Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

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Cannabinoid Acid Crystalline Forms

Cannabinoid acids are a class of natural compounds that are commonly isolated from the plant C. sativa, which, when decarboxylated, produce the most widely known and used cannabinoids. Both naturally extracted as well as synthetically produced cannabinoids have therapeutic potential, as evidenced by FDA approval of a synthetic formulation of THC and THC analog for treatment of nausea and vomiting associated with chemotherapy as well as anorexia associated with AIDS patients. More recently, cannabinoid acids have been characterized and analyzed for their potential as active pharmaceutical ingredients (APIs). Cannabinoid acids have been shown to be COX-1 and COX-2 inhibitors and shown to bind to the SARS-CoV-2 spike protein. However, cannabinoid acids can degrade with time, temperature, and light exposure, leading to storage challenges. This degradation can result in a change in their structure in a way that affects their binding affinity to receptors and ultimately their efficacy.

Prof. Jeffery Yarger at Arizona State University and collaborators have developed novel crystalline solid forms of cannabinoid acids and methods for producing these crystalline forms. These crystalline cannabinoid acids can be utilized in a wide range of products, including as APIs. Crystalline structures of several cannabinoid acids were created and tested for verification and stability. These compounds have improved molecular stability compared to current non-crystalline solid and liquid forms resulting in increased shelf life and reduced costs associated with cannabinoid acid API degradation. Further, because they have greater stability, their safety profiles are improved due to the reduction in decomposition to degradants with unknown biological activity.

Using molecular engineering, novel solid cannabinoid acids have been created with controlled and well understood molecular bonding and lattice packing, so as to have improved stability and resistance to chemical reaction and degradation.

Potential Applications

- Active pharmaceutical ingredients
  - Inflammatory disease therapeutics

- Antiviral drugs for use against SARS-CoV-2
- CNS disorder therapeutics
- Anti-anxiety or nausea therapeutics
- Obesity treatments
- Metabolic disorder treatments
- And more

Benefits and Advantages

- Improved stability and resistance to chemical reactions and degradation when compared to their liquid, amorphous or molecular mixture and solution states
- Improved shelf life reduces associated costs
- Improved safety
  - Reduced decomposition into degradants with unknown biological activity
- The process produces highly molecularly purified compounds

For more information about the inventor(s) and their research, please see

Dr. Yarger's departmental webpage

Dr. Yarger's laboratory webpage