

RESEARCH MONOGRAPH . COMPOUND PROFILE

PQQ (Pyrroloquinoline Quinone)

A bacterial redox cofactor and putative mitochondrial biogenesis enhancer found in trace amounts in plant foods, sold as a dietary supplement.

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RESEARCH USE ONLY

ABSTRACT

Pyrroloquinoline quinone (PQQ; CAS 72909-34-3; molecular formula $C_{14}H_6N_2O_8$; molecular weight 330.21) is a redox cofactor present in bacterial dehydrogenases and in trace amounts in plant foods (kiwi, parsley, green tea, fermented soy). PQQ has been studied as a putative mitochondrial biogenesis stimulant; chronic dietary PQQ deficiency in mice produces mitochondrial dysfunction phenotypes that are reversed by repletion. The compound has been studied for cognitive function, fatigue, and cardiovascular endpoints in small human trials with modest effect sizes. Mechanism is incompletely characterized; proposed activities include direct redox cycling, NRF2 pathway activation, and PGC-1 α -mediated mitochondrial biogenesis. Doses are typically 10 to 40 mg per day. The compound is sold as a dietary supplement (BioPQQ).

1. Compound Identification

PQQ (Pyrroloquinoline Quinone) is described as redox cofactor. A bacterial redox cofactor and putative mitochondrial biogenesis enhancer found in trace amounts in plant foods, sold as a dietary supplement.

1.1 Class summary

Redox cofactor

1.2 Subtitle

A bacterial redox cofactor and putative mitochondrial biogenesis enhancer found in trace amounts in plant foods, sold as a dietary supplement.

2. Abstract

Pyrroloquinoline quinone (PQQ; CAS 72909-34-3; molecular formula C₁₄H₆N₂O₈; molecular weight 330.21) is a redox cofactor present in bacterial dehydrogenases and in trace amounts in plant foods (kiwi, parsley, green tea, fermented soy). PQQ has been studied as a putative mitochondrial biogenesis stimulant; chronic dietary PQQ deficiency in mice produces mitochondrial dysfunction phenotypes that are reversed by repletion. The compound has been studied for cognitive function, fatigue, and cardiovascular endpoints in small human trials with modest effect sizes. Mechanism is incompletely characterized; proposed activities include direct redox cycling, NRF2 pathway activation, and PGC-1 α -mediated mitochondrial biogenesis. Doses are typically 10 to 40 mg per day. The compound is sold as a dietary supplement (BioPQQ).

3. Mechanism of Action

Redox cofactor; NRF2 pathway activation; PGC-1alpha-mediated mitochondrial biogenesis (proposed).

The mechanistic profile described above represents the consensus position from peer-reviewed literature where available; for compounds with sparse formal characterization, this section reflects vendor-grade reports and structurally-related class pharmacology and should be interpreted with appropriate caution.

4. Pharmacokinetics and Routes of Administration

Pharmacokinetic data are summarized within the abstract for compounds with formal Phase 1 records. Compounds without published human pharmacokinetic studies are noted as such; investigators should treat the absence of data as a research limitation.

5. Reported Research Dose Ranges

10 to 40 mg per day.

Doses are scaled from clinical use where the compound is approved as a medicine, from Phase 2/3 trials where development advanced, or from rodent dose-response data scaled by allometric assumptions where the compound has no human clinical record. Investigators should treat dose ranges from research-chemical-grade vendors as starting points for their own pharmacokinetic and tolerability characterization rather than validated dosing recommendations.

6. Sourcing and Quality Verification

Investigators should obtain analytical confirmation of identity (mass spectrometry; for peptides, additionally amino acid analysis or N-terminal sequencing) and purity (HPLC area-percent, ideally greater than 95 percent) on every lot. Vendor certificates of analysis vary in quality; third-party analytical confirmation through independent laboratories (e.g., Janoshik Analytical, Anabolic Lab) is the gold standard for research-grade peptides and small molecules.

For compounds with established pharmaceutical-grade marketing in any jurisdiction, sourcing from the marketed product (where legal and accessible) provides the highest quality assurance.

7. Reconstitution and Handling

Peptides should be reconstituted in bacteriostatic water or sterile water for injection in the volume appropriate to the desired concentration; lyophilized peptides should be allowed to come to room temperature before reconstitution to minimize precipitation. Reconstituted peptides should be stored refrigerated and used within the timeframe specified by the manufacturer (typically 14 to 30 days for bacteriostatic water reconstitutions, shorter for sterile water).

Small molecules: storage conditions vary by compound; consult the certificate of analysis for the specific product. Most are stable at room temperature in dry, dark conditions; oxidation-sensitive compounds (e.g., catecholamine precursors) require cool storage and protection from light.

8. Stack Interaction Considerations

Investigators combining this compound with other research substances should consider receptor-level interactions (additive effects at shared targets), enzyme-level interactions (CYP-mediated drug-drug interactions where applicable), and pharmacodynamic interactions (additive sedation, additive serotonergic activity, additive hemodynamic effects).

The stack interaction section in published monographs of well-characterized compounds is necessarily incomplete for any specific combination; investigators should treat novel combinations with elevated caution and titrate gradually.

9. References

1. Stites T, et al. Pyrroloquinoline quinone modulates mitochondrial quantity and function. J Nutr 2006.

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