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Evaluation of the potential of the molybdenum-containing enzyme DMSO reductase as an oxygenation catalyst

"This collaboration has allowed us to initiate a collaboration with Piramal that will hopefully lead to many other useful interactions," Gary Black, Northumbria University

Gary W Black and Justin J Perry, Northumbria University; Robert A Holt, Piramal Healthcare UK

Picture: pixabay.com

A chiral drug has a spatial arrangement of atoms that cannot be superimposed on its mirror image – rather like a pair of mittens.

OUTCOMES: In total six DMSO reductase enzyme preparations were produced from several bacterial strains from *Rhodobacter capsulatus, Rhodobacter sphaeroides, Cupriavidus metallidurans, Aeromonas hydrophila* and *Oceanithermus profundus,* and their capacity to perform complex oxidation chemistry was determined.

INITIAL AIMS: The enantiomers of a chiral drug — one that has a spatial arrangement of atoms that cannot be superimposed on its mirror image — can have different properties with respect to pharmacology, metabolism, immune response and so on. There has been significant effort to develop cost-effective and scalable methodology for the synthesis of enantiomerically pure compounds, but the development of processes involving oxidative reactions has lagged behind. Dimethylsulphoxide reductase (DMSOR) is a molybdenum-containing enzyme that can reduce sulphoxides to the corresponding sulphides. When the sulphoxide is a mixture of both enantiomers, DMSOR reduces one enantiomer much more rapidly, which leads to enantiomeric enrichment of the slower reacting enantiomer. This project will explore the potential of DMSOR to carry out complex oxidation chemistry

- Depending further results, the industrial and academic partners are considering an application to Innovate UK

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