Casual Friday Series

Chronic Disease – Sleep Connections

A Biogenetix Clinical Presentation

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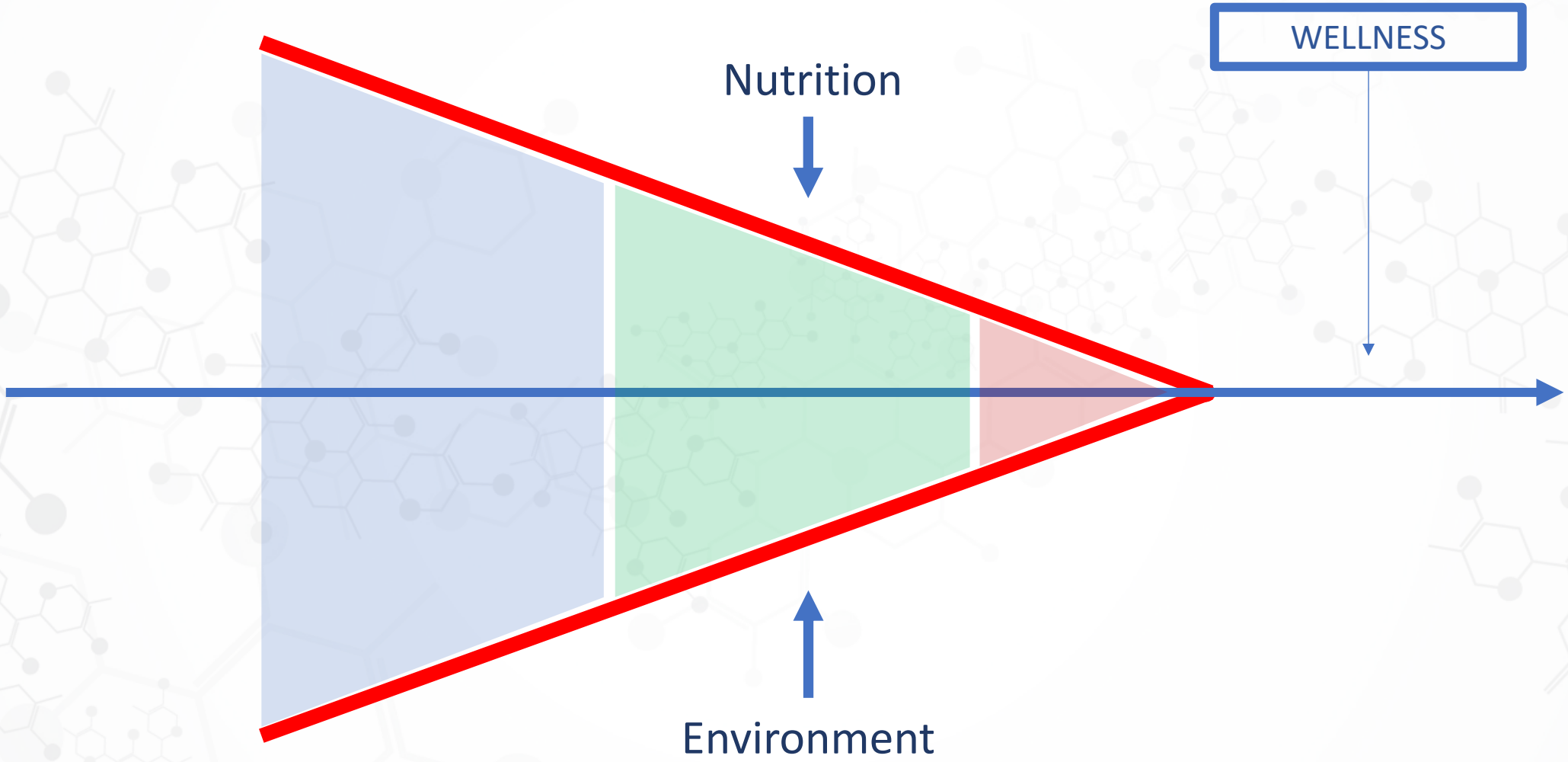
Disclaimer

- *Information in this presentation is not intended, in itself, to diagnose, treat, reverse, cure, or prevent any disease. While this presentation is based on medical literature, findings, and text, The following statements have not been evaluated by the FDA.*
- *The information provided in this presentation is for your consideration only as a practicing health care provider. Ultimately you are responsible for exercising professional judgment in the care of your own patients.*

Protocols



PLoS One. 2012; 7(1): e30972.
Published online 2012 Jan 25. doi: 10.1371/journal.pone.0030972
PMCID: PMC3266295
PMID: 22295122

Association of Sleep Duration with Chronic Diseases in the European Prospective Investigation into Cancer and Nutrition (EPIC)-Potsdam Study

Ann

Methods

Data from 23 620 middle-aged participants of the European Prospective Investigation into Cancer and Nutrition (EPIC)-Potsdam study, that were recruited between 1994–1998, were analyzed by using Cox proportional hazard regression to examine the association between self-reported sleep duration at baseline and incidence of chronic diseases, such as diabetes, myocardial infarction, stroke, and cancer.

Results

During a mean follow-up period of 7.8 years 841 incident cases of type 2 diabetes, 197 cases of myocardial infarction, 169 incident strokes, and 846 tumor cases were observed. Compared to persons sleeping 7-<8 h/day, participants with sleep duration of <6 h had a significantly increased risk of stroke (Hazard Ratio (HR)=2.06, 95% confidence interval (CI): 1.18–3.59), cancer (HR=1.43, 95% CI: 1.09–1.87), and overall chronic diseases (HR=1.31, 95% CI: 1.10–1.55) in multivariable adjusted models. Self-reported daytime sleep at baseline was not associated with incident chronic diseases in the overall study sample. However, there had been an effect modification of daytime sleep by hypertension showing that daytime sleep was inversely related to chronic disease risk among non-hypertensive participants but directly related to chronic diseases among hypertensives.

Sleep. 2013 Oct 1; 36(10): 1421–1427.
Published online 2013 Oct 1. doi: 10.5665/sleep.3028
PMCID: PMC3773191
PMID: 24082301

Sleep Duration and Chronic Diseases among US Adults Age 45 Years and Older: Evidence From the 2010 Behavioral Risk Factor Surveillance System

Yong Liu, MD, MS, Anne G. Wheaton, PhD, Daniel P. Chapman, PhD, MSc, and Janet B. Croft, PhD

Participants:

There were 54,269 adults age 45 y or older who completed the 2010 Behavioral Risk Factor Surveillance System survey in 14 states.

Results:

Nearly one third (31.1% or an estimated 11.1 million) of respondents age 45 y and older reported being short sleepers (≤ 6 h), 64.8% being optimal sleepers (7-9 h), and 4.1% being long sleepers (≥ 10 h) in a 24-h period. Compared with the optimal sleep duration, both short and long sleep durations were significantly associated with obesity, FMD (mental health was not good ≥ 14 days during the past 30 days), CHD, stroke, and diabetes after controlling for sex, age, race/ethnicity, and education. The U-shaped relationships of sleep duration with CHD, stroke, and diabetes were moderately attenuated by FMD. The relationship between sleep duration and diabetes was slightly attenuated by obesity.

Sleep. 2016 Nov 1; 39(11): 1927–1940.
Published online 2016 Nov 1. doi: 10.5665/sleep.6218
PMCID: PMC5070747
PMID: 27568797

Sleep Duration and Quality in Relation to Autonomic Nervous System Measures: The Multi-Ethnic Study of Atherosclerosis (MESA)

Cecilia Castro-D… …eeman, PhD,[5]
Paula McKinley,…

Methods:

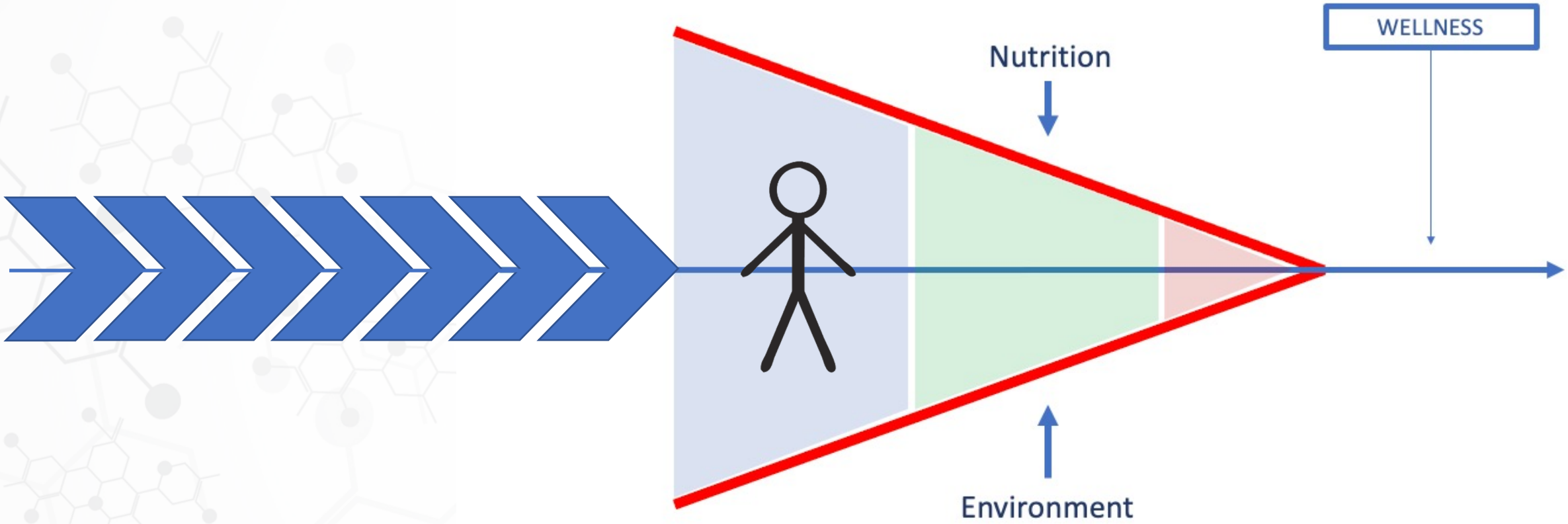
Cross-sectional analysis of data from actigraphy-based measures of sleep duration and efficiency and responses to a challenge protocol obtained from 527 adult participants in the Multi-Ethnic Study of Atherosclerosis.

Results:

Participants who slept fewer than 6 h per night (compared to those who slept 7 h or more per night) had higher baseline HR (fully adjusted model 0.05 log beats/min, 95% confidence interval [CI] 0.01, 0.09) and greater HR orthostatic reactivity (fully adjusted model 0.02 log beats/min, 95% CI 0.002, 0.023). Participants who slept 6 to less than 7 h/night (compared to those who slept 7 h or more per night) had lower baseline HF-HRV (fully adjusted model −0.31 log $msec^2$, 95% CI −0.60, −0.14). Participants with low sleep efficiency had lower baseline HF-HRV than those with higher sleep efficiency (fully adjusted model −0.59 log $msec^2$, 95% CI −1.03, −0.15). Participants with low sleep efficiency had higher baseline levels of amylase than those with higher sleep efficiency (fully adjusted model 0.45 log U/mL, 95% CI 0.04, 0.86).

Conclusions:

Short sleep duration, low sleep efficiency, and insomnia combined with short sleep duration were associated with markers of autonomic tone that indicate lower levels of cardiac parasympathetic (vagal) tone and/or higher levels of sympathetic tone.


WELLNESS
Nutrition
Environment

https://physiops.com/the-autonomic-nervous-system/

67 yo male diabetic.

Chemistries

Glucose	**100**	**High**	mg/dL	65-99
Hemoglobin A1c	**9.1**	**High**	%	4.8-5.6

Please Note:
Prediabetes: 5.7 - 6.4
Diabetes: >6.4
Glycemic control for adults with diabetes: <7.0

Uric Acid	**10.5**	**High**	mg/dL	3.8-8.4

Therapeutic target for gout patients: <6.0

BUN	**41**	**High**	mg/dL	8-27
Creatinine	**1.60**	**High**	mg/dL	0.76-1.27
eGFR If NonAfricn Am	**44**	**Low**	mL/min/1.73	>59
eGFR If Africn Am	**51**	**Low**	mL/min/1.73	>59
BUN/Creatinine Ratio	**26**	**High**		10-24

C-Reactive Protein, Cardiac	**9.10**	**High**	mg/L	0.00-3.00

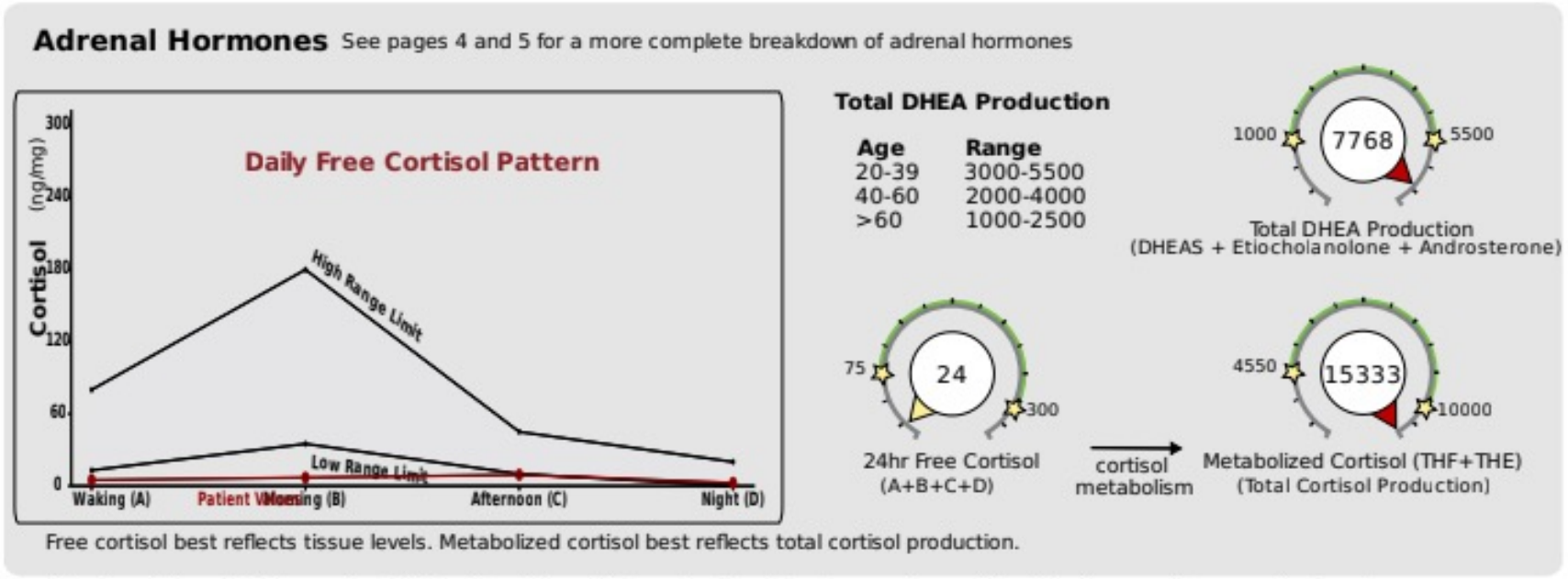
Relative Risk for Future Cardiovascular Event

Low	**<1.00**
Average	**1.00 - 3.00**
High	**>3.00**

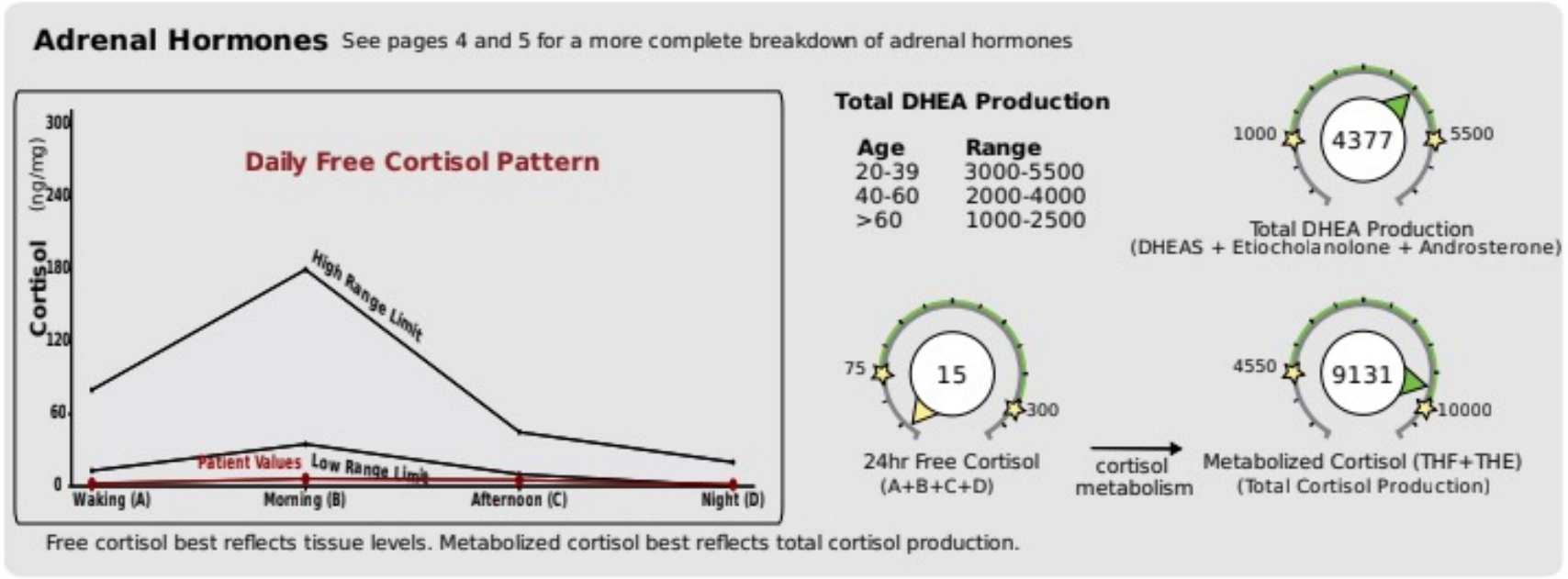
Homocyst(e)ine	**21.5**	**High**	umol/L	0.0-17.2
Insulin	**183.0**	**High**	uIU/mL	2.6-24.9

67 yo male diabetic.

March 2021



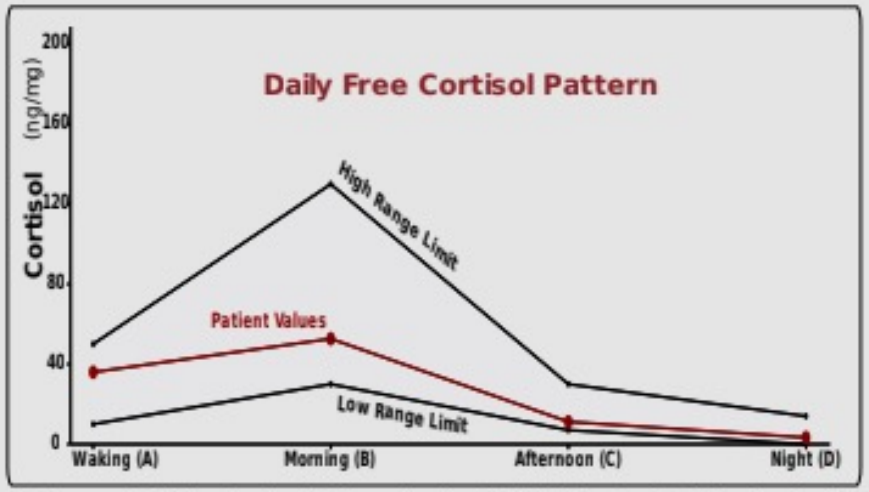
June 2021



46 yo Female, “don’t feel well.”

Jan 2021

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



Total DHEA Production

Age	Range
20-39	1300-3000
40-60	750-2000
>60	500-1200

Total DHEA Production
(DHEAS + Etiocholanolone + Androsterone)

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

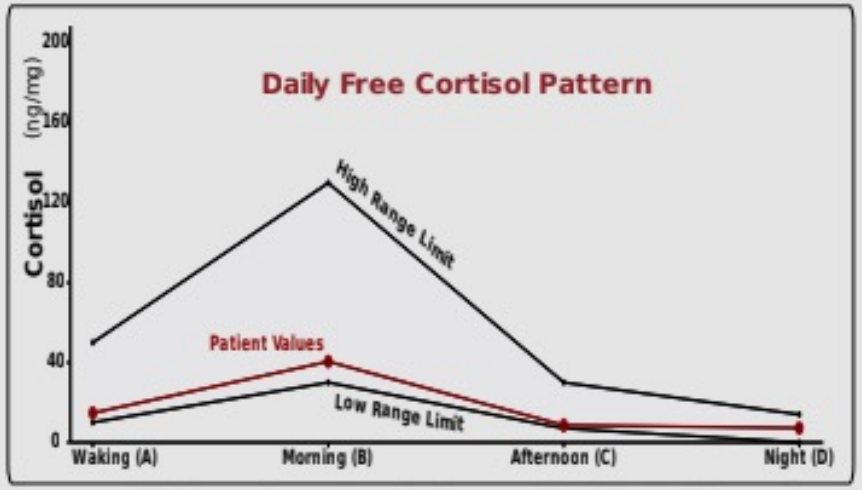
cortisol metabolism

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

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

June 2021

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



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

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

Review > J Hypertens. 1997 Dec;15(12 Pt 2):1613-9.
doi: 10.1097/00004872-199715120-00062.

The sympathetic nervous system and obstructive sleep apnea: implications for hypertension

K Narkiew

Affiliation

PMID: 94

Patients with obstructive sleep apnea experience repetitive apneic events during sleep, with consequent hypoxia and hypercapnia. Hypoxia and hypercapnia, acting via the chemoreflexes, elicit increases in sympathetic nerve activity. The sympathetic responses to hypoxia and hypercapnia are potentiated during apnea, when the sympathetic inhibitory influence of the thoracic afferent nerves is eliminated. As a consequence of the sympathetic vasoconstrictor response to apneic events, patients with obstructive sleep apnea manifest marked increases in blood pressure during sleep, especially evident at the end of the apnea. The increases in sympathetic activity and blood pressure during sleep in these patients appear to carry over into the daytime such that patients with sleep apnea have an increased prevalence of hypertension and high levels of sympathetic nerve activity. Although the mechanism underlying the persistent elevation in sympathetic activity during the daytime is not known, it is likely that the increased sympathetic drive is implicated in the higher daytime blood pressures in these patients. Whereas patients with sleep apnea have an increased prevalence of hypertension, in those patients with sleep apnea who do have hypertension, the sympathetic response to apneic events may be potentiated. This may be secondary to impaired baroreflex sensitivity, since the baroreflexes exert an inhibitory influence on the chemoreflex responses to hypoxia. Treatment with continuous positive airway pressure results in an acute reduction in blood pressure and sympathetic activity during sleep. Prolonged effective treatment of sleep apnea may also reduce daytime blood pressure levels. This review examines the physiology of the chemoreflex responses to hypoxia, hypercapnia and apnea, as well as the physiologic responses to sleep in normal humans. These physiologic responses are compared with the pathophysiologic sympathetic and hemodynamic responses that characterize obstructive sleep apnea. Increases in sympathetic activity and blood pressure in patients with obstructive sleep apnea may play a role in linking sleep apnea to hypertension and cardiac and vascular events.

67 yo male

Chemistries				
Glucose	**100**	**High**	mg/dL	65-99
Hemoglobin A1c	**9.1**	**High**	%	4.8-5.6
Please Note:				
Prediabetes: 5.7 - 6.4				
Diabetes: >6.4				
Glycemic control for adults with diabetes: <7.0				
Uric Acid	**10.5**	**High**	mg/dL	3.8-8.4
Therapeutic target for gout patients: <6.0				
BUN	**41**	**High**	mg/dL	8-27
Creatinine	**1.60**	**High**	mg/dL	0.76-1.27
eGFR If NonAfricn Am	**44**	**Low**	mL/min/1.73	>59
eGFR If Africn Am	**51**	**Low**	mL/min/1.73	>59
BUN/Creatinine Ratio	**26**	**High**		10-24
Sodium	142		mmol/L	134-144
Potassium	**5.9**	**High**	mmol/L	3.5-5.2
Chloride	102		mmol/L	96-106
Carbon Dioxide, Total	**19**	**Low**	mmol/L	20-29
Calcium	10.2		mg/dL	8.6-10.2
Phosphorus	3.9		mg/dL	2.8-4.1
Magnesium	**1.3**	**Low**	mg/dL	1.6-2.3
C-Reactive Protein, Cardiac	**9.10**	**High**	mg/L	0.00-3.00
Relative Risk for Future Cardiovascular Event				
		Low		**<1.00**
		Average		**1.00 - 3.00**
		High		**>3.00**
Homocyst(e)ine	**21.5**	**High**	umol/L	0.0-17.2
TSH	3.070		uIU/mL	0.450-4.500
Thyroxine (T4)	6.8		ug/dL	4.5-12.0
T3 Uptake	28		%	24-39
Free Thyroxine Index	1.9			1.2-4.9
Triiodothyronine (T3)	99		ng/dL	71-180
Triiodothyronine (T3), Free	2.9		pg/mL	2.0-4.4
Reverse T3, Serum [A]	21.8		ng/dL	9.2-24.1
T4,Free(Direct)	1.18		ng/dL	0.82-1.77
Thyroid Peroxidase (TPO) Ab	<9		IU/mL	0-34
Thyroglobulin Antibody	<1.0		IU/mL	0.0-0.9
Thyroglobulin Antibody measured by Beckman Coulter Methodology				
Vitamin D, 25-Hydroxy	**13.6**	**Low**	ng/mL	30.0-100.0

52 yo female

Test	Current Result and Flag	Previous Result and Date		Units
Glucose [01]	90	88	02/01/2021	mg/dL
Hemoglobin A1c [01]	5.3	5.4	02/01/2021	%
Uric Acid [01]	4.8	4.8	02/01/2021	mg/dL
	Therapeutic target for gout patients: <6.0			
BUN [01]	17	15	02/01/2021	mg/dL
Creatinine [01]	0.85	0.91	02/01/2021	mg/dL
eGFR If NonAfricn Am	79	73	02/01/2021	mL/min/1.73
eGFR If Africn Am	91	84	02/01/2021	mL/min/1.73
	Labcorp currently reports eGFR in compliance with the current recommendations of the National Kidney Foundation. Labcorp will update reporting as new guidelines are published from the NKF-ASN Task force.			
BUN/Creatinine Ratio	20	16	02/01/2021	
Sodium [01]	141	139	02/01/2021	mmol/L
Potassium [01]	4.5	4.0	02/01/2021	mmol/L
Chloride [01]	104	101	02/01/2021	mmol/L
Carbon Dioxide, Total [01]	20	23	02/01/2021	mmol/L

Arthritis Res Ther. 2014; 16: 504.
Published online 2014 Dec 12. doi: 10.1186/s13075-014-0504-2
PMCID: PMC4396833
PMID: 25789375

The sympathetic nervous response in inflammation

Georg Pongratz and Rainer H Straub

Author informati

Inflammation causes increased activity of the SNS with release of NE and co-transmitters in lymphoid organs and inflamed local sites. Immune cells carry receptors (for example, ARs) to detect and process signals from the SNS. The reaction of the immune cell to neurotransmitters is variable depending on the context of receptor engagement (activation state of the cell, expression pattern of neurotransmitter receptors, microenvironment, cytokine milieu, and distance from the catecholamine source (concentration)).

On a systemic level, the signals from the SNS are proinflammatory in the initial phase of inflammation, whereas anti-inflammatory effects are dominant in the late or chronic phases of an inflammatory response, at least in collagen-induced arthritis. Upon initiating an inflammatory process, the body adopts an 'inflammatory configuration' with increased systemic SNS and HPA axis activity. This reaction can be interpreted as an 'energy appeal reaction' resulting in the provision of enough energy-rich fuels, like glucose and free fatty acids, to fulfill the needs of an activated immune system.

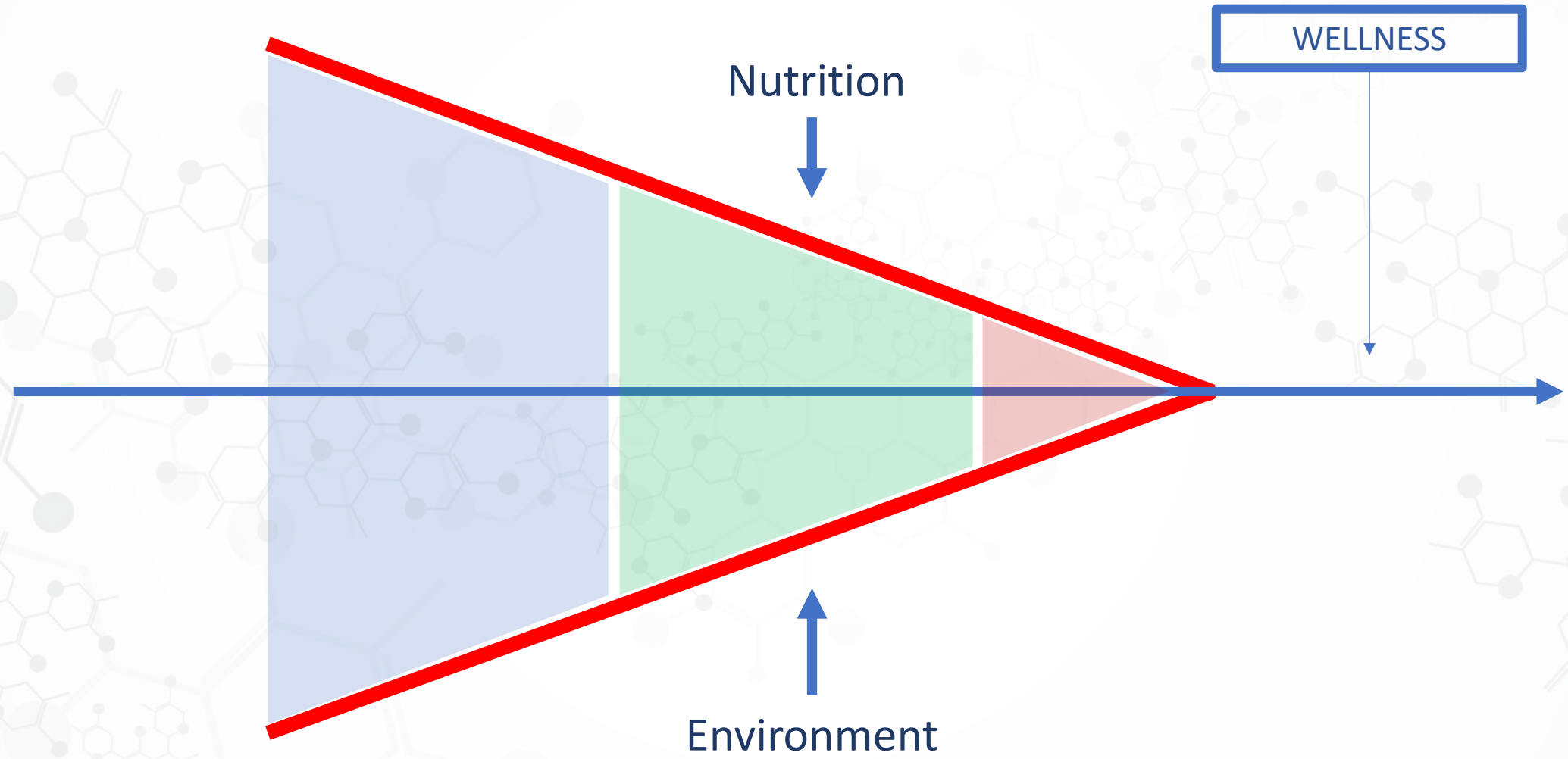
If inflammation becomes chronic, as in chronic inflammatory illness, the system changes into a 'chronic inflammatory condition' that is characterized by 1) still increased systemic activity of the SNS, 2) still increased activity of the HPA axis but without immunosuppression (glucocorticoid receptor desensitization and inadequacy), and 3) local repulsion of SNS fibers from inflamed tissue, including lymphoid organs, to create zones of permitted inflammation. The immune response is more or less uncoupled from central regulation to avoid the anti-inflammatory influence of the brain. All mechanisms ensure an optimal fight against an antigen.

Short Term…


Biogenetix
Hypaax Balance
Professional Formulation
BIOGENETIX BLEND
VITAMIN & HERBAL
DIETARY SUPPLEMENT 90
Net Weight: 72g
Biogenetix
P/S Support
Professional Formulation
BIOGENETIX BLEND
PHOSPHOLIPID COMPLEX
DIETARY SUPPLEMENT 60
Net Weight: 38g
Biogenetix
BioG-Max GABA
Liposomal Delivery System
Dietary Supplement
Net 1.7 fl. oz. (50 mL)

Short Term…

Protocols



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