

Honours Project 2008

Predicting the structure of Alpaca melanocortin 1 receptor mutant

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Melanocortin 1 receptor (MC1R) is a G-protein coupled receptor (GPCR). It is expressed in melanocytes and is present in many species. It is responsible for a range of effects depending upon the ligand. In particular, it can regulate the amount and type of pigment produced by the melanocytes and this can result in differing hair and skin colour.

Recently, Kylie's research team have discovered a single point mutation in the Alpaca MC1R gene. This mutation changes an arginine residue to a cysteine residue in the mature MC1R protein.

The principal aims of this project are to:

- (1) model both the wild type MC1R and the mutant MC1R using protein structure prediction and molecular modelling software
- (2) compare the wild type model with the mutant model to determine the effect, if any, of the single point mutation on the three dimensional structure of the MC1R protein
- (3) explore the putative effect of any structural changes on protein function

Alpacas are bred for their hair colour and quality. This mutation may have a role in defining their hair colour. There is a young but growing market for Alpaca products. Consequently, the significance of this project is that it may help us understand what may affect Alpaca hair colour and quality.

It is envisaged that most of this project will involve computer-based work involving different types of software. There may also be other avenues that could be explored. This project will be done in collaboration with Dr Kylie Munyard's research team and Kylie will be a co-supervisor for the project.

Dr Bottomley has supervised three first class honours students, and one 2A honours student. Steven believes in supervising the student to help develop research and problem solving skills. He does this through an appropriate mix of coaching, direct guidance, and partnership in the project. However, he also expects the student to be enthusiastic, diligent in their studies, work hard, and to think for themselves. Students interested in this project are welcome to contact Steven and make an appointment to discuss this project in more detail.

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