

Neurotransmitter Support

5-HTP

100 mg

Description

This formulation is designed to provide neurotransmitter support in the brain. 5-hydroxytryptophan, also known as 5-HTP, is the immediate precursor to the neurotransmitter serotonin, which influences mood, sleep and appetite. Through its ability to pass the blood-brain-barrier, 5-HTP helps to support healthy serotonin levels.

Features & Benefits

- 5-HTP is the intermediate precursor in the natural synthesis of serotonin
- 5-HTP readily crosses the blood-brain barrier
- Clinical studies suggest that 5-HTP can support healthy serotonin level, promoting a positive (emotional) outlook
- 5-HTP helps promote restful sleep and supports proper sleep patterns
- 5-HTP helps regulate a normal appetite
- 5-HTP helps promote healthy blood sugar levels already in normal range

Suggested Usage

As a dietary supplement, take 1 Vcap® daily, preferably on an empty stomach at bedtime. For intensive use, take up to 3 Vcaps® daily, in divided doses, or as directed by a qualified healthcare practitioner. If GI discomfort is experienced, lower the dose, take with a meal or discontinue use.

Allergen Checklist

Contains no sugar, salt, wheat, gluten, corn, soy, milk, egg, shellfish or preservatives. Vegetarian/Vegan Product.

Cautions / Interactions

See page 2



Technical Summary

In dietary supplement form, 5-HTP is derived from seeds of the African plant *Griffonia simplicifolia*. 5-HTP has been successfully used in clinical trials for over 30 years: the primary areas of research involved persons with mild to moderate emotional disturbances,^{4,5,21,22,23,24,25,26,27,28} difficulty sleeping,^{10,11,29,30} those desiring weight management,^{7-9,31} and subjects experiencing occasional headaches.^{32,33,34,35,36,37} Especially with regard to mood alterations, positive results with oral 5-HTP preparations have been reported by the majority of investigators (please see ref. 24 for the most recent meta-analysis). Research in other areas, such as its efficacy for weight or temporary pain management, and promoting normal blood sugar levels also appears promising.

Mechanisms of Action

5-HTP primarily acts by increasing serotonin levels within the Central Nervous System (CNS); once 5-HTP levels rise, it is converted into serotonin. Serotonin in turn – when released into the synaptic clefts – affects mood, appetite, pain sensations, and through its conversion into melatonin, promotes sleep.^{1-11,38,39} Additionally, concentrations of other neurotransmitters, such as dopamine, norepinephrine, and beta-endorphin, may be influenced by the oral administration of 5-HTP.¹ Emerging science suggests that 5-HTP might also influence leptin levels,⁴⁰ which would explain its observed effects on appetite,⁴¹ reduced calorie intakes,⁷⁻⁹ and healthy blood sugar levels.⁷ Of note is the fact that serotonin itself cannot pass the blood-brain-barrier, whereas tryptophan (Trp) and 5-HTP are able to cross it.^{1,13,29,42} However, only about 3% of dietary Trp may be transported into the CNS,⁴³ while pharmacokinetic studies found that the oral bioavailability of 5-HTP in humans is approximately 70%.^{44,45}

Clinical Applications

As a dietary supplement, 5-HTP has primarily been advocated to promote positive mood and lift emotional outlook, assist with restless sleeping pattern, as well as to support a normal appetite and healthy body weight when combined with a healthy diet and exercise. Based on the currently available research, the oral application of 5-HTP may also be of value for occasional tension headaches, affecting sleep quality, cognitive performance,^{46,47} occasional nervousness with agitation,^{2,25,48,49,50} and diet adherence,^{7-9,31} as well as for assisting with already healthy blood sugar levels.⁷ The majority of clinical research studies employed doses between 50mg - 300mg taken two to three times daily. In the case of dysregulated sleep, a one-time dose ranging from 200mg to 600mg has been employed. While no significant adverse effects were reported in clinical trials, mild digestive distress, such as nausea with and without emesis has been observed after the ingestion of one-time doses of 150mg,⁴⁵ 200mg,⁴⁶ and 300mg⁹ oral 5-HTP in a small percentage of the subjects. Since the symptoms were transitory in nature and only recognized in a few instances during the gradual build-up of increasing steady state levels of 5-HTP, the importance of a slow initiation of therapeutic dosing should be emphasized.⁴⁶

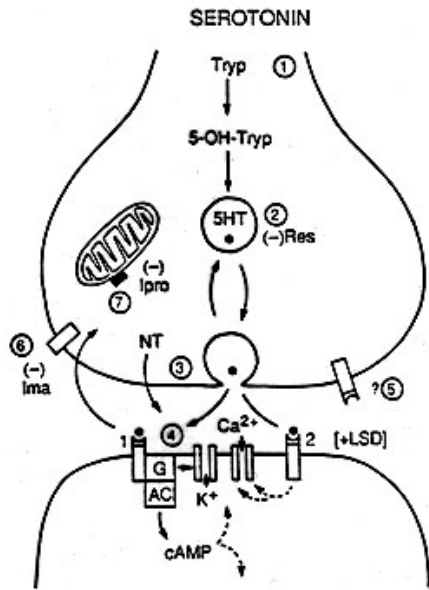


FIGURE 1 Tryptophan to 5-HTP to Serotonin conversion and biological action.

(<http://www.nature.com/nrd/journal/v4/n9/images/nrd1821-f1.jpg> accessed 11/17/2009)

1) tryptophan is transformed to 5-HTP (catalyzed by tryptophan hydroxylase) to 5-hydroxytryptamine (5HT, or serotonin) (catalyzed by 5-hydroxytryptophan decarboxylase); (2) transport and storage (blocked by reserpine, Res); (3) release of 5HT by exocytosis; corelease with a neuropeptide, e.g. neurotensin, NT; (4) binding to a 5HT1 postsynaptic receptor (coupled to G protein and cAMP), or to a 5HT2 receptor (LSD is an agonist/antagonist); (5) possible binding to presynaptic receptors; (6) reuptake terminates 5HT action (blocked by tricyclic antidepressant drugs such as imipramine, Ima); (7) degraded by MAO.

Complementary Products

Consider taking this product in combination with PROTOCOL Omega-3 (P1656), Slimaluma® Plus (P1905), Adrenal Cortisol Support™ (P3344) or MetaboEnergetics™ (P3326).

Supplement Facts

Serving Size 1 Vcap®

P0105

Amount Per Serving

**5-HTP (5-hydroxytryptophan)
(from *Griffonia simplicifolia*) (Seed)**

200 mg

Other Ingredients: Rice Flour and Cellulose (capsule).

Contains no: sugar, salt, wheat, gluten, corn, soy, milk, egg, shellfish or preservatives. Vegetarian/Vegan Product. Vcaps® is a registered trademark of Capsugel. This bottle contains an Ageless® oxygen absorbing packet to ensure freshness. Do not eat packet.

Suggested Usage: As a dietary supplement, take 1 Vcap® daily, preferably on an empty stomach at bedtime. For intensive use, take up to 3 Vcaps® daily, in divided doses, or as directed by a qualified healthcare practitioner. If GI discomfort is experienced, lower the dose, take with a meal or discontinue use.

Caution: If you are pregnant/lactating or currently taking any antidepressant medications, please consult your healthcare practitioner prior to use.

Cautions/ Interactions

Although no reports have been published, it is possible that 5-HTP, when taken in combination with antidepressant drugs, such as Selective Serotonin Reuptake Inhibitors (SSRIs), Serotonin-Norepinephrine Reuptake Inhibitors (SNRIs), or MAO inhibitors as well as other serotonergic drugs (e.g. dextromethorphan, meperidine and triptans), may contribute to a condition known as serotonin syndrome.^{14,14-17} This syndrome is characterized by agitation, confusion, delirium, tachycardia, diaphoresis, and blood pressure fluctuations.^{14,15,19,20} In addition, 5-HTP could increase the therapeutic effects and risk for adverse events when consumed concomitantly with certain nutraceuticals, such as L-tryptophan, S-adenosylmethionine (SAMe), and St. John's Wort.¹⁵⁻¹⁷ Hence, their combined use should only occur under close medical supervision. Not recommended for pregnant or lactating women.

References on page 3

Formulated by doctors and clinical scientists exclusively for licensed healthcare practitioners. Manufactured in an A-rated Good Manufacturing (GMP) Certified facility.

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*These statements have not been evaluated by the FDA. These products are not intended to diagnose, treat, cure or prevent any disease.

REFERENCES

1. Birdsall TC. 5-Hydroxytryptophan: a clinically-effective serotonin precursor. *Altern Med Rev*. 1998; 3(4): 271-80. www.ncbi.nlm.nih.gov/pubmed/9727088
2. Kahn RS, Westenberg HG, Verhoeven WM, et al. Effect of a serotonin precursor and uptake inhibitor in anxiety disorders; a double-blind comparison of 5-hydroxytryptophan, clomipramine and placebo. *Int Clin Psychopharmacol*. 1987;2(1):33-45. www.ncbi.nlm.nih.gov/pubmed/3312397
3. Fernstrom JD. Can nutrient supplements modify brain function? *Am J Clin Nutr*. 2000;71(6 Suppl):1669S-75S. www.ncbi.nlm.nih.gov/pubmed/10837313
4. Byerley WF, Judd LL, Reimherr FW, et al. 5-hydroxytryptophan: a review of its antidepressant efficacy and adverse effects. *J Clin Psychopharmacol*. 1987;7:127-137. www.ncbi.nlm.nih.gov/pubmed/3298325
5. Polding W, Calanchini B, Schwarz W. A functional-dimensional approach to depression: Serotonin deficiency as a target syndrome in a comparison of 5-hydroxytryptophan and fluvoxamine. *Psychopathology*. 1991;24:53-81. www.ncbi.nlm.nih.gov/pubmed/1909444
6. Meyers S. Use of neurotransmitter precursors for treatment of depression. *Altern Med Rev*. 2000;5(1):64-71. www.ncbi.nlm.nih.gov/pubmed/10696120
7. Cangiano C, Laviano A, Del Ben M, et al. Effects of oral 5-hydroxy-tryptophan on energy intake and macronutrient selection in non-insulin dependent diabetic patients. *Int J Obes Relat Metab Disord*. 1998; 22(7): 648-54. www.ncbi.nlm.nih.gov/pubmed/9705024
8. Cangiano C, Ceci F, Cancino A, et al. Eating behavior and adherence to dietary prescriptions in obese adult subjects treated with 5-hydroxytryptophan. *Am J Clin Nutr* 1992;56:863-7. www.ncbi.nlm.nih.gov/pubmed/1384305
9. Ceci F, Cangiano C, Cairella M, et al. The effects of oral 5-hydroxytryptophan administration on feeding behavior in obese adult female subjects. *J Neural Transm*. 1989;76(2):109-17. www.ncbi.nlm.nih.gov/pubmed/2468734
10. Bruni O, Ferri R, Miano S, Verrillo E. L-5-Hydroxytryptophan treatment of sleep terrors in children. *Eur J Pediatr*. 2004;163(7):402-7. www.ncbi.nlm.nih.gov/pubmed/15146330
11. Wyatt RJ, Zarcone V, Engelman K, et al. Effects of 5-hydroxytryptophan on the sleep of normal human subjects. *Electroencephalogr Clin Neurophysiol*. 1971;30(6):505-9. www.ncbi.nlm.nih.gov/pubmed/4105646
12. Nakazawa Y, Hasuzawa H, Kotorii T, et al. Study on the effects of L-5HTP on the stages of sleep in man as evaluated by using sleep deprivation. *Folia Psychiatr Neurol Jpn*. 1980;34(2):83-9. www.ncbi.nlm.nih.gov/pubmed/6970155
13. Nakatani Y, Sato-Suzuki I, Tsujino N, et al. Augmented brain 5-HT crosses the blood-brain barrier through the 5-HT transporter in rat. *Eur J Neurosci*. 2008;27(9):2466-72. www.ncbi.nlm.nih.gov/pubmed/18445233
14. Martin TG. Serotonin syndrome. *Ann Emerg Med*. 1996;28(5):520-6. www.ncbi.nlm.nih.gov/pubmed/8909274
15. Singhal AB, Caviness VS, Begleiter AF, et al. Cerebral vasoconstriction and stroke after use of serotonergic drugs. *Neurology* 2002;58:130-3. www.ncbi.nlm.nih.gov/pubmed/11781419
16. Meltzer H, Bastani B, Jayathilake K, Maes M. Fluoxetine, but not tricyclic antidepressants, potentiates the 5-hydroxytryptophan-mediated increase in plasma cortisol and prolactin secretion in subjects with major depression or with obsessive compulsive disorder. *Neuropsychopharmacology*. 1997;17(1):1-11. www.ncbi.nlm.nih.gov/pubmed/9194044
17. Aliño JJ, Gutierrez JL, Iglesias ML. 5-Hydroxytryptophan (5-HTP) and a MAOI (nialamide) in the treatment of depressions. A double-blind controlled study. *Int Pharmacopsychiatry*. 1976;11(1):8-15. www.ncbi.nlm.nih.gov/pubmed/770365
18. Nakajima T, Kudo Y, Kaneko Z. Clinical evaluation of 5-hydroxy-L-tryptophan as an antidepressant drug. *Folia Psychiatr Neurol Jpn* 1978;32:223-30. www.ncbi.nlm.nih.gov/pubmed/307522
19. Frank C. Recognition and treatment of serotonin syndrome. *Can Fam Physician* 2008; 54(7): 988-92. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2464814/>
20. Shapiro RE, Tepper SJ. The Serotonin Syndrome, Triptans, and the Potential for Drug-Drug Interactions. *Headache* 2007;47:266-9. www.ncbi.nlm.nih.gov/pubmed/17300366
21. Takahashi S, Kondo H, Kato N, et al. Effect of L-5-Hydroxytryptophan on Brain Monoamine Metabolism and Evaluation of Its Clinical Effect in Depressed Patients. *Psychiat Res* 1975; 12: 177-87. www.ncbi.nlm.nih.gov/pubmed/1081591
22. van Praag H. Management of Depression with Serotonin Precursors. *Biol Psychiatry*. 1981; 16: 291-310. www.ncbi.nlm.nih.gov/pubmed/6164407
23. Zmilacher K, Battagay R, Gastpar M. L-5-Hydroxytryptophan Alone and in Combination with a Peripheral Decarboxylase Inhibitor in the Treatment of Depression. *Neuropsychobiology*. 1988; 20: 28-35. www.ncbi.nlm.nih.gov/pubmed/3265988
24. Turner EH, Loftis JM and Blackwell AD. Serotonin a la carte: Supplementation with the serotonin precursor 5-hydroxytryptophan. *Pharmacology & Therapeutics*. 2006; 109: 325-38. www.ncbi.nlm.nih.gov/pubmed/16023217
25. Kahn R, Westenberg H. L-5-Hydroxytryptophan in the Treatment of Anxiety Disorders. *J Affect Disord* 1985; 8: 197-200. www.ncbi.nlm.nih.gov/pubmed/3157732
26. Maron E, Tõru I, Vasar V, et al. The Effect of 5-Hydroxytryptophan on Cholecystokinin-4-Induced Panic Attacks in Healthy Volunteers. *Journal of Psychopharmacology* 2004; 18(2):194-9. www.ncbi.nlm.nih.gov/pubmed/15260907
27. Linnoila V, Virkkunen M. Aggression, Suicidality, and Serotonin. *J Clin Psychiatry*. 1992; 53: 46-51. www.ncbi.nlm.nih.gov/pubmed/1385390
28. Eriksson O, Wall A, Marteinsdottir I, et al. Mood changes correlate to changes in brain serotonin precursor trapping in women with premenstrual dysphoria. *Psychiatry Res*. 2006 Mar 31;146(2):107-16. www.ncbi.nlm.nih.gov/pubmed/16515859
29. Guillemainault C, Cathala JP, Castaigne P. Effects of 5-hydroxytryptophan on sleep of a patient with a brain-stem lesion. *Electroencephalogr Clin Neurophysiol* 1973;34:177-184. www.ncbi.nlm.nih.gov/pubmed/4119531
30. Soulaire A, Lambinet H. Effect of 5-hydroxytryptophan, a serotonin precursor, on sleep disorders. *Ann Med Psychol* 1977;1:792-798. www.ncbi.nlm.nih.gov/pubmed/339807
31. Wurtman J. Carbohydrate Craving, Mood Changes and Obesity. *J Clin Psychiatry*. 1988; 49: 37-9. www.ncbi.nlm.nih.gov/pubmed/3045110
32. Bono G, Criscuoli M, Martignoni E, et al. Serotonin precursors in migraine prophylaxis. *Adv Neurol*. 1982;33:357-63. www.ncbi.nlm.nih.gov/pubmed/7034490

33. De Benedittis G, Massei R. Serotonin precursors in chronic primary headache. A double-blind cross-over study with L-5-Hydroxytryptophan vs. placebo. *J Neurosurg Sci.* 1985;29:239-48. www.ncbi.nlm.nih.gov/pubmed/3913752
34. Longo G, Rudoj I, Iannuccelli M, et al. Treatment of essential headache in developmental age with L-5-HTP (cross over double-blind study versus placebo) [in Italian, English abstract]. *Pediatr Med Chir.* 1984;6:241-6. www.ncbi.nlm.nih.gov/pubmed/6397729
35. De Giorgis G, Mileto R, Iannuccelli M, et al. Headache in association with sleep disorders in children: a psychodiagnostic evaluation and controlled clinical study-L-5-HTP versus placebo. *Drugs Exp Clin Res* 1987;13:425-33. www.ncbi.nlm.nih.gov/pubmed/3308389
36. Maissen CP, Ludin HP. Comparison of the effect of 5-hydroxytryptophan and propranolol in the interval treatment of migraine. *Schweiz Med Wochenschr* 1991;121:1585-90. www.ncbi.nlm.nih.gov/pubmed/1947955
37. Ribeiro CAF. L-5-Hydroxytryptophan in the prophylaxis of chronic tension-type headache: a double-blind, randomized, placebo-controlled study. *Headache.* 2000;40:451-6. www.ncbi.nlm.nih.gov/pubmed/10849040
38. Nicolodi M; Sicuteri F. L-5-hydroxytryptophan can prevent nociceptive disorders in man. *Adv Exp Med Biol.* 1999; 467: 177-82. www.ncbi.nlm.nih.gov/pubmed/10721054
39. Esteban S, Nicolaus C, Garmundi A, et al. Effect of orally administered L-tryptophan on serotonin, melatonin, and the innate immune response in the rat. *Mol Cell Biochem.* 2004; 267(1-2): 39-46. www.ncbi.nlm.nih.gov/pubmed/15663184
40. Yamada J, Sugimoto Y, Ujikawa M. The serotonin precursor 5-hydroxytryptophan elevates serum leptin levels in mice. *Eur J Pharmacol.* 1999; 383(1):49-51. www.ncbi.nlm.nih.gov/pubmed/10556680
41. Yamada J; Sugimoto Y; Ujikawa M. Involvement of leptin in hypophagia induced by the serotonin precursor 5-hydroxytryptophan (5-HTP) in mice. *Biol Pharm Bull.* 2006; 29(3): 557-9. www.ncbi.nlm.nih.gov/pubmed/16508167
42. Agren H, Reibring L, Hartvig P, et al. Low brain uptake of L-[11C]5-hydroxytryptophan in major depression: a positron emission tomography study on patients and healthy volunteers. *Acta Psychiatr Scand* 1991; 83(6): 449-55. www.ncbi.nlm.nih.gov/pubmed/1882697
43. Diksic M and Young SN. Study of the brain serotonergic system with labeled alpha-methyl-L-tryptophan. *Journal of neurochemistry.* 2001; 78(6): 1185-200. www.ncbi.nlm.nih.gov/pubmed/11579128
44. Magnussen I; Nielsen-Kudsk F. Bioavailability and related pharmacokinetics in man of orally administered L-5-hydroxytryptophan in steady state. *Acta pharmacologica et toxicologica.* 1980; 46(4): 257-62. www.ncbi.nlm.nih.gov/pubmed/6966118
45. Westenberg HG; Gerritsen TW; Meijer BA; van Praag HM. Kinetics of L-5-hydroxytryptophan in healthy subjects. *Psychiatry research.* 1982; 7(3): 373-85. www.ncbi.nlm.nih.gov/pubmed/6187038
46. Naruse H, Hayashi T, Takesada M, et al. [Metabolic changes in aromatic amino acids and monoamines in infantile autism and development of new treatment related to the finding]. *No To Hattatsu.* 1989;21(2):181-9 [Abstract]. www.ncbi.nlm.nih.gov/pubmed/2653386
47. Ramaekers VT, Senderek J, Hausler M, et al. A novel neurodevelopmental syndrome responsive to 5-hydroxytryptophan and carbidopa. *Mol Genet Metab.* 2001;73(2):179-87. www.ncbi.nlm.nih.gov/pubmed/11386854
48. Jacobsen FM, Sack DA, Wehr TA et al. Neuroendocrine response to 5-hydroxytryptophan in seasonal affective disorder. *Arch Gen Psychiatry.* 1987;44(12):1086-91. www.ncbi.nlm.nih.gov/pubmed/3500688
49. Young SN. The use of diet and dietary components in the study of factors controlling affect in humans: a review. *J Psychiatry Neurosci.* 1993;18(5):235-44. www.ncbi.nlm.nih.gov/pmc/articles/PMC1188544/
50. Schruers K, van Diest R, Overbeek T, Griez E. Acute L-5-hydroxytryptophan administration inhibits carbon dioxide-induced panic in panic disorder patients. *Psychiatry Res.* 2002;113(3):237-43. www.ncbi.nlm.nih.gov/pubmed/12559480