Novel Compounds for Treatment of Parasitic Infections (2019-019)

Novel compounds that target trypanosomiasis and other devastating parasitic infections

Market Overview

African Trypanosomiasis, also known as “sleeping sickness,” is caused by microscopic parasites transmitted to humans by the Tsetse fly, found in rural Africa. It is a serious public health problem in sub-Saharan Africa, with around 10,000 new cases each year. This serious disease is fatal if left untreated, however, the currently available treatments are incredibly difficult to administer, and can be extremely toxic to the patient. Melarsoprol, one of the primary drugs used to treat late stage disease, is an arsenic derivative that is lethal to around 5% of patients who receive it. The global market for treatment of neglected tropical diseases was valued at $1.2 billion in 2018 and is expected to rise to $2.6 billion by 2021. The patient need, combined with global warming increasing the spread of tropical diseases north and southward, has created a strong demand for new solutions. Clemson researchers have developed novel compounds that are active against this devastating pathogen, offering an avenue for dramatically improved treatment.

Technical Summary

These compounds are diazocyclobutenes, synthesized via a novel and simple method, and could potentially be active against many different diseases. The compounds are currently demonstrated to be efficacious against *Trypanosoma brucei*, and have a superior safety profile to some of the currently available drugs. They are active in the nano- to micro-molar range, which is crucial for the development of a pharmaceutical, and although the structure-function relationship is not well understood, they are non-toxic to mammalian cells, a drastic improvement over the arsenic-derived compounds currently used to treat the disease.

Application

Drug discovery, Neglected Tropical Disease Treatments

Development Stage

Preliminary Data

Advantages

- Novel synthesis pathway is simple and high yielding, resulting in cheaper production costs and high volumes produced
- Novel compounds have never been used for treatment of any prior disease, reducing acquired pathogen resistance to practically zero
- Compounds are active against Trypanosoma brucei, but non-toxis to mammalian cells, providing improved targeting and less patient toxicity than previously available treatment

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Provisional	United States	62/817,150	NA	2019-019	Dr. Daniel Whitehead Dr. Jim Morris

About the Inventors

Dr. Daniel Whitehead

Associate Professor of Chemistry at Clemson University

Dr. Daniel Whitehead received his Ph.D. from Michigan State University for Chemistry in 2009. From 2009-2011, he was a postdoctoral fellow at North Carolina State Unversity. Dr. White is also the Chemistry Undergraduate Program Coordinator at Clemson. His research centers on new reaction methodology, focusing mainly on new oxidation methods, as well as materials chemistry and bio-inorganic chemistry.

Dr. Jim Morris

Professor of Genetics and Biochemistry at Clemson University

Dr. Jim Morris received his Ph.D. from the University of Georgia for Cellular Biology in 1997. He is the lead researcher for the Laboratory of Protozoan Parasite Nutrient Sensing at Clemson. Dr. Morris' research focuses on T. brucei and how the parasite responds to changes in environmental glucose availability, as well as exploring novel drug targets.

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