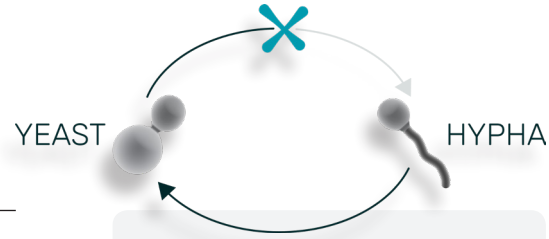
MORPHO BLOC



A NOVEL ANTIFUNGAL CLASS TO TREAT SYSTEMIC, INVASIVE AND RELAPSING FUNGAL DISEASE

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Market need and potential

Improved medical health care enables treatment and survival of critically ill persons and consequently also increased numbers of immunocompromised patients. These individuals in turn are at high risk of acquiring severe fungal infections with high levels of mortality ranging from 30–50 percent. Every year about 2 million immunocompromised individuals, from all over the world, are infected with life-threatening mycoses. Existing therapies are inefficient and frequently cause toxic side effects. At the same time the selection pressure drives emergence of resistance against available drugs.

The increasing incidence of mycosis is reflected by the rise in global budget for antifungal drugs, which in 2014 reached 11.8 billion USD and is estimated to grow with an additional 2.1 billion USD in 2018. This worldwide rise is also exemplified by an elevated prescription of antifungal drugs; a 14 percent increase during the last nine years in Sweden, and an annual increase of 3 percent since 2012 in USA, resulting in a total cost of 6.8 billion USD in 2015.

These numbers, and an extensive analysis based on interviews with pharmaceutical companies and more than 10 infectious disease clinicians in Europe and USA, have strongly confirmed the unmet need for more efficient and less toxic antifungal therapies.

Business idea

The most frequent fungal pathogens enter and colonize the human body as yeast or spore. To further invade tissue and infect organs, fungi use a filamentous growth form called hyphae.

Under normal healthy conditions the human immune system prevents hazardous colonization by hyphae. However in immunocompromised individuals this prevention system is malfunctioning and invasive hyphae disseminate to deeper tissues and organs causing severe/lethal disease.

Morphobloc is developing a highly specific antifungal approach by preventing hyphal switching – an essential and conserved virulence factor in the most common fungal pathogens. Morphobloc prevents the formation of hyphae - keeping fungi in the benign and commensal colonizing form of growth, called yeast cell, until the patient's defense system has recovered.

Competition

Morbidity and mortality is unacceptably high in opportunistic fungal infections. Patients with severe fungal infections are treated with azoles and polyenes that come with a high number of toxic side effects. Furthermore, selective pressure drives an increase of resistance to the present drugs on the market.

There are companies with products for systemic fungal infections in the pipeline, for example F2G. Additionally, three more academic groups are working with preventing morphological changes in fungi.

Advantages

- Morphobloc targets some of the most frequent fungal pathogens.
- Morphobloc provides high efficacy in cell-based assays with low micromolar EC_{50} - minimizing toxic side effects.
- Morphobloc does not kill, but instead disarms the most frequent fungal filamentous pathogens, minimizing drug-resistance caused by selection pressure.
- Prophylactic administration of morphobloc will reduce relapsing cases of mycoses.

Current status

Morphobloc compounds are efficient in cell-based assays in low micromolar concentrations. Notably, the compounds do not kill non-infectious yeast cells and show low toxicity to host cell lines. We are currently performing pharmacokinetic studies *in vivo* to prepare for proof of concept (PoC) using state-of-the-art animal infection models. The *in vivo* PoC is planned to be finalized June 2019.

Photos by OrU, UmU, Animation by Elias Eriksson.

COMPANY PROFILE

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IPR

The IPR suitability of compounds within the Morphobloc project has-been verified by patent experts. Patent application is filed for Morphobloc compounds.

Capital need

The team of Morphobloc seeks investments to complete the preclinical study and move on to Phase I. The five-year capital budget (2019-2024) is calculated to 75 MSEK. The budget breakdown is: 80% product development (competence, CMC-drug product, non-clinical), 18% business development (Management, infrastructure, PR/website) and 2% for IPR and regulatory (patent processing and consultancy).

Partnership

Next short-term goal is to build a company to seek investors or collaborators who support us in taking the project to clinical phase I & II studies before exit. An ideal partner will also bring experience in drug development.

Management / Board

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Founder, PhD Organic & Medicinal Chemistry

Maria Nelson
Project Manager, PhD Molecular Biology

Business advisors

Pia Keyser, Umeå Biotech Incubator

Background

The Morphobloc project team has developed a novel class of antifungals to treat systemic, invasive and relapsing fungal diseases. Morphobloc prevents hyphal switching, which serves as an essential virulence factor for fungal pathogens. The Morphobloc project was initiated in 2015 and is based on research performed in the Antifungal Immunity Group at the Department of Clinical Microbiology at Umeå University

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