Canterbury Medical Research Foundation
Final report for Grant in Aid Amy Osborne 2017 GIA2

Grant recipient

Dr Amy Osborne
University of Canterbury
School of Biological Sciences

amy.osborne@canterbury.ac.nz
0273654211
Private Bag 4800 8140

Grant details

GRANT TYPE	Grant in Aid	FUNDING ROUND	2017 Grant In Aid 2
GRANT REFERENCE	Amy Osborne 2017 GIA2	GRANT AMOUNT	$4,900

Final report

1. Scientific Assessing Committee report

We are delighted to finally be able to report results from our research, entitled 'Establishing the zebrafish as a model of drug use on the genome'.

We thank the CMRF for their patience in receiving this report - unbeknownst to us at the start of this proehct, that it would take almost 2 years for the MoH to approve our possession of controlled drugs for this project. We received the approval in early March 2020, unfortunately, slightly before we were required to lockdown! So timing has not been on our side. However, I'm very happy to report that once we were able to access the lab again, our experiments proceeded rapidly, and successfully.

Our research was to investigate the effects of the active ingredients of cannabis (THC [psychoactive] and CBD [proposed therapeutic]) on DNA methylation within the genome of the zebrafish. The reason for this is that we are unable to undertake these sorts of drug exposure experiments easily in humans. Therefore we needed to develop a tractable model system in which to investigate the effects that cannabis components have on the genome. Zebrafish were considered to be a good starting point.

We treated zebrafish embryos (to mimic adolescent exposure) with THC and CBD. We extracted the DNA and this was sent for Reduced Representation Bisulphite Sequencing. From this, we were able to establish the pattern of DNA methylation at over 4 million sites within the zebrafish genome.

We found significantly different methylation differences between treated embryos and control across both THC and CBD:

THC - we found significant methylation differences at 7 loci that are all very close together in the genome, that mark a gene-rich region containing many genes that all have roles in brain development and neurotransmission. We are about to start probing this gene region further.

CBD - we found multiple methylation differences at genes that act as potassium channels. Potassium channels have vital roles in neurotransmission, but also in smooth muscle contraction and heart rate regulation.

Therefore, given that the genes that the differential methylation is indicating are biologically relevant when we consider the effects of cannabis on human physiology, we have determined that the zebrafish is definitely a good model for human drug exposure. We look forward to using these data here as pilot data for our future research grants.

4. Feedback

Publication

Date

29/10/2020