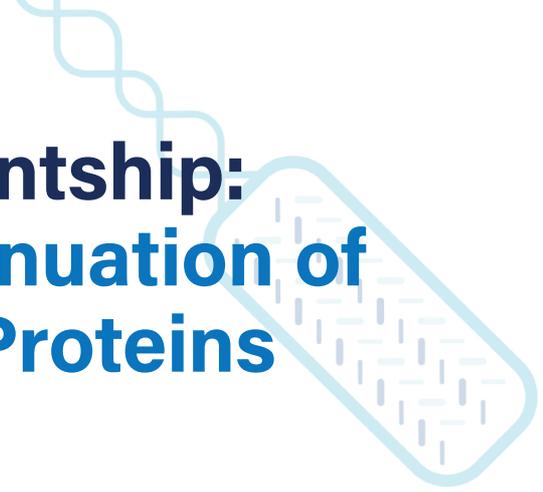


CBMNet Vacation Studentship: Optimal Expression Attenuation of Membrane Transporter Proteins



The Challenge

Transport of substrates and products across cell membranes can be a critical bottleneck for whole-cell industrial biotechnological processes. However, over-expression of membrane proteins can lead to a compromise in cell membrane integrity and result in negative effects upon cell viability and biomass accumulation. Thus a key challenge is to balance membrane protein expression, and transport processes against cell viability.

The Research

Dr Neil Dixon is a Senior Lecturer at the University of Manchester. The research in his laboratory focuses on the use of gene regulation and molecular recognition for biotechnology and biomedical applications.

The fatty acid importer (FadL) has been shown to demonstrate modest alkane import capacity. Using an alkane responsive biosensor (alkS-GFP), we wished to explore the FadL import capacity in wild-type and Δ FadL E. coli strains. Additionally we wished to attenuate the over expression of the FadL importer and measure alkane importer capacity and the affect upon cell growth.

The Result

Research insight gained; an understanding of the relationship between transporter expression level and import capacity. An understanding of the optimal balance between both membrane transport capacity and biomass accumulation.

“The opportunity to work on this project was invaluable to me. Not only have I gained considerable understanding and knowledge of the biochemistry and molecular biology area of research, but I built a set of skills to aid in my PhD and to help me successfully follow my academic career aspirations.”

Luminita Gabriela Horga,
CBMNet vacation studentship scholar

The Future

The Student was trained in a variety of techniques and skills in: microbial handling, recombinant protein expression, biochemical analytics (SDS PAGE, Western blot), cell viability assays (CFU/LDH assays), biophysical analytics (fluorescent plate reader analysis), functional analysis (biosensor use).

The student is now studying for a PhD in recombinant therapeutic protein secretion into the E. coli periplasm using orthogonal riboswitches.