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P. aeruginosa Recombinantly Expressed HemO Protein

Summary

Pathogenic bacteria require iron for their survival and ability to cause infection. Many bacterial pathogens have evolved sophisticated systems to use heme as a primary source of iron, including *Pseudomonas aeruginosa*, an opportunistic gram-negative pathogen that is a common cause of nosocomial infections and associated with high morbidity. To study the heme uptake and utilization of P. aeruginosa and other pathogenic bacteria, researchers have developed a recombinant *P. aeruginosa* heme oxygenase (HemO) enzyme expressed in E. coli and purified by ion exchange and size exclusion chromatography for research use.

Key Investigator

Angela Wilks

Field

Drug-resistant infections

Research tool

Technology

Recombinant, purified *P. aeruginosa* HemO enzyme

Advantages

HemO protein with novel regiospecificity has been isolated and available to study heme oxygenase pathways in pathogenic infections

Status

Available for licensing

UMB Docket Reference

AW-2015-091

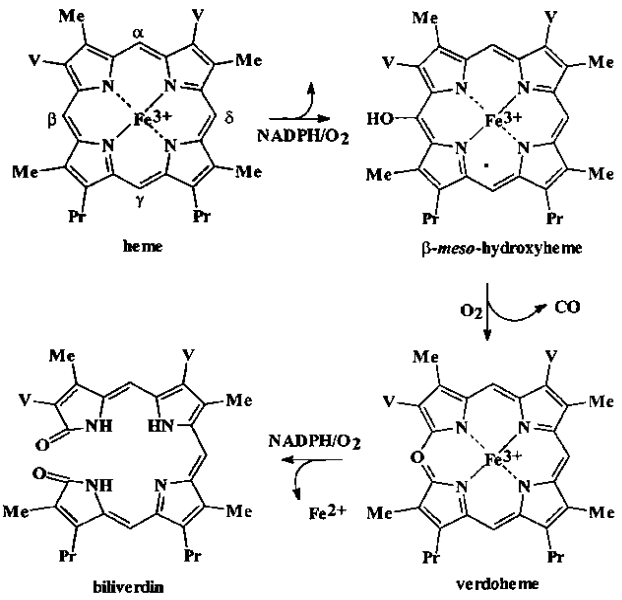
External Reference

Ratliff et al. (2001) *J of Bacteriology.* 183(21): 6394-6403.

Wilks et al. (2013) *ACS Chem Biol.* 8(8) 1794-1802.

Market

P. aeruginosa can cause severe, acute, and chronic urinary tract, respiratory, and ocular infections. It is a major health problem for immunocompromised patients and individuals with cystic fibrosis. There are an estimated 51,000 healthcare cases associated with *P. aeruginosa* infections per year in the US, according to the Center for Disease Control. These infections are treated with antibiotics, but approximately 13% of *P. aeruginosa* infections are multi-drug resistant. As antimicrobial resistance continues to increase, there is a need for novel solutions to diagnose, treat, and prevent these infections. Finding new heme metabolic and regulatory pathways aids this therapeutic effort, as heme controls cellular processes such as DNA transcription, RNA translation, protein stability and targeting, and cell differentiation. This novel, recombinant heme enzyme with unique stereo-specificity can be used as a tool to develop new compounds that can overcome current antibiotic resistance potentially.



Technology

The recombinant enzyme of the *pigA* gene of *P. aeruginosa* (PIG) was expressed in *E. coli* and purified by ion exchange and size exclusion chromatography. The PigAHO displays unique selectivity for a β-*meso*-carbon. Previously isolated HemO protein has demonstrated a preference for α-*meso*-carbon. Recombinantly expressed HemO from *P. aeruginosa* represents a new class of enzymes with novel regiospecificity. It functionally replaces HemO in *N. meningitidis* in vivo. This technology may be used to identify new heme metabolic and regulatory pathways to study heme controlled cellular processes such as DNA transcription, RNA translation, protein stability and targeting, and cell differentiation.

Technology Status

The ability of recombinantly expressed HemO from *P. aeruginosa* to catalyze heme degradation has been tested in vitro.

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