

Microbial Preparation of Glucuronides with a Novel Streptomycete

04/01/2025



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Biotechnology and Life Sciences

Abstract

Uridine diphosphate glucuronyltransferase (UGT) in *Streptomyces chromofuscus* can be used to prepare different polyphenol glucuronides to effectively increase water solubility and bioavailability of drugs. This enzyme has broad substrate specificity, and thus can be applied to diverse bioactive molecules.

Problem

Water-solubility plays a large role in drug development. Many bioactive molecules are found to have low water solubility and bioavailability, which has limited their benefits in the human body and further development as therapeutics.

Solution

This technology presents a novel streptomycete strain that can glycosylate a variety of polyphenols, making it an effective biocatalyst for preparation of more-water soluble glucuronides of bioactive molecules.

Value Proposition

By increasing water solubility and bioavailability through glucuronidation, this invention presents an effective tool to improve the activities of drug candidates.

Benefit

Bioavailability refers to the utility of the chemical in an organism. Water solubility commonly affects the bioavailability of a xenobiotic entering an organism. Glucuronidation is often used to increase the water solubility of the molecule in the liver of an organism which naturally produces proteins that use glucuronidation of fat-soluble molecules to water-soluble molecules. Natural products have many biological activities allowing for wide applications in both pharmaceuticals and nutraceuticals. However, their health benefits are often limited by their poor water solubility and low bioavailability. Many drugs have limited bioavailability, due to poor water solubility.

Glucuronidation refers to the process of binding a glucuronic acid moiety to a substrate. A glucuronide is any substance that links glucuronic acids through a glycosidic bond. Glucuronidation is a highly efficient way to increase the water solubility of the original substance. This invention presents a novel streptomycete strain that can glycosylate a variety of polyphenols to prepare corresponding glucuronides. The dedicated enzyme can transfer the glucuronic acid moiety to various bioactive molecules, making it a powerful tool in medical scenarios to increase bioavailability. These effects increase water solubility which leads to greater bioavailability thus enhancing the effects of drugs.

This technology will allow efficient and cost-effective preparation of glucuronides of bioactive molecules. The water-soluble products may have enhanced bioactivity and bioavailability that can find wide applications in drug discovery, cosmetics, food additives, etc. This would prove helpful in increasing drug effectiveness.

Market Application

This technology can be applied across various industries - such as food, cosmetics, pharmaceuticals, and nutraceuticals - as a biocatalyst to enhance water solubility.

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Funding

This invention was made with government support under Grant No. CBET-2044558 and Grant No. CHE-1429195 awarded by the National Science Foundation. The government has certain rights in the invention.

USU Reference No. C21014

Intellectual Property

U.S. Patent No. 12,018,307 Issued June 25, 2024 entitled "Process for Producing a Glucuronide and Genetically Modified Microorganisms Useful in this Process"