ENDOCRINOLOGY
DIVISION NEWS
Volume 2 | Issue 1 |July 2015

AACC Better health through laboratory medicine.

THE RECEPTOR

Message from the Chair

Hubert Vesper, PhD,
Centers for Disease Control and Prevention

Greetings!

The 2015 AACC Annual Meeting begins very soon and I would like to take this time to encourage you to attend several Endocrinology Division activities. Some of the specific details for these programs are listed in this newsletter. We'll be having our annual meeting on Monday at noon with presentations from two experts: Dr. Jim Faix and Dr. Katleen Van Uytfanghe. I am very glad to have these two distinguished speaker with us and, for the first time, we are able to provide CME and ACCENT credits for this event. In addition to the presentations, you will have a wonderful opportunity to meet others interested in endocrinology. At this event, we will also recognize our division's poster award winners Suemi Marui and Sonia La'ulu. Hopefully you can attend our first Annual Meeting, and I look forward to meeting all that attend!

Other relevant activities include the Tuesday poster walk, led by Dr. William Winter; the CDC Standardization Programs Forum also on Tuesday; and the NGSP IFCC Manufacturer Forum. For the first time, AACC has created an endocrinology mini-track. I encourage you to take a look at it and consider participating in some or all of the recommended courses. Of course there are a number of other excellent endocrinology related sessions for consideration too! You can easily find them in the program guide.

It's only a few days and we'll be meeting in Atlanta! I look forward to seeing all of you.

Travel safely,

Hubert Vesper
Chair, Endocrinology Division

Endocrinology Division Poster Awards

The Endocrinology Division Awards Committee led by Dr. Vesper, congratulates our 2015 Poster Award winners.

- Is free T3 useful to evaluate thyroid status? by Suemi Marui, and
- Zooming In on the Low End: Functional Sensitivity of Automated Testosterone Immunoassays by Sonia La'ulu

The poster award recipients will be recognized at the division's annual meeting.

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Division Activities at the 2015 Annual Meeting

Endocrinology Division Annual meeting
Monday July 27, 2015, 12:00 pm – 2:00 pm
Hyatt Regency, Farlie room

Presentations
Diagnostic Endocrinology: 2015 Update – Dr. Jim Faix
Thyroid Function Test Standardization & Harmonization: 2015 Update - Dr. Katleen Van Uytfanghe

ACCENT and CME credit will be available

We will present the poster awards (I already send you an email with further details)
We applied for ACCENT and CME credits for the mixer. Still waiting on the approval notice.

NGSP IFCC Manufacturer Forum
Monday, July 27
10:00 am – 12:00 pm
Hyatt Regency Atlanta – Hanover F and G

Poster Walk led by Dr. William Winter
Tuesday, July 28, 12:30 pm -1:30 pm
Georgia World Congress Center Exhibit Hall

CDC Standardization Programs Forum
Tuesday July 28
5:30 pm - 7:00pm
Hyatt Regency Atlanta- Room: Hanover D/E

CDC's Hormone Standardization Programs supports laboratories and assay manufactures with increasing the accuracy and reliability of clinical laboratory measurements for key hormones such as vitamin D, estradiol and testosterone. This annual CDC Forum will

- review the status of assay standardization for testosterone, estradiol and 25-hydroxyvitamin D,
- update about changes to the current program such as new performance criteria for assay evaluation,
- introduce new products and services to better demonstrate measurement accuracy and performance to other organizations and agencies,
- outline plans for introducing new analytes such as SHBG, PTH, and for new related interlaboratory comparison studies.

All are invited to attend, no registration is necessary. However, we encourage attendees to arrive in time as seating might be limited. Any questions or requests for further information can be sent to standardization@cdc.gov.

Endocrinology Mini-Track

This year's annual meeting is featuring a concentrated "track" for those interested in concentrating their educational experience in an area of laboratory medicine. The Endocrinology Mini-Track includes the following:

32208 Influence of Non-Glycemic Factors on Hemoglobin A1c: Fact and Fiction
33211 Urine Free Cortisol: Pros and Cons
33104 Oral Abstracts - Endocrinology in Preventive and Chronic Care
191005 Laboratorians to Diagnosticians: The True Value of Laboratory Medicine in Endocrinology Practice
73215 Laboratory Identification of Hemoglobinopathies: A Case Study Approach
44117/54217 Diagnostic Endocrinology 2015

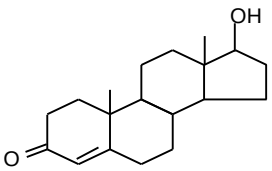
HORMOME OF THE MONTH

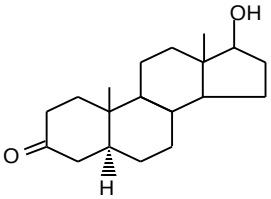
What is sex hormone binding globulin (SHBG) and why would SHBG ever be measured?
William E. Winter, MD

Sex hormone binding globulin (SHBG) is a ~100 kDa homodimeric plasma protein where its 373 amino acid monomeric form is ~50 kDa. The gene for SHBG is located on chromosome 17p1.

SHBG serves as the plasma transport protein for testosterone and dihydrotestosterone (DHT) (Figure 1). Estrogen is also carried on SHBG whereas the affinity of SHBG for estrogen is lower than for testosterone or dihydrotestosterone. Estrogens and thyroid hormone increase SHBG concentrations, whereas insulin, growth hormone, glucocorticoids, androgens, and progestins lower SHBG concentrations. SHBG concentrations are higher in children than in adults. SHBG concentrations are generally higher in women than in men although their reference intervals overlap substantially. SHBG levels may decline in persons with the metabolic syndrome. With increasing age SHBG levels rise in men.

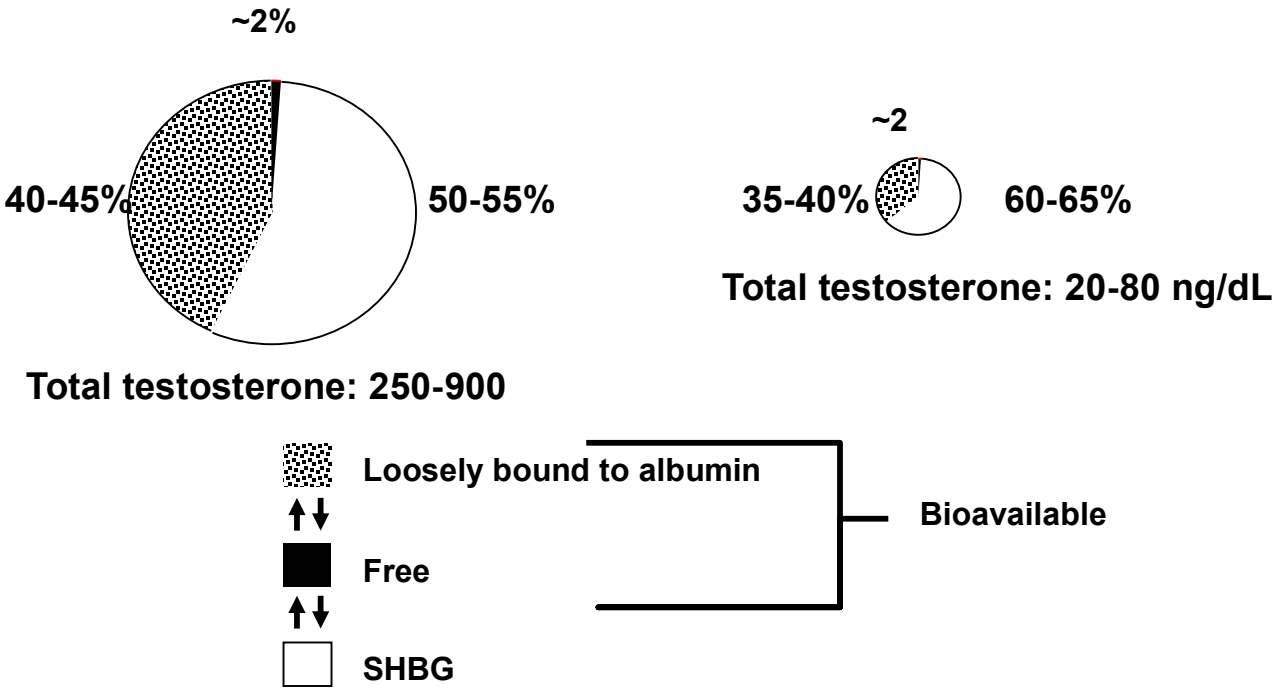
Testosterone **Dihydrotestosterone**





Testosterone exists in 3 pools: free, loosely (a.k.a. - weakly) bound to albumin and tightly bound to SHBG. Both free and weakly bound testosterones are considered to be biologically active (e.g., "bioactive" or "bioavailable"). Various sources report that the percent free testosterone (as a proportion of the total testosterone) is 0.5 - 3.0% or 1.0 - 4.0%. Often the figure of 2% is used as the average percent free testosterone in men and women. In men, albumin-bound testosterone is 50 - 65% of the total testosterone and SHBG-bound testosterone is 40 - 45% of the total testosterone (Figure 2). In women, albumin-bound testosterone is 35-40% of the total testosterone and SHBG-bound testosterone is 60-65% of the total testosterone (Figure 2)

Distribution of testosterone in plasma: men versus women



Adapted from figures provided by Lawrence Demers, PhD

Free or bioavailable testosterone can be measured using a variety of methods: calculated from the total testosterone and SHBG measurements, ultracentrifugation, dialysis equilibrium, precipitation of SHBG-bound testosterone, direct immunoassay and mass spectroscopy. What constitutes the "best method" for measuring free or bioavailable testosterone is controversial; however, many experts believe that in the setting of the routine clinical laboratory, the calculation of the free testosterone based upon the total testosterone and SHBG levels is the superior approach (see: http://www.issam.ch/freetesuit.htm) . Note that in women and children, total testosterone is best measured by mass spectroscopy.

General references:

- Diver MJ. Laboratory measurement of testosterone. Front Horm Res. 2009;37:21-31.
- Elin RJ, Winters SJ. Current controversies in testosterone testing: aging and obesity. Clin Lab Med. 2004 Mar;24(1):119-39.
- Grundy SM, Brewer HB Jr, Cleeman JI, Smith SC Jr, Lenfant C; American Heart Association; National Heart, Lung, and Blood Institute. Definition of metabolic syndrome: Report of the National Heart, Lung, and Blood Institute/American Heart Association conference on scientific issues related to definition. Circulation. 2004 Jan 27;109(3):433-8.
- Morales A, Collier CP, Clark AF. A critical appraisal of accuracy and cost of laboratory methodologies for the diagnosis of hypogonadism: the role of free testosterone assays. Can J Urol. 2012 Jun;19(3):6314-8.
- Patel SM, Nestler JE. Fertility in polycystic ovary syndrome. Endocrinol Metab Clin North Am. 2006 Mar;35(1):137-55, vii.
- Rachoń D. Differential diagnosis of hyperandrogenism in women with polycystic ovary syndrome. Exp Clin Endocrinol Diabetes. 2012 Apr;120(4):205-9.
- Rosenfield RL. Ovarian and adrenal function in polycystic ovary syndrome. Endocrinol Metab Clin North Am. 1999 Jun;28(2):265-93.
- Wheeler MJ. Measurement of androgens. Methods Mol Biol. 2006;324:197-211.