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**Lab Dept:** Chemistry

**Test Name:** TESTOSTERONE, TOTAL AND FREE

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***General Information***

**Lab Order Codes:** FTES

**Synonyms:** N/A

**CPT Codes:** 84402 – Testosterone, free  
84270 – Sex hormone binding globulin  
84403 – Testosterone, total

**Test Includes:** Total testosterone (ng/mL), Free Testosterone (pg/mL), % free testosterone, and sex hormone binding globulin (SHBG)(nmol/L)

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***Logistics***

**Test Indications:** Most circulating testosterone is bound to a specific carrier protein usually called sex hormone binding hormone (SHBG) or testosterone-binding globulin (TeBG). A small portion of total testosterone exists in the free or unbound state available for entry into the cells of target organs. Free testosterone is probably the physiologically active component of testosterone. The serum free testosterone assay was developed because the measurement total testosterone does not always give an accurate picture of the amount of testosterone available to target organ cells. A number of conditions or medications are known to increase or decrease the TeBG concentration, which may cause total testosterone concentration to change but without necessarily influencing the free testosterone concentration, many of the influences known to alter thyroxine-binding proteins also influence TeBG in a similar way. Thus, estrogens increase the concentration of TeBG and androgens tend to decrease it.

**Lab Testing Sections:** Chemistry - Sendouts

**Referred to:** Esoterix, Inc. (ESL Test: 500290)

**Phone Numbers:** MIN Lab: 612-813-6280

STP Lab: 651-220-6550

**Test Availability:** Daily, 24 hours

**Turnaround Time:** 4 – 7 days, test set up Monday - Friday

**Special Instructions:** N/A

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***Specimen***

|                             |  |
|-----------------------------|--|
| <b>Specimen Type:</b>       | Blood  |
| <b>Container:</b>           | Red top tube   |
| <b>Draw Volume:</b>         | 6 mL (Minimum: 3 mL) blood   |
| <b>Processed Volume:</b>    | 2 mL (Minimum: 1 mL) serum<br><b>Note:</b> Submission of the minimum volume does not permit repeat analysis.   |
| <b>Collection:</b>          | Routine blood collection   |
| <b>Special Processing:</b>  | Lab Staff: Centrifuge specimen within 1 hour of collection. Remove serum aliquot into a screw-capped round bottom plastic vial. Store and ship frozen in a plastic vial. Forward promptly. |
| <b>Patient Preparation:</b> | None   |
| <b>Sample Rejection:</b>    | Specimen not separated within 1 hour of draw; mislabeled or unlabeled specimens  |

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***Interpretive***

**Reference Range:**

|                            |
|----------------------------|
| <b>Total Testosterone:</b> |
|----------------------------|

| <b>Premature Infants:</b>  |                    |                    |                      |                    |
|--|--------------------|--------------------|----------------------|--------------------|
| <b>Age</b>   | <b>Males</b>       |                    | <b>Females</b>       |                    |
| 26 - 28 weeks, day 4   | 59 - 125 ng/dL     |                    | 5 - 16 ng/dL         |                    |
| 31 - 35 weeks, day 4   | 37 - 198 ng/dL     |                    | 5 - 22 ng/dL         |                    |
| <b>Infants: Full Term Newborns:</b>  |                    |                    |                      |                    |
| <b>Males*</b>  |                    |                    | <b>Females**</b>     |                    |
| 75 - 400 ng/dL   |                    |                    | 20 - 64 ng/dL        |                    |
| Infants: 1-7 months  |                    |                    |                      |                    |
| *Males: Levels decrease rapidly the first week to 20 - 50 ng/dL, then increase to 60 - 400 ng/dL between 20 - 60 days. Levels then decline to prepubertal range by 7 months. |                    |                    |                      |                    |
| **Females: Levels decrease during the first month to <10 ng/dL and remain there until puberty.   |                    |                    |                      |                    |
| <b>Prepubertal Children:</b>   |                    |                    |                      |                    |
| Males (1 – 10 years):  |                    |                    | <2.5 – 10 ng/dL      |                    |
| Females (1 – 9 years):   |                    |                    | <2.5 – 10 ng/dL      |                    |
| <b>Puberty:</b>  |                    |                    |                      |                    |
| <b>Tanner Stage</b>  | <b>Males ng/dL</b> | <b>Age (years)</b> | <b>Females ng/dL</b> | <b>Age (years)</b> |
| 1  | <2.5 – 10          | <9.8               | < 2.5 – 10           | <9.2               |
| 2  | 18 – 150           | 9.8 – 14.5         | 7 – 28               | 9.2 – 13.7         |
| 3  | 100 - 320          | 10.7 – 15.4        | 15 – 35              | 10.0 – 14.4        |
| 4  | 200 – 620          | 11.8 – 16.2        | 13 – 32              | 10.7 – 15.6        |
| 5  | 350 - 970          | 12.8 – 17.3        | 20 - 38              | 11.8 – 18.6        |

| <b>Adult:</b>                | <b>Male</b>                                    | <b>Female</b>  |
|------------------------------|--|--|
| 20 – 50 years:               | 264 – 916 ng/dL                                | Premenopausal:<br>10 – 55 ng/dL<br><br>Postmenopausal:<br>7 – 40 ng/dL |
| <b>Free Testosterone:</b>    |  |  |
| <b>Males</b>                 | <b>% Free</b>                                  | <b>pg/dL</b>   |
| Full Term Infants Males      |  |  |
| 1 – 15 days                  | 0.9 – 1.7                                      | 1.5 – 31   |
| 1 – 3 months                 | 0.4 – 0.8                                      | 3.3 – 18   |
| 3 – 5 months                 | 0.4 – 1.1                                      | 0.7 – 14   |
| 5 – 7 months                 | 0.4 – 1.0                                      | 0.4 – 4.8  |
| Prepubertal Children Males   |  |  |
| 1 – 10 years                 | 0.4 – 0.9                                      | 0.15 – 0.6   |
| Puberty Males                | Comprehensive values are currently unavailable |  |
| Adults Males                 | 1.5 – 3.2                                      | 52 - 280   |
| <b>Females</b>               | <b>% Free</b>                                  | <b>pg/dL</b>   |
| Full Term Infants Females    |  |  |
| 1 – 15 days                  | 0.8 – 1.5                                      | 0.5 – 2.5  |
| 1 – 3 months                 | 0.4 – 1.1                                      | 0.1 – 1.3  |
| 3 – 5 months                 | 0.5 – 1.0                                      | 0.3 – 1.1  |
| 5 – 7 months                 | 0.5 – 0.8                                      | 0.2 – 0.6  |
| Prepubertal Children Females |  |  |
| 1 – 10 years                 | 0.4 – 0.9                                      | 0.15 – 0.6   |

|                                     |   |                         |
|-------------------------------------|---|-------------------------|
| Puberty Females                     | Comprehensive values are currently unavailable. |                         |
| Adults Females                      | 0.8 – 1.4                                       | 1.1 – 6.3               |
| <b>Sex Hormone Binding Globulin</b> |   |                         |
| <b>Age</b>                          | <b>Males (nmol/L)</b>                           | <b>Females (nmol/L)</b> |
| Infants 1 – 23 months:              | 60.0 – 252.0                                    | 60.0 – 252.0            |
| Prepubertal:                        | 72.0 – 220.0                                    | 72.0 – 220.0            |
| Pubertal:                           | 16.0 – 100.0                                    | 36.0 – 125.0            |
| Adults 20 – 49 years:               | 72 – 220  | 72 - 220                |
| Adults >49 years:                   | 19.3 – 76.4                                     | 24.6 – 122.0            |

**Critical Values:**

N/A

**Limitations:**

N/A

**Methodology:**

Binding Capacity/HPLC Tandem Mass Spectrophotometer

**References:**

Esoterix Inc. “Expected Value and S.I. Unit Conversion Table”, 5<sup>th</sup> Edition

[Esoterix Laboratories](#) January 2018

**Updates:**

4/17/12: Reference range updates.

8/2/2017: Ref range update (Males >18)

1/18/2018: Update Sex Binding Hormone reference ranges