

ENDOCRINOLOGY



EXPECTED VALUES & S.I. Unit Conversion Tables



ENDOCRINOLOGY EXPECTED VALUES AND S.I. UNIT CONVERSION TABLES

TABLE OF CONTENTS

Introduction	4 – 5
Expected Values	6 – 66
S.I. Unit Conversion Table	67 – 78

(E) = Esoterix Test Number

(L) = LabCorp Test Number

Esoterix is a wholly-owned subsidiary of LabCorp where its Endocrine Sciences laboratory operates as a member of LabCorp's Specialty Group with a focus on specialized endocrinology. Endocrine Sciences' testing can be accessed directly from Esoterix or through LabCorp and any of its regional facilities.

Introduction

As a specialized laboratory, Endocrine Sciences recognizes the need for comprehensive reference values for hormone tests. In response to this need, we maintain an active program to determine hormone levels in healthy individuals at all ages and over a broad range of physiologic conditions. The value of this information is appreciated by physicians, who because of the nature of endocrine disease, rely extensively on laboratory results for diagnosis.

Diagnostic problems in pediatric endocrinology are further complicated by dramatic changes in hormone levels which occur during the neonatal and prepubertal periods, at adrenarche, and during pubertal development. Comprehensive reference values are indispensable to the assessment of hormonal dysfunction in children. Since its founding in 1972, Endocrine Sciences has maintained a continuous program to obtain reference intervals in children.

Through collaborative studies conducted with pediatricians, hospitals and university research centers, we have obtained comprehensive pediatric values for the majority of our tests. The information accumulated over the past several decades is published herein to facilitate the interpretation of endocrine test results on pediatric patients. Endocrine Sciences would like to express its gratitude to the many clinicians and researchers who have participated in our program and generously contributed their time and patient samples.

The difficult nature of certain studies has limited the ability to collect all of the necessary data through this program, therefore some values included here are from research publications. This outside data is included only after extensive review and careful examination to ensure that methods demonstrated adequate specificity and that values were comparable to those determined at Endocrine Sciences. Determining reference values for hormone tests is an on-going program. We will continue to collect data on current assays and establish reference values for new tests. We cordially invite interested physicians to join us in this continuing project.

21-Hydroxylase Antibodies

BLOOD ASSAYS

500036 (E)**500092 (L)****ALL AGES** <1.0 U/mL**Acid Labile Subunit (ALS)**

BLOOD ASSAYS

500012 (E)**500120 (L)**

	RANGE (mg/L)	MEAN
INFANTS		
0 – 2 Months:	0.2 – 5.1	2.1
3 – 6 Months:	0.7 – 5.6	3.4
7 – 11 Months:	0.7 – 7.9	4.0
PREPUBERTAL		
1 – 2 Years:	0.9 – 9.3	5.5
3 – 4 Years:	1.9 – 10	6.8
5 – 7 Years:	2.3 – 11	7.2
8 – 10 Years:	4.2 – 13	8.9
PUBERTAL		
11 – 13 Years:	5.6 – 16	12
14 – 18 Years:	5.6 – 16	12
ADULTS		
19 – 25 Years:	7.0 – 16	12
26 – 35 Years:	7.0 – 16	12
36 – 45 Years:	7.0 – 16	11
46 – 55 Years:	7.0 – 16	11
56 – 65 Years:	7.0 – 16	10

Adrenocorticotrophic Hormone (ACTH)

BLOOD ASSAYS

500011 (E)**500471 (L)****ADULTS** 6 – 48 pg/mL

Aldosterone, HPLC-MS/MS

BLOOD ASSAYS

500014 (E)**500467 (L)****Ad Lib Sodium Intake****RANGE
(ng/dL)****PREMATURE INFANTS, SUPINE**

26 – 28 Weeks, Day 4:	5 – 635
31 – 35 Weeks, Day 4:	19 – 141

FULL-TERM INFANTS, SUPINE

3 Days:	7 – 184
7 Days:	5 – 175
1 – 11 Months:	5 – 90

CHILDREN, SUPINE

12 – 23 Months:	7 – 54
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CHILDREN, UPRIGHT

24 Months – 9 Years:	5 – 80
10 – 14 Years:	4 – 48

ADULTS, UPRIGHT

<31

Values are based on early morning samples from subjects on ad lib sodium intake. Aldosterone levels may vary for patients on different sodium diets; additional variation may depend on time of day and posture.

Alpha Subunit

BLOOD ASSAYS

500016 (E)**140269 (L)****RANGE (ng/mL)****ADULTS**

Male:

20 – 44 Years: <0.55

45 – 54 Years: <0.86

55 – 64 Years: <1.37

65 – 94 Years: <2.13

Female:

Premenopausal (20 – 44 Years): <1.02

Perimenopausal (45 – 59 Years): <2.34

Postmenopausal (60 – 99 Years): <3.56

Adult serum alpha subunit (ASU) levels gradually increase with age.

As with all tumor markers, the ASU results should be assessed in conjunction with patient's medical history, clinical examination and other findings. If test results are clinically discordant, please contact the laboratory.

Pregnancy is associated with very substantial, physiological elevations in serum free alpha-subunit levels, paralleling chorionic gonadotropin (hCG) secretion. Elevated alpha-subunit values should be interpreted in the context of pregnancy status.

Androstanediol Glucuronide, HPLC-MS/MS

BLOOD ASSAYS

500026 (E)**500881 (L)****RANGE (ng/dL)****PREPUBERTAL CHILDREN** Not Established**ADULTS**

Male: 112 – 1046

Female*: 11 – 249

*Occasionally, normal females with no evidence of hirsutism may have levels well beyond the normal range.

Androstenedione, HPLC-MS/MS

BLOOD ASSAYS

500030 (E)**500152 (L)****RANGE (ng/dL)****PREMATURE INFANTS**

26 – 28 Weeks, Day 4: 63 – 935

31 – 35 Weeks, Day 4: 50 – 449

FULL-TERM INFANTS

1 – 7 Days: <10 – 279

Levels decrease rapidly to a range of <52 ng/dL after one week.

1 – 11 Months: <10 – 37

Androstenedione gradually decreases during the first six months to prepubertal levels.

PREPUBERTAL CHILDREN

1 – 10 Years: <10 – 17

PUBERTY

Male				Female			
Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)	Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)
1	<9.8	<10 – 17	<10	1	<9.2	<10 – 17	<10
2	9.8 – 14.5	<10 – 33	12	2	9.2 – 13.7	<10 – 72	33
3	10.7 – 15.4	17 – 72	36	3	10.0 – 14.4	50 – 170	97
4	11.8 – 16.2	15 – 115	52	4	10.7 – 15.6	47 – 208	105
5	12.8 – 17.3	33 – 192	77	5	11.8 – 18.6	50 – 224	137

ADULTS18 – 40 Years:
Postmenopausal:**MALE RANGE**

44 – 186

FEMALE RANGE (entire cycle)28 – 230
<10 – 93

Androsterone, Serum, HPLC-MS/MS

BLOOD ASSAYS

804005 (E)**504005 (L)****RANGE (ng/dL)**

<18 Years:

Not established

ADULTS

Male:

<28

Female:

<23

Anti-Mullerian Hormone (AMH), Serum

BLOOD ASSAYS

500043 (E)**500183 (L)**

	RANGE (ng/mL)	MEAN (ng/mL)
MALES		
Birth – 6 Years:	32.77 – 262.69	124.58
7 – 10 Years:	45.26 – 191.34	92.52
20 – 98 Years:	0.11 – 13.07	4.95
FEMALES		
Birth – 6 Years:	0.53 – 7.78	2.85
7-19 Years:	1.05 – 12.86	5.23
20 – 25 Years:	1.23 – 11.51	4.70
26 – 30 Years:	1.03 – 11.10	4.20
31 – 35 Years:	0.66 – 8.75	3.00
36 – 40 Years:	0.42 – 8.34	1.69
41 – 46 Years:	0.26 – 5.81	0.58
47 – 54 Years:	≤0.82	<0.03
55 – 97 Years:	≤0.18	<0.03

Circulating AMH levels change during pubertal development: male levels decrease, and female levels increase with sexual development.

An AMH concentration of ≥ 1.06 ng/mL is correlated with a better response to ovarian stimulation and produces more retrievable oocytes and higher odds of live birth according to Gleicher, et. al. *Fertil Steril.* 2010;94:2824-2827. The current AMH test method correlates with the study method with a slope of 0.94.

Females at risk of ovarian hyperstimulation syndrome or polycystic ovarian syndrome (PCOS) may exhibit elevated serum AMH concentrations. AMH levels from PCOS patients may be 2- to 5-fold higher than age-appropriate reference interval values.

Granulosa cell tumors of the ovary may secrete AMH along with other tumor markers. Elevated AMH is not specific for malignancy, and the assay should not be used exclusively to diagnose or exclude an AMH-secreting ovarian tumor.

Anti-Thyroglobulin Antibodies (Anti-Tg)

BLOOD ASSAYS

500038 (E)**500555 (L)****RANGE (IU/mL)****NEGATIVE**

<1.0

POSITIVE

≥1.0

Low positive Thyroglobulin antibodies are seen in a portion of the asymptomatic populations.

Beta-Hydroxybutyrate

BLOOD ASSAYS

803610 (E)**503610 (L)****RANGE (mg/dL)****ALL AGES (FASTING)**

0.2 – 2.8

Calciferols (Vitamin D), Total and Fractionated HPLC-MS/MS

BLOOD ASSAYS

803835 (E)**503835 (L)****RANGE (ng/mL)****ADULTS**

<52

If evaluating malabsorption: Increase of 50+ ng/mL above baseline levels.

Refer to Lo et al. Am J Clin Nutr. 1985; 42(4): 644-649.

NOTE: For patients being evaluated for fat or vitamin D malabsorption, patients should be administered 50,000 units of vitamin D₂ 12 to 24 hours before specimen collection.

Calcitonin

BLOOD ASSAYS

500047 (E)**500636 (L)****RANGE (pg/mL)****MALES**

All Ages:

<8.4

FEMALES

All Ages:

<5.0

Catecholamines, Fractionated, Urine, HPLC-MS/MS (Includes Creatinine)

URINE ASSAYS

500062 (E)**500520 (L)**

	RANGE ($\mu\text{g}/24$ hours)	RANGE ($\mu\text{g}/\text{g}$ creatinine)
<u>NOREPINEPHRINE</u>		
≤ 9 Years:	<60	<151
10 – 19 Years:	<91	<68
≥ 20 Years:	<136	<112
<u>EPINEPHRINE</u>		
≤ 9 Years:	<12	<38
10 – 19 Years:	<19	<18
≥ 20 Years:	<21	<20

Catecholamines, Total, Urine, HPLC-MS/MS (Includes Creatinine)

URINE ASSAYS

500060 (E)**500473 (L)**

	RANGE ($\mu\text{g}/24$ hours)	RANGE ($\mu\text{g}/\text{g}$ creatinine)
≤ 9 Years:	<66	<204
10 – 19 Years:	<108	<85
≥ 20 Years:	<144	<113

Corticosteroid Binding Globulin (CBG)

BLOOD ASSAYS

500076 (E)**500130 (L)****RANGE (mg/dL)****ADULTS**

1.7 – 3.1

Corticosterone, HPLC-MS/MS

BLOOD ASSAYS

500084 (E)**500135 (L)****RANGE (ng/dL)****PREMATURE INFANTS**

26 – 28 Weeks, Day 4: 235 – 1108

31 – 35 Weeks, Day 4: 150 – 1700

NEWBORN

1 – 7 Days: 70 – 850

30 Days – 11 Months: 80 – 1500

CHILDREN1 – 16 Years: **8:00 AM** 135 – 1860**4:00 PM**

70 – 620

ADULTS

130 – 820

60 – 220

Cortisol, Free, by Equilibrium Dialysis & HPLC-MS/MS

BLOOD ASSAYS

804020 (E)**504020 (L)****RANGE (µg/dL)****ADULTS**

8:00 AM: 0.10 – 1.20

4:00 PM: 0.042 – 0.872

Cortisol, Free, Urine (Incl. Creatinine), HPLC-MS/MS

URINE ASSAYS

500102 (E)**500410 (L)**

	RANGE (µg/24 hours)	RANGE (µg/g creatinine)
PREPUBERTAL CHILDREN	3 – 9	7 – 25
ADULT MALES	11 – 84	7 – 45
ADULT FEMALES	10 – 34	9 – 32
Pregnancy:	16 – 60	14 – 59

Cortisol, Saliva, HPLC-MS/MS

SALIVA ASSAYS

500094 (E)**500179 (L)**

	RANGE (µg/dL)
CHILDREN AND ADULTS	
8:00 AM:	0.025 – 0.600
Noon:	<0.010 – 0.330
4:00 PM:	0.010 – 0.200
Midnight:	<0.010 – 0.090

Cortisol, Serum or Plasma, HPLC-MS/MS

BLOOD ASSAYS

500092 (E)**500154 (L)****RANGE (µg/dL)****PREMATURE INFANTS**

26 – 28 Weeks, Day 4:	1 – 11
31 – 35 Weeks, Day 4:	2.5 – 9.1

FULL-TERM INFANTS

Day 3:	1.7 – 14
Day 7:	2.0 – 11
31 Days – 11 Months:	2.8 – 23

CHILDREN

	8:00 AM	4:00 PM
12 Months – 15 Years:	3.0 – 21	Not Determined

ADULTS

8.0 – 19	4.0 – 11
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Cortisone, Serum, HPLC-MS/MS

BLOOD ASSAYS

803725 (E)**503725 (L)****Cortisol-Cortisone Ratio: 803715 (E)****503715 (L)****CORTISONE
RANGE (µg/dL)****CORTISOL-CORTISONE
RATIO****INFANTS**

1 – 11 months:	0.63 – 5.67	1.1 – 10.4
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ADULTS

8:00 AM:	1.34 – 2.65	3.9 – 11.0
4:00 PM:	0.69 – 2.06	3.0 – 9.8

C-Peptide, Ultrasensitive

BLOOD ASSAYS

500104 (E)**503830 (L)****RANGE (ng/mL)****CHILDREN**

8:00 AM Fasting: 0.4 – 2.2

ADULTS

8:00 AM Fasting: 0.4 – 2.1

2 Hours Post Prandial

(Sustacal): 1.2 – 3.4

2 Hours Post Glucose: 2.0 – 4.5

Assay quantitation limit: <0.004

C-Telopeptide, Serum

BLOOD ASSAYS

500130 (E)**500089 (L)****RANGE (pg/mL)****ADULT MALES**

38 – 724

ADULT FEMALES

Premenopausal: 34 – 635

Postmenopausal: 34 – 1037

Dehydroepiandrosterone (DHEA), HPLC-MS/MS

BLOOD ASSAYS

500116 (E)**500156 (L)****RANGE (ng/dL)****PREMATURE INFANTS**

26 – 31 Weeks:	82 – 1484
32 – 35 Weeks:	56 – 1853

FULL-TERM INFANTS

2 – 7 Days:	41 – 1292
8 Days – 5 Months:	<948
6 – 12 Months:	<136

PREPUBERTAL CHILDREN

1 – 5 Years:	<68
6 – 7 Years:	<111
8 – 10 Years:	<186

PUBERTAL CHILDREN AND ADULTS

11 – 12 Years:	<202
13 – 14 Years:	<319
15 – 16 Years:	39 – 481
17 – 19 Years:	40 – 491
20 – 49 Years:	31 – 701
≥50 Years:	21 – 402

Dehydroepiandrosterone Sulfate (DHEA-S), HPLC-MS/MS BLOOD ASSAYS

500120 (E)**500161 (L)****RANGE (µg/dL)****PREMATURE INFANTS**

26 – 28 Weeks, Day 4: 123 – 882

31 – 35 Weeks, Day 4: 122 – 710

FULL-TERM INFANTS

3 Days: 88 – 356

1 – 11 Months: DHEA-S Levels fall to <112 µg/dL during the first month and decrease further to <49 µg/dL by 6 months of age.

PREPUBERTAL CHILDREN

1 – 5 Years: <57

6 – 7 Years: <72

8 – 10 Years: <193

PUBERTY

Male				Female			
Tanner Stage	Age (years)	Range (µg/dL)	Mean (µg/dL)	Tanner Stage	Age (years)	Range (µg/dL)	Mean (µg/dL)
1	<9.8	13 – 83	36	1	<9.2	19 – 144	40
2	9.8 – 14.5	42 – 109	93	2	9.2 – 13.7	34 – 129	72
3	10.7 – 15.4	48 – 200	122	3	10.0 – 14.4	32 – 226	88
4	11.8 – 16.2	102 – 385	206	4	10.7 – 15.6	58 – 260	120
5	12.8 – 17.3	120 – 370	230	5	11.8 – 18.6	44 – 248	148

Ranges continued on next page

Dehydroepiandrosterone Sulfate (DHEA-S), HPLC-MS/MS BLOOD ASSAYS

Continued

ADULTS

21 – 30 Years:

MALE RANGE (µg/dL)

38 – 523

FEMALE RANGE (µg/dL)

22 – 372

31 – 40 Years:

33 – 416

17 – 286

41 – 50 Years:

16 – 390

<229

51 – 60 Years:

<298

<215

61 – 70 Years:

<251

<128

71 – 80 Years:

<208

<111

81 – 90 Years:

<106

<101

Deoxycorticosterone (DOC), HPLC-MS/MS

BLOOD ASSAYS

500124 (E)

500138 (L)

RANGE (ng/dL)

PREMATURE INFANTS

26 – 28 Weeks, Day 4:

20 – 105

34 – 36 Weeks, Day 4:

28 – 78

NEWBORN

Levels are markedly elevated at birth and decrease rapidly during the first week to the range of 7-49 as found in older infants.

FULL-TERM INFANTS

1 – 11 Months:

7 – 49

PREPUBERTAL CHILDREN

2 – 10 Years:

2 – 34

PUBERTAL CHILDREN AND ADULTS

8:00 AM:

2 – 19

Desoxycortisol, 11-, (Compound S for Metyrapone Test)

BLOOD ASSAYS

500136 (E)**500550 (L)****RANGE (µg/dL)****CHILDREN AND ADULTS**

Baseline:	<1
Post Metyrapone:	
Single Dose Test:	7 – 18
Multiple Dose Test:	10 – 25

Desoxycortisol, 11-, (Specific Compound S), HPLC-MS/MS

BLOOD ASSAYS

500132 (E)**500171 (L)****RANGE (ng/dL)****PREMATURE INFANTS**

26 – 28 Weeks, Day 4:	110 – 1376
31 – 35 Weeks, Day 4:	48 – 579

FULL-TERM INFANTS

3 Days:	13 – 147
31 Days – 11 Months:	<10 – 156

PREPUBERTAL CHILDREN

8:00 AM:	20 – 155
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**PUBERTAL CHILDREN
AND ADULTS**

8:00 AM:	12 – 158
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Deoxycortisol, 21-, HPLC-MS/MS

BLOOD ASSAYS

804045 (E)**504045 (L)****CHILDREN AND ADULTS**

≥2 years:	<10 ng/dL
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Dexamethasone, HPLC-MS/MS

BLOOD ASSAYS

500140 (E)**500118 (L)****RANGE (ng/dL)****ADULTS**

Baseline:

<30

8:00 AM:

140 – 295

Following 1 mg Dexamethasone, Previous Evening

8:00 AM:

1600 – 2850

Following 8 mg Dexamethasone, (4 x 2 mg Doses) Previous Day

Dihydrotestosterone (DHT), HPLC-MS/MS

BLOOD ASSAYS

500144 (E)**500142 (L)**

	MALE RANGE (ng/dL)	FEMALE RANGE (ng/dL)
PREMATURE INFANTS	10 – 53	2 – 13
FULL-TERM NEWBORNS	5 – 60	<2 – 15

2 Weeks – 6 Months:

Male: DHT decreases rapidly the first week, then increases to 12–85 ng/dL between 30–60 days. Levels then decrease gradually to prepubertal values by seven months.

Female: Levels decrease during the first month to <3 ng/dL and remain there until puberty.

PREPUBERTAL CHILDREN

Male (1 – 10 Years): <3

Female (1 – 9 Years): <3

PUBERTY

Male				Female			
Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)	Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)
1	<9.8	<3		1	<9.2	<3	
2	9.8 – 14.5	3 – 17	8	2	9.2 – 13.7	5 – 12	8
3	10.7 – 15.4	8 – 33	19	3	10.0 – 14.4	7 – 19	12
4	11.8 – 16.2	22 – 52	36	4	10.7 – 15.6	4 – 13	7
5	12.8 – 17.3	24 – 65	43	5	11.8 – 18.6	3 – 18	9

RANGE (ng/dL)**ADULTS**

Male: 30 – 85

Female: 4 – 22

Dihydrotestosterone (DHT), Free, by Equilibrium Dialysis & HPLC-MS/MS

BLOOD ASSAYS

804026 (E)**504026 (L)**

RANGE (pg/mL)
 <18 Years: Not established

ADULTS

Male: 2.30 – 11.60

Female: 0.09 – 1.02

% FREE DHT

RANGE (%)
 <18 Years: Not established

ADULTS

Male: 0.54 – 2.58

Female: <1.27

Dopamine, Urine, HPLC-MS/MS

URINE ASSAYS

500138 (E)**500733 (L)**

	RANGE (µg/24hrs)	RANGE (µg/g creatinine)
≤9 Years:	<415	<1489
10 – 19 Years:	<576	<355
≥20 Years:	<511	<349

Estradiol, Free, by Equilibrium Dialysis

BLOOD ASSAYS

Free with Total: 500149 (E) 500649 (L)**Free, Total and SHBG: 500150 (E) 500430 (L)**

	MALE RANGE (pg/mL)	FEMALE RANGE (pg/mL)
ADULTS	0.2 – 1.5	0.6 – 7.1

% FREE ESTRADIOL

	MALE RANGE (%)	FEMALE RANGE (%)
ADULTS	1.7 – 5.4	1.6 – 3.6

Estradiol, HPLC-MS/MS

BLOOD ASSAYS

500152 (E)**500108 (L)****NEWBORN****RANGE (pg/mL)**

Levels are markedly elevated at birth and fall rapidly during the first week to prepubertal values of <15 pg/mL.

1 – 6 Months:

Male:

Levels increase to 10 – 32 pg/mL between 30 and 60 days, then decline to prepubertal levels of <15 pg/mL by six months.

1 – 11 Months:

Female:

Levels increase to 5.0 – 50 pg/mL between 30 and 60 days, then decline to prepubertal levels of <15 pg/mL during the first year.

PREPUBERTAL CHILDREN

Male (6 Months – 10 Years): <15

Female (1 – 9 Years): <15

PUBERTY**Male****Female**

Tanner Stage	Age (years)	Range (pg/mL)	Mean (pg/mL)	Tanner Stage	Age (years)	Range (pg/mL)	Mean (pg/mL)
1	<9.8	5.0 – 11	8.0	1	<9.2	5.0 – 20	8.0
2	9.8 – 14.5	5.0 – 16	11	2	9.2 – 13.7	10 – 24	16
3	10.7 – 15.4	5.0 – 25	16	3	10.0 – 14.4	7.0 – 60	25
4	11.8 – 16.2	10 – 36	22	4	10.7 – 15.6	21 – 85	47
5	12.8 – 17.3	10 – 36	21	5	11.8 – 18.6	34 – 170	110

ADULTS**RANGE (pg/mL)**

Male:

8 – 35

Female

Follicular:

30 – 100

Luteal:

70 – 300

Postmenopausal:

<15

Estrogens, Total

BLOOD ASSAYS

500148 (E)**500714 (L)****RANGE (pg/mL)****FULL-TERM INFANTS**

Newborn:

Markedly elevated at birth and fall rapidly during the first week to <25 by seven days.

30 Days – 11 Months:

Male:

Levels increase to 10 – 40 between 30 – 60 days then decline to <25 by 12 months

Female:

Levels increase to 10 – 60 between 30 – 60 days then decline to <25 by 12 months

PREPUBERTAL CHILDREN

Male (1 – 10 Years): <25 Female (1 – 9 Years): <25

PUBERTY

Male				Female			
Tanner Stage	Age (years)	Range (pg/mL)	Mean (pg/mL)	Tanner Stage	Age (years)	Range (pg/mL)	Mean (pg/mL)
1	<9.8	10 – 38	20	1	<9.2	10 – 46	23
2	9.8 – 14.5	17 – 45	30	2	9.2 – 13.7	22 – 63	41
3	10.7 – 15.4	22 – 55	41	3	10.0 – 14.4	24 – 110	61
4	11.8 – 16.2	27 – 80	53	4	10.7 – 15.6	40 – 180	91
5	12.8 – 17.3	25 – 80	50	5	11.8 – 18.6	60 – 280	170

ADULTS**RANGE (pg/mL)**

Male:

20 – 80

Female

Follicular:

60 – 200

Luteal:

160 – 400

Postmenopausal:

<50

Note: This assay is specific for estrone and estradiol, and does not measure estriol.

Estrone, HPLC-MS/MS

BLOOD ASSAYS

500172 (E)**500634 (L)****RANGE (pg/mL)****NEWBORN**

Values are strikingly elevated at birth, then decrease rapidly during the first week to prepubertal levels of <15.

PREPUBERTAL CHILDREN

Male (1 Month – 10 Years): <15

Female (1 Month – 10 Years): <15

PUBERTY**Male****Female**

Tanner Stage	Age (years)	Range (pg/mL)	Mean (pg/mL)	Tanner Stage	Age (years)	Range (pg/mL)	Mean (pg/mL)
1	<9.8	5.0 – 17	11	1	<9.2	4.0 – 29	13
2	9.8 – 14.5	10 – 25	16	2	9.2 – 13.7	10 – 33	21
3	10.7 – 15.4	15 – 25	21	3	10.0 – 14.4	15 – 43	30
4	11.8 – 16.2	15 – 45	33	4	10.7 – 15.6	16 – 77	36
5	12.8 – 17.3	20 – 45	32	5	11.8 – 18.6	29 – 105	61

ADULTS**RANGE (pg/mL)**

Male: 10 – 50

Female

Follicular: 30 – 100

Luteal: 90 – 160

Postmenopausal: <40

Estrone Sulfate, HPLC-MS/MS

BLOOD ASSAYS

500175 (E)**501049 (L)****RANGE (ng/dL)**

<18 Years

Not Established

ADULTS

Male:

<10 – 138

Female

Early Follicular

(days 0 – 6):

<10 – 154

Late Follicular

(days 7 – luteal):

15 – 390

Luteal:

<10 – 373

Postmenopausal:

<10 – 69

Follicle Stimulating Hormone (FSH) ECL

BLOOD ASSAYS

500192 (E)**502280 (L)****INFANTS**

4 Weeks – 11 Months:

Male:

RANGE (mIU/mL)

0.16 – 4.1

Levels are for infants from 4 weeks of age to one year. FSH in males declines to prepubertal levels by the end of the first year.

Female:

0.24 – 14.2

Levels are for infants from 4 weeks of age to one year. FSH declines more slowly than in males to reach prepubertal levels by the end of the second year.

PREPUBERTAL CHILDREN**MALE****FEMALE**

12 Months – 8 Years:

0.26 – 3.0

1.0 – 4.2

PUBERTY**Male****Female**

Tanner Stage	Age (years)	Range (mIU/mL)	Mean (mIU/mL)	Tanner Stage	Age (years)	Range (mIU/mL)	Mean (mIU/mL)
1	<9.8	0.26 – 3.0	0.98	1	<9.2	1.0 – 4.2	2.1
2	9.8 – 14.5	1.8 – 3.2	2.5	2	9.2 – 13.7	1.0 – 10.8	4.0
3	10.7 – 15.4	1.2 – 5.8	2.9	3	10.0 – 14.4	1.5 – 12.8	5.1
4	11.8 – 16.2	2.0 – 9.2	4.4	4	10.7 – 15.6	1.5 – 11.7	6.4
5	12.8 – 17.3	2.6 – 11.0	6.1	5	11.8 – 18.6	1.0 – 9.2	4.9

ADULTS**RANGE (mIU/mL)**

Male (20 – 50 Years):

2.0 – 9.2

Female

Follicular & Luteal:

1.8 – 11.2

Mid-cycle:

6 – 35

Postmenopausal:

30 – 120

Glutamic Acid Decarboxylase (GAD-65) Autoantibodies

BLOOD ASSAYS

500236 (E)**500611 (L)****RANGE (U/mL)****ALL AGES****NEGATIVE**

<0.5

POSITIVE

≥0.5

GlycoMark™ (1, 5-Anhydroglucitol)

BLOOD ASSAYS

500609 (E)**500115 (L)****RANGE
(µg/mL)****MEAN
(µg/mL)****SD****ADULTS**

Male:

10.7 – 32.0

22.5

5.8

Female:

6.8 – 29.3

17.7

6.2

Glycemic control goal for diabetic patients: >10 µg/mL

Growth Hormone Antibodies

BLOOD ASSAYS

500214 (E)**500144 (L)****RANGE (ng/mL)****ALL AGES****NEGATIVE**

≤8.3

POSITIVE

≥8.4

Growth Hormone Binding Protein (GHBP)

BLOOD ASSAYS

500209 (E)**500177 (L)****RANGE (pmol/L)****CHILDREN**

<1 Year: <125 – 762

2 – 9 Years: 267 – 1638

10 – 14 Years: 431 – 1892

ADULTS

20 – 50 Years: 686 – 2019

LARON DWARFISM

<300

Growth Hormone, ICMA

BLOOD ASSAYS

500213 (E)**500647 (L)****ALL AGES** ≤6 ng/mL

NOTE: GH is secreted episodically. An individual may have levels ranging from undetectable to elevated over the course of a day.

RESPONSE TESTING (CHILDREN AND ADULTS):

GH response to provocative stimuli among normal individuals is highly variable. Response values greater than 6 ng/mL using two-site assays have historically been considered to reflect normal GH secretory function, while values below 6 ng/mL have been considered to indicate some degree of GH deficiency. However, it should be noted that this limit is arbitrarily derived. A significant percentage of normal controls exhibit response values well below this 6 ng/mL limit. The clinical research literature should be consulted for a more recent detailed review of the interpretation of GH response data.

Growth Hormone, RIA

BLOOD ASSAYS

500212 (E)**500632 (L)****RANGE (ng/mL)****NEWBORN**

1 Day: 5 – 53

2 – 7 Days: 5 – 27

31 Days – 11 Months: 2 – 10

Following an 8 – 12 hour overnight fast:

CHILDREN ≤6**ADULTS** ≤6**RESPONSE TESTING (CHILDREN AND ADULTS):**

The assessment of GH secretory capacity is complicated because of the episodic nature of GH release from the pituitary. Basal GH levels can exhibit considerable variability throughout a 24-hour period, thus limiting their clinical utility. Alternatively, measurement of GH response to various stimuli has commonly been used to improve the diagnostic assessment of GH secretion. GH response to provocative stimuli among normal individuals, however, is highly variable. Response values greater than 10 ng/mL have historically been considered to reflect normal GH secretory function, while values below 10 ng/mL have been considered to indicate some degree of GH deficiency. However, it should be noted that this limit is arbitrarily derived. A significant percentage of normal controls exhibit response values well below this 10 ng/mL limit. The clinical research literature should be consulted for a more recent detailed review of the interpretation of GH response data.

Hemoglobin A1c

BLOOD ASSAYS

With Estimated Average Glucose: 502080 (E)	501270 (L)
Hemoglobin A1c Only: 501643 (E)	501963 (L)

American Diabetes Association (ADA) Guidelines:

- <5.7% = Decreased risk for diabetes
- 5.7 – 6.4% = Increased risk for diabetes
- >6.4% = Ongoing Hyperglycemia of any cause
- <7.0% = Glycemic control for adults with diabetes

Racial and ethnic differences in the relationship of mean blood glucose to hemoglobin A1c (HbA1c) exist. Red blood cell diseases and red cell turnover rate also impact A1c levels. For these reasons, HbA1c must be used thoughtfully and in combination with traditional glucose criteria when screening for and diagnosing diabetes and diabetes risks.

**Homovanillic Acid (HVA), Urine, HPLC-MS/MS
(Includes Creatinine)**

URINE ASSAYS

500218 (E)		501814 (L)
	RANGE (mg/24 hour)	RANGE (mg/g creatinine)
<3 Months:	Not determined	<35.1
3 – 23 Months:	Not determined	<32.7
2 – 4 Years:	Not determined	<22.1
5 – 9 Years:	Not determined	<15.2
10 – 19 Years:	Not determined	<12.9
ADULTS	<10.1	<7.7

Hydroxycorticosterone, 18, HPLC-MS/MS

BLOOD ASSAYS

500088 (E)**500778 (L)****18-OH-Corticosterone
RANGE (ng/dL)****18-OH-Corticosterone/
Aldosterone Ratio
RANGE****PREMATURE INFANTS**

26 – 28 Weeks, Day 4: 10 – 670

1.0 – 4.5

31 – 35 Weeks, Day 4: 57 – 410

1.1 – 5.2

FULL-TERM INFANTS

3 Days: 31 – 546

2.6 – 5.3

31 Days – 11 Months: 5 – 220

2.3 – 6.0

CHILDREN

12 – 23 Months: 18 – 155

1.7 – 5.0

24 Months – 9 Years: 6 – 85

2.4 – 10.5

10 – 14 Years: 10 – 72

2.0 – 8.3

ADULTS

9 – 58

1.7 – 8.8

8:00 AM Supine: 4 – 21

8:00 AM Upright: 5 – 46

Samples were collected without regard to posture from subjects on *ad lib* sodium intake.

**Hydroxyindoleacetic Acid, 5-(5-HIAA),
Plasma HPLC-MS/MS**

BLOOD ASSAYS

804510 (E)**504510 (L)****RANGE (ng/mL)****ADULTS**

<22

Hydroxyindoleacetic Acid, 5- (5-HIAA), Urine (Includes Creatinine)

URINE ASSAYS

500215 (E)**500720 (L)**

	RANGE (mg/24 hour)	RANGE (mg/g creatinine)
<9 Years:	Not Determined	<16.3
9 – 12 Years:	Not Determined	<8.8
13 – 17 Years:	Not Determined	<5.6
ADULTS	<15.0	<7.0

Hydroxypregnenolone, 17-, HPLC-MS/MS

BLOOD ASSAYS

500262 (E)**140715 (L)**

	RANGE (ng/dL)
PREMATURE INFANTS	
26 – 28 Weeks, Day 4:	375 – 3559
31 – 35 Weeks, Day 4:	64 – 2380
FULL-TERM INFANTS	
3 Days:	10 – 829
1 – 5 Months:	36 – 763
6 – 11 Months:	42 – 540
PREPUBERTAL CHILDREN	
12 – 23 Months:	14 – 207
24 Months – 5 Years:	10 – 103
6 – 9 Years:	10 – 186
PUBERTAL CHILDREN	
	44 – 235
ADULTS	53 – 357

Hydroxyprogesterone, 17a-, (17-OHP), HPLC-MS/MS

BLOOD ASSAYS

500270 (E)**500163 (L)****RANGE (ng/dL)****PREMATURE INFANTS**

26 – 28 Weeks, Day 4: 124 – 841

31 – 35 Weeks, Day 4: 26 – 568

FULL-TERM INFANTS

Day 3: <78

Male 1 – 11 Months: Levels increase after the first week to peak values ranging from 40 – 200 ng/dL between 30 and 60 days. Levels then decline to a prepubertal value of <91 before one year.

Female 1 – 11 Months: 13 – 106

PREPUBERTAL CHILDREN

Male (1 – 10 Years): <91 Female (1 – 9 Years): <91

PUBERTY

Male				Female			
Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)	Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)
1	<9.8	<91	38	1	<9.2	<83	31
2	9.8 – 14.5	<116	51	2	9.2 – 13.7	11 – 98	49
3	10.7 – 15.4	10 – 138	57	3	10.0 – 14.4	11 – 155	70
4	11.8 – 16.2	29 – 180	80	4	10.7 – 15.6	18 – 230	91
5	12.8 – 17.3	24 – 175	97	5	11.8 – 18.6	20 – 265	108

ADULTS**RANGE (ng/dL)**

Male: 27 – 199

Female

Follicular: 15 – 70

Luteal: 35 – 290

IA-2/ICA-512 Autoantibodies

BLOOD ASSAYS

500255 (E)**141531 (L)****RANGE (μU/mL)****ALL AGES****NEGATIVE**

<1.0

POSITIVE

≥1.0

IGF Binding Protein-1 (IGFBP-1)

BLOOD ASSAYS

500283 (E)**140822 (L)****RANGE (ng/mL)****PREPUBERTAL CHILDREN**

Fasting:

30 – 1000

Random:

10 – 500

PUBERTAL CHILDREN

Fasting:

20 – 200

Random:

20 – 100

ADULTS

Fasting:

10 – 150

Random:

≤40

IGF Binding Protein-2 (IGFBP-2)

BLOOD ASSAYS

500284 (E)**500133 (L)****RANGE (ng/mL)****INFANTS AND CHILDREN**

1 Year:	408 – 728
2 Years:	359 – 696
3 Years:	317 – 668
4 Years:	277 – 640
5 Years:	243 – 617
6 Years:	217 – 602
7 Years:	194 – 583
8 Years:	173 – 562
9 Years:	154 – 542

PUBERTAL CHILDREN AND ADULTS

10 Years:	138 – 522
11 Years:	123 – 503
12 Years:	111 – 486
13 Years:	101 – 477
14 – 16 Years:	86 – 470
17 – 19 Years:	84 – 500
20 – 25 Years:	84 – 580
26 – 35 Years:	99 – 686
36 – 45 Years:	110 – 702
46 – 55 Years:	130 – 715
56 – 65 Years:	140 – 727
66 – 75 Years:	151 – 740
76 – 80 Years:	153 – 744

IGF Binding Protein-3 (IGFBP-3)

BLOOD ASSAYS

500281 (E)**500644 (L)****MALE
RANGE (mg/L)****FEMALE
RANGE (mg/L)****INFANTS**

0 – 11 Months

1.11 – 3.18

1.05 – 3.27

CHILDREN

1 Year:

1.29 – 3.63

1.22 – 3.72

2 Years:

1.47 – 4.07

1.39 – 4.15

3 Years:

1.64 – 4.49

1.55 – 4.56

4 Years:

1.80 – 4.88

1.71 – 4.93

5 Years:

1.94 – 5.19

1.85 – 5.24

6 Years:

2.04 – 5.38

1.95 – 5.40

7 Years:

2.10 – 5.47

2.02 – 5.52

8 Years:

2.15 – 5.55

2.10 – 5.63

9 Years:

2.22 – 5.66

2.18 – 5.76

10 Years:

2.30 – 5.80

2.27 – 5.91

11 Years:

2.39 – 5.96

2.36 – 6.06

12 Years:

2.46 – 6.09

2.44 – 6.18

13 Years:

2.53 – 6.20

2.52 – 6.29

14 Years:

2.58 – 6.27

2.58 – 6.37

15 Years:

2.61 – 6.31

2.64 – 6.43

16 Years:

2.64 – 6.32

2.68 – 6.47

17 Years:

2.66 – 6.32

2.72 – 6.50

ADULTS

18 Years:

2.68 – 6.33

2.75 – 6.51

19 Years:

2.70 – 6.34

2.78 – 6.53

20 Years:

2.72 – 6.36

2.81 – 6.55

21 – 25 Years:

2.75 – 6.36

2.86 – 6.56

26 – 30 Years:

2.68 – 6.13

2.75 – 6.22

31 – 35 Years:

2.61 – 5.98

2.57 – 5.80

	MALE RANGE (mg/L)	FEMALE RANGE (mg/L)
ADULTS (CONTINUED)		
36 – 40 Years:	2.57 – 5.98	2.50 – 5.71
41 – 45 Years:	2.52 – 6.02	2.41 – 5.61
46 – 50 Years:	2.37 – 5.89	2.34 – 5.61
51 – 55 Years:	2.25 – 5.81	2.31 – 5.70
56 – 60 Years:	2.13 – 5.71	2.24 – 5.72
61 – 65 Years:	2.03 – 5.61	2.16 – 5.69
66 – 70 Years:	1.93 – 5.49	2.06 – 5.57
71 – 75 Years:	1.78 – 5.20	2.01 – 5.55
76 – 80 Years:	1.67 – 5.02	1.95 – 5.49
81 – 85 Years:	1.63 – 5.01	1.93 – 5.50
86 – 90 Years:	1.67 – 5.24	1.96 – 5.67
91+ Years:	Not Established	Not Established

IGF-1 (Insulin-like Growth Factor 1)

BLOOD ASSAYS

500282 (E)	500485 (L)
IGF-I, Pediatric with Z Score: 803660 (E)	503660 (L)

	TERM RANGE (ng/mL)	MEAN	PRE-TERM* RANGE (ng/mL)	MEAN
NEWBORNS AND INFANTS				
Birth:	15 – 109	59	21 – 93	51
1 Day – 2 Months:	15 – 109	55	23 – 163	81
3 – 4 Months:	7 – 124	50	23 – 171	74
5 – 6 Months:	7 – 93	41	15 – 132	61
7 – 11 Months:	15 – 101	56	15 – 179	77

* Values of preterm infants were determined at their age from expected term gestation

	MALE	MEAN	FEMALE	MEAN
TODDLERS				
1 – 2 Years:	30 – 122	76	56 – 144	100

Pubertal ranges by tanner stage, and adult ranges continued on following pages.

IGF-1 (Insulin-like Growth Factor 1)

BLOOD ASSAYS

MALE CHILDREN - RANGES BY TANNER STAGE:

Age	Tanner 1		Tanner 2 & 3		Tanner 4 & 5	
	Range (ng/mL)	Mean (ng/mL)	Range (ng/mL)	Mean (ng/mL)	Range (ng/mL)	Mean (ng/mL)
3 Years	20 – 141	63				
4 Years	25 – 157	73				
5 Years	30 – 174	84				
6 Years	37 – 192	96				
7 Years	44 – 211	109				
8 Years	52 – 231	123	39 – 264	121		
9 Years	61 – 252	137	52 – 304	146		
10 Years	71 – 275	153	67 – 347	174		
11 Years	82 – 299	170	86 – 393	206	277 – 673	449
12 Years	93 – 324	188	106 – 443	240	265 – 652	433
13 Years	106 – 350	207	130 – 497	277	241 – 612	401
14 Years	120 – 377	227	156 – 554	318	220 – 574	372
15 Years	127 – 391	237	185 – 616	362	199 – 537	343
16 Years			201 – 648	386	180 – 501	316
17 Years					161 – 467	290
18 Years					144 – 434	266
Total N Subjects	Tanner 1: 254		Tanner 2 & 3: 199		Tanner 4 & 5: 111	

(The IGF-1 reference intervals by pubertal tanner stage reflect ranges and means based on asymmetric curves. Please contact the laboratory for Z-Score calculations based on the asymmetric curves with transformed data.)

Ranges continued on next page

IGF-1 (Insulin-like Growth Factor 1)

BLOOD ASSAYS

FEMALE CHILDREN - RANGES BY TANNER STAGE:

Age	Tanner 1		Tanner 2		Tanner 3		Tanner 4 & 5	
	Range (ng/mL)	Mean (ng/mL)	Range (ng/mL)	Mean (ng/mL)	Range (ng/mL)	Mean (ng/mL)	Range (ng/mL)	Mean (ng/mL)
3 Years	26 – 162	77						
4 Years	32 – 179	88						
5 Years	39 – 198	100						
6 Years	47 – 217	113						
7 Years	55 – 238	127						
8 Years	64 – 259	142	89 – 369	181				
9 Years	74 – 282	158	96 – 399	196	192 – 568	350		
10 Years	85 – 306	175	104 – 431	212	192 – 568	350	279 – 664	446
11 Years	97 – 332	194	112 – 466	229	192 – 568	350	268 – 646	433
12 Years	110 – 358	213	121 – 504	247	192 – 568	350	248 – 612	406
13 Years			131 – 545	267	192 – 568	350	229 – 579	380
14 Years			136 – 566	278	192 – 568	350	211 – 547	356
15 Years					192 – 568	350	194 – 516	332
16 Years							177 – 487	309
17 Years							162 – 458	287
18 Years							147 – 430	266
Total N Subjects	Tanner 1: 138		Tanner 2: 158		Tanner 3: 114		Tanner 4 & 5: 155	

(The IGF-1 reference intervals by pubertal tanner stage reflect ranges and means based on asymmetric curves. Please contact the laboratory for Z-Score calculations based on the asymmetric curves with transformed data.)

Ranges continued on next page

IGF-1 (Insulin-like Growth Factor 1)

BLOOD ASSAYS

ADULTS	MALE RANGE (ng/mL)	MEAN	FEMALE RANGE (ng/mL)	MEAN
19 – 20 Years:	281 – 510	371	217 – 475	323
21 – 30 Years:	155 – 432	289	87 – 368	237
31 – 40 Years:	132 – 333	226	106 – 368	225
41 – 50 Years:	121 – 237	160	118 – 298	205
51 – 60 Years:	68 – 245	153	53 – 287	172
61 – 70 Years:	60 – 220	132	75 – 263	180
71 – 80 Years:	36 – 215	131	54 – 205	156

IGF-2 (Insulin-like Growth Factor 2)

BLOOD ASSAYS

500228 (E)	RANGE (ng/mL)	MEAN	141770 (L)
PREPUBERTAL	258 – 882	570	
PUBERTAL	273 – 892	583	
ADULTS	333 – 967	650	

Insulin

BLOOD ASSAYS

500220 (E)	RANGE (μIU/mL)*	503068 (L)
PREPUBERTAL		
≤8 Years:	≤13	
PUBERTAL CHILDREN	≤17	
ADULTS	≤17	
2 Hours Post Meal (Sustacal):	7.6 – 26	
2 Hours Post Glucose (75 gm):	15 – 53	

* Following a 4 – 12 hour fast

Insulin Antibodies

BLOOD ASSAYS

500225 (E)**141598 (L)****RANGE (μU/mL)****ALL AGES****NEGATIVE**

<5.0

POSITIVE

≥5.0

Insulin, Free and Total

BLOOD ASSAYS

500226 (E)**501561 (L)****RANGE (μU/mL)****NON-DIABETIC**

In the absence of insulin-binding antibodies, the free and total insulin assays are equivalent. However, this assay is intended for use in diabetics with insulin autoantibody present. Measurement is performed on acid-treated samples. Therefore, the sensitivity and absolute values by this method may differ from the direct insulin assay.

Following a 4 – 12 hour fast:

INFANTS AND PREPUBERTAL**CHILDREN**

≤13 μU/mL

**PUBERTAL CHILDREN
AND ADULTS**

≤17 μU/mL

**INSULIN DEPENDENT
DIABETIC PATIENTS**

Total insulin levels are dependent on the binding capacity of circulating antibodies and the patient's insulin dose. Values range from about 50 μU/mL to more than 1000 μU/mL. Free insulin levels vary depending on the capacity and affinity of circulating insulin-binding antibodies and the dose of insulin given to the patient. Values range from non-diabetic levels up to about 100 μU/mL.

Leptin

BLOOD ASSAYS

500237 (E)**500716 (L)****RANGE (ng/mL)****RANGE (ng/mL)****MALE****FEMALE****ADULTS (BMI = 22)**

0.7 – 5.3

3.3 – 18.3

Range is 5th – 95th percentile.

NOTE: Leptin values are gender-dependent and highly correlated with the Body Mass Index (BMI). Reference range provided is based on average BMI value, for additional BMI reference ranges for adults, see below. (Contact the laboratory for pediatric ranges):

Male			Female		
BMI	Range (ng/mL)	Mean (ng/mL)	BMI	Range (ng/mL)	Mean (ng/mL)
15	0.2 – 1.3	0.5	15	1.2 – 6.6	2.8
16	0.2 – 1.6	0.6	16	1.4 – 7.7	3.2
17	0.2 – 2.0	0.7	17	1.6 – 8.9	3.8
18	0.3 – 2.4	0.8	18	1.8 – 10.3	4.3
19	0.4 – 2.9	1.0	19	2.1 – 11.9	5.0
20	0.4 – 3.6	1.3	20	2.5 – 13.7	5.8
21	0.5 – 4.4	1.5	21	2.8 – 15.9	6.7
22	0.7 – 5.3	1.9	22	3.3 – 18.3	7.7
23	0.8 – 6.5	2.3	23	3.8 – 21.2	9.0
24	1.0 – 7.9	2.8	24	4.4 – 24.5	10.4
25	1.2 – 9.7	3.4	25	5.1 – 28.3	12.0
26	1.4 – 11.8	4.1	26	5.8 – 32.7	13.8
27	1.8 – 14.4	5.0	27	6.8 – 37.8	16.0
28	2.2 – 17.5	6.1	28	7.8 – 43.7	18.5
29	2.6 – 21.4	7.5	29	9.0 – 50.5	21.3
30	3.2 – 26.1	9.1	30	10.4 – 58.4	24.7
31	3.9 – 31.8	11.1	31	12.1 – 67.4	28.5
32	4.8 – 38.7	13.6	32	13.9 – 78.0	33.0
33	5.8 – 47.3	16.6	33	16.1 – 90.1	38.1
34	7.1 – 57.6	20.2	34	18.6 – 104.1	44.0
35	8.7 – 70.3	24.7	35	21.5 – 120.4	50.9

Luteinizing Hormone (LH), ECL

BLOOD ASSAYS

500234 (E)**502286 (L)****RANGE (mIU/mL)****INFANTS**

2 Weeks – 11 Months:

Values begin to increase about two weeks after birth to a range of 0.02 – 7.0 mIU/mL within the first three months, then decline to prepubertal values, by the end of the first year.

PREPUBERTAL CHILDREN

12 Months – 8 Years:

0.02 – 0.3

PUBERTY**Male****Female**

Tanner Stage	Age (years)	Range (mIU/mL)	Mean (mIU/mL)	Tanner Stage	Age (years)	Range (mIU/mL)	Mean (mIU/mL)
1	<9.8	0.02 – 0.3	0.09	1	<9.2	0.02 – 0.18	0.06
2	9.8 – 14.5	0.2 – 4.9	1.8	2	9.2 – 13.7	0.02 – 4.7	0.72
3	10.7 – 15.4	0.2 – 5.0	1.9	3	10.0 – 14.4	0.10 – 12.0	2.3
4–5	11.8 – 17.3	0.4 – 7.0	2.6	4–5	10.7 – 18.6	0.4 – 11.7	3.3

ADULTS**RANGE (mIU/mL)**

Male:

1.5 – 9.0

Female

Follicular:

2.0 – 9.0

Mid-cycle:

18.0 – 49.0

Luteal:

2.0 – 11.0

Postmenopausal:

20.0 – 70.0

Macroprolactin

BLOOD ASSAYS

500375 (E)**500324 (L)**

Monomeric Prolactin values should be utilized to assess the biologically active level of Prolactin.

RANGE (ng/mL)**MONOMERIC PROLACTIN****INFANTS**

1 – 7 Days: 30 – 495

CHILDREN AND ADULTS

Male: 3 – 18

Female: 3 – 24

**Metanephrines, Fractionated Urine, HPLC-MS/MS
(Includes Creatinine)**

URINE ASSAYS

500240 (E)**501533 (L)****NORMETANEPHRINE****RANGE (µg/24 hours)****RANGE (µg/g creatinine)****CHILDREN**

<1 Year: Not Determined 180 – 1900

12 – 23 Months: Not Determined 250 – 830

24 Months – 7 Years: Not Determined 150 – 735

8 – 14 Years: Not Determined 95 – 705

ADULTS

110 – 720 109 – 596

METANEPHRINE**CHILDREN**

<1 Year: Not Determined 150 – 310

12 – 23 Months: Not Determined 60 – 250

24 Months – 7 Years: Not Determined 55 – 460

8 – 14 Years: Not Determined 70 – 380

ADULTS

35 – 278 22 – 205

Pediatric values were determined on both random and overnight urine collections.

Metanephrines, Total Urine, HPLC-MS/MS (Includes Creatinine)

URINE ASSAYS

500242 (E)**500480 (L)**

	RANGE (µg/24 hours)	RANGE (µg/g creatinine)
CHILDREN		
<1 Year:	Not Determined	410 – 2000
12 – 23 Months:	Not Determined	300 – 1200
24 Months – 7 Years:	Not Determined	200 – 900
8 – 14 Years:	Not Determined	140 – 830
ADULTS	300 – 900	180 – 700

Pediatric values were determined on both random and overnight collections.

Microalbumin, Urine (Includes Creatinine)

URINE ASSAYS

502440 (E)**500870 (L)**

	RANGE (mg/24 hours)	RANGE (mg/g creatinine)
ADULTS		
24 Hour Collection:	<30	<30

Parathyroid Hormone, Intact (IPTH) (Includes Calcium)

BLOOD ASSAYS

500246 (E)**500692 (L)**

CHILDREN AND ADULTS 10 – 65 pg/mL

Parathyroid Hormone, Intact (IPTH), Parathyroid Aspirate

502092 (E)

503000 (L)

Results should be interpreted in conjunction with fine needle aspirate (FNA) cytological analysis and ultrasonography.

REFERENCE RANGE Not Applicable

ASSAY DETECTION LIMIT 10 pg/mL

Parathyroid Hormone-Related Peptide (PTHrP)

BLOOD ASSAYS

500333 (E)

503380 (L)

ALL AGES <2.0 pmol/L

The PTHrP assay should not be used to exclude cancer or screen tumor patients for humoral hypercalcemia of malignancy (HHM). The results should always be assessed in conjunction with the patient's medical history, clinical examination, and other findings. If test results are clinically discordant, please contact the laboratory.

Pregnenolone, HPLC-MS/MS

BLOOD ASSAYS

500258 (E)

140707 (L)

RANGE (ng/dL)

PREMATURE INFANTS

26 – 28 Weeks, Day 4: 260 – 2104

34 – 36 Weeks, Day 4: 203 – 1024

INFANTS

1 – 7 Days: 150 – 2000

Levels decrease after birth, and are within the prepubertal range by three months.

PREPUBERTAL CHILDREN 20 – 140

PUBERTAL AND ADULTS <151

Progesterone, HPLC-MS/MS

BLOOD ASSAYS

500266 (E)**500167 (L)****MALES****RANGE (ng/dL)**

1 – 16 Years: <10 – 15

Adults: <10 – 11

FEMALES**RANGE (ng/dL)**

1 – 10 Years: <10 – 26

11 Years: <10 – 255

12 Years: <10 – 856

13 Years: <10 – 693

14 Years: <10 – 1204

15 Years: <10 – 1076

16 Years: <10 – 1294

ADULT FEMALE CYCLE DAYS

1 – 6 <10 – 17

7 – 12 <10 – 135

13 – 15 <10 – 1563

16 – 28 <10 – 2555

POSTMENOPAUSAL <10

NOTE: Luteal progesterone peaked from 350 to 3750 ng/dL on days ranging from 17 to 23.

Progesterone, Free, HPLC-MS/MS

BLOOD ASSAYS

Total and Free Progesterone: 803658 (E)**503658 (L)****MALES****RANGE (% Free)****RANGE (ng/dL)**

Adults 1.9 – 4.2 <0.42

FEMALES**RANGE (% Free)****RANGE (ng/dL)**

Luteal: 1.6 – 3.3 7.9 – 71.5

Follicular: 1.5 – 3.4 <6.1

Postmenopausal: 1.6 – 3.1 <7.1

Proinsulin

BLOOD ASSAYS

500272 (E)**500722 (L)****PROINSULIN
RANGE (pmol/L)****PROINSULIN/INSULIN*
(Molar Ratio As %)
RANGE****NORMAL CHILDREN**

Fasting:

1.8 – 10

6.4 – 16

NORMAL ADULTS

Fasting:

1.7 – 12

3.4 – 21

* Ratio calculated using actual insulin value, not the sum of insulin and proinsulin in the denominator.

Prolactin

BLOOD ASSAYS

500274 (E)**500557 (L)****RANGE (ng/mL)****NEWBORN**

1 – 7 Days:

30 – 495

1 – 8 Weeks:

Values decline during the first two months of life to those observed in adult males 3-18 and females 3-24.

CHILDREN AND ADULTS

Male:

3 – 18

Female:

3 – 24

Renin, Plasma (Plasma Renin Activity) HPLC-MS/MS

BLOOD ASSAYS

500278 (E)**500458 (L)****RANGE (ng/mL/hr)****PREMATURE INFANTS**

1 – 7 Days: 11.000 – 167.000

FULL-TERM INFANTS

1 – 7 Days: 2.000 – 35.000

Plasma renin activity in newborns is elevated and highly variable.

INFANTS

0 – 11 Months: 2.000 – 37.000

CHILDREN

1 – 3 Years: 1.700 – 11.200

4 – 5 Years: 1.000 – 6.500

6 – 10 Years: 0.500 – 5.900

11 – 15 Years: 0.500 – 3.300

CHILDREN AND ADULTS

>15 Years: 0.167 – 5.380

Sex Hormone Binding Globulin (SHBG)

BLOOD ASSAYS

500299 (E)**500848 (L)****RANGE (nmol/L)****INFANTS**

1 Month – 23 Months: 60.0 – 252.0

PREPUBERTAL CHILDREN 72.0 – 220.0**PUBERTAL CHILDREN**

Males: 16.0 – 100.0

Females: 36.0 – 125.0

ADULT MALES

20 – 49 Years: 16.5 – 55.9

>49 Years: 19.3 – 76.4

ADULT FEMALES

20 – 49 Years: 24.6 – 122.0

>49 Years: 17.3 – 125.0

Testosterone, Bioavailable

BLOOD ASSAYS

(Bioavailable, Total, and SHBG)**500288 (E)****500650 (L)****RANGE (ng/dL)****PREPUBERTAL CHILDREN**

Male (1 – 10 Years): <0.2 – 1.3

Female (1 – 9 Years): <0.2 – 1.3

PUBERTY

Male				Female			
Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)	Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)
1	<9.8	<0.2 – 3.4		1	<9.2	<0.2 – 3.4	
2	9.8 – 14.5	2 – 58	12	2	9.2 – 13.7	0.8 – 4.7	3.6
3	10.7 – 15.4	12 – 70	30	3	10.0 – 14.4	1.1 – 9.6	4.7
4 – 5	11.8 – 17.3	84 – 350	210	4 – 5	10.7 – 18.6	2.3 – 13.9	6.1

RANGE (ng/dL)**ADULTS**

Male

20 – 39 Years: 128 – 430

40 – 49 Years: 95 – 350

50 – 69 Years: 95 – 285

70 – 79 Years: 60 – 240

Female: 1.1 – 14.3

Testosterone, Free, by Equilibrium Dialysis

BLOOD ASSAYS

Free with Total: 501475 (E)**500726 (L)****Free, Total and SHBG: 500290 (E)****500102 (L)**

	MALE RANGE (pg/mL)	FEMALE RANGE (pg/mL)
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FULL-TERM INFANTS

1 – 15 Days:	1.5 – 31	0.5 – 2.5
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1 – 2 Months:	3.3 – 18	0.1 – 1.3
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3 – 4 Months:	0.7 – 14	0.3 – 1.1
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5 – 6 Months:	0.4 – 4.8	0.2 – 0.6
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PREPUBERTAL CHILDREN

1 – 10 Years:	0.15 – 0.6	0.15 – 0.6
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PUBERTY

Comprehensive values for free testosterone by dialysis for both males and females throughout puberty are currently unavailable.

ADULTS

	52 – 280	1.1 – 6.3
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% FREE TESTOSTERONE

	MALE RANGE (%)	FEMALE RANGE (%)
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FULL-TERM INFANTS

1 – 15 Days:	0.9 – 1.7	0.8 – 1.5
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1 – 2 Months:	0.4 – 0.8	0.4 – 1.1
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3 – 4 Months:	0.4 – 1.1	0.5 – 1.0
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5 – 6 Months:	0.4 – 1.0	0.5 – 0.8
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PREPUBERTAL CHILDREN

1 – 10 Years:	0.4 – 0.9	0.4 – 0.9
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PUBERTY

Comprehensive values for free testosterone by dialysis for both males and females throughout puberty are currently unavailable.

ADULTS

	1.5 – 3.2	0.8 – 1.4
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Testosterone, Saliva, HPLC-MS/MS

SALIVA ASSAYS

803765 (E)**503765 (L)****RANGE (pg/mL)****ADULTS**

Male: 23 – 85

Female: <9.8

Testosterone, Total, HPLC-MS/MS

BLOOD ASSAYS

500286 (E)**500159 (L)****PREMATURE INFANTS****MALE RANGE (ng/dL)****FEMALE RANGE (ng/dL)**

26 – 28 Weeks, Day 4:

59 – 125

5 – 16

31 – 35 Weeks, Day 4:

37 – 198

5 – 22

FULL-TERM INFANTS

Newborns:

75 – 400

20 – 64

Male 1 – 7 Months: Levels decrease rapidly the first week to 20 – 50 ng/dL, then increase to 60 – 400 ng/dL (Mean = 190) between 20 – 60 days. Levels then decline to prepubertal range of <2.5 – 10 by seven months.

Female 1 – 7 Months: Levels decrease during the first month to <10 ng/dL and remain there until puberty.

PREPUBERTAL CHILDREN

Male (1 – 10 Years): <2.5 – 10

Female (1 – 9 Years): <2.5 – 10

PUBERTY**Male****Female**

Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)	Tanner Stage	Age (years)	Range (ng/dL)	Mean (ng/dL)
1	<9.8	<2.5 – 10	4.9	1	<9.2	<2.5 – 10	4.9
2	9.8 – 14.5	18 – 150	42	2	9.2 – 13.7	7 – 28	18
3	10.7 – 15.4	100 – 320	190	3	10.0 – 14.4	15 – 35	25
4	11.8 – 16.2	200 – 620	372	4	10.7 – 15.6	13 – 32	22
5	12.8 – 17.3	350 – 970	546	5	11.8 – 18.6	20 – 38	28

ADULTS**RANGE (ng/dL)**

Male:

264 – 916

Female

Premenopausal:

10 – 55

Postmenopausal:

7 – 40

Thyroglobulin Comprehensive

BLOOD ASSAYS

With Anti-Tg Screen: 500316 (E)**500540 (L)****ANTI-THYROGLOBULIN ANTIBODIES (ANTI-TG)**

Negative <1.0 IU/mL

Positive ≥1.0 IU/mL

THYROGLOBULIN ICMA**MALE RANGE (ng/mL)****FEMALE RANGE (ng/mL)**

1 – 25 Days:

31.6 – 101.6

33.4 – 169.9

26 – 31 Days:

Not Established

Not Established

1 – 23 Months:

9.5 – 110.0

12.9 – 92.4

24 Months – 7 Years:

Not Established

Not Established

8 – 10 Years:

3.7 – 35.6

1.7 – 38.4

11 – 14 Years:

3.1 – 23.6

3.7 – 31.0

15 – 17 Years:

2.7 – 26.0

3.0 – 30.4

>17 Years:

1.4 – 29.2

1.5 – 38.5

Assay quantitation limit: <0.1

THYROGLOBULIN RIA**RANGE (ng/mL)**

1 – 11 Months

12 – 113

PREPUBERTAL CHILDREN

5.2 – 72

**PUBERTAL CHILDREN
AND ADULTS**

<40

Assay quantitation limit:

<2.0

According to the National Academy of Clinical Biochemistry, the reference interval for thyroglobulin (TG) should be related to euthyroid patients and not for patients who underwent thyroidectomy. TG reference intervals for these patients depend on the residual mass of the thyroid tissue left after surgery. Establishing a post-operative baseline is recommended.

Thyroglobulin, Lymph Node Aspirate

501916 (E)

502380 (L)

Results should be interpreted in conjunction with fine needle aspirate (FNA) cytological analysis and ultrasonography.¹

REFERENCE RANGE Not Applicable

LLOQ 1.0 ng/mL per one FNA collection diluted in 1 mL of saline

1. Borel, Al Et Al. Significance of low levels of thyroglobulin in fine needle aspirates from cervical lymph nodes of patients with a history of differentiated thyroid cancer. *European Journal of Endocrinology*. 2008;158:691-698.

Thyroid Peroxidase Antibodies (Anti-TPO)

BLOOD ASSAYS

500042 (E)

500638 (L)

ALL AGES <9.0 IU/mL

Thyroid Stimulating Hormone (TSH), ICMA

BLOOD ASSAYS

500305 (E)

500477 (L)

	RANGE (μU/mL)	MEAN (μU/mL)
PREMATURE INFANTS		
26 – 32 Weeks, Day 3 – 4:	0.8 – 6.9	2.3
FULL TERM INFANTS		
Newborns:	TSH surges within the first 15 – 60 minutes of life reaching peak levels between 25 – 160 at about 30 minutes. Values then decline rapidly within one week.	
Day 4:	1.3 – 16	4.9
1 – 11 Months:	0.9 – 7.7	2.9
PREPUBERTAL CHILDREN	0.6 – 5.5	1.9
PUBERTAL CHILDREN AND ADULTS	0.5 – 4.8	1.6

Thyroxine (T-4)

BLOOD ASSAYS

500310 (E)**500348 (L)****RANGE (µg/dL)****PREMATURE INFANTS**26 – 30 Weeks,
Day 3 – 4:

2.6 – 14.0

FULL-TERM INFANTS

1 – 3 Days:

8.2 – 19.9

1 Week:

6.0 – 15.9

1 – 11 Months:

6.1 – 14.9

PREPUBERTAL CHILDREN

12 Months – 2 Years:

6.8 – 13.5

3 – 10 Years:

5.5 – 12.8

PUBERTAL CHILDREN

11 – 17 Years:

4.9 – 13.0

ADULTS

4.2 – 13.0

Thyroxine Binding Globulin (TBG)

BLOOD ASSAYS

500318 (E)**500724 (L)****RANGE (µg/mL)****CHILDREN**

12.7 – 27.9

ADULTS

13.0 – 39.0

Thyroxine, Free by Dialysis and MS

BLOOD ASSAYS

500329 (E)**501902 (L)****RANGE (ng/dL)****PREMATURE INFANTS**

Birth – 4 Weeks: 0.86 – 4.46

INFANTS AND PRE-PUBERTAL CHILDREN

Newborn (0 – 2 Weeks): 0.84 – 4.97

Infants (2 Weeks – 12 Months): 0.81 – 2.12

1 – 11 Years: 0.65 – 1.9

PUBERTAL CHILDREN AND ADULTS 0.8 – 1.7**PREGNANT FEMALES**

1st Trimester (0 – 13.3 Weeks): 0.65 – 1.4

2nd Trimester (13.4 – 26.6 Weeks): 0.5 – 1.3

3rd Trimester (>26.6 Weeks): 0.5 – 1.1

Thyroxine, Free Automated Analog Immunoassay

BLOOD ASSAYS

504001 (E)**500835 (L)****RANGE (ng/dL)****INFANTS**

Birth – 4 Days: 0.66 – 2.71

4 Days – 1 Month: 0.83 – 3.09

1 – 11 Months: 0.48 – 2.34

CHILDREN AND ADULTS

1 – 5 Years: 0.85 – 1.75

6 – 10 Years: 0.90 – 1.67

11 – 19 Years: 0.93 – 1.60

≥20 Years: 0.82 – 1.77

Triiodothyronine (T-3)

BLOOD ASSAYS

500322 (E)**500563 (L)****RANGE (ng/dL)****PREMATURE INFANTS**26 – 30 Weeks,
Day 3 – 4:

24 – 132

FULL-TERM INFANTS

1 – 3 Days:

89 – 405

1 Week:

91 – 300

1 – 11 Months:

85 – 250

PREPUBERTAL CHILDREN 119 – 218**PUBERTAL CHILDREN**

11 – 17 Years:

80 – 185

ADULTS

55 – 170

Triiodothyronine, Free by Dialysis and MS

BLOOD ASSAYS

500336 (E)**503600 (L)****RANGE (pg/mL)****Mean****INFANTS**

Premature (Birth – 4 Weeks):

1.35 – 6.25

3.13

Newborn (Birth – 2 Weeks):

0.99 – 8.03

4.21

Infants (2 Weeks – 12 Months):

1.59 – 6.15

3.87

CHILDREN AND ADULTS

Prepubertal 1 – 10 Years:

2.21 – 4.99

3.60

Children and Adults:

1.81 – 4.06

2.77

PREGNANT FEMALES

First Trimester:

1.6 – 3.3

2.5

Second Trimester:

To be determined

Third Trimester:

1.0 – 3.2

2.1

Triiodothyronine, Free Automated Analog Immunoassay

BLOOD ASSAYS

500323 (E)**500834 (L)****RANGE (pg/mL)****INFANTS**

Birth – 4 Days:	2.0 – 7.9
4 Days – 1 Month:	2.0 – 5.2
1 – 11 Months:	1.6 – 6.4

CHILDREN AND ADULTS

1 – 5 Years:	2.0 – 6.0
6 – 10 Years:	2.7 – 5.2
11 – 19 Years:	2.3 – 5.0
≥20 Years:	2.0 – 4.4

Triiodothyronine, Reverse, HPLC-MS/MS

BLOOD ASSAYS

500326 (E)**503663 (L)****RANGE (ng/dL)****PREMATURE INFANTS**

26 – 31 Weeks:	33 – 147
32 – 35 Weeks:	49 – 217

FULL-TERM INFANTS

2 – 7 Days:	33 – 206
8 Days – 5 Months:	13 – 107
6 – 12 Months:	8.1 – 52.8

CHILDREN AND ADULTS

1 – 15 Years:	8.3 – 22.9
≥16 Years:	9.2 – 24.1

TSH Receptor Antibody (TRAb)

BLOOD ASSAYS

500308 (E)**500538 (L)****RANGE (U/L)****ALL AGES****NEGATIVE**

<1

EQUIVOCAL

1.1 - 1.5

POSITIVE

>1.5

Vanillylmandelic Acid (VMA), Urine (Includes Creatinine)

URINE ASSAYS

500330 (E)**500496 (L)****RANGE****RANGE****(mg/24 hours)****(mg/g creatinine)**

<2 Years:

Not Determined

<18.9

2 – 4 Years:

Not Determined

<11.1

5 – 9 Years:

Not Determined

<8.4

10 – 19 Years:

Not Determined

<8.3

ADULTS

<7.6

<6.1

Vitamin D, 1, 25-Dihydroxy, Total and Fractionated, HPLC-MS/MS

BLOOD ASSAYS

500342 (E)**500600 (L)****RANGE (pg/mL)****NEWBORNS**

≤30 Days:

<10 – 72

INFANTS AND CHILDREN

31 Days – 17 Years:

15 – 90

ADULTS

>18 Years:

21 – 65

Vitamin D, 25-Hydroxy, Total, HPLC-MS/MS

BLOOD ASSAYS

500338 (E)**500510 (L)****ALL AGES** Target Levels 30 – 100 ng/mL**Vitamin D, 25-Hydroxy, Total and Fractionated, HPLC-MS/MS**

BLOOD ASSAYS

500337 (E)**504115 (L)**

Reference range provided is the same as Total Vitamin D above

3-Epi-Vitamin D, 25-Hydroxy, HPLC-MS/MS

BLOOD ASSAYS

803580 (E)**503580 (L)****RANGE (% 3-Epi-25-OH Vitamin D)****INFANTS**

<1 Year:

<40

**CHILDREN
AND ADULTS**

<9

Zinc Transporter 8 (ZNT8) Antibodies

BLOOD ASSAYS

803995 (E)**503995 (L)****RANGE (U/mL)****ALL AGES****NEGATIVE**

<15

POSITIVE

≥15

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
1, 25-Dihydroxy-Vitamin D	pmol/L	0.4166	pg/mL
11-Deoxycortisol (Compound S)	nmol/L	34.650	ng/dL
17-Hydroxypregnenolone	nmol/L	33.250	ng/dL
17-Hydroxyprogesterone	nmol/L	33.050	ng/dL
18-Hydroxycorticosterone	nmol/L	36.250	ng/dL
18-Hydroxydeoxycorticosterone (18-OH-DOC)	pmol/L	0.0347	ng/dL
20-Hydroxyprogesterone	nmol/L	31.650	ng/dL
21-Deoxycortisol	nmol/L	34.646	ng/dL
25-Hydroxy-Vitamin D	nmol/L	0.4006	ng/mL
5-Hydroxyindoleacetic Acid (5-HIAA), Urine 5-HIAA/Creatinine	nmol/d nmol/mmol	0.1912 1.6906	µg/24 h µg/g
ACTH (Corticotropin)	pmol/L	4.5000	pg/mL
Albumin	g/L	0.1000	g/dL
Aldosterone, Serum	nmol/L	36.040	ng/dL
Aldosterone, Urine	nmol/d	0.3604	µg/24 h
Aldosterone/Creatinine	nmol/mmol	3.1859	µg/g
Androstanediol Glucuronide	nmol/L	46.900	ng/dL
Androstanediol	nmol/L	29.200	ng/dL
Androstenedione	nmol/L	28.640	ng/dL
Androsterone, Serum	nmol/L	29.044	ng/dL
Androsterone, Urine	µmol/d	0.2905	mg/24 h

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Androsterone/Creatinine	$\mu\text{mol}/\text{mmol}$	2.5680	mg/g
Angiotensin I Converting Enzyme	U/L	1.0000	mU/mL
Angiotensin I	pmol/L	1.2960	pg/mL
Angiotensin II	pmol/L	1.0460	pg/mL
Angiotensin III	pmol/L	0.9310	pg/mL
Antidiuretic Hormone (ADH)	pmol/L	1.0840	pg/mL
Atrial Natriuretic Peptide (ANP)	pmol/L	3.0800	pg/mL
C-Peptide	nmol/L	3.0210	ng/mL
C-Peptide, Urine	nmol/L	3.0210	ng/mL
C-Peptide/Creatinine	nmol/mmol	26.7109	$\mu\text{g}/\text{g}$
Calcitonin	pmol/L	3.4180	pg/mL
Calcium	mmol/L	4.0080	mg/dL
Calcium, Urine	mmol/d	40.0800	mg/24 h
Catecholamines, Urine	nmol/d	0.1762	$\mu\text{g}/24\text{ h}$
Catecholamines/Creatinine	nmol/mmol	1.5572	$\mu\text{g}/\text{g}$
Corticosterone	nmol/L	34.650	ng/dL
Cortisol, Serum	nmol/L	0.0363	$\mu\text{g}/\text{dL}$
Cortisol, Urine	nmol/d	0.3625	$\mu\text{g}/24\text{ h}$
Cortisol/Creatinine	nmol/mmol	3.2045	$\mu\text{g}/\text{g}$
Cortisone	nmol/L	0.0361	$\mu\text{g}/\text{dL}$
Creatinine, Urine	$\mu\text{mol}/\text{d}$	0.1131	mg/24 h

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Cyclic Amp, Urine	μmol/L	1.0000	nmol/mL
Cyclic Amp/Creatinine	nmol/mmol	0.0088	μmol/g
Dehydroepiandrosterone (DHEA)	nmol/L	28.840	ng/dL
Dehydroepiandrosterone-Sulfate (DHEA-S)	nmol/L	0.0368	μg/dL
Deoxycorticosterone (DOC)	pmol/L	0.0331	ng/dL
Dexamethasone	nmol/L	39.250	ng/dL
Dihydrotestosterone (DHT)	nmol/L	29.040	ng/dL
Dopamine, Plasma	pmol/L	0.1530	pg/mL
Dopamine, Urine	nmol/d	0.1530	μg/24 h
Dopamine/Creatinine	nmol/mmol	1.3528	μg/g
Endorphin, Beta	pmol/L	4.0000	pg/mL
Ephedrine, Urine	nmol/d	0.1831	μg/24 h
Epinephrine, Plasma	pmol/L	0.1831	pg/mL
Epinephrine/Creatinine	nmol/mmol	1.6186	μg/g
Estradiol	pmol/L	0.272	pg/mL
Estril	pmol/L	0.0288	ng/dL
Estrogens, Serum	pmol/L	0.271	pg/mL
Estrone Sulfate	pmol/L	0.0350	ng/dL
Estrone	pmol/L	0.270	pg/mL
Folic Acid	pmol/L	0.0441	ng/dL

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Follicle Stimulating Hormone (FSH)	IU/L	1.0000	mIU/mL
Follicle Stimulating Hormone, Urine	IU/d	1.0000	IU/24 h
Free Testosterone	pmol/L	0.2884	pg/mL
FSH/Creatinine	IU/mmol	8.8420	IU/g
Gastrin	ng/L	1.0000	pg/mL
Glucagon	ng/L	1.0000	pg/mL
Growth Hormone	µg/L	1.0000	ng/mL
HCG, Urine	IU/d	1.0000	IU/24 h
HCG/Creatinine	IU/mmol	8.8420	IU/g
Homovanillic Acid (HVA), Urine	nmol/d	0.1822	µg/24 h
Human Chorionic Gonadotropin (HCG)	IU/L	1.0000	mIU/mL
HVA/Creatinine	nmol/mmol	1.6110	µg/g
IGF-I (Somatomedin C)	nmol/L	7.6490	ng/mL
IGF-II	nmol/L	7.5000	ng/mL
Inhibin	U/L	0.0010	U/mL
Insulin	pmol/L	0.1440	µU/mL
LH/Creatinine	IU/mmol	8.8420	IU/g
Luteinizing Hormone (LH)	IU/L	1.0000	mIU/mL
Luteinizing Hormone, Urine	IU/d	1.0000	IU/24 h
Metanephrine, Urine	nmol/d	0.1972	µg/24 h
Metanephrine/Creatinine	nmol/mmol	1.7432	µg/g

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Metanephrines, Total, Urine	nmol/d	0.1902	µg/24 h
Metanephrines, Total/Creatinine	nmol/mmol	1.6814	µg/g
Methoxytyramine, Urine	nmol/d	0.1672	µg/24 h
Methoxytyramine/Creatinine	nmol/mmol	1.4786	µg/g
Norepinephrine, Plasma	pmol/L	0.1692	pg/mL
Norepinephrine, Urine	nmol/d	0.1692	µg/24 h
Norepinephrine/Creatinine	nmol/mmol	1.4957	µg/g
Normetanephrine, Urine	nmol/d	0.1832	µg/24 h
Normetanephrine/Creatinine	nmol/mmol	1.6195	µg/g
Osteocalcin	nmol/L	6.5000	ng/mL
Parathyroid Hormone	pmol/L	9.5000	pg/mL
Prednisolone	nmol/L	36.040	ng/dL
Prednisone	nmol/L	35.840	ng/dL
Pregnenolone	nmol/L	31.650	ng/dL
Progesterone	nmol/L	31.450	ng/dL
Prolactin	µg/L	1.0000	ng/mL
Renin (Plasma Renin Activity)	ng/L/s	3.6000	ng/mL/h
Reverse T-3	pmol/L	0.0651	ng/dL
Secretin	pmol/L	3.0550	pg/mL
Sex Hormone Binding Globulin (SHBG)	nmol/L	0.0288	µg/dL
Somatostatin-14	pmol/L	1.6380	pg/mL

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Somatostatin-28	pmol/L	3.2760	pg/mL
Testosterone	nmol/L	28.840	ng/dL
Testosterone, Urine	nmol/d	0.2884	µg/24 h
Testosterone/Creatinine	nmol/mmol	2.5495	µg/g
Thyroglobulin	µg/L	1.0000	ng/mL
Thyroid Stimulating Hormone (TSH)	mU/L	1.0000	µU/mL
Thyrotropin Releasing Hormone (TRH)	pmol/L	0.3620	pg/mL
Thyroxine (T-4)	nmol/L	0.0777	µg/dL
Thyroxine Binding Globulin	mg/L	0.1000	mg/dL
Triiodothyronine (T-3)	nmol/L	65.100	ng/dL
Vanillylmandelic Acid (VMA), Urine	nmol/d	0.1982	µg/24 h
Vitamin B-12	pmol/L	0.1355	ng/dL
VMA/Creatinine	nmol/mmol	1.7525	µg/g

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
1, 25-Dihydroxy-Vitamin D	pg/ml	2.4004	pmol/L
11-Deoxycortisol (Compound S)	ng/dL	0.02887	nmol/L
17-Hydroxypregnenolone	ng/dL	0.03008	nmol/L
17-Hydroxyprogesterone	ng/dL	0.03026	nmol/L
18-Hydroxycorticosterone	ng/dL	0.02759	nmol/L
18-Hydroxydeoxycorticosterone (18-OH-DOC)	ng/dL	28.8600	pmol/L
20-Hydroxyprogesterone	ng/dL	0.03160	nmol/L
21-Deoxycortisol	ng/dL	0.0289	nmol/L
25-Hydroxy-Vitamin D	ng/mL	2.4963	nmol/L
5-Hydroxyindoleacetic Acid (5-HIAA), Urine	µg/24 h	5.2301	nmol/d
ACTH (Corticotropin)	pg/mL	0.2222	pmol/L
Albumin	g/dL	10.0000	g/L
Aldosterone, Serum	ng/dL	0.02775	nmol/L
Aldosterone, Urine	µg/24 h	2.7747	nmol/d
Aldosterone/Creatinine	µg/g	0.3139	nmol/mmol
Androstanediol Glucuronide	ng/dL	0.02134	nmol/L
Androstanediol	ng/dL	0.03420	nmol/L
Androstenedione	ng/dL	0.03492	nmol/L
Androsterone, Serum	ng/dL	0.0344	nmol/L
Androsterone, Urine	mg/24 h	3.4423	µmol/d

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Androsterone/Creatinine	mg/g	0.3894	μmol/mmol
Angiotensin I Converting Enzyme	mU/mL	1.0000	U/L
Angiotensin I	pg/mL	0.7716	pmol/L
Angiotensin II	pg/mL	0.9560	pmol/L
Angiotensin III	pg/mL	1.0741	pmol/L
Antidiuretic Hormone (ADH)	pg/mL	0.9225	pmol/L
Atrial Natriuretic Peptide (ANP)	pg/mL	0.3247	pmol/L
C-Peptide	ng/mL	0.3310	nmol/L
C-Peptide, Urine	ng/mL	0.3310	nmol/L
C-Peptide/Creatinine	μg/g	0.0374	nmol/mmol
Calcitonin	pg/mL	0.2926	pmol/L
Calcium Urine	mg/24 h	0.0250	mmol/d
Calcium	mg/dL	0.2495	mmol/L
Catecholamines, Urine	μg/24 h	5.6770	nmol/d
Catecholamines/Creatinine	μg/g	0.6422	nmol/mmol
Corticosterone	ng/dL	0.02886	nmol/L
Cortisol, Serum	μg/dL	27.5862	nmol/L
Cortisol, Urine	μg/24 h	2.7586	nmol/d
Cortisol/Creatinine	μg/g	0.3121	nmol/mmol
Cortisone	μg/dL	27.7393	nmol/L
Creatinine, Urine	mg/24 h	8.8420	μmol/d

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Cyclic Amp, Urine	nmol/mL	1.0000	µmol/L
Cyclic Amp/Creatinine	µmol/g	113.1000	nmol/mmol
Dehydroepiandrosterone (DHEA)	ng/dL	0.03467	nmol/L
Dehydroepiandrosterone-Sulfate (DHEA-S)	µg/dL	27.2109	nmol/L
Deoxycorticosterone (DOC)	ng/dL	30.2572	pmol/L
Dexamethasone	ng/dL	0.02548	nmol/L
Dihydrotestosterone (DHT)	ng/dL	0.03444	nmol/L
Dopamine, Plasma	pg/mL	6.5359	pmol/L
Dopamine, Urine	µg/24 h	6.5359	nmol/d
Dopamine/Creatinine	µg/g	0.7392	nmol/mmol
Endorphin, Beta	pg/mL	0.2500	pmol/L
Ephedrine, Urine	µg/24 h	5.4615	nmol/d
Epinephrine, Plasma	pg/mL	5.4615	pmol/L
Epinephrine/Creatinine	µg/g	0.6178	nmol/mmol
Estradiol	pg/mL	3.6711	pmol/L
Estril	ng/dL	34.6741	pmol/L
Estrogens, Serum	pg/mL	3.6845	pmol/L
Estrone Sulfate	ng/dL	28.6123	pmol/L
Estrone	pg/mL	3.6982	pmol/L
Folic Acid	ng/dL	22.6552	pmol/L

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Follicle Stimulating Hormone (FSH)	mIU/mL	1.0000	IU/L
Follicle Stimulating Hormone, Urine	IU/24 h	1.0000	IU/d
Free Testosterone	pg/mL	3.4674	pmol/L
FSH/Creatinine	IU/g	0.1131	IU/mmol
Gastrin	pg/mL	1.0000	ng/L
Glucagon	pg/mL	1.0000	ng/L
Growth Hormone	ng/mL	1.0000	µg/L
HCG, Urine	IU/24 h	1.0000	IU/d
HCG/Creatinine	IU/g	0.1131	IU/mmol
Homovanillic Acid (HVA), Urine	µg/24 h	5.4885	nmol/d
Human Chorionic Gonadotropin (HCG)	mIU/mL	1.0000 I	U/L
HVA/Creatinine	µg/g	0.6207	nmol/mmol
IGF-I (Somatomedin C)	ng/mL	0.1307	nmol/L
IGF-II	ng/mL	0.1333	nmol/L
IGF-II	ng/mL	0.1333	nmol/L
Inhibin	U/mL	1000.0	U/L
Insulin	µU/mL	6.945	pmol/L
LH/Creatinine	IU/g	0.1131	IU/mmol
Luteinizing Hormone (LH)	mIU/mL	1.0000	IU/L
Luteinizing Hormone, Urine	IU/24 h	1.0000	IU/d
Metanephrine, Urine	µg/24 h	5.0710	nmol/d

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Metanephrine/Creatinine	µg/g	0.5736	nmol/mmol
Metanephrines, Total, Urine	µg/24 h	5.2576	nmol/d
Metanephrines, Total/Creatinine	µg/g	0.5948	nmol/mmol
Methoxytyramine, Urine	µg/24 h	5.9809	nmol/d
Methoxytyramine/Creatinine	µg/g	0.6764	nmol/mmol
Norepinephrine, Plasma	pg/mL	5.9100	pmol/L
Norepinephrine, Urine	µg/24 h	5.9100	nmol/d
Norepinephrine/Creatinine	µg/g	0.6686	nmol/mmol
Normetanephrine, Urine	µg/24 h	5.4585	nmol/d
Normetanephrine/Creatinine	µg/g	0.6175	nmol/mmol
Osteocalcin	ng/mL	0.1538	nmol/L
Parathyroid Hormone	pg/mL	0.1053	pmol/L
Prednisolone	ng/dL	0.02774	nmol/L
Prednisone	ng/dL	0.02790	nmol/L
Pregnenolone	ng/dL	0.03160	nmol/L
Progesterone	ng/dL	0.03180	nmol/L
Prolactin	ng/mL	1.0000	µg/L
Renin (Plasma Renin Activity)	ng/mL/h	0.2778	ng/L/s
Reverse T-3	ng/dL	15.3610	pmol/L
Secretin	pg/mL	0.3273	pmol/L
Sex Hormone Binding Globulin (SHBG)	µg/dL	34.6741	nmol/L

HORMONE	WHEN YOU KNOW	MULTIPLY BY	TO FIND
Somatostatin-14	pg/mL	0.6105	pmol/L
Somatostatin-28	pg/mL	0.3053	pmol/L
Testosterone, Urine	µg/24 h	3.4674	nmol/d
Testosterone/Creatinine	µg/g	0.3922	nmol/mmol
Testosterone	ng/dL	0.03467	nmol/L
Thyroglobulin	ng/mL	1.0000	µg/L
Thyroid Stimulating Hormone (TSH)	µU/mL	1.0000	mU/L
Thyrotropin Releasing Hormone (TRH)	pg/mL	2.7624	pmol/L
Thyroxine (T-4)	µg/dL	12.8717	nmol/L
Thyroxine Binding Globulin	mg/dL	10.0000	mg/L
Triiodothyronine (T-3)	ng/dL	0.01536	nmol/L
Vanillylmandelic Acid (VMA), Urine	µg/24 h	5.0454	nmol/d
Vitamin B-12	ng/dL	7.3779	pmol/L
VMA/Creatinine	µg/g	0.5706	nmol/mmol



DISCLAIMER: This data applies to the highly sensitive and specific assay methods developed, validated, and performed solely at Endocrine Sciences.



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