THE TUESDAY MINUTE

THIS WEEK'S TOPIC

Support For Adrenal Exhaustion

"ADB5-Plus was developed to provide all the nutrients and appropriate glandular extracts to support and facilitate repair for adrenal exhaustion."

While preparing to do a lecture to a group of nutritional consultants, I was given the rare opportunity to see the "top ten" selling products from Biotics Research nationwide and its distributors. To me when I see the "top 10" products I know those are the ones that work time after time and get the job done. Interestingly, ADHS a supplement for excess cortisol was #8 on the Biotics list.

ADHS stands for ADrenal HyperSecretion, it contains a number of adrenal adaptogenic herbs and nutrient cofactors to reduce cortisol and it works great. Because of the adaptogenic component, Dr. Lasneski says it even raises low cortisol in about 50% of the cases.

But what I found fascinating is that two of the distributors place major emphasis on in-office functional testing. And for those territories, ADB5-Plus was the number 5 and 6.

ADB5-Plus is a formula that was designed for those chronic stress people who experience low cortisol and fight exhaustion, both mentally and physically. Besides exhaustion, some of the symptoms of low cortisol are: postural hypotension, low blood pressure, ligament laxity, and reactive hypoglycemia. But it is not uncommon to see depression, anxiety, confusion, an inability to cope with stress, salt craving, knee pain, back pain or insomnia.

When the adrenal glands become inactive or fail to produce sufficient amounts of the catabolic fight or flight hormone cortisol, the condition is called primary hypoadrenalism or Addison's disease.

This is usually caused by an autoimmune disorder. But when exposed to extreme stress for long periods of time cofactors become depleted and functional hypoadrenalism surfaces.

Remember Hans Selye the famous physiologist who studied stress? He said the beginning stages of stress is called the "alarm phase", then the body adapts to the stress and moves into a resistive phase. This is where we

expect to find elevated levels of cortisol. You may have heard the term "cortisol steal" as this phase continues.

The body takes raw materials that should go toward the repair of the adrenal hormone DHEA, but uses them instead to make more cortisol. After all, the real or perceived message is danger, danger. Ultimately levels of this life building anabolic hormone, DHEA, drop. But at some point we reach the third stage he called exhaustion. Here, cortisol levels plummet and DHEA levels go even lower.

ADB5-Plus was developed by Biotics Research Corporation to provide all the nutrients and appropriate glandular extracts to support and facilitate repair for adrenal exhaustion.

The term adrenal exhaustion suggests that fatigue factors must be addressed. ADB5-Plus provides phosphorylated forms of vitamins B1, B2 and B6, along with the minerals magnesium and manganese to facilitate the Krebs Cycle.

The combination of citrates and malates, low dose iron as well as the above mentioned B vitamins also support mitochondrial health.

Pantothenic acid (B5), and vitamin C have historically been found to be beneficial as adrenal supports.

Two unique factors in this formula are Choline and Rhodiola. I always think of choline for brain health and liver support but when you do functional testing you'll find choline comes up when everything else fails.

Rhodiola is another example of an adaptogen that has been used for centuries mostly in the traditional medicine of Russia, Scandinavia, and other countries as an energy boost and immune modulator. Some research shows that rhodiola, also known as Arctic root, can increase work performance and reduce mental fatigue. Rhodiola normalizes hormones by modulating the release of glucocorticoid into the body. Rhodiola helps regulate blood sugar levels for diabetics and protects the liver from toxins.

But perhaps the most unique part of this formula is the porcine adrenal. As you are probably, aware pharmaceutical thyroid glandular products come from porcine rather than bovine because they work better. Hormonally we are more like pigs than cows so this product uses a porcine adrenal extract. You can see a complete list of ingredients to the right.

Doctors generally recommend 2-3 in the morning and at noon. This is one of those products that when the patient needs it, they feel like someone turned on the lights.

By the way, Dr. Lasneski describes that "some patients have difficulty sleeping because they are constantly waking up due to low cortisol and blood sugar dysregulation." As a clinical trial, give the patient 3 tablets and let them try it on a Friday night. If they need the product and get a little cortisol boost they will report they got a great night sleep.

Remember, I mentioned the distributors that focus on in-office testing. You can see a handout to the right that includes a description of some of the in-office tests, a patient questionnaire that you can give to everyone as they sit in the waiting room and then the list of products you can use to test. Of course you will want a separate appointment as you learn to use these tests; most patients want that individual assessment and are willing to pay for the extra time. I hope you find them as exciting as I do.

Thanks for reading this week's Tuesday Minute edition. I'll see you next Tuesday.

Couldn't Attend The Nutritional Workshops Discussed In The Enclosed Flyer?...

<u>Now</u> You Can Learn These Exciting Nutritional Techniques 30 Minutes At A Time, Right In Your Office

The Leg Length Test Is On Pages 6 & 8

Learn 5 Simple, No Cost, In-Office Tests That Can Identify Patient Adrenal Stress In Under 5 Minutes

Let's face it, today's patient experiences more stress than any other people in the history of the world. The question now is just how much stress can a person handle before they are affected by adrenal fatigue. Adrenal fatigue can eventually manifest as structural problems, hormone imbalances, osteoporosis, leaky gut, liver dysfunction, sleep disorders, irritability, immune disorders, fibromyalgia, etc., etc.. As many as half of the patients that walk through your door may have an adrenal stress component to their condition. At the very least adrenal stress can increase recovery time for your patient.

Lab tests exist to evaluate this phenomena and many laboratories use cortisol and DHEA as a yardstick to evaluate the above. These saliva tests are accurate but costly for the patient. Also, once the tests come back the question arises as to which nutrients do you use to balance the body.

Another option is to use five simple <u>functional</u> tests in right in your office to assess patient adrenal stress levels. Not only is this free to the patient, but it takes under 5 minutes to perform and is noninvasive. The best part is if the patient does have an adrenal fatigue problem you can use these same tests to identify which nutrient will assist the adrenals in the healing process.

Metabolic Management has put together a list of the 5 adrenal fatigue tests, and a very short patient questionnaire to identify patients who should be tested. In just 30 minutes you can be using this great tool in your practice.

Call our office at 800-373-1373 and ask for one of our sales reps to visit your office and detail the adrenal stress tests and nutrient selection process.

Adrenal Evaluation Notes

Thank you for your interest in evaluating your patients adrenal stress using the Functional Test as taught by the Nutritional Therapy Association class titled “Sugar Handling.” This class is one of 7 modules teaching physicians to use the physical exam to its fullest to detect subtle nutritional imbalances. The use of these simple tests however will often eliminate the need for more advanced testing except in the most advanced cases. The practitioner should be aware that other laboratory test can be employed. One of the most reliable and cost effective is a laboratory called Medical Clinical Lab (888-611-1751). This lab utilizes multiple saliva tests to evaluate adrenal function.

The following model can be used to asses adrenal stress. Ask the patient to fill out the questionnaire attached in this packet titled “Adrenal/Stress Evaluation” (page 8). It is the section highlighted in yellow. The total number of possible answers is 44. Please note the following ranges:

Possible Answers		% Answered Positive	Score	Rating
44	X	40%	17	Severe
44	X	20%	9	Moderate
44	X	>20%	>9	Mild

Patients who score 9 or more have probable adrenal stress and should be screened using the techniques below. Note: Some patients (especially men) tend to minimize their condition and will score less than 9 yet will respond positively to the tests and therapy.

Examine the patient using the tests as outlined on the following pages.

1). Ragland Postural Hypotension
2). Paradoxicol Pupillary Response
3). Unilateral Inguinal Ligament Tenderness
4.) Medial Knee Pain
5). Chronic Short Leg

If the patient scores 9 or higher on the adrenal stress questions, test them using all of the above in-office functional tests. The greater the number of the above tests which indicate the patient’s adrenal stress (as well as the level of tenderness the patient feels upon palpation) gives the practitioners an idea of the severity of the condition.Test nutrients one at a time to find which nutrient gives the greatest benefit. Use that nutrient as the foundation nutrient and have patient taste other nutrients with the foundation nutrient in their mouth to further reduce reflex tenderness or leg length.

Approximately 90% of the patients will respond to ADHS, Cytozyme AD, or Bioglycozyme or a combination of the three (i.e. Bioglycozyme and ADHS). Do not be concerned if the reflexes or leg length get worse during the testing. This indicates that particular nutrient was inappropriate for them at this time. Discard that nutrient, wipe the patient's tongue with tissue, cleanse the mouth with water and retest with another nutrient until you find the appropriate one to reduce reflex tenderness.

Please Note: Two of the following tests will NOT neurolingual test consistently with supplements. The tests can be used to identify adrenal stress but cannot be used to identify the needed nutrient. See numbers 1 and 2 above.

Reassess patients in 30 days and change their nutrients accordingly. One of the reasons the adrenal glands become over reactive is to alkalize an overly acidic condition. By increasing the foods which have natural buffers and which have an alkaline ash will assist the process. It is essential that patients reduce their refined carbohydrate load (see sugar handling diet page) and increase their water ounces intake to 1/2 their body weight (200lbs=100 oz/day)

RAGLANDS POSTURAL HYPOTENSION TEST

Purpose: To determine presence and severity of adrenal exhaustion.

Procedure:

1. Instruct the patient to lay supine on the treatment table.
2. Place the blood pressure cuff on the arm of choice and determine the systolic pressure.
3 . Pump up the cuff again 15 mm/Hg higher than the supine systolic pressure and while supporting their arm., instruct the patient to stand up quickly.
4. Immediately release the valve so that you can determine the standing systolic pressure within 5 seconds of the patient arising.

Results:

Excellent: 6-10 point rise in systolic pressure upon standing.
Fair: systolic pressure remains the same.
*Poor: systolic pressure drops up to 10 points.
*Failure: systolic pressure drops up to 20 points.
*Exhaustion: systolic pressure drops over 20 points.

*Note: Poor adrenal function is often manifested by dizziness when standing up quickly.

Note: this test may be conducted sitting to standing but the blood pressure drop may not be as dramatic so adjust accordingly.

Important:

The systolic pressure must be assessed <u>within 5 seconds</u> of the patient standing otherwise the systolic drop will occur before you can measure. Neurolingual testing with nutrients will NOT affect the outcome of a Ragland test on a consistent basis. **This test can be used to identify adrenal stress levels but <u>cannot be used to identify the needed nutrient</u>**

PARADOXICAL PUPILARY RESPONSE

Purpose: To determine the ability of the eyes to adapt to light as an indication of the presence and severity of adrenal exhaustion.

Procedure:

1. Darken the room and wait 15 seconds.
2. Instruct the patient to look at a fixed point and not to blink.
3. Come in from the side of the eye and direct the pen light at the pupil at approximately a 45 degree angle. Hold the light 6-12 inches from the patients 3 eye depending on the intensity of the light.
4. Count 20 seconds observing the reaction of the pupil.

Results:

Grade on a scale of 1-5

1. Excellent: pupil constricts and holds tight for 20 seconds without pulsing.
2. Fair pupil holds but pulses after 10 seconds.

* 3. Poor pupil pulses and becomes larger after 5-10 seconds.

* 4. Failure pupil pulses and becomes gradually larger over the first 10 seconds.

* 5. Extreme Exhaustion: pupil immediately becomes larger or fails to constrict. (rule out drugs or neurological dysfunction)

* Note: This person will normally wear sunglasses outside in even moderate sunlight.

Important:

Neurolingual testing will NOT affect the results of this test. **This test can be used to identify adrenal stress levels but <u>cannot be used to identify the needed nutrient</u>**. Both Raglands and PPR will change over a period of time and NOT respond to neurolingual testing.

Unilateral Inguinal Ligament Tendernes

This test can be evaluated by physician and patient or both. The physician will feel a taunt or tightness unilaterally upon palpation, almost like a rubber band, in the inguinal area. See enclosed chart for specific testing area. There may be pain associated with the palpation depending upon the severity of the condition. The greater the experienced pain or tautness the greater the adrenal stress. Ask the patient to rate the tenderness on a scale of 1-10. In this scale 1 = NO TENDERNESS, 10 = EXTREME TENDERNESS. Record the patient response on the adrenal stress evaluation form.

Important:
This test WILL change using neurolingual testing, you can **use it both to identify adrenal stress levels and <u>also to test nutrients that may be appropriate for the patient.</u>**

Medial Knee Pain

Apply pressure at the insertion of the sartorius muscle at the pes anserinus. See enclose chart for location. The indication may be unilateral or bilateral. Ask the patient to rate the tenderness on a scale of 1 to 10 (10 being extreme tenderness) and record the patient's response on the enclosed Adrenal Stress evaluation form.

Important:
This test WILL change using neurolingual testing, you can **use it both to identify adrenal stress levels and <u>also to test nutrients that may be appropriate for the</u>**

Chronic Short Leg

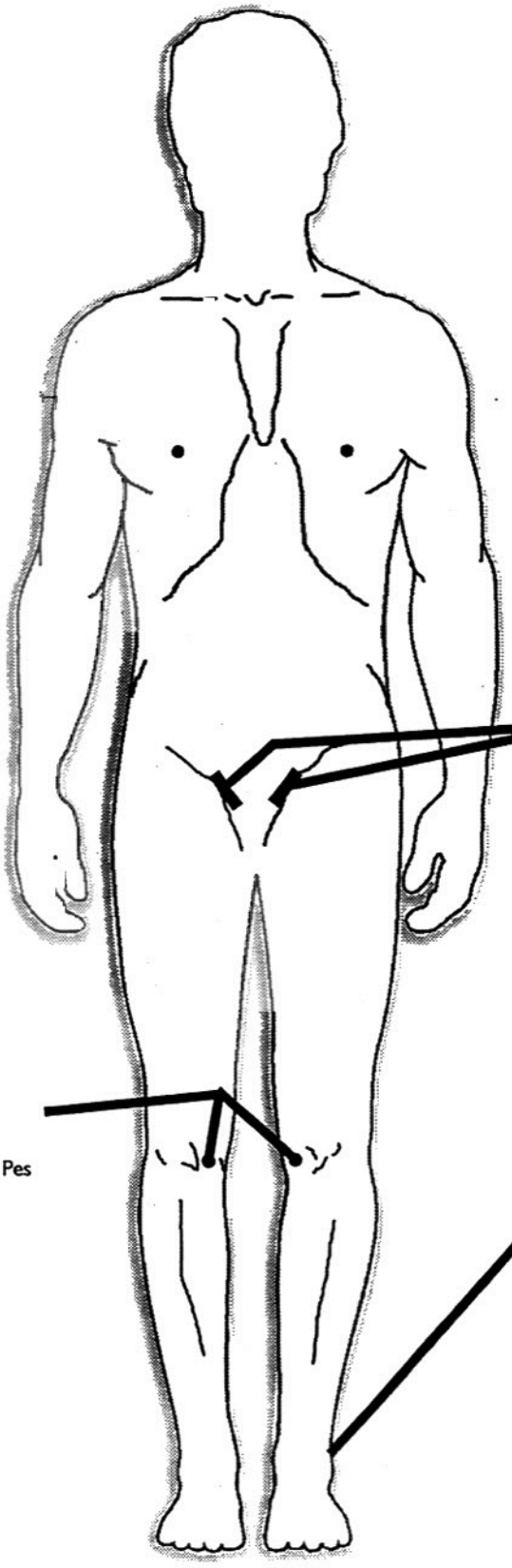
due to posterior inferior ilium

When structural or genetic weakness have been ruled out this test can be confirmed with the Postural Hypotension and Paradoxal Pupillay Response tests. Record the approximate difference in leg length in inches on the Adrenal Stress evaluation form. After neurolingual testing each nutrient it is important to have the patient stand and walk a few steps or manually lift the patients pelvic area to reset the muscles and allow the change in leg length to occur. When the correct nutrient or group of nutrients is tested neurolingually the leg length will return to normal for the patient.

Important:
This test WILL change using neurolingual testing, you can **use it both to identify adrenal stress levels and <u>also to test nutrients that may be appropriate for the patient.</u>**

Functional Evaluation of Sugar Handling Problems

(<u>Adrenal</u>, Liver, Pancreas)



<u>INGUINAL LIGAMENT TENDERNESS</u>
Unilateral tenderness to palpation is an Adrenal indicator.
ADHS, Cytozyme-AD, Bio-Glycozyme Forte, Neonatal Multi-Gland, Cu-Zyme, Cytozyme-PT/HTP

<u>MEDIAL KNEE</u>
The insertion of the Sartorius muscle at the Pes Anserinus. An Adrenal Indicator when tender.

<u>CHRONIC SHORT LEG DUE TO POSTERIOR-INFERIOR ILIUM (PI)</u>
Adrenal indicator when confirmed with Postural Hypotension and Parodoxical Pupillary Response

ADRENAL / STRESS EVALUATION

In today's hectic world few people can escape the effects of stress. People experience stress both physically and emotionally. In fact emotional stress can hinder the speed of your recovery. Our office can evaluate the way your body responds to stress quickly and effectively. Through minor dietary changes and the addition of some key individualized nutrients you can continue to live your fast pace lifestyle without feeling "burned out".

Please complete the brief questions inside the "Related Questions" box below. Rate your answers by frequency of occurrence, circle 1 for 'very seldom', circle 4 for 'frequently'. If the question does not apply pass on to the next one.

Patient Name _____ Date _____

Reflexes **1-5**

Adrenals

1.) Postural Hypotension _____

2.) Paradoxical Pupilary Response _____

1-10

3.) Inguinal Ligament Tenderness (ILT) _____

4.) Medial Knee Pain (MKP) _____

Leg Lengths Differential (LLD)

5.) Differential in inches _____

Related Questions

Are you fatigued?	
Do you feel "low" with a strong desire to sleep, sleep a lot or have difficulty waking up?	1 2 3 4
Do you crave salt or salty foods, or do you put salt on your food before you taste it?	1 2 3 4
Do you have pain on the inside (medial) portion of the knee or on one side of the low back?	1 2 3 4
Do you get dizzy when standing up suddenly from a lying or sitting position?	1 2 3 4
Do you tend to be a "night person"?	1 2 3 4
Do you have a tendency to worry?	1 2 3 4
Do you have a tendency to be calm on the outside, troubled on the inside?	1 2 3 4
Do you feel "keyed up" or have trouble calming down?	1 2 3 4
Does exercise make you feel worse?	1 2 3 4
Do you feel overwhelmed or stressed out?	1 2 3 4

Vertebral Level +/-

T-9 _____

ADRENALS

Testing Nutrients: ADB5 Plus, ADHS, Bio-Glycozyme Forte, Phoshatidylcholine, Cytozyme-AD, Neonatal Mulit-Gland, De-Stress, Bio Ashwaganda, Phoshatidylserine

	BASELINE	Nutrient Result	Nutrient Result	Nutrient Result	Nutrient Result	Nutrient Result	Nutrient Result	Nutrient Result	Nutrient Result	Nutrient Result
ILT										
MKP										
LLD										

PROTOCOL: _____

Sugar Control Diet

The following is a trial diet, designed to help recalibrate your bodies sugar control mechanisms, it will increase your energy and vitality. Please follow it very closely. It is not a healthy diet for all times, but it is beneficial for you during this trial period. As your condition improves, your doctor may add back foods to your diet. This way of eating does take a little planning, but is well worth the effort. Most people will lose many of their unhealthy cravings within one or two weeks on this diet. Many who need to loose weight are pleased to find weight loss while on this diet, without being hungry. Others who need to gain weight often find weight return without undue effort.

PROTEIN: Each meal should include minimum 4 to 6 ounces of protein, but you can have as much as you desire. Meat, poultry, fish, and eggs are unlimited. Vegetarians may use soy and tofu items where no allergy exists.

VEGETABLES: Eat as much as you desire, you can't eat too much here. Focus on dark leafy greens, and a variety of colors. No potatoes, yams, or other starchy vegetables.

FRUITS: Careful here, only to be eaten alone between meals as a snack. Leave the sweeter fruits such as bananas, mangos, persimmons, papayas, dried fiuits, etc. alone. One or two pieces of fruit per day should be plenty.

NUTS: Raw nuts, especially raw cashews make a great snack.

GRAINS: No wheat including breads, rolls, muffins and pasta. Only grain allowed is rice, and only at the evening meal. All rice should be roasted first before cooking. Place dry uncooked rice in pan and brown, some of the kernels will pop. Then cook as normal.

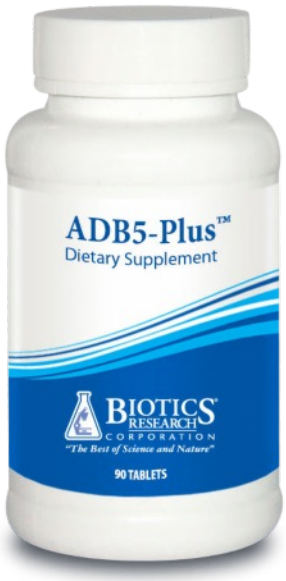
DAIRY: No dairy, unless specifically allowed by your doctor.

SWEETENERS: No sweeteners of any kind.

FATS: No artificial fats such as hydrogenated, or partially hydrogenated.

You must eat every 2 hours of the waking day. You need not eat a large volume of food at these snacks, just a fist full of nuts or a carrot or apple or something. No processed or packaged foods, eat only those foods as found in nature. Eat some vegetables raw everyday such as salad, unless otherwise directed by your doctor.

ADB5-Plus™



As a component necessary for survival, a dynamic equilibrium or steady state must exist in the internal bodily environment. As a constituent of this steady state equilibrium, the adrenals function to secrete specific neurotransmitters, including epinephrine (adrenaline), norepinephrine (noradrenaline), and cortisol in response to stress. Subsequently, with the release of these neurotransmitters, a series of physiologic effects ensues. These events may include for example a rapid heart rate or an increased alertness. Thus in these aspects stress represents a protective and restorative event. Alternatively, constant or excess stress may have negative consequences, manifesting as an assortment of symptoms and encompassing a multitude of emotional, behavioral, and even physical symptoms, which may include adrenal gland enlargement, gastrointestinal consequences, as well as immune dysfunction.[1] Although an adaptive process, when in excess, stress consequently results in adaptation, which in turn may result in bodily or organ damage. This process has been defined by Selye as the 'general adaptation (adjustment) or stress syndrome.' Selye, the first to coin the word "stress," further categorized it to represent the "mutual actions of forces that take place across any section of the body, physical or psychological."[2]

An excess production of stress may manifest in a variety of symptoms, varying enormously among different individuals. Stress related illnesses are a frequent occurrence, noted as one of the most common clinical patterns seen in healthcare clinics. As the degrees of stress vary broadly among individuals, four categories and degrees of stress have been categorized, which include; 1) physical stress, including overwork, lack of sleep, or athletic over-training; 2) chemical stress, such as environmental pollutants, diets excessively high in refined carbohydrates, food or additive allergies, and endocrine gland imbalances; 3) thermal stress, including over-heating or over-chilling of the body; and 4) emotional and mental stress.[3]

Hypoadrenia or adrenal fatigue is considered to be one of the most prevalent debilitating conditions of the past fifty years; however it is rarely diagnosed, and often it is misdiagnosed as other types of illnesses, including chronic fatigue conditions, fibromyalgia or serious food/inhalant allergies. Most patients describe their symptomatology as a 'fatigue that simply cannot be overcome.'[4] In addition to the adrenals acting alone, the combined hypothalamic-pituitary-adrenal axis also contributes to the body's ability to cope with stressors, which include among others infections, blood pressure fluctuations, and illnesses.

The adrenal glands play an essential part in many bodily functions, primarily as a consequence of the hormones they secrete. As such they supply components necessary for numerous biochemical reactions. As a consequence of these hormonal factors, they significantly effect the functioning of every tissue, organ and gland in the body. They also exert an effect on both mental processes and the overall feeling of wellness. Taking into account all of these actions, their primary function is to enable the body to cope with stress. In fact they have been subjectively classified as "the glands of stress."[4] Endurance, energy and resiliency, as well as life itself depends upon their proper functioning. In fact, the hormones secreted by the adrenal glands have been said to "influence all of the major physiological processes in the body."[4]

Adrenal dysfunction can take many forms, the most severe form being Addison's disease, which if left untreated is life threatening. Adrenal fatigue, although less serious, effects millions each year, and usually goes undiagnosed. Diminished function or adrenal hypofunction results from a deficiency in the function of the adrenal glands, and may present as a broad spectrum of disorders. Cortisol has a broad reaching effect in the body, as it not only affects glucose but also has an influence on both protein and fat metabolism. As a consequence of adrenal dysfunction, changes in carbohydrate, protein and fat metabolism may occur, as well as alterations in fluid and electrolyte balance, heart and cardiovascular system problems or a reduced sexual desire.[4] Nutrients, including vitamins, minerals and botanicals are known to provide valuable support for the adrenals, and can offer subsidiary and restorative components to overstressed adrenals.

Structurally, the adrenal gland is divided into two parts, an outer region called the adrenal cortex and an inner region called the adrenal medulla. The adrenal cortex, comprising the bulk of the gland, produces the mineralocorticoid aldosterone and the glucocorticoid cortisol, while the cells of the adrenal medulla produce epinephrine (adrenalin) and norepinephrine (noradrenalin). Androgens, including DHEA and testosterone are also produced by the adrenal cortex. Both epinephrine and norepinephrine have an effect on numerous organs or functions thereof, including the heart, the liver, blood pressure, blood vessels and airways.[5] The chief responsibility of the mineralcorticoids and glucocorticoids is to regulate the stress response, via the synthesis of corticosteroids (cortisol) and catecholamines (adrenaline).[6]

Vitamins associated with Adrenal Support

Vitamin C. In the adrenal glands the concentration of vitamin C is among the highest in the body, being roughly 100 times that of blood plasma levels.[7] As such the adrenals are extremely sensitive to inadequacies in vitamin C. In catecholamine synthesis, vitamin C is required as a co-factor in the conversion of dopamine to norepinephrine.[8] In humans vitamin C secretion occurs as part of the stress response via hormone regulation, specifically in response to stimulation via the adrenocorticotrophic hormone (ACTH). Utilizing adrenal vein catheterization, it was demonstrated that following ACTH stimulation, the mean adrenal vein vitamin C level increased approximately four fold, and then subsequently returned to near

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pre-stimulation levels approximately 15 minutes thereafter. Peak adrenal vitamin C and cortisol concentrations have been strongly correlated (r^2=0.35, P<0.001), suggesting a local action of vitamin C on the adrenal glands. Additionally, it has been noted that, although being of unknown function, the increase in vitamin C secretion suggests that "adrenal vitamin C secretion is an integral part of the stress response."[9] Stress, fever and viral infections, as well as habitual actions, such as smoking and alcohol use, cause a rapid decline in the blood level of vitamin C,[10] and the vitamin C requirements tend to be higher in stressed or traumatized persons.[11]

Thiamin (B_1) (as cocarboxylase). As a coenzyme thiamin plays central role in intracellular glucose metabolism,[12] making it a vital adjunct in adrenal dysfunction, as blood sugar fluctuations (hypoglycemia) are a known correlating symptom. Thiamin is required for the metabolism of carbohydrates, as part of the coenzyme cocarboxylase, also know as thiamin pyrophosphate (TPP). The energy produced from oxidation of glucose is highly dependent upon TPP,[13] and in the absence of thiamin a slowing or complete blocking of this enzymatic reaction occurs, due to a lack of TPP. An inadequate production of TPP has the potential to affect multiple enzymatic processes, particularly that of carbohydrate metabolism. Thiamin also participates as an active component in the citric acid cycle (Kreb's cycle), as a required cofactor for the decarboxylation of α-ketoglutaric acid to succinyl CoA, thus serves as an important component in energy production. Furthermore, a deficiency in thiamin has been correlated to selective neuronal death in the brain, possibly due to the induction of oxidative stress, as evidenced by the up-regulation of markers of endoplasmic reticulum stress. This type of stress has been associated with a range of neurodegenerative processes, including the obstruction of blood flow to the brain.[14] Decreased mental acuity is a correlating symptom of adrenal dysfunction, thus thiamin may play a beneficial role in this capacity.

Riboflavin (Vitamin B_2). Riboflavin is found primarily in the body as a fundamental component of the coenzymes flavin adenine dinucleotid (FAD) and flavin mononucleotide (FMN).[15] In both adrenal and thyroid insufficiency the conversion of riboflavin into FAD and FMN is impaired.[16,17] A deficiency in riboflavin has also been correlated to an increase in oxidative stress.[17] Along with other B vitamins, riboflavin is utilized to support energy transfer and production via its action in the metabolism of fats, carbohydrates and proteins. As such it plays a vital role in energy production. Additionally, riboflavin is required for red blood cell formation and respiration, antibody production, and in the regulation and production of growth hormone.

Niacin (as niacinamide). Niacin is an essential component of the coenzymes NAD and NADP, thus is essential to all living cells. NAD metabolism has been associated with a vital effect on biological entities, including the overall human lifespan.[19] NAD functions as both an electron carrier for intracellular respiration, and along with other enzymes, as a dehydrogenase, for the purpose of oxidizing energy providing molecules, including poly (ADP-ribose) polymerases, mono-ADP-ribosyltransferases, as well as the sirtuin enzymes.[19,20] NADP on the other hand functions as a hydrogen donor in reductive biosynthesis. It has been estimated that approximately 200 enzymes require the coenzymes, NAD and NADP.[20] Nicotinic acid has also been associated with the glucose tolerance factor, implicating its importance in the insulin response, making it an extremely important entity in adrenal support, as adrenal fluctuations are associated with hypoglycemic symptoms. In niacin deficient DNA repair models, a dramatic inhibition in DNA repair has been demonstrated.[21,22] A deficiency in niacin is commonly recognized by changes in the skin, including the mucosa of the mouth, tongue, stomach, and intestinal tract, as well as changes in the nervous system.[23]

Vitamin B_6 (as pyridoxal-5-phosphate). Vitamin B_6 serves as a coenzyme in well over 100 reactions, which makes it functionally important in both metabolism and health. The active coenzymes of vitamin B6 are pyridoxal 5-phosphate (PLP) and pyridoxamine 5-phosphate (PMP). PLP functions as a cofactor in lipid metabolism. Consequently with vitamin B_6 deficiency, decreased body fat, decreased levels of liver lipids, as well as impaired lysosomal lipid degradation has been observed.[24,25,26] Both the nervous and immune systems require an adequate supply of vitamin B_6 for efficient function.[27,28,29,30] Vitamin B_6 is also required for the conversion of tryptophan to niacin and serotonin,[31,32] as well as for the conversion of tyrosine to dopamine. In one study a deficiency in vitamin B_6 was correlated to a slower extracellular dopamine release (43% longer with deficiency).[33] Dopamine is known to be an active participant in the secretory modulation of both aldosterone and catecholamine from the adrenal gland,[34] and dopamine depletion is correlated with physical and/or psychological stress. In an animal study a single dose of B6 was demonstrated to stimulate the secretion of adrenal catecholamines.[35]

Vitamin B_{12} (as cobalamin). Fatigue is a common symptom in adrenal dysfunction, and a deficiency in vitamin B_{12} may be correlated to symptoms of fatigue. Vitamin B_{12} plays an integral part in the biosynthesis of pyrimidines and purines, making it an essential component in the synthesis of nucleic acids.[11] Vitamin B_{12} is required as a coenzyme for multiple enzymes, including N^5-Methyltetrahydrofolate homocysteine methyltransferase, which is a required component of L-methionine synthesis. A deficiency in vitamin B_{12} has been associated with neurological manifestations.[36] Additionally, vitamin B_{12} deficiency, in combination with a deficiency in other B vitamins, including vitamin B_6 has a direct impact on the synthesis of neurotransmitters.[37] Subsequently with deficiency an impact on cognitive functions is possible. Alternatively, supplemental vitamin B_{12} may alleviate this deficiency and provide support for adrenal dysfunction, via its impact on improving decreased mental acuity.

Folate (as folic acid). Folate is a constituent of every living cell, both in plants and in animals. Like vitamin B_{12}, folic acid is involved in the biosynthesis of purines and pyrimidines, and is utilized by the body to decrease homocysteine levels. Folate also plays a role as a coenzyme in numerous metabolic reactions, and deficiency has been correlated with generalized weakness, melancholy feelings, as well as disorders of the peripheral nerves.[11]

Pantothenic Acid (as calcium pantothenate). (Vitamin B_5) Pantothenic acid, a water soluble vitamin, plays an essential role in the metabolism of carbohydrates, fats and proteins. It also participates in other essential bodily functions including the production of common neurotransmitters, for example hormones, and, as a factor in the synthesis and oxidation of fatty acids and pyruvate, it serves as an essential component of the citric acid cycle. As such it is an important factor in energy production.[38] A deficiency in pantothenic acid has been associated with adrenal atrophy.

Pantothenic acid forms the core of Coenzyme A (CoA), as the initial step in the synthesis of Coenzyme A is the phosphorylation of pantothenate. Coenzyme A is required in the synthesis of the important neurotransmitter, acetylcholine, a chemical required for nerve transmission. Thus, pantothenic acid plays an intricate role in the synthesis of isoprenoid-type compounds, including steroid hormones, cholesterol, and vitamins A and D.[39] Altered CoA homeostasis has been documented in certain conditions, including starvation, diabetes, alcoholism and vitamin B_{12} deficiency.[40] A close relationship exists between the tissue levels of pantothenic acid and adrenal cortex function, as pantothenic acid functions to stimulate the adrenal glands to produce additional cortisol. A deficiency in pantothenic acid has been correlated to disruptions in or abnormalities of neurotransmitter production, resulting in difficulty in dealing with stressful situations. Accordingly, pantothenic acid is sometimes referred to as the "anti-stress" vitamin. A deficiency in pantothenic acid has been shown to result in clinically prevalent symptoms of generalized malaise.[40]

Minerals Associated with Adrenal Support

Iron (as ferrous gluconate). Iron is a major component of hemoglobin, the primary component of red blood cells, accounting for greater than 65% of iron in the body.[11] In addition to hemoglobin, other iron containing compounds include myoglobin and the cytochromes. Myoglobin's primary function is in the transport and storage of oxygen within the muscle, while the cytochromes, specifically cytochromes a, b and c, function in the mitochondrial electron transport chain, and thus are critical to respiration and energy metabolism. Significant iron deficiency has been correlated with depleted levels of cytochromes b and c, resulting in limited rates of oxidation by the electron transport chain.[41] Iron is also required as a cofactor in the synthesis of the neurotransmitters dopamine, norepinephrine and serotonin.[42] Epinephrine is derived from the amine norepinephrine, and epinephrine levels are known to be affected in adrenal fatigue, characteristically being decreased. Norepinephrine and epinephrine also act as aids in the maintenance of normal blood glucose levels by stimulating glucagon release, glycogenolysis and food consumption, and by inhibiting insulin release.[43] As a final point, iron deficiency is noted as the most common nutritional deficiency worldwide, affecting predominately women and children.[44,45]

Magnesium (as magnesium malate). As a cofactor in over 300 metabolic reactions, including those involved in the production of metabolic energy, magnesium serves as an extremely important mineral *in vivo*. A deficiency in magnesium is characterized by diverse symptomatology, including muscle spasms, personality changes, and neuromuscular symptoms,[11] as well as 'impairments in emotional memory,[46] and central nervous hyperexcitability".[47] Magnesium is a necessary component in the adrenal hormone cascade, thus magnesium status is closely correlated to the ability of the adrenals to recover from stress. Additionally, the absorption capacity of magnesium decreases with increasing age, emphasizing the need for added magnesium with increasing age.[48]

Zinc (as zinc citrate). Zinc performs many diverse actions in the body; however three are considered vital, those being its function as a structural component, as a catalyst, and as a cocatalyst. An added role is its function as a regulatory factor. Zinc is an essential component of the zinc containing metalloenzymes, which includes alkaline phosphatase and lactate dehydrogenase, and in this role may have dual functions, for example playing both a functional and a structural role. Consequently, a depleted zinc status affects the function of these enzymes, resulting in either diminished or complete loss of enzymatic activity.[49] Proper functioning of the adrenal glands relies on adequate zinc status. Thus it is not surprising that zinc deficiency has been correlated to 'adenohypophyseal-adrenal cortex function' as well as to an increased stress response. The adrenocorticotropin response was demonstrated to be positively correlated with serum zinc status.[50] Also, with zinc deficiency an increase in neuronal damage has been observed, which was associated with an increase in the formation of free radicals.[51] Supplemental zinc has demonstrated to be an efficient means of improving zinc status.[52]

Manganese (manganese glycinate). Manganese functions as a component of the mitochondrial manganese containing superoxide dismutase (SOD), which plays a critical role in protecting the cell from damage due to oxidative stress. Manganese deficiency in animals has been reported to downregulate the mitochondrial manganese SOD, at the level of gene transcription. Manganese-activated enzymes also play important roles in the metabolism of carbohydrates, amino acids, and cholesterol.[53] Both manganese-containing and manganese-activated enzymes play critical roles in gluconeogenesis.[54]

Copper (as copper gluconate). Copper is an essential trace element for both humans and animals, as it plays a critical role in the oxidation/reduction reactions of the body, primarily due to its ability to easily accept and donate electrons. This capacity also makes it an important mineral in the scavenging of free radicals. In addition to being a vital component of the copper containing enzymes, known as the cuproenzymes, it is also involved in multiple enzyme processes, including the production of cellular energy, via its vital function as part of the enzyme cytochrome *c* oxidase. As a result it may be viewed as a vital component for adrenal support.

Malic Acid (as magnesium malate). A deficiency in malate, an essential component of the Citric Acid Cycle, has been linked to physical exhaustion.[55] Exogenous Malate in very small amounts is required to increase ATP production and mitochondrial oxidative phosphorylation. Additionally, Malic Acid, known to be an aluminum chelator, may support aluminum detoxification.

Botanicals Beneficial for Adrenal Support

***Rhodiola rosea* (extract) (root).** In many parts of the world *Rhodiola* has been utilized for decades to alleviate everyday symptoms of anxiety, despair, and insomnia, and is a popular adaptogen and anti-stress plant in both Europe and Asia.[56] Its use has been correlated to mood improvement, and the alleviation of both depression and fatigue.[57] In one study the use of *R. rosea* was demonstrated to significantly improve symptoms of general apprehension, as indicated by a reduction in the Hamilton Anxiety Rating Scale (HARS) score.[58]

Tyrosinase (from mushroom). Mushroom derived Tyrosinase is a valuable source of amino acids, containing all of the essential amino acids, along with most of the nonessential amino acids.[59] Tyrosinase is a copper-binding transmembrane glycoprotein, which catalyzes the hydroxylation of tyrosine, the first step towards melanogeneisis; the biochemical pathway for melanin biosynthesis.[60] Tyrosinase also catalyzes the hydroxylation of tyrosine to dihydroxyphenylalanine (DOPA), as well as the subsequent oxidation of DOPA to further bioactive derivates, including 5, 6-dihydroxyindole (DHI).[62,63] DOPA plays a significant role in adrenal function as it is the precursor of dopamine, noradrenaline, and adrenaline, as well as the rate-limiting step in catecholamine biosynthesis.[64] In addition to its presence in epidermal melanocytes, tyrosinase is also a component of the eye, as part of the pigment epithelia of the retina, iris, and ciliary body.[61]

Additional Components Providing Support for Adrenal Function

Citrus Bioflavonoids. The adrenals are known to be concentrators of vitamin C, with the level of vitamin C in the adrenals typically around 100-fold that of blood plasma levels.[65,66] In animal studies a depletion of vitamin C was shown to reduce the vitamin C content of the adrenals to 1/20th of the normal concentration, which was correlated with a lower secretion of aldersterone, compared to those animals with no vitamin C depletion. Additionally, in animals exhibiting vitamin C depletion, an impaired plasma aldosterone response to sodium depletion has been demonstrated.[67] As such antioxidants such as bioflavonoids may provide support to stressed adrenals.

N-acetyl-L-cysteine (NAC). NAC is a potent antioxidant that functions in intracellular glutathione synthesis,[68] in which it serves as a scavenger of reactive oxygen intermediates. As an antioxidant NAC functions to inhibit glutathione-induced cytochrome *c* release, to reduce elevated levels of intracellular hydrogen peroxide (H2O2), and to prevent the loss of mitochondrial membrane potential. These actions are particularly important during increased oxidative stress, as under these conditions various intracellular components, including polyunsaturated fatty acids, lipids, proteins, as well as DNA may suffer extensive damage.[69] NAC has also been demonstrated to be a potent blocker of the induction of TNF-alpha, IL-1 beta, IFN-gamma and iNOS,[70] implicating an additional beneficial action via its ability to quench these proinflammatory activators.

Choline (as choline bitartrate). Choline is recognized as an essential nutrient in humans, primarily due to its role as the precursor of phospholipids, as well as to the neurotransmitter acetylcholine.[72,73] Acetylcholine functions as a crucial component for the structural integrity of the cell membrane. The phosphorylation of choline, via the Kennedy pathway, yields phosphatidylcholine, the major form of cellular choline.[74] Over 1,000 genes associated with neural precursor cells, including those involved in cell proliferation, differentiation and apoptosis require choline for activity, thus choline is an essential factor in gene expression.[75] In addition to other functions, choline participates in lipid and cholesterol metabolism, cholinergic neurotransmission, and transmembrane signaling.[76]

Superoxide Dismutase and Catalase (vegetable culture sources). Superoxide dismutase and Catalase both function as potent antioxidants, shown in human studies to decrease both oxidative damage, as well as other types of damage to DNA.[77] Since adrenal dysfunction may potentially result in an increased production of reactive oxygen species, antioxidants may be an important adjunct for adrenal support.

Glandular Support

Adrenal Gland Concentrate (porcine), Lamb Pituitary/Hypothalamus Complex (ovine), Parotid Tissue (bovine). Glandular components serve to provide raw materials which aide in the functional support of the respective organ. Glandular components also contain vital chemical messengers, which are potentially lacking in those with adrenal dysfunction. They function in supporting the adrenals by relieving the burden of underfunctioning adrenal glands, which may be particularly important in the initial phases of adrenal repair. They have also been demonstrated to speed recovery of the organ, and specifically with the adrenals may lead to increased energy.[78]

In addition to a good diet, natural adrenal support utilizing vitamins, minerals, botanicals and glandular components serves to aid in promoting the restoration of healthy adrenal function.

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THE TUESDAY MINUTE

THIS WEEK'S TOPIC

Ashwagandha Rejuvenative Effects

"Adaptogens have been used for centuries to help deal with stress whether it's physical, chemical, mental or emotional."

Do you have patients that are trapped in situations where they are just exhausted? It may be that they are stuck in a job or family situation that's sapping their strength. It could be a mom or dad who is caring for a dying parent or perhaps someone with an autistic child. These are people who could benefit from adaptogens. Adaptogens have been used for centuries to help deal with stress whether it's physical, chemical, mental or emotional.

Over centuries every culture has identified botanical agents that create or sustain increases in endurance, physical and mental performance. You can see a link to hear more about adaptogens and adaptogenic combinations particularly in terms of supporting healthy sexual function. But in terms of a single or isolated substance, Ashwagandha is one of the all-stars.

Ashwagandha or withania somnifera is referred to as a "royal herb" because of its multiple rejuvenative effects on the human body. It is nicknamed Indian ginseng or winter cherry. It has been used for over 4,000 years. One researcher claimed it's the most commonly used and extensively studied adaptogen.

Many of us are familiar with Ashwagandha's ability to modulate cortisol but Ashwagandha affects multiple systems. Ashwagandha has been studied as adaptogenic, antioxidant, anticancer, antianxiety, antidepressant, cardio-protective, thyroid modulating, immune-modulating, antibacterial, antifungal, anti-inflammatory, neuroprotective, cognitive enhancing and as a hematopoietic agent.

In an article, "Ayurvedic medicinal plants for Alzheimer's disease: a review," authors believe Ashwagandha has some very interesting applications to cognitive problems including Alzheimer's. "Unlike other adaptogens, which tend to be stimulating, Ashwagandha has a calming effect and thus may be particularly indicated in people with Alzheimer's disease."

A recent double-blind, randomized, placebo-controlled study of the effects of Ashwagandha on stress found that it reduced symptoms of stress and inability to concentrate

and reversed forgetfulness in a dose-dependent manner, at 500 mg/day.

In animal models Ashwagandha extracts induced significant regeneration of both axons and dendrites and reversed amyloid peptide-induced memory deficiency in mice.

Another group reported that oral administration of a semi purified extract of the Ashwagandha root reversed behavioral deficits, plaque load, and accumulation of beta-amyloid peptides in mouse models of Alzheimer's disease.

Of course I am not suggesting we treat Alzheimer's patients with Ashwagandha; however, these studies show its versatility and healing abilities. But I like the idea of eating nutrients that reduce plague and beta-amyloid peptides.

As I mentioned, because of the number of unique phytochemicals found in Ashwagandha and its long history of safety and rejuvenation effects, there are numerous articles on both animals and humans. One study with lab rats found that when given Ashwagandha, they actually were able to swim twice as long compared to the same type of rats that were not treated.

I found this study on resistance training interesting. 57 males aged 20-50 were divided into two randomized groups; 29 people in a treatment group who received 300 mg of Ashwagandha twice a day and 28 subjects who served as a control group and received a placebo. Following baseline measurements, both groups of subjects underwent resistance training for 8 weeks and measurements were repeated at the end of week 8.

Researchers were primarily interested in muscle strength but also evaluated muscle size, body composition, serum testosterone levels and muscle recovery. As you would expect with 8 weeks of resistance training, all the health indicators measured increased. However, the group taking the Ashwagandha was found to be statistically significantly greater than the placebo in all areas. Muscle strength, muscle size and body fat percentage, testosterone, and muscle recovery were increased over the placebo group. There was also a 4.3 fold increase in testosterone.

When we think of substances that increase endurance, strength or physical and mental performance, we generally think of guarana, caffeine or what the Chinese may call a "yang effect." Ashwagandha however seems to work in the opposite direction.

An Indian study looked at anxiety with 64 participants in a 60-day clinical trial that compared 600 mg of Ashwagandha per day with placebo. Significant differences were found for all outcome measures, including scores on the Perceived Stress Scale ($p<0.0001$), the General Health Questionnaire ($p<0.0001$), and levels of cortisol in the bloodstream ($p=0.0006$). Ashwagandha was well tolerated and reported no serious adverse events.

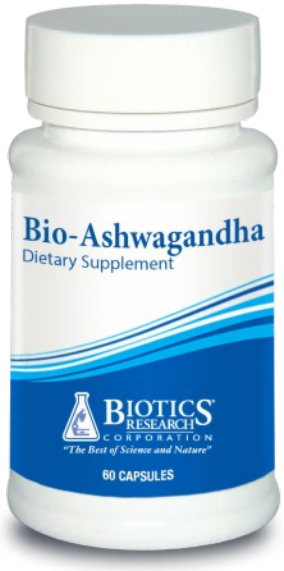
A new product by Biotics Research Corporation, Bio-Ashwagandha, contains 300 mg per capsule, in a 60 count bottle. Most of the studies use 250-300 mg twice a day, but note: animal studies safely use much higher doses.

Many of the sources of Ashwagandha come from third world countries and sometimes growing and processing conditions can be questionable. The beauty of using botanicals from Biotics is that you can be assured that it is free of heavy metals and solvents.

We've talked about testing elderly patients using a modified form of the Romberg test to see if we could increase neurological function specifically balance in the past. You can see a link to the right. Based on its adaptogenic qualities consider Bio-Ashwagandha as one of your first choices.

Thanks for reading this week's Tuesday Minute edition. I'll see you next Tuesday.

Bio-Ashwagandha



Ashwagandha (Withania somnifera), is a small evergreen shrub found in India and the Middle East, as well as in parts of Africa.[1] It is a plant in the Solanaceae or nightshade family providing adaptogenic properties, i.e. "something that helps one adapt to stressful situations". Among Ashwagandha's primary active components are mild-acting calming alkaloids. These steroidal lactones called glycowithanolides, consisting of Withaferin A, Withasomniferin-A, provide significant supportive health benefits. Some of the withanolides have been reported to be structurally similar to ginsenosides from ginseng,[2] and are used to provide support for healthy adrenal, cognitive and immune system function, as well as providing relief for menstrual discomfort.

Traditionally viewed as a rejuvenative tonic, research in animal models suggests that Ashwagandha has soothing effects, and been demonstrated to suppress stress-induced increases in dopamine receptors in the brain.[3] It also appears to reduce stress-induced increases of plasma corticosterone, blood urea nitrogen, and blood lactic acid.[4]

Each bottle of **Bio-Ashwagandha** supplies 60 capsules

Caution: Not recommended for pregnant or lactating women.

References

1. Ven Murthy MR, Ranjekar PK, Ramassamy C, Deshpande M. Scientific basis for the use of Indian Ayurveda medicinal plants in the treatment of neurodegenerative disorders: ashwagandha. Cent.Nerv.Syst.Agents Med.Chem. 2010 09 10(3):238-246.
2. Dasgupta A, Peterson A, Wells A, Actor JK. Effect of Indian Ayurvedic medicine Ashwagandha on measurement of serum digoxin and 11 commonly monitored drugs using immunoassays: study of protein binding and interaction with Digibind. Arch Pathol Lab Med. 2007 131:1298-303.
3. Upton R, ed. Ashwagandha Root (Withania somnifera): Analytical, quality control, and therapuetic monograph. Santa Cruz, CA: American Herbal Pharmacopoeia. 2000 1-25.
4. Mishra LC, Singh BB, Dagenais S. Scientific basis for the therapeutic use of Withania somnifera (ashwagandha): a review. Altern Med Rev. 2000 5:334-46.

Bio-Ashwagandha is available in 60-count bottles (#8050).

Supplement Facts

Serving Size: 1 Capsule

	Amount Per Serving	% Daily Value
Ashwagandha root (Withania somnifera)	300 mg	*

*** Daily Value not established**

Other Ingredients: Microcrystalline cellulose, capsule shell (gelatin and water) and magnesium stearate.

This product is gluten free.

RECOMMENDATION: One (1) capsule each day as a dietary supplement or as otherwise directed by a healthcare professional.

CAUTION: Not recommended for pregnant or lactating women.

KEEP OUT OF REACH OF CHILDREN
Store in a cool, dry area.
Sealed with an imprinted safety seal for your protection.

Product # 8050 Rev. 09/16

To place your order for **Bio-Ashwagandha** or for additional information please contact us below.

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