

CORTISOL AWAKENING RESPONSE (CAR)



What is the Cortisol Awakening Response (CAR), and how do we test for it?

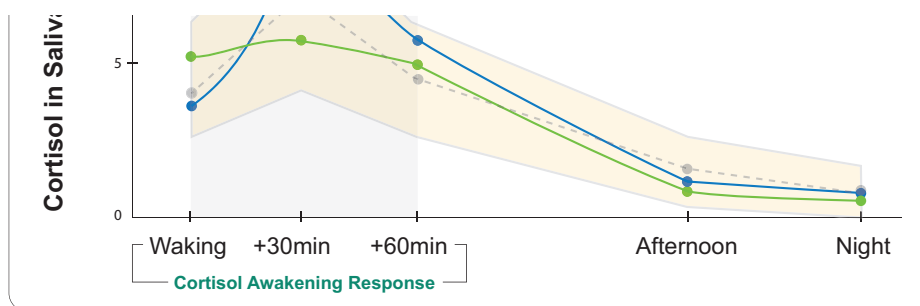
When we open our eyes upon waking, cortisol levels naturally begin to rise by an average of 50%. 30 minutes after waking, cortisol levels will still show this sharp increase. By 60 minutes after waking, cortisol levels have peaked and begin to decline. Measuring this rise and fall of cortisol levels at waking can be used as a “mini stress-test”. Research shows that the size of this increase correlates with HPA-axis function, even if the individual sample measurements are all within range. A quick saturation of saliva swabs upon waking, and at 30 and 60 minutes after waking, provide what is required to assess a patient’s cortisol awakening response. Additional samples at dinner and bedtime provide the daily picture of free cortisol.

A low or blunted Cortisol Awakening Response can be a result of an underactive HPA axis, excessive psychological burnout, seasonal affective disorder (SAD), sleep apnea or poor sleep in general, PTSD, chronic fatigue and/or chronic pain. A decreased CAR has also been associated with systemic hypertension, functional GI diseases, postpartum depression, and autoimmune diseases.

An elevated Cortisol Awakening Response can be a result of an over-reactive HPA axis, ongoing job-related stress (anticipatory stress for the day), glycemic dysregulation, pain (i.e. waking with painful joints or a migraine), and general depression (not SAD). A recent study¹ showed that neither the waking nor post-waking cortisol results correlated to Major Depressive Disorder, but the CAR calculation (the change between the first two samples) did. This measurement of the response to waking has independent clinical value showing dysfunction that may be hidden by current testing options.



CORTISOL AWAKENING RESPONSE



Why aren't true Cortisol Awakening Response (CAR) tests readily available?

A true cortisol awakening response assessment requires salivary samples to be collected within five minutes of waking, again 30 minutes after waking, and once more 60 minutes after waking. Our collection uses specialty, FDA-approved, and patented collection devices called Salivettes™, which make it easy to quickly collect enough saliva for testing. Other labs may require patients to spit in collection tubes until a large volume has been collected. This often takes too long. If the first sample is not collected within a few minutes of waking, the cortisol concentration will begin to rise causing errant CAR calculations. Almost all published research on the CAR reports using Salivettes™. Precision Analytical, Inc. is one of a few labs to offer a true CAR and the only to offer the collection method preferred by researchers to ensure accurate collection and calculation.

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What's Included in the Cortisol Awakening Response Test?

The CAR test uses five saliva samples. These samples are collected over the course of one day, from waking to bedtime. Five measurements each of cortisol and cortisone are analyzed using LC-MS/MS to provide the up-and-down pattern throughout the day, as well as the CAR calculation.

References 1. Adam EK, Doane LD, Zinbarg RE, Mineka S, Craske MG, Griffith JW. Prospective prediction of major depressive disorder from cortisol awakening responses in adolescence. *Psychoneuroendocrinology*. 2010 Jul;35(6):921-31.

Additional References Chida Y, Steptoe A. Cortisol awakening response and psychosocial factors: a systematic review and meta-analysis. *Biol Psychol*. 2009 Mar;80(3):265-78 3., Clow A, Hucklebridge F, Stalder T, Evans P, Thorn L. The cortisol awakening response: more than a measure of HPA axis function. *Neurosci Biobehav Rev*. 2010 Sep;35(1):97-103., Fries E, Dettenborn L, Kirschbaum C. The cortisol awakening response (CAR): Facts and future directions. *International Journal of Psychophysiology* 2009 Apr, 72(1):67-73 5., Huber TJ, Issa K, Schik G, Wolf OT. The cortisol awakening response is blunted in psychotherapy inpatients suffering from depression. *Psychoneuroendocrinology*. 2006 Aug;31(7):900-4 6., Jakuszkowiak-Wojten K, Landowski J, Wiglusz MS, Cubala WJ. Cortisol awakening response in drug-naïve panic disorder. *Neuropsychiatr Dis Treat*. 2016 Jun 27;12:1581-5 7., Roberts AD, Wessely S, Chalder T, Papadopoulos A, Cleare AJ. Salivary cortisol response to awakening in chronic fatigue syndrome. *Br J Psychiatry*. 2004 Feb;184:136-41.

