Lab Dept: Chemistry

Test Name: TESTOSTERONE, TOTAL AND FREE

General Information

Lab Order Codes:	TGRP
Synonyms:	N/A
CPT Codes:	84402 – Testosterone, free 84403 – Testosterone, total
Test Includes:	Total testosterone (ng/dL), Free Testosterone (ng/dL)

Logistics

Test Indications:	Alternative, second-level test for suspected increases or decreases in physiologically active testosterone: ● Assessment of androgen status in cases with suspected or known sex hormone-binding globulin globulin-binding abnormalities ● Assessment of functional circulating testosterone in early pubertal boys or older men ● Assessment of functional circulating testosterone in women with symptoms or signs of hyperandrogenism, but normal total testosterone levels ● Monitoring of testosterone therapy or antiandrogen therapy in older men and in females
Lab Testing Sections:	Chemistry - Sendouts
Referred to:	Mayo Clinic Laboratories (Mayo test: TGRP)
Phone Numbers:	MIN Lab: 612-813-6280 STP Lab: 651-220-6550
Test Availability:	Daily, 24 hours
Turnaround Time:	3 – 5 days, test set up Monday - Saturday
Special Instructions:	N/A

Specimen

Specimen Type:	Blood
Container:	Red NO GEL (SST tubes will not be accepted)

Draw Volume:	7.5 mL (Minimum: 3 mL) blood
Processed Volume:	2.5 mL (Minimum: 1 mL) serum **Note:** Submission of the minimum volume does not permit repeat analysis.
Collection:	Routine blood collection
Special Processing:	Lab Staff: Centrifuge specimen within 1 hour of collection. Remove serum aliquot into a screw-capped round bottom plastic vial. Store and ship refrigerated in a plastic vial. Forward promptly.
Patient Preparation:	None
Sample Rejection:	Gross hemolysis; gross lipemia; gross icterus; mislabeled or unlabeled specimens

Interpretive

Reference Range:

TOTAL TESTOSTERONE:	
Infants: Full Term Newborns (0-5 months):	
Males:	**Females:**
75 – 400 ng/dL	20 - 80 ng/dL
Prepubertal Children:	
Males (6 months – 9 years):	<7 – 20 ng/dL
Females (6 months – 9 years):	<7 – 20 ng/dL

Puberty – Adult:	
Males:	**Females:**
10 – 11 years: <7 – 130 ng/dL	10 – 11 years: <7 – 20 ng/mL
12 – 13 years: <7 – 800 ng/dL	12 – 16 years: <7 – 75 ng/mL
14 years: <7 – 1200 ng/dL	
15 – 16 years: 100 – 1200 ng/dL	
17 – 18 years: 300 – 1200 ng/dL	17 – 18 years: 20 – 75 ng/mL
≥19 years: 240 – 950 ng/dL	≥19 years: 8 – 60 ng/mL

Tanner Stage	**Males ng/dL**	**Females ng/dL**
1	<7 - 20	< 2.5 – 10
2	8 - 66	7 – 28
3	26 - 800	15 – 35
4	85 - 1200	13 – 32
5	300 - 950	20 - 38

FREE TESTOSTERONE:	
Males	
Full Term Infants Males < 1 year	
1 – 15 days:	<0.20 – 3.10 ng/mL
16 days – 1 year:	Values decrease gradually from newborn (0.20 – 3.20 ng/mL) to prepubertal levels
Prepubertal Children Males	
1 – 8 years:	<0.04 – 0.11 ng/mL
9 years:	<0.04 – 0.45 ng/mL
10 years:	<0.04 – 1.26 ng/mL

11 years:	<0.04 – 5.52 ng/mL
12 years:	<0.04 – 9.28 ng/mL
13 years:	<0.04 – 12.6 ng/mL
14 years:	0.48 – 15.3 ng/mL
15 years:	1.62 – 17.7 ng/mL
16 years:	2.93 – 19.5 ng/mL
17 years:	4.28 – 20.9 ng/mL
18 years:	5.40 – 21.8 ng/mL
19 years:	5.36 – 21.2 ng/mL
Adults Males	
20 - <25 years:	5.25 – 20.7 ng/mL
25 - <30 years:	5.05 – 19.8 ng/mL
30 - <35 years:	4.85 – 19.0 ng/mL
35 - <40 years:	4.65 – 18.1 ng/mL
40 - <45 years:	4.46 – 17.1 ng/mL
45 - <50 years:	4.26 – 16.4 ng/mL
50 - <55 years:	4.06 – 15.6 ng/mL
55 - <60 years:	3.87 – 14.7 ng/mL
60 - <65 years:	3.67 – 13.9 ng/mL
65 - <70 years:	3.47 – 13.0 ng/mL
70 - <75 years:	3.28 – 12.2 ng/mL
75 - <80 years:	3.08 – 11.3 ng/mL
80 - <85 years:	2.88 – 10.5 ng/mL

85 - <90 years:	2.69 – 9.61 ng/mL
90 - <95 years:	2.49 – 8.76 ng/mL
95 – 100+ years:	2.29 – 7.91 ng/mL
Females	
Full Term Infants Females <1 year	
1 – 15 days	0.06 – 0.25 ng/mL
16 days – 1 year:	Values decrease gradually from newborn (0.06 – 0.25 ng/mL) to prepubertal levels
Prepubertal Children Females	
1 – 4 years:	<0.04 ng/mL
5 years:	<0.04 – 0.07 ng/mL
6 years:	<0.04 – 0.14 ng/mL
7 years:	<0.04 – 0.23 ng/mL
8 years:	<0.04 – 0.34 ng/mL
9 years:	<0.04 – 0.46 ng/mL
10 years:	<0.04 – 0.59 ng/mL
11 years:	<0.04 – 0.72 ng/mL
12 years:	<0.04 – 0.84 ng/mL
13 years:	<0.04 – 0.96 ng/mL
14 years:	<0.04 – 1.06 ng/mL
15 - 18 years:	<0.04 – 1.09 ng/mL
19 years:	0.06 – 1.08 ng/mL
Adults Females	
20 - <25 years:	0.06 – 1.08 ng/mL

25 - <30 years:	0.06 – 1.06 ng/mL
30 - <35 years:	0.06 – 1.03 ng/mL
35 - <40 years:	0.06 – 1.00 ng/mL
40 - <45 years:	0.06 – 0.98 ng/mL
45 - <50 years:	0.06 – 0.95 ng/mL
50 - <55 years:	0.06 – 0.92 ng/mL
55 - <60 years:	0.06 – 0.90 ng/mL
60 - <65 years:	0.06 – 0.87 ng/mL
65 - <70 years:	0.06 – 0.84 ng/mL
70 - <75 years:	0.06 – 0.82 ng/mL
75 - <80 years:	0.06 – 0.79 ng/mL
80 - <85 years:	0.06 – 0.76 ng/mL
85 - <90 years:	0.06 – 0.73 ng/mL
90 - <95 years:	0.06 – 0.71 ng/mL
95 – 100+ years:	0.06 – 0.68 ng/mL

Critical Values: N/A

Limitations: Early morning testosterone levels in young male individuals are on average 50% higher than pm levels, reference values were established using specimens collected in the morning.

Testosterone levels can fluctuate substantially between different days, and sometimes more rapidly. Assessment of androgen status should be based on more than a single measurement.

The low end of the normal reference range for total testosterone in prepubertal subjects is not yet established.

While free testosterone can be used for the same indications as bioavailable testosterone, determination of bioavailable testosterone levels may be superior to free testosterone measurement in most situations.

Methodology:	Free Testosterone: Equilibrium Dialysis Total Testosterone: Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)
References:	Mayo Clinic Laboratories April 2022
Updates:	4/17/12: Reference range updates. 8/2/2017: Ref range update (Males >18) 1/18/2018: Update Sex Binding Hormone reference ranges 11/20/2021: Moved from Esoterix to Mayo