PURDUE INNOVATES | Office of Technology Commercialization

Targeting Cdc14 phosphatase for anti-fungal agents

A potent, selective Cdc14 phosphatase inhibitor is a novel therapeutic agent for broadly combating human and crop fungal infections as well as cancer.

Researchers at Purdue University have developed a new agent for treating crop fungal infections, human fungal infections, and cancer. Approximately 10% of global food harvests are lost to pathogens and fungi are considered some of the most calamitous pathogens affecting crop production. Human fungal infections are also problematic with the yeast pathogen, Candida albicans, responsible for over 150 million infections that costs the U.S. healthcare industry more than $2 billion annually. Fabricating fungicides has proven to be incredibly challenging, and only a few classes of FDA-approved antifungal drugs for treating invasive candidiasis exist. In 2022, the WHO urged novel strategies to be developed for combating fungal human and crop diseases to reduce the widespread collateral damage caused by harmful pathogens in the environment.

The novel anti-fungal agent developed by Purdue University researchers leverages cell division cycle 14 (Cdc14) phosphatase as an antifungal target to treat and prevent fungal human and crop diseases. Cdc14 is amenable to specific chemical inhibition and precipitates cell separation defects, making this phosphatase ideal for application as an anti-fungal agent. The potent and selective agent will also be invaluable for cancer treatment therapeutics as Cdc14 has demonstrated viable cancer inhibition capabilities. This treatment method harnessing Cdc14 as an antifungal and anticancer agent is completely unprecedented and will serve as a highly effective solution to broadly impede the spread of cancer and human and crop fungal infections.

Technology Validation:

An agar hyphal growth assay was used to assess if the Cdc14 inhibitor compounds exhibited biological activity towards Candida albicans, a dimorphic yeast, and could elicit phenotypes consistent with reduced Cdc14 function. The compounds reduced hyphal growth in a dose-dependent manner, with 200 ÂµM almost completely abolishing hyphal formation

Technology ID
2024-ZHAN-70728

Category
Biotechnology & Life Sciences/Bioinformatics & Computational Biology
Artificial Intelligence & Machine Learning/AI Model Optimization & Acceleration Tools
Pharmaceuticals/Drug Discovery & Development
Pharmaceuticals/Small Molecule Therapeutics
Pharmaceuticals/Research Tools & Assays

Authors
Jiajun Dong
Mark Christopher Hall
Jinmin Miao
Zhong-Yin Zhang

Further information
Joe Kasper
JRKasper@prf.org

Nathan Smith
nesmith@prf.org

View online

similar to the Cdc14 strain at 48 hours of growth.

Advantages:

-Entirely unprecedented

-Combats fungal and crop diseases

-Precipitates cell separation defects and amenable to chemical inhibition

Applications:

-Plant and Human Pathogen Prevention

-Anti-Fungal Agents

-Biotechnology

-Agriculture

-Cancer

-Pharmaceuticals

Publications:

1. PUB1 â€" why the properties of Cdc14 enzymes would make them potential targets for developing new antifungal crop treatments https://www.nature.com/articles/s41598-020-68921-3

2. PUB2 -- showed in laboratory experiments that Cdc14 is critically important for infections by Candida albicans, a common fungal pathogen in humans https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2023.1129155/full

3. PUB3 -- identified a compound that acts specifically on the Cdc14 enzyme, which offers a way to assess its potential for drug development. So far, this research is based on animal models. https://pubs.acs.org/doi/10.1021/acs.jmedchem.4c00149

4. Recent article published August 14 https://ag.purdue.edu/news/2025/08/joint-agriculture-pharmacy-project-seeks-to-develop-novel-antifungal-treatment.html

TRL: 4

Intellectual Property:

Provisional-Gov. Funding, 2024-05-17, United States | PCT-Gov. Funding, 2025-02-26, WO

Keywords: Antifungal agent, Cdc14 phosphatase, cell division cycle 14, crop fungal infections, human fungal infections, cancer treatment therapeutics, chemical inhibition, cell separation defects, Candida albicans, anti-cancer agent