

SLEEP EZE

One problem that many people across the nation, or even the globe for that matter, have in common is sleep disorders. Ranging from insomnia to sleep apnea, sleep disorders are a thorn in many of our fleashes that we wish would go away forever. Insomnia and symptoms of insomnia for example, effect between 20 and 40 percent of the general population¹ and seems to be robbing people of a normal lifestyle. While many different types of prescription medications seem to yield a quick fix for short term bouts of this disorder, many would argue that drug dependencies are not the answer. Hidden within various species of plants and other natural sources are the wonder molecules that may provide an alternative to modern medications used to treat sleep disorders.

Melatonin

Melatonin is a hormone found in our bodies in which its main biological role (besides acting as an antioxidant) is regulating circadian biorhythms. One such bioregulation is our sleep cycle. All throughout the day (but mostly at night), our pineal gland is hard at work synthesizing melatonin from L-tryptophan, secreting it into the blood stream in various amounts depending on the time of day, amount of light entering the eyes, environmental conditions, etc. Many insomnia sufferers have some sort of disruption in the production or actions of melatonin. In fact, a melatonin synthesis/action dysfunction may result in several different diseases, such as neurodegenerative diseases, mood disorders, type 2 diabetes and pain². Melatonin has been researched for years and although it has been shown to be beneficial in many different disorders, much focus has been put on insomnia, especially in the elderly. The interesting thing about melatonin is that although it acts as a sleep *aid*, it does not necessarily cause drowsiness. Supplementary melatonin, when taken a couple of hours prior to bedtime and in sync with melatonin's phase response curve (biological oscillations such as the sleep/wake cycle) actually acts as a chronobiotic and not as a sedative, increasing total sleep time³. Melatonin has been used as a sleep aid for jet lag and delayed sleep phase disorder as well.

GABA

Gamma-aminobutyric acid (GABA) is the prominent inhibitory neurotransmitter in the human central nervous system. This little amino

acid is responsible for stopping certain parts of the brain from "firing up" under stressful conditions. It does this by binding to specific receptors found in inhibitory synapses of the brain causing hyperpolarization of the involved neurons. Think of GABA acting as the molecule that pushes the doorbell to certain neural cells creating an electric charge difference in that neuron which results in the shutting down of the neural spike that leads to a panic response. In fact, this shut down mechanism is sometimes impaired in certain individuals with panic or stress disorders⁴. When GABA has completed its primary responsibility as an inhibitory neurotransmitter, its fate in the human body is a simple and convenient one. The little amino acid gets rearranged in a two-step process into a usable form of energy via the Krebs cycle.

Griffonia Simplicifolia

Griffonia simplicifolia is a woody shrub originally found in West and Central Africa. Its phytochemical of interest is found in the seeds of the Griffonia simplicifolia plant, known as 5-hydroxytryptophan (5-HTP). Not to be confused too much with its precursor L-tryptophan, 5-HTP is the hydroxylated metabolite of tryptophan and has no correlation with the negative publicity that the contaminated batch of tryptophan received a while back. 5-HTP's primary fate is the conversion to serotonin and then to melatonin. This conversion takes place within certain portions of the brain and also in the liver with the help of pyridoxal phosphate. This is why it may be helpful to supplement with vitamin B6 when taking 5-HTP⁵. Griffonia simplicifolia is sold in

many parts of the world for its therapeutic uses as an antidepressant, sleep aid, appetite suppressant, etc. As a sleep aid, 5-HTP has been shown in test subjects to increase the duration of stage 2 and 3 sleep⁶. Although a natural sleep aid in and of itself, Griffonia simplicifolia may have the potential of enhanced effects when in combination with other natural sleep aid supplements.

L-Theanine

L-theanine (aka. *N*-ethylglutamine) is a metabolic cousin to the amino acid glutamate and is found in tea extracts. Although an analog to glutamate, L-theanine does not give the same excitatory responses that glutamate gives on the brain. Rather, L-theanine has very low binding capacity to the glutamate receptor and actually does quite the opposite. L-theanine seems to alter brain alpha waves⁷ (neural oscillations that induce relaxation) in humans. This amino acid is thought to do this by being able to cross the blood-brain barrier and increase overall levels of GABA as well as increase brain dopamine levels⁸. Some research indicates that supplementation with L-theanine may have an effect on serotonin production in the brain, making 5-HTP a good add on to L-theanine. In a 1998 study, supplementation with L-theanine showed positive results for increasing alpha waves, reducing anxiety, and prolonged sleep in healthy volunteers⁹.

Valerian root

The extract of the root of the *Valeriana officinalis* plant has been used for medicinal purposes for many years. As an herbal supplement Valerian root extract is known for its sedative and anxiolytic properties. The actions of this herb are attributed to a select few phytochemicals that it contains. For example, some of the sesquiterpenoids found in the root's extract have been known in some studies to act as GABA analogs – having some affinity to the GABA_A receptor¹⁰ (the primary receptor system involved in neural inhibition). Despite its stinky odor, the root's extract also contains GABA and other alkaloids that have demonstrated marked decreases in sleep latency similar to

benzodiazapines¹¹.

Hops

Hops are the seed cones of the hop plant *Humulus lupulus* and is what gives beer its bitter flavor. Despite its usefulness in brewing alcoholic beverages, Hops has been used medicinally to induce sleep and reduce anxiety. Working in a manner similar to valerian root, hops owes much of its sedative effects to the dimethylvinyl carbinol it contains¹². However, as in valerian's pharmacology, the α -acid component 2-methyl-3-buten-2-ol found in hops increases the activity of GABA¹³. In this fashion, combining Hops with valerian root, L-theanine and GABA may have synergistic effects and enhance the actions of one another.

Skullcap

Scutellaria lateriflora is a perennial flowering plant used medicinally for a variety of different ailments. Once such remedy is anxiety and stress. It is thought that two of the phytochemicals found in Skullcap, scutellerin and baicalin, are mainly responsible for Skullcap's antispasmodic/sedative effects. These two flavanoids seem to act on the human nervous system by mimicking the actions of GABA¹⁴. This may be why many studies on sleep induction by skullcap extract includes co administration with valerian root extract.

Passion Flower

The extract of *Passiflora incarnata* has been used in a similar manner to Valerian and Skullcap as an anxiolytic and is thought to work via the same mechanisms. One such study conducted in an attempt to investigate the sleep-inducing and relaxing properties of *Passiflora incarnata* showed a drastic improvement of sleep quality and relaxation¹⁵. Other studies show similar effects when combined with *Scutellaria lateriflora* and valerian root extracts.

Magnesium

Although magnesium plays a crucial role in many different biological functions, its effect on the central nervous system and the tissues involved have been studied for many years. Being

the fourth most abundant mineral in the human body, about half of it is found in bone while the rest resides inside our cells. The majority of research done on magnesium's many functions in the human body has been launched by disorders found in magnesium deficient subjects. Ionic magnesium is responsible for electrolyte balance, nerve and muscle function, and even acts as a coenzyme in most enzymatic systems. Magnesium has been studied extensively for its role in sedation, namely as an aid for insomnia¹⁶. Interestingly, magnesium has the unique ability to bind to GABA receptors *and* at the same time inhibiting NMDA receptor function¹⁷. Think of this as magnesium pressing the “calm” button (Benzodiazepine/GABA_A receptor) and the “excitatory” button (NMDA receptor) on neural cells at the same time, providing a one-two punch on the central nervous system.

Nature seems to provide a vast array of sleep-inducing phytochemicals, each of them possessing their own unique mechanism of doing so. Some, working well as a stand-alone remedy for sleep disorders, while others working best in conjunction with other nutraceuticals. While the previously named nutrients work well as a sleep aid both solo and as part of a team, research continues on to uncover more and more mystery molecules found in nature's pharmacy.

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