



Nature's Bioavailability Enhancing Theronutrient®

Black pepper (*Piper nigrum*) from the botanical family Piperaceae is the most commonly used spice worldwide. It has been mentioned in Sanskrit literature, which is considered as old as 3000 years, for its healthful effects.

Today, piperine is used worldwide as a food supplement, spice, theronutrient and as a natural bioenhancer. However, modern drug discovery process has guided a radical change in the way health benefits of black pepper are perceived.

Sabinsa's BioPerine® is a patented extract obtained from black pepper fruits standardized to 95% Piperine.

Clinically Validated
Piperine for its Safety
and Efficacy

Piper nigrum
"The King of Spices"

Self-affirmed GRAS:
A Safe and Completely
Natural Ingredient

Piperine

A Natural Bioavailability Enhancer

Spices are known to exhibit innumerable healthful properties that would benefit human life. A Spice is generally a fruit, bark, berries, roots or even a part of flower used as flavouring agent or for fragrance—very often used in cuisine to enhance the taste and flavour of the dish. This in turn helps improve our metabolism to function normal. The active molecules present in spices are required in micro levels and thus categorized as *micronutrients*.

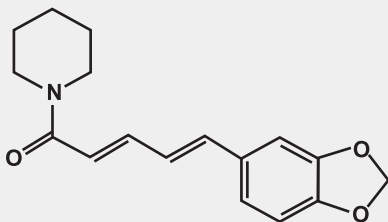
There are well documented reports on these spices to prove that they can help cells to work normal and promote a healthy system. One such interesting spice

is black pepper (*Piper nigrum*) that has long been known for its unique property—**bioavailability enhancement**.

Many a times, our body cells fail to absorb whatever we eat completely. This could be because the present lifestyle has a big impact on normal metabolism or the chemical nature of the nutrient consumed; as a result regular nutrients' absorption is reduced. Thus, it becomes imperative to improve absorption and bioavailability of drugs. Incidentally, use of absorption enhancers of plant-based natural compounds like black pepper could be the answer.

About Black Pepper

The spicy or “hot” taste of pepper when sprinkled on food is well known. The perception of heat is stronger when fresh pepper is used. This heat is in fact a manifestation of the biological activity of some of the active compounds found in pepper, the most notable of these being piperine.



Chemical Structure of Piperine

Piper nigrum is considered the “King of Spices” throughout the world due to its pungent principle, piperine.



Traditional Uses of Pepper

One of the Most Widely Used Herbs in Ayurveda

Black pepper has been used in human diet from ancient times and is one of the most widely used spices throughout the world. It has also been used in various traditional medicines, preservatives and health supplements.

Black pepper has been documented in The Materia Medica of Ayurveda documents as one of the three essential herbal ingredients for several prescriptions and formulations.

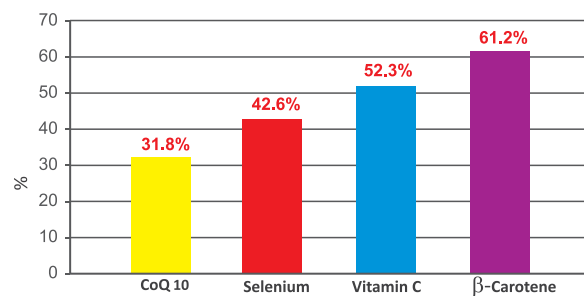
Out of 370 compound formulations listed in Handbook of Domestic Medicines and Common Ayurvedic Remedies, 210 contain either Trikatu (i.e.

three acids) or its individual ingredients (i.e. black pepper, long pepper and ginger). In Ayurveda, Trikatu has been described as a major decoction, useful in restoring the balance of Kapha, Vata and Pitta.

Several study reports support the “Bioenhancer concept” of piperine, as it was known to enhance the bioavailability of various nutrients in both human and animals.

Nutrient Bioavailability Enhancement by Piperine: Evidence-based Approach

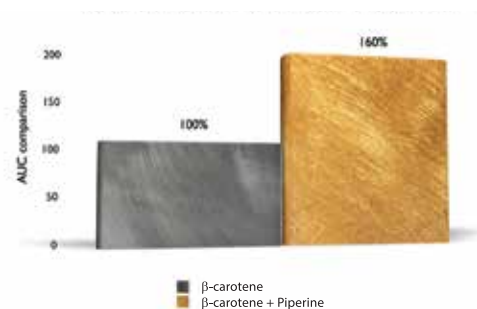
Piperine has been clinically tested with several nutrient groups, including fat-soluble vitamins (β -carotene), water-soluble vitamins (vitamin B₆ and vitamin C), selenoamino acid [L(+)-Selenomethionine] and Coenzyme Q10 (CoQ10), and shown to significantly enhance the bioavailability of these supplemented nutrients through increased absorption. Herbal extracts, such as curcumin was also absorbed better when co-administered with piperine.



β -carotene

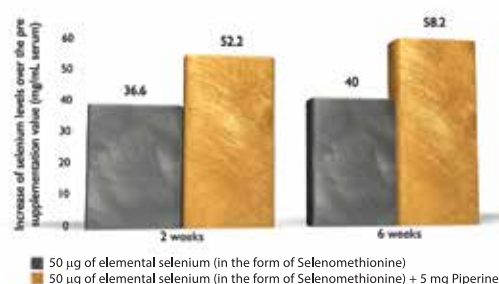
In a double-blind, crossover study, small amount of piperine (5 mg) when combined with a formula containing 15 mg of β -carotene, given as a food supplement once a day, increased almost 2-fold the blood levels of β -carotene in human volunteers.

Additionally, after 14-day supplementation, researchers found that combination group (β -carotene + piperine) showed a 60% increase in the area under the curve (AUC) concentration of β -carotene compared to the control.



Selenium

In a double-blind study, bioavailability of selenium was found improved by approximately 30% in the group receiving selenium with piperine after 2 weeks of treatment.

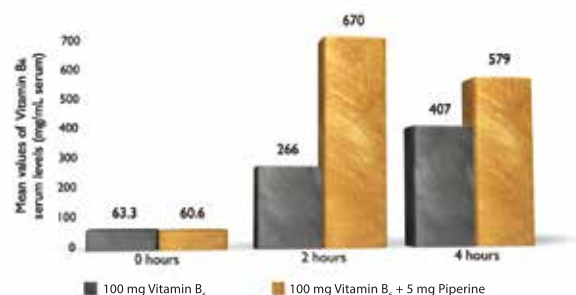


A Bioavailability Enhancer
for over 20 Years

Nutrient Bioavailability Enhancement by Piperine: Evidence-based Approach

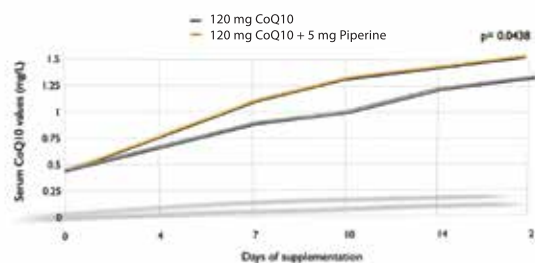
Vitamin B₆

Bioavailability of vitamin B₆ (100 mg) was evaluated with and without piperine. At 2 h, the maximum serum levels of vitamin B₆ were 2.5 times higher in the group receiving piperine as compared to the control group. At 4 h, vitamin B₆ levels in the group receiving piperine were 1.4 times higher as compared to the control group.



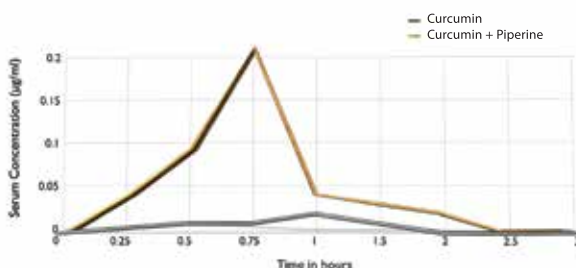
Coenzyme Q10

Bioavailability of CoQ10 (120 mg) was evaluated with and without piperine supplementation. After 21 days of supplementation, co-administration of piperine resulted in an absolute increase in CoQ10 serum levels by 1.12 µg/ml as compared to the absolute increase of 0.85 µg/ml in the control group. A 30% increase was observed in the AUC of CoQ10 when supplemented with piperine, compared to control.



Curcumin

A clinical study done at St. John's Medical College, Bangalore, India has to its credit of being the most downloaded article in *Planta Medica*. It provided clinical evidence of piperine's role in increasing the bioavailability of curcumin, in healthy human volunteers.



Piperine significantly improved the uptake of Curcumin—the healthful extract from turmeric roots, known for promoting a healthy inflammatory response and mitigating a number of different health issues, as a result.

Bioavailability of curcumin (2000 mg) when co-administered with piperine (20 mg) was enhanced by 20-fold or 2000% than the oral bioavailability of curcumin alone in humans at doses that were devoid of any adverse side effects.

Enhances the Uptake of Curcumin

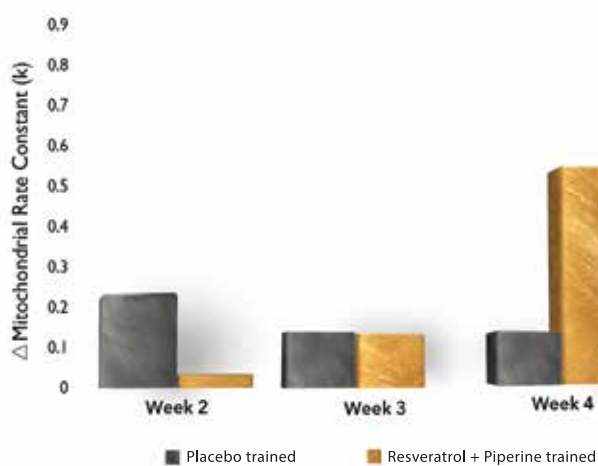
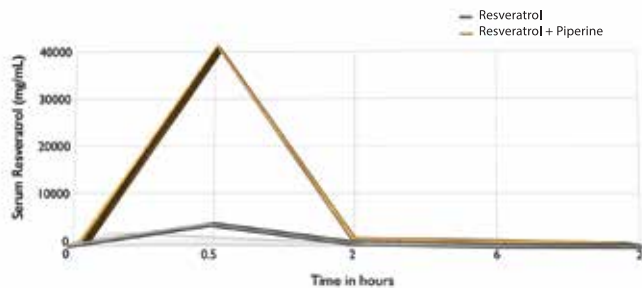


Nutrient Bioavailability Enhancement by Piperine: Evidence-based Approach

Resveratrol

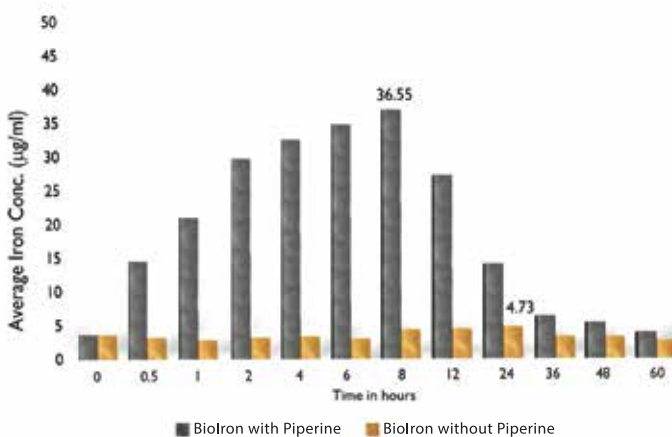
Researchers from University of Wisconsin, USA showed that piperine significantly improved the bioavailability of resveratrol by 229% *in vivo* and the maximum serum concentration (C_{max}) was increased to 1544%.

In a clinical study, 4-week supplementation of Resveratrol (500 mg) and piperine (10 mg) combination along with exercise training on skeletal muscle mitochondrial capacity showed significant changes in mitochondrial capacity from baseline to post-testing (40% increase), as well as compared to placebo group at week 4. Overall, it was observed that supplementation with resveratrol and piperine combination might be helpful in enhancing skeletal muscle mitochondrial capacity during low-intensity exercise training.



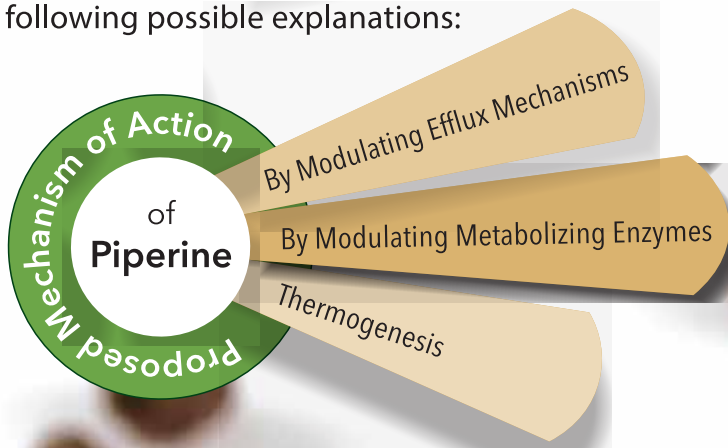
Iron

An *in vivo* study validated the bioavailability of organic elemental iron (BiolIron) in combination with or without piperine. A single oral dose of BiolIron with piperine resulted in significant increase in the serum concentration of iron at 8 h time point when compared to BiolIron alone.



BioPerine® is promoted as a “Bioavailability Enhancer” and a natural “Thermonutrient®”

The mechanisms by which Piperine exerts the drug bioavailability may be explained by following possible explanations:



Dosage form and suggested use level:

BioPerine® can be used in the form of capsules or tablets.

Suggested use level: 5 mg three times a day.

Patents:

US5536506, US5744161, US5972382, US6054585,
EP0810868, JP3953513, CA2247467



BIOPERINE®

Standardized Black Pepper Extract



How just 5mg will turn your supplement into a nutritional powerhouse.

Nature's Bioavailability Enhancing Thermonutrient

With just 5mg of BioPerine®, it is possible to change the way the body looks at supplements. When formulating supplements, you might think that by merely increasing the milligrams of an ingredient, the supplement becomes more potent and available for use by the body. In fact, research indicates that this approach can actually negate the benefit and absorption of other nutrients. Instead, by adding 5mg of BioPerine, Nature's Own Thermonutrient®,

a patented extract from black pepper fruit, significantly "improves the gastrointestinal absorption and systemic utilization of nutrients" that are supplemented. Based on clinical data, having BioPerine in "the right place at the right time" in the digestive tract, with a supplemented nutrient, improves absorption.* Give your consumer optimum nutrition and supplementation by boosting absorption with BioPerine.

Clinically Improves Absorption of:



β-Carotene • CoQ10 • Selenium



SABINSA CORPORATION

Clinically Improves Absorption of:



Vitamin B6 • Vitamin C... and many more

These BioPerine® Patents Are Strictly Enforced: US5,536,506; US5,744,161; US5,972,382; US6,054,585; CA2247467; EP0810868; JP3953513

* These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

BioPerine® is a registered trademark of Sabinsa.

7 Patents & 100s of Health Applications



Brand Name	BioPerine®
Common Name	<i>Piper nigrum</i> extract
Description	Off white to greenish yellow powder with characteristic odor
Solubility	Soluble in alcohol; insoluble in water
Particle Size	80 mesh - Not less than 95% w/w
Assay	
Content of Piperine by HPLC	Not less than 95.0% w/w and not more than 102.0% w/w on dry basis
Shelf Life	5 years
Storage Condition	Store at room temperature
Certifications	Kosher, Halal, ISO 22000:2005, FSSC 22000:2011, NSF GMP, FDA Audited

BioPerine® is the only product sourced out of piperine to obtain a patented status for its ability to increase the bioavailability of nutritional compounds

BioPerine® is the only source from piperine to have undergone clinical studies in the U.S. to substantiate its safety and efficacy for nutritional use

BioPerine® is a self-affirmed GRAS ingredient; it is safe, completely natural ingredient for increasing the efficacy of the nutrients of choice

BioPerine® is a registered trademark of Sabinsa

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