The Janus transcription factor HapX controls fungal adaptation to both iron starvation and iron excess.

Gsaller F, Hortschansky P, Beattie SR, Klammer V, Tuppatsch K, Lechner BE, Rietzschel N, Werner ER, Vogan AA, Chung D, Mühlenhoff U, Kato M, Cramer RA, Brakhage AA, Haas H (2014) The Janus transcription factor HapX controls fungal adaptation to both iron starvation and iron excess. *EMBO J* 33(19), 2261-2276.

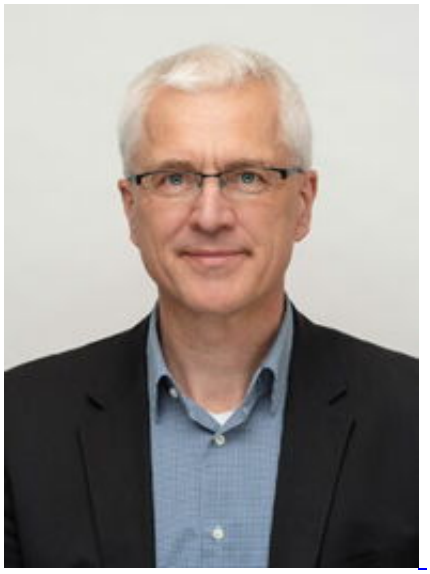
Abstract

Balance of physiological levels of iron is essential for every organism. In Aspergillus fumigatus and other fungal pathogens, the transcription factor HapX mediates adaptation to iron limitation and consequently virulence by repressing iron consumption and activating iron uptake. Here, we demonstrate that HapX is also essential for iron resistance via activating vacuolar iron storage. We identified HapX protein domains that are essential for HapX functions during either iron starvation or high-iron conditions. The evolutionary conservation of these domains indicates their wide-spread role in iron sensing. We further demonstrate that a HapX homodimer and the CCAAT-binding complex (CBC) cooperatively bind an evolutionary conserved DNA motif in a target promoter. The latter reveals the mode of discrimination between general CBC and specific HapX/CBC target genes. Collectively, our study uncovers a novel regulatory mechanism mediating both iron resistance and adaptation to iron starvation by the same transcription factor complex with activating and repressing functions depending on ambient iron availability.

Involved units

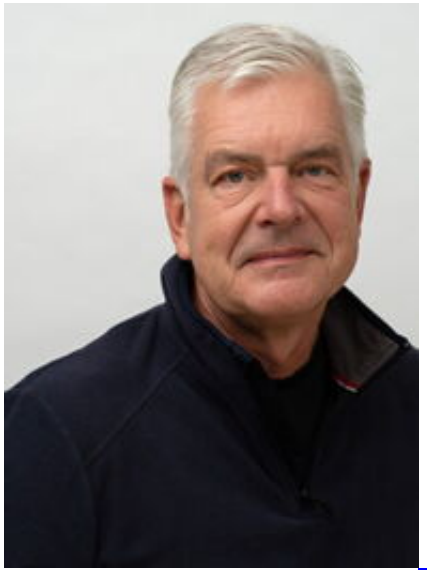
Molecular and Applied Microbiology Axel Brakhage Read more

Leibniz-HKI-Authors



Axel A. Brakhage

Details



Peter Hortschansky

Details

Katja Tuppatsch

Details

Identifier

doi: e201489468

PMID: 25092765