	497	518	539	561	585	609	634	660	687	715	745	776	808
4.4	492	512	533	555	577	601	625	651	677	704	734	764	795	827
4.5	507	527	549	571	594	618	643	668	695	722	753	783	815	847
4.6	522	543	565	587	611	635	660	687	714	742	772	803	835	868
4.7	538	559	581	604	628	653	678	705	733	762	792	823	856	889
4.8	554	576	598	621	646	671	697	724	752	781	812	844	877	911
4.9	571	593	616	639	664	690	716	744	772	801	833	865	899	933
5	588	610	634	658	683	709	736	764	793	822	855	887	921	956
5.1	606	628	652	677	702	729	756	785	814	844	877	910	944	980
5.2	624	647	671	696	722	749	777	806	836	866	899	933	967	1,003
5.3	643	666	691	716	743	770	798	828	858	889	922	956	992	1,028
5.4	662	686	711	737	764	791	820	850	881	912	946	981	1,016	1,053
5.5	682	706	732	758	785	814	843	873	904	935	970	1,005	1,041	1,079
5.6	702	727	753	780	808	836	866	897	928	960	995	1,031	1,067	1,105
5.7	724	749	775	802	831	860	890	921	953	986	1,021	1,057	1,094	1,132
5.8	745	771	798	826	854	884	914	946	979	1,012	1,047	1,084	1,121	1,160
5.9	768	794	821	849	878	908	939	971	1,005	1,039	1,074	1,111	1,149	1,188
6	791	818	845	874	903	934	965	998	1,031	1,065	1,102	1,139	1,178	1,217
6.1	815	842	870	899	929	960	992	1,025	1,059	1,094	1,130	1,168	1,207	1,247
6.2	839	867	895	925	955	987	1,019	1,052	1,087	1,122	1,160	1,198	1,237	1,278
6.3	865	893	922	951	982	1,014	1,047	1,081	1,116	1,151	1,189	1,228	1,268	1,309
6.4	891	919	949	979	1,010	1,042	1,076	1,110	1,146	1,181	1,220	1,259	1,299	1,341
6.5	918	946	976	1,007	1,039	1,072	1,105	1,140	1,176	1,211	1,251	1,291	1,332	1,373
6.6	945	975	1,005	1,036	1,068	1,101	1,136	1,171	1,207	1,242	1,284	1,323	1,365	1,407
6.7	974	1,004	1,034	1,066	1,099	1,132	1,167	1,203	1,240	1,276	1,317	1,357	1,399	1,441
6.8	1,003	1,033	1,065	1,097	1,130	1,164	1,199	1,235	1,273	1,309	1,351	1,391	1,433	1,477
6.9	1,033	1,064	1,096	1,128	1,162	1,196	1,232	1,269	1,306	1,344	1,385	1,427	1,469	1,513
7	1,064	1,096	1,128	1,161	1,195	1,230	1,266	1,303	1,341	1,379	1,421	1,463	1,506	1,550
7.1	1,096	1,128	1,161	1,194	1,229	1,264	1,301	1,338	1,377	1,415	1,458	1,500	1,543	1,588
7.2	1,129	1,162	1,195	1,229	1,264	1,299	1,336	1,374	1,414	1,452	1,495	1,538	1,581	1,626
7.3	1,163	1,196	1,230	1,264	1,299	1,336	1,373	1,412	1,451	1,490	1,534	1,577	1,621	1,666
7.4	1,199	1,232	1,266	1,300	1,336	1,373	1,411	1,450	1,490	1,529	1,573	1,616	1,661	1,707
7.5	1,235	1,268	1,303	1,338	1,374	1,411	1,450	1,489	1,529	1,569	1,614	1,657	1,702	1,749
7.6	1,272	1,306	1,341	1,376	1,413	1,451	1,490	1,529	1,570	1,609	1,655	1,699	1,745	1,791
7.7	1,310	1,345	1,380	1,416	1,453	1,491	1,531	1,571	1,612	1,651	1,698	1,742	1,788	1,835
7.8	1,350	1,384	1,420	1,457	1,494	1,533	1,573	1,613	1,655	1,695	1,741	1,786	1,833	1,880
7.9	1,390	1,426	1,462	1,499	1,537	1,576	1,616	1,657	1,699	1,740	1,786	1,832	1,878	1,926
8	1,432	1,468	1,505	1,542	1,580	1,620	1,660	1,702	1,744	1,785	1,832	1,878	1,925	1,973
8.1	1,475	1,511	1,549	1,586	1,625	1,665	1,706	1,748	1,791	1,832	1,879	1,926	1,973	2,021
8.2	1,520	1,556	1,594	1,632	1,671	1,712	1,753	1,795	1,838	1,880	1,928	1,974	2,022	2,070
8.3	1,566	1,603	1,640	1,679	1,719	1,759	1,801	1,844	1,887	1,929	1,977	2,024	2,072	2,121

(continued)

Table 11 Estimated Fetal Weight (in Grams) Based on Femur Length (FL) and Abdominal Circumference (AC) (continued)

FL (cm)	AC (cm)													
	22	22.5	23	23.5	24	24.5	25	25.5	26	26.5	27	27.5	28	28.5
3	618	647	677	709	742	777	814	852	892	934	978	1,024	1,072	1,122
3.1	633	662	693	725	759	794	831	870	910	953	997	1,044	1,092	1,143
3.2	648	678	709	742	776	812	849	888	929	972	1,017	1,064	1,113	1,164
3.3	663	694	725	758	793	829	867	907	948	991	1,037	1,084	1,134	1,185
3.4	679	710	742	776	811	847	886	926	968	1,011	1,057	1,105	1,155	1,207
3.5	695	727	759	793	829	866	905	945	987	1,032	1,078	1,126	1,177	1,229
3.6	712	744	777	811	847	885	924	965	1,008	1,052	1,099	1,148	1,199	1,252
3.7	729	761	795	830	866	904	944	985	1,028	1,073	1,121	1,170	1,221	1,275
3.8	747	779	813	848	885	924	964	1,006	1,049	1,095	1,143	1,192	1,244	1,298
3.9	765	798	832	868	905	944	984	1,027	1,071	1,117	1,165	1,215	1,267	1,322
4	783	816	851	887	925	964	1,006	1,048	1,093	1,139	1,188	1,238	1,291	1,346
4.1	802	836	871	907	946	986	1,027	1,070	1,115	1,162	1,211	1,262	1,315	1,371
4.2	821	855	891	928	967	1,007	1,049	1,093	1,138	1,186	1,235	1,287	1,340	1,396
4.3	841	875	912	949	988	1,029	1,071	1,116	1,162	1,209	1,259	1,311	1,365	1,422
4.4	861	896	933	971	1,010	1,051	1,094	1,139	1,185	1,234	1,284	1,336	1,391	1,448
4.5	882	917	954	993	1,033	1,074	1,118	1,163	1,210	1,259	1,309	1,362	1,417	1,474
4.6	903	939	976	1,015	1,056	1,098	1,142	1,187	1,235	1,284	1,335	1,388	1,444	1,501
4.7	924	961	999	1,038	1,079	1,122	1,166	1,212	1,260	1,310	1,361	1,415	1,471	1,529
4.8	947	984	1,022	1,062	1,103	1,146	1,191	1,237	1,286	1,336	1,388	1,442	1,498	1,557
4.9	969	1,007	1,046	1,086	1,128	1,171	1,216	1,263	1,312	1,363	1,415	1,470	1,527	1,585
5	993	1,030	1,070	1,111	1,153	1,197	1,242	1,290	1,339	1,390	1,443	1,498	1,555	1,615
5.1	1,016	1,055	1,095	1,136	1,179	1,223	1,269	1,317	1,367	1,418	1,471	1,527	1,584	1,644
5.2	1,041	1,080	1,120	1,162	1,205	1,250	1,296	1,344	1,395	1,446	1,500	1,556	1,614	1,674
5.3	1,066	1,105	1,146	1,188	1,232	1,277	1,324	1,373	1,423	1,476	1,530	1,586	1,644	1,705
5.4	1,091	1,131	1,172	1,215	1,259	1,305	1,352	1,401	1,452	1,505	1,560	1,617	1,675	1,736
5.5	1,118	1,158	1,199	1,242	1,287	1,333	1,381	1,431	1,482	1,535	1,591	1,648	1,707	1,768
5.6	1,144	1,185	1,227	1,271	1,316	1,362	1,411	1,461	1,513	1,566	1,622	1,679	1,739	1,801
5.7	1,172	1,213	1,255	1,299	1,345	1,392	1,441	1,491	1,544	1,598	1,654	1,712	1,772	1,834
5.8	1,200	1,242	1,284	1,329	1,375	1,422	1,472	1,523	1,575	1,630	1,686	1,744	1,805	1,867
5.9	1,229	1,271	1,314	1,359	1,406	1,454	1,503	1,554	1,608	1,662	1,719	1,778	1,839	1,902
6	1,258	1,301	1,345	1,390	1,437	1,485	1,535	1,587	1,641	1,696	1,753	1,812	1,873	1,936
6.1	1,289	1,331	1,376	1,421	1,469	1,518	1,568	1,620	1,674	1,730	1,787	1,847	1,908	1,972
6.2	1,319	1,363	1,408	1,454	1,501	1,551	1,602	1,654	1,709	1,765	1,823	1,882	1,944	2,008
6.3	1,351	1,395	1,440	1,487	1,535	1,585	1,636	1,689	1,744	1,800	1,858	1,919	1,981	2,045
6.4	1,384	1,428	1,473	1,520	1,569	1,619	1,671	1,724	1,779	1,836	1,895	1,955	2,018	2,082
6.5	1,417	1,461	1,507	1,555	1,604	1,655	1,707	1,760	1,816	1,873	1,932	1,993	2,056	2,121
6.6	1,451	1,496	1,542	1,590	1,640	1,691	1,743	1,797	1,853	1,911	1,970	2,031	2,094	2,160
6.7	1,486	1,531	1,578	1,626	1,676	1,727	1,780	1,835	1,891	1,949	2,009	2,070	2,134	2,199
6.8	1,521	1,567	1,614	1,663	1,713	1,765	1,818	1,873	1,930	1,988	2,048	2,110	2,174	2,240
6.9	1,558	1,604	1,652	1,701	1,752	1,804	1,857	1,913	1,970	2,028	2,089	2,151	2,215	2,281
7	1,595	1,642	1,690	1,740	1,791	1,843	1,897	1,953	2,010	2,069	2,130	2,192	2,256	2,322
7.1	1,633	1,681	1,729	1,779	1,830	1,883	1,938	1,994	2,051	2,110	2,171	2,234	2,299	2,365
7.2	1,673	1,720	1,769	1,819	1,871	1,924	1,979	2,035	2,093	2,153	2,214	2,277	2,342	2,408
7.3	1,713	1,761	1,810	1,861	1,913	1,966	2,021	2,078	2,136	2,196	2,258	2,321	2,386	2,453
7.4	1,754	1,802	1,852	1,903	1,955	2,009	2,065	2,122	2,180	2,240	2,302	2,365	2,431	2,498
7.5	1,796	1,845	1,895	1,946	1,999	2,053	2,109	2,166	2,225	2,285	2,347	2,411	2,476	2,543
7.6	1,839	1,888	1,939	1,990	2,043	2,098	2,154	2,211	2,270	2,331	2,393	2,457	2,523	2,590
7.7	1,883	1,933	1,983	2,035	2,089	2,144	2,200	2,258	2,317	2,378	2,440	2,504	2,570	2,638
7.8	1,928	1,978	2,029	2,082	2,135	2,190	2,247	2,305	2,365	2,426	2,488	2,552	2,618	2,686
7.9	1,975	2,025	2,076	2,129	2,183	2,238	2,295	2,353	2,413	2,474	2,537	2,602	2,668	2,735
8	2,022	2,072	2,124	2,177	2,231	2,287	2,344	2,403	2,463	2,524	2,587	2,652	2,718	2,785
8.1	2,071	2,121	2,173	2,227	2,281	2,337	2,394	2,453	2,513	2,575	2,638	2,702	2,769	2,837
8.2	2,120	2,171	2,224	2,277	2,332	2,388	2,446	2,504	2,565	2,626	2,690	2,754	2,821	2,889
8.3	2,171	2,222	2,275	2,329	2,384	2,440	2,498	2,557	2,617	2,679	2,742	2,807	2,874	2,942

Table 11 Estimated Fetal Weight (in Grams) Based on Femur Length (FL) and Abdominal Circumference (AC) (continued)

FL (cm)	AC (cm)													
	29	29.5	30	30.5	31	31.5	32	32.5	33	33.5	34	34.5	35	35.5
3	1,175	1,230	1,288	1,349	1,412	1,479	1,548	1,621	1,697	1,777	1,860	1,948	2,039	2,135
3.1	1,196	1,252	1,310	1,371	1,435	1,502	1,572	1,645	1,722	1,802	1,886	1,973	2,065	2,161
3.2	1,218	1,274	1,333	1,394	1,458	1,526	1,596	1,669	1,746	1,827	1,911	1,999	2,092	2,188
3.3	1,239	1,296	1,355	1,417	1,482	1,550	1,620	1,694	1,772	1,853	1,937	2,026	2,118	2,215
3.4	1,262	1,319	1,378	1,441	1,506	1,574	1,645	1,720	1,797	1,879	1,964	2,052	2,145	2,242
3.5	1,284	1,342	1,402	1,465	1,530	1,599	1,670	1,745	1,823	1,905	1,990	2,079	2,172	2,270
3.6	1,307	1,365	1,426	1,489	1,555	1,624	1,696	1,771	1,850	1,932	2,017	2,107	2,200	2,298
3.7	1,331	1,389	1,450	1,514	1,580	1,649	1,722	1,797	1,876	1,959	2,045	2,134	2,228	2,326
3.8	1,354	1,413	1,475	1,539	1,606	1,675	1,748	1,824	1,903	1,986	2,072	2,162	2,256	2,354
3.9	1,379	1,438	1,500	1,564	1,632	1,702	1,775	1,851	1,931	2,014	2,101	2,191	2,285	2,383
4	1,403	1,463	1,525	1,590	1,658	1,729	1,802	1,879	1,959	2,042	2,129	2,220	2,314	2,413
4.1	1,429	1,489	1,551	1,617	1,685	1,756	1,830	1,907	1,987	2,071	2,158	2,249	2,344	2,442
4.2	1,454	1,515	1,578	1,644	1,712	1,783	1,858	1,935	2,016	2,100	2,187	2,278	2,373	2,472
4.3	1,480	1,541	1,605	1,671	1,740	1,812	1,886	1,964	2,045	2,129	2,217	2,308	2,404	2,503
4.4	1,507	1,568	1,632	1,699	1,768	1,840	1,915	1,993	2,074	2,159	2,247	2,339	2,434	2,533
4.5	1,534	1,596	1,660	1,727	1,797	1,869	1,944	2,023	2,104	2,189	2,278	2,370	2,465	2,565
4.6	1,561	1,623	1,688	1,756	1,826	1,898	1,974	2,053	2,135	2,220	2,309	2,401	2,497	2,596
4.7	1,589	1,652	1,717	1,785	1,855	1,928	2,004	2,084	2,166	2,251	2,340	2,432	2,528	2,628
4.8	1,618	1,681	1,746	1,814	1,885	1,959	2,035	2,115	2,197	2,283	2,372	2,464	2,560	2,660
4.9	1,647	1,710	1,776	1,845	1,916	1,990	2,066	2,146	2,229	2,315	2,404	2,497	2,593	2,693
5	1,676	1,740	1,806	1,875	1,947	2,021	2,098	2,178	2,261	2,347	2,437	2,530	2,626	2,726
5.1	1,706	1,770	1,837	1,906	1,978	2,053	2,130	2,210	2,294	2,380	2,470	2,563	2,659	2,760
5.2	1,737	1,801	1,868	1,938	2,010	2,085	2,163	2,243	2,327	2,413	2,503	2,597	2,693	2,794
5.3	1,768	1,833	1,900	1,970	2,043	2,118	2,196	2,277	2,360	2,447	2,537	2,631	2,727	2,828
5.4	1,799	1,865	1,933	2,003	2,076	2,151	2,229	2,310	2,394	2,482	2,572	2,665	2,762	2,863
5.5	1,832	1,897	1,966	2,036	2,109	2,185	2,264	2,345	2,429	2,516	2,607	2,700	2,797	2,898
5.6	1,864	1,931	1,999	2,070	2,143	2,219	2,298	2,380	2,464	2,552	2,642	2,736	2,833	2,933
5.7	1,898	1,964	2,033	2,104	2,178	2,254	2,333	2,415	2,500	2,587	2,678	2,772	2,869	2,969
5.8	1,932	1,999	2,068	2,139	2,213	2,290	2,369	2,451	2,536	2,624	2,714	2,808	2,905	3,006
5.9	1,966	2,034	2,103	2,175	2,249	2,326	2,405	2,488	2,573	2,660	2,751	2,845	2,942	3,043
6	2,002	2,069	2,139	2,211	2,286	2,363	2,442	2,525	2,610	2,698	2,789	2,883	2,980	3,080
6.1	2,038	2,105	2,175	2,248	2,323	2,400	2,480	2,562	2,647	2,736	2,827	2,921	3,018	3,118
6.2	2,074	2,142	2,212	2,285	2,360	2,438	2,518	2,600	2,686	2,774	2,865	2,959	3,056	3,156
6.3	2,111	2,180	2,250	2,323	2,398	2,476	2,556	2,639	2,724	2,813	2,904	2,998	3,095	3,195
6.4	2,149	2,218	2,289	2,362	2,437	2,515	2,595	2,678	2,764	2,852	2,943	3,037	3,134	3,235
6.5	2,187	2,256	2,328	2,401	2,477	2,555	2,635	2,718	2,804	2,892	2,983	3,077	3,174	3,274
6.6	2,227	2,296	2,367	2,441	2,517	2,595	2,675	2,759	2,844	2,933	3,024	3,118	3,215	3,315
6.7	2,267	2,336	2,408	2,481	2,557	2,636	2,716	2,800	2,885	2,974	3,065	3,159	3,256	3,355
6.8	2,307	2,377	2,449	2,523	2,599	2,677	2,758	2,841	2,927	3,015	3,107	3,200	3,297	3,397
6.9	2,348	2,418	2,490	2,564	2,641	2,719	2,800	2,884	2,969	3,058	3,149	3,242	3,339	3,438
7	2,391	2,461	2,533	2,607	2,683	2,762	2,843	2,926	3,012	3,101	3,191	3,285	3,381	3,481
7.1	2,433	2,504	2,576	2,650	2,727	2,806	2,887	2,970	3,056	3,144	3,235	3,328	3,424	3,523
7.2	2,477	2,547	2,620	2,694	2,771	2,850	2,931	3,014	3,100	3,188	3,279	3,372	3,468	3,567
7.3	2,521	2,592	2,664	2,739	2,816	2,895	2,976	3,059	3,145	3,233	3,323	3,416	3,512	3,610
7.4	2,566	2,637	2,710	2,785	2,861	2,940	3,021	3,105	3,190	3,278	3,368	3,461	3,557	3,655
7.5	2,612	2,683	2,756	2,831	2,908	2,987	3,068	3,151	3,236	3,324	3,414	3,507	3,602	3,700
7.6	2,659	2,730	2,803	2,878	2,955	3,034	3,115	3,198	3,283	3,371	3,461	3,553	3,648	3,745
7.7	2,707	2,778	2,851	2,926	3,002	3,081	3,162	3,245	3,330	3,418	3,508	3,600	3,694	3,791
7.8	2,755	2,826	2,899	2,974	3,051	3,130	3,211	3,294	3,379	3,466	3,555	3,647	3,741	3,838
7.9	2,805	2,876	2,949	3,024	3,100	3,179	3,260	3,343	3,427	3,514	3,604	3,695	3,789	3,885
8	2,855	2,926	2,999	3,074	3,151	3,229	3,310	3,392	3,477	3,564	3,653	3,744	3,837	3,933
8.1	2,906	2,977	3,050	3,125	3,202	3,280	3,360	3,443	3,527	3,614	3,702	3,793	3,886	3,981
8.2	2,958	3,029	3,102	3,177	3,253	3,332	3,412	3,494	3,578	3,664	3,752	3,843	3,935	4,030
8.3	3,011	3,082	3,155	3,230	3,306	3,384	3,464	3,546	3,630	3,716	3,803	3,893	3,985	4,080

(continued)

Table 11 Estimated Fetal Weight (in Grams) Based on Femur Length (FL) and Abdominal Circumference (AC) (continued)

FL (cm)	AC (cm)														
	36	36.5	37	37.5	38	38.5	39	39.5	40	40.5	41	41.5	42	42.5	43
3	2,236	2,341	2,451	2,566	2,687	2,813	2,945	3,083	3,228	3,380	3,539	3,705	3,880	4,062	4,253
3.1	2,262	2,367	2,478	2,593	2,714	2,840	2,972	3,111	3,256	3,407	3,566	3,732	3,906	4,087	4,278
3.2	2,289	2,394	2,505	2,620	2,741	2,868	3,000	3,138	3,283	3,434	3,593	3,758	3,932	4,113	4,303
3.3	2,316	2,422	2,532	2,648	2,769	2,896	3,028	3,166	3,311	3,462	3,620	3,785	3,958	4,139	4,328
3.4	2,344	2,450	2,560	2,676	2,797	2,924	3,056	3,194	3,339	3,489	3,647	3,812	3,985	4,165	4,353
3.5	2,371	2,478	2,588	2,704	2,825	2,952	3,084	3,222	3,367	3,517	3,675	3,839	4,011	4,191	4,379
3.6	2,399	2,506	2,617	2,733	2,854	2,981	3,113	3,251	3,395	3,545	3,703	3,867	4,038	4,217	4,404
3.7	2,428	2,534	2,646	2,762	2,883	3,010	3,142	3,280	3,424	3,574	3,731	3,894	4,065	4,244	4,430
3.8	2,457	2,563	2,675	2,791	2,912	3,039	3,171	3,309	3,452	3,602	3,759	3,922	4,093	4,270	4,456
3.9	2,486	2,593	2,704	2,821	2,942	3,068	3,200	3,338	3,481	3,631	3,787	3,950	4,120	4,297	4,482
4	2,515	2,622	2,734	2,850	2,972	3,098	3,230	3,367	3,511	3,660	3,816	3,978	4,148	4,324	4,508
4.1	2,545	2,652	2,764	2,880	3,002	3,128	3,260	3,397	3,540	3,689	3,845	4,007	4,175	4,351	4,534
4.2	2,575	2,683	2,794	2,911	3,032	3,159	3,290	3,427	3,570	3,719	3,874	4,035	4,203	4,378	4,561
4.3	2,606	2,713	2,825	2,942	3,063	3,189	3,321	3,458	3,600	3,748	3,903	4,064	4,231	4,406	4,588
4.4	2,637	2,744	2,856	2,973	3,094	3,220	3,351	3,488	3,630	3,778	3,933	4,093	4,260	4,434	4,614
4.5	2,668	2,776	2,888	3,004	3,125	3,251	3,383	3,519	3,661	3,809	3,962	4,122	4,288	4,461	4,641
4.6	2,700	2,807	2,919	3,036	3,157	3,283	3,414	3,550	3,692	3,839	3,992	4,151	4,317	4,489	4,668
4.7	2,732	2,839	2,951	3,068	3,189	3,315	3,446	3,582	3,723	3,870	4,022	4,181	4,346	4,517	4,696
4.8	2,764	2,872	2,984	3,100	3,221	3,347	3,478	3,613	3,754	3,901	4,053	4,211	4,375	4,546	4,723
4.9	2,797	2,905	3,017	3,133	3,254	3,379	3,510	3,645	3,786	3,932	4,083	4,241	4,404	4,574	4,751
5	2,830	2,938	3,050	3,166	3,287	3,412	3,542	3,677	3,818	3,963	4,114	4,271	4,434	4,603	4,779
5.1	2,864	2,972	3,083	3,200	3,320	3,445	3,575	3,710	3,850	3,995	4,145	4,302	4,464	4,632	4,806
5.2	2,898	3,005	3,117	3,233	3,354	3,479	3,608	3,743	3,882	4,027	4,177	4,332	4,494	4,661	4,835
5.3	2,932	3,040	3,152	3,268	3,388	3,513	3,642	3,776	3,915	4,059	4,208	4,363	4,524	4,690	4,863
5.4	2,967	3,075	3,186	3,302	3,422	3,547	3,676	3,809	3,948	4,091	4,240	4,394	4,554	4,720	4,891
5.5	3,002	3,110	3,221	3,337	3,457	3,581	3,710	3,843	3,981	4,124	4,272	4,426	4,584	4,749	4,920
5.6	3,037	3,145	3,257	3,372	3,492	3,616	3,744	3,877	4,015	4,157	4,304	4,457	4,615	4,779	4,948
5.7	3,073	3,181	3,293	3,408	3,527	3,651	3,779	3,911	4,048	4,190	4,337	4,489	4,646	4,809	4,977
5.8	3,110	3,218	3,329	3,444	3,563	3,686	3,814	3,946	4,082	4,224	4,370	4,521	4,677	4,839	5,006
5.9	3,147	3,254	3,365	3,480	3,599	3,722	3,849	3,981	4,117	4,257	4,403	4,553	4,709	4,869	5,036
6	3,184	3,291	3,402	3,517	3,636	3,758	3,885	4,016	4,151	4,291	4,436	4,586	4,740	4,900	5,065
6.1	3,222	3,329	3,440	3,554	3,673	3,795	3,921	4,052	4,186	4,326	4,470	4,618	4,772	4,931	5,095
6.2	3,260	3,367	3,478	3,592	3,710	3,832	3,957	4,087	4,222	4,360	4,503	4,651	4,804	4,962	5,125
6.3	3,299	3,406	3,516	3,630	3,747	3,869	3,994	4,124	4,257	4,395	4,537	4,684	4,836	4,993	5,154
6.4	3,338	3,445	3,555	3,668	3,785	3,906	4,031	4,160	4,293	4,430	4,572	4,718	4,868	5,024	5,185
6.5	3,377	3,484	3,594	3,707	3,824	3,944	4,069	4,197	4,329	4,465	4,606	4,751	4,901	5,056	5,215
6.6	3,418	3,524	3,633	3,746	3,863	3,983	4,106	4,234	4,365	4,501	4,641	4,785	4,934	5,087	5,245
6.7	3,458	3,564	3,673	3,786	3,902	4,021	4,144	4,271	4,402	4,537	4,676	4,819	4,967	5,119	5,276
6.8	3,499	3,605	3,714	3,826	3,941	4,060	4,183	4,309	4,439	4,573	4,711	4,854	5,000	5,151	5,307
6.9	3,541	3,646	3,754	3,866	3,981	4,100	4,222	4,347	4,477	4,610	4,747	4,888	5,034	5,184	5,338
7	3,583	3,688	3,796	3,907	4,022	4,139	4,261	4,386	4,514	4,647	4,783	4,923	5,067	5,216	5,369
7.1	3,625	3,730	3,837	3,948	4,062	4,180	4,300	4,425	4,552	4,684	4,819	4,958	5,101	5,249	5,400
7.2	3,668	3,772	3,880	3,990	4,103	4,220	4,340	4,464	4,591	4,721	4,855	4,994	5,136	5,282	5,432
7.3	3,712	3,815	3,922	4,032	4,145	4,261	4,380	4,503	4,629	4,759	4,892	5,029	5,170	5,315	5,464
7.4	3,756	3,859	3,965	4,075	4,187	4,303	4,421	4,543	4,668	4,797	4,929	5,065	5,205	5,348	5,496
7.5	3,800	3,903	4,009	4,118	4,230	4,344	4,462	4,583	4,708	4,835	4,966	5,101	5,240	5,382	5,528
7.6	3,845	3,948	4,053	4,161	4,272	4,386	4,504	4,624	4,747	4,874	5,004	5,137	5,275	5,415	5,560
7.7	3,891	3,993	4,098	4,205	4,316	4,429	4,545	4,665	4,787	4,913	5,042	5,174	5,310	5,449	5,592
7.8	3,937	4,039	4,143	4,250	4,359	4,472	4,587	4,706	4,827	4,952	5,080	5,211	5,346	5,484	5,625
7.9	3,984	4,085	4,188	4,295	4,404	4,515	4,630	4,748	4,868	4,992	5,118	5,248	5,381	5,518	5,658
8	4,031	4,131	4,234	4,340	4,448	4,559	4,673	4,790	4,909	5,031	5,157	5,286	5,417	5,553	5,691
8.1	4,079	4,179	4,281	4,386	4,493	4,603	4,716	4,832	4,950	5,072	5,196	5,323	5,454	5,587	5,724
8.2	4,127	4,226	4,328	4,432	4,539	4,648	4,760	4,875	4,992	5,112	5,235	5,361	5,490	5,622	5,758
8.3	4,176	4,275	4,376	4,479	4,585	4,693	4,804	4,918	5,034	5,153	5,275	5,399	5,527	5,658	5,791

Note: $\text{Log}_{10} = 1.3598 + (0.051 \times \text{AC}) + (0.1844 \times \text{FL}) - (0.0037 \times \text{AC} \times \text{FL})$.

Reproduced with permission from Hadlock FP, Harrist RB, Carpenter RJ, et al. Sonographic estimation of fetal weight. *Radiology*. 1984;150:535-540.

Table 12 Neonatal Birth Weights and Percentiles Based on Gestational Age (GA) Derived by First-Trimester Ultrasound (Males and Females Combined)

GA (wk)	Neonatal Weight Percentiles (g)						
	5th	10th	25th	50th	75th	90th	95th
25	450	489	564	660	772	890	968
26	523	568	652	760	885	1,016	1,103
27	609	659	754	875	1,015	1,160	1,257
28	707	764	870	1,005	1,161	1,323	1,430
29	820	884	1,003	1,153	1,327	1,505	1,623
30	947	1,019	1,152	1,319	1,511	1,707	1,836
31	1,090	1,170	1,317	1,502	1,713	1,928	2,070
32	1,249	1,337	1,499	1,702	1,933	2,167	2,321
33	1,422	1,519	1,696	1,918	2,168	2,422	2,588
34	1,607	1,713	1,906	2,146	2,416	2,688	2,865
35	1,804	1,918	2,126	2,383	2,671	2,960	3,148
36	2,006	2,128	2,350	2,622	2,927	3,231	3,428
37	2,210	2,339	2,572	2,859	3,177	3,493	3,698
38	2,409	2,544	2,786	3,083	3,412	3,737	3,947
39	2,595	2,734	2,984	3,288	3,622	3,952	4,164
40	2,762	2,903	3,156	3,462	3,798	4,128	4,340
41	2,900	3,041	3,293	3,597	3,929	4,255	4,462
42	3,002	3,141	3,388	3,685	4,008	4,323	4,523
43	3,060	3,195	3,433	3,717	4,026	4,325	4,515

Note: $\ln(Wt) = 5.5952 - 0.16626 \times GA + 0.011973 \times GA^2 - 0.0001555 \times GA^3$; and SD of $\ln(Wt) = 0.39269 - 0.0063838 \times GA$.
 Ln, natural log; Wt, weight.

Data from Doubilet PM, Benson CB, Nadel AS, et al. Improved birth weight table for neonates developed from gestations dated by early ultrasonography. *J Ultrasound Med.* 1997;16:241-249.

Table 13 Gender-Specific Reference Values for Neonatal Birth Weights Based on Gestational Age (GA) Derived by First-Trimester Ultrasound

GA (wk)	Birth Weights (g)													
	Males ^a							Females ^b						
	Percentiles							Percentiles						
	5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
25	460	501	577	676	791	911	992	450	487	557	646	749	856	927
26	533	578	664	773	901	1,034	1,123	526	568	647	748	864	984	1,064
27	617	668	764	886	1,028	1,175	1,273	613	662	751	865	995	1,130	1,219
28	715	772	879	1,015	1,173	1,335	1,443	713	768	869	997	1,144	1,294	1,393
29	827	891	1,011	1,162	1,336	1,515	1,634	827	889	1,002	1,146	1,309	1,477	1,587
30	955	1,027	1,160	1,327	1,519	1,716	1,846	955	1,024	1,151	1,311	1,493	1,678	1,800
31	1,099	1,179	1,326	1,511	1,722	1,937	2,078	1,097	1,174	1,316	1,493	1,694	1,898	2,032
32	1,259	1,348	1,510	1,713	1,943	2,177	2,331	1,253	1,339	1,496	1,691	1,911	2,135	2,281
33	1,435	1,532	1,710	1,931	2,181	2,434	2,599	1,423	1,517	1,689	1,902	2,143	2,385	2,543
34	1,625	1,731	1,924	2,164	2,433	2,704	2,881	1,603	1,706	1,893	2,125	2,384	2,646	2,815
35	1,827	1,941	2,149	2,406	2,693	2,982	3,169	1,792	1,904	2,105	2,354	2,632	2,911	3,092
36	2,036	2,159	2,380	2,653	2,957	3,260	3,456	1,986	2,105	2,321	2,586	2,881	3,176	3,366
37	2,248	2,377	2,611	2,897	3,215	3,530	3,734	2,180	2,306	2,534	2,813	3,123	3,431	3,630
38	2,455	2,591	2,834	3,130	3,458	3,783	3,991	2,368	2,500	2,738	3,029	3,350	3,669	3,874
39	2,651	2,790	3,040	3,343	3,677	4,006	4,217	2,544	2,681	2,926	3,225	3,554	3,880	4,088
40	2,826	2,967	3,220	3,525	3,860	4,189	4,398	2,701	2,841	3,091	3,394	3,727	4,054	4,264
41	2,971	3,112	3,364	3,667	3,997	4,320	4,525	2,831	2,972	3,223	3,526	3,858	4,184	4,391
42	3,078	3,216	3,462	3,757	4,078	4,389	4,587	2,928	3,068	3,316	3,615	3,941	4,259	4,462
43	3,138	3,271	3,507	3,790	4,094	4,390	4,577	2,986	3,122	3,364	3,654	3,968	4,275	4,470

^aMales: $\ln(Wt) = 6.5464 - 0.24681 \times GA + 0.014222 \times GA^2 - 0.00017596 \times GA^3$; SD of $\ln(Wt) = 0.39791 - 0.0065856 \times GA$.

^bFemales: $\ln(Wt) = 4.4807 - 0.0689 \times GA + 0.0091683 \times GA^2 - 0.00012913 \times GA^3$; SD of $\ln(Wt) = 0.35439 - 0.0053902 \times GA$.

Ln, natural log; Wt, weight.

Data from Doubilet PM, Benson CB, Nadel AS, et al. Improved birth weight table for neonates developed from gestations dated by early ultrasonography. *J Ultrasound Med.* 1997;16:241-249.

Table 14 Fetal Weight Percentiles by Gestational Age

GA (wk)	Fetal Weight Percentiles (g)				
	3rd	10th	50th	90th	97th
10	26	29	35	41	44
11	34	37	45	53	56
12	43	48	58	68	73
13	54	61	73	85	92
14	69	77	93	109	117
15	87	97	117	137	147
16	109	121	146	171	183
17	135	150	181	212	227
18	166	185	223	261	280
19	204	227	273	319	342
20	247	275	331	387	415
21	298	331	399	467	500
22	357	397	478	559	599
23	424	472	568	664	712
24	500	556	670	784	840
25	586	652	785	918	984
26	681	758	913	1,068	1,145
27	787	876	1,055	1,234	1,323
28	903	1,005	1,210	1,415	1,517
29	1,029	1,145	1,379	1,613	1,729
30	1,163	1,294	1,559	1,824	1,955
31	1,306	1,454	1,751	2,048	2,196
32	1,457	1,621	1,953	2,285	2,449
33	1,613	1,795	2,162	2,529	2,711
34	1,773	1,973	2,377	2,781	2,981
35	1,936	2,154	2,595	3,036	3,254
36	2,098	2,335	2,813	3,291	3,528
37	2,259	2,514	3,028	3,542	3,797
38	2,414	2,687	3,236	3,785	4,058
39	2,563	2,852	3,435	4,018	4,307
40	2,700	3,004	3,619	4,234	4,538
41	2,825	3,144	3,787	4,430	4,749
42	2,935	3,266	3,934	4,602	4,933

Note: $\ln(Wt) = 0.578 + 0.332 MA - 0.00354 \times MA^2$; standard deviation = 12.7% of predicted weight.

Ln, natural log; MA, menstrual age; Wt, weight.

Reproduced with permission from Hadlock FP, Harrist RB, Marinez-Poyer J. In utero analysis of fetal growth: a sonographic weight standard. *Radiology*. 1991;181:129-133, extrapolated to 42 weeks from 40 weeks.

Table 15 Fitted Percentiles for Fractional Arm Volume

Menstrual Age (wk)	Fractional Arm Volume (m)								
	<i>n</i>	5th	10th	25th	50th	75th	90th	95th	1 SD
18–18.9	16	1.3	1.4	1.6	1.9	2.2	2.6	2.8	1.27
19–19.9	12	1.5	1.7	1.9	2.3	2.7	3.1	3.4	1.27
20–20.9	11	1.9	2.1	2.4	2.9	3.3	3.8	4.2	1.26
21–21.9	17	2.3	2.5	2.9	3.4	4.0	4.6	5.0	1.26
22–22.9	15	2.7	2.9	3.4	3.9	4.6	5.3	5.8	1.26
23–23.9	12	3.4	3.7	4.3	5.0	5.8	6.7	7.3	1.26
24–24.9	10	3.8	4.1	4.8	5.5	6.4	7.4	8.0	1.25
25–25.9	14	4.6	5.0	5.7	6.7	7.8	8.9	9.6	1.25
26–26.9	13	5.4	5.9	6.7	7.8	9.1	10.4	11.3	1.25
27–27.9	12	6.3	6.8	7.8	9.0	10.5	12.0	13.0	1.25
28–28.9	14	7.2	7.8	8.9	10.3	11.9	13.6	14.7	1.24
29–29.9	11	8.2	8.9	10.1	11.7	13.6	15.5	16.8	1.24
30–30.9	14	9.5	10.3	11.7	13.6	15.7	17.9	19.3	1.24
31–31.9	13	10.8	11.7	13.4	15.4	17.8	20.3	22.0	1.24
32–32.9	15	12.5	13.5	15.4	17.8	20.5	23.3	25.2	1.24
33–33.9	14	14.3	15.4	17.5	20.2	23.3	26.5	28.6	1.24
34–34.9	9	15.3	16.5	18.8	21.6	24.9	28.3	30.6	1.23
35–35.9	13	17.3	18.7	21.2	24.4	28.1	32.0	34.5	1.23
36–36.9	13	19.7	21.3	24.1	27.7	31.9	36.2	39.1	1.23
37–37.9	15	22.0	23.7	26.9	30.9	35.6	40.3	43.5	1.23
38–38.9	45	25.0	27.0	30.6	35.1	40.3	45.7	49.2	1.23
39–39.9	49	26.9	28.9	32.8	37.6	43.2	48.9	52.7	1.23
40–40.9	9	29.4	31.6	35.8	41.1	47.1	53.3	57.4	1.23
41–41.9	13	33.6	36.1	40.8	46.8	53.7	60.7	65.3	1.22
42–42.9	8	35.0	37.7	42.6	48.8	55.9	63.2	68.0	1.22

Reproduced with permission from Lee W, Balasubramaniam M, Deter RL, et al. Fractional limb volume—a soft tissue parameter of fetal body composition: validation, technical considerations and normal ranges during pregnancy. *Ultrasound Obstet Gynecol.* 2009;33:427–440.

Table 16 Fitted Percentiles for Fractional Thigh Volume

Menstrual Age (wk)	Fractional Thigh Volume (m)								
	<i>n</i>	5th	10th	25th	50th	75th	90th	95th	1 SD
18–18.9	16	2.4	2.6	2.9	3.4	3.9	4.4	4.7	1.23
19–19.9	12	2.9	3.2	3.6	4.1	4.7	5.4	5.8	1.23
20–20.9	11	3.7	4.0	4.6	5.3	6.1	6.9	7.4	1.23
21–21.9	17	4.5	4.9	5.6	6.4	7.4	8.4	9.1	1.23
22–22.9	15	5.3	5.7	6.5	7.5	8.6	9.8	10.6	1.24
23–23.9	12	6.9	7.4	8.4	9.7	11.2	12.8	13.8	1.24
24–24.9	10	7.6	8.2	9.4	10.8	12.5	14.2	15.4	1.24
25–25.9	14	9.3	10.1	11.5	13.3	15.3	17.5	18.9	1.24
26–26.9	13	11.1	12.0	13.7	15.8	18.3	20.8	22.5	1.24
27–27.9	12	13.0	14.0	16.0	18.5	21.3	24.3	26.3	1.24
28–28.9	14	14.9	16.1	18.3	21.2	24.5	27.9	30.2	1.24
29–29.9	11	17.2	18.6	21.2	24.5	28.4	32.3	35.0	1.24
30–30.9	14	20.1	21.8	24.8	28.7	33.2	37.9	41.0	1.24
31–31.9	13	23.1	25.0	28.6	33.1	38.3	43.7	47.2	1.24
32–32.9	15	26.9	29.2	33.3	38.5	44.6	50.9	55.1	1.24
33–33.9	14	31.0	33.5	38.3	44.3	51.4	58.7	63.5	1.24
34–34.9	9	33.3	36.1	41.2	47.8	55.4	63.2	68.4	1.24
35–35.9	13	38.0	41.2	47.0	54.5	63.2	72.2	78.2	1.25
36–36.9	13	43.6	47.2	54.0	62.6	72.6	83.0	89.9	1.25
37–37.9	15	49.1	53.1	60.8	70.5	81.8	93.5	101.3	1.25
38–38.9	45	56.2	61.0	69.7	80.9	93.9	107.4	116.4	1.25
39–39.9	49	60.6	65.7	75.1	87.2	101.3	115.9	125.6	1.25
40–40.9	9	66.6	72.2	82.6	95.9	111.4	127.5	138.2	1.25
41–41.9	13	76.7	83.2	95.2	110.7	128.6	147.2	159.6	1.25
42–42.9	8	80.2	87.0	99.6	115.8	134.5	154.0	167.0	1.25

Reproduced with permission from Lee W, Balasubramaniam M, Deter RL, et al. Fractional limb volume—a soft tissue parameter of fetal body composition: validation, technical considerations and normal ranges during pregnancy. *Ultrasound Obstet Gynecol.* 2009;33:427–440.

Ultrasound Extremity Measurements

Table 17 Ultrasound Reference Values of Major Long Bones

GA (wk)	Femur (mm) ^a				Tibia (mm) ^b				Fibula (mm) ^c			
	Percentiles				Percentiles				Percentiles			
	5th	50th	95th	SD	5th	50th	95th	SD	5th	50th	95th	SD
12	3.9	8.1	12.3	2.5	3.3	7.2	11.2	2.4	1.7	5.7	9.6	2.4
13	6.8	11.0	15.2	2.5	5.6	9.6	13.6	2.4	4.7	8.7	12.7	2.4
14	9.7	13.9	18.1	2.6	8.1	12.0	16.0	2.4	7.7	11.7	15.6	2.4
15	12.6	16.8	21.0	2.6	10.6	14.6	18.6	2.4	10.6	14.6	18.6	2.4
16	15.4	19.7	23.9	2.6	13.1	17.1	21.2	2.5	13.3	17.4	21.4	2.5
17	18.3	22.5	26.8	2.6	15.6	19.7	23.8	2.5	16.1	20.1	24.2	2.5
18	21.1	25.4	29.7	2.6	18.2	22.3	26.4	2.5	18.7	22.8	26.9	2.5
19	23.9	28.2	32.6	2.6	20.8	24.9	29.0	2.5	21.3	25.4	29.5	2.5
20	26.7	31.0	35.4	2.7	23.3	27.5	31.6	2.5	23.8	27.9	32.0	2.5
21	29.4	33.8	38.2	2.7	25.8	30.0	34.2	2.5	26.2	30.3	34.5	2.5
22	32.1	36.5	40.9	2.7	28.3	32.5	36.7	2.5	28.5	32.7	36.9	2.5
23	34.7	39.2	43.6	2.7	30.7	34.9	39.1	2.6	30.8	35.0	39.2	2.6
24	37.4	41.8	46.3	2.7	33.1	37.3	41.6	2.6	33.0	37.2	41.5	2.6
25	39.9	44.4	48.9	2.7	35.4	39.7	43.9	2.6	35.1	39.4	43.6	2.6
26	42.4	46.9	51.4	2.7	37.6	41.9	46.2	2.6	37.2	41.5	45.7	2.6
27	44.9	49.4	53.9	2.8	39.8	44.1	48.4	2.6	39.2	43.5	47.8	2.6
28	47.3	51.8	56.4	2.8	41.9	46.2	50.5	2.6	41.1	45.4	49.7	2.6
29	49.6	54.2	58.7	2.8	43.9	48.2	52.6	2.6	42.9	47.2	51.6	2.6
30	51.8	56.4	61.0	2.8	45.8	50.1	54.5	2.7	44.7	49.0	53.4	2.7
31	54.0	58.6	63.2	2.8	47.6	52.0	56.4	2.7	46.3	50.7	55.1	2.7
32	56.1	60.7	65.4	2.8	49.4	53.8	58.2	2.7	47.9	52.4	56.8	2.7
33	58.1	62.7	67.4	2.8	51.1	55.5	60.0	2.7	49.5	53.9	58.4	2.7
34	60.0	64.7	69.4	2.9	52.7	57.2	61.6	2.7	50.9	55.4	59.9	2.7
35	61.8	66.5	71.2	2.9	54.2	58.7	63.2	2.7	52.3	56.8	61.3	2.7
36	63.5	68.3	73.0	2.9	55.8	60.3	64.8	2.8	53.6	58.2	62.7	2.8
37	65.1	69.9	74.7	2.9	57.2	61.8	66.3	2.8	54.9	59.4	64.0	2.8
38	66.6	71.4	76.2	2.9	58.7	63.2	67.8	2.8	56.0	60.6	65.2	2.8
39	68.0	72.8	77.7	2.9	60.1	64.7	69.3	2.8	57.1	61.7	66.3	2.8
40	69.3	74.2	79.0	3.0	61.5	66.1	70.7	2.8	58.1	62.8	67.4	2.8

GA (wk)	Humerus (mm) ^d				Radius (mm) ^e				Ulna (mm) ^f			
	Percentiles				Percentiles				Percentiles			
	5th	50th	95th	SD	5th	50th	95th	SD	5th	50th	95th	SD
12	4.8	8.6	12.3	2.3	3.0	6.9	10.8	2.4	2.9	6.8	10.7	2.4
13	7.6	11.4	15.1	2.3	5.6	9.5	13.4	2.4	5.8	9.7	13.7	2.4
14	10.3	14.1	17.9	2.3	8.1	12.0	16.0	2.4	8.6	12.6	16.6	2.4
15	13.1	16.9	20.7	2.3	10.5	14.5	18.5	2.4	11.4	15.4	19.4	2.4
16	15.8	19.7	23.5	2.3	12.9	16.9	20.9	2.4	14.1	18.1	22.1	2.4
17	18.5	22.4	26.3	2.4	15.2	19.3	23.3	2.5	16.7	20.8	24.8	2.5
18	21.2	25.1	29.0	2.4	17.5	21.5	25.6	2.5	19.3	23.3	27.4	2.5
19	23.8	27.7	31.6	2.4	19.7	23.8	27.9	2.5	21.8	25.8	29.9	2.5
20	26.3	30.3	34.2	2.4	21.8	25.9	30.0	2.5	24.2	28.3	32.4	2.5
21	28.8	32.8	36.7	2.4	23.9	28.0	32.2	2.5	26.5	30.6	34.8	2.5
22	31.2	35.2	39.2	2.4	25.9	30.1	34.2	2.5	28.7	32.9	37.1	2.5
23	33.5	37.5	41.6	2.4	27.9	32.0	36.2	2.5	30.9	35.1	39.3	2.5
24	35.7	39.8	43.8	2.5	29.7	34.0	38.2	2.6	33.0	37.2	41.5	2.6
25	37.9	41.9	46.0	2.5	31.6	35.8	40.0	2.6	35.1	39.3	43.5	2.6
26	39.9	44.0	48.1	2.5	33.3	37.6	41.9	2.6	37.0	41.3	45.6	2.6
27	41.9	46.0	50.1	2.5	35.0	39.3	43.6	2.6	38.9	43.2	47.5	2.6
28	43.7	47.9	52.0	2.5	36.7	41.0	45.3	2.6	40.7	45.0	49.3	2.6
29	45.5	49.7	53.9	2.5	38.3	42.6	46.9	2.6	42.5	46.8	51.1	2.6
30	47.2	51.4	55.6	2.6	39.8	44.1	48.5	2.7	44.1	48.5	52.8	2.7

(continued)

Table 17 Ultrasound Reference Values of Major Long Bones (continued)

GA (wk)	Humerus (mm) ^d				Radius (mm) ^e				Ulna (mm) ^f			
	Percentiles				Percentiles				Percentiles			
	5th	50th	95th	SD	5th	50th	95th	SD	5th	50th	95th	SD
31	48.9	53.1	57.3	2.6	41.2	45.6	50.0	2.7	45.7	50.1	54.5	2.7
32	50.4	54.7	58.9	2.6	42.6	47.0	51.4	2.7	47.2	51.6	56.1	2.7
33	52.0	56.2	60.5	2.6	44.0	48.4	52.8	2.7	48.7	53.1	57.5	2.7
34	53.4	57.7	62.0	2.6	45.2	49.7	54.1	2.7	50.0	54.5	59.0	2.7
35	54.8	59.2	63.5	2.6	46.4	50.9	55.4	2.7	51.3	55.8	60.3	2.7
36	56.2	60.6	64.9	2.6	47.6	52.1	56.6	2.7	52.6	57.1	61.6	2.7
37	57.6	62.0	66.4	2.7	48.7	53.2	57.7	2.8	53.7	58.2	62.8	2.8
38	59.0	63.4	67.8	2.7	49.7	54.2	58.8	2.8	54.8	59.3	63.9	2.8
39	60.4	64.8	69.3	2.7	50.6	55.2	59.8	2.8	55.8	60.4	64.9	2.8
40	61.9	66.3	70.8	2.7	51.5	56.2	60.8	2.8	56.7	61.3	65.9	2.8

^aFemur (mean) = $-25.252 + 2.555 \times GA + 0.027566 \times GA^2 - 0.00073286 \times GA^3$ (Jeanty et al., 1984).

^bTibia (mean) = $5.555 - 0.915554 \times GA + 0.23359 \times GA^2 - 0.00638 \times GA^3 + 0.000055801 \times GA^4$ (Jeanty et al., 1984).

^cFibula (mean) = $-36.563 + 3.963 \times GA - 0.037 \times GA^2$ (Exacoustos et al., 1991).

^dHumerus (mean) = $-16.24 + 0.76315 \times GA + 0.1683 \times GA^2 - 0.0056212 \times GA^3 + 0.000055666 \times GA^4$.

^eRadius (mean) = $-29.09 + 3.371 \times GA - 0.031 \times GA^2$ (Exacoustos et al., 1991).

^fUlna (mean) = $-34.313 + 3.8685 \times GA - 0.036949 \times GA^2$ (Jeanty et al., 1984).

GA, gestational age.

Derived from compilation of data: Jeanty P, Cousaert E, Cantraine F, et al. A longitudinal study of fetal limb growth. *Am J Perinatol.* 1984;1:136–144; Merz E, Grubner A, Kern F. Mathematical modeling of fetal limb growth. *J Clin Ultrasound.* 1989;17:179–185; and Exacoustos C, Rosati P, Rizzo G, et al. Ultrasound measurements of fetal limb bones. *Ultrasound Obstet Gynecol.* 1991;1:325–330.

Table 18 Ultrasound Reference Values for Foot Length

GA (wk)	Foot Length (mm)		
	-2 SD	Mean	+2 SD
12	7	8	9
13	10	11	12
14	13	15	16
15	16	18	20
16	19	21	23
17	21	24	27
18	24	27	30
19	27	30	33
20	30	33	37
21	32	36	40
22	35	39	43
23	37	42	46
24	40	45	49
25	42	47	52
26	44	50	55
27	47	53	58
28	49	55	61
29	51	58	64
30	53	60	66
31	56	62	69
32	58	65	72
33	60	67	74
34	62	69	77
35	63	71	79
36	65	74	81
37	67	76	84
38	69	78	86
39	71	80	88
40	72	81	90

Note: Modified formula to fit tabular data: foot length = $-0.02728 \times GA^2 + 4.045 \times GA - 36.74$ (range $\pm 11\%$).

GA, gestational age.

Reproduced with permission from Mercer BM, Sklar S, Shariatmadar A, et al. Fetal foot length as a predictor of gestational age. *Am J Obstet Gynecol.* 1987;156:350–355.

Table 19 Ultrasound Scapular Length (± 2 SD) Compared with Gestational Age

Gestational Age (wk)	Scapular Length (mm)		
	-2 SD	Mean	+2 SD
14	10	10	10
15	11	11	11
16	12	12	12
17	13	13	13
18	14	14	14
19	14	15	15
20	15	16	16
21	16	17	17
22	17	18	18
23	18	19	19
24	19	20	20
25	20	21	21
26	21	22	22
27	22	23	23
28	23	23	24
29	24	24	25
30	25	25	26
31	26	26	27
32	27	27	28
33	28	28	29
34	29	29	30
35	30	30	31
36	31	31	32
37	32	32	32
38	33	33	33
39	34	34	34
40	35	35	35
41	35	36	36
42	36	37	37

Data from Sherer DM, Plessinger MA, Allen TA. Fetal scapular length in the ultrasonographic assessment of gestational age. *J Ultrasound Med.* 1994;13:523–528.

Table 20 Ultrasound Reference Values of Clavicle Length

GA (wk)	Jeanty ^a			Yarkoni ^b		
	Percentiles			Percentiles		
	5th	50th	95th	5th	50th	95th
12	8	13	18	—	—	—
13	10	15	20	—	—	—
14	11	16	21	—	—	—
15	12	17	22	11	16	21
16	13	18	23	12	17	22
17	14	19	24	13	18	23
18	15	20	25	14	19	24
19	16	21	26	15	20	25
20	17	22	27	16	21	26
21	18	23	28	17	22	27
22	20	25	30	18	23	28
23	21	26	31	19	24	29
24	22	27	32	20	25	30
25	23	28	33	21	26	31
26	24	29	34	22	27	32
27	25	30	35	23	28	33
28	26	31	36	24	29	34
29	27	32	37	25	30	35
30	29	34	39	26	31	36
31	30	35	40	27	32	37
32	31	36	41	28	33	38
33	32	37	42	29	34	39
34	33	38	43	30	35	40
35	34	39	44	31	36	41
36	35	40	45	32	37	42
37	36	41	46	33	38	43
38	37	42	47	34	39	44
39	39	44	49	35	40	45
40	40	45	50	36	41	46

Note: Used modified formula to fit tabular data. Clavicle = 1.118303 + 0.988639 × GA (SD = 2.920)

^aFrom Jeanty et al.

^bReproduced with permission from Yarkoni S, Schmidt W, Jeanty P, et al. Clavicular measurement: a new biometric parameter for fetal evaluation. *J Ultrasound Med.* 1985;4:467–470.

GA, gestational age.

Table 21 Ultrasound Reference Values for Rib Length

GA (wk)	Rib Length (mm)		
	Percentiles		
	5th	50th	95th
14	1.4	2.3	3.1
15	1.6	2.5	3.3
16	1.8	2.7	3.5
17	2.0	2.9	3.7
18	2.2	3.1	3.9
19	2.5	3.3	4.1
20	2.7	3.5	4.3
21	2.9	3.7	4.5
22	3.1	3.9	4.7
23	3.3	4.1	4.9
24	3.5	4.3	5.1
25	3.7	4.5	5.3
26	3.9	4.7	5.5
27	4.1	4.9	5.7
28	4.3	5.1	5.9
29	4.5	5.3	6.1
30	4.7	5.5	6.3
31	4.9	5.7	6.5
32	5.1	5.9	6.7
33	5.3	6.1	6.9
34	5.5	6.3	7.1
35	5.7	6.5	7.3
36	5.9	6.7	7.5
37	6.1	6.9	7.8
38	6.3	7.1	8.0
39	6.5	7.3	8.2
40	6.7	7.5	8.4

Note: Rib length = -0.5834 + 0.203 × GA (SD = 0.5).

GA, gestational age.

Adapted from Abuhamad AZ, Sedule-Murphy SJ, Kolm P, et al. Prenatal ultrasonographic fetal rib length measurement: correlation with gestational age. *Ultrasound Obstet Gynecol.* 1996;7:193–196.

Brain and Face Measurements

Table 22 Ultrasound Transcerebellar Diameter Measurements

GA	Mean (cm)	SD (cm)
15	1.46	0.14
16	1.61	0.1
17	1.71	0.1
18	1.83	0.12
19	1.94	0.11
20	2.03	0.12
21	2.14	0.13
22	2.28	0.18
23	2.43	0.16
24	2.59	0.17
25	2.76	0.16
26	2.91	0.18
27	3.08	0.17
28	3.25	0.18
29	3.41	0.21
30	3.6	0.22
31	3.78	0.24
32	3.92	0.24
33	4.14	0.26
34	4.29	0.27
35	4.47	0.3
36	4.66	0.34
37	4.8	0.32
38	4.98	0.33

GA, gestational age; SD, standard deviation.

Adapted from Chaves MR, Ananth CV, Smulian JC, et al. Fetal transcerebellar diameter nomogram in singleton gestations with special emphasis in the third trimester: a comparison with previously published nomograms. *Am J Obstet Gynecol.* 2003;189:1021.

Table 23 Ultrasound Reference Intervals for the Cerebellar Vermis, Basilar Pons, and the Brain Stem

GA (wk)	Vermis								
	Sagittal CC (mm)			Sagittal AP (mm)			Sagittal Surface Area (cm ²)		
	5%	50%	95%	5%	50%	95%	5%	50%	95%
18-19	8.4	9.2	11.3	7.8	8.8	10.6	0.61	0.65	0.80
20-21	10.0	12.2	14.0	8.3	10.0	13.2	0.80	1.06	1.34
22-23	11.3	13.4	15.1	11.2	12.6	15.5	1.07	1.25	1.56
24-25	14.6	15.7	17.3	13.3	14.7	16.9	1.32	1.63	1.87
26-27	15.6	17.3	18.6	13.7	16.2	18.7	1.9	2.20	2.50
28-29	16.4	18.5	22.2	16.1	18.6	20.6	1.73	2.48	2.97
30-31	19.1	20.3	22.8	16.5	19.1	22.8	2.59	3.12	3.52
32-33	19.6	22.3	23.5	18.3	20.2	22.4	2.84	3.27	3.90
34-35	20.6	22.1	25.4	18.6	22.0	23.6	3.12	3.81	4.38
36-37	22.0	24.7	27.1	20.5	24.7	26.0	3.71	4.00	4.78
38-39	24.3	26.5	28.2	18.8	22.7	25.8	4.30	4.64	5.02

GA (wk)	Pons								
	Sagittal CC (mm)			Sagittal AP (mm)			Sagittal Surface Area (cm ²)		
	5%	50%	95%	5%	50%	95%	5%	50%	95%
18-19	4.5	5.5	6.8	3.4	4.2	4.7	0.13	0.22	0.28
20-21	4.8	6.7	8.4	4.3	5.2	6.7	0.22	0.30	0.39
22-23	5.8	7.1	9.3	3.6	5.2	6.5	0.30	0.40	0.56
24-25	7.4	8.6	10.9	5.4	6.3	8.0	0.41	0.48	0.54
26-27	6.4	9.1	10.9	4.7	5.9	7.7	0.40	0.69	0.86
28-29	9.3	10.1	14.1	5.8	7.6	9.5	0.50	0.69	0.78
30-31	10.0	12.3	13.9	6.7	7.9	9.9	0.62	0.83	0.98
32-33	11.2	13.1	15.7	7.9	8.9	10.5	0.75	0.99	1.23
34-35	11.5	13.5	15.1	7.6	8.6	10.3	0.92	1.11	1.37
36-37	12.1	13.7	14.4	6.8	8.9	10.1	1.00	1.28	1.35
38-39	12.5	13.4	14.0	9.3	9.4	10.1	1.20	1.51	1.67

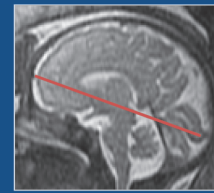
GA (wk)	Brainstem		
	Sagittal Surface Area (cm ²)		
	5%	50%	95%
18-19	1.08	1.26	1.66
20-21	1.51	1.75	1.98
22-23	1.66	2.14	2.57
24-25	1.89	2.34	2.92
26-27	2.62	3.09	3.61
28-29	2.85	3.74	4.40
30-31	3.15	4.00	4.58
32-33	3.59	4.36	5.08
34-35	3.59	4.72	5.56
36-37	5.04	5.26	5.59
38-39	4.76	5.02	5.57

Reproduced from Ginath S, Lerman-Sagie T, Haratz Krajden K, et al. The fetal vermis, pons and brainstem: normal longitudinal development as shown by dedicated neurosonography. *J Matern Fetal Neonatal Med.* 2013;26:757-762, with permission.

Table 24 MRI Measurements of the Fetal Brain

FRONTO-OCCIPITAL DIAMETER (FOD)

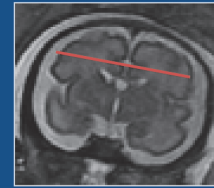
Between extreme points of frontal and occipital lobes (sagittal).



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	18	19	25	19	13	13	16	13	14	13	15	14	13	12	11	13	14	16	13	14
Ave	35.38	38.39	44.02	47.75	51.57	57.41	59.59	64.92	66.90	69.98	74.99	77.56	79.36	84.94	87.35	91.10	92.22	92.73	99.18	101.60	102.56	104.96
SD	1.72	2.00	2.28	2.74	2.62	2.53	3.00	1.93	1.60	3.44	2.92	3.45	3.50	2.21	3.58	4.37	1.57	4.13	3.74	5.21	4.15	4.22

CEREBAL BIPARIETAL DIAMETER (C-BPD)

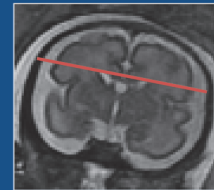
Greatest transverse diameter of brain at level of temporal lobes (coronal).



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	18	18	24	18	14	13	16	13	14	14	15	15	13	12	11	13	14	18	13	14
Ave	29.06	31.29	34.42	36.23	38.85	42.04	44.61	47.80	49.23	51.07	55.41	59.05	60.43	65.23	67.16	69.72	74.09	74.91	79.33	79.45	82.50	83.90
SD	0.94	1.12	1.98	1.77	2.33	2.85	1.89	1.07	1.79	4.87	2.66	3.81	2.20	2.03	2.25	3.01	3.42	2.27	3.90	4.60	4.57	5.86

BONE BIPARIETAL DIAMETER (B-BPD)

Greatest transverse diameter of skull at level of temporal lobes (coronal).



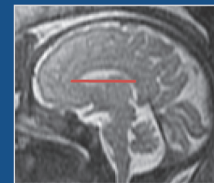
GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	18	18	24	19	14	13	15	13	14	13	14	15	13	12	11	13	13	18	13	14
Ave	32.93	35.25	39.20	42.50	45.64	50.45	51.39	56.88	57.18	60.86	64.31	67.26	68.22	73.25	75.04	78.16	81.56	83.29	85.64	86.60	90.75	90.88
SD	1.46	1.39	2.43	1.92	2.44	3.00	4.19	2.59	2.44	4.91	4.01	3.55	2.46	2.48	3.66	4.07	4.04	2.31	3.46	5.45	7.23	7.07

CRANIOCEREBRAL INDEX Bone BPD – cerebral BPD/ bone BPD.

GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
Index	11.75	11.23	12.20	14.76	14.87	16.68	13.19	15.96	13.91	16.09	13.85	12.21	11.43	10.94	10.49	10.79	9.16	10.06	7.37	8.26	9.09	7.68

LENGTH OF CORPUS CALLOSUM (LCC)

Between genu and splenium of CC (sagittal)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	16	16	20	16	13	12	15	11	12	14	13	14	13	12	11	12	13	16	13	14
Ave	7.53	9.73	13.64	16.44	20.01	22.93	23.99	27.83	28.05	31.25	32.52	32.68	34.44	36.14	36.60	37.29	37.79	39.40	40.05	41.37	42.18	45.02
SD	0.61	1.03	2.53	2.02	1.16	1.42	1.76	1.96	1.16	2.44	2.02	1.87	1.95	2.06	1.63	2.44	2.92	1.63	1.54	2.66	3.32	2.28

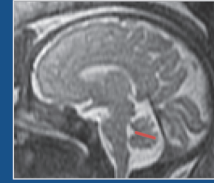
Table 24 MRI Measurements of the Fetal Brain (continued)

LCC/FOD RATIO

GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
Ratio	21.29	25.34	30.98	34.44	38.80	39.94	40.26	42.86	41.93	44.65	43.36	42.14	43.40	42.54	41.90	40.93	40.98	42.48	40.38	40.72	41.13	42.89

AP VERMIS

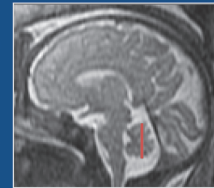
Greatest AP diameter measured from median part of 4th ventricle's roof (fastigial point) posteriorly (sagittal)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	17	17	24	16	12	10	15	13	14	14	15	14	13	12	12	13	12	14	13	14
Ave	3.51	4.15	4.87	5.45	6.17	6.49	7.41	8.21	8.57	9.65	9.71	10.45	11.09	11.82	12.00	12.83	12.93	13.89	14.90	14.90	16.48	16.96
SD	0.31	0.32	0.43	0.54	0.65	0.76	0.44	1.12	0.58	1.24	0.96	1.15	1.08	1.03	0.68	0.96	1.50	1.12	0.60	0.88	0.91	2.18

HEIGHT OF VERMIS

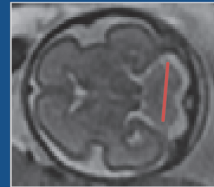
Greatest height of vermis, parallel to axis of brainstem (sagittal)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	17	17	24	17	13	12	15	13	14	14	15	14	13	12	12	13	13	15	13	14
Ave	4.73	5.65	6.70	7.19	8.11	8.96	9.97	11.23	11.84	12.05	13.54	14.87	15.38	15.87	16.64	17.51	18.31	19.12	19.79	20.09	22.32	22.33
SD	0.43	0.39	0.63	0.80	1.07	1.45	1.00	1.32	0.83	0.84	1.19	0.88	1.46	0.98	1.55	0.82	1.58	0.97	1.30	1.29	3.10	1.97

TRANSCEREBELLAR DIAMETER

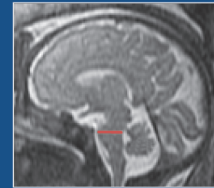
Greatest transverse diameter of cerebellum (axial)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	18	18	24	17	14	13	15	13	13	13	15	15	13	12	11	12	14	17	13	14
Ave	14.73	15.94	17.16	17.92	19.32	20.39	21.91	24.32	25.33	27.42	28.12	30.25	32.68	34.92	35.94	38.06	40.33	40.98	44.34	45.78	48.12	49.83
SD	0.70	0.60	1.35	1.30	1.45	1.38	1.81	1.40	1.83	2.75	1.31	1.95	1.21	1.40	2.23	1.77	2.57	1.85	3.31	2.19	3.82	3.44

AP PONS

Maximal AP diameter of pons (midline sagittal)



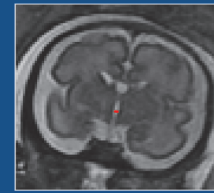
GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	15	15	23	13	12	12	15	13	13	13	15	14	12	12	12	13	13	15	13	14
Ave	5.02	5.44	6.14	6.18	6.29	6.39	6.48	7.77	7.78	8.11	8.99	9.19	10.08	10.85	11.22	11.57	11.97	12.28	12.75	13.25	13.54	13.86
SD	0.34	0.26	0.43	0.61	0.64	0.58	0.72	0.39	0.46	0.83	0.65	1.14	1.05	0.84	0.53	0.73	1.47	1.31	0.81	0.83	1.74	1.39

(continued)

Table 24 MRI Measurements of the Fetal Brain (*continued*)

DIAMETER THIRD VENTRICLE (DV3)

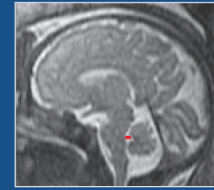
Maximal transverse diameter (coronal)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	18	16	24	18	13	12	16	13	14	14	15	14	13	12	12	13	14	17	13	14
Ave	2.04	2.07	2.13	1.91	1.75	2.13	1.84	2.09	2.03	2.01	1.99	2.16	2.06	2.09	2.04	2.22	2.03	2.81	2.50	2.37	2.42	2.35
SD	0.31	0.26	0.49	0.48	0.38	0.40	0.32	0.36	0.56	0.43	0.45	0.50	0.50	0.49	0.73	0.84	0.68	0.48	0.62	0.68	0.70	0.87

DIAMETER FOURTH VENTRICLE (DV4)

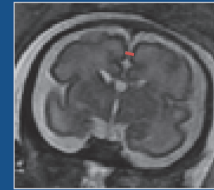
Maximal AP diameter (midline sagittal)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	17	18	25	17	13	12	15	13	13	14	15	14	13	12	12	13	13	15	13	14
Ave	2.51	2.63	2.87	2.52	2.33	2.44	2.43	2.52	2.88	2.68	2.76	2.89	3.54	3.33	3.21	3.20	3.50	4.00	3.60	3.79	4.05	4.35
SD	0.46	0.32	0.75	0.58	0.69	0.52	0.43	0.51	0.60	0.79	0.54	0.82	0.60	0.79	0.47	0.55	0.69	0.50	0.80	0.86	0.53	0.95

INTERHEMISPHERIC DISTANCE (IHD)

Between internal edges of lateral hemispheres (coronal)



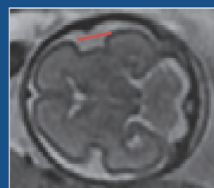
GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	18	19	25	19	13	13	15	13	14	14	15	15	13	12	12	13	14	17	13	14
Ave	2.61	2.80	2.57	2.72	2.66	3.09	2.77	2.94	2.49	2.42	2.89	2.70	2.69	2.45	2.42	2.28	2.62	2.51	2.81	2.76	2.26	2.45
SD	0.55	0.53	0.61	0.57	0.92	0.63	0.83	0.59	0.52	0.71	0.87	0.75	0.61	0.65	0.60	0.72	0.90	0.47	0.73	0.60	0.80	0.77

IHD/C-BPD INDEX

GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37-39
Index	8.98	8.95	7.46	7.51	6.86	7.34	6.21	6.15	5.05	4.74	5.21	4.58	4.45	3.76	3.61	3.27	3.53	3.35	3.54	3.47	2.74	2.92

AP INTEROPERCULAR DISTANCE

Distance between anterior and posterior edge of sylvian fissure at most external point, at level of third ventricle (axial)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	11	18	18	19	18	14	12	16	12	14	13	16	11	12	10	12	12	14	16	12	13
Ave	9.54	10.31	10.52	10.40	10.76	11.31	11.10	11.56	13.38	11.96	13.17	12.65	13.86	12.38	11.22	9.46	9.63	9.94	9.78	10.02	6.95	7.65
SD	1.04	0.77	1.34	2.50	2.05	2.59	1.83	2.11	2.56	2.57	3.00	2.25	2.10	2.97	1.10	2.36	1.63	2.30	2.42	4.09	1.90	2.42

Table 24 MRI Measurements of the Fetal Brain (continued)

CRANIOCAUDAL INTEROPERCULAR DISTANCE

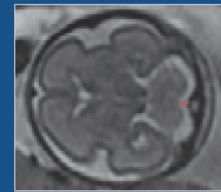
Distance between superior and inferior edge of sylvian fissure at most external point, at level of third ventricle (axial)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	14	15	21	18	14	13	15	13	14	13	15	13	13	11	12	12	14	17	12	14
Ave	6.46	7.59	7.98	8.49	7.72	7.56	8.04	7.02	8.76	6.25	6.11	5.23	5.41	3.95	3.43	3.50	2.62	2.85	2.77	2.64	1.97	2.25
SD	0.53	0.83	1.48	1.85	1.99	1.39	1.84	1.99	1.72	1.07	1.36	1.81	1.49	0.91	1.70	1.06	0.82	0.95	0.83	0.62	0.77	1.09

CISTERNA MAGNA (CM)

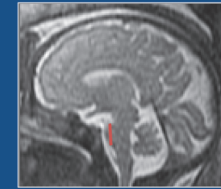
From posterior aspect cerebellum to inner table skull (axial)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	17	18	24	18	13	13	15	13	14	14	15	14	12	10	12	13	13	16	12	14
Ave	4.47	6.11	6.02	6.39	5.20	5.08	5.65	4.52	5.27	4.92	4.61	6.04	6.84	6.25	5.43	5.74	4.84	6.20	6.11	5.89	4.77	5.59
SD	1.31	1.43	1.61	2.15	1.49	1.39	1.28	0.92	1.59	1.41	1.63	1.51	2.32	2.09	1.98	1.55	1.89	2.23	1.44	2.19	1.94	1.59

HEIGHT PONS

Maximal height of pons (midline sagittal)



GA	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	>37
#	15	12	15	13	19	13	13	12	12	12	13	13	15	14	12	11	12	13	13	15	13	14
Ave	5.01	5.56	5.89	5.93	6.34	6.60	6.76	7.87	8.48	8.58	8.96	10.07	10.32	11.15	11.74	12.17	12.29	12.52	13.01	13.11	13.64	14.56
SD	0.57	0.68	0.63	0.62	0.92	1.37	1.20	1.03	0.87	2.11	2.70	1.54	0.66	0.68	1.36	1.12	0.85	1.23	1.14	1.17	2.15	1.26

Revised from Egloff A, Hoshim H, Bulas D, Vezina G M MRI Measurements of the Fetal Brain abstract European Society of Pediatric Radiology June 2009, Istanbul, Turkey.

Additional biometry provided by Beth M. Kline-Fath and Constance Bitters

Table 25A Ultrasound Reference Values for Binocular Diameter, Interocular Diameter, and Ocular Diameter by Gestational Age

GA (wk)	Binocular Diameter (mm)			Interocular Diameter (mm)			Ocular Diameter (mm)		
	Percentiles			Percentiles			Percentiles		
	5th	50th	95th	5th	50th	95th	5th	50th	95th
11	5	13	20	—	—	—	—	—	—
12	8	15	23	4	9	13	1	3	6
13	10	18	25	5	9	14	2	4	7
14	13	20	28	5	10	14	3	5	8
15	15	22	30	6	10	14	4	6	9
16	17	25	32	6	10	15	5	7	9
17	19	27	34	6	11	15	5	8	10
18	22	29	37	7	11	16	6	9	11
19	24	31	39	7	12	16	7	9	12
20	26	33	41	8	12	17	8	10	13
21	28	35	43	8	13	17	8	11	13
22	30	37	44	9	13	18	9	12	14
23	31	39	46	9	14	18	10	12	15
24	33	41	48	10	14	19	10	13	15
25	35	42	50	10	15	19	11	13	16
26	36	44	51	11	15	20	12	14	16
27	38	45	53	11	16	20	12	14	17
28	39	47	54	12	16	21	13	15	17
29	41	48	56	12	17	21	13	15	18
30	42	50	57	13	17	22	14	16	18
31	43	51	58	13	18	22	14	16	19
32	45	52	60	14	18	23	14	17	19
33	46	53	61	14	19	23	15	17	19
34	47	54	62	15	19	24	15	17	20
35	48	55	63	15	20	24	15	18	20
36	49	56	64	16	20	25	16	18	20
37	50	57	65	16	21	25	16	18	21
38	50	58	65	17	21	26	16	18	21

Reproduced with permission from Romero R, Pilu G, Jeanty F, et al. *Prenatal Diagnosis of Congenital Anomalies*. Norwalk, CT: Appleton & Lange; 1988:83.

Table 25B Reference Ranges for Fetal Optic Tract Diameter (in mm)

GA (wk)	Centile				
	3rd	5th	50th	95th	97th
21	1.6	1.7	2.0	2.3	2.3
22	1.7	1.8	2.1	2.4	2.4
23	1.8	1.9	2.2	2.5	2.5
24	1.9	2.0	2.3	2.6	2.6
25	2.0	2.1	2.4	2.6	2.7
26	2.1	2.2	2.5	2.7	2.8
27	2.2	2.3	2.5	2.8	2.9
28	2.3	2.4	2.6	2.9	3.0
29	2.4	2.4	2.7	3.0	3.1
30	2.5	2.5	2.8	3.1	3.2
31	2.6	2.6	2.9	3.2	3.3
32	2.7	2.7	3.0	3.3	3.3
33	2.8	2.8	3.1	3.4	3.4
34	2.9	2.9	3.2	3.5	3.5
35	2.9	3.0	3.3	3.6	3.6
36	3.0	3.1	3.4	3.7	3.7

Reproduced from Bault JP, Salomon LJ, Guibaud L, et al. Role of three-dimensional ultrasound measurement of the optic tract in fetuses with agenesis of the septum pellucidum. *Ultrasound Obstet Gynecol*. 2011;37(5):570–575. Copyright © International Society of Ultrasound in Obstetrics and Gynecology. With permission of John Wiley & Sons Ltd.

Table 26 MRI Reference Values for Binocular Diameter, Interocular Diameter, and Ocular Diameter by Gestational Age

Gestational Age (wk)	No. of Fetuses	No. of Observations	BOD			IOD			OD		
			5%	50%	95%	5%	50%	95%	5%	50%	95%
15			16.6	20.8	21.4	7.4	9.8	12.3	3.4	5.5	6.4
16	2	2	19.0	22.8	24.0	8.2	10.6	13.3	4.2	6.1	7.1
17	1	3	21.3	24.8	26.5	9.0	11.4	14.3	5.0	6.7	7.9
18			23.4	26.8	28.9	9.7	12.1	15.2	5.7	7.3	8.5
19	3	9	25.4	28.7	31.1	10.4	12.9	16.1	6.4	7.9	9.2
20	6	11	27.3	30.5	33.2	11.1	13.6	16.9	7.0	8.5	9.8
21	14	40	29.1	32.3	35.2	11.7	14.3	17.6	7.6	9.0	10.4
22	9	28	30.8	34.1	37.1	12.3	14.9	18.4	8.2	9.6	10.9
23	8	29	32.4	35.8	38.9	12.8	15.6	19.1	8.8	10.1	11.4
24	8	46	34.0	37.4	40.7	13.4	16.2	19.8	9.3	10.6	11.9
25	4	14	35.5	39.0	42.4	13.9	16.8	20.4	9.8	11.1	12.4
26	10	36	37.0	40.6	44.0	14.4	17.4	21.0	10.3	11.6	12.9
27	5	23	38.4	42.1	45.5	14.9	17.9	21.6	10.8	12.0	13.3
28	7	27	39.7	43.5	47.0	15.3	18.5	22.2	11.3	12.5	13.8
29	9	22	41.0	44.9	48.5	15.8	19.0	22.8	11.7	12.9	14.2
30	1	4	42.3	46.3	49.9	16.2	19.5	23.3	12.1	13.4	14.6
31	4	6	43.5	47.6	51.2	16.6	19.9	23.8	12.5	13.8	15.0
32	3	5	44.6	48.8	52.5	17.0	20.4	24.3	12.9	14.2	15.4
33	6	19	45.8	50.0	53.8	17.4	20.8	24.8	13.3	14.6	15.7
34	5	17	46.9	51.2	55.0	17.8	21.2	25.3	13.7	15.0	16.1
35	5	9	48.0	52.3	56.2	18.2	21.5	25.7	14.1	15.3	16.4
36			49.0	53.3	57.3	18.5	21.9	26.2	14.4	15.7	16.7
37	1	3	50.0	54.4	58.5	18.9	22.2	26.6	14.8	16.0	17.1
38			51.0	55.3	59.6	19.2	22.5	27.0	15.1	16.3	17.4
39			52.0	56.2	60.6	19.5	22.7	27.4	15.4	16.6	17.7
40			52.9	57.1	61.7	19.9	23.0	27.8	15.8	16.9	18.0
Total	111	353									

Reproduced with permission from Robinson AJ, Blaser S, Toi A, et al. MRI of the fetal eyes: morphologic and biometric assessment for abnormal development with ultrasonographic and clinicopathologic correlation. *Pediatr Radiol.* 2008;38:971–981.

Table 27 Ultrasound Percentile Reference Values for Ear Length

Gestational Age (wk)	Ear Length (mm)		
	Percentiles		
	5th	50th	95th
15	7	9	11
16	8	10	12
17	9	11	13
18	10	12	14
19	11	13	16
20	11	15	17
21	12	16	18
22	13	17	19
23	14	18	21
24	15	19	22
25	16	20	24
26	17	22	26
27	18	23	27
28	18	24	28
29	19	25	29
30	20	26	30
31	21	27	31
32	22	28	32
33	22	28	33
34	23	29	34
35	24	30	35
36	25	30	36
37	25	31	37
38	26	31	37
39	27	32	38
40	27	32	38

Note: Ratio biparietal diameter/ear length is 3.03 (SD, 0.29), independent of gestational age.

Modified data, smoothed and rounded to nearest millimeter, from Chitkara U, Lee L, El-Sayed YY, et al. Ultrasonographic ear length measurement in normal second- and third-trimester fetuses. *Am J Obstet Gynecol.* 2000;183:230–234.

Reproduced with permission from Shimizu T, Salvador L, Allanson J, et al. Ultrasonographic measurements of fetal ear. *Obstet Gynecol.* 1992;80:381–384.

Table 28 Ultrasound Reference Values for Mandible Length

MA (wk)	Mandible Length (mm)		
	Percentiles		
	5th	50th	95th
15	11	14	18
16	13	17	20
17	15	19	22
18	17	21	24
19	19	23	26
20	21	25	28
21	23	26	30
22	25	28	32
23	27	30	33
24	28	32	35
25	30	33	37
26	31	35	38
27	33	36	40
28	34	38	41
29	36	39	43
30	37	41	44
31	39	42	45
32	40	43	47
33	41	45	48
34	42	46	49
35	43	47	50
36	44	48	51
37	45	49	52
38	46	50	53
39	47	51	54

Note: Mandible length (mm) = $-20.41 + 2.97 \times GA - 0.027 \times GA^2$ (SD = 2.077). GA, gestational age; MA, menstrual age.

Reproduced with permission from Otto C, Platt LD. The fetal mandible measurement: an objective determination of fetal jaw size. *Ultrasound Obstet Gynecol.* 1991;1:12–17.

Table 29 Ultrasound Reference Values for Length of Nasal Bone

Gestational Age (wk)	Length of Nasal Bone (mm)		
	-2 SD	Mean	+2 SD
14	3.3	4.2	5.0
16	3.1	5.2	7.3
18	5.0	6.3	7.6
20	5.7	7.6	9.5
22	6.0	8.2	10.4
24	6.8	9.4	12.0
26	7.2	9.7	12.3
28	7.8	10.7	13.6
30	8.3	11.3	14.4
32	8.0	11.6	15.2
34	7.5	12.3	17.0

Reproduced with permission from Guis F, Ville Y, Vincent Y, et al. Ultrasound evaluation of the length of the fetal nasal bones throughout gestation. *Ultrasound Obstet Gynecol.* 1995;5:304–307.

Neck and Chest Measurements

Table 30 Ultrasound Thyroid Circumference Based on Biparietal Diameter (BPD)

BPD (cm)	Thyroid Circumference by Percentile (cm)				
	5th	10th	50th	90th	95th
3.50	1.5	1.7	2.3	2.8	3.0
3.75	1.6	1.8	2.3	2.9	3.1
4.00	1.6	1.8	2.4	3.0	3.2
4.25	1.7	1.8	2.5	3.1	3.3
4.50	1.7	1.9	2.5	3.2	3.4
4.75	1.8	2.0	2.6	3.3	3.5
5.00	1.9	2.1	2.8	3.4	3.6
5.25	2.0	2.2	2.9	3.6	3.8
5.50	2.1	2.3	3.0	3.7	3.9
5.75	2.2	2.4	3.1	3.9	4.1
6.00	2.3	2.5	3.3	4.0	4.3
6.25	2.4	2.7	3.4	4.2	4.4
6.50	2.6	2.8	3.6	4.4	4.6
6.75	2.7	3.0	3.8	4.6	4.8
7.00	2.9	3.1	4.0	4.8	5.0
7.25	3.1	3.3	4.2	5.0	5.2
7.50	3.2	3.5	4.4	5.2	5.5
7.75	3.4	3.7	4.6	5.5	5.7
8.00	3.6	3.9	4.8	5.7	6.0
8.25	3.8	4.1	5.0	6.0	6.2
8.50	4.1	4.3	5.3	6.2	6.5
8.75	4.3	4.6	5.5	6.5	6.8
9.00	4.5	4.8	5.8	6.8	7.0

Reproduced from Ranzini AC, Anath CV, Smulian JC, et al. Ultrasonography of the fetal thyroid: monograms based on biparietal diameter and gestational age. *J Ultrasound Med.* 2001;20(6):613–617, with permission from the American Institute for Ultrasound in Medicine.

Table 31 Ultrasound Thyroid Circumference Based on Gestational Age

Gestational Age (wk)	No. of Patients	Thyroid Circumference by Percentile (cm)				
		5th	10th	50th	90th	95th
16	5	1.3	1.7	2.3	2.8	3.0
17	5	1.4	1.8	2.3	2.9	3.1
18	14	1.5	1.8	2.4	3.0	3.2
19	10	1.7	1.8	2.5	3.1	3.3
20	25	1.8	1.9	2.5	3.2	3.4
21	13	1.9	2.0	2.6	3.3	3.5
22	11	2.1	2.1	2.8	3.4	3.6
23	4	2.2	2.2	2.9	3.6	3.8
24	11	2.3	2.3	3.0	3.7	3.9
25	11	2.5	2.4	3.1	3.9	4.1
26	15	2.6	2.5	3.3	4.0	4.3
27	7	2.7	2.7	3.4	4.2	4.4
28	10	2.9	2.8	3.6	4.4	4.6
29	9	3.0	3.0	3.8	4.6	4.8
30	6	3.1	3.1	4.0	4.8	5.0
31	5	3.3	3.3	4.2	5.0	5.2
32	9	3.4	3.5	4.4	5.2	5.5
33	11	3.5	3.7	4.6	5.5	5.7
34	1	3.7	3.9	4.8	5.7	6.0
35	7	3.8	4.1	5.0	6.0	6.2
36	7	3.9	4.3	5.3	6.2	6.5
37	4	4.1	4.6	5.5	6.5	6.8

Reproduced from Ranzini AC, Anath CV, Smulian JC, et al. Ultrasonography of the fetal thyroid: monograms based on biparietal diameter and gestational age. *J Ultrasound Med.* 2001;20(6):613–617, with permission from the American Institute for Ultrasound in Medicine.

Table 32 Ultrasound Reference Values for Thyroid Volume

GA (wk)	Thyroid Volume (cm ³)	
	Mean	Range
20–23	0.08	±0.05
24–27	0.15	±0.09
28–31	0.24	±0.10
32–35	0.42	±0.21
>35	0.63	±0.22

Note: Volume = 0.38 – 0.02 × GA + 0.3 × EFW.
 EFW, estimated fetal weight; GA, gestational age.
 Reproduced with permission from Ho SSY, Metreweli C. Normal thyroid volume. *Ultrasound Obstet Gynecol.* 1998;11:118–122.

Table 33 Ultrasound Percentile Reference Values for Thoracic Circumference

Gestational Age (wk)	n	Predictive Percentiles								
		2.5th	5th	10th	25th	50th	75th	90th	95th	97.5th
16	6	5.9	6.4	7.0	8.0	9.1	10.3	11.3	11.9	12.4
17	22	6.8	7.3	7.9	8.9	10.0	11.2	12.2	12.8	13.3
18	31	7.7	8.2	8.8	9.8	11.0	12.1	13.1	13.7	14.2
19	21	8.6	9.1	9.7	10.7	11.9	13.0	14.0	14.6	15.1
20	20	9.5	10.0	10.6	11.7	12.8	13.9	15.0	15.5	16.0
21	30	10.4	11.0	11.6	12.6	13.7	14.8	15.8	16.4	16.9
22	18	11.3	11.9	12.5	13.5	14.6	15.7	16.7	17.3	17.8
23	21	12.2	12.8	13.4	14.4	15.5	16.6	17.6	18.2	18.8
24	27	13.2	13.7	14.3	15.3	16.4	17.5	18.5	19.1	19.7
25	20	14.1	14.6	15.2	16.2	17.3	18.4	19.4	20.0	20.6
26	25	15.0	15.5	16.1	17.1	18.2	19.3	20.3	21.0	21.5
27	24	15.9	16.4	17.0	18.0	19.1	20.2	21.3	21.9	22.4
28	24	16.8	17.3	17.9	18.9	20.0	21.2	22.2	22.8	23.3
29	24	17.7	18.2	18.8	19.8	21.0	22.1	23.1	23.7	24.2
30	27	18.6	19.1	19.7	20.7	21.9	23.0	24.0	24.6	25.1
31	24	19.5	20.0	20.6	21.6	22.8	23.9	24.9	25.5	26.0
32	28	20.4	20.9	21.5	22.6	23.7	24.8	25.8	26.4	26.9
33	27	21.3	21.8	22.5	23.5	24.6	25.7	26.7	27.3	27.8
34	25	22.2	22.8	23.4	24.4	25.5	26.6	27.6	28.2	28.7
35	20	23.1	23.7	24.3	25.3	26.4	27.5	28.5	29.1	29.6
36	23	24.0	24.6	25.2	26.2	27.3	28.4	29.4	30.0	30.6
37	22	24.9	25.5	26.1	27.1	28.2	29.3	30.3	30.9	31.5
38	21	25.9	26.4	27.0	28.0	29.1	30.2	31.2	31.9	32.4
39	7	26.8	27.3	27.9	28.9	30.0	31.1	32.2	32.8	33.3
40	6	27.7	28.2	28.8	29.8	30.9	32.1	33.1	33.7	34.2

Note: Measurements in centimeters.

Reproduced with permission from Chitkara U, Rosenberg J, Chervenak FA, et al. Prenatal sonographic assessment of the fetal thorax: normal values. *Am J Obstet Gynecol.* 1987;156:1069–1074.

Table 34 Reference Values for Lung Volumes Calculated by 3D Ultrasound

GA (wk)	Lung Volume (cm ³)		
	Percentiles		
	5th	50th	95th
14	0.3	3.9	11.6
15	0.7	5.3	14.1
16	1.2	6.8	16.9
17	2.0	8.6	20.0
18	2.9	10.6	23.3
19	3.9	12.8	26.8
20	5.1	15.2	30.7
21	6.5	17.8	34.7
22	8.1	20.7	39.0
23	9.8	23.7	43.6
24	11.7	26.9	48.4
25	13.7	30.4	53.5
26	16.0	34.0	58.9
27	18.3	37.9	64.5
28	20.9	42.0	70.3
29	23.6	46.2	76.4
30	26.5	50.7	82.7
31	29.5	55.4	89.3
32	32.8	60.3	96.2
33	36.1	65.4	103.3
34	39.7	70.7	110.7
35	43.4	76.2	118.3
36	47.3	82.0	126.2
37	51.3	87.9	134.3
38	55.5	94.0	142.7
39	59.9	100.4	151.3
40	64.4	107.0	160.2

Note: Mean volume^{0.5} = $-2.538094 + 0.322 \times \text{GA}$.

GA, gestational age.

Reproduced with permission from Lee A, Kratochwil A, Stumpflen I, et al. Fetal lung volume determination by three-dimensional ultrasonography. *Am J Obstet Gynecol.* 1996;175(3, pt 1):588-592.

Table 35 Reference Values for the Right Lung Volume Calculated by 3D Ultrasound

EFW (g)	n	Lung Volume (cm ³)							
		Percentiles							
		2.5th	5th	10th	50th	90th	95th	97.5th	SD
200	23	0.48	0.92	1.42	3.99	6.56	7.07	7.50	1.566
300	27	1.42	1.97	2.60	5.85	9.10	9.74	10.28	1.980
400	28	2.35	3.02	3.78	7.71	11.63	12.41	13.07	2.393
500	17	3.28	4.07	4.97	9.57	14.17	15.08	15.86	2.806
600	20	4.22	5.12	6.15	11.43	16.71	17.74	18.64	3.219
700	16	5.15	6.17	7.33	13.29	19.25	20.41	21.43	3.633
800	13	6.09	7.22	8.51	15.15	21.78	23.08	24.21	4.046
900	15	7.02	8.27	9.70	17.01	24.32	25.75	27.00	4.459
1,000	16	7.96	9.32	10.88	18.87	26.86	28.42	29.78	4.872
1,100	11	8.89	10.37	12.06	20.73	29.40	31.09	32.57	5.286
1,200	10	9.82	11.42	13.24	22.59	31.94	33.76	35.36	5.699
1,300	9	10.76	12.47	14.42	24.45	34.47	36.43	38.14	6.112
1,400	12	11.69	13.52	15.61	26.31	37.01	39.10	40.93	6.525
1,500	13	12.63	14.57	16.79	28.17	39.55	41.77	43.71	6.939
1,600	8	13.56	15.62	17.97	30.03	42.09	44.44	46.50	7.352
1,700	8	14.50	16.67	19.15	31.89	44.62	47.11	49.28	7.765
1,800	14	15.43	17.72	20.34	33.75	47.16	49.78	52.07	8.179
1,900	6	16.36	18.77	21.52	35.61	49.70	52.45	54.86	8.592
2,000	7	17.30	19.82	22.70	37.47	52.24	55.12	57.64	9.005
2,100	5	18.23	20.87	23.88	39.33	54.78	57.79	60.43	9.418
2,200	6	19.17	21.92	25.07	41.19	57.31	60.46	63.21	9.832
2,300	4	20.10	22.97	26.25	43.05	59.85	63.13	66.00	10.249
2,400	5	21.04	24.02	27.43	44.91	62.39	65.80	68.78	10.658

EFW, estimated fetal weight.

Reproduced with permission from Gerards FA, Engels MAJ, Twisk JWR, et al. Normal fetal lung volume measured with three-dimensional ultrasound. *Ultrasound Obstet Gynecol.* 2006;27:134–144.**Table 36** Reference Values for the Left Lung Volume Calculated by 3D Ultrasound

EFW (g)	n	Lung Volume (cm ³)							
		Percentiles							
		2.5th	5th	10th	50th	90th	95th	97.5th	SD
200	23	0.41	0.77	1.18	3.30	5.42	5.84	6.19	1.291
300	27	1.19	1.63	2.14	4.73	7.32	7.82	8.27	1.582
400	28	1.98	2.50	3.10	6.15	9.20	9.80	10.32	1.862
500	17	2.77	3.37	4.06	7.57	11.08	11.78	12.37	2.143
600	20	3.55	4.23	5.00	9.00	12.99	13.76	14.45	2.434
700	16	4.34	5.10	5.97	10.42	14.87	15.74	16.50	2.714
800	13	5.12	5.96	6.92	11.84	16.76	17.72	18.56	3.000
900	15	5.91	6.83	7.88	13.27	18.66	19.70	20.63	3.286
1,000	16	6.70	7.70	8.84	14.69	20.54	21.68	22.68	3.566
1,100	11	7.48	8.56	9.79	16.11	22.43	23.66	24.74	3.852
1,200	10	8.27	9.43	10.75	17.54	24.33	25.64	26.81	4.138
1,300	9	9.05	10.29	11.71	18.96	26.21	27.63	28.87	4.423
1,400	12	9.84	11.16	12.67	20.38	28.09	29.61	30.92	4.704
1,500	13	10.63	12.03	13.63	21.81	29.99	31.59	32.99	4.990
1,600	8	11.41	12.89	14.58	23.23	31.88	33.57	35.05	5.275
1,700	8	12.20	13.76	15.54	24.65	33.76	35.55	37.10	5.556
1,800	14	12.98	14.62	16.49	26.08	35.67	37.53	39.18	5.847
1,900	6	13.77	15.49	17.45	27.50	37.55	39.51	41.23	6.128
2,000	7	14.57	16.36	18.41	28.92	39.43	41.49	43.27	6.408
2,100	5	15.34	17.22	19.36	30.35	41.34	43.47	45.36	6.699
2,200	6	16.14	18.09	20.32	31.77	43.22	45.45	47.40	6.980
2,300	4	16.93	18.96	21.28	33.19	45.10	47.43	49.45	7.260
2,400	5	17.70	19.81	22.23	34.61	46.99	49.41	51.52	7.551

EFW, Estimated Fetal Weight

Reproduced with permission from Gerards FA, Engels MAJ, Twisk JWR, et al. Normal fetal lung volume measured with three-dimensional ultrasound. *Ultrasound Obstet Gynecol.* 2006;27:134–144.

Table 37 MRI Reference Values for Lung Volumes

GA (wk)	n	FLV Range (mL)	Mean FLV (mL)	Median FLV (mL)	SD	Skewness	95% CI
21.0–25.0	13	16–48	26.15	24	9.15	1.18	13.00–47.55
26.0–27.5	29	23–66	38.83	37	10.12	0.57	22.33–63.27
28.0–30.0	34	29–89	52.97	53	14.20	0.59	29.73–88.00
31.0–31.5	26	35–101	65.04	64	15.91	0.18	37.71–105.53
32.0	32	38–109	70.22	67.5	18.16	0.41	40.30–114.62
32.5–33.0	34	47–110	72.29	69	17.18	0.69	44.38–111.73
33.5–35.0	30	52–129	80.73	77.50	24.32	0.73	43.34–138.38
35.5–38.0	16	38–150	88.63	77.50	31.77	0.42	39.45–175.58

FLV, fetal lung volume; SD, standard deviation; CI, confidence interval.
 Reproduced with permission from Rypens F, Metens T, Rocourt N, et al. Fetal lung volume: estimation at MR Imaging—initial results. *Radiology*. 2001;219:236–241.

Abdominal Measurements

Table 38 Ultrasound Reference Values for Renal Length

GA (wk)	N	Fitted Centiles					SD ^a
		3rd	10th	50th	90th	97th	
14	3	7.5	8.0	9.3	10.8	11.6	0.12
15	3	8.8	9.5	11.0	12.8	13.7	0.12
16	2	10.2	11.0	12.7	14.8	15.8	0.12
17	12	11.6	12.5	14.5	16.8	18.1	0.12
18	10	13.1	14.1	16.3	18.9	20.3	0.12
19	15	14.6	15.6	18.2	21.1	22.6	0.12
20	15	16.1	17.2	20.0	23.2	24.9	0.12
21	15	17.5	18.8	21.8	25.4	27.2	0.12
22	14	19.0	20.4	23.6	27.4	29.4	0.12
23	16	20.4	21.9	25.4	29.5	31.6	0.12
24	17	21.8	23.4	27.1	31.5	33.8	0.12
25	18	23.1	24.8	28.8	33.4	35.8	0.12
26	20	24.4	26.2	30.4	35.3	37.8	0.12
27	24	25.6	27.5	31.9	37.1	39.7	0.12
28	18	26.8	28.7	33.4	38.7	41.5	0.12
29	19	27.9	29.9	34.7	40.3	43.2	0.12
30	19	28.9	31.0	36.0	41.8	44.8	0.12
31	23	29.9	32.1	37.2	43.2	46.3	0.12
32	23	30.8	33.0	38.3	44.5	47.7	0.12
33	22	31.6	33.9	39.4	45.7	49.0	0.12
34	19	32.4	34.7	40.3	46.8	50.2	0.12
35	20	33.1	35.4	41.1	47.8	51.2	0.12
36	23	33.7	36.1	41.9	48.7	52.2	0.12
37	14	34.2	36.7	42.6	49.4	53.0	0.12
38	17	34.7	37.2	43.2	50.1	53.8	0.12
39	13	35.1	37.6	43.7	50.7	54.4	0.12
40	14	35.4	38.0	44.1	51.2	54.9	0.12
41	26	35.7	38.3	44.5	51.6	55.4	0.12
42	17	36.0	38.6	44.8	52.0	55.7	0.12

^aSD, standard deviation of log of measurement (constant).
 Reproduced with permission from Chitty LS, Altman DG. Charts of fetal size: kidney and renal pelvis measurements. *Prenat Diagn*. 2003;23:891–897.

Table 39 Reference Values for Renal Volumes Based on 3D Ultrasound

GA (wk)	Renal Volumes (cm ³)									
	Right Kidney					Left Kidney				
	Percentiles					Percentiles				
	5th	10th	50th	90th	95th	5th	10th	50th	90th	95th
20	0.3	0.6	1.5	2.4	2.7	0.6	0.9	1.8	2.7	3.0
21	0.8	1.1	2.2	3.3	3.6	1.2	1.5	2.6	3.6	4.0
22	1.4	1.7	3.0	4.2	4.6	1.7	2.1	3.3	4.6	4.9
23	1.9	2.3	3.7	5.1	5.5	2.3	2.7	4.1	5.5	5.9
24	2.4	2.9	4.5	6.0	6.5	2.8	3.3	4.8	6.4	6.9
25	3.0	3.5	5.2	6.9	7.4	3.4	3.9	5.6	7.3	7.8
26	3.5	4.0	5.9	7.8	8.4	4.0	4.6	6.5	8.4	9.0
27	4.0	4.6	6.7	8.7	9.3	4.5	5.1	7.1	9.2	9.8
28	4.5	5.2	7.4	9.7	10.3	5.0	5.6	7.9	10.1	10.8
29	5.1	5.8	8.2	10.6	11.2	5.6	6.3	8.7	11.0	11.7
30	5.6	6.3	8.9	11.5	12.2	6.1	6.9	9.4	12.0	12.7
31	6.1	6.9	9.6	12.4	13.1	6.7	7.4	10.2	12.9	13.7
32	6.7	7.5	10.4	13.3	14.1	7.2	8.0	10.9	13.8	14.6
33	7.2	8.1	11.1	14.2	15.0	7.8	8.6	11.7	14.7	15.6
34	7.7	8.6	11.9	15.1	16.0	8.3	9.2	12.5	15.7	16.6
35	8.3	9.2	12.6	16.0	16.9	8.9	9.8	13.2	16.6	17.6
36	8.8	9.8	13.3	16.9	17.9	9.4	10.4	14.0	17.5	18.5
37	9.3	10.4	14.1	17.8	18.9	10.0	11.0	14.7	18.4	19.5
38	9.8	11.0	14.8	18.7	19.8	10.5	11.6	15.5	19.4	20.5
39	10.4	11.5	15.6	19.6	20.7	11.1	12.2	16.3	20.3	21.4
40	10.9	12.1	16.3	20.5	21.7	11.8	13.0	17.2	21.4	21.7

Note: Volume can be estimated by length × height × width × 0.52.

Data adapted from Yu C, Chang F, Ko H, et al. Fetal renal volume in normal gestation: a three-dimensional ultrasound study. *Ultrasound Med Biol.* 2000;26:1253–1256.

Table 40 Reference Values of Fetal Liver Volume Determined by 3D Ultrasound Compared with Estimated Fetal Weight

Estimated Fetal Weight (g)	Liver Volume (cm ³)		
	Percentiles		
	5th	50th	95th
400	5	17	29
500	9	21	33
600	12	24	37
700	16	28	40
800	19	32	44
900	23	35	47
1,000	27	39	51
1,100	30	42	55
1,200	34	46	58
1,300	37	50	62
1,400	41	53	65
1,500	45	57	69
1,600	48	60	73
1,700	52	64	76
1,800	55	68	80
1,900	59	71	83
2,000	63	75	87
2,100	66	78	91
2,200	70	82	94
2,300	73	86	98
2,400	77	89	101
2,500	81	93	105
2,600	84	96	109
2,700	88	100	112
2,800	91	104	116
2,900	95	107	119
3,000	99	111	123

Note: Liver volume = $2.79 + 0.036 \times GA$ (SD = 7.44).

Data from Laudy JAM, Janssen MMM, Struykk PC, et al. Fetal liver volume measurement by three-dimensional ultrasonography: a preliminary study. *Ultrasound Obstet Gynecol.* 1009;12:93–96.

Table 41 Fetal Ultrasound Liver Length^a Compared with Gestational Age

GA (wk)	Liver Length (mm)		
	Percentiles		
	5th	50th	95th
13	10	13	16
14	11	14	18
15	13	16	19
16	13	17	21
17	14	19	23
18	16	20	25
19	18	22	28
20	18	24	30
21	20	26	32
22	22	28	34
23	23	29	36
24	25	31	38
25	26	33	41
26	28	35	43
27	29	37	45
28	30	39	47
29	32	40	50
30	33	42	52
31	34	43	53
32	35	45	55
33	36	46	56
34	37	47	58
35	38	48	60
36	38	49	62
37	39	50	63
38	39	50	63
39	40	51	64
40	40	51	64

^aValues are approximate, based on graphic data only.
Reproduced with permission from Roberts AB, Mitchell JM, Pattison NS. Fetal liver length in normal and isoimmunized pregnancies. *Am J Obstet Gynecol.* 1989;161:42-46.

Table 42 Ultrasound Reference Values for Splenic Length

Gestational Age (wk)	Splenic Length (mm)		
	Percentiles		
	5th	50th	95th
18	7	14	21
20	11	18	26
22	15	22	29
24	19	25	32
26	20	27	34
28	24	31	38
30	27	34	41
32	31	28	45
34	35	43	50
36	41	48	55
38	47	54	62
40	55	62	70

Reproduced with permission from Schmidt W, Yarkoni S, Jeanty P, et al. Sonographic measurement of the fetal spleen: clinical implications. *J Ultrasound Med.* 1985;4:667.

Table 43 Ultrasound Reference Values for Splenic Circumference between 18 and 37 Weeks

GA (wk)	Splenic Circumference	
	Percentiles	
	50th	95th
18	30.7	39.7
19	33.9	43.8
20	37.2	48.0
21	40.4	52.2
22	43.6	56.3
23	46.9	60.5
24	50.1	64.7
25	53.3	68.9
26	56.6	73.0
27	59.8	77.1
28	63.1	81.3
29	66.3	85.5
30	69.5	89.6
31	72.8	93.8
32	76.0	97.9
33	79.7	102.1
34	82.5	106.3
35	85.7	110.4
36	88.9	114.6
37	92.2	118.7

Note: Splenic circumference = $-27.569 + 3.23654 \times \text{GA}$.

GA, gestational age.

Reproduced with permission from Bahado-Singh R, Oz U, Mari G, et al. Fetal splenic size in anemia due to Rhalloimmunization. *Obstet Gynecol.* 1998;92:828-832.

Table 44 Normal Ultrasound Colon Diameters

Gestational Age (wk)	Colon Diameters (mm)		
	-2 SD	Mean	+2 SD
22	2	4	6
24	3	5	7
26	4	6	9
28	4	7	10
30	5	8	11
32	6	9	12
34	7	10	13
36	8	12	16
38	9	14	18
40	10	16	20

Data adapted from Harris RD, Nyberg DA, Mack LA, et al. Anorectal atresia: prenatal sonographic diagnosis. *AJR Am J Roentgenol.* 1987;149:395-400.

Cardiac Measurements

Table 45 Reference Values for Aortic Root Internal Diameter, Pulmonary Artery, Left Ventricle, Right Ventricle, Left Atrium, and Right Atrium (Values Are Shown for 5th, 50th, and 95th Percentiles)

GA (wk)	Aortic Root (mm) ^a			Pulmonary Artery (mm) ^b			Left Ventricle (mm) ^c		
	5th	50th	95th	5th	50th	95th	5th	50th	95th
14.0	1.2	1.8	2.4	1.3	1.9	2.5	1.2	2.3	3.5
15.0	1.4	2.0	2.7	1.6	2.2	2.8	1.8	3.0	4.3
16.0	1.6	2.3	2.9	1.8	2.5	3.1	2.4	3.7	5.0
17.0	1.9	2.5	3.2	2.1	2.8	3.4	2.9	4.3	5.8
18.0	2.1	2.8	3.5	2.3	3.0	3.8	3.4	5.0	6.5
19.0	2.3	3.0	3.7	2.6	3.3	4.1	3.9	5.6	7.2
20.0	2.5	3.3	4.0	2.8	3.6	4.4	4.4	6.1	7.9
21.0	2.8	3.5	4.3	3.1	3.9	4.7	4.8	6.7	8.5
22.0	3.0	3.8	4.6	3.3	4.2	5.0	5.2	7.2	9.2
23.0	3.2	4.0	4.8	3.6	4.5	5.3	5.6	7.7	9.8
24.0	3.4	4.3	5.1	3.8	4.7	5.6	6.0	8.2	10.4
25.0	3.6	4.5	5.4	4.1	5.0	5.9	6.4	8.7	11.0
26.0	3.9	4.8	5.6	4.4	5.3	6.3	6.7	9.1	11.5
27.0	4.1	5.0	5.9	4.6	5.6	6.6	7.0	9.5	12.0
28.0	4.3	5.3	6.2	4.9	5.9	6.9	7.3	9.9	12.5
29.0	4.5	5.5	6.5	5.1	6.2	7.2	7.6	10.3	13.0
30.0	4.8	5.7	6.7	5.4	6.4	7.5	7.8	10.6	13.4
31.0	5.0	6.0	7.0	5.6	6.7	7.8	8.0	10.9	13.9
32.0	5.2	6.2	7.3	5.9	7.0	8.1	8.2	11.2	14.3
33.0	5.4	6.5	7.5	6.1	7.3	8.4	8.4	11.5	14.7
34.0	5.7	6.7	7.8	6.4	7.6	8.8	8.5	11.8	15.0
35.0	5.9	7.0	8.1	6.6	7.9	9.1	8.6	12.0	15.4
36.0	6.1	7.2	8.4	6.9	8.1	9.4	8.7	12.2	15.7
37.0	6.3	7.5	8.6	7.1	8.4	9.7	8.8	12.4	16.0
38.0	6.5	7.7	8.9	7.4	8.7	10.0	8.9	12.5	16.2
39.0	6.8	8.0	9.2	7.6	9.0	10.3	8.9	12.7	16.5
40.0	7.0	8.2	9.4	7.9	9.3	10.6	8.9	12.8	16.7

GA (wk)	Right Ventricle (mm) ^d			Left Atrium (mm) ^e			Right Atrium (mm) ^f		
	5th	50th	95th	5th	50th	95th	5th	50th	95th
14.0	1.4	2.5	3.5	2.2	3.2	4.2	2.4	3.5	4.7
15.0	2.0	3.1	4.3	2.8	3.9	5.0	3.0	4.2	5.4
16.0	2.5	3.8	5.1	3.3	4.5	5.7	3.5	4.8	6.2
17.0	3.0	4.4	5.8	3.8	5.1	6.4	4.0	5.5	6.9
18.0	3.6	5.1	6.6	4.3	5.7	7.1	4.6	6.1	7.6
19.0	4.0	5.7	7.3	4.8	6.3	7.8	5.1	6.7	8.3
20.0	4.5	6.3	8.0	5.3	6.9	8.4	5.6	7.3	9.0
21.0	5.0	6.9	8.7	5.7	7.4	9.1	6.0	7.9	9.7
22.0	5.5	7.4	9.4	6.2	8.0	9.7	6.5	8.5	10.4
23.0	5.9	8.0	10.1	6.6	8.5	10.3	7.0	9.0	11.1
24.0	6.3	8.5	10.7	7.0	9.0	10.9	7.4	9.6	11.7
25.0	6.7	9.1	11.4	7.5	9.5	11.5	7.8	10.1	12.4
26.0	7.1	9.6	12.0	7.8	10.0	12.1	8.3	10.6	13.0
27.0	7.5	10.1	12.6	8.2	10.5	12.7	8.7	11.1	13.6
28.0	7.9	10.6	13.3	8.6	10.9	13.2	9.1	11.6	14.2
29.0	8.3	11.0	13.8	8.9	11.4	13.8	9.5	12.1	14.8
30.0	8.6	11.5	14.4	9.3	11.8	14.3	9.8	12.6	15.4
31.0	8.9	12.0	15.0	9.6	12.2	14.8	10.2	13.1	16.0
32.0	9.2	12.4	15.5	9.9	12.6	15.3	10.5	13.5	16.5
33.0	9.6	12.8	16.1	10.2	13.0	15.8	10.9	14.0	17.1
34.0	9.8	13.2	16.6	10.5	13.4	16.2	11.2	14.4	17.6
35.0	10.1	13.6	17.1	10.8	13.7	16.7	11.5	14.8	18.1

Table 45

Reference Values for Aortic Root Internal Diameter, Pulmonary Artery, Left Ventricle, Right Ventricle, Left Atrium, and Right Atrium (Values Are Shown for 5th, 50th, and 95th Percentiles) (continued)

GA (wk)	Right Ventricle (mm) ^d			Left Atrium (mm) ^e			Right Atrium (mm) ^f		
	5th	50th	95th	5th	50th	95th	5th	50th	95th
36.0	10.4	14.0	17.6	11.0	14.1	17.1	11.8	15.2	18.6
37.0	10.6	14.4	18.1	11.2	14.4	17.6	12.1	15.6	19.1
38.0	10.9	14.7	18.6	11.5	14.7	18.0	12.4	16.0	19.6
39.0	11.1	15.1	19.0	11.7	15.0	18.4	12.7	16.4	20.1
40.0	11.3	15.4	19.5	11.9	15.3	18.8	12.9	16.7	20.6

^aAorta = 0.247 × GA - 1.6638 (SD = 0.0146 × GA + 0.16).

^bPulmonary artery = 0.283 × GA - 2.055 (SD = 0.018 × GA + 0.11).

^cLeft ventricle (end diastole) = -0.01152 × GA² + 1.024 × GA - 9.735 (SD = 0.065 × GA - 0.234).

^dRight ventricle (end diastole) = -0.006848 × GA² + 0.866 × GA - 8.306 (SD = 0.071 × GA - 0.359).

^eLeft atrium = -0.00698 × GA² + 0.8422 × GA - 7.2 (SD = 0.05677 × GA - 0.18).

^fRight atrium = -0.00587 × GA² + 0.8246 × GA - 6.846 (SD = 0.0634 × GA - 0.21).

GA, gestational age.

Data adapted from Shapiro I, Degani S, Leibovitz Z, et al. Fetal cardiac measurements derived by transvaginal and transabdominal cross-sectional echocardiography from 14 weeks of gestation to term. *Ultrasound Obstet Gynecol.* 1998;12:404-418.

Table 46

Reference Values for E/A Ratio of Mitral Valve and Tricuspid Valve

GA (wk)	Mitral Valve ^a			Tricuspid Valve ^b		
	Percentiles			Percentiles		
	5th	50th	95th	5th	50th	95th
20	0.47	0.59	0.71	0.51	0.62	0.74
21	0.48	0.60	0.72	0.52	0.63	0.75
22	0.48	0.61	0.73	0.53	0.64	0.76
23	0.49	0.62	0.74	0.54	0.65	0.77
24	0.50	0.63	0.76	0.55	0.66	0.78
25	0.51	0.64	0.77	0.56	0.67	0.79
26	0.52	0.65	0.78	0.57	0.68	0.80
27	0.53	0.66	0.79	0.58	0.69	0.81
28	0.53	0.67	0.81	0.59	0.70	0.82
29	0.54	0.68	0.82	0.60	0.71	0.83
30	0.55	0.69	0.83	0.61	0.72	0.84
31	0.56	0.70	0.85	0.62	0.73	0.84
32	0.57	0.71	0.86	0.63	0.74	0.85
33	0.58	0.73	0.87	0.64	0.75	0.86
34	0.59	0.74	0.89	0.65	0.76	0.87
35	0.60	0.75	0.90	0.66	0.77	0.88
36	0.61	0.76	0.92	0.67	0.78	0.89
37	0.62	0.77	0.93	0.68	0.79	0.90
38	0.63	0.79	0.95	0.69	0.80	0.91
39	0.64	0.80	0.96	0.70	0.81	0.92
40	0.65	0.81	0.98	0.71	0.82	0.93

Note: E/A ratio is equal to the peak velocity of E wave during early diastole/peak velocity with a wave during atrial contraction.

^aMitral valve \log_{10} (E/A ratio) = -0.3699 + 0.007 × GA (SD = 0.0687 transformed).

^bTricuspid valve E/A ratio = 0.428 + 0.0098 × A14 (SD = 0.0687).

GA, gestational age.

Data from Hecher K, Campbell S, Snijders R, et al. Reference ranges for fetal venous and atrio-ventricular blood flow parameters. *Ultrasound Obstet Gynecol.* 1994;4:381-390.

Table 47

Normal Doppler Echocardiography in the Fetus

Valve	Tricuspid	Mitral	Pulmonary	Aorta
Maximal velocity (cm/s)	51 ± 4	47 ± 4	60 ± 4	70 ± 3
Mean velocity (cm/s)	12 ± 1	11 ± 1	16 ± 2	18 ± 2
Valve diameter (mm) ^a	8 ± 0.5	6.6 ± 0.4	7.6 ± 0.3	6.7 ± 0.2
Cardiac output (mL/kg/min) ^a	307 ± 30	232 ± 25	312 ± 11	250 ± 9
A/E ratio ^a	1.29 ± 0.04	1.35 ± 0.01	—	—
Deceleration time (ms) ^a	97 ± 29	110 ± 31	—	—
Acceleration time (ms) ^a	—	—	50.6 ± 12.0	46.7 ± 9.1

A/E, atrial contraction/early diastole.

^aVaries with gestational age.

Reproduced with permission from Reed KL. Fetal Doppler echocardiography. *Clin Obstet Gynecol.* 1989;32:728-737.

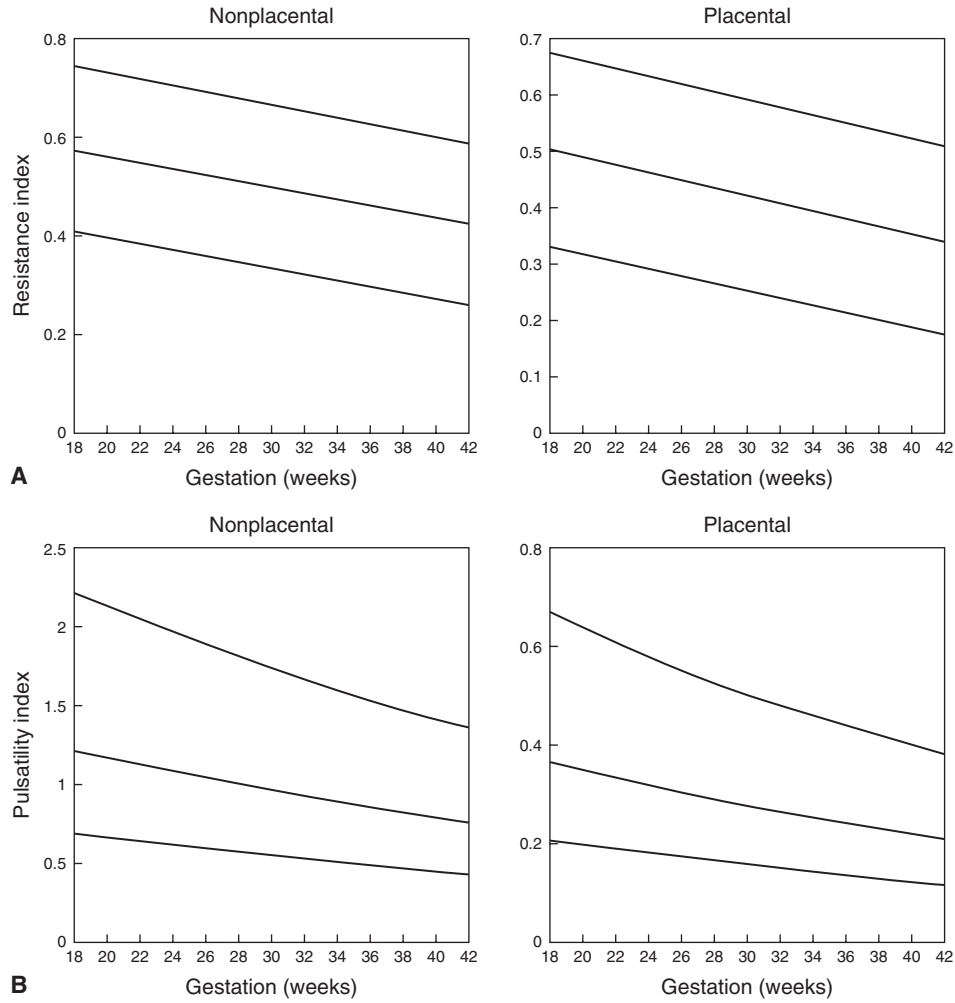
Doppler

Table 48 Reference Intervals for Mean Uterine Artery Pulsatility Index

GA (wk)	Percentiles		
	5th	50th	95th
11	1.18	1.79	2.7
12	1.11	1.68	2.53
13	1.05	1.58	2.38
14	0.99	1.49	2.24
15	0.94	1.41	2.11
16	0.89	1.33	1.99
17	0.85	1.27	1.88
18	0.81	1.2	1.79
19	0.78	1.15	1.7
20	0.74	1.1	1.61
21	0.71	1.05	1.54
22	0.69	1	1.47
23	0.66	0.96	1.41
24	0.64	0.93	1.35
25	0.62	0.89	1.3
26	0.6	0.86	1.25
27	0.58	0.84	1.21
28	0.56	0.81	1.17
29	0.55	0.79	1.13
30	0.54	0.77	1.1
31	0.52	0.75	1.06
32	0.51	0.73	1.04
33	0.5	0.71	1.01
34	0.5	0.7	0.99
35	0.49	0.69	0.97
36	0.48	0.68	0.95
37	0.48	0.67	0.94
38	0.47	0.66	0.92
39	0.47	0.65	0.91
40	0.47	0.65	0.9
41	0.47	0.65	0.89

Reproduced with permission from Gómez O, Figueras F, Fernández S, et al. Reference ranges for uterine artery mean pulsatility index at 11–41 weeks of gestation. *Ultrasound Obstet Gynecol.* 2008;32(2):128–132.

Table 49 Uterine Artery Doppler Resistance Index and Pulsatility Index by Placental and Nonplacental Location



Following placental site determination, if the placenta was deviated to one side, then the uterine artery on that side was referred to as "Placental".
 Reproduced with permission from Bower S, Vyas S, Campbell S, et al. Color Doppler imaging of the uterine artery in pregnancy: normal ranges of impedance to blood flow, mean velocity and volume of flow. *Ultrasound Obstet Gynecol.* 1992;2:261–265.

Table 50 Reference Values for Umbilical Artery S/D Ratio

GA (wk)	Percentile								
	2.5th	5th	10th	25th	50th	75th	90th	95th	97.5th
19	2.73	2.93	3.19	3.67	4.28	5	5.75	6.26	6.73
20	2.63	2.83	3.07	3.53	4.11	4.8	5.51	5.99	6.43
21	2.51	2.7	2.93	3.36	3.91	4.55	5.22	5.67	6.09
22	2.43	2.6	2.83	3.24	3.77	4.38	5.03	5.45	5.85
23	2.34	2.51	2.72	3.11	3.62	4.21	4.82	5.22	5.61
24	2.25	2.41	2.62	2.99	3.48	4.04	4.63	5.02	5.38
25	2.17	2.33	2.52	2.88	3.35	3.89	4.45	4.83	5.18
26	2.09	2.24	2.43	2.78	3.23	3.75	4.3	4.66	5
27	2.02	2.17	2.35	2.69	3.12	3.63	4.15	4.5	4.83
28	1.95	2.09	2.27	2.6	3.02	3.51	4.02	4.36	4.67
29	1.89	2.03	2.2	2.52	2.92	3.4	3.89	4.22	4.53
30	1.83	1.96	2.13	2.44	2.83	3.3	3.78	4.1	4.4
31	1.77	1.9	2.06	2.36	2.75	3.2	3.67	3.98	4.27
32	1.71	1.84	2	2.29	2.67	3.11	3.57	3.87	4.16
33	1.66	1.79	1.94	2.23	2.6	3.03	3.48	3.77	4.06
34	1.61	1.73	1.88	2.16	2.53	2.95	3.39	3.68	3.96
35	1.57	1.68	1.83	2.11	2.46	2.87	3.3	3.59	3.86
36	1.52	1.64	1.78	2.05	2.4	2.8	3.23	3.51	3.78
37	1.48	1.59	1.73	2	2.34	2.74	3.15	3.43	3.69
38	1.44	1.55	1.69	1.95	2.28	2.67	3.08	3.36	3.62
39	1.4	1.51	1.64	1.9	2.23	2.61	3.02	3.29	3.54
40	1.36	1.47	1.6	1.85	2.18	2.56	2.96	3.22	3.48
41	1.33	1.43	1.56	1.81	2.13	2.5	2.9	3.16	3.41

Reproduced from Acharya G, Wilsgaard T, Berntsen GK, et al. Reference ranges for serial measurements of umbilical artery Doppler indices in the second half of pregnancy. *Am J Obstet Gynecol.* 2005;192(3):937-944.

Table 51 Reference Values for Umbilical Artery Pulsatility Index

GA (wk)	Percentile								
	2.5th	5th	10th	25th	50th	75th	90th	95th	97.5th
19	0.97	1.02	1.08	1.18	1.3	1.44	1.57	1.66	1.74
20	0.94	0.99	1.04	1.14	1.27	1.4	1.54	1.62	1.7
21	0.9	0.95	1	1.1	1.22	1.36	1.49	1.58	1.65
22	0.87	0.92	0.97	1.07	1.19	1.32	1.46	1.54	1.62
23	0.84	0.89	0.94	1.04	1.15	1.29	1.42	1.5	1.58
24	0.81	0.86	0.91	1	1.12	1.25	1.38	1.47	1.55
25	0.78	0.83	0.88	0.97	1.09	1.22	1.35	1.44	1.51
26	0.76	0.8	0.85	0.94	1.06	1.19	1.32	1.41	1.48
27	0.73	0.77	0.82	0.92	1.03	1.16	1.29	1.38	1.45
28	0.71	0.75	0.8	0.89	1	1.13	1.26	1.35	1.43
29	0.68	0.72	0.77	0.86	0.98	1.1	1.23	1.32	1.4
30	0.66	0.7	0.75	0.84	0.95	1.08	1.21	1.29	1.37
31	0.64	0.68	0.73	0.82	0.93	1.05	1.18	1.27	1.35
32	0.62	0.66	0.7	0.79	0.9	1.03	1.16	1.25	1.32
33	0.6	0.64	0.68	0.77	0.88	1.01	1.14	1.22	1.3
34	0.58	0.62	0.66	0.75	0.86	0.99	1.12	1.2	1.28
35	0.56	0.6	0.64	0.73	0.84	0.97	1.09	1.18	1.26
36	0.54	0.58	0.63	0.71	0.82	0.95	1.07	1.16	1.24
37	0.53	0.56	0.61	0.69	0.8	0.93	1.05	1.14	1.22
38	0.51	0.55	0.59	0.68	0.78	0.91	1.04	1.12	1.2
39	0.49	0.53	0.57	0.66	0.76	0.89	1.02	1.1	1.18
40	0.48	0.51	0.56	0.64	0.75	0.87	1	1.09	1.17
41	0.47	0.5	0.54	0.63	0.73	0.85	0.98	1.07	1.15

Reproduced from Acharya G, Wilsgaard T, Berntsen GK, et al. Reference ranges for serial measurements of umbilical artery Doppler indices in the second half of pregnancy. *Am J Obstet Gynecol.* 2005;192:937-944.

Table 52 Reference Values for Umbilical Artery Resistance Index

GA (wk)	Percentile								
	2.5th	5th	10th	25th	50th	75th	90th	95th	97.5th
19	0.64	0.66	0.68	0.72	0.77	0.81	0.85	0.88	0.9
20	0.63	0.65	0.67	0.71	0.75	0.8	0.84	0.87	0.89
21	0.62	0.64	0.66	0.7	0.74	0.79	0.83	0.85	0.88
22	0.6	0.62	0.65	0.68	0.73	0.78	0.82	0.84	0.87
23	0.59	0.61	0.63	0.67	0.72	0.76	0.81	0.83	0.86
24	0.58	0.6	0.62	0.66	0.71	0.75	0.8	0.82	0.85
25	0.56	0.58	0.61	0.65	0.69	0.74	0.79	0.81	0.84
26	0.55	0.57	0.59	0.64	0.68	0.73	0.78	0.8	0.83
27	0.54	0.56	0.58	0.62	0.67	0.72	0.77	0.79	0.82
28	0.53	0.55	0.57	0.61	0.66	0.71	0.76	0.78	0.81
29	0.51	0.53	0.56	0.6	0.65	0.7	0.75	0.77	0.8
30	0.5	0.52	0.54	0.59	0.64	0.69	0.74	0.76	0.79
31	0.49	0.51	0.53	0.58	0.63	0.68	0.73	0.76	0.78
32	0.47	0.5	0.52	0.56	0.61	0.67	0.72	0.75	0.77
33	0.46	0.48	0.51	0.55	0.6	0.66	0.71	0.74	0.77
34	0.45	0.47	0.5	0.54	0.59	0.65	0.7	0.73	0.76
35	0.44	0.46	0.48	0.53	0.58	0.64	0.69	0.72	0.75
36	0.42	0.45	0.47	0.52	0.57	0.63	0.68	0.71	0.74
37	0.41	0.43	0.46	0.51	0.56	0.62	0.67	0.7	0.73
38	0.4	0.42	0.45	0.5	0.55	0.61	0.66	0.7	0.73
39	0.39	0.41	0.44	0.48	0.54	0.6	0.65	0.69	0.72
40	0.38	0.4	0.43	0.47	0.53	0.59	0.65	0.68	0.71
41	0.36	0.39	0.41	0.46	0.52	0.58	0.64	0.67	0.7

Reproduced with permission from Acharya G, Wilsgaard T, Berntsen GK, et al. Reference ranges for serial measurements of umbilical artery Doppler indices in the second half of pregnancy. *Am J Obstet Gynecol.* 2005;192:937–944.

Table 53 Reference Values for Peak Systolic Velocity of the Middle Cerebral Artery

GA (wk)	Peak Systolic Velocity (cm/s)				
	Multiples of the Median				
	1	1.3	1.5	1.7	2
15	20	26	30	34	40
16	21	27	32	36	42
17	22	29	33	37	44
18	23	30	35	39	46
19	24	31	36	41	48
20	25	33	38	43	50
21	26	34	39	44	52
22	28	36	42	48	56
23	29	38	44	49	58
24	30	39	45	51	60
25	32	42	48	54	64
26	33	43	50	56	66
27	35	46	53	60	70
28	37	48	56	63	74
29	38	49	57	65	76
30	40	52	60	68	80
31	42	55	63	71	84
32	44	57	66	75	88
33	46	60	69	78	92
34	48	62	72	82	96
35	50	65	75	85	100
36	53	69	80	90	106
37	55	72	83	94	110
38	58	75	87	99	116
39	61	79	92	104	122
40	63	82	95	107	126

Note: Peak systolic velocity (cm/s) = $e^{(2.31 + 0.046 \times GA)}$, GA, gestational age.

Reproduced with permission from Mari G, Deter RL, Carpenter RL, et al. Noninvasive diagnosis by Doppler ultrasonography of fetal anemia due to maternal red-cell alloimmunization. Collaborative Group for Doppler Assessment of the Blood Velocity in Anemic Fetuses. *N Engl J Med.* 2000;342:9–14.

Table 54 Middle Cerebral Artery Pulsatility Index

GA (wk)	Middle Cerebral Artery Pulsatility Index				
	Percentile				
	5th	10th	50th	90th	95th
21	1.18	1.26	1.6	2.04	2.19
22	1.25	1.33	1.69	2.15	2.30
23	1.32	1.41	1.78	2.25	2.41
24	1.38	1.47	1.86	2.36	2.52
25	1.44	1.54	1.94	2.45	2.62
26	1.50	1.6	2.01	2.53	2.71
27	1.55	1.65	2.06	2.60	2.78
28	1.58	1.69	2.11	2.66	2.84
29	1.61	1.71	2.15	2.70	2.88
30	1.62	1.73	2.16	2.72	2.90
31	1.62	1.73	2.16	2.71	2.90
32	1.61	1.71	2.14	2.69	2.87
33	1.58	1.68	2.10	2.64	2.82
34	1.53	1.63	2.04	2.57	2.74
35	1.47	1.56	1.96	2.47	2.64
36	1.39	1.48	1.86	2.36	2.52
37	1.30	1.39	1.75	2.22	2.38
38	1.20	1.29	1.63	2.07	2.22
39	1.1	1.18	1.49	1.91	2.05

Reproduced with permission from Ebbing C, Rasmussen S, Kiserud T. Middle cerebral artery blood flow velocities and pulsatility index and the cerebroplacental pulsatility ratio: longitudinal reference ranges and terms for serial measurements. *Ultrasound Obstet Gynecol.* 2007;30:287–296.

Table 55 Pulsatility Index in the Umbilical and Middle Cerebral Arteries and Cerebroplacental Doppler Ratio

GA (wk)	N	Umbilical Artery		Middle Cerebral Artery		CPR	
		Mean	SD	Mean	SD	Mean	SD
20	25	1.31	0.26	1.76	0.24	1.37	0.40
21	15	1.27	0.18	1.79	0.20	1.44	0.25
22	9	1.28	0.17	1.87	0.33	1.48	0.29
23	11	1.12	0.12	1.65	0.16	1.49	0.23
24	21	1.21	0.14	1.85	0.21	1.53	0.22
25	13	1.13	0.16	2.03	0.41	1.83	0.48
26	14	1.11	0.13	2.09	0.43	1.92	0.55
27	17	1.07	0.17	2.18	0.68	2.12	0.61
28	17	1.05	0.13	2.21	0.41	2.13	0.52
29	17	1.11	0.19	2.02	0.31	1.86	0.43
30	12	1.04	0.23	2.34	0.33	2.34	0.55
31	19	0.99	0.13	2.21	0.31	2.29	0.34
32	10	0.93	0.19	1.81	0.19	2.03	0.48
33	17	0.92	0.17	1.90	0.38	2.10	0.40
34	21	0.89	0.13	1.79	0.27	2.10	0.45
35	13	0.91	0.11	1.81	0.31	2.01	0.34
36	19	0.93	0.18	1.80	0.27	2.01	0.46
37	6	0.95	0.24	2.06	0.68	2.25	0.66
38	11	0.89	0.16	1.66	0.30	1.90	0.41
39	8	1.01	0.17	1.64	0.26	1.64	0.29
40	11	0.75	0.16	1.29	0.21	1.80	0.44

CPR, cerebroplacental Doppler ratio; SD, standard deviation.

Reproduced with permission from Baschat AA, Gembruch U. The cerebroplacental Doppler ratio revisited. *Ultrasound Obstet Gynecol.* 2003;21:124–127.

Table 56 Reference Ranges for the Systolic-to-Atrial Ratio of the Ductus Venosus

GA (wk)	Percentile		
	5th	Mean	95th
14	3.583	4.497	5.78
15	3.153	4.047	5.304
16	2.767	3.641	4.871
17	2.44	3.295	4.497
18	2.171	3.007	4.182
19	1.955	2.771	3.919
20	1.785	2.582	3.703
21	1.654	2.432	3.526
22	1.557	2.315	3.381
23	1.486	2.225	3.264
24	1.437	2.157	3.169
25	1.406	2.107	3.092
26	1.389	2.07	3.028
27	1.382	2.044	2.974
28	1.383	2.025	2.929
29	1.39	2.013	2.889
30	1.401	2.005	2.854
31	1.415	1.999	2.821
32	1.431	1.996	2.791
33	1.449	1.994	2.762
34	1.467	1.993	2.734
35	1.486	1.993	2.706
36	1.505	1.993	2.678
37	1.524	1.992	2.651
38	1.543	1.992	2.624
39	1.563	1.992	2.597
40	1.582	1.992	2.57
41	1.601	1.992	2.542

Modified from Bahlmann F, Wellek S, Reinhardt I, et al. Reference values of ductus venosus flow velocities and calculated waveform indices. *Prenat Diagn.* 2000;20:623–634.

Table 57 Reference Ranges for the Pulsatility Index for Veins (PIV) of the Ductus Venosus

GA (wk)	Percentile								
	2.5th	5th	10th	25th	50th	75th	90th	95th	97.5th
21	0.27	0.32	0.38	0.47	0.57	0.68	0.77	0.83	0.88
22	0.28	0.32	0.38	0.47	0.57	0.68	0.77	0.83	0.88
23	0.28	0.32	0.38	0.47	0.57	0.68	0.77	0.83	0.88
24	0.27	0.32	0.38	0.47	0.57	0.68	0.77	0.83	0.88
25	0.27	0.32	0.37	0.47	0.57	0.67	0.77	0.83	0.88
26	0.27	0.31	0.37	0.46	0.57	0.67	0.77	0.82	0.87
27	0.26	0.31	0.36	0.46	0.56	0.67	0.76	0.82	0.87
28	0.26	0.31	0.36	0.45	0.56	0.66	0.76	0.81	0.86
29	0.25	0.30	0.35	0.45	0.55	0.65	0.75	0.81	0.86
30	0.25	0.29	0.35	0.44	0.54	0.65	0.74	0.80	0.85
31	0.24	0.28	0.34	0.43	0.53	0.64	0.73	0.79	0.84
32	0.23	0.28	0.33	0.42	0.53	0.63	0.73	0.78	0.83
33	0.22	0.27	0.32	0.41	0.52	0.62	0.72	0.77	0.82
34	0.21	0.26	0.31	0.40	0.51	0.61	0.71	0.76	0.81
35	0.20	0.25	0.30	0.39	0.50	0.60	0.70	0.75	0.80
36	0.19	0.24	0.29	0.38	0.49	0.59	0.69	0.74	0.79
37	0.18	0.23	0.28	0.37	0.48	0.58	0.67	0.73	0.78
38	0.17	0.22	0.27	0.36	0.46	0.57	0.66	0.72	0.77
39	0.16	0.21	0.26	0.35	0.45	0.56	0.65	0.71	0.76

Modified from Kessler J, Rasmussen S, Hanson M, et al. Longitudinal reference ranges for ductus venosus flow velocities and waveform indices. *Ultrasound Obstet Gynecol.* 2006;28:890–898.

Aneuploidy Tables

Table 58 Comparison of Likelihood Ratios Reported for Sonographic Markers of Fetal Aneuploidy from Two Studies and from a Meta-analysis Study

Sonographic Marker	Nyberg et al. ^a	Bromley et al. ^b	Smith-Bindman et al. ^c
	Likelihood Ratios (95% CI)	Likelihood Ratios	Likelihood Ratios (95% CI)
Nuchal thickening	11.0 (5.5–22.0)	12	17 (8–38)
Hyperechoic bowel	6.7 (2.7–16.8)	—	6.1 (3–12.6)
Short humerus	5.1 (1.6–16.5)	6	7.5 (4.7–12)
Short femur	1.5 (0.8–2.8)	1	2.7 (1.2–6)
Echogenic intracardiac focus	1.8 (1.0–3.0)	1.2	2.8 (1.5–5.5)
Pyelectasis	1.5 (0.6–3.6)	1.3	1.9 (0.7–5.1)
Normal ultrasound	0.36	0.2	—

CI, confidence interval.

^aReproduced with permission from Nyberg DA, Souter VL, El-Bastawissi A, et al. Isolated sonographic markers for detection of fetal Down syndrome in the second trimester of pregnancy. *J Ultrasound Med.* 2001;20:1053–1063.

^bReproduced with permission from Bromley B, Lieberman E, Shipp T, et al. The genetic sonogram: a method of risk assessment for Down syndrome in the mid-trimester. *J Ultrasound Med.* 2002;21:1087–1096.

^cReproduced with permission from Smith-Bindman R, Hosmer W, Feldstein VA, et al. Second-trimester ultrasound to detect fetuses with Down syndrome: a meta-analysis. *JAMA.* 2001;285:1044–1055.

Table 59 Maternal Age–Specific Odds (1:__) of Fetal Down Syndrome during the Second Trimester Based on Sonographic Markers of Fetal Aneuploidy

Maternal Age (wk)	Preultrasound Odds	Normal Ultrasound	Nuchal Thickness	Hyperechoic Bowel	Short Femur Length	Short Humerus Length	Echogenic Intracardiac Focus	Renal Pelvis
	(1: __)	(1: __)	(1: __)	(1: __)	(1: __)	(1: __)	(1: __)	(1: __)
		LR 0.36	LR 11.0	LR 6.7	LR 1.5	LR 5.1	LR 1.8	LR 1.5
20	1,176	3,265	108	176	784	231	654	784
21	1,160	3,220	106	174	774	228	645	774
22	1,136	3,154	104	170	758	224	632	758
23	1,114	3,093	102	167	743	219	619	743
24	1,087	3,018	100	163	725	214	604	725
25	1,040	2,887	95	156	694	205	578	694
26	990	2,748	91	149	660	195	550	660
27	928	2,576	85	139	619	183	516	619
28	855	2,373	79	128	570	168	475	570
29	760	2,109	70	114	507	150	423	507
30	690	1,915	64	104	460	136	384	460
31	597	1,657	55	90	398	118	332	398
32	508	1,409	47	77	339	100	283	339
33	421	1,168	39	64	281	83	234	281
34	342	948	32	52	228	68	190	228
35	274	759	26	42	183	55	153	183
36	216	598	21	33	144	43	120	144
37	168	465	16	26	112	34	94	112
38	129	357	13	20	86	26	72	86
39	98	270	10	15	66	20	55	66
40	74	204	8	12	50	15	42	50
41	56	154	6	9	38	12	32	38
42	42	115	5	7	28	9	24	28
43	31	84	4	5	21	7	18	21
44	23	62	3	4	16	5	13	16

Note: Assuming LRs of Nyberg et al. in Table 58.

Odds ratio (O) based on formula $O(\text{Down syndrome}) = O(\text{maternal age})/LR + 1 - 1/LR$.

LR, likelihood ratio.

Reproduced with permission from Nyberg DA, Souter VL, El-Bastawissi A, et al. Isolated sonographic markers for detection of fetal Down syndrome in the second trimester of pregnancy. *J Ultrasound Med.* 2001;20:1053–1063.

First Trimester Values

- 1A. Combined data comparing menstrual age with mean gestational sac diameter, crown-rump length, and human chorionic gonadotropin (HCG) levels
- 1B. Relationship between mean sac diameter and menstrual age
 2. Predicted menstrual age from crown-rump length measurements
 3. Reference values for crown-rump length compared with gestational sac size

Amniotic Fluid Index

- 4A. Amniotic fluid index (AFI) values in centimeters during normal pregnancy
- 4B. Maximal vertical pocket (SDP) values in centimeters during normal pregnancy

Basic Ultrasound Biometry

5. Predicted fetal measurements at specific gestational age (GA)
6. Reference values for abdominal circumference
7. Reference values for head circumference
8. Reference values for femur length
9. Reference values for abdominal circumference (AC), head circumference (HC), biparietal diameter (BPD), and femur length (FL)
10. Normal biometric ratios of head circumference (HC)/abdominal circumference (AC), AC/femur length (FL), and biparietal diameter (BPD)/FL
11. Estimated fetal weight (in Grams) based on femur length (FL) and abdominal circumference (AC)
12. Neonatal birth weights and percentiles based on gestational age (GA) derived by first-trimester ultrasound (males and females combined)
13. Gender-specific reference values for neonatal birth weights based on gestational age (GA) derived by first-trimester ultrasound
14. Fetal weight percentiles by gestational age
15. Fitted percentiles for fractional arm volume
16. Fitted percentiles for fractional thigh volume

Ultrasound Extremity Measurements

17. Ultrasound reference values of major long bones
18. Ultrasound reference values for foot length
19. Ultrasound scapular length (± 2 SD) compared with gestational age
20. Ultrasound reference values of clavicle length
21. Ultrasound reference values for rib length

Brain and Face Measurements

22. Ultrasound transcerebellar diameter measurements
23. Ultrasound reference intervals for the cerebellar vermis, basilar pons, and the brain stem
24. MRI measurements of the fetal brain

- 25A. Ultrasound reference values for binocular diameter, interocular diameter, and ocular diameter by gestational age
- 25B. Reference ranges for fetal optic tract diameter (in mm)
26. MRI reference values for binocular diameter, interocular diameter, and ocular diameter by gestational age
27. Ultrasound percentile reference values for ear length
28. Ultrasound reference values for mandible length
29. Ultrasound reference values for length of nasal bone

Neck and Chest Measurements

30. Ultrasound thyroid circumference based on biparietal diameter (BPD)
31. Ultrasound thyroid circumference based on gestational age
32. Ultrasound reference values for thyroid volume
33. Ultrasound percentile reference values for thoracic circumference
34. Reference values for lung volumes calculated by 3D ultrasound
35. Reference values for the right lung volume calculated by 3D ultrasound
36. Reference values for the left lung volume calculated by 3D ultrasound
37. MRI reference values for lung volumes

Abdominal Measurements

38. Ultrasound reference values for renal length
39. Reference values for renal volumes based on 3D ultrasound
40. Reference values of fetal liver volume determined by 3D ultrasound compared with estimated fetal weight
41. Fetal ultrasound liver length^a compared with gestational age
42. Ultrasound reference values for splenic length
43. Ultrasound reference values for splenic circumference between 18 and 37 weeks
44. Normal ultrasound colon diameters

Cardiac Measurements

45. Reference values for aortic root internal diameter, pulmonary artery, left ventricle, right ventricle, left atrium, and right atrium (values are shown for 5th, 50th, and 95th percentiles)
46. Reference values for E/A ratio of mitral valve and tricuspid valve
47. Normal doppler echocardiography in the fetus

Doppler

48. Reference intervals for mean uterine artery pulsatility index
49. Uterine artery doppler resistance index and pulsatility index by placental and nonplacental location
50. Reference values for umbilical artery S/D ratio
51. Reference values for umbilical artery pulsatility index
52. Reference values for umbilical artery resistance index
53. Reference values for peak systolic velocity of the middle cerebral artery

- 54. Middle cerebral artery pulsatility index
- 55. Pulsatility index in the umbilical and middle cerebral arteries and cerebroplacental doppler ratio
- 56. Reference ranges for the systolic-to-atrial ratio of the ductus venosus
- 57. Reference ranges for the pulsatility index for veins (PIV) of the ductus venosus

Aneuploidy Tables

- 58. Comparison of likelihood ratios reported for sonographic markers of fetal aneuploidy from two studies and from a meta-analysis study
- 59. Maternal age-specific odds (1:__) of fetal Down syndrome during the second trimester based on sonographic markers of fetal aneuploidy