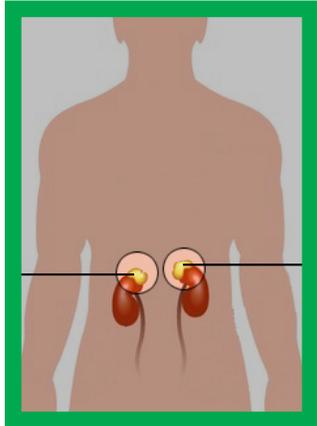


Energy In The Body



A look at how the body produces energy to support the processes of life and maintain good health. Topics include the fundamentals of energy production; metabolic regulation of energy; the roles of the adrenal and thyroid glands in this process; glucose metabolism; and nutrients needed by the body's organs and systems in sustaining healthy energy levels.

WHAT IS ENERGY?

Funk & Wagnall's *New International Dictionary* defines energy as the "power by which anything acts effectively to move or change other things or accomplish any result." Put another way, it is the ability to do work or to move mass. It's an interesting observation that energy and mass can neither be destroyed nor created, but each can be converted into the other.

Energy takes many forms: potential, kinetic, radiant, physical or chemical, to name a few. Energy production in the body is a chemical process that occurs in every single cell, generated by a structure called the mitochondria. Think of it as "the little engine that could."

To accomplish this task, the cells need fuel to produce a lively and energetic feeling in the body. That fuel is glucose, a sugar extracted from foods through a chemical process called metabolism.

THAT "LOW" FEELING

Nutritional and naturopathic counselors often hear complaints from their clients about low energy levels. Clients report that their normal daily routines have become "chores," and some chores are simply avoided because they require too much effort. Yet, those very projects and deeds may be vital to that person's life or lifestyle. That's why it's important to look at energy and its role in the body.

There are, of course, many reasons why a person would experience low energy levels. Examples include physically or mentally stressful situations, poor dietary habits (like eating only fast-foods) and missing meals altogether.

Low food-intake, combined with poor nutritional habits, may deprive the body of adequate amounts of nutrients essential for energy production.

In addition, some physical actions and stressful situations create conditions within the body that may require greater than normal amounts of nutrients. For this reason, it is essential that each of us regularly consume all the nutrients known to participate in energy production.

METABOLISM & NUTRITION

The energy-production process requires specific nutrients. One of the most crucial is pantothenic acid, because it is one of the catalysts of energy creation. Pantothenic acid is an element in the formation of acetyl coenzyme-A, which is a carrier molecule in the Krebs cycle. The Krebs cycle is the series of enzyme reactions that yield energy through the utilization of carbohydrates, fats and proteins to fuel cellular functions.¹ It is involved in releasing energy from carbohydrates and in gluconeogenesis, the formation of glycogen from non-carbohydrate sources such as amino acids or fatty acids.²

Pantothenic acid also helps boost red blood cell production, which provides more oxygen for "fuel burning" and enhances the body's coenzyme-A activity for increased **ATP production**, essential to maintaining the body's energy levels.³

Several of the B-complex vitamins are essential for the energy production process: B1, B2 and B12 help vital amino acids enter the Krebs cycle; Vitamin B12 also helps the body metabolize fats, carbohydrates and proteins, and interacts in the metabolic process with folic acid, required for all cell growth and reproduction.⁴

GLANDS & ENERGY

Two key glands involved in energy's production and regulation in the body are the **adrenals** and the **thyroid**. Both are part of the endocrine system, the body's ductless glands that produce and secrete hormones directly into the blood or lymph, which circulates the substances to all parts of the body.⁵

THE ADRENALS

Adrenal glands consist of an inner section, the **medulla**, plus an outer portion, the **cortex**. Each part produces secretions that affect energy production in the body.

Responding to impulses originating in the brain and traveling through the sympathetic nervous system, the medulla produces the hormones universally associated with the "fright, fight or flight" alarm reaction. These hormones, **adrenaline** and **noradrenaline**, are secreted directly into the blood and carried to virtually all tissues of the body.

Circulating noradrenaline causes constriction of virtually all the body's blood vessels. Other responses include increases in heart activity, inhibition of the gastrointestinal tract, dilation of the pupils and decreases in nonessential activities.

Adrenaline's effects are similar, although epinephrine causes greater impact on cardiac activity and less constriction of the blood vessels. Adrenaline's impact on tissue metabolism is also several times greater. With a capacity for increasing each cell's metabolic rate by as much as 100% above normal, adrenaline influences other metabolic activities such as glucose production in the liver and muscle, and glucose release in the blood.⁶

The adrenal cortex produces a trio of life-essential substances, called **glucocorticoids**, that, together with other hormones, regulate metabolism and also the body's resistance to stress. They are **cortisol (hydrocortisone)**, **corticosterone** and **cortisone**. Cortisol is the most abundant and is responsible for about 95% of glucocorticoid activity.⁷

Glucocorticoids' role is to make sure the body has enough ATP available. ATP, or adenosine triphosphate, is the principal energy-storing molecule in the body.⁸

Glucocorticoids increase the rate at which proteins are broken down and amino acids are removed from cells, primarily muscle fibers, and transported to the liver. Amino acids can be synthesized into new proteins, such as the enzymes needed for metabolic reactions. If the body's reserves of glycogen and fat are low, the liver may convert lactic acid or amino acids into glucose (gluconeogenesis). Glucocorticoids also stimulate lipolysis, the breakdown of triglycerides into fatty acids and glycerol, plus the release of fatty acids from adipose tissue.⁹

THE THYROID

Thyroid hormones regulate the body's oxygen use, cellular metabolism and basal metabolic rate, as well as growth and development. In regulating metabolism, the hormones stimulate protein synthesis, enhance cholesterol excretion in bile (which aids in fat digestion, thus reducing cholesterol levels), and increases the use of glucose in the production of ATP, the main energy-producing chemical in cells.¹⁰

ABOUT MICHAEL'S® PRODUCTS

MICHAEL'S® NATUROPATHIC PROGRAMS combine the basics and the newest developments along with the finest ingredients and the most effective formulations for your total healthcare. Each program is designed to produce physical results you can feel, owing to innovative nutritional supplementation with specific, targeted FACTORS OF LIFE® products.

MICHAEL'S® FACTORS OF LIFE® formulas are synergistically complete. Each contains combinations of nutrients that work together to increase assimilation and reduce the amount of binders and fillers. The formulas contain organically grown herbs, when available, to ensure the highest quality. These high-potency, all-natural products are manufactured with food-grade fillers, binders and enteric coatings. Most are suitable for vegetarians and those who follow a kosher diet.

Every product includes a best if used by date to ensure freshness and is double safety-sealed with an outer shrink-wrap and inner-bottle freshness seal. As is normal with all-natural products, some color and texture variations may occur but this does not affect product purity, potency or assimilation.

Adrenal Factors Stress Support™ contains vitamins C and B12 along with pantothenic acid, complemented by the herbs eleuthero root and licorice root, known for their energizing properties.

Adrenal Xtra Energy Support™ is formulated to enhance the body's endurance and speed its return to normal energy levels. **Adrenal Xtra Energy Support™** derives its name and potency from the addition of three times the amount of energy-enhancing pantothenic acid found in **Adrenal Factors Stress Support™** and also from *Rhodiola rosea*, used for centuries to combat fatigue, support physical strength and enhance mental stamina.

Thyroid Factors™ contains iodine, manganese and tyrosine, complemented with the herbs Irish moss and gentian root.

ESSENTIAL NUTRIENTS FOR ENERGY PRODUCTION

Glands synthesize and secrete certain fluids for use in the body. The production of such substances, like the important adrenal and thyroid hormones, always requires active work by the cells and results in an expenditure of energy.

Nutrients required for proper functioning of the adrenal and thyroid glands include these substances:

ADRENALS

Pantothenic acid. Plays a key role in releasing energy from carbohydrates; in gluconeogenesis; in synthesis and degradation of fatty acids; and in the synthesis of such vital compounds as sterols and steroid hormones.¹² Helps to boost red blood cell production providing more oxygen for "fuel burning" and enhances the body's coenzyme-A activity for increased ATP production, essential to maintaining the body's energy levels.

Vitamin B12. Necessary for synthesis of RNA and DNA, and proper functioning of folic acid. Helps maintain the nerves' myelin-sheath coating.

Vitamin C. Occurs in large concentrations in both parts of the adrenal gland: the outer cortex and the inner medulla.¹³ Essential in the adrenal medulla's production of adrenalin and noradrenalin. Although adrenals are rich in vitamin C, large amounts are lost with secretion of corticosteroids.¹⁴

THYROID

Manganese. A mineral necessary for production of thyroxine, one of the thyroid hormones that must be present for the regulation of basal metabolism.

Chromium. A mineral involved in metabolism of carbohydrates, lipids (fats) and nucleic acids.

Tyrosine. An amino acid necessary to the manufacturing of the thyroid hormones, as well as to the adrenal glands and pituitary.

Irish moss. Rich in iodine.

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¹²RDA, 169.

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¹⁴Paige, David M., M.D., M.P.H. (1988). Clinical Nutrition. Washington, D.C.: C. V. Mosby Co., 571.

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MICHAEL'S® PRODUCT FORMULAS

Adrenal Factors Stress Support™

Supplement Facts

Serving Size: Three (3) Tablets		
Amount Per Serving		% Daily Value
Vitamin C (as Calcium Ascorbate)	750 mg	833%
Vitamin B12 (as Methylcobalamin)	900 mcg	37,500%
Pantothenic Acid (as d-Calcium Pantothenate)	450 mg	9000%
Calcium (as Calcium Ascorbate)	90 mg	7%

Proprietary Blend 1.8 g (1800 mg)
Eleuthero Root (*Eleutherococcus senticosus*), Ashwagandha Root (*Withania somnifera*), Juniper Berry (*Juniperus communis*), Licorice Root (*Glycyrrhiza glabra*) and Turmeric Root (*Curcuma longa*)

*Daily Value not established.

OTHER INGREDIENTS: Dicalcium Phosphate, Stearic Acid, Microcrystalline Cellulose, Vegetable Magnesium Stearate, Modified Cellulose Gum, Silicon Dioxide and Pharmaceutical Glaze (Shellac, Povidone).

Adrenal Xtra Energy Support™

Supplement Facts

Serving Size: Three (3) Tablets		
Amount Per Serving		% Daily Value
Vitamin C (as Calcium Ascorbate)	500 mg	556%
Vitamin B12 (as Methylcobalamin)	500 mcg	20,833%
Pantothenic Acid (as d-Calcium Pantothenate)	1500 mg	30,000%
Calcium (as Calcium Ascorbate)	60 mg	5%

Proprietary Blend 650 mg
Ashwagandha Root (*Withania somnifera*), Rhodiola Root Extract (3% rosavins), Rhodiola Root and Licorice Root (*Glycyrrhiza glabra*)

*Daily Value not established.

OTHER INGREDIENTS: Dicalcium Phosphate, Stearic Acid, Microcrystalline Cellulose, Modified Cellulose Gum, Vegetable Magnesium Stearate, Silicon Dioxide and Pharmaceutical Glaze (Shellac, Povidone).

Thyroid Factors™

Supplement Facts

Serving Size: Three (3) Veggie Capsules		
Amount Per Serving		% Daily Value
Vitamin B6 (as Pyridoxine Hydrochloride)	75 mg	4412%
Iodine (from Kelp)	225 mcg	150%
Manganese (as Manganese Amino Acid Chelate)	11 mg	478%
Chromium (as Chromium Polynicotinate**)	300 mcg	857%

Proprietary Blend 600 mg
Gentian Root (*Gentiana lutea*), Irish Moss (Whole Plant) (*Chondrus crispus*) and L-Tyrosine

*Daily Value not established.

OTHER INGREDIENTS: Rice Flour, Hypromellose (Capsule) and Lecithine.

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