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Multifunctional Radical Quenchers for the Treatment of Mitochondrial Dysfunction

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Invention Description

Mitochondrial diseases are a group of disorders caused by dysfunctional mitochondria, often caused by genetics or mutations to the mitochondrial DNA. Mitochondrial defects are damaging, particularly to tissues with high energy demands, such as neural and muscle tissues. Energetic defects have been implicated in forms of movement disorders, cardiomyopathy, myopathy, blindness, and deafness. Membrane-penetrating antioxidants are often prescribed, but treatment options are limited.

Researchers at the Biodesign Institute of Arizona State University have developed a new paradigm for designing coenzyme Q10 analogs that may be useful for the treatment of mitochondrial disease. Such compounds would act as multifunctional radical quenchers when delivered as a therapeutic agent, while also augmenting ATP production.

As there is currently no way to predict which classes of compounds related to coenzyme Q10 may be useful as a therapeutic, this invention promises to help researchers more efficiently search for therapies for mitochondrial diseases.

Potential Applications

- Mitochondrial diseases:
    - Friedreich's ataxia, Leber's Hereditary Optic Neuropathy, Kearns-Sayre Syndrome, MELAS (Mitochondrial Encephalomyopathy with Lactic Acidosis and Stroke-Like Episodes), and others

Benefits and Advantages

- In mitochondria, optimized analogs of coenzyme Q10 would function as multifunctional radical quenchers:
    - quenching reactive oxygen species
    - quenching carbon-centered lipid radicals produced by mitochondrial reactive oxygen species
    - augmenting ATP production, using electrons that have escaped from the mitochondrial election transport chain

Intellectual Property Status:
Patent Pending

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