



Age Management Panel Male Fasting Panel

Doctor ID 1001	Patient Name DOE, JOHN				Doctor Name and Address DR AGE WRIGHT ANYTOWN, USA
Age 55	Sex M	Test ID 4306	Accession # 999999	Test Code 4306	
Date Collected 01/01/07	Date Received 01/02/07	Date Reported 01/06/07	Tech ZT		
Comments SAMPLE REPORT					

TEST	RESULT	UNITS	RANGE
FASTING INSULIN	7.5	µIU/mL	0 - 30
IGF-1	555	ng/mL	402 - 839
IGFBP-3	5.8	µg/mL	age 20-50 3.4-6.7 age 50+ 3.2-6.6
ESTRADIOL	5 L	pg/mL	6.0 - 30.0
TOTAL TESTOSTERONE	425	ng/dL	300 - 750
FREE TESTOSTERONE	25	pg/mL	5.9 - 41.45
SHBG	36	nmo/L	13 - 71
ALBUMIN	4.3	g/dL	age 20 - 59 3.5-5.2 age 60 - 90 3.2-4.6
BIOAVAILABLE TESTOSTERONE (calculated)	195	ng/dL	age 18+ 130-680
PSA	1.3	ng/mL	0.1 - 4.0
FREE PSA	25	ng/mL	
Free/Total PSA Ratio		%	0 - 10% suggest carcinoma 10 - 20% equivocal >20% suggest benign

The ratio is most clinically useful in the total PSA range of 4 to 10 ng/mL (high PSA)

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Patient Name DOE, JOHN	
Test ID	Accession # 999999

TEST	RESULT	UNITS	RANGE
DHEA-S	225	µg/mL	52 - 365
HOMOCYSTEINE	15 H	µmo/L	5.0 - 12.0
hs C-REACTIVE PROTEIN	1.5 H	mg/dL	0 - 1.1
FREE T3	3.2	pg/mL	1.8 - 3.9

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Patient Name: **DOE, JOHN**

Accession #: **999999**

AGE MANAGEMENT PANEL™

Interpretive Commentaries

Fasting Insulin

- H - Elevated fasting insulin levels are indicative of insulin resistance, a precursor of non-insulin dependent diabetes. Fasting insulin can also be elevated in cases of pancreatic beta cell tumors (insulinoma).
- L - Not Indicative.

Insulin-like Growth Factor – I (IGF-I)

IGF-1 is produced primarily by the liver as an endocrine hormone impacting target tissues in a paracrine/autocrine fashion. Its primary action is mediated by binding to specific IGF receptors present on many cell types in many tissues. The signal is transduced by intracellular events. IGF-1 is one of the most potent natural activators of the AKT signaling pathway, a stimulator of cell growth and multiplication and a potent inhibitor of apoptosis. Almost every cell in the human body is affected by IGF-1, especially cells in muscle, cartilage, bone, liver, kidney, nerves, skin, and lungs. In addition to the insulin-like effects, IGF-1 can also regulate cell growth and development, especially in nerve cells, as well as cellular DNA synthesis

IGF-I is routinely tested to identify diseases and conditions caused by deficiencies and overproduction of growth hormone (GH), to evaluate pituitary function, and to monitor the effectiveness of GH treatment.

- H - Growth hormone supplementation
Pituitary tumor

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Acromegaly

- L - Malnutrition
- Growth hormone insensitivity
- Lack of growth hormone receptors
- Signaling pathway disruption
- Hypopituitarism
- Dwarfism
- Hypothyroidism
- Kwashiorkor
- Hepatocellular disease, cirrhosis
- Anorexia
- Emotional deprivation syndrome

IGFBP-3

Insulin-like growth factor binding proteins bind IGF-I and IGF-II with high affinity but do not bind insulin. There have been six distinct IGF binding proteins structurally identified at this time; however, IGFBP-3 has been demonstrated to be the major transporter of IGF-I and IGF-II, transporting approximately 95% of the two hormones. IGFBP-3 is growth hormone (GH) dependent and therefore useful in the evaluation of GH secretion.

The IGFBP-3 assay is useful in determining nutritional status, because IGFBP-3 decreases with both caloric and protein restriction.

Hypertensive individuals with concomitant high IGFBP-3 values have been associated with a nine-fold risk increase for carotid arteriosclerosis.

Estradiol (E2)

Estradiol is a steroid hormone produced primarily by the ovary and peripheral tissues such as cutaneous fat and skin in females, and the testes in men. It is considered to be the most active of endogenous estrogens. Testosterone and DHEA may also be aromatized in the tissues to estradiol. It may be converted to estrone or estriol in the body. In females, levels vary depending on menstrual cycle phase.

- H - hormone supplementation (estrogen, DHEA, testosterone, pregnenolone)
- Estrogen producing tumors (men and women)
- Testicular feminization syndrome
- Precocious puberty related to adrenal tumors

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Hepatic cirrhosis

Hyperthyroidism

In females, during menses, preovulation, and during the 23rd to 41st week of pregnancy

- L - Primary and secondary hypogonadism
- Kallman syndrome
- Anorchia, primary testicular failure
- Hypofunction or dysfunction of the pituitary and adrenal glands
- Menopause

Testosterone, Free and Total

Testosterone is secreted by the testes and adrenal glands in men, and by the adrenal glands and ovaries in women. Testosterone exists in the serum both free and bound to albumin and sex hormone binding globulin. Unbound (free) testosterone is the physiologically active form.

Total testosterone

- H - Men: Hyperthyroidism
Syndromes of androgen resistance
Adrenal tumors
Congenital adrenal hyperplasia
Precocious puberty
Idiopathic CNS lesion
- L - Men: Hypogonadism
Klinefelter's syndrome
Hypopituitarism (primary and secondary)
Orchidectomy
Hepatic cirrhosis
Down syndrome
Delayed puberty

Free testosterone

- H - Men: Testosterone supplementation
DHEA supplementation
- L - Men: High SHBG
Alcoholism

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Steroids, androgens

SHBG - Sex hormone binding globulin

This is also known as testosterone binding globulin, but also binds estrogens with lower binding constants. It is a protein that has one androgen binding site per molecule. In the serum, about 2% of testosterone is free, and 44% is bound to SHBG, the other 54% is bound to albumin. The fraction of testosterone bound to SHBG is proportional to the amount of SHBG. Estradiol is also bound to SHBG, though with less affinity. Testosterone supplementation has a suppressive effect on circulating SHBG levels while estrogen supplementation has a stimulative effect.

- H – estrogen supplementation, specifically oral, synthetic estrogens
Females have higher levels than men
Hypogonadal men
Thyroid hormone excess
- L – testosterone supplementation
Hypothyroidism

Albumin

Albumins are a group of proteins that constitutes roughly {60%} of the plasma proteins. It is the most abundant protein important in transporting fatty acids, thyroid hormones, some steroid hormones (i.e. testosterone in a dissociable manner), and other substances.

- H - IV infusions
Dehydration
(elevated hemoglobin and hematocrit indicate higher albumin levels)
- L - Liver disease
Alcoholism
Malabsorption syndromes
Crohn's disease
Protein losing enteropathy
Starvation states
Congenital analbuminemia
Nephrotic syndrome
Burns (third degree)

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Bioavailable Testosterone (calculated)

Bioavailable testosterone (non-SHBG testosterone) is a calculated value thought to most accurately reflect the amount of Testosterone available to the tissues. It is calculated from the levels of Total Testosterone, SHBG, and albumin. Testosterone bound weakly to albumin is considered readily dissociable, while the fraction bound to SHBG is not tissue available. Bioavailable testosterone is computed from the levels of these analytes and is believed to be a truer indicator of testosterone status than free testosterone. ^{1A}

1A. *"J Clin Endocrinol Metab 84:3666-3672, 1999 – A critical evaluation of simple methods for the estimation of free testosterone in serum"*

Prostate Specific Antigen (PSA) and Free PSA

PSA is a protein produced by the cells of the prostate gland. PSA is present in small quantities in the serum of normal men, and is often elevated in the presence of prostate cancer and in other prostate disorders. Higher than normal levels of PSA are associated with both localized and metastatic prostate cancer.

PSA is normally present in the blood at very low levels. Increased levels of PSA may suggest the presence of prostate cancer. However, prostate cancer can also be present in the complete absence of an elevated PSA level, in which case the test result would be a false negative.

PSA levels can also be elevated due to prostate infection, irritation, benign prostatic hypertrophy or recent ejaculation, in which case the test may give a false positive.

In serum, PSA is largely bound to proteins, mainly α 1-antitrypsin (ACT) and to a lesser extent α -2-macroglobulin. Measured total PSA consists of free and inhibitor bound forms. A small amount of PSA is not protein bound and is called free PSA (synonym PSA II, or fPSA).

The risk of cancer increases if the free to total ratio is less than 20%. The lower the percentage, the greater the probability of prostate cancer. Over 20% suggests benign, 10 – 20% equivocal, and less than 10% suggesting carcinoma. Measuring the free to total PSA appears to be particularly promising for eliminating unnecessary biopsies in men with total PSA levels between 4 and 10 ng/mL, with a concomitant ratio greater than 20%. The free to total PSA ratio is FDA approved.

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DHEA-S

DHEA-S originates almost exclusively in the adrenal glands, although some may be derived from the testes, none is produced by the ovaries. DHEA-S is weakly androgenic but is metabolized in peripheral tissues to testosterone and dihydrotestosterone. Serum levels of DHEA-S are > 1000X those of DHEA and 10 times those of cortisol. Unlike DHEA, DHEA-S does not exhibit a marked diurnal variation and has a low clearance rate. Unlike testosterone, DHEA-S does not circulate bound to sex hormone. DHEA-S levels in men and women decline progressively with age.

- H - Supplementation of DHEA
 Hyperplasia of adrenal gland
 Adrenocortical tumor (adrenal malignancy)
 Cushing's Disease
 Polycystic ovarian syndrome (PCOS)

- L - Peripheral tissue conversion to testosterone/estradiol
 Gradual decline with age (peaks between 20 and 30 years of age)
 Low adrenal function
 Hypopituitarism
 Addison's Disease

Homocysteine

- H - Elevated homocysteine is an independent risk factor for cardiovascular disease. It is also used as a functional test for vitamin B₁₂, folate, and/or vitamin B₆ deficiency (when homocysteine is high, vitamin supplementation is recommended).

 Individual variability is ~8% over a one year period, although it can be up to 25% in patients with hyperhomocysteinemia. Generally, one measurement is considered sufficient to determine homocysteine relevance.

- L - Homocysteine values can be low due to Down syndrome, pregnancy, hyperthyroidism, and early diabetes.

C-Reactive Protein, high sensitivity, hs-CRP

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H - CRP levels in serum may rise during general, nonspecific response to infectious or non-infectious inflammatory conditions such as cardiovascular disease, rheumatoid arthritis, or peripheral vascular disease. CRP is synthesized in the liver and is normally present in trace quantities.

24 to 48 hours after acute tissue damage, production of CRP rises dramatically, up to approximately 1000 times the constitutive level.

As elevated CRP levels are always associated with pathological changes, the CRP values provide useful information in the diagnosis, intervention, and monitoring of inflammatory conditions and diseases. However, it is not indicative any specific inflammatory condition and should be used in context of a constellation of other indicators.

L - CRP does not produce a meaningful Low indication.

Free T3

This value measures the circulatory T3 that exists in the free state in the blood, unbound to protein. This value is used to rule out T3 toxicosis, hypothyroidism, and hyperthyroidism. It is also an important factor in determining appropriate thyroid supplementation.

H - Hyperthyroidism
T3 toxicosis
Peripheral resistance syndrome

L - Hypothyroidism