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USING CRISPR GENOME EDITING TO UNDERSTAND THE GENOMIC BASIS OF OBESITY, ALCOHOL ABUSE AND MOOD DISORDERS

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Conditions such as obesity, alcohol abuse and depression cause huge amount of morbidity and mortality globally each year. However, genome wise association (GWA) studies suggest that most associated loci (>90%) are found within regions of the genome that do not encode proteins. This presents a problem, not only for understanding the causes of disease, but also for stratified medicine where side effects and a lack of efficacy in patient response to drugs is a major problem. This seminar will describe our use of bioinformatics, magnetofection of primary neuron cultures, CRISPR genome editing in mice, behavioural analysis and ChIP assay to identify non-coding tissue-specific regulatory elements in the human genome and to determine the functional effects of disease associated polymorphisms and epigenetic modification on their activity. Our recent findings will have a direct effect on our understanding of the genomic mechanisms modulating critical aspects of behaviour such as food intake, fat selection and alcohol intake and how these mechanisms are altered by polymorphic variation and epigenetics. Development of a greater understanding of the functional effects of polymorphic variation and DNA-methylation on tissue-specific gene regulation will have a critical impact on our ability to predict disease, to design novel personalised treatments and to select the patients who would most benefit from specific treatments; a central tenet of stratified medicine.

Biography

Alasdair MacKenzie is a Reader in Molecular Genetics at the University of Aberdeen. From 2006-2009, he was a Senior Lecturer at the University of Aberdeen. He completed his Postdoc in 2001 in University of Edinburgh Vet School. He completed his Ph.D in Molecular and Cellular Biology, in 1992-Manchester University.

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