Cyclopropane Fatty Acid Modulators of Nuclear Receptors

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ABSTRACT

Researchers at the University of California, Davis ("UC Davis") have demonstrated the use of two long-chain cyclopropane fatty acids (CpFAs) in the binding of proteins known to interact with DNA (nuclear receptors).

FULL DESCRIPTION

CpFAs are odd-chained fatty acids that include a cyclopropane ring integrated onto a fatty acid's double bond by bacteria and certain plants. Some CpFAs have been identified in foods (e.g., cheese, milk, others) and in human fatty tissues, serum, and the liver. Currently, it is thought that CpFAs are metabolized through incomplete beta-oxidation, supporting the idea that gut-derived CpFAs are naturally occurring substances in human cells that are stored/released in white fatty tissues similar to "classic" fatty acids. Little is known concerning the bioactivity of CpFAs, though recent evaluations indicate that certain CpFAs can bind to a nuclear receptor, involved in a variety of functions: lipid catabolism/storage, oxidative metabolism, and mitochondrial functions.

Researchers at UC Davis have evaluated the use of two novel and several other CpFAs as new bioactive molecules capable of binding and modulating/activating the nuclear receptors with unique potential utility body-wide to improve metabolic health, but notably in liver since these CpFAs derive from gut sources and the liver is an early tissue that interacts with gut-derived signals. Such binding and modulation (e.g., activation) would be useful in diseases or conditions in which changes to the nuclear receptor activities can treat disease, prevent disease development and/or disease progression, or improve health and tissue function. This invention provides a potential treatment method for non-alcoholic fatty liver disease (NAFLD) or other conditions in which sub-optimal hepatic metabolism leads to pathology.

APPLICATIONS

- Disease treatment/prevention/progression; type 2 diabetes mellitus, pre-diabetes, non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), hepatic insulin resistance/sequelae, hypertriglyceridemia, hepatic cancers
- Improved tissue function, overall health
- Use in foods, nutrients, prebiotics, probiotics, supplements for human consumption

FEATURES/BENEFITS

- The identified CpFAs are natural metabolites, and their use should pose no safety concerns
- These CpFAs can bind to several different nuclear receptors with the potential to modulate/activate several metabolic pathways simultaneously.
- As these CpFAs originate in the gut, they can operate by impacting hepatic metabolism/liver health in a more focused manner vs. other tissues, when compared to available pharmaceuticals which target nuclear receptors such as PPARs.

PATENT STATUS

Patent Pending

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OTHER INFORMATION

KEYWORDS

Cyclopropane fatty acids, CpFAs, PPAR, proliferator activated receptor, nuclear receptor, xenometabolite

CATEGORIZED AS

- Medical
  - Disease:
    - Autoimmune and Inflammation
    - Disease: Digestive System
    - Disease: Metabolic/Endocrinology
    - Therapeutics

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