Oestradiol, Progesterone, Testosterone, DHEA-S, Cortisol and Melatonin

Salivary Hormone Profile

Introduction
As hormones play such an important role in the management of health, the determination of a hormonal imbalance can help identify the cause of many health related issues. Addressing these imbalances with appropriate testing and treatment protocols provide a direct basis for maintaining optimal health and wellbeing.

Endocrine hormones are secreted within glands and from there move into other extra-cellular spaces. Several endocrine hormones are distributed widely following secretion and equilibrate throughout virtually all extra-cellular spaces, including formed saliva stored in the salivary glands.

Once a hormone is bound to its receptor, the transduction of the signal may initiate a wide range of intracellular events including protein synthesis and secretion and lipid and carbohydrate metabolism. Hormones act over a range of distances and many of their functions are integrative and are aimed at co-coordinating the wide variety of functions required to maintain optimal overall wellness.

Salivary Hormone Testing Overview
Saliva testing is the most reliable way to measure free, “bioavailable” hormone activity at a cellular level. This differs from most blood tests which do not measure “bioavailable” hormone levels.

Free steroid hormones passively traverse into the cells in the salivary gland and flow with the fluid that passively accompanies Na+ that is pumped by the sodium/potassium ATPase mechanism. Thus, there is no change in hormone concentration with change in flow rate. Bound steroids are too large to diffuse freely through the salivary cells into the salivary gland lumen as they have a large molecular weight. Total blood hormone levels are not comparable to saliva levels and can only be loosely compared using the approximate ratio (1-10%) of free to bound hormones.

Saliva testing can help identify hormonal imbalances that may be causing chronic health problems. Testing can be used to monitor the effects of bio-identical/natural hormone replacement therapy.

Benefits of Salivary Hormone Testing vs. Serum Testing
- Testing measures free, bio-available hormones levels.
- Baseline hormone levels can be assessed and hormone replacement therapy can be easily monitored and adjusted.
- Painless, non-invasive and economical and can be done at home.
- Specimens are sent directly to the laboratory without special handling.
- Multiple saliva collections can be taken in a single day or over a number of weeks to evaluate levels.
- Hormones are stable in saliva at room temperature.
- Transport of saliva to laboratory by overnight courier from anywhere within Australia
Salivary Hormone Assays

**Hormones Tested in Saliva**

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Test Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oestradiol (E2)</td>
<td>Available Soon</td>
</tr>
<tr>
<td>Progesterone</td>
<td>Cortisol</td>
</tr>
<tr>
<td>Testosterone</td>
<td>Melatonin</td>
</tr>
</tbody>
</table>

**Available Soon**
- Oestrone (E1)
- Oestriol (E3)

**Oestrogens** (oestradiol, oestrone and oestriol) are important for maintaining the health of the reproductive tissues, breasts, skin and brain. Excessive oestrogens can cause symptoms such as fluid retention, weight gain, migraines and over stimulation of the breasts, ovaries and uterus, leading to cancer. Insufficient oestrogen levels can lead to hot flushes, vaginal dryness, rapid skin aging, urinary problems, excessive bone loss and possible acceleration of dementia.

An excess of oestrogen, relative to testosterone, is thought to play a role in the development of prostate problems in men. Recent research suggests that the by-products of oestrogen metabolism are the cause of both breast and prostate cancers.

**Progesterone** enhances the beneficial effect of estrogens while preventing symptoms associated with oestrogen excess, thereby having a balancing effect. Whilst progesterone is a key hormone in women, its benefit for men in maintaining prostate health, is also very important.

**Testosterone** helps maintenance of lean body mass, bone density, skin elasticity, libido and cardiovascular health in both sexes. Women have smaller amounts of testosterone compared to men.

**DHEA** is the principal androgen in both men and women. DHEA levels decline with age, and research suggests that DHEA may help restore energy, improve immune status and mental function.

**Cortisol** is produced by the adrenal glands in response to stressors such as emotional, mental and physical stress. Cortisol mobilises the body’s immune response against viral and/or bacterial infections and inflammation. Chronic elevated cortisol levels will suppress the action of the immune system leaving the individual more susceptible to infections.

**Melatonin** is predominantly produced by the pineal gland, with smaller amounts in the retina and gastrointestinal tract. Melatonin is secreted with a distinct circadian rhythm—stimulated by darkness, inhibited by light and independent of sleep. The phase of the diurnal rhythm is influenced by day length (increasing in amplitude in the winter and decreasing in summer).

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**Steroids - Biochemical Pathway**

- Cholesterol
  - 17-Alpha-Hydroxylase
    - Pregnenolone
      - 17-Alpha-Hydroxylase
        - Progesterone
          - 21-Beta-Hydroxylase
            - Deoxycorticosterone
              - 11-Beta-Hydroxylase
                - Corticosterone
                  - 11-Hydroxysteroid Dehydrogenase
                    - Hydroxycorticosterone
                      - Aldosterone
        - 21-Beta-Hydroxylase
          - Deoxycortisol
            - 21-Beta-Hydroxylase
              - Cortisol
                - 11-Hydroxysteroid Dehydrogenase
                  - Hydroxycorticosterone
                    - Cortisone
                      - 2-Methoxyestrone
                        - Oestriol
                      - 16-Alpha-Hydroxyestrone
                        - Hydroxyoestradiol
        - 3-Beta-Dehydrogenase
          - Dehydroepiandrosterone (DHEA)
            - Androstenedione
              - 5-Alpha-Reductase
                - Testosterone
                  - Androstenediol
                    - Androstanediol
                      - Dihydrotestosterone (DHT)
                        - Oestradiol
                          - Etiolcholanone
                            - Androsterone
                              - Oestrone
                                - Hydroxyestradiol
spring) or artificial illumination.

Due to its circadian rhythm, Melatonin should be collected at midnight in the dark and again on rising (0600-0800).

**Factors Effecting Hormone Levels**

Many factors may contribute to altered hormone levels. These include both environmental and lifestyle induced factors and specific conditions. These range from pathology at the site of production (e.g. tissue damage leading to reduced secretion), altered feedback control (e.g. decreased receptor responsiveness leading to elevated levels of hormones), deficiencies in precursor availability (e.g. low oestrogen levels in women with very low body fat due to decreased cholesterol availability), or transient non-specific effects (e.g. unrelated illness, fever, or infection).

The altered hormone levels may result from adaptive responses to a triggering factor, for example feedback control by the same or a related hormone, or from direct disturbance of correct hormonal control by an external agent (drug, pathogen, environmental factor).

**Specimen Requirements**

3mls of clear saliva is required. Up to six (6) hormones can be tested from one saliva specimen. Multiple samples during one day or over a series of days require multiple tubes.

Following collection, saliva should be either frozen (when collecting multiple samples) or returned to ARL via courier.

**Practitioner Guidelines for Hormone Collection**

<table>
<thead>
<tr>
<th>Conditions/Symptoms Associated with Hormone Imbalance</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Amenorrhea</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Dysmenorrhea</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Vaginal atrophy</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Hot flushes and/or night sweats</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Infertility</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>• Miscarriage</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Endometriosis</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Hirsutism</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Breast and uterine cancers</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Depression</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>• Bone loss</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>• Migraines/headaches</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>• Sleep disorders</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>• Weight gain</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>• Uterine fibroids</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Fibrocystic breasts</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Low libido</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>• Arthritis</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>• Poor memory/ concentration</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

**Specimen Collection**

- **Hormones**
  - Creams/Gels/Patches
    - Patients using hormone creams/gels/patches are advised to collect their saliva specimen(s) at least 12 hours after the last application of cream.
  - **Troches**
    - Patients using troches are advised to allow for a three (3) day break before collecting their saliva specimen(s).

**References**

Please refer to [www.arlaus.com.au](http://www.arlaus.com.au) for a complete list of references.
Other Laboratory Services Include:

- 2 & 16 Urinary Oestrogen Metabolites
- Urinary Growth Hormone
- Osteoporosis Risk Marker
- Functional Liver Detoxification Profile
- Complete Digestive Stool Analysis
- Stool Parasitology & Culture
- Helicobacter pylori Antigen
- 3 Day Stool Parasitology
- Intestinal Permeability
- IgG Food Sensitivity Test
- Total Antioxidant Status
- Trace Elements
- Vitamins
- CoEnzyme Q10
- Heavy Metals
- Chlorinated Pesticide Residues
- Overnight Urinary Catecholamines
- Hair Mineral Analysis
- Chelation