

RESEARCH ARTICLE

Screening novel antiviral compounds to treat *Clostridioides difficile* infectionsBrice J. Stoltz^{1,2}, Ahmed A. Abouelkhair^{1,2}, Mohamed N. Seleem^{1,2*}

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Citation: Stoltz BJ, Abouelkhair AA, Seleem MN (2024) Screening novel antiviral compounds to treat *Clostridioides difficile* infections. *PLOS ONE* 19(12): e0309624. <https://doi.org/10.1371/journal.pone.0309624>

Editor: Baochuan Lin, Defense Threat Reduction Agency, UNITED STATES OF AMERICA

Received: August 14, 2024

Accepted: November 27, 2024

Published: December 13, 2024

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Data Availability Statement: All relevant data are within the manuscript and its [Supporting Information files](#).

Funding: This work was funded by the National Institutes of Health (grant R01AI130186). Link: https://reporter.nih.gov/search/v5_bjCQoL80mmCvC38ybmd3Mg/project-details/10165470/similar-Projects This funding was received by: M. N. Seleem. The funders played no role in the study of design, data collection, analysis, decision to publish, or preparation of this manuscript and its work.

Abstract

Clostridioides difficile is a major cause of nosocomial infections, often associated with individuals who have gut dysbiosis from previous antibiotic therapies. *C. difficile* infections (CDI) have a high recurrence rate and impose significant financial and mortality burdens on the healthcare system. Therefore, novel anti-*C. difficile* drugs are urgently needed to treat and reduce the severity and recurrence of infection. In this study, we screened a library of 618 antiviral drugs to identify a potential candidate for repurposing as novel anti-*C. difficile* therapeutics. Following our preliminary screening, we identified 9 novel compounds that inhibited *C. difficile* at a concentration of 16 μ M or lower. Among these, 4 antiviral compounds demonstrated the most potent anti-*C. difficile* activity against a panel of 15 *C. difficile* isolates, with minimum inhibitory concentrations (MICs) comparable to the drug of choice, vancomycin. These include rottlerin (MIC₅₀ = 0.25 μ g/mL), α -mangostin (MIC₅₀ = 1 μ g/mL), dryocrassin ABBA (MIC₅₀ = 1 μ g/mL), and obelazimod (MIC₅₀ = 4 μ g/mL). All exhibited minimal to no activity against representative members of the human gut microbiota. Interestingly, α -mangostin, a natural xanthone derived from the mangosteen fruit, exhibited strong bactericidal action, clearing a high inoculum of *C. difficile* in less than an hour. All other drugs exhibited bacteriostatic activity. Given their characteristics, these compounds show great promise as novel treatments for CDI.

Introduction

Healthcare-associated infections are one of the greatest burdens on healthcare systems. Most bacteria responsible for a part of this burden are associated with antimicrobial resistance, with one notable exception: *C. difficile*. Despite lacking a significant antimicrobial resistance profile, *C. difficile* is still considered an urgent threat and one of the deadliest bacterial infections responsible for approximately 30,000 deaths annually, primarily affecting older populations [1–5]. The incidence of *C. difficile* infections (CDI) in the United States has increased over the last two decades and has remained relatively stable from 2021 to 2022, with the COVID-19 pandemic seeing a drop in cases due to improved strategies preventing the spread of

Screening The Novel

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