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BIOLOGICAL AND BIOCHEMICAL PRODUCTION OF ENANTIOPURE L-PIPERAZIC ACID

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Background:

Compounds containing piperazic acid (Piz), a nonproteinogenic amino acid, are of significant interest for drug discovery. Peptidic compounds incorporating Piz as a building block include antibacterial, antiviral, immunomodulatory and anticancer drug leads, and all naturally-occurring Piz containing compounds discovered thus far are bioactive. Thus, synthetic chemists are attracted to L-Piz for incorporation into drug-like compounds, molecular probes, etc. However, L-Piz is very expensive to produce.

Technology Description:

Researchers at Washington University have developed a method to perform green biocatalysis of L-Piz *in vitro* and *in vivo*. Green biocatalysis of L-Piz *in vitro* uses a coupled enzyme assay and the inexpensive feedstock, enantiopure L-Ornithine. This method can also be used to create heavy isotope-labelled Piz, which are valuable tools for mass spectrometric and NMR based studies. Furthermore, researchers have also demonstrated L-Piz fermentation in a heterologous, genetically engineered host grown on standard lab media. The development of these two methods of synthesizing L-Piz allows L-Piz to be produced much more economically.

Key Advantages:

- Less expensive
- Enantiopure product
- “Greener” production of the important building block L-Piz

Publications:

Hu Y, Qi Y, Stumpf SD, D'Alessandro JM, Blodgett JAV., Bioinformatic and functional evaluation of actinobacterial piperazate metabolism. *ACS Chem Biol*. 2019 Mar 28.

Transgenic microorganisms and synthesis of piperazic acid, piperazic acid containing products, and derivatives thereof (U.S. Patent Application, Publication No. US20190002936)