dutch
Dried Urine Test for Comprehensive Hormones

Accession # 00212403
Sample Female Report
123 A Street
Sometown, CA 90266

PRECISION ANALYTICAL
Consulting & Laboratory

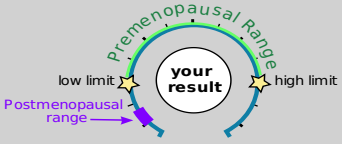
Ordering physician:
Precision Analytical

DOB:1976-01-01
Gender: Female

Collection Times:
2015-08-16 05:00PM
2015-08-16 10:00PM
2015-08-17 06:00AM
2015-08-17 08:00AM

Hormone Testing Summary

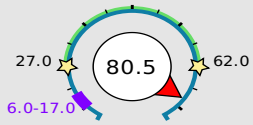
All units are given in ng/mg creatinine



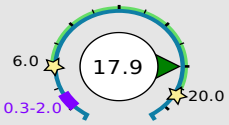
How to read the graphical representation of results

Sex Hormones

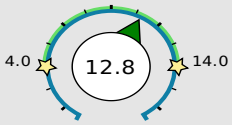
See Pages 2 and 3 for a thorough breakdown of sex hormone metabolites



Total Estrogen
(Sum of 8 Estrogen Metabolites)



Progesterone
(Serum Equivalent, ng/mL)

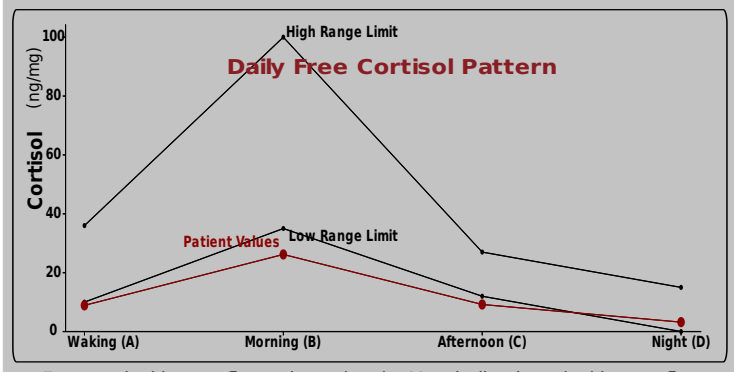


Testosterone

Progesterone Serum Equivalent is a calculated value based on urine pregnanediol.
This value may not accurately reflect serum when progesterone is taken by mouth.

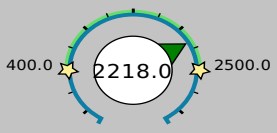
Adrenal Hormones

See pages 4 and 5 for a more complete breakdown of adrenal hormones

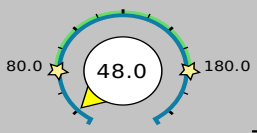


Total DHEA Production

Age	Range
20-40	800-2500
40-60	530-1550
>60	400-1350

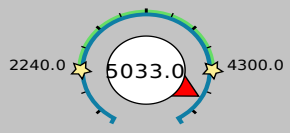


Total DHEA Production
(DHEAS + Etiocholanolone + Androsterone)



24hr Free Cortisol
(A+B+C+D)

cortisol metabolism



Metabolized Cortisol (THF+THE)
(Total Cortisol Production)

Free cortisol best reflects tissue levels. Metabolized cortisol best reflects total cortisol production.

Patient Reported Hormone Therapies: ROA 1=oral, 2=sublingual, 3=transdermal cream, 4=transdermal gel, 5=vaginal/labial, 6=rectal mucosa, 7=patch, 8=pellet, 9=injection, 10=other

Hormone	Brand	ROA (1-10)	Dose (mg)	Date Last Used	Times per Day	Length of use
Progesterone	Supreme	5	100 mg/ml	7/6/15	1	11 mos.

☐ Not taking any listed hormones

Do you take DIM/I-3-C regularly? ☐ Yes ☒ No

List Any other relevant drugs, supplements or others:
Magnesium Glycinate (Lete) 600mg
Adrenal Support 2

Patient reports regular menstrual cycles

Last Menstrual Period - 2015-07-27

TO THE LEFT YOU CAN SEE A SCREENSHOT OF THE THERAPY SECTION OF THE PATIENT REQUISITION.

There is a series of videos in our video library at dutchtest.com that you may find useful in understanding the report. The following videos (which can also be found on the website under the listed names) may be particularly helpful in aiding your understanding:
Analytical Report Overview (quick overview)
Estrogen tutorial ; Androgen tutorial
Cortisol tutorial

dutch
Dried Urine Test for Comprehensive Hormones

Sex Hormones and Metabolites

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Category	Test		Result	Units	Normal Range
Progesterone Metabolism					
	b-Pregnanediol	Within range	996.0	ng/mg	450 - 1400
	a-Pregnanediol	High end of range	499.0	ng/mg	120 - 500
Androgen Metabolism					
	DHEAS	Above range	428.0	ng/mg	23 - 350
	Androsterone	Above range	1400.0	ng/mg	399 - 1364
	Etiocholanolone	Low end of range	390.0	ng/mg	371 - 765
	Testosterone	High end of range	12.8	ng/mg	4 - 14
	5a-DHT	Within range	2.1	ng/mg	0 - 8.8
	5a-Androstanediol	Within range	53.1	ng/mg	22 - 66
	5b-Androstanediol	Within range	12.1	ng/mg	6 - 32
	Epi-Testosterone	Within range	14.1	ng/mg	4.5 - 22.3
Estrogen Metabolites					
	Estrone(E1)	Above range	42.5	ng/mg	12 - 26
	Estradiol(E2)	Above range	7.4	ng/mg	1.8 - 4.5
	Estriol(E3)	Above range	22.5	ng/mg	5 - 18
	2-OH-E1	Below range	3.7	ng/mg	4.6 - 14.4
	4-OH-E1	Within range	1.1	ng/mg	0 - 1.8
	16-OH-E1	Within range	2.9	ng/mg	1 - 3.5
	2-Methoxy-E1	Below range	1.2	ng/mg	2 - 5.5
	2-OH-E2	Within range	0.4	ng/mg	0 - 1.2

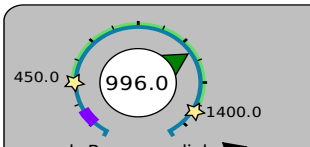
Normal Ranges	Luteal	Postmenopausal		Follicular	Ovulatory
Estrone (E1)	12-26	1.3-6.7		4.0-12.0	22-68
Estradiol (E2)	1.8-4.5	0.2-0.8		1.0-2.0	4.0-12.0
Estriol (E3)	5-18	0.8-3.7		N/A	N/A
2-OH-E1	4.6-14.4	0.4-1.9		N/A	N/A
4-OH-E1	0-1.8	0-0.3		N/A	N/A
16-OH-E1	1-3.5	0.1-0.6		N/A	N/A
2-Methoxy-E1	2-5.5	0.2-1.0		N/A	N/A
			Oral Pg (100mg)		
a-Pregnanediol	120-500	5.0-34	750-2300	25-100	25-100
b-Pregnanediol	450-1400	28-135	2300-6000	100-300	100-300

HOW TO READ YOUR RESULTS: Hormones are presented on this page graphically in the order the body metabolizes them. Arrows represent conversion from one hormone to another. The stars represent the low and high limits of the reference ranges (see example, right). The number in the middle is your result.

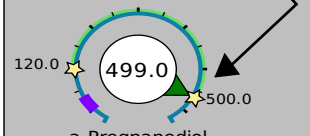
Progesterone Metabolism female

Pregnenolone

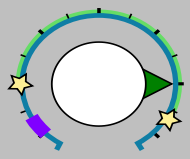
Androgen Metabolism



b-Pregnanediol



a-Pregnanediol

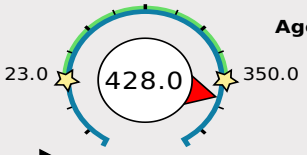


Progesterone

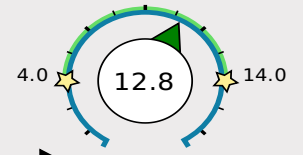
A weighted average of progesterone metabolites Progesterone itself is not found in urine in measurable levels

Age-Dependent DHEAS Ranges

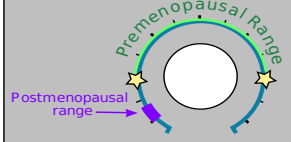
Age	DHEAS
20-40	30-350
40-60	10-100
>60	5-50



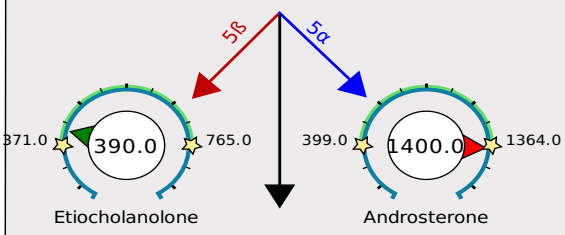
DHEA → DHEAS



Androstenedione → Testosterone



Androstenedione

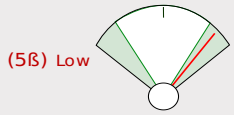


Etiocholanolone Androsterone

Testosterone

Less Androgenic Metabolites

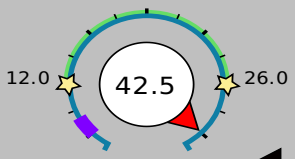
5α-DHT Most potent androgen



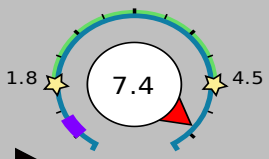
5a-Reductase Activity

5α-metabolism makes androgens more androgenic, most notably 5α-DHT is the most potent testosterone metabolite (~3x more potent than testosterone itself). 5α-Reductase activity is assessed using the ratio of Androsterone (5α) to Etiocholanolone (5ß).

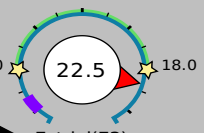
Estrogen Metabolism



Estrone(E1)



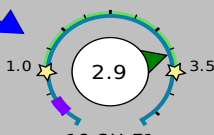
Estradiol(E2)



Estriol(E3)

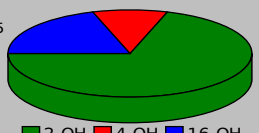
primary estrogens (E1, E2, E3)

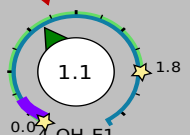
protective pathway



16-OH-E1

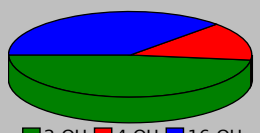
Normal Estrogen Metabolism





4-OH-E1

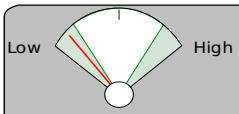
Patient Estrogen Metabolism



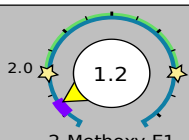
4-Methoxy-E1
(Protective, but not enough in urine to measure)

4-OH-E1

If not methylated, 4-OH-E1 can bind to and damage DNA

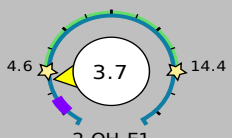


Methylation-activity
2-Methoxy/2-OH



2-Methoxy-E1

methylation (protective)



2-OH-E1

dutch
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Advanced Adrenal Assessment

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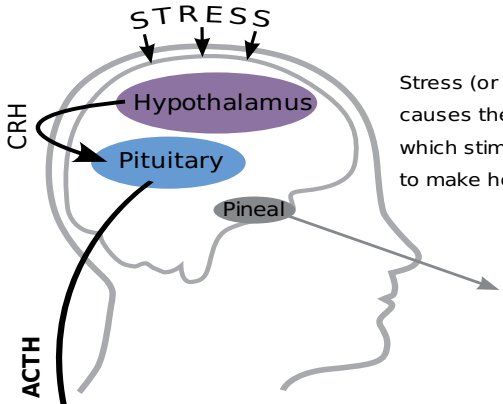
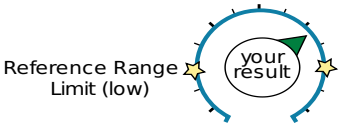
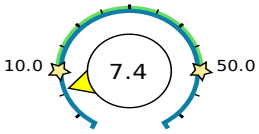
Category	Test		Result	Units	Normal Range
Creatinine					
	Creatinine A (Waking)	Within range	0.96	mg/ml	0.3 - 3
	Creatinine B (Morning)	Within range	1.71	mg/ml	0.3 - 3
	Creatinine C (Afternoon)	Within range	0.55	mg/ml	0.3 - 3
	Creatinine D (Night)	Within range	0.99	mg/ml	0.3 - 3
Daily Free Cortisol and Cortisone					
	Cortisol A (Waking)	Below range	8.9	ng/mg	10 - 36
	Cortisol B (Morning)	Below range	26.2	ng/mg	35 - 100
	Cortisol C (Afternoon)	Below range	9.2	ng/mg	12 - 27
	Cortisol D (Night)	Within range	3.2	ng/mg	0 - 15
	Cortisone A (Waking)	Low end of range	34.0	ng/mg	30 - 90
	Cortisone B (Morning)	Within range	108.0	ng/mg	80 - 185
	Cortisone C (Afternoon)	Low end of range	46.0	ng/mg	40 - 85
	Cortisone D (Night)	Within range	30.0	ng/mg	0 - 40
	24hr Free Cortisol	Below range	48.0	ug	80 - 180
	24hr Free Cortisone	Low end of range	218.0	ug	210 - 370
Cortisol Metabolites and DHEAS					
	a-Tetrahydrocortisol (a-THF)	Above range	600.0	ng/mg	90 - 320
	b-Tetrahydrocortisol (b-THF)	High end of range	1310.0	ng/mg	750 - 1450
	b-Tetrahydrocortisone (b-THE)	Above range	3123.0	ng/mg	1300 - 2560
	Metabolized Cortisol (THF+THE)	Above range	5033.0	ng/mg	2240 - 4300
	DHEAS	Above range	428.0	ng/mg	23 - 350
Melatonin (*measured as 6-OH-Melatonin-Sulfate)					
	Melatonin* (Waking)	Below range	7.4	ng/mg	10 - 50



Stress (or inflammation) causes the brain to release ACTH, which stimulates the adrenal glands to make hormones





Melatonin* (Waking)

Total DHEA Production

Age	Range
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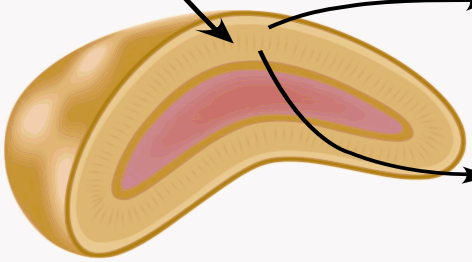
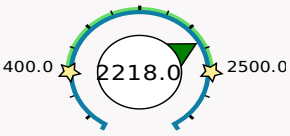


Adrenal Gland

DHEA

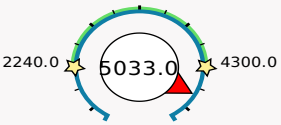


Total DHEA Production
(DHEAS + Etiocholanolone + Androsterone)

A patient's catabolic vs anabolic balance can be estimated by observing relative DHEA (anabolic) vs cortisol (catabolic) production

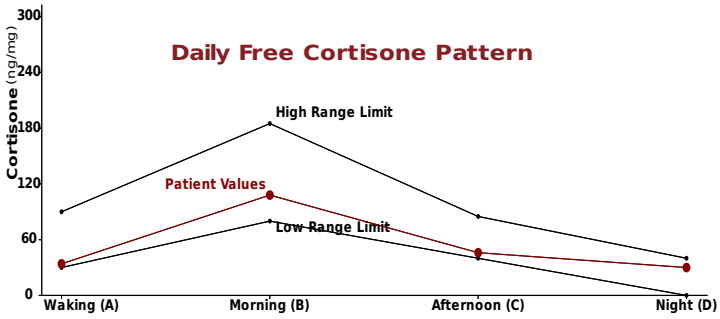
Cortisol

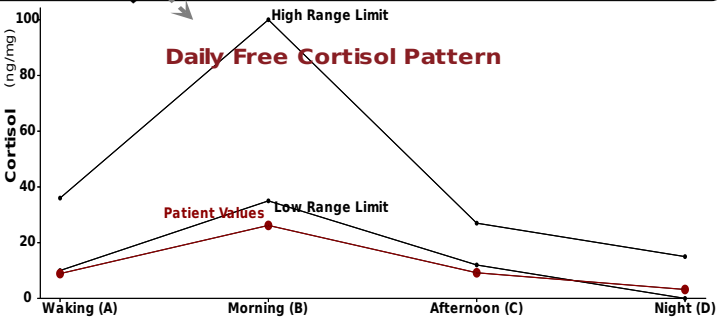
Cortisol Metabolism

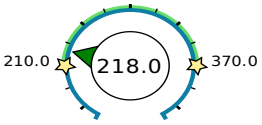


Metabolized Cortisol (THF+THE)
(Total Cortisol Production)

Circulating Free Cortisol

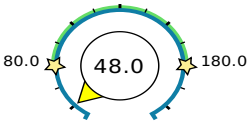




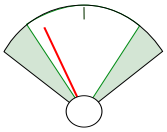


24hr Free Cortisone
(A+B+C+D)

Cortisol and Cortisone interconvert (11b-HSD)
and are metabolized to THF & THE for excretion



24hr Free Cortisol
(A+B+C+D)



More cortisone metabolites (THE)

More cortisol metabolites (THF)

Provider Notes

Thank you for testing with us! If this is your first report, you are encouraged to skip to the last two paragraphs first under "Reading the Report" for an explanation of how to read the report and background information on urine hormone testing. Comments in the report that are specific to the patient ARE IN ALL CAPS. The other information is general information that we hope you will find useful in understanding the patient's results. Reference ranges updated 7/23/2015.

THE PATIENT REPORTS SIGNIFICANT SYMPTOMS OF ESTROGEN DEFICIENCY.

Progesterone Metabolism: The primary role of progesterone is to balance the strong effects of estrogen. Progesterone metabolites are measured and reflect progesterone levels well because very little progesterone is found in urine, so b-Pregnanediol is typically used a surrogate marker because it is the most abundant metabolite, but we also test the corresponding a-pregnanediol. The average of the two metabolites is reported for progesterone. If levels are in the lower part of the reference range compared to estrogen levels, symptoms of too much estrogen may occur
When ordering the DUTCH Complete, you will see Progesterone Serum Equivalent on the summary page 1. The urine metabolites of progesterone have been proven to correlate strongly enough to serum progesterone to provide this value. The correlation is the strongest for values within the premenopausal luteal range. Urine metabolites can at times result in somewhat higher serum equivalent results in the postmenopausal range. For this reason the postmenopausal Serum Equivalent range is slightly higher than typical serum ranges. NOTE: If progesterone is taken orally (also with sublingual), these metabolites are elevated from gut metabolism and results do NOT accurately reflect serum levels.

THE PATIENT REPORTS USE OF VAGINAL PROGESTERONE. SERUM LEVELS INCREASE TO PRE-MENOPAUSAL LUTEAL LEVELS WITH APPROPRIATE DOSES OF VAGINAL PROGESTERONE. URINE METABOLITES SHOULD LIKEWISE INCREASE TO PREMENOPAUSAL LEVELS WITH APPROPRIATE DOSING. This video may assist with understanding results in this situation.

Androgen Metabolism: This group of hormones is typically thought of as “male” hormones, but they play a key role for women as well. Testosterone is made in the ovaries as well as the adrenal glands. In postmenopausal women, the adrenal glands are the primary source of testosterone. a-DHT (a-dihydrotestosterone) is the most potent androgen (3X more than testosterone), but it is primarily made within the liver and target cells (it is a paracrine hormone) and not by the gonads. a-DHT is subsequently deactivated to a-androstanediol within target tissues and then excreted. Only a fraction of a-DHT formed actually enters circulation as a-DHT (Toscano, 1987). The corresponding beta metabolites (for example b-DHT) are not androgenic. Looking at the balance of androsterone (alpha) and etiocholanolone offer the best approximation of how readily DHT will be made. Elevated androgens can cause general and sexual aggression, increased muscle mass, increased facial/body hair, reduction of fat deposition, and increased libido. Androgen deficiency can lead to decreased sexual function, vaginal dryness, fatigue, depression, and bone loss.

5a-Reductase Activity: The competing enzymes 5a and 5b-reductase act on the androgens androstenedione (creating androsterone and etiocholanolone located under the progesterone picture) and testosterone (creating a-DHT and b-DHT). They also metabolize progesterone, and cortisol. The alpha metabolites of androstenedione and testosterone are far more androgenic than their beta counterparts. Consequently, increased 5a-reductase activity may be accompanied by clinical signs of androgenicity (excess facial hair growth, scalp hair loss, acne, irritability, oily skin, prostate issues in men…etc). If the patient heavily favors the 5a pathway and there are concerns of excess androgenicity (or prostate cancer risk), this may be worth addressing.

Estrogen Metabolism: There are two primary issues with respect to estrogens. 1) Estrogen production (is the patient deficient, sufficient, or in excess?) and 2) Estrogen metabolism (is the metabolism of estrogen favorable or unfavorable when looking at the phase 1 hydroxylation and phase 2 methylation pathways?)

While estradiol (E2) is the most potent estrogen, levels of estrone (E1) and estriol (E3) should also be considered when evaluating the patient's estrogen production. It is important to compare the patient's distribution of metabolites from the pie chart (2nd pie chart) to "Normal Estrogen Metabolism" pie chart. If they are making considerably less of the protective 2-OH estrogens, consider something to improve this metabolism (DIM, I-3-C, etc). Be advised that increasing 2-OH metabolism will likely lower E1 and E2 as well which may not be warranted if E1 and E2 are already low. It is our position that the ratio of 2:16 OHE1 is not as relevant as has been thought historically (Obi, 2011). Providers may still wish to use this index and it can be calculated by simply dividing the two numbers. A female reference range for the ratio with our methodology is 2.4-6.0.

The methylation index will show you how effectively the patient is turning 2 and 4-OH estrogens into methoxy estrogens. Methylation protects against potentially harmful 4-OH estrogens (carcinogenic) made in phase 1 detoxification. Supporting the methylation pathway should be considered if this index is low.

PATIENTS TYPICALLY METABOLIZE A MUCH HIGHER PERCENTAGE OF THEIR ESTROGENS DOWN THE MORE PROTECTIVE 2-OH PATHWAY IN PHASE 1 DETOXIFICATION. DIINDOLYLMETHANE (DIM) OR INDOLE-3-CARBINOL CONTAINING PRODUCTS CAN HELP MOVE ESTROGENS MORE EFFICIENTLY DOWN THIS PATHWAY. BE AWARE THAT THIS TYPICALLY LOWERS MOST OF THE OTHER ESTROGENS, INCLUDING E1 AND E2 AS WELL. IF PATIENTS ARE TAKING OR CONSIDERING HORMONE REPLACEMENT THERAPY, THESE PRODUCTS MAY BE CONSIDERED BUT A HIGHER DOSE OF ESTROGEN MAY BE NEEDED FOR THE SAME CLINICAL EFFECT IF TAKEN AT THE SAME TIME.

DUTCH Adrenal: The HPA-Axis refers to the communication and interaction between the hypothalamus (H) and pituitary (P) in the brain down to the adrenal glands (A) that sit on top of your kidneys. When a physical or psychological stressor occurs, the hypothalamus tells the pituitary to make ACTH, a hormone. ACTH stimulates the adrenal glands to make the stress hormone, cortisol and to a lesser extent DHEA and DHEA-S. Normally, the HPA-axis production follows a daily pattern in which cortisol rises rather rapidly in the first 10-30 minutes after waking in order to help with energy, then gradually decreases throughout the day so that it is low at night for sleep. The cycle starts over the next morning. Abnormally high activity occurs in Cushing's Disease where the HPA-axis is hyper-stimulated causing cortisol to be elevated all day. The opposite is known as Addison's Disease, where cortisol is abnormally low because it is not made appropriately in response to ACTH's stimulation. These two conditions are somewhat rare. Examples of more common conditions related to less severely abnormal cortisol levels include fatigue, depression, insomnia, fibromyalgia, anxiety, inflammation and more.

Only a fraction of cortisol is "free" and bioactive. This fraction of cortisol is very important, but levels of metabolized cortisol best represents overall production of cortisol therefore both should be taken into account to correctly assess adrenal function.

The Daily Free Cortisol Pattern: In healthy adrenal function, cortisol levels are expected to rise in the early morning and fall throughout the day, reaching the lowest point around 1am and peaking 30-60min after waking. The waking sample represents the total of free cortisol throughout the sleeping period. Cortisone is the inactive form of cortisol. Its pattern is of secondary importance, but at times can give additional clarity and is provided on the adrenal page. Typical urine testing (24-hour collection) averages the daily production of cortisol. This approach is not able to properly characterize individuals whose cortisol patterns do not fit the typical rise then fall pattern through the day. Dysfunctional diurnal patters have been associated with health-related problems such as fatigue and insomnia.

The daily total of free cortisol is approximated by summing the four measurements. This calculated value correlates to a 24-hour free cortisol value. It is helpful to compare the relative level of 24-hr free cortisol with metabolized cortisol to understand HPA-axis activity. The total of free cortisol for the day only represents about 1-3% of the total production. The total of the metabolites is a better marker for overall cortisol production.

WHILE FREE CORTISOL LEVELS ARE LOW, THESE RESULTS CAN BE SOMEWHAT MISLEADING IN THIS CASE. OVERALL CORTISOL PRODUCTION IS BEST APPROXIMATED BY LEVELS OF METABOLIZED CORTISOL, WHICH ARE ELEVATED. THIS IMPLIES THAT OVERALL HPA-AXIS ACTIVITY IS ELEVATED. CORTISOL CLEARANCE IS UP-REGULATED IN THIS PATIENT, LEAVING THEM WITH LOW LEVELS OF FREE CORTISOL. THE PATIENT'S CORTISOL STATUS MAY BE DIFFERENT DEPENDING ON LOCATION WITHIN THE BODY. FOR EXAMPLE, THE CONVERSION FROM NORADRENALINE TO ADRENALINE IS DRIVEN BY CORTISOL AND TAKES PLACE WITHIN THE ADRENAL MEDULLA. IN THIS CASE, THIS AREA IS LIKELY FLOODED WITH HIGH LEVELS OF CORTISOL FORCING CONVERSION TO ADRENALINE, WHEREAS THE BRAIN (WHERE CORTISOL HAS NEGATIVE FEEDBACK ON ACTH PRODUCTION) MAY BE CORTISOL DEFICIENT. EFFORTS TO INCREASE HPA-AXIS ACTIVITY MAY EXACERBATE SOME SYMPTOMS. CALMING THE HPA-AXIS, WHILE SUPPORTING IT IN WAYS THAT ARE NOT EXCITATORY, MAY BE THE BEST COURSE OF ACTION.

The Cortisol-Cortisone Balance: Cortisol, which is the active hormone, can convert into cortisone, the inactive form. They convert back and forth in different parts of the body. We tell which one you make more of by looking at whether cortisol metabolites (aTHF, bTHF) or coritsone metabolites (bTHE) are made more (compared to what is normal) in the gauge at the bottom of the adrenal page. The deactivation of cortisol to cortisone (via enzyme 11b-HSD II) occurs predominantly in the kidneys, colon, and saliva glands. The local formation of inactive cortisone from cortisol in the kidney is strongly reflected in urine. Activation of cortisone to cortisol takes place primarily in the liver, adipose tissue, gonads, brain, and muscle. Within these same tissues (mostly the liver) the free hormones are also converted to their metabolites (cortisol to a/b-THF, cortisone to THE). Balance between the two is usually preferred, but making more cortisol than cortisone is sometimes good to help give you enough cortisol if your levels are low however a preference for the active cortisol is enhanced by central adiposity, hypothyroidism, inflammation, and supplements such as licorice root extract. Cortisone formation is enhanced by growth hormone, estrogen, coffee and hyperthyroidism.

THE PATIENT'S THF/THE AND CORTISOL TO CORTISONE RATIOS IMPLY A PREFERENCE FOR CORTISONE (RELATIVE TO CORTISOL). THIS IS LIKELY A CONTRIBUTING FACTOR TO THE SOMEWHAT LOWER CORTISOL LEVELS ALTHOUGH THE PATIENT DOES NOT REPORT SIGNIFICANT FATIGUE. IF ADRENAL SUPPORT IS CONSIDERED, USE HERBS THAT WILL ASSIST IN BLOCKING THE DEACTIVATION OF CORTISOL TO CORTISONE AS WELL AS THE METABOLISM OF CORTISOL BY 5b-REDUCTASE.

Reading the Report: The first page of the Dutch Complete lab report is a summary page while the second page of the Dutch Complete lab report and first page of the Dutch sex hormone and Dutch adrenal test are a classic lab report showing each result and the respective range of each hormone. Reference ranges shown are those of young healthy individuals with females collecting on days 19-21 (mid-luteal phase) of the menstrual cycle. The graphical representation of results on the page that follows allows the viewing of hormone results within the biochemical flowchart to more easily see the relative level of each hormone. The gauge format shows the patient result (represented by the "needle" of the gauge) and the area between the stars represents the reference range.
Reference ranges are typically set at the 20th to the 80th percentile of young, healthy individuals (DHEAS for example). This means that a result at the low end of a range is lower than 80 percent of young, healthy individuals. Likewise a result at the high end of a range is higher than 80 percent of the population. Some reference ranges are set more widely. For example, slightly elevated progesterone is not generally considered problematic, so its metabolites have reference ranges that extend further (90th percentile instead of 80th).
The "fan" style gauges are used for indexes/ratios such as on 5a-reductase activity, cortisol/cortisone, and estrogen methylation. Because these values are all based on ratios there are no values or units, but they give a general idea of a particular relationship and can tell you how 'turned up' or 'turned down' a particular process is. The middle of the gauge represents an average value, while the lines towards the edge represent results lower or higher than most (80%) of the

population. Being outside of any range is not always considered unfavorable. For example, on the estrogen methylation gauge, an elevated level means someone methylates estrogens very effectively which may have positive consequences.

What is actually measured in urine? In blood, most hormones are bound to binding poteins. A small fraction of the total hormone levels are "free" and unbound such that they are active hormones. These free hormones are not found readily in urine except for cortisol and cortisone (because they are much more water soluble than, for example, testosterone). As such, free cortisol and cortisone can be measured in urine and it is this measurement that nearly all urinary cortisol research is based upon. In the DUTCH Adrenal Profile the diurnal patterns of free cortisol and cortisone are measured by LC-MS/MS.

All other hormones measured (cortisol metabolites, DHEA, and all sex hormones) are excreted in urine predominately after the addition of a glucuronide or sulfate group (to increase water solubility for excretion). As an example, Tajic (Natural Sciences, 1968 publication) found that of the testosterone found in urine, 57-80% was testosterone-glucuronide, 14-42% was testosterone-sulfate, and negligible amounts (<1% for most) was free testosterone. The most likely source of free sex hormones in urine is from contamination from hormonal supplements. To eliminate this potential, we remove free hormones from conjugates (our testing can be used even if vaginal hormones have been given). The glucuronides and sulfates are then broken off of the parent hormones, and the measurement is made. These measurements reflect well the bioavailable amount of hormone in most cases as it is only the free, nonprotein-bound fraction in blood/tissue that is available for phase II metabolism (glucuronidation and sulfation) and subsequent urine excretion.
Disclaimer: the filter paper used for sample collection is designed for blood collection, so it is technically considered "research only" for urine collection. Its proper use for urine collection has been thoroughly validated.