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Presents: Intro To Hormones 102
Salivary Hormone Testing

Part 2

Women & Men’s Health

Ronald Steriti, ND, PhD

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Salivary Hormones

The following hormones are typically in saliva:

- All three Estrogens: Estrone (E1), Estradiol (E2), and Estriol (E3)
- Progesterone and Pregnenolone
- Testosterone and Dihydrotestosterone (DHT)
- Cortisol, DHEA and DHEA-S
- Melatonin
Associated Diseases

• There are many diseases that are associated with hormonal imbalances
• Most (but not all) are women’s and men’s health issues
• We will briefly describe each disease and the hormonal imbalance associated with it.
Hormonal Imbalance

• From a clinical standpoint, it is important to know when to suspect hormonal imbalance.
• The following list of diseases was compiled using conventional medical textbooks by searching for those with hormone imbalances in their etiologies.
Etiologies

• Most diseases have multiple etiologies.
• Hormone imbalance is usually not the only cause, and may not be the primary cause.
• Hormonal imbalance may be causative or secondary to other etiologies.
• This is the art of medicine.
Menopause

• The traditional view of menopause is that it is caused by decreased production of estrogen by the ovaries.
• The average age of menopause is 51, and virtually all women will be postmenopausal by age 58.
• Menopause is also associated with osteoporosis (which can cause fractures), and arteriosclerosis - coronary artery disease.
Psychologic Symptoms

• Psychologic symptoms (depression, nervousness, insomnia) are common with menopause
• Some believe that vasomotor symptoms are associated with hormonal imbalance, while psychological symptoms are not
• Psychological symptoms may be related to imbalances in tryptophan and serotonin
Vasomotor Symptoms

- Vasomotor symptoms, including hot flashes and night sweats, are common during perimenopause.
- Night sweats are hot flashes with drenching perspiration that occur during the night, often disrupting sleep.
- In most women, hot flashes will abate over time without any intervention.
Hot Flashes

• Hot flashes may be due to excess progesterone, which increases basal body temperature during ovulation
• Studies indicate that stabilization of either estrogen or progesterone can minimize hot flashes.
Thermoregulatory Dysfunction

- Estrogens are thought to modulate serotonin and norepinephrine, two neurotransmitters that may play a role in thermoregulation.
- As estrogen levels fluctuate and decrease, serotonin and norepinephrine levels may become imbalanced, resulting in the thermoregulatory dysfunction that may lead to hot flashes and night sweats.
Epidemal Atrophy

Atrophy of epidemal tissue can affect several areas.

- Vaginal atrophy causes dyspareunia (painful menses).
- Urinary tract atrophy causes stress or urge urinary incontinence.
- Skin atrophy causes wrinkles.
Estrogen & Progesterone

• Some believe there is a balance between estrogen and progesterone
• Estrogen is “opposed” by progesterone in women (and testosterone in men)
• Therefore, decreased estrogen can result in symptoms of increased progesterone
Hormone Replacement Therapy

• Many physicians are taking women off of hormone replacement therapy due to recent negative studies.
• This is usually difficult for patients that experience symptoms of menopause.
Feedback Control

• Hormone production is controlled by a fairly complex feedback mechanism.
• Unfortunately, production is easy to turn off (with exogenous hormones), but not so easy to turn back on after several years.
Natural HRT

- Natural HRT uses the natural forms of hormones, instead of drugs
- It is considered a safer alternative to drugs
- Salivary hormone testing is often used with natural hormone replacement therapy to monitor and adjust the mix and dose.
Osteoporosis

- Primary type I osteoporosis is caused by estrogen deficiency in postmenopausal women or athletes.
- Although calcium and vitamin D receive all the press, bone building and resorption are controlled by estrogen and progesterone.
- Both estrogen (primarily estradiol) and progesterone effect osteoclast and osteoblast activity.
Pyrilinks-D

- Although not a hormone, many salivary lab companies offer the Pyrilinks-D test, which is useful as an indicator of bone resorption.
- About 90% bone is type I collagen, crosslinked by pyridinium, pyridinoline and deoxypyridinoline.
- Deoxypyridinoline is released during bone resorption and excreted in urine.
- Urinary Pyrilinks-D provides a quantitative measure of the excretion of deoxypyridinoline crosslinks as an indicator of bone resorption.
Premenstrual Syndrome

- PMS Type A is associated with high estrogen and low progesterone. The women become irritable and moody.
- PMS Type D is associated with low estrogen, high progesterone, and elevated androgens. Depression may be caused by low serotonin.
- PMS Type H is associated with elevated androgens (mostly testosterone). There is bloating and breast tenderness.
PMS

• The hormonal imbalances in PMS encompass estrogen, progesterone, testosterone and serotonin.

• It’s important to realize that the PMS types are diagnosed by symptoms, not by their hormone imbalances.
Premenstrual Dysphoric Disorder

- PMDD is much more severe than PMS
- Irritability is a characteristic symptom.
- Progesterone, birth control pills and SSRI’s are approved drugs.
- The previous slide showed how complicated the hormone profiles are in PMS.
- PMDD combines symptoms of PMS type A and D.
Polycystic Ovary Syndrome

Symptoms of PCOS (Stein-Leventhal Syndrome) include:

- amenorrhea, oligomenorrhea, dysfunctional uterine bleeding, infertility, obesity, hirsutism, acne, acanthosis nigrans, hypertension, virilism, deep voice, enlarged clitoris and ovaries
PCOS Labs

- Labs show increased testosterone, DHEA, progesterone, estrone, androstenedione; and decreased sex hormone binding globulin (SHBG)
- Increased testosterone is the key diagnostic indicator
PCOS Etiology

- PCOS is associated with androgen excess, especially testosterone
- PCOS may be caused by a disruption of the hypothalamus-pituitary-ovarian (HPO) axis
Fibrocystic Breast Disease

- Breast lumps are common in young women and vary with the phase of the menstrual cycle
- The exact cause is unknown.
- Possibilities include a luteal phase defect in progesterone, increased estrogen, hypersensitivity to estrogen, sensitivity to methylxanthines (caffeine and chocolate), and dietary fat intake.
Hormone Complexity

- Notice the complexity of hormonal hypothesis for fibrocystic breast disease
- It includes both
  - increased estrogen and
  - hypersensitivity to estrogen, which are two distinct entities.
Fibroadenoma

- A fibroadenoma is a benign breast tumor that feels encapsulated, moves freely, has a rubbery consistency, and is circumscribed.
- They are more common young people.
- Fibroadenomas are estrogen dependent, with rapid growth during pregnancy.
Uterine Fibroids

• Uterine fibroids are discrete, round, firm, benign uterine tumors made of smooth muscle and connective tissue
• They are the most common neoplasm, occurring in 25% of women over 35 years old
• They are stimulated by estrogen during reproductive years, and often grow during pregnancy
Endometriosis

- Endometriosis is ectopic uterine mucosa (endometrium) found in various locations.
- It responds to estrogen and progesterone (birth control pills and progesterone are used to treat it) and usually ends after menopause.
- Pregnancy may relieve the condition.
Endometrial Hyperplasia

- Endometrial hyperplasia is the benign overgrowth of endometrial tissue caused by excess estrogen
- It is uncommon with normal menstrual cycles
Dysfunctional Uterine Bleeding

• DUB is abnormal uterine bleeding (heavy or spotting) usually associated with anovulation
• It is caused by unopposed estrogen, tumors producing estrogen, exogenous estrogen, polycystic ovary syndrome, anticoagulants, and hormonal imbalance
Secondary Amenorrhea

- Cessation of menses for 6 consecutive months in a woman past menarche who is not pregnant
- Amenorrhea has an extensive list of causes, many of which are hormonal (estrogen and progesterone imbalances).
- These include menopause, POS, premature ovarian failure, hysterectomy, and endocrine disorders
Migraines

• Migraines may be precipitated by the menstrual cycle and oral contraceptives
• They are also more common in women
• Some studies show that migraines are associated with estrogen deficiency
Acne vulgaris

- Androgens stimulate the rate of keratin turnover in sebaceous glands
- Androgenic steroid abuse and some birth control pills can cause acne
- Testosterone and DHT are sometimes measured
Androgenic Alopecia

- Androgenic alopecia is hair loss in either sex caused by stimulation of the hair roots by male hormones (testosterone and DHT).
- It can be caused by adrenal hyperplasia, POS, ovarian or pituitary hyperplasia, carcinoid
- Drug causes include: testosterone, danazol, ACTH, anabolic steroids, progesterone
Gynecomastia

- A benign glandular enlargement of the male breast that is generally bilateral
- It can be caused by exposure to high levels of estrogen compared to testosterone
BPH

• Benign prostatic hypertrophy is a growth of prostate that may result in bladder outlet obstruction.

• BPH is a universal pathologic phenomenon seen in older men:
  – 50% of men over the age of 50; and
  – 80% of men over the age of 70.
Etiology

• The exact etiology (cause) is unknown, but evidence suggests BPH arises from a systemic hormonal alteration which may or may not act in combination with growth factors stimulating stromal or glandular hyperplasia
Labs

- Assessments of testosterone and dihydrotestosterone are recommended.
- Some studies measure the diurnal variation of testosterone using 4 samples in a 24-hour period.
- Measurement of DHT is based on inhibiting 5-alpha reductase, which converts testosterone into DHT.
- Finasteride (Proscar) inhibits 5-alpha reductase
Male Menopause

- Male menopause (andropause) involves the hormonal, physiological and chemical changes that occur in all men generally between the ages of 40 and 55.
- Approximately 40% of men in their 40s, 50s and 60s will experience some degree of lethargy, depression, increased irritability, mood swings, and difficulty in attaining and sustaining erections that characterize male menopause.
Testosterone

- Many endocrinologists and scientists who have pioneered hormone studies say the phenomenon of male menopause correlates with a decline in testosterone levels.
- Testosterone is the hormone that stimulates sexual development in the male infant, bone and muscle growth in man and is responsible for sexual drive.
Low Testosterone

• Low testosterone has been found to cause fatigue, depression, loss of concentration, as well as decreased muscle strength and endurance.
• Testosterone is more important in libido or sex drive than in the erectile mechanism.
• Men with low testosterone levels usually have problems with erections.