

Basic metabolic functions of L-Tryptophan

Short communication

Amino acids build proteins, and proteins are life-sustaining macronutrients. While some of the amino acids able to make proteins, where others show variety of roles, from supporting metabolism in protecting your heart. Several amino acids produce neurotransmitters, but two important amino acids such as tryptophan and tyrosine. Tryptophan produces serotonin, which is involved in human behaviour, thinking, type of mood, to produce healthy sleep and perception. Further, clinical trials stated that L-tryptophan's efficacy for treatment of psychiatric disorders, particularly when used in combination with other therapeutic drugs. Tryptophan was first synthesized in 1949, but by the early 1980s chemical synthesis of tryptophan was replaced with fermentation process which helped to increase obtainable yields, making tryptophan supplements more available.¹ Tryptophan helps in many metabolic processes (Figure 1).

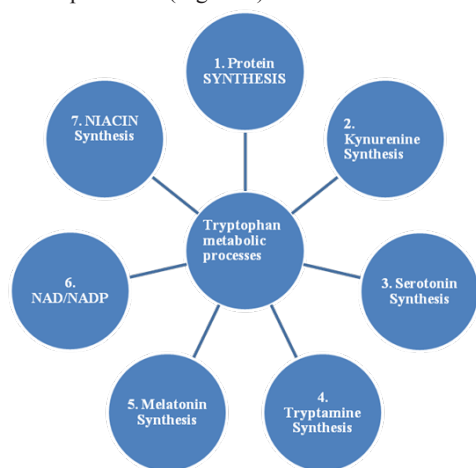


Figure 1 It shows flow diagram of tryptophan metabolic processes.

Protein synthesis: Tryptophan helps human body for protein synthesis. As it found fewer concentrations among the amino acids, and is thought to play a rate-limiting role during protein synthesis.²

Kynurenine synthesis: Synthesis of kynurenine accounts for approximately 90% of tryptophan catabolism. Kynurenine is essential component in the synthesis of maximum number of metabolites and it is the precursor of kynurenic and quinolinic acids. Kynurenic acid is a glutamate receptor antagonist, while quinolinic acid is a glutamate receptor against.³

Serotonin synthesis: Presence of serotonin (95 %) in the gastrointestinal tract and 3% of the dietary tryptophan which is used for serotonin synthesis throughout the body. And only 1% of dietary tryptophan is used for serotonin synthesis in the brain, but despite the relatively low concentration it has a great effect as a neurotransmitter and neuromodulator implicated in numerous psychiatric conditions and psychological processes.⁴

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Tryptamine synthesis: Important biologically active compound which is effective on control for the balance between excitatory and inhibitory functions of serotonin. Tryptamine acts as a neurotransmitter with specific receptors that are independent of serotonin function.⁵

Melatonin synthesis: Melatonin is a hormone produced in the tryptophan/serotonin pathway, which regulates diurnal rhythms and influences the reproductive and immune systems, as well as digestive processes and gastrointestinal motility.⁶

NAD/NADP synthesis: Tryptophan helps for synthesis of the coenzymes nicotinamide adenine dinucleotide (NAD) and NAD phosphate (NADP). NAD and NADP are coenzymes essential for redox reactions in all living cells.

Niacin synthesis: Act as a substrate for niacin synthesis through the kynurenine/quinolinic acid pathway.

Tryptophan is the precursor of a wide range of metabolites, which are involved in different aspects of human nutrition and metabolism. Deficiency of tryptophan, which is an essential amino acid may lead to pellagra. Adding the tryptophan rich foods like found in banana, peanuts, meat, poultry, fish and eggs improves the functioning of tryptophan.

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None.

Conflict of interest

The author declares that there is none of the conflicts.

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