

PQQ with BioPQQ®

**Doctor's
BEST**

Science-Based Nutrition™



INGREDIENTS

Doctor's Best PQQ with BioPQQ® supplies pyrroloquinoline quinone (PQQ, methoxatin), a polyphenol nutrient that is an exceptionally potent antioxidant and cell regulator.¹⁻³ The PQQ molecule is widespread in nature, being present in numerous species of bacteria, as well as in many plants and in animals including humans.¹⁻⁴ To date, PQQ is known to be produced only in bacteria, for which it serves potent roles both in antioxidant protection and as an essential cofactor for a variety of enzymes.^{2,4}

The full details of PQQ's metabolic and other biochemical importance are still being discovered. The molecule has powerful electronic properties, which allow it to receive and donate electrons far more efficiently than other naturally occurring antioxidants.^{1,2} This superior capacity for "redox cycling" is likely the foundation for PQQ's unique actions in living systems. One group of researchers likened PQQ's chemical attributes to combining ascorbic acid (vitamin C), riboflavin (Vitamin B2), and pyridoxal (Vitamin B6) into one molecule.¹

BENEFITS

At the cell level, PQQ is a biochemical growth factor for mitochondria, the tiny dynamos within our cells that generate over 90 percent of our life energy.⁵ PQQ promotes mitochondrial survival, proliferation, and energy-generating performance.¹⁻³ Beyond its mitochondrial effects, PQQ also can regulate cell development, cell signaling, even gene functions.^{2,6}

In rats and mice, PQQ is known to be a vitamin-like "biofactor" necessary for healthy growth and fitness.^{1-3,7} For mice, having PQQ in the diet is necessary for healthy circulation, fertility, gastrointestinal function, and immunity. Mice made deficient in PQQ show reduction in both the numbers of mitochondria and the total volume of mitochondria per cell.⁷ These mitochondria also function at lower efficiency.^{1,7}

PQQ is found in many common human foods, albeit in very small quantities,^{1,2} and is readily absorbed when taken by mouth.⁸ It is also present in human breast milk.⁹ PQQ has stimulated growth in cultured human cells, even when present at very low levels.¹⁰ In cultured human

nerve cells, PQQ stimulated the production of nerve growth factor (NGF), an important growth factor for nerve cells located within and outside the brain.¹¹

Two competently performed clinical trials are currently available to document PQQ's human benefits.^{12,13} The first was conducted in Japan, on office workers with stress-related complaints.¹² PQQ (20 mg per day for 8 weeks) improved fatigue recovery, sleep quality, and other quality of life measures. Appetite, vigor, tension, mood, self-control, and confusion were significantly improved. PQQ also significantly improved sleepiness at awakening, sleep onset and maintenance, and sleep duration.

An American clinical trial with PQQ was published in summary form, pending full publication.¹³ In this trial PQQ showed potent antioxidant and other tissue-supportive effects, and positively influenced mitochondrial function. The full potential of PQQ for human health remains to be elucidated, but it is highly probable that exciting new benefits will be discovered for this biochemically unique nutrient.

With Doctor's Best PQQ with BioPQQ®, Doctor's Best is pleased to provide authentic, fully bioactive PQQ, identical to the form used in these clinical trials.

The 20 mg daily intake we recommend for this product is the same as used in the clinical trials. This product is also suitable for vegetarians and vegans.

Supplement Facts

Serving Size 1 Veggie Capsule

Servings Per Container 30

	Amount Per Serving	% Daily Value
PQQ (as BioPQQ®)	20 mg	†
Pyrroloquinoline Quinone disodium salt		

† Daily Value not established.

Other Ingredients: Cellulose, modified cellulose (vegetarian capsule).

Suggested Adult Use: Take 1 capsule daily with food, or as recommended by a nutritionally-informed physician.

Non-GMO / Gluten Free / Soy Free / Vegan
Store in a cool dry place.

* 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.

SCIENTIFIC REFERENCES

1. Stites TE, Mitchell AE, Rucker RB. *J Nutr* 2000;130:719-727.
2. Misra HS, Rajpurohit YS, Khairnar NP. *J Biosci* 2012;37:313-325.
3. Rucker R, Chowanadisai W, Nakano M. *Altern Med Rev* 2009;14:268-277.
4. Goodwin PM, Anthony C. *Adv Microb Physiol* 1998;40:1-80.
5. Alberts B, Johnson A, Lewis J, others. *Molecular Biology of the Cell*. 2002; New York: Garland Publishing.
6. Chowanadisai W, Bauerly KA, Tchapanian E, others. *J Biol Chem* 2010;285:142-152.
7. Steinberg FM, Gershwin E, Rucker RB. *J Nutr* 1994;124:744-753.
8. Smidt CR, Unkefer CJ, Houck DR, Rucker RB. *Proc Soc Exp Biol Med* 1991;197:27-31.
9. Mitchell AE, Jones AD, Mercer RS, Rucker RB. *Analyt Biochem* 1999;269:317-325.
10. Naito Y, Kumazawa T, Kino I, Suzuki O. *Life Sci* 1993;52:1909-1915.
11. Murase K, Hattori A, Kohno M, Hayashi K. *Biochem Mol Biol Int* 1993;30:615-621.
12. Nakano M, Yamamoto T, Okamura H, others. *Func Foods Hlth Dis* 2012;2:307-324.
13. Rucker RB, Harris C, Chowanadisai W, Slupsky C. *FASEB J* 2012;26:363.1 (abstract only).



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