



APPROACHES FOR POTENTIATING THE EFFECTS OF PIPERINE

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Piperine is an alkaloid found in several species of *Piperaceae* family that are traditionally used as spices all around the world. Its nutraceutical properties have been investigated in recent years and this compound has attracted scientific attention, as many research have shown its antioxidant, anti-inflammatory, anticancer, immunomodulatory, antibacterial, antifungal antispasmodic, analgesic, with the number of confirmed actions constantly rising.

Absorption and metabolism of piperine has been studied. Compared to other nutraceuticals that have low water solubility, studies exist that report piperine to reach bioavailability as high as 97% in animal models. However, its low water solubility and strong pungency can present a limitation to reaching its full potential. Until recently, piperine has mostly been regarded as bioavailability enhancer itself in combination with other bioactives, such as curcumin. But current research also deals with designing innovative delivery systems, as nanoparticles or other platforms and approaches in formulation that may be valuable in potentiating the beneficial effects of piperine. Most approaches use nano- and micro-emulsification, polymer (protein- or polysaccharide-) based carriers, or complexation and conjugation with certain molecules as techniques generally employed for improvement of bioavailability of low-soluble bio-actives. This work sums up the most employed approaches for potentiation of the effects of piperine. According to our research, piperine has been formulated, and investigated after complexation with cyclodextrine, loaded into nanocapsules and liposomes, in solid dispersion, solid lipid nanoparticles and microemulsion with self-emulsifying drug delivery system and even bile-salt based nanovesicles.

Although cyclodextrin complexation is most used technique for improving bioavailability of piperine to date, it is expected that forthcoming methods will be directed to various nanotechnology tools. In addition, it is expected that methods will be modelled according to the need of specific target/site of action, thus enabling targeted delivery of this active substance.

Keywords: piperine, nutraceutical, nanoparticles, bioavailability