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ST VINCENT'S PATHOLOGY

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SEX HORMONE BINDING GLOBULIN (SHBG) INFORMATION SHEET

PHYSIOLOGY

Sex Hormone Binding Globulin (SHBG) is the major binding protein for testosterone in the serum, accounting for about 40% of testosterone binding with serum albumin accounting for the remainder. SHBG is a dimeric glycoprotein of molecular weight 90,000 comprising 373 amino acids. SHBG is secreted from the liver with production strongly regulated by a number of hormonal and other factors. Before puberty SHBG concentrations are similar in males and females, but due to the effects of sex hormones the adult female concentrations are approximately twice those of adult males. The concentration of SHBG affects the bioavailability of testosterone, with high concentrations binding more testosterone leaving less free for interaction with tissue receptors, and conversely low SHBG concentrations leading to higher free testosterone concentrations. In women the effect of SHBG on testosterone is assessed with the Free Androgen Index (FAI) which is equal to the total testosterone concentration divided by the SHBG concentration. The FAI is not a suitable tool for use in males. Oestrogen also binds to SHBG but with 1/5th the affinity of testosterone.

PATHOLOGY

SHBG production is strongly influenced by sex hormones, increasing in high oestrogen states and falling in high androgen states. Production is also affected by age, corticosteroid status, thyroid status and other factors. Concentrations are commonly low in polycystic ovarian syndrome, contributing to the excess androgen effects in this condition. Low concentrations of SHBG in obesity, hypothyroidism and acromegaly may influence total testosterone concentrations indicating the need for an assessment of free testosterone concentration.

CAUSES OF ELEVATED SERUM SHBG

- High oestrogen states (eg pregnancy)
- Low androgens (hypogonadism), androgen insensitivity
- Increasing age
- Drugs: oral contraceptive pill, hormone replacement therapy, tamoxifen, phenytoin, carbamazepine
- Other: thyrotoxicosis, cirrhosis, anorexia nervosa (women only)

CAUSES OF DECREASED SERUM SHBG

- Obesity
- Polycystic ovarian syndrome (PCOS)
- Cushing's syndrome, hypothyroidism, acromegaly, hyperprolactinaemia
- Drugs: corticosteroid treatment, androgen treatment, Danazol
- Other: nephrotic syndrome, congenital deficiency, expected fall after menopause

SYDPATH REFERENCE INTERVALS:

Female: (15 years and older): 20 - 110
Male: (15 - 50 years): 15 – 50, (>50 years): 20 – 90
(no intervals supplied for subjects < 15 years of age)

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