

## Accepted Manuscript

Title: Harnessing the power of fungal siderophores for the imaging and treatment of human diseases

Author: Agnieszka Szebesczyk, Evgenia Olshvang, Abraham Shanzer, Peggy L. Carver, Elzbieta Gumienna-Kontecka

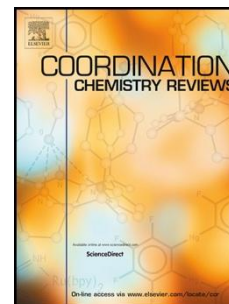
PII: S0010-8545(16)30014-5  
DOI: <http://dx.doi.org/doi: 10.1016/j.ccr.2016.05.001>  
Reference: CCR 112251

To appear in: *Coordination Chemistry Reviews*

Received date: 13-1-2016  
Revised date: 6-5-2016  
Accepted date: 7-5-2016

Please cite this article as: Agnieszka Szebesczyk, Evgenia Olshvang, Abraham Shanzer, Peggy L. Carver, Elzbieta Gumienna-Kontecka, Harnessing the power of fungal siderophores for the imaging and treatment of human diseases, *Coordination Chemistry Reviews* (2016), <http://dx.doi.org/doi: 10.1016/j.ccr.2016.05.001>.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



## Harnessing the power of fungal siderophores for the imaging and treatment of human diseases

Agnieszka Szebesczyk,<sup>a,†</sup> Evgenia Olshvang,<sup>b,†</sup> Abraham Shanzer,<sup>b</sup> Peggy L. Carver,<sup>c,d</sup> and Elzbieta Gumienna-Kontecka<sup>e,\*</sup>

<sup>a</sup> *Institute of Cosmetology, Public Higher Medical Professional School in Opole, Opole, Poland*

<sup>b</sup> *Department of Organic Chemistry, The Weizmann Institute of Science, Rehovot, Israel*

<sup>c</sup> *University of Michigan College of Pharmacy, Ann Arbor, MI, USA*

<sup>d</sup> *University of Michigan Health System, Ann Arbor, MI, USA*

<sup>e</sup> *Faculty of Chemistry, University of Wrocław, Wrocław, Poland*

<sup>†</sup>These authors contributed equally to this work.

\*Corresponding author. Tel.: +48 713757347;

E-mail address: elzbieta.gumienna-kontecka@chem.uni.wroc.pl

**Keywords** invasive fungal infections; candidiasis; aspergillosis; Mucor; mold infections; antifungal agents; triazole; isavuconazole; iron, iron assimilation, fungal siderophores; biomimetic chemistry; artificial siderophores

### Highlights

- New antifungal agents and diagnostic methodologies are urgently required, as the incidence of drug-resistant invasive mycoses is a serious medical problem.
- Fungi are metabolically similar to mammalian cells; thus, pathogen-specific targets are limited. One fundamental difference lies in the iron acquisition system via low molecular weight organic chelators – siderophores, often essential for fungal virulence and pathogenicity.
- Natural siderophores exhibit broad-spectrum activity and can be recognized by various types of microorganisms. However, biomimetic analogues overcome these limitations and offer sites for incorporation of additional functionalities, including fluorescent probes, surface adhesive moieties and drug molecules, to be used for the preparation of imaging and/or therapeutic conjugates smuggled into microbial species by siderophore recognition and ‘Trojan Horse’ strategy.

### Abstract

Innovative strategies are needed to address the current lack of clinically available antifungal drugs and for diagnostic techniques. ‘Repurposing’ of antifungal drugs, similar to techniques currently being utilised with ‘older’ antibacterial drugs in order to combat widespread resistance in the face of a dearth of new drugs, could prove beneficial. Although as yet very limited for fungi, a siderophore-based ‘Trojan Horse’ strategy, in the form of siderophore–antibiotic conjugates, siderophore–fluorescent probe conjugates, or Ga(III)–siderophore complexes, reveals potential clinical relevance and provides a strategy for targeting fungal infections through drug delivery, imaging, and in diagnostics. The application of siderophores against pathogenic fungi is evolving but is still far from its full potential and further studies are needed to demonstrate their advantages and limitations.

One of the biggest obstacles in developing fungus-specific diagnostics and side-effects-free therapeutics is that apart from the fungal cell wall, fungi are metabolically similar to mammalian cells;

Download English Version:

<https://daneshyari.com/en/article/5150867>

Download Persian Version:

<https://daneshyari.com/article/5150867>

[Daneshyari.com](https://daneshyari.com)