TITLE

"Prodrugs of anti-cancer and anti-autoimmune diseases therapeutic agents, and methods of making and use thereof"

Key Investigator

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Field

Therapeutic
Cancer
Autoimmune

Technology

Prodrug
Cancer
Autoimmune
Therapeutic

Advantages

Reduce off-target effects.
Reduce toxicity.
Tailored drugs

Status

Available for licensing

Patent Status

EP Application 19 892 696.6
US Patent Appl. 17/311,216

UMB Docket Reference

FX-2019-033

External Reference

Ai Y, Obianom ON, Kuser M, et al. Enhanced Tumor Selectivity of 5-Fluorouracil Using a Reactive Oxygen Species-Activated Prodrug Approach. ACS Medicinal Chemistry Letters. 2019 Jan;10(1):127-131.

Summary

In summary, the invention disclosed by UMB investigators offers a promising new approach to the treatment of cancer and autoimmune diseases by introducing a series of novel prodrugs with improved safety and efficacy profiles. The technology leverages the use of biodegradable linkers for selective drug activation at target sites, reducing off-target effects and systemic toxicity. Additionally, the flexibility of the prodrug design allows for the development of tailored therapies, potentially contributing to the growing field of personalized medicine and revolutionizing the way we treat these complex and life-altering diseases.

Market

The global cancer therapeutics market is one of the major markets targeted by invention. The cancer therapeutics market has been experiencing significant growth in recent years, driven by the increasing prevalence of various types of cancer, along with advancements in research and development. As of 2021, the global cancer therapeutics market was valued at USD 182.3 billion and is expected to grow at a CAGR of 7.4% from 2021 to 2028, reaching an estimated market size of USD 314.3 billion by 2028. The invention addresses the need for more targeted, effective, and less toxic cancer treatments, which could lead to a reduction in cancer-related morbidity and mortality.

The novel prodrugs may also have application in the autoimmune diseases therapeutics market. This market encompasses drugs and treatments for a wide range of autoimmune diseases, including rheumatoid arthritis, multiple sclerosis, lupus, and inflammatory bowel diseases, among others. The increasing incidence of autoimmune diseases, coupled with the demand for more effective therapies, has contributed to the growth of this market. As of 2021, the global autoimmune diseases therapeutics market was valued at USD 153.5 billion and is projected to grow at a CAGR of 4.2% during the forecast period 2021-2028, reaching an estimated market size of USD 217.7 billion by 2028 (2). The invention could potentially provide more effective and safer treatment options for patients suffering from autoimmune diseases, addressing an unmet need in the market for targeted therapies with reduced side effects.

Technology

The invention describes a series of novel prodrugs designed to improve the efficacy and safety profiles of anti-cancer and anti-autoimmune disease therapeutic agents. These prodrugs are specifically engineered to be biologically inactive precursors that are metabolized within the body, releasing the active drug moiety selectively at the target site. This selective activation not only enhances the therapeutic index of the active drug but also reduces systemic toxicity and side effects associated with traditional therapies.

The filed patent applications describes a variety of prodrug candidates, each containing a therapeutic agent covalently bound to a biodegradable linker. The linker serves as a critical component, allowing for the controlled release of the active drug upon exposure to specific enzymes or chemical conditions present in the tumor microenvironment or at the site of autoimmune disease activity. This site-specific release mechanism offers the advantage of increasing the local concentration of the active drug while minimizing off-target effects and associated toxicity.

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The prodrugs can be designed to target a wide range of cancer types and autoimmune diseases by modifying the therapeutic agent and linker components to suit the specific requirements of the target disease. This flexibility allows for the development of tailored therapies that can address the unique challenges and complexities of each disease, potentially leading to improved treatment outcomes.

An important aspect of these prodrugs is their potential applicability in personalized medicine, where treatments can be customized based on the patient's genetic, environmental, and lifestyle factors. The prodrugs can be further optimized by incorporating biomarker-based strategies, enabling the identification of patients who are most likely to benefit from the treatment. This targeted approach can lead to enhanced clinical efficacy, reduced side effects, and a better overall patient experience.

Technology Status

Available for license

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