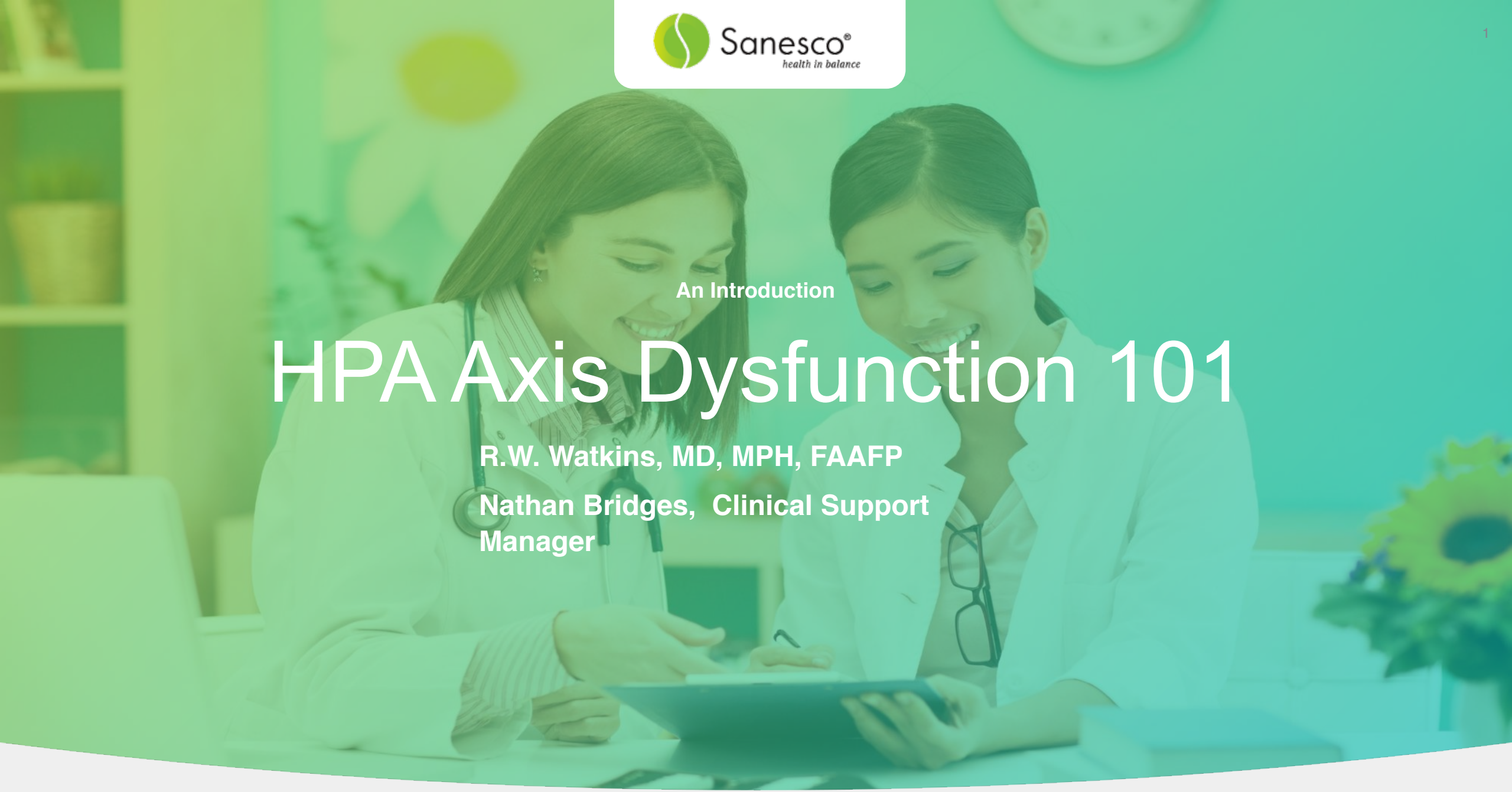

An Introduction

HPA Axis Dysfunction 101

R.W. Watkins, MD, MPH, FAAFP

Nathan Bridges, Clinical Support Manager

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Speaker

R.W. Watkins, MD, MPH, FAAFP

- Medical degree from East Carolina School of Medicine with an internship and residency in Family Medicine
- Master's in Public Health, Health Promotion and Nutrition
- Focus on functional medicine with a special interest in neurohormonal imbalances
- 20+ years of experience in private practice, teaching, and corporate medicine
- Accomplished lecturer and author
- Adjunct Clinical Associate Professor at UNC School of Medicine and the East Carolina School of Medicine
- Member of AAFP with the honorary degree of fellow and a post on the Board of Directors for COLA

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Speaker

Nathan Bridges,
Clinical Support Manager

- Graduate of UNCA in Asheville with a B.S. in Health and Wellness Promotion and a minor in Psychology
- For the past six years, Nathan has been studying the neuroendocrine system under guidance from Dr. Watkins
- Written and delivered numerous educational presentations and blogs to healthcare providers on topics related to the HPA-axis and neurotransmitters
- Analyzed, interpreted, and written/reviewed hundreds of personalized laboratory reports for doctors
- Currently manages Sanesco's clinical support department

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Our Vision

Health Analyzed. Health Personalized. Health Optimized.

Our Mission

To improve quality of life through personalized medicine by providing clinicians and patients worldwide with innovative, research-driven, and evidence-based clinical tools and products.

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- Neuroendocrine Laboratory
  - NeuroLab® A Division of Sanesco International
- Targeted Neuroendocrine Supplements
  - TARGETED NUTRITIONAL THERAPY
- Diagnostic Laboratory
  - COMMUNITYLAB a division of Sanesco Health

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A Division of Sanesco International

NeuroLab®

- Specializes in the research, analysis, and development of biomarkers associated with neuroendocrine system function
- Both CLIA and COLA certified
- Participates in voluntary, third-party, quality assurance testing

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NeuroLab

Biomarkers Analyzed

Urinary Neurotransmitters

- Serotonin
- GABA
- Epinephrine
- Norepinephrine
- Dopamine
- Glutamate
- PEA

Salivary Adrenal Hormones

- Cortisol
- DHEA-S

Salivary Sex Hormones

- Testosterone
- Progesterone
- Estrone (E1)
- Estradiol (E2)
- Estriol (E3)

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NeuroLab: A Division of Sanesco International, Inc.

Proven Testing Methodologies

- Utilizes the gold standard technology for neurotransmitter analysis: UHPLC Triple Quadrupole Mass Spectrometry
- Highest level of sensitivity and specificity for neurotransmitters, the most accurate and reproducible results
- Every run is accompanied by a control

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Webinar

Agenda

1. Who should be tested
2. Why test neurotransmitters and cortisol (HPA axis)
3. Validity of urinary neurotransmitters
4. Benefits of CARE package add-on
5. Case study

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Who Should be Tested

Patients Who Benefit from Neuroendocrine Testing

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Who Should be Tested

Common Neuroendocrine Health Complaints

- Wellness
- Prevention
- Existing complaints

- Hormonal imbalances
- Menopause
- Andropause
- PMS
- Stress
- Low mood
- Anxiousness
- Lack of motivation
- Nervousness
- Irritability
- Aches and discomfort
- Weight issues
- Cognitive concerns
- Headaches
- Fatigue
- Sleep issues
- Obsessive behaviors
- Poor focus

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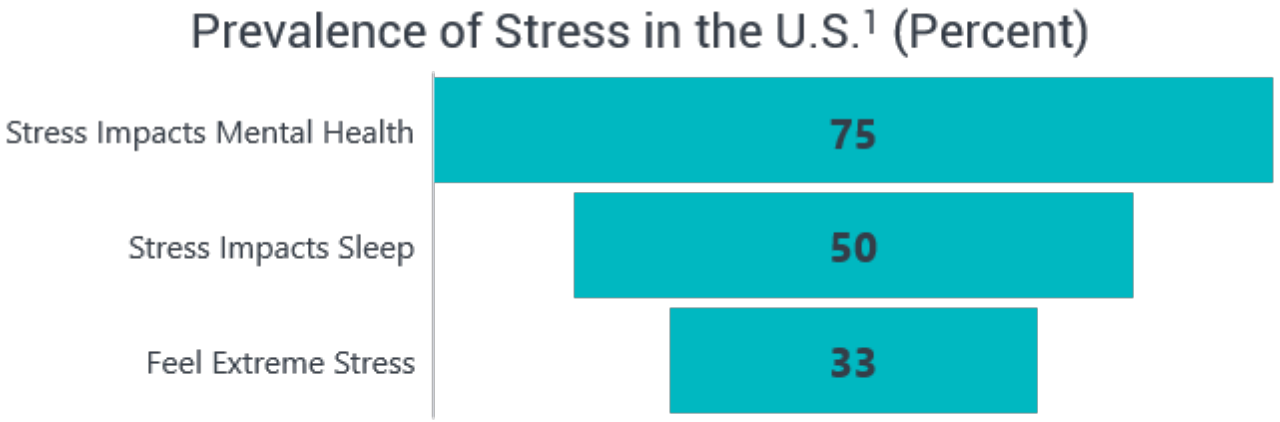
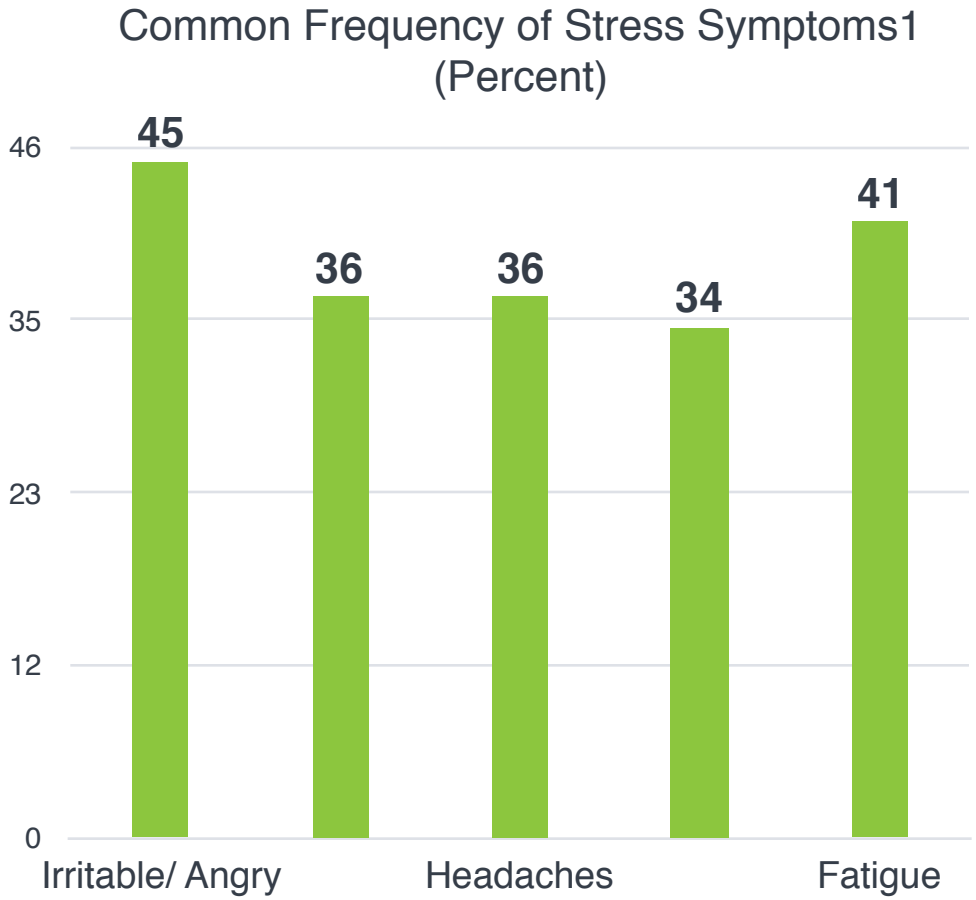
Who Should be Tested

The Stress Pandemic





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Why Test Neurotransmitters and Adrenal Hormones

Comprehensive Hypothalamic-Pituitary-Adrenal (HPA) Assessment

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Why Test Neurotransmitters and Adrenal Hormones

Symptoms of Neurotransmitter and Adrenal Imbalance

These symptoms are currently addressed through hormone measurement only or without use of functional biomarkers at all.

- Stress
- Low mood
- Anxiousness
- Lack of motivation
- Nervousness
- Irritability
- Aches and discomfort
- Weight issues
- Cognitive concerns
- Headaches
- Fatigue
- Sleep issues
- Obsessive behaviors
- Poor focus
- Hyperactivity

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The Stress Response

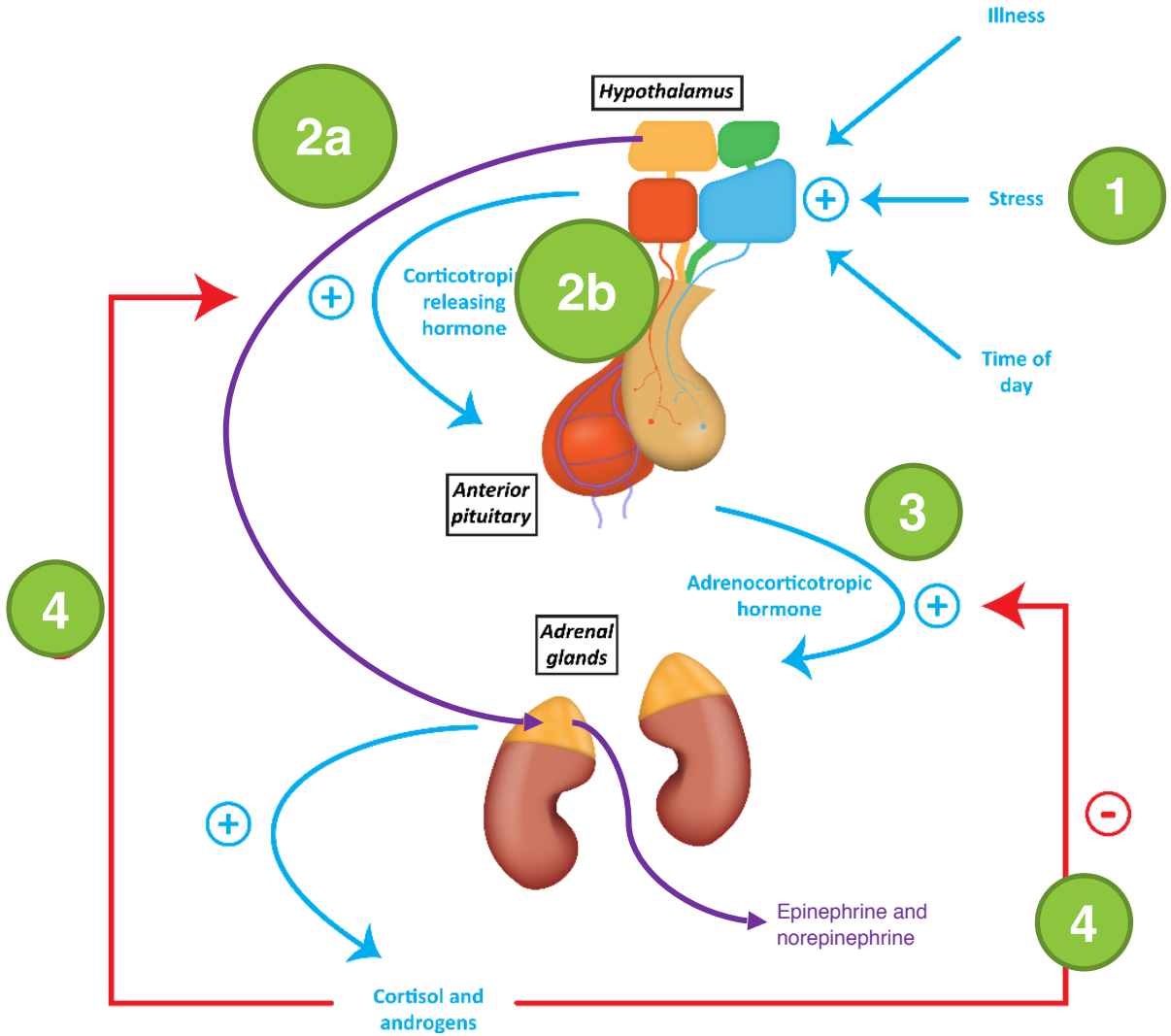
1. Stress stimulates the hypothalamus

2a. Triggers the sympathomedullary pathway which releases epinephrine and norepinephrine from the adrenal medulla

2b. Release CRH which stimulates release of ACTH from the pituitary

3. ACTH activates the adrenal cortex to release cortisol and DHEA

4. Cortisol inhibits CRH and ACTH release via a negative feedback loop



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Adrenal/Neurotransmitter Interactions

Adrenal hormones and neurotransmitters increase in response to stress

DHEA impacts dopamine, norepinephrine, and serotonin

Elevated DHEA is associated with suppression of GABA function and potentiation of glutamate

Elevated cortisol may suppress serotonin, further contributing to stress

	Stress Response	High Sensitivity
Cortisol	↑	↓
DHEA	↑	↓
Epinephrine	↑	↓
Norepi	↑	↓
Glutamate	↑	
GABA	↓ function	
Serotonin	↓ (potential)	

Changes in sensitivity to negative feedback can alter activity or levels

Cortisol is needed for epinephrine synthesis

Norepinephrine and epinephrine become desensitized to stressor, lowering their activity/ release from the adrenal

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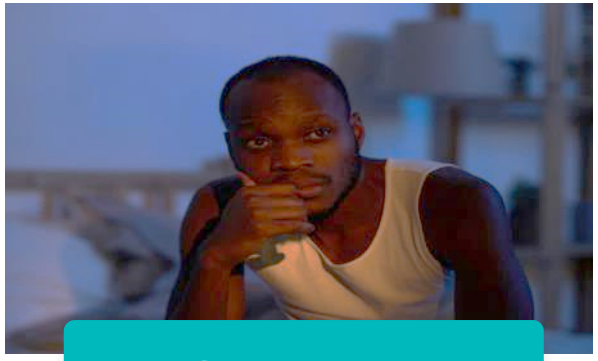
Why Test Neurotransmitters and Adrenal Hormones

What Activates the Stress Response?

Perceived Stress

- Mental/emotional stressors
- Biomarkers:
  - Serotonin
  - GABA
  - Norepinephrine
  - Glutamate



Poor Sleep

- Not getting enough sleep
- Biomarkers:
  - Melatonin
  - Cortisol
  - Serotonin
  - GABA
  - Norepinephrine
  - Glutamate

Inflammation

- Immune challenges
- Biomarkers:
  - TNF-α
  - IL-6
  - IL-1β
  - Cortisol
  - Norepinephrine
  - Epinephrine
  - Glutamate

Glycemic Dysregulation

- Diet and nutrition
- Biomarkers:
  - Insulin
  - Cortisol
  - Norepinephrine
  - Epinephrine

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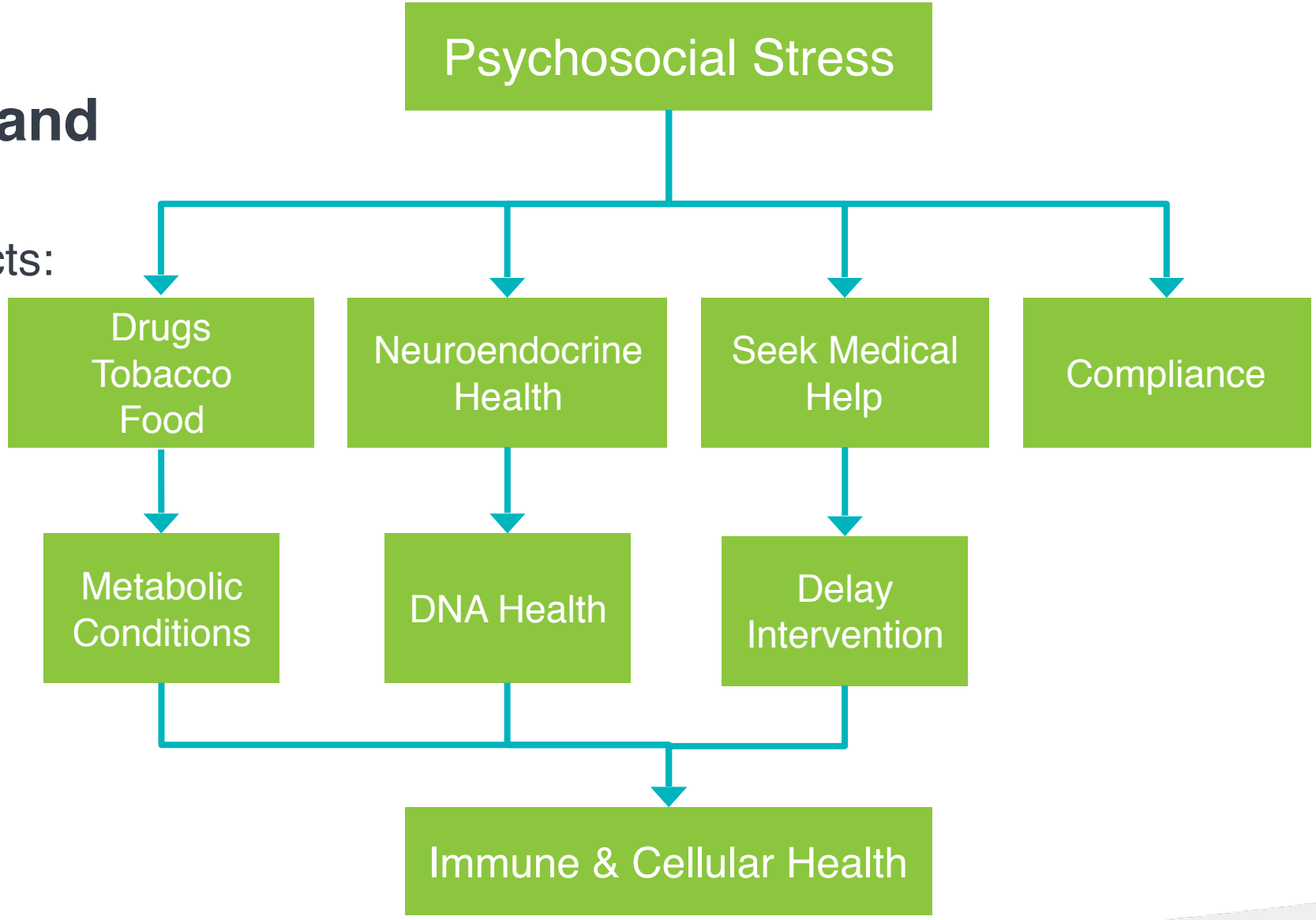
Psychosocial Stress and Well-Being

- Psychological stress impacts:
  - Mood[3]
  - Glucose regulation[3]
  - Cardiovascular health[3]
  - Immune health[3,4]
  - Respiratory health[3]
  - Cellular health[4]



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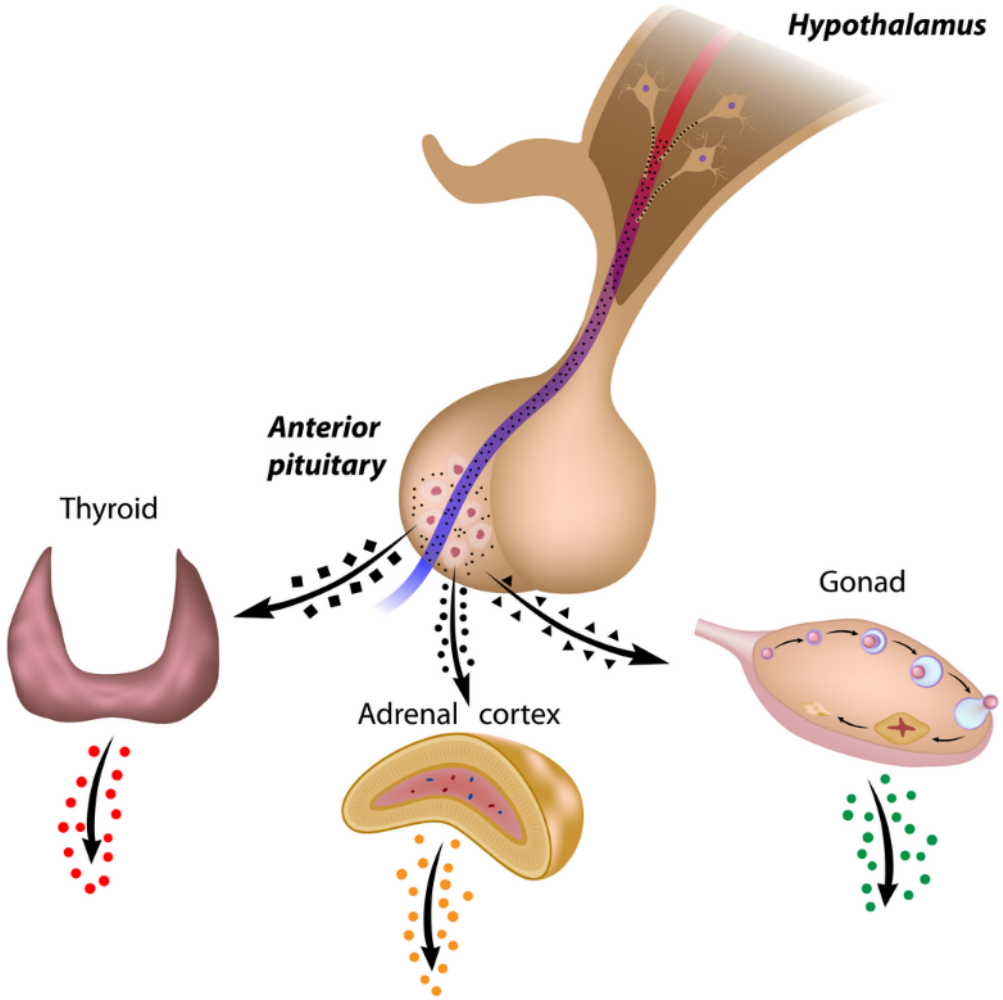
Why Test Neurotransmitters and Adrenal Hormones

Stress & Endocrine Health

- Stress reduces conversion of T4 to T3[5,6]
- Stress causes thyroid hormone resistance[5,6]
- Stress causes hormonal imbalances[5,6]
- Stress shuts down reproduction and decreases some sex hormones[7]



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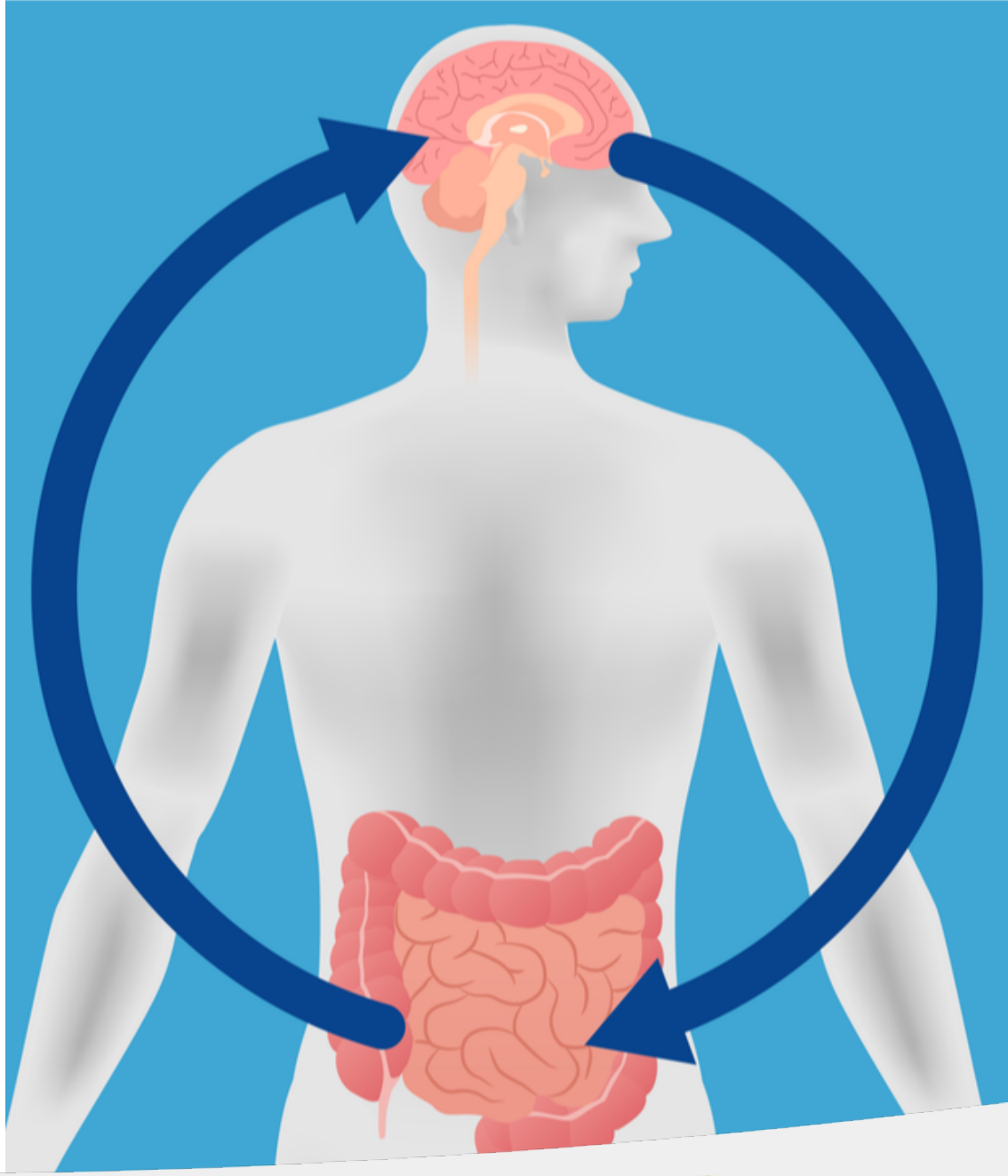
Why Test Neurotransmitters and Cortisol

Stress & GI Health

- Stress impacts
  - Microbial balance and health
  - GI function
  - GI inflammation
  - Tissue health
- GI health impacts HPA drive



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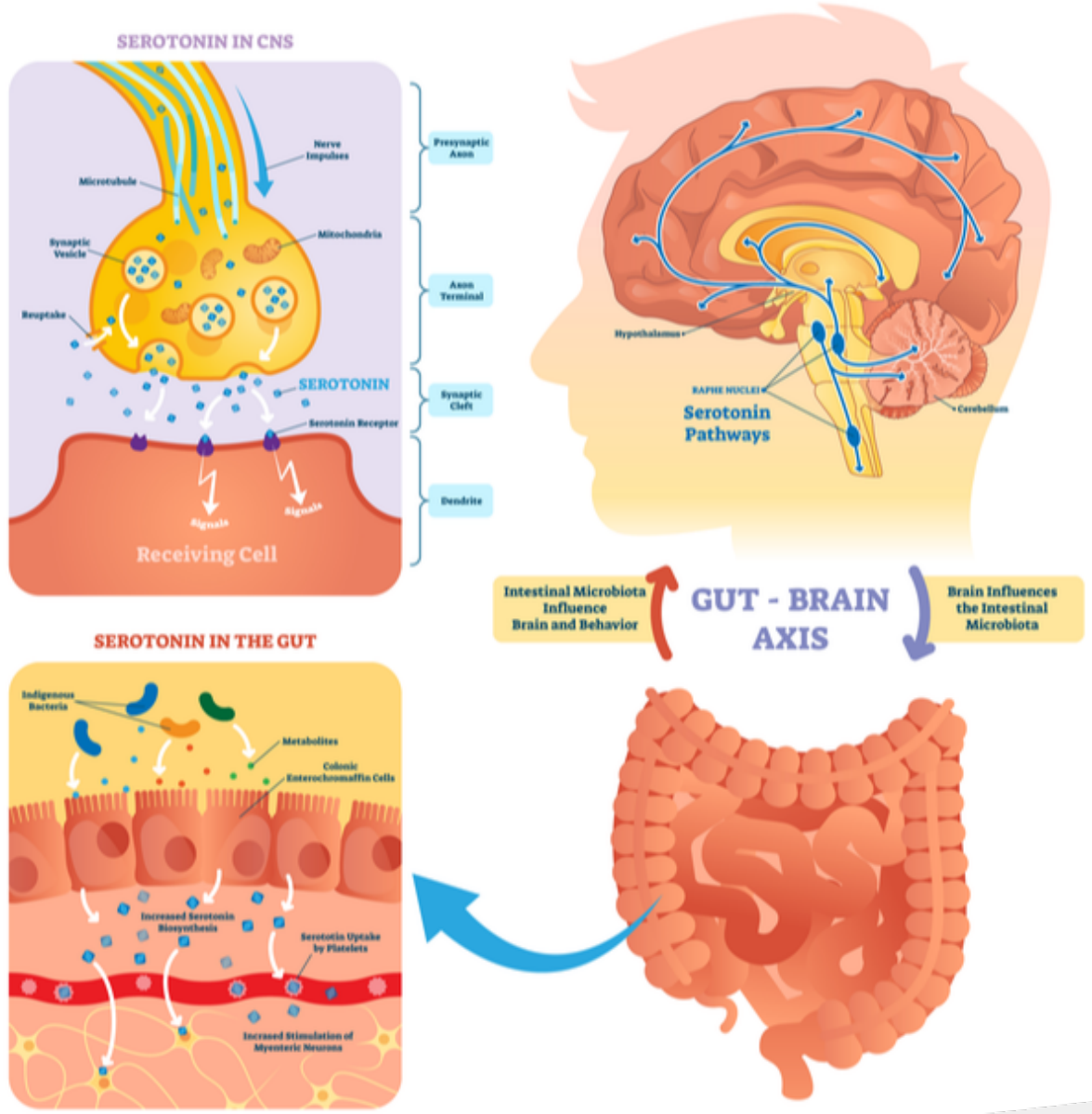
Why Test Neurotransmitters and Adrenal Hormones

Serotonin and the GI

- Motility patterns and gastric emptying[8]
- Secretion[8]
- Immune system[8]
- Discomfort[8]
- Nausea and vomiting[8]
- Alters microbiome[8]



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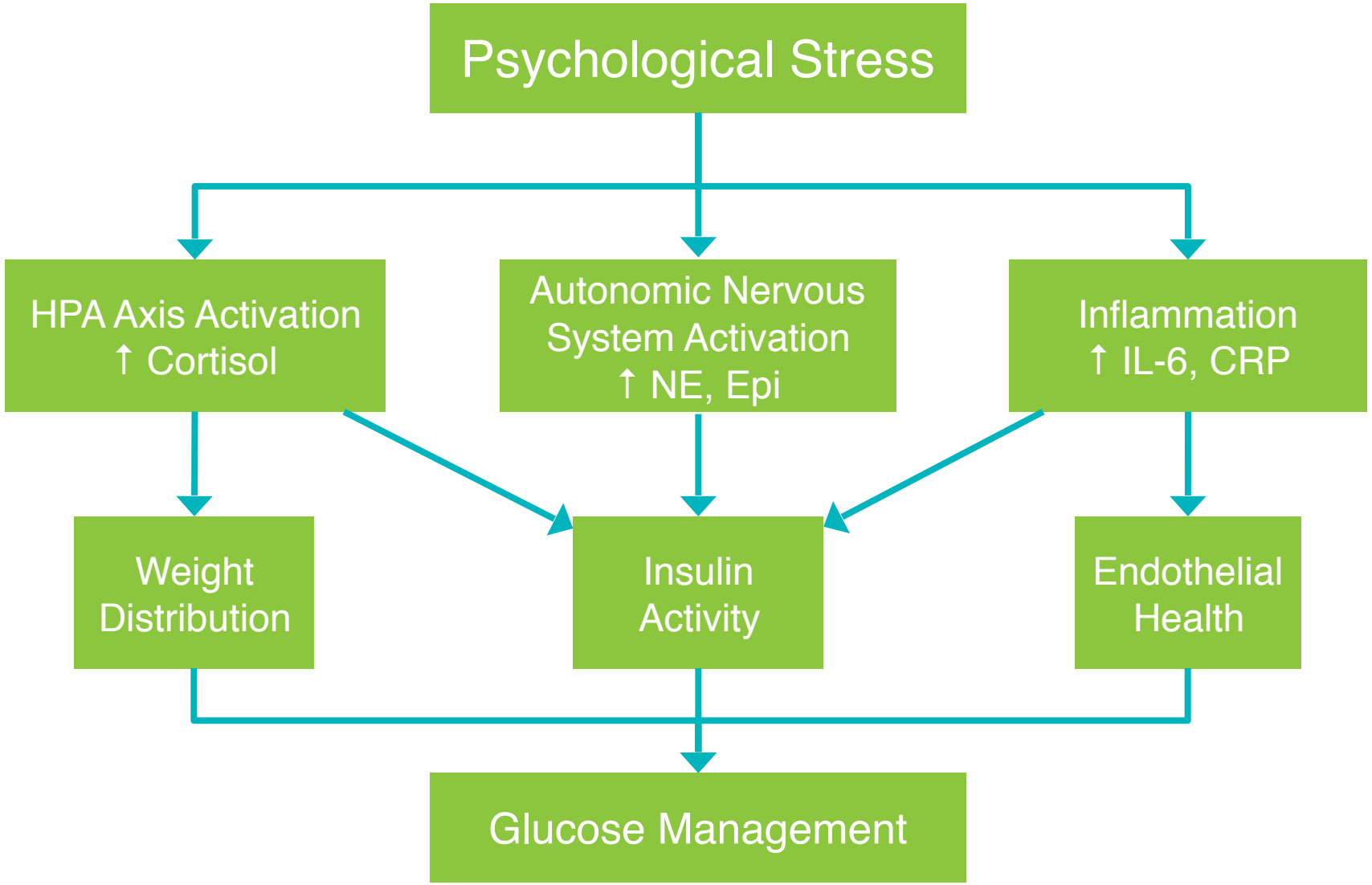
Stress and Glucose Regulation



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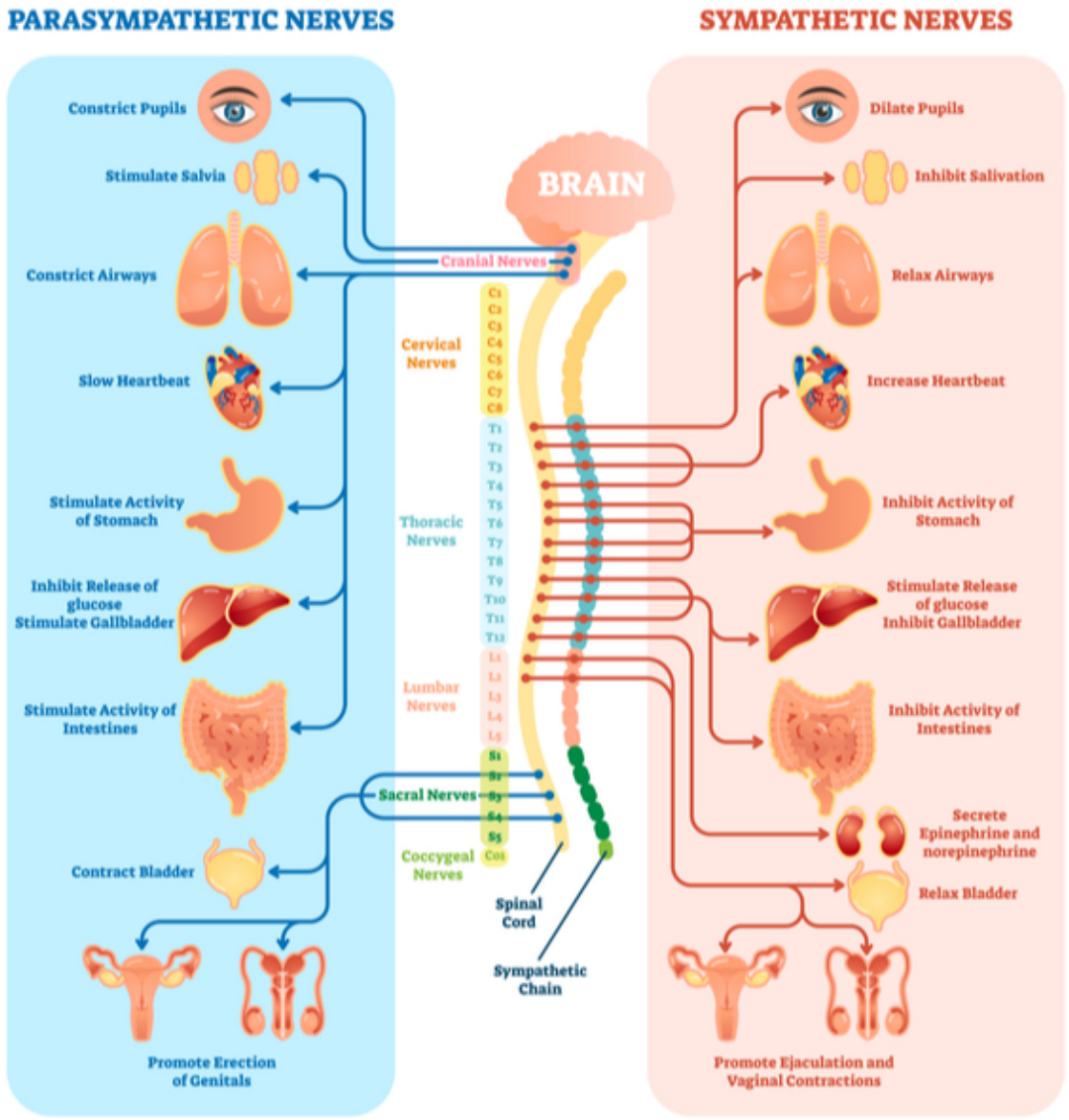
Why Test Neurotransmitters and Adrenal Hormones

The Nervous System Controls All Bodily Processes



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Why Test Neurotransmitters and Adrenal Hormones

The Many Faces of Anxiousness

Biomarker	Patient 1	Patient 2	Patient 3
Serotonin			▼
GABA	▼		▼
Dopamine			
Norepinephrine	▲	▲	▼
Epinephrine		▲	▼
Glutamate	▲		
PEA			
Cortisol 1		▲	▼
Cortisol 2		▲	▼
Cortisol 3			▼
Cortisol 4		▲	
DHEA-S 1	▲		▼
DHEA-S 2			
Intervention	Support GABA	Calm adrenals	Support inhibitory Support adrenal

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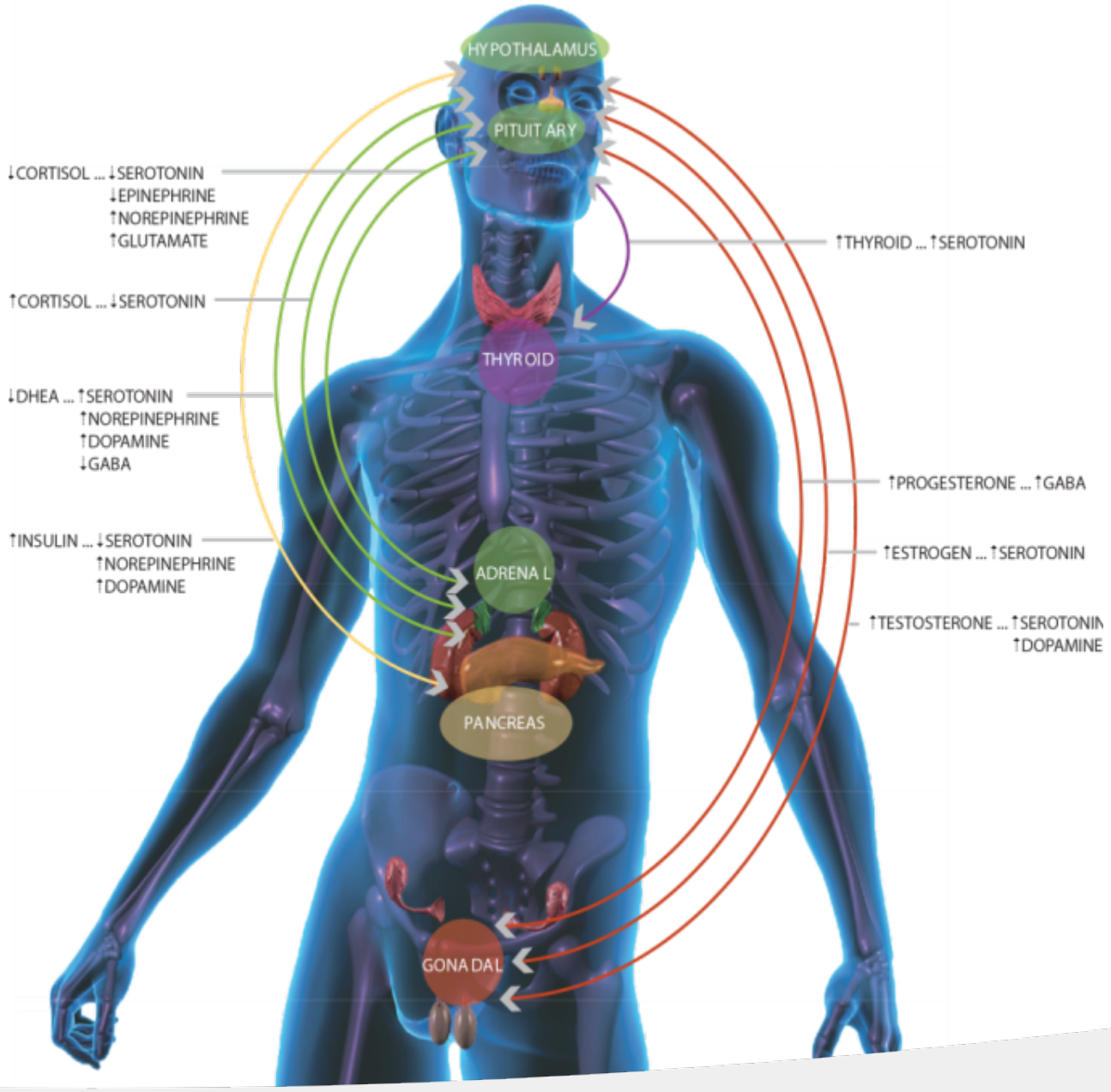
Why Test Neurotransmitters and Cortisol

Path to Optimal Wellness

- Neuroendocrine health is key to quality of life
- Clinical complaints begin to manifest when imbalances are present



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Clinical Associations with Biomarkers

Biomarker	Mood	Sleep/Wake	Anxiousness	Poor Focus/ Memory	Immune Activity
Melatonin		✓			✓
Cortisol		✓	✓		✓
Serotonin	✓	✓	✓	✓	✓
GABA		✓	✓		✓
Dopamine				✓	
Norepinephrine	✓	✓	✓	✓	✓
Epinephrine			✓	✓	
Glutamate	✓	✓	✓	✓	✓
PEA	✓		✓	✓	

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Top Profiles

HPA-G Complete

7 neurotransmitters

2 adrenal hormones (4-pt cortisol, 2-pt DHEA-S)

5 sex hormones

Recommended for individuals >30 years or experiencing hormone-related complaints

HPA

7 neurotransmitters

2 adrenal hormones (4-pt cortisol, 2-pt DHEA-S)

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Validity

Urinary Neurotransmitters

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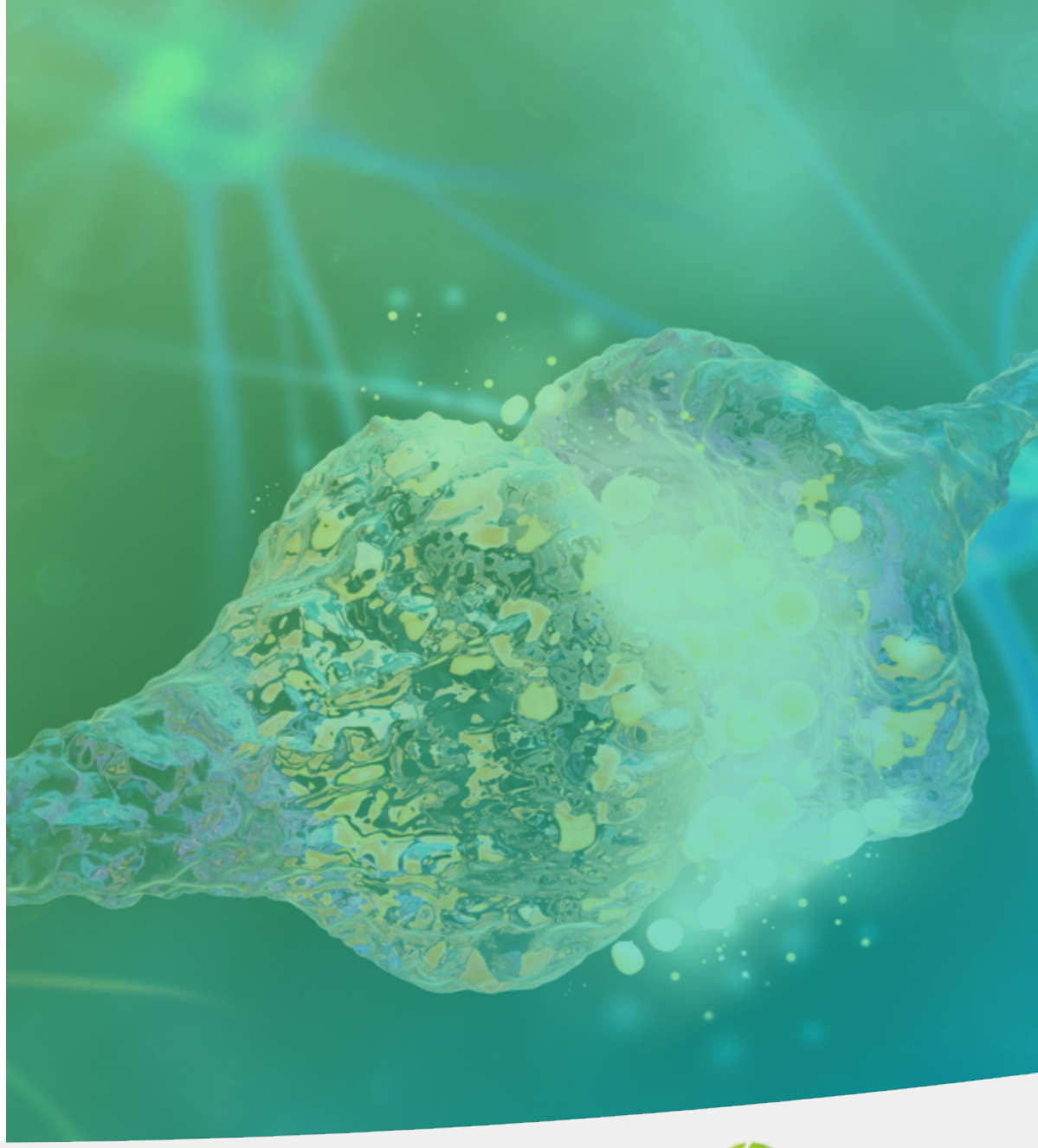
Urinary Neurotransmitter Validity

Specimen Validity

- Long history of measuring neurotransmitters for a variety of medical conditions in blood, CSF, urine, saliva, and vitreous humor
- Urinary neurotransmitters
  - Positively correlate with neurotransmitters of the central nervous system
  - Offer an idea of the patient's neuroendocrine system not previously available



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Urinary Neurotransmitter Validity

Blood-Brain Barrier (BBB)

Neurotransmitters cross from the brain into the blood

- Serotonin, dopamine, and norepinephrine to cross the BBB via plasma membrane monoamine transporters and efflux transport[9]
- The BBB performs efflux transport of GABA[10] and glutamate[11]
- Augmented brain serotonin can cross the BBB and travel into the bloodstream via the 5-HT transporter[12]

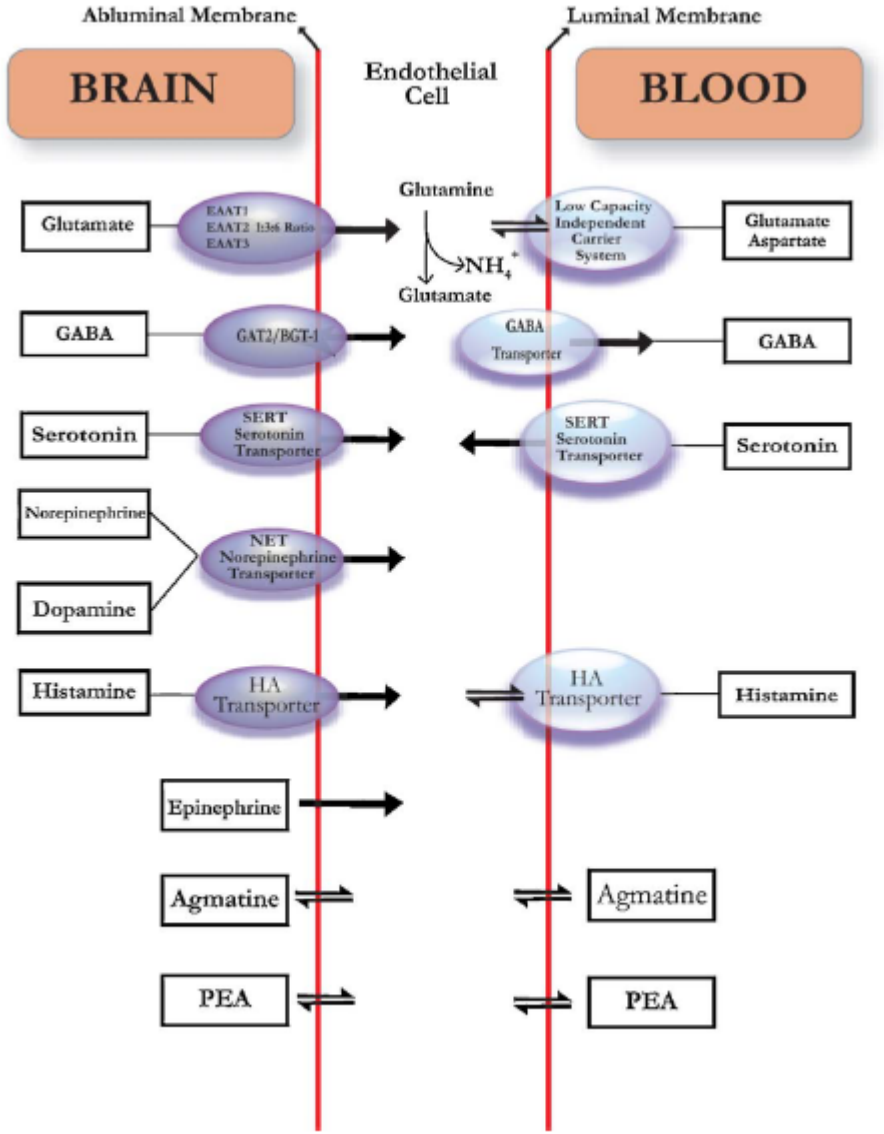

Image Source: Marc DT, et al. Neuroscience and Biobehavioral Reviews 35 (2011) 635–644

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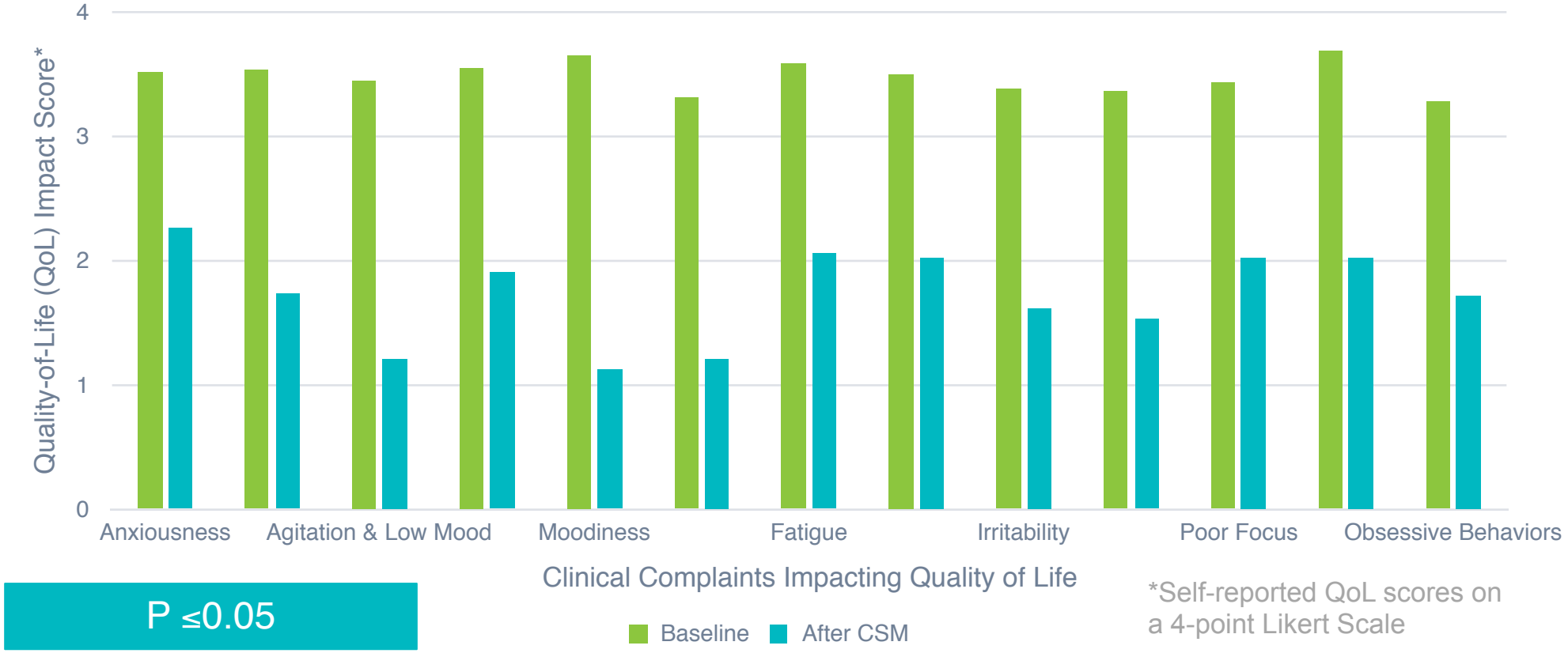
Validity

Urinary Neurotransmitter Clinical Validity

Patients Report Statistically Significant Improvements after Neuroendocrine Communication System Management Approach



P ≤0.05

*Self-reported QoL scores on a 4-point Likert Scale

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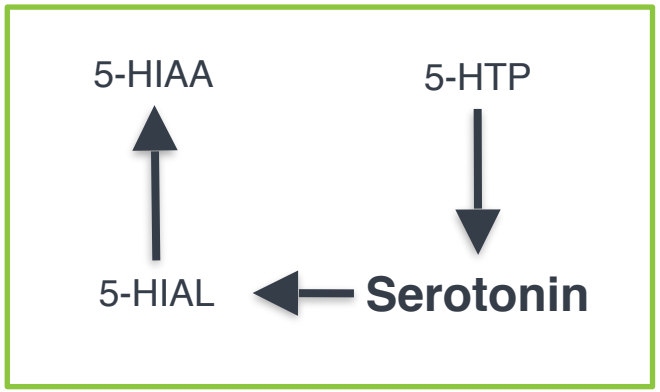
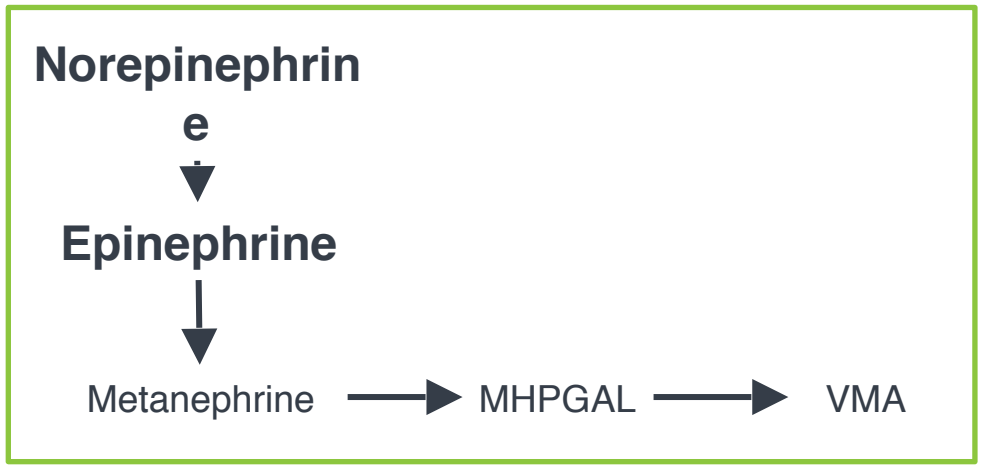
Validity

Neurotransmitter vs Neurotransmitter Metabolite Testing

- Neurotransmitter metabolites (NM)
  - Dopamine metabolite: HVA (homovanillic acid)
  - NE/Epi metabolite: VMA (vanillylmandelic acid)
  - Serotonin metabolite: 5-HIAA
- NM testing
  - Shows the level of inactive neurotransmitter by-product
  - Does not indicate neurotransmitter levels
- NMs do not act on neurotransmitter receptors





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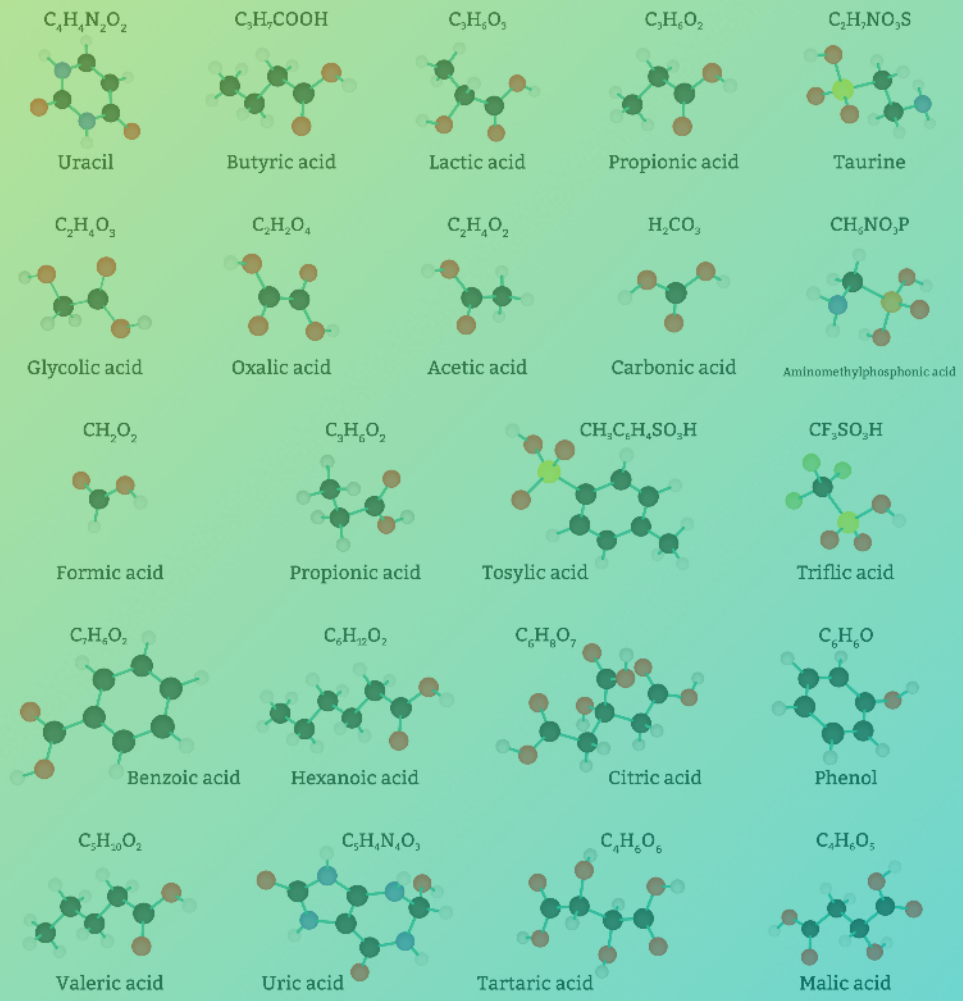
Validity

Neurotransmitter vs Organic Acid Testing (OAT)

- Organic acids are products of cellular metabolism excreted in the urine of mammals
- Some directly or indirectly indicate deficiencies of vitamins such as B12, pantothenic acid, and biotin
- OAT offers insight into:
  - Neurotransmitter synthesis
  - Phenols (important in autism cases)
  - Oxidative stress
- Vitamins impact neurotransmitter synthesis, but do not indicate neurotransmitter levels



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C.A.R.E. Package Add-On

orrelation Analysis Report and Education
ab Results and Beyond

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Without CARE Package Add-On

Standard Lab Results

- Provides great insight into patients' neuroendocrine systems
- The most important thing Sanesco has to offer
- Does not contain correlation analysis, education, clinical insights, or therapeutic recommendations

Marker	Values		Optimal	Reference
INHIBITORY NEUROTRANSMITTERS				
SEROTONIN	**35.2**	(L)	125 - 260 mcg/g Cr	50 - 250 mcg/g Cr
GABA	**299.0**	(L)	600 - 1100 mcg/g Cr	150 - 700 mcg/g Cr
EXCITATORY NEUROTRANSMITTERS				
DOPAMINE	**202.8**	(L)	250 - 400 mcg/g Cr	100 - 350 mcg/g Cr
NOR-EPINEPHRINE	**65.3**	(H)	30 - 50 mcg/g Cr	13 - 70 mcg/g Cr
EPINEPHRINE	**12.0**		10 - 15 mcg/g Cr	3 - 20 mcg/g Cr
GLUTAMATE	**14.1**	(H)	5 - 10 mg/g Cr	2 - 12 mg/g Cr
PEA	**4.0**		n/a	1.6 - 7.3 mcg/g Cr
ADRENAL ADAPTATION INDEX				
NOREPI/EPI RATIO	**5.4**		n/a	< 13
OTHER MARKERS				
CREATININE, URINE	**100.0**		n/a	mg/dL
ADRENAL HORMONES				
CORTISOL (830a)	**4.5**	(L)	n/a	5.1 - 11.6 nM
CORTISOL (1230p)	**2.0**	(L)	n/a	2.3 - 5.3 nM
CORTISOL (530p)	**1.0**		n/a	1.0 - 2.4 nM
CORTISOL (930p)	**3.4**	(H)	n/a	0.4 - 2.1 nM
DHEA-s (830a)	**2.9**		n/a	1.0 - 6.0 ng/ml
DHEA-s (530p)	**3.0**		n/a	1.0 - 6.0 ng/ml

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Correlation Analysis Report and Education

The C.A.R.E. Package Add-On

Every report includes a personalized comprehensive analysis.

1. Patient quality-of-life questionnaire
2. NeuroLab test results
3. Personalized correlation analysis and education
4. Targeted Nutritional Therapy™ recommendation

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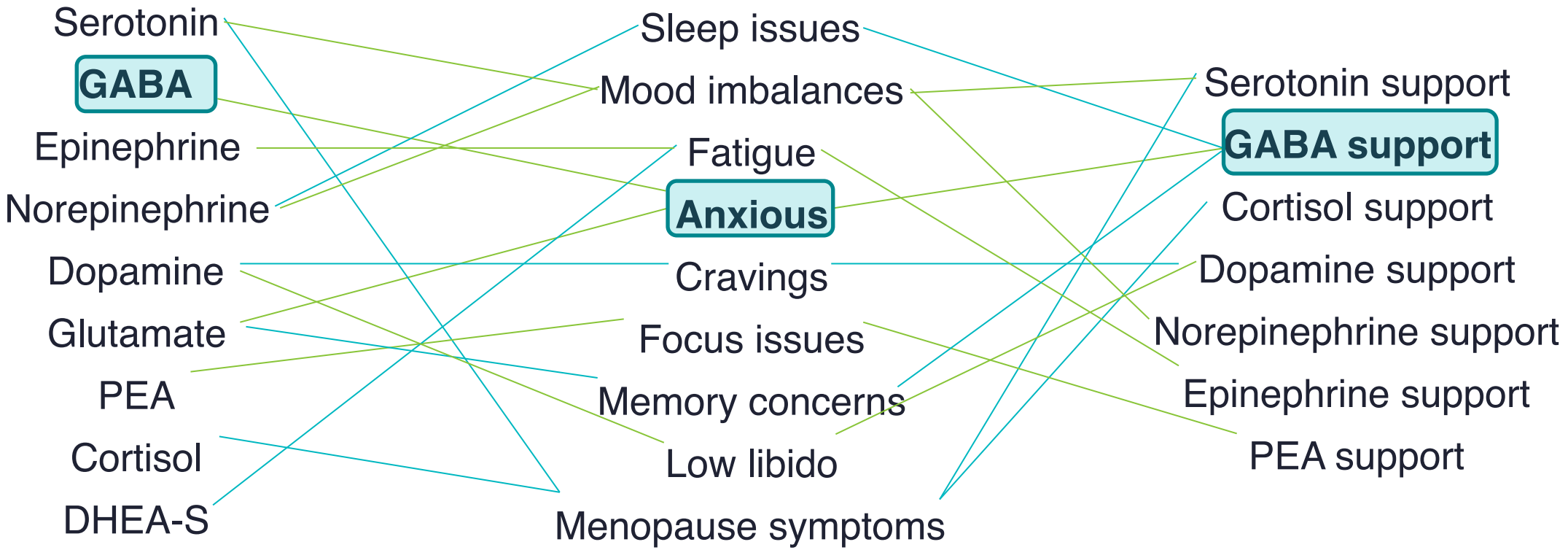
CARE Package Add-On

Overview

Health Analyzed.

Health Personalized.

Health Optimized.



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Sampling of connections. Not comprehensive.

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CARE Package Add-On

Targeted Nutritional Therapies™ (TNT)

Proven to make a statistically significant impact on common quality-of-life concerns

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CARE Package Add-On

TNT Quality

- All TNT™ formulas are manufactured at a cGMP facility
- All TNT™ formulas are:
  - Free of gluten
  - Non-GMO
  - Free of hydrogenated or partially hydrogenated fats/oils
  - Free of allergens such as:
    - peanuts, tree nuts, soy, wheat, yeast, shellfish, fish, eggs, artificial preservatives or sugars

TARGETED NUTRITIONAL THERAPY

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CARE Package Add-On

Patient Quality-of-Life Questionnaire

General

- Female, 63 years old
- 5’6” 190lbs
- Post-menopausal + HRT
- 1 c. caffeine
- 2 drink/wk
- High BP
- Celiac

Medications/Supplements

- Lasix 40 mg
- Celexa 20 mg
- Ambien 5 mg (occasionally)
- Progesterone 20 mg BID
- DHEA 15 mg
- Melatonin (occasionally)
- Magnesium

Symptoms

Symptoms	Score 1	2	3	4
Anxious	☐	☐	■	☐
Decreased libido	☐	☐	☐	■
Decreased stamina	☐	☐	■	☐
Abdominal weight gain	☐	■	☐	☐
Low mood with nerves	☐	☐	☐	■
Poor sleep	☐	☐	■	☐
Irritability	☐	☐	☐	■
Poor memory	☐	☐	■	☐
Sugar cravings	☐	☐	☐	■

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CARE Package Add-On

Identify Imbalances & Correlate with Presentation

Symptoms

- Anxious
- Low libido
- Decreased stamina
- Abdominal weight gain
- Low mood with nerves
- Poor sleep
- Irritable
- Poor memory
- Sugar cravings

Includes education explaining correlations

Marker	Values		Optimal	Reference
INHIBITORY NEUROTRANSMITTERS				
SEROTONIN	**35.2**	(L)	125 - 260 mcg/g Cr	50 - 250 mcg/g Cr
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EPINEPHRINE	**12.0**		10 - 15 mcg/g Cr	3 - 20 mcg/g Cr
GLUTAMATE	**14.1**	(H)	5 - 10 mg/g Cr	2 - 12 mg/g Cr
PEA	**4.0**		n/a	1.6 - 7.3 mcg/g Cr
ADRENAL ADAPTATION INDEX				
NOREPI/EPI RATIO	**5.4**		n/a	< 13
OTHER MARKERS				
CREATININE, URINE	**100.0**		n/a	mg/dL
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CORTISOL (1230p)	**2.0**	(L)	n/a	2.3 - 5.3 nM
CORTISOL (530p)	**1.0**		n/a	1.0 - 2.4 nM
CORTISOL (930p)	**3.4**	(H)	n/a	0.4 - 2.1 nM
DHEA-s (830a)	**2.9**		n/a	1.0 - 6.0 ng/ml
DHEA-s (530p)	**3.0**		n/a	1.0 - 6.0 ng/ml

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CARE Package Add-On

Personalize, Targeted Recommendations

Overall Summary and Recommendations

Prolent™	*x 1 in the PM for inhibitory support; based on the clinician's assessment and judgement, may increase to x 2 after 10 days.* *Contains: 5-HTP, Suntheanine, Glycine, and Vitamin B6*
Lentra™	*x 1 daily for GABA support; increase to twice daily after 5 days.* *Contains: GABA-A agonists: Magnesium Taurate, Suntheanine, and Lactium*
Adaptacin™	*After 7-10 days, implement x 2 in the AM for adrenal support;* *Do not take after 2 PM as it may disrupt sleep.* *Contains: Bovine Adrenal Cortex, adaptogens, and vitamin cofactors*

Additional Recommendations

* It is recommended that all patients on a program to balance HPA axis function should also supplement with B complex, a multi-mineral and multi-vitamin as well as EPA/DHA.

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CARE Package Add-On

Retest

Marker	Values	Previous Value	Optimal Range	Reference Range
INHIBITORY NEUROTRANSMITTERS				
SEROTONIN	**121.1** (L)	**35.2** (L)	125 - 260 mcg/g Cr	50 - 250 mcg/g Cr
GABA	**426** (L)	**299** (L)	600 - 1100 mcg/g Cr	150 - 700 mcg/g Cr
EXCITATORY NEUROTRANSMITTERS				
DOPAMINE	**181.5** (L)	**202.8** (L)	250 - 400 mcg/g Cr	100 - 350 mcg/g Cr
NOR-EPINEPHRINE	**40**	**65.3** (H)	30 - 50 mcg/g Cr	13 - 70 mcg/g Cr
EPINEPHRINE	**9.8** (L)	**12**	10 - 15 mcg/g Cr	3 - 20 mcg/g Cr
GLUTAMATE	**7.7**	**14.1** (H)	5 - 10 mg/g Cr	2 - 12 mcg/g Cr
PEA	**3.7**	**4**	n/a	1.6 - 7.3 mcg/g Cr
ADRENAL ADAPTATION INDEX				
NOREPI/EPI RATIO	**4.1**	**5.4**	n/a	< 13
OTHER MARKERS				
CREATININE, URINE	**107.5**	**100**	n/a	mg/dL
ADRENAL HORMONES				
CORTISOL (9:15a)	**9.6**	**4.5** (L)	n/a	5.1 - 11.6 nM
CORTISOL (12:45p)	**4.8**	**2** (L)	n/a	2.3 - 5.3 nM
CORTISOL (4:30p)	**2.1**	**1**	n/a	1.0 - 2.4 nM
CORTISOL (9:15p)	**1.4**	**3.4** (H)	n/a	0.4 - 2.1 nM
DHEA-s (9:15a)	**3.6**	**2.9**	n/a	1.0 - 6.0 ng/ml
DHEA-s (4:30p)	**4.2**	**3**	n/a	1.0 - 6.0 ng/ml

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Case Study

Breaking it down

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Case Study

Clinical Presentation

General

- Female, 42 years old
- 5’6” 190lbs
- Hypothyroidism

Symptoms

- Anxiousness
- Fatigue
- Depression with exhaustion
- Abdominal weight gain
- Headaches
- Night sweats
- Shakiness when meal is skipped

Medications/Supplements

- Liothyronine
- Levothyroxine
- Venlafaxine
- Zinc
- Magnesium
- Probiotic
- Vitamin D
- Fish Oil

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Case Study

Identify Imbalances & Correlate with Presentation

Symptoms

- Anxiousness
- Fatigue
- Low mood with exhaustion
- Abdominal weight gain
- Headaches
- Night sweats
- Shakiness when meal is skipped

Marker	Values	Optimal	Reference
INHIBITORY NEUROTRANSMITTERS			
SEROTONIN	**66.4** (L)	125 - 260 mcg/g Cr	50 - 250 mcg/g Cr
GABA	**100** (L)	600 - 1100 mcg/g Cr	150 - 700 mcg/g Cr
EXCITATORY NEUROTRANSMITTERS			
DOPAMINE	**60.7** (L)	250 - 400 mcg/g Cr	100 - 350 mcg/g Cr
NOR-EPINEPHRINE	**19.3** (L)	30 - 50 mcg/g Cr	13 - 70 mcg/g Cr
EPINEPHRINE	**1.9** (L)	10 - 15 mcg/g Cr	3 - 20 mcg/g Cr
GLUTAMATE	**17.5** (H)	5 - 10 mg/g Cr	2 - 12 mg/g Cr
PEA	**47.6** (H)	n/a	1.6 - 7.3 mcg/g Cr
ADRENAL ADAPTATION INDEX			
NOREPI/EPI RATIO	**10.2**	n/a	< 13
OTHER MARKERS			
CREATININE, URINE	**80.4**	n/a	mg/dL
ADRENAL HORMONES			
CORTISOL (645a)	**15.8** (H)	n/a	5.1 - 11.6 nM
CORTISOL (1200p)	**1.5** (L)	n/a	2.3 - 5.3 nM
CORTISOL (700p)	**0.9** (L)	n/a	1.0 - 2.4 nM
CORTISOL (1000p)	**1.4**	n/a	0.4 - 2.1 nM
DHEA-s (645a)	**10.6** (H)	n/a	1.0 - 6.0 ng/mL
DHEA-s (700p)	**6.5** (H)	n/a	1.0 - 6.0 ng/mL
SEX HORMONES			
ESTRONE (E1)	**15.9**	n/a	11 - 29 pg/mL
ESTRADIOL (E2)	**1.3**	n/a	0.8 - 2.0 pg/mL
ESTRIOL (E3)	**< 5.4** (L)	n/a	5.4 - 34 pg/mL
PROGESTERONE	**95.8**	n/a	37 - 276 pg/mL
TESTOSTERONE	**46.9**	n/a	26 - 98 pg/mL

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Case Study

Interpretation Insights

High Glutamate & PEA

- Underlying inflammation?
- Aspartame consumption?

Marker	Values	Optimal	Reference
INHIBITORY NEUROTRANSMITTERS			
SEROTONIN	**66.4** (L)	125 - 260 mcg/g Cr	50 - 250 mcg/g Cr
GABA	**100** (L)	600 - 1100 mcg/g Cr	150 - 700 mcg/g Cr
EXCITATORY NEUROTRANSMITTERS			
DOPAMINE	**60.7** (L)	250 - 400 mcg/g Cr	100 - 350 mcg/g Cr
NOR-EPINEPHRINE	**19.3** (L)	30 - 50 mcg/g Cr	13 - 70 mcg/g Cr
EPINEPHRINE	**1.9** (L)	10 - 15 mcg/g Cr	3 - 20 mcg/g Cr
GLUTAMATE	**17.5** (H)	5 - 10 mg/g Cr	2 - 12 mg/g Cr
PEA	**47.6** (H)	n/a	1.6 - 7.3 mcg/g Cr
ADRENAL ADAPTATION INDEX			
NOREPI/EPI RATIO	**10.2**	n/a	< 13
OTHER MARKERS			
CREATININE, URINE	**80.4**	n/a	mg/dL
ADRENAL HORMONES			
CORTISOL (645a)	**15.8** (H)	n/a	5.1 - 11.6 nM
CORTISOL (1200p)	**1.5** (L)	n/a	2.3 - 5.3 nM
CORTISOL (700p)	**0.9** (L)	n/a	1.0 - 2.4 nM
CORTISOL (1000p)	**1.4**	n/a	0.4 - 2.1 nM
DHEA-s (645a)	**10.6** (H)	n/a	1.0 - 6.0 ng/mL
DHEA-s (700p)	**6.5** (H)	n/a	1.0 - 6.0 ng/mL
SEX HORMONES			
ESTRONE (E1)	**15.9**	n/a	11 - 29 pg/mL
ESTRADIOL (E2)	**1.3**	n/a	0.8 - 2.0 pg/mL
ESTRIOL (E3)	**< 5.4** (L)	n/a	5.4 - 34 pg/mL
PROGESTERONE	**95.8**	n/a	37 - 276 pg/mL
TESTOSTERONE	**46.9**	n/a	26 - 98 pg/mL

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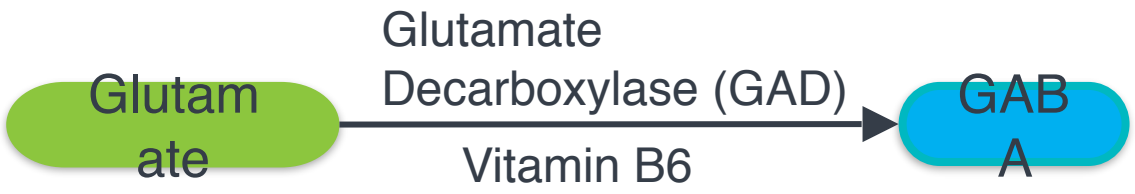
Case Study

Interpretation Insights

Very Low GABA, High Glutamate

- Decreased glutamate decarboxylase activity?



Marker	Values	Optimal	Reference
INHIBITORY NEUROTRANSMITTERS			
SEROTONIN	**66.4** (L)	125 - 260 mcg/g Cr	50 - 250 mcg/g Cr
GABA	**100** (L)	600 - 1100 mcg/g Cr	150 - 700 mcg/g Cr
EXCITATORY NEUROTRANSMITTERS			
DOPAMINE	**60.7** (L)	250 - 400 mcg/g Cr	100 - 350 mcg/g Cr
NOR-EPINEPHRINE	**19.3** (L)	30 - 50 mcg/g Cr	13 - 70 mcg/g Cr
EPINEPHRINE	**1.9** (L)	10 - 15 mcg/g Cr	3 - 20 mcg/g Cr
GLUTAMATE	**17.5** (H)	5 - 10 mg/g Cr	2 - 12 mg/g Cr
PEA	**47.6** (H)	n/a	1.6 - 7.3 mcg/g Cr
ADRENAL ADAPTATION INDEX			
NOREPI/EPI RATIO	**10.2**	n/a	< 13
OTHER MARKERS			
CREATININE, URINE	**80.4**	n/a	mg/dL
ADRENAL HORMONES			
CORTISOL (645a)	**15.8** (H)	n/a	5.1 - 11.6 nM
CORTISOL (1200p)	**1.5** (L)	n/a	2.3 - 5.3 nM
CORTISOL (700p)	**0.9** (L)	n/a	1.0 - 2.4 nM
CORTISOL (1000p)	**1.4**	n/a	0.4 - 2.1 nM
DHEA-s (645a)	**10.6** (H)	n/a	1.0 - 6.0 ng/mL
DHEA-s (700p)	**6.5** (H)	n/a	1.0 - 6.0 ng/mL
SEX HORMONES			
ESTRONE (E1)	**15.9**	n/a	11 - 29 pg/mL
ESTRADIOL (E2)	**1.3**	n/a	0.8 - 2.0 pg/mL
ESTRIOL (E3)	**< 5.4** (L)	n/a	5.4 - 34 pg/mL
PROGESTERONE	**95.8**	n/a	37 - 276 pg/mL
TESTOSTERONE	**46.9**	n/a	26 - 98 pg/mL

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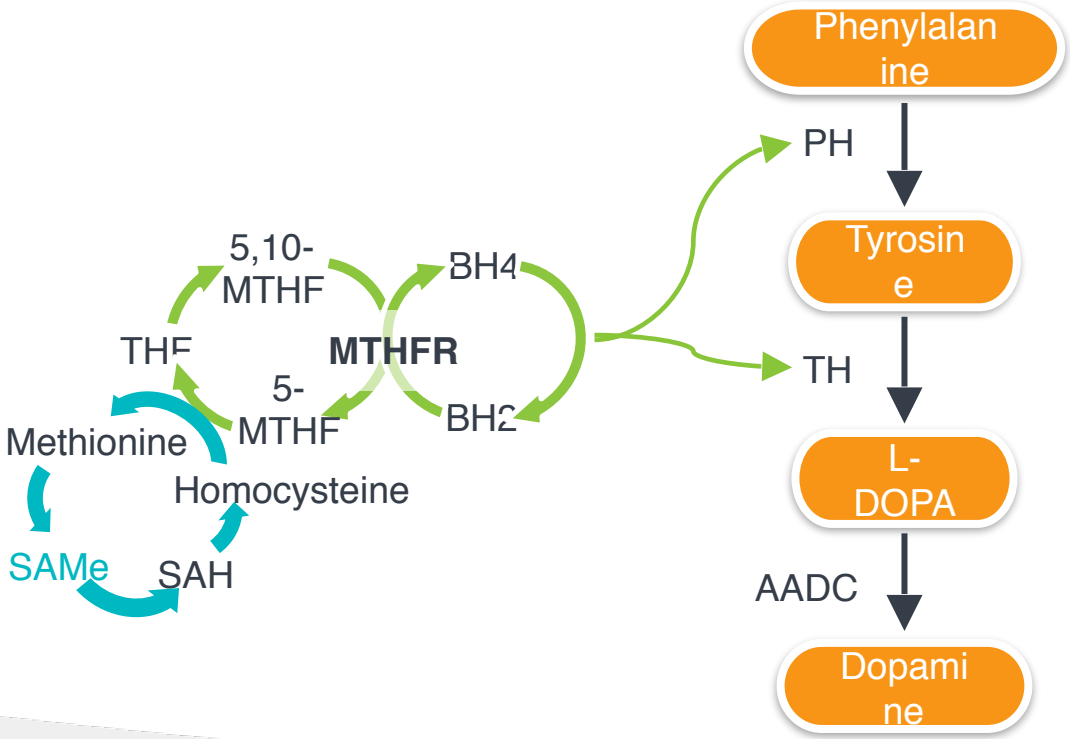
Case Study

Interpretation Insights

Very Low Dopamine, High PEA

- Decreased phenylalanine hydroxylase (PH) activity?
- Poor methylation? (ie lack of BH4)



Marker	Values	Optimal	Reference
INHIBITORY NEUROTRANSMITTERS			
SEROTONIN	**66.4** (L)	125 - 260 mcg/g Cr	50 - 250 mcg/g Cr
GABA	**100** (L)	600 - 1100 mcg/g Cr	150 - 700 mcg/g Cr
EXCITATORY NEUROTRANSMITTERS			
DOPAMINE	**60.7** (L)	250 - 400 mcg/g Cr	100 - 350 mcg/g Cr
NOR-EPINEPHRINE	**19.3** (L)	30 - 50 mcg/g Cr	13 - 70 mcg/g Cr
EPINEPHRINE	**1.9** (L)	10 - 15 mcg/g Cr	3 - 20 mcg/g Cr
GLUTAMATE	**17.5** (H)	5 - 10 mg/g Cr	2 - 12 mg/g Cr
PEA	**47.6** (H)	n/a	1.6 - 7.3 mcg/g Cr
ADRENAL ADAPTATION INDEX			
NOREPI/EPI RATIO	**10.2**	n/a	< 13
OTHER MARKERS			
CREATININE, URINE	**80.4**	n/a	mg/dL
ADRENAL HORMONES			
CORTISOL (645a)	**15.8** (H)	n/a	5.1 - 11.6 nM
CORTISOL (1200p)	**1.5** (L)	n/a	2.3 - 5.3 nM
CORTISOL (700p)	**0.9** (L)	n/a	1.0 - 2.4 nM
CORTISOL (1000p)	**1.4**	n/a	0.4 - 2.1 nM
DHEA-s (645a)	**10.6** (H)	n/a	1.0 - 6.0 ng/mL
DHEA-s (700p)	**6.5** (H)	n/a	1.0 - 6.0 ng/mL
SEX HORMONES			
ESTRONE (E1)	**15.9**	n/a	11 - 29 pg/mL
ESTRADIOL (E2)	**1.3**	n/a	0.8 - 2.0 pg/mL
ESTRIOL (E3)	**< 5.4** (L)	n/a	5.4 - 34 pg/mL
PROGESTERONE	**95.8**	n/a	37 - 276 pg/mL
TESTOSTERONE	**46.9**	n/a	26 - 98 pg/mL

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Case 3

Interpretation Insights

High DHEA-S

- Acute Stress?
- Thyroid meds?

Low Cortisol & Epinephrine

- Prolonged stress?
- Poor blood sugar control?

Low Serotonin and Norepinephrine

- Patient has been on a SSNRI for 10 yrs

Low Serotonin & Estriol

- Low E3 may be further exacerbating serotonin dysfunction

Marker	Values	Optimal	Reference
INHIBITORY NEUROTRANSMITTERS			
SEROTONIN	**66.4** (L)	125 - 260 mcg/g Cr	50 - 250 mcg/g Cr
GABA	**100** (L)	600 - 1100 mcg/g Cr	150 - 700 mcg/g Cr
EXCITATORY NEUROTRANSMITTERS			
DOPAMINE	**60.7** (L)	250 - 400 mcg/g Cr	100 - 350 mcg/g Cr
NOR-EPINEPHRINE	**19.3** (L)	30 - 50 mcg/g Cr	13 - 70 mcg/g Cr
EPINEPHRINE	**1.9** (L)	10 - 15 mcg/g Cr	3 - 20 mcg/g Cr
GLUTAMATE	**17.5** (H)	5 - 10 mg/g Cr	2 - 12 mg/g Cr
PEA	**47.6** (H)	n/a	1.6 - 7.3 mcg/g Cr
ADRENAL ADAPTATION INDEX			
NOREPI/EPI RATIO	**10.2**	n/a	< 13
OTHER MARKERS			
CREATININE, URINE	**80.4**	n/a	mg/dL
ADRENAL HORMONES			
CORTISOL (645a)	**15.8** (H)	n/a	5.1 - 11.6 nM
CORTISOL (1200p)	**1.5** (L)	n/a	2.3 - 5.3 nM
CORTISOL (700p)	**0.9** (L)	n/a	1.0 - 2.4 nM
CORTISOL (1000p)	**1.4**	n/a	0.4 - 2.1 nM
DHEA-s (645a)	**10.6** (H)	n/a	1.0 - 6.0 ng/mL
DHEA-s (700p)	**6.5** (H)	n/a	1.0 - 6.0 ng/mL
SEX HORMONES			
ESTRONE (E1)	**15.9**	n/a	11 - 29 pg/mL
ESTRADIOL (E2)	**1.3**	n/a	0.8 - 2.0 pg/mL
ESTRIOL (E3)	**< 5.4** (L)	n/a	5.4 - 34 pg/mL
PROGESTERONE	**95.8**	n/a	37 - 276 pg/mL
TESTOSTERONE	**46.9**	n/a	26 - 98 pg/mL

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Case 3

Targeted Recommendations

For Low Serotonin

For Low GABA

For Low DA, NE, E

For Low Cortisol

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CARE Package Add-On Take Home

This Clinical Model- Test, Correlate, Target- Significantly Reduced ($p<0.05$) the Impact of Complaints on Quality of Life for Most Individuals

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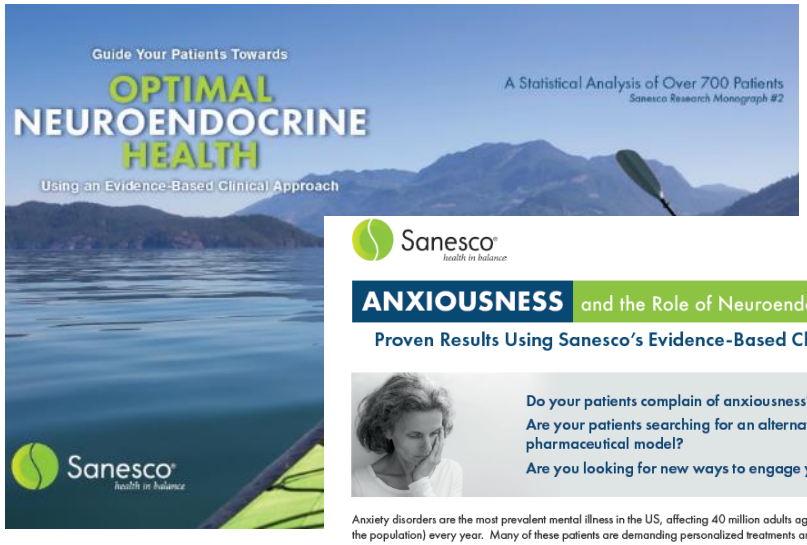
A Data-Driven Clinical Model



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ANXIOUSNESS and the Role of Neuroendocrine Health

Proven Results Using Sanesco's Evidence-Based Clinical Model

Do your patients complain of anxiousness?
Are your patients searching for an alternative to the pharmaceutical model?
Are you looking for new ways to engage your patients?

Anxiety disorders are the most prevalent mental illness in the US, affecting 40 million adults age 18 and older (17% of the population) every year. Many of these patients are demanding personalized treatments and non-pharmaceutical interventions (National Alliance On Mental Illness (NAMI.org), 2018).

NeuroLab's neuroendocrine testing and expert clinical team will provide you with objective data to develop and monitor protocols. Targeted Nutritional Therapy™ (TNT) formulas can then be used to address neuroendocrine imbalances with a limited side effect profile.

With an exceptional clinical track record and backed by research-driven science, Sanesco's Communication System Management™ (CSM) model has been shown to support your patients complaining of anxiousness. Additionally, patients who complain of problems with libido, stamina, focus, and sleep also show improvement after intervention with the CSM™ model (testing followed by recommended TNT™ protocols).

Patient Example 1: Anxiousness with Low Serotonin and High Norepinephrine

	Serotonin	Nor-epinephrine	ANXIOUSNESS	IRRITABILITY	MOODINESS	FATIGUE
Baseline	40.7	46.8	Severe	Severe	Severe	Severe
After CSM, TNT	130.5	29.9	Mild	Mild	None	Mild

Patient Example 2: Anxiousness with Low GABA and High Glutamate

	GABA	Glutamate	ANXIOUSNESS	JOINT PAIN	POOR LIBIDO	POOR MEMORY	POOR FOCUS	POOR SLEEP	SHAKINESS
Baseline	226.4	23.8	Severe	Severe	Profound	Moderate	Profound	Severe	Severe
After CSM, TNT	710.9	4.8	None	None	None	None	None	None	None

Patient Example 3: Anxiousness with Low GABA and Low Serotonin

	Serotonin	GABA	ANXIOUSNESS	LOW MOOD	FATIGUE	POOR STAMINA
Baseline	40.7	46.8	Severe	Severe	Severe	Severe
After CSM, TNT	130.5	29.9	Mild	Mild	Mild	None

IMPROVING POOR SLEEP AND ADRENAL FUNCTION THROUGH TARGETED NUTRITIONAL THERAPY™

R.W. Watkins, MD, MPH, FAAFP; Jeff Schmitt, PhD
Sanesco International Inc, Asheville, NC
Email: info@sanescohealth.com

At a Glance

Patients who reported moderate to severe poor sleep on their baseline questionnaire and then followed the Communication System Management™ (CSM) clinical model under clinician supervision, showed:

- dramatic improvement in sleep quality (nearly 50% improvement in self-reported poor-sleep mean severity scores)
- better adrenal tone (increase in morning cortisol and decrease in evening cortisol; higher norepinephrine levels)

comitant improvement in other quality of life factors (e.g., fatigue).

g data are derived from the 703 patient
ribed in Sanesco's recent monograph,
Patient Quality of Life for Over a Decade (2017)."
oses of this study, we selected patients
moderate-to-severe poor sleep; these patients
ted a score of 3 or 4 on their self-re
fe (QoL) questionnaire for poor slee
e is provided with each NeuroLab®
d below.

v shows the change in serotonin ar
els between baseline assessment (
ritional Therapy™ ((TNT)) and test
er 8 months of TNT™ adherence). T
ically significant increases in mean

Weight Management: Positive Outcomes of Balancing Neuroendocrine Function

Blog written by: Ramona Richard, MS, NC
Sanesco Health | info@sanescohealth.com

Feb 17, 2020 - Asheville, NC

A poster recently presented at the American Society for Nutrition provides evidence that the Communication System
supports weight management when combined with
body mass index (BMI), weight-related quality-of-life
management.

alth and quality of life. We report here correlations
ovascular function to name just a few. Underlying
thalamic-pituitary-adrenal and thyroid (HPA-T) axis, may
althy weight. The results of this study indicate imbalances
es in a patient's weight management.

clinician care on BMI and various self-reported quality-of-

e testing, personalized neuroendocrine analysis reporting,
duals typically report optimal results after completing three
of 703 patients and another subgroup of 279 patients
SM clinical model, used Sanesco's TNT formulas, and were
were not seeking care for weight management. Results
with the data obtained after the third cycle of testing and
s related to weight.

re on Weight Management

s people into categories based on weight divided by the
nostic of body fat or individual health, it is used as a screen
ertain health problems. BMIs from 19-24 are considered
nt health concerns.

or the main cohort and the sub-group after three cycles of
e percent change was greatest and most significant for the
bution (see graphs) shows how significantly the mean and

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Summary

Patients Demand a Better Quality of Life

- Stress is rampant
- The HPA axis plays a critical role in responding to and controlling stress
- Neuroendocrine imbalances contribute to clinical complaints
- Urinary neurotransmitter and salivary hormone testing are valid means of identifying imbalances associated with clinical complaints
- Care package add-on allows you to implement a statistically-significant, evidence-based clinical model

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Scientific Support

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Q&A

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