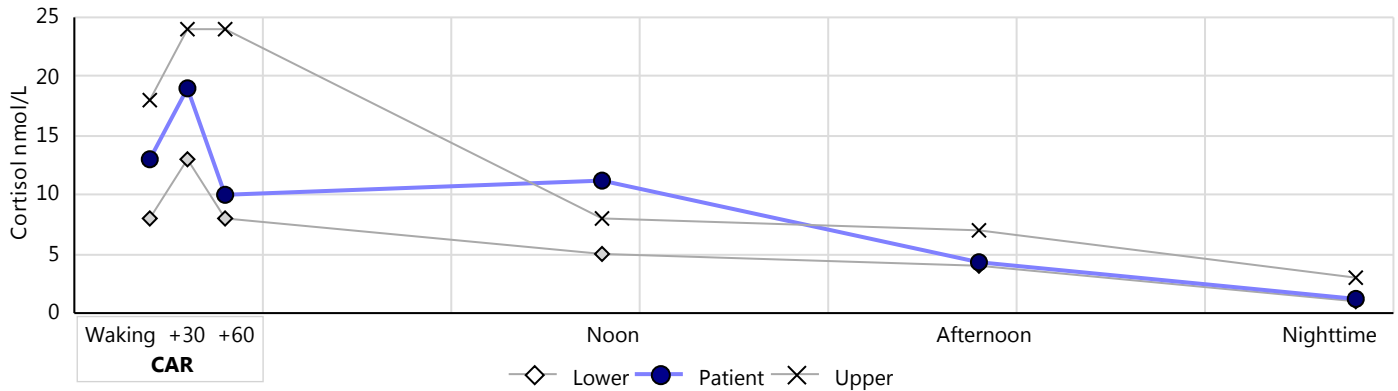


Authorizing Clinician	Patient	Collected	Received	Reported
BioHealth Laboratory 23900 Hawthorne Blvd, Suite 150 Torrance, CA 90505	Rebecca Stein	Gender: Female DOB: 11/26/1968	01/08/2017	01/10/2017 01/09/2017

HPA Stress Profile +5 with CAR (#205-CAR)

Cortisol Awakening Response (CAR) with Cortisol Diurnal Rhythm



Time of Waking: 7:45 AM

Perceived Stress Score: 32

Cortisol and DHEA-S Results

Parameter	Result	Reference Range	Units
Cortisol - Waking	13.0	8.0 - 18.0*	nmol/L
Cortisol - Waking +30	19.0	13.0 - 24.0	nmol/L
Cortisol - Waking +60	10.0	8.0 - 24.0*	nmol/L
Cortisol - Noon	11.2	5.0 - 8.0	nmol/L
Cortisol - Afternoon	4.3	4.0 - 7.0	nmol/L
Cortisol - Nighttime	1.2	1.0 - 3.0	nmol/L
Cortisol - Sum	35.9	23.0 - 42.0	nmol/L
DHEA-S Waking +30	6.7	1.0 - 10.0	nmol/L
Cortisol:DHEA-S Ratio	2.9 : 1	**	Molar Ratio

** A new Cortisol:DHEA-S ratio reference range is currently being determined by analysis of patient data from the newly improved test conditions.

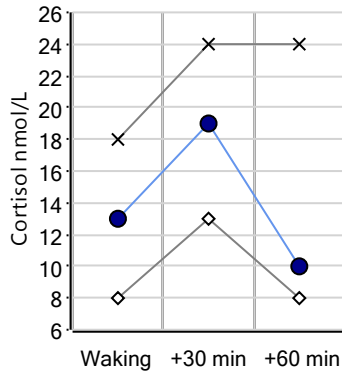
The Perceived Stress Scale (PSS) is the most widely used physiological instrument for measuring the perception of stress. Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress. The PSS score should be taken context of several demographic categories: Gender, age, race, education, employment and income. For more information on how to use the PSS score in the context of particular demographics please see the article. [The Perceived Stress Scale and HPA Assessment](#). In the future, demographic categories will be built into PSS forms and adjusted scores will be provided on test reports.

* Waking cortisol values are variable - see CAR guidelines below for data interpretation. Cortisol and DHEA-S values used in the Cortisol:DHEA-S molar ratio are reported from the waking +30 sample. DHEA-S reference ranges are loaded dynamically based on patient age and gender. The Cortisol Sum includes the +30 minute, noon, afternoon, and nighttime values.

Authorizing Clinician	Patient	Collected	Received	Reported
BioHealth Laboratory 23900 Hawthorne Blvd, Suite 150 Torrance, CA 90505	Rebecca Stein	Gender: Female DOB: 11/26/1968	01/08/2017	01/10/2017 01/09/2017

HPA Stress Profile +5 with CAR (#205-CAR)

Cortisol Awakening Response (CAR)



Cortisol Awakening Response (CAR) is the rise in cortisol levels observed at 30 minutes post-awakening (approximately 35-60% above the waking value) followed by an expected decline one hour after waking. The behavior of cortisol is an important physiological response to anticipation of the day ahead and is a key indicator of HPA axis reactivity. The waking, 30 minute, and 60 minute cortisol results comprise something of a "mini stress test" and capture the dynamic rise and decline of cortisol in the first hour after awakening, preceding the steady decline of cortisol throughout the day (known as "diurnal rhythm").

CAR Result	% Change	Guideline	Interpretation
Rise: Percent of cortisol change from waking to waking +30 minutes.	46.15%	35-60%	The 30 minute post-awakening collection should show an approximately 35-60% increase from awakening cortisol value.
Decline: Percent of cortisol change from waking to waking +60 minutes.	-23.08%	<33%	The 60 minute post-awakening collection captures the expected decrease in cortisol concentration (approximately 0-33% above baseline value).

Cortisol Result	Value (nmol/L)	Guideline
Waking	13.0	8.0 - 18.0* nmol/L
Waking +30 Minutes	19.0	13.0 - 24.0 nmol/L
Waking +60 Minutes	10.0	8.0 - 24.0* nmol/L

* These guideline ranges are based on the available literature, as cited, and are interim ranges pending a comprehensive analysis of patient data. These guidelines are for research purposes only. The results should be interpreted in the context of patient symptoms, intake data, and relevant diagnostic information.

Authorizing Clinician	Patient	Gender:	Collected	Received	Reported
BioHealth Laboratory 23900 Hawthorne Blvd, Suite 150 Torrance, CA 90505	Rebecca Stein	Female	01/08/2017	01/10/2017	01/09/2017
		DOB: 11/26/1968			

HPA Stress Profile +5 with CAR (#205-CAR)

Cortisol:DHEA-S Ratio

Parameter	Result	Reference Range	Units
Cortisol - Waking +30	19.0	13.0 - 24.0	nmol/L
DHEA-S - Waking +30	6.7	1.0 - 10.0	nmol/L
Cortisol:DHEA-S Ratio	2.9 : 1	**	Molar Ratio

** A new Cortisol:DHEA-S ratio reference range is currently being determined by analysis of patient data from the newly improved test conditions.

The Cortisol to DHEA-S ratio provides a snapshot of the waking values of these hormones and is reported specific to the age and gender of the patient. In general, an elevated cortisol:DHEA-S ratio is indicative of progressive HPA axis dysfunction in which acute and/or chronic stressors have taken their toll on homeostasis. The cortisol:DHEA-S ratio is generally considered to be a measure of catabolic vs. anabolic activities, but it may be better described as the overall burden of glucocorticoid signaling on tissues, since DHEA acts not only as an anabolic hormone, but appears to function to down-regulate the cellular effects of cortisol. Therefore, the signaling burden of cortisol is not just a function of available free cortisol, but of the DHEA-S available as an opposing signal.

Comments:

Cortisol has one of the most distinct circadian rhythms in human physiology. This is regulated by the central clock located in the suprachiasmatic nucleus of the hypothalamus. Cortisol acts as a secondary messenger between central and peripheral clocks, hence its importance in the synchronization of body circadian rhythms. Optimal regulation of the hypothalamic-pituitary-adrenal (HPA) axis is critical for a successful response to any stressor as well as in non-stressful situations. Dysregulation of the HPA axis in basal conditions or in response to acute or chronic (including psychosocial) stress is closely related to the onset and/or progression of many diseases. The anabolic steroid, dehydroepiandrosterone sulfate (DHEA-S), is secreted from the adrenal cortex. It plays a significant role in the body as a precursor to sex steroids as well as a role in HPA axis response to stress.

References:

1. Clow, A., et al., The cortisol awakening response: More than a measure of HPA axis function. *Neurosci.Biobehav. Rev.* 2010, doi:10.1016/j.neubiorev.2009.12.011
2. Guillems, Thomas G. *The Role of Stress and the HPA Axis in Chronic Disease Management.* Stevens Point: Point Institute, 2015. Print.
3. Wust S, Wolf J, Hellhammer DH, Federenko I, Schommer N, Kirschbaum C. The cortisol awakening response - normal values and confounds. *Noise Health [serial online]* 2000 ;2:79-88.
4. Ferrari, E. et al., Age-related changes of the hypothalamic-pituitary-adrenal axis: pathophysiological correlates. *European Journal of Endocrinology* (2001) 144 319-329
5. Kroboth, PD et al., DHEA and DHEA-S: a review. *J Clin Pharmacol.* 1999. 39(4): 327-48.
6. Orentreich, N., Age changes and sex differences in serum dehydroepiandrosterone sulfate concentrations throughout adulthood.

Authorizing Clinician	Patient	Gender:	Collected	Received	Reported
BioHealth Laboratory 23900 Hawthorne Blvd, Suite 150 Torrance, CA 90505	Rebecca Stein	Female	01/08/2017	01/10/2017	01/09/2017
		DOB: 11/26/1968			

HPA Stress Profile +5 with CAR (#205-CAR)

Parameter	Result	Units	Reference Range	
Estradiol	1.1	pg/mL	FEMALE:	
			Follicular Phase	1.0 - 5.0 pg/mL
			Midcycle	3.0 - 8.0 pg/mL
			Luteal Phase	1.0 - 5.0 pg/mL
			Postmenopausal	0.5 - 3.0 pg/mL
Physiological Range	4.0 - 14.0 pg/mL			
			MALE:	1.0 - 3.0 pg/mL
Estriol	18.9	pg/mL	FEMALE: 2 - 98 pg/mL MALE: 0.5 - 40 pg/mL	
Progesterone	123.9	pg/mL	FEMALE:	
			Premenopausal	50 - 400 pg/mL
			Postmenopausal	5.0 - 95 pg/mL
			Physiological Range	100 - 500 pg/mL
			MALE:	5.0 - 100 pg/mL
Melatonin (Bedtime)	17.4	pg/mL	12.0 - 35.0 (MALE/FEMALE)	
Testosterone	23.8	pg/mL	FEMALE:	20 - 60 pg/mL
			MALE:	40 - 130 pg/mL