

Four hormones make up the Male Panel: testosterone, estradiol, DHEA-S and cortisol. Interactions between these hormones are fundamental to health and, as a consequence, imbalances may negatively impact health. Progesterone levels are generally not useful in men, although men exposed to progesterone cream through skin to skin transfer from a partner may experience significant accumulation and testosterone deficiency symptoms may ensue.

Testosterone

- ▶ Production of testosterone is stimulated by luteinizing hormone (LH), the output of which is regulated via estradiol levels. If estradiol is high, LH shuts down and testosterone production declines.
- ▶ Low testosterone levels may be a result of decreased hormone production or due to increased conversion of testosterone to estradiol via the aromatase enzyme.

Estradiol

- ▶ If estradiol is high, LH shuts down and testosterone production declines.
- ▶ Excess estradiol can compete with testosterone at gene response sites, and thus interfere with the message testosterone is trying to deliver.

Cortisol

- ▶ Cortisol and testosterone deliver opposing messages to many of the same genes. Consequently, when cortisol levels are high, men with normal testosterone levels may have symptoms of testosterone deficiency because the elevated cortisol interferes with the testosterone message. This results in a functional deficiency; where the system has normal levels of testosterone, but functions as if there is not enough.
- ▶ High cortisol can induce aromatase, which speeds the conversion of testosterone to estradiol, resulting in elevated estradiol levels.
- ▶ Excess cortisol is catabolic for bone and also opposes the action of testosterone, which is anabolic for bone. Thus, significant bone loss may occur with elevated cortisol levels.
- ▶ Over time, high cortisol levels may cause the adrenal glands to suppress cortisol production.

Testosterone/Estradiol Ratio

- ▶ Our laboratory data shows that the ratio of testosterone to estradiol for a 20 year old man is between 20 and 40. A decrease in the T/E2 ratio is associated with an increased risk of cardiovascular disease.
- ▶ The aromatase enzyme that converts testosterone to estradiol is found in adipose fat cells. Men with central adiposity or high cortisol levels may have more aromatase activity and therefore convert more testosterone to estradiol. Excessive aromatization may result in symptoms like breast enlargement, decreased muscle mass, and emotional disturbances.

DHEA-S

- ▶ DHEA is stored in the blood mainly in its sulphate form, DHEA-S.
- ▶ Cortisol and DHEA have opposite effects on immune function and insulin regulation.
- ▶ High cortisol levels mean more DHEA must be released to balance effects of cortisol therefore, chronically elevated cortisol can result in a deficiency of DHEA.
- ▶ The ratio of cortisol to DHEA-S increases with age, mostly because of declining DHEA levels. ZRT Laboratory data shows age and ratio associations as follows:
 - age 20 - 0.6
 - age 45 - 1.0
 - age 60 - 1.5
 - age 75 - 2.3
- ▶ Low DHEA-S levels may be associated with hypothyroidism, depression, and chronic fatigue.



Cortisol
DHEAs
Estradiol
Testosterone

This panel provides an excellent overview of male hormone balance.



Hormone	Clinical Considerations	Hormone	Clinical Considerations
Low Estradiol	<ul style="list-style-type: none"> • supplements to boost estrogen production <ul style="list-style-type: none"> – boron • periodic monitoring of bone density in the face of low estradiol may be advisable 	High* Estradiol	<ul style="list-style-type: none"> • nutritional supplements <ul style="list-style-type: none"> – zinc may slow conversion of testosterone to estradiol via aromatase – chrysin may decrease aromatization of testosterone to estradiol • reduce estrogen formation <ul style="list-style-type: none"> – prescription aromatase inhibitors like letrozole and anastrozole decrease conversion of testosterone to estradiol (not an approved indication) – reduce cortisol levels, as cortisol drives aromatase expression – weight loss reduces aromatase activity • optimize liver function
Low Testosterone	<ul style="list-style-type: none"> • nutritional supplements <ul style="list-style-type: none"> – zinc may slow conversion of testosterone to estradiol via aromatase • reduce cortisol levels, as cortisol induces aromatase and conversion of testosterone to estradiol • prescription aromatase inhibitors like letrozole and anastrozole inhibit conversion of testosterone to estradiol • testosterone supplementation • rule out pituitary problems 	High* Testosterone	<ul style="list-style-type: none"> • prolonged excessive testosterone supplementation may result in androgen receptor down-regulation and symptoms of testosterone deficiency • reduce dose of testosterone <ul style="list-style-type: none"> – saliva testosterone levels are above or at high end of range and symptoms of excess (or deficiency) are present • a significantly elevated endogenous testosterone level may require referral for an endocrine evaluation
Low DHEAs	<ul style="list-style-type: none"> • adrenal support <ul style="list-style-type: none"> – adaptogenic herbs • DHEA supplementation <ul style="list-style-type: none"> – oral, sublingual: minimum dose to relieve symptoms and stay within range • low DHEA may be associated with hypo-thyroidism 	High* DHEAs	<ul style="list-style-type: none"> • prolonged excessive DHEA supplementation may result in androgen receptor down-regulation and symptoms of androgen deficiency • reduce dose of DHEA
Low Cortisol	<ul style="list-style-type: none"> • assess diurnal cortisol via an Adrenal Function Panel or 4-pt cortisol saliva test • cortisol supplementation <ul style="list-style-type: none"> – short term supplementation may be necessary in some cases (see The Safe Uses of Cortisol by William Jeffries) • nutritional supplements <ul style="list-style-type: none"> – adaptogenic herbs – see Adrenal Function Panel Clinical Info sheet • assess sleep: low morning cortisol is associated with insomnia 	High* Cortisol	<ul style="list-style-type: none"> • assess diurnal cortisol via an Adrenal Function Panel or 4-pt cortisol saliva test • nutritional supplements <ul style="list-style-type: none"> – cortisol lowering supplements – adrenal support protocol (see Adrenal Function Panel Clinical Info Sheet) • assess sleep: difficulty sleeping may be a result of high bedtime cortisol • weight loss: elevated cortisol may be associated with weight gain

* Note that high saliva hormone levels may result if a man has skin to skin contact with someone on transdermal hormones. For example, a man whose wife uses transdermal estradiol and/or progesterone may report a high saliva estradiol and/or progesterone level.

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