



46-50 Coombe Road  
New Malden  
Surrey KT3 4QF

63 Zillicoa Street  
Asheville, NC 28801 USA

Patient:  
DOB:  
Sex: F  
MRN:

**Order Number:**  
Completed:  
Received:  
Collected:

## Salivary Hormone Results

Estradiol ♦ pmol/L

>3330.0

Reference Range	
Follicular	2.8-8.8 pmol/L
Peak *	4.5-19.1 pmol/L
Luteal	2.8-8.2 pmol/L
Menopausal	3.7-9.4 pmol/L
Male	3.1-7.4 pmol/L
* Peak = Days 11 and 12	

Testosterone ♦ pmol/L

<30

Reference Range	
Premenopausal	34-148 pmol/L
Menopausal	34-148 pmol/L
Male	110-513 pmol/L

Estrone pmol/L

306.8

Reference Range	
Menopausal	4.7-18.9 pmol/L

Progesterone ♦ pmol/L

11,713

Reference Range	
Follicular	120-593 pmol/L
Peak *	328-1385 pmol/L
Luteal	145-797 pmol/L
Menopausal	163-669 pmol/L
Male	141-529 pmol/L
* Peak = Days 18 and 20	

Estriol pmol/L

341

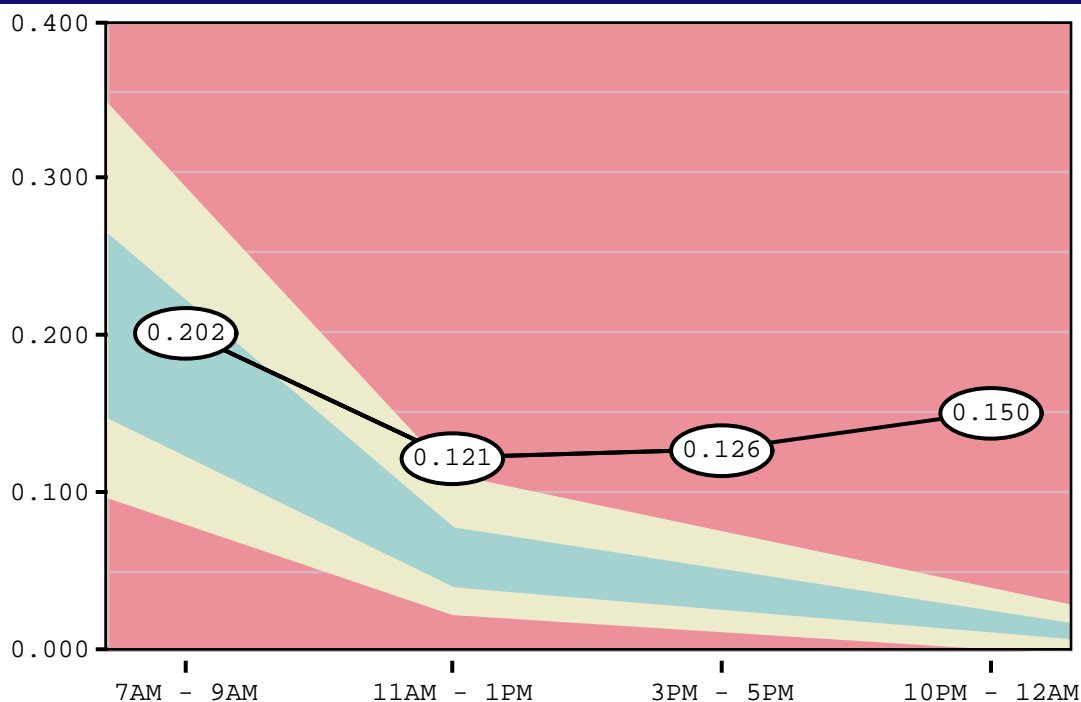
Reference Range	
Menopausal	<= 133 pmol/L

P/E2 Ratio

4

Reference Range	
Follicular	23-159
Luteal	25-141
Menopausal	33-116

### Salivary Cortisol and DHEA



Cortisol ♦

Reference Range

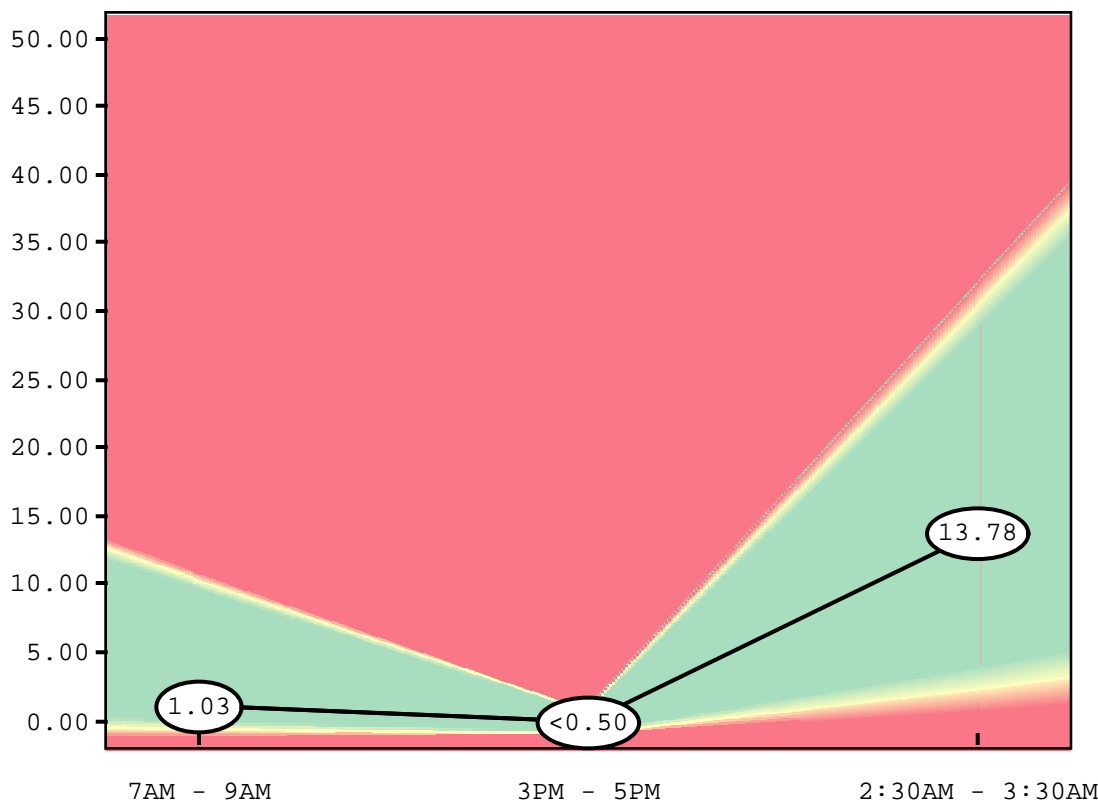
- 1 Hour After Rising  
7AM - 9AM:  
0.097-0.337 mcg/dL
- 11AM - 1PM:  
0.027-0.106 mcg/dL
- 3PM - 5PM:  
0.013-0.068 mcg/dL
- 10PM - 12AM:  
≤0.034 mcg/dL

#### Hormone

#### Reference Range

DHEA 7am - 9am	17	71-640 pg/mL
DHEA: Cortisol Ratio/10,000	84	358-2,538

### Salivary Melatonin



Reference Range

- 7AM - 9AM:  
≤10.50 pg/mL
- 3PM - 5PM:  
≤0.88 pg/mL
- 2:30AM - 3:30AM:  
2.53-30.67 pg/mL

## Commentary

### Lab Comments

*Estradiol result confirmed by repeat analysis. 05/26/2017 mc*

The performance characteristics of all assays have been verified by Genova Diagnostics, Inc. Unless otherwise noted with ♦, the assay has not been cleared by the U.S. Food and Drug Administration.

Methodology: EIA and RIA

Commentary is provided to the practitioner for educational purposes, and should not be interpreted as diagnostic or treatment recommendations. Diagnosis and treatment decisions are the responsibility of the practitioner.

Estrogens play a critical role in female sexual development, menstrual function, protein synthesis, cardiovascular function, bone formation and remodeling, cognitive function, emotional balance and other important health factors. The estrogenic potency of estradiol is 12 times that of estrone and 80 times that of estriol. Estradiol is the primary estrogen in premenopausal women. Estrone is the second most potent estrogen compared to estradiol. After menopause, estrone becomes the primary estrogen as the ovary loses its ability to manufacture estradiol, and it is synthesized in the adrenal glands and fat cells. Estriol is considered to be the mildest and briefest-acting of the three estrogens. Estrogen metabolism and synthesis in men appear to remain relatively stable across the life course.

- In women, lower levels of estrogens have been associated with a variety of clinical symptoms: peri/menopausal symptoms (vasomotor symptoms; mood and memory alterations; atrophic vaginitis, a condition associated with decreased vaginal lubrication and thinner vaginal epithelial; lining diminished skin tone); altered lipid metabolism; accelerated rate of bone loss. Excessive estrogen levels have been associated with increased risk of some hormone-dependent cancers.

- In men, low levels of estrogen may be associated with decreased bone density, cognitive decline and cardiovascular disease. Excessive estradiol levels have been associated with greater risk of stroke and cardiovascular disease, as well as BPH, gynecomastia, decreased sexual function and weight gain. A source of elevated estrogen in men may be associated with men who have a higher body fat percentage, as increased aromatization of testosterone to estradiol can occur in adipose tissue.

- In a large, population based study of salivary sex hormone levels in older adults researchers found: Older men and women had similar estradiol concentrations. Estradiol concentrations have been associated with cognition, mood, and memory in women and, in combination with testosterone and other factors, preservation of memory and cognitive function in men.

Progesterone is important for normal reproductive and menstrual function, and influences the health of bone, blood vessels, heart, brain, skin, and many other tissues and organs. As a precursor, progesterone is used by the body to make other steroid hormones, including DHEA, cortisol, estrogen and testosterone. In addition, progesterone plays an important role in mood, blood sugar balance, libido, and thyroid function, as well as adrenal gland health.

Progesterone is primarily produced in the ovaries in premenopausal women and in the adrenal cortex in postmenopausal women. Although progesterone is found in both women and men, the physiologic role in men is poorly understood.

- In women, lower levels of progesterone have been associated with dysfunctional uterine bleeding, and may play a role in osteoporosis and impaired neurological function. Excessive amounts can result in problems such as dysglycemia, alopecia, acne and breast tenderness.

- The clinical significance of elevated or low levels in men is poorly understood. Low progesterone levels may be involved in male infertility. Increased levels of progesterone have been found in states of stress and anxiety in men and women: this may relate to its sedative or stress countering effects.

## Commentary

Testosterone is an androgenic sex steroid/hormone that helps maintain libido, influences muscle mass and weight loss, and plays a role in the production of several other hormones. During the aging process, testosterone levels gradually decline in both sexes, which can lead to loss of bone density. Testosterone concentrations tend to be higher in men versus women.

- In women, imbalances of testosterone have been associated with various forms of coronary heart disease and cardiovascular events, including myocardial infarction in postmenopausal women. Low salivary testosterone levels have also been shown in women with breast cancer compared to age-matched controls. Obese women exhibit higher levels of free salivary testosterone. Excessive amounts are associated with PCOS, acne, oily skin and hirsutism.
- In men, lower levels of testosterone are associated with aortic, peripheral vascular, and cardiovascular disease in middle-aged and older men. In some but not all studies, lower levels of testosterone predict increased incidence of cardiovascular events and mortality. Additionally, elevated testosterone can be associated with CVD risk. Men with excessive testosterone may exhibit aggressive behavior or increased irritability, and hair loss (scalp).
- In men and women, low levels of testosterone have been associated with lower coital frequency and loss of sexual desire in men and women. Low levels are also associated with reduced stamina and lean muscle mass, anxiety, depression and cognitive decline in both men and women.

The P/E2 ratio describes the relationship between progesterone and estradiol levels, and is used clinically to ascertain dominance of one hormone compared to the other.

- An elevated ratio may indicate progesterone dominance, and symptoms may be consistent with progesterone excess.
- A low ratio may indicate estrogen dominance, and symptoms may be consistent with estrogen excess.

In this profile, the 7-9 AM cortisol level is within the reference range. Because cortisol levels are typically at their peak shortly after awakening, morning cortisol may be a good indicator of peak adrenal gland function. Morning cortisol levels within reference range suggest a component of normal adrenal function with regard to peak circadian activity.

The 11 AM-1 PM cortisol level is above the reference range. Mid-day cortisol levels may be a good indication of adaptive adrenal gland function since they represent the adrenal glands' response to the demands of the first few hours of the day. High mid-day cortisol levels suggest a degree of adrenal hyperfunction with hyper-reactive adaptive response, most commonly to stress. Other possible causes of high salivary cortisol include heavy exercise, pregnancy, hypoglycemia, smoking, obesity, depression, alcoholism, and if significantly elevated, adrenal hyperplasia or Cushing's syndrome.

The 3-5 PM cortisol level is above the reference range. Afternoon cortisol levels may be a good indication of glycemic control exerted by the adrenal gland since they represent a postprandial sample. High afternoon levels suggest a degree of adrenal hyperfunction with increased adrenal assistance in glycemic control. Other possible causes of high salivary cortisol include stress, heavy exercise, pregnancy, smoking, obesity, depression, alcoholism, or if significantly elevated, adrenal hyperplasia and Cushing's syndrome.

The 10 PM-12 AM cortisol level is above the reference range. Late-night cortisol levels may be a good indication of baseline adrenal gland function since they typically represent the lowest level during the day. High late-night cortisol levels suggest a degree of adrenal hyperfunction with regard to baseline circadian activity. Possible causes of elevated late-night cortisol include stress, heavy exercise, pregnancy, hypoglycemia, smoking, obesity, depression, alcoholism, and the use of glucocorticoids. Significantly elevated late-night cortisol levels are considered a reliable indicator of Cushing's syndrome, especially if coupled with a reduced circadian rhythm.

DHEA is below the reference range. Decreased DHEA levels may be seen in thyroid disorders, cardiovascular disease, obesity, reduced immunity, rheumatologic diseases, and excess cortisol production, or with administration of pharmacological doses of glucocorticosteroids. Low DHEA levels are indicative of a lowered capacity to endure physiological or psychological stress/trauma/injury, and may present with abnormal immune response, with increased

## Commentary

incidence of autoimmune disease.

A low DHEA: cortisol ratio is generally associated with chronic stress and hypothalamic-pituitary-adrenal imbalances. While often observed in individuals as they age, it may also be associated with cognitive and mood disorders, anxiety, and depressive symptoms. DHEA levels in women tend to decrease more rapidly with aging (especially between 50-60 years of age) than DHEA levels in men.

A pattern showing one or more elevated cortisol levels in the presence of decreased DHEA is clinically significant. Elevated cortisol with decreased DHEA suggests adrenal hyperfunction of the zona fasciculata (the primary source of cortisol) with a decreased function of the zona reticularis (the primary source of DHEA). This presentation represents a significant shift of steroidogenesis in favor of cortisol, and away from DHEA. In such a shift, there is frequently decreased aldosterone production as well. This shift may present in the presence of increased physiological or psychological stress and/or dysglycemia.

Melatonin activity is normal throughout the sample period revealing a normal melatonin circadian rhythm.

As well as playing a crucial role in sleep-wake cycles, melatonin influences other vital functions, including cardiovascular and antioxidant protection, endocrine function, immune regulation and body temperature.