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Powerful Nutritional Supplement Synthesized in Lab at UCSB

One of the hottest nutritional supplements, currently manufactured by fermentation only in Japan, may eventually be synthesized in the United States thanks to research at the University of California, Santa Barbara.

Bruce H. Lipshutz, professor of chemistry and biochemistry at UCSB, has developed a way to prepare coenzyme Q₁₀ (CoQ₁₀) that he calls "short and sweet." His method is patented and he is already talking to U.S. companies regarding potential commercialization. The process is economically competitive, using transition metal catalysts along the way, such as inexpensive nickel and cobalt complexes.

CoQ₁₀ is produced in the human body, but after the age of about 20 the efficiency of our biosynthesis begins to drop, said Lipshutz. "And without CoQ₁₀ there is no human life." Another name for CoQ₁₀ is ubiquinone, since it is ubiquitous in the body.

According to the National Cancer Institute, CoQ₁₀ helps cells to produce energy, and acts as an antioxidant. "CoQ₁₀ was first isolated in 1957, and its chemical structure was determined in 1958," said the NCI. "Interest in CoQ₁₀ as a therapeutic agent in cancer began in 1961, when a deficiency was noted in the blood of both Swedish and American cancer patients, especially in the blood of patients with breast cancer. A subsequent study showed a statistically significant relationship between the level of plasma CoQ₁₀ deficiency and breast cancer prognosis."

CoQ₁₀ also is essential for the process of respiration, as the body converts oxygen into water. “This (compound) affects everyone on the planet,” said Lipshutz. “I am hoping to make people more aware as to how important it is to take supplemental CoQ₁₀. For much of the population it can be viewed as an essential ‘vitamin.’”

The compound is marketed as a “nutraceutical” in the U.S., or a “nutritional supplement,” and can be purchased in health food and discount drug stores and other places where vitamins are sold. Because of this designation, it is not regulated by the Food and Drug Administration. In Japan and several other countries, CoQ₁₀ is sold as a pharmaceutical requiring a prescription.

Besides aiding the fight against cancer, Lipshutz said that CoQ₁₀ is believed to slow the progression of Huntington's and Parkinson's diseases, and is especially important for those taking statin or who suffer from heart disease. As an antioxidant, it helps to combat “free radicals” (those unstable molecules that cause damage to healthy cells) in the body, thus slowing the aging process.

“Lipshutz and laboratory co-workers Paul Mollard, Steven Pfeiffer and Will Chrisman kept costs down by using inexpensive ingredients – including one compound derived from tobacco waste – and by reducing the number of steps involved in making CoQ₁₀,” according to the National Science Foundation, which made a grant to support the team's work. “The result is a very short and efficient process for making CoQ₁₀ in the laboratory that may finally make non-fermentative production of this supplement economical.”

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