

Maximizing your metabolism

Are you “tired all the time”? There are ways to maximize your energy, enabling you to perform your daily activities, and have some energy left to spare. Present states of health affect energy. Many illnesses, such as thyroid abnormalities, can drain our energy reserves. Hormone imbalances and deficiencies may sap our energy reserves and leave us begging for a nap. However, too many people feel tired all the time without an identifiable cause. If you fit this profile, help is on the way.

All the activities that we perform—walking, singing, your reading of these words—require energy. What gives us our energy? The answer is ATP, adenosine triphosphate. This chemical compound is the energy currency that helps our body perform such tasks.

Did you know that you have a lot in common with a car engine? In a car engine, gasoline is burned in the presence of oxygen, during what is called exergonic reactions, in which the products contain less energy than the reactants and the excess energy is released.

Molecules of gasoline are broken down to carbon dioxide and water, releasing energy as heat. Explosive bursts of heat produce pressure that move the pistons in the engine, propelling the car. In the engines of each of your cells, the mitochondria, the products of the foods we consume are broken down and burned in the presence of oxygen.

Like the car engine, during a series of exergonic reactions, these molecules are broken down to carbon dioxide and water, releasing energy. Most of this energy is released as heat, helping maintain our body temperature. However, a good percentage of it is captured in molecules of ATP. Even in the absence of oxygen, your muscles can still effectively create ATP for energy by switching to an anaerobic metabolism.

All the activities performed by living things involve chains of reactions that use, move, carry, store and free energy. These chains of reactions are called metabolic pathways. In metabolic pathways, organisms couple exergonic reactions that release energy from molecules such as ATP with endergonic reactions, in which the products of the reaction contain more energy than the reactants, so the extra energy must be supplied for the reaction to proceed. So what does all of this have to do with energy, and how can you influence it? The foods you eat, after numerous complex processes, eventually yield ATP. Glycolysis, tricarboxylic acid cycle (or Krebs cycle) and the electron transport chain are the major steps to ATP synthesis. To illustrate the importance of nutrients in energy production, many of the food components you are familiar with act as coenzymes in these energy yielding pathways. **Thiamin (Vitamin B-1)** provides the coenzyme thiamin pyrophosphate that is involved in energy metabolism. **Riboflavin (Vitamin B-2)** provides part of the coenzymes flavin adenine dinucleotide and flavin mononucleotide, which are used in energy metabolism. **Niacin (Vitamin B-3)** is involved in the formation of a very important coenzyme called nicotinamide adenine dinucleotide (NADH), which is a direct precursor to ATP synthesis. The supplement ENADA, which is the absorbable form of the aforementioned NADH coenzyme, has been studied in cases of chronic fatigue syndrome at the dose of 10 mg to 20 mg with significant energy enhancing results. Other nutrients play a role in energy production.

Coenzyme Q10 is essential in the electron transport chain of the energy sequence. Cases of mitochondrial myopathy, a disorder of the mitochondrion, have responded to

Coenzyme Q10 therapy. Oral supplementation of Coenzyme Q10 improved skeletal muscle energy metabolism in middle-aged post-polio syndrome subjects, revealing the energy enhancing benefits of this nutrient. Further, a subjective perception of enhanced vigor occurred in middle-aged, untrained men supplemented with Coenzyme Q10.

L-Carnitine transports long chain fatty acids into the mitochondria where they are processed into ATP. Carnitine is synthesized in the body from the amino acids lysine and methionine. In essence, carnitine fuels the fire of energy production. Carnitine also may benefit those with chronic fatigue syndrome. A study of 28 patients with this condition at Mercy Hospital & Medical Center in Chicago found that carnitine benefited almost all of the patients in eight weeks. Researchers suggest that this is due to carnitine shuttling fats into the tricarboxylic acid cycle, in which they are burned for energy.

Ribose has recently appeared in the spotlight. More than 150 studies demonstrate the ability of ribose, a 5 carbon sugar found in all living cells, to increase ATP levels and cardiac muscle energy metabolism. Ribose is the key compound used by the body to form the compound ATP, which is depleted during strenuous physical activity or from lack of oxygen. Ribose, taken before, during or after high-intensity exercise, accelerates repletion of depleted ATP, providing rapid regeneration of critical energy molecules for maximal training. Alpha lipoic acid is one of the four coenzymes required by the body in order to create acetyl-CoA, which is an important step to ATP formation.

Magnesium is perhaps the most important nutrient cofactor involved in cellular respiration, as it is actively involved in every single step. Carbohydrates, lipids and proteins cannot yield ATP without the presence of magnesium.

Optimal magnesium status can facilitate oxygen and energy transport to working muscle tissue.

Now that we have an understanding of how certain nutrients can enhance energy production, let's explore some dietary strategies to boost our energy. The first place to look when you are lacking energy is diet. Diet is a key player in energy production. The importance of obtaining all essential nutrients in optimal amounts is probably quite obvious by now, so we shall look at diet from another angle. Besides the obvious role of food as fuel, the relative ratios of macronutrient components (carbohydrates, protein, fats) are key to keeping blood sugar in balance. If you ever have that mid-afternoon slump, you are most likely experiencing a drop in blood sugar, resulting in fatigue. The best approach is to consume a diet that prevents such fluctuations in blood sugar. By choosing protein-rich meals, mixed with complex carbohydrates and a small amount of healthy fats, one can create a stable level of blood sugar; you will feel an increase in energy, provided that you don't skip meals. Eliminate all refined sugars and as many refined flours as possible from your diet. Try to tailor your intake of carbohydrates to your individual needs. Some fast burners, individuals that have rapid metabolisms, can handle higher complex carbohydrate totals than those with slow metabolisms. There are many factors that influence the total amount of carbohydrate in the diet. Amounts and types of exercise, and your overall state of health (certain conditions such as diabetes, elevated cholesterol) are all factors. The best approach is to work with a nutritionist to help identify a fuel mix that is right for you. Eliminate as much junk food as you can, and make sure you are increasing your intake of low-starch vegetables and low-glycemic fruit. Build your diet foundation on whole foods.

Exercise begets energy. Building more muscle through strength training and increasing cardiovascular fitness through aerobics are great ways to maximize your energy. Increasing muscle mass also increases your resting metabolic rate, leading

to higher caloric usage and more overall energy for the body. Sound sleep is fundamental to increasing energy. Try to establish a routine, such as getting to bed the same time every night. If you are having trouble sleeping, keep distractions out of your bedroom by banishing activities other than sleep or sex from your bedroom. If you experience a chronic lack of quality sleep, a referral to a sleep specialist is recommended.

Chronic dehydration can lead to fatigue. Increased exercise, the dry heat of indoor air in the winter, excess caffeine and stress can lead to dehydration. Stay hydrated by drinking a minimum of 8 to 10 eight-ounce glasses of water per day. However, if you have mitral valve prolapse or chronic low blood pressure, you should increase your sodium as well.

Unacknowledged emotional issues and states of depression can deplete energy. Consulting with a mental health professional may help you address emotional energy sappers.

Fatigue also can be addressed by looking at levels of neurotransmitters. Serotonin, dopamine, norepinephrine, epinephrine and GABA are neurotransmitters that should be in balance for optimal wellness and optimal energy. At the Hoffman Center, we routinely measure neurotransmitter levels and replace deficiencies and imbalances by having the patient supplement with direct precursors to neurotransmitters. Neurotransmitter therapy is an innovative method of addressing fatigue.

Fatigue, weakness and exercise intolerance are the primary signs of hypoadrenalism. Low adrenal function may be a byproduct of hypoglycemia, neurotransmitter deficiencies, hyperthyroidism or hypothyroidism and mitral valve prolapse. Dietary modification and targeted supplementation can help balance adrenal function. Salivary cortisol levels, measured throughout the day, indicate adrenal stress and exhaustion.

DHEA drops when the adrenal glands are taxed. It's very important to have DHEA status checked first, then supplement with DHEA as warranted by a nutritionally trained physician. DHEA is a hormone and should not be abused. *Rhodiola rosea* is derived from the arctic regions of eastern Siberia. It is one of the more fascinating plant species in the world although quite unknown in the United States. It is the plant's roots that provide adaptogenic characteristics. An adaptogen offers varied physiological support to numerous systems in the body. *Rhodiola rosea* has been found to maximize energy, fight the effects of stress and aging, reduce adrenal stress, improve mood and boost immunity. *Ashwagandha* is commonly used in Ayurvedic medicine as an adrenal tonic. In Sanskrit *ashwagandha* means "the sweat or smell of a horse" indicating that one who takes it would have the strength and stamina of a horse. It is quickly becoming well known as an herb for energy, endurance and stress. According to Ayurvedic medicine, *ashwagandha* balances both the nervous system and the musculoskeletal system simultaneously.

The Fatigue IV, offered exclusively at the Hoffman Center, is an intravenous solution containing potent energy stimulating nutrients and cofactors. Usually recommended once a week, the Fatigue IV has been very effective in our practice. It is a favorite among the staff, and many patients request it after hearing other patient's positive experiences.

Stimulants such as caffeine, guarana, amphetamines, methamphetamines and MDMA (ecstasy) provide fake energy. You get a quick burst of energy, but the crash always occurs. In the case of caffeine and guarana, adrenal glands suffer, and it takes more and more caffeine to give you any lift. The key is to stop all artificial

energy boosters and focus on increasing energy production naturally.

Alcohol often is misunderstood to be a stimulant because it appears to make people more lively and uninhibited. It is actually a depressant. If taken in small quantities, it depresses that part of the brain that controls inhibitions. When blood alcohol concentration is low, the drinker experiences a feeling of relaxation and a sense of well-being. When the blood alcohol concentration is high, it depresses other areas of the central nervous system.

The mixture of stimulants in energy drinks and a depressant such as alcohol lowers blood sugar, increases heart rate, promotes dehydration and raises the risk of alcohol poisoning. The body's normal warning signs to alcohol consumption are to depress the central nervous system, slow a person down and make him tired, but energy drinks stop those signals, leading to a greater intake of alcohol.

Tired All The Time, by Dr. Ronald Hoffman, examines the 12 leading causes of persistent fatigue and provides self-tests, checklists and actual patient histories of chronic fatigue cases.

If you are suffering with constant fatigue, first seek a medical evaluation. But even if you are given a "clean bill of health," as so often happens, the information provided in this article may help you find and keep your lost energy.