Press Release 5th April 2016

Are gut microbes the missing piece in understanding myelination?

UCC scientists uncover a potential role of the microbiome in regulating myelination in the brain

Myelin is the insulation that surrounds the axon of nerve cells allowing efficient conduction of electrical signals. It is essential for the proper functioning of the nervous system. Understanding the mechanisms regulating myelination is important for developing strategies for myelin disorders such as Multiple Sclerosis, which is characterised by a loss of myelin. Now, scientists at the Science Foundation Ireland-funded APC Microbiome Institute at University College Cork have shown that the microbiome regulates myelination in the brains of adult mice. Their research is being published in the Nature Journal *Translational Psychiatry.*

Over the past decade it is becoming increasing clear that the microbes that reside within and around us play a clear role is our health and wellbeing. Perhaps most surprising of all is the realisation that gut bacteria can even influence brain function and behaviour.

Now scientists in the APC Microbiome Institute and Department of Anatomy and Neuroscience, University College Cork Ireland have shown, at least in animal models that major disturbance in communication between the gut microbiota and brain has resulted in changes in myelination patterns in the prefrontal cortex, a brain region that is key to higher cognitive functions and in the expression of anxiety and social behaviours.

Using microbe-free mice Professor John F. Cryan and Dr Gerard Clarke along with their PhD student Alan Hoban have shown that these mice display greater increase in myelin-related gene expression and that these effects were specific to this brain area. Importantly, Professor Cryan's team were able to visualise using transmission electron microscopy the extent of this increase in myelination.

Additionally they showed that colonizing these animals, so essentially introducing a normal microbiome had the ability to reverse some of the parameters used to measure the changes in myelination. Obviously more work is needed to advance our understanding of the mechanisms behind the relationship between the microbiota and myelination and why only the cortex seems to be susceptible to its potential influence.

"*It is likely that key signals from the gut to the brain provide a brake on myelination processes*" says Prof Cryan. Furthermore, he says that "*understanding what these may open innovative gut microbiome-based strategies for tackling myelin-related disorders*". Moreover, this data presented by the APC Microbiome team continues to broaden the concept that the microbiome has a remarkable influence over fundamental brain processes and may be harnessed in the future for a wide range of brain disorders.

This research was supported by Science Foundation Ireland through a Centre grant to the APC Microbiome Institute. The research was co-authored by APC researchers at UCC, Alan Edward Hoban, Roman M Stilling, Feargal Ryan, Marcus Claesson, Fergus Shanahan and Ted Dinan.

Full reference:

'*Regulation of Prefrontal Cortex Myelination by the Microbiota'* Alan Edward Hoban, Roman M Stilling, Feargal Ryan, Marcus Claesson, Fergus Shanahan and Ted Dinan Nature Translational Psychiatry doi of 10.1038/TP.2016.42: http://dx.doi.org/10.1038/TP.2016.42

ENDS

For further information please contact Dr Catherine Buckley, Communications and Outreach Manager,APC Microbiome Institute, University College Cork tel (mobile) +353 86 8554744; office +353 21 4903362; email: c.buckley@ucc.ie