

PRESS RELEASE

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Understanding How Pain is Bugging you... Irish Scientists Uncover Critical Role for Microbes in Mediating Gut Pain

Scientists at the Science Foundation Ireland-funded APC Microbiome Institute at University College Cork, Ireland have shown that, at least in mice, gut bacteria play a key role in regulating abdominal pain and its associated changes in the brain and spinal cord.

Visceral pain is a global term used to describe pain originating from the internal organs of the body, which affects a significant proportion of the population and is a common feature of functional gastrointestinal disorders such as irritable bowel syndrome (IBS). Currently, the treatment strategies for visceral pain are unsatisfactory, with development of novel therapeutics hindered by a lack of detailed knowledge of the underlying mechanisms although alterations of the Gut-Brain axis has been implicated. The human gut is home to over 100 trillion bacteria and other microorganisms collectively known as the microbiota. The gut microbiota is involved in critical processes such as digestion, metabolism, immune responses, and absorption of nutrients. Until recently, little was known about how the microbiota influences the nervous system; however, it is becoming increasingly clear that gut microorganisms can influence the brain and behavior.

Profs. John Cryan and Ted Dinan along with postdoctoral fellow Dr. Monica Tramullas and research scientist Pauline Luczynski have unraveled a novel mechanism underlying how visceral pain can emerge. They have shown that mice that grow up without microbes (germ free mice) were more sensitive to visceral pain stimuli. These animals also showed corresponding changes in genes in their spinal cord. In the brain, germ-free mice had changes in areas involved in the descending pain modulation and its emotional regulation.

Of great interest, colonization of germ-free mice with gut bacteria reversed these changes which suggest that there is potential to reverse the changes with microbiota- based interventions. Prof. Cryan, says *"we are very excited about these data, although the microbiota has long been thought to play a key role in pain modulation, the current study proves it categorically and offers insights into some of the potential neurobiological mechanisms at play"*

The data have implications for our understanding of IBS and supports the concept of targeting the microbiota to modulate pain symptoms in this and other gastrointestinal disorders.

The research is published today in the journal eLife. The research was co-authored by APC researchers at UCC, Maria Viola, Gerard Clarke and Fergus Shanahan, and funded by Science Foundation Ireland through a Research Centres Grant to the APC Microbiome Institute and through EU Grant 613979 MY NEWGUT FP7-KBBE-2013-7

(Timothy Dinan & John Cryan).

Full reference

Pauline Luczynski, Monica Tramullas, Maria Viola, Siobhain O'Mahony, Fergus Shanahan, Gerard Clarke, Timothy Dinan & John Cryan (2017)

"Microbiota regulates visceral pain in the mouse". eLife 20th June 2017

<https://doi.org/10.7554/eLife.25887>

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Notes for Editors:

About APC Microbiome Institute:

The APC Microbiome Institute (APC; <http://apc.ucc.ie>) was formed in 2003 with funding from Science Foundation Ireland and in conjunction with key industry partners. It represents a seamless collaboration between University College Cork, Teagasc (the Irish Agriculture and Food Development Authority) and Cork Institute of Technology. It is widely recognised that the gut microbiota plays an important role in human health and has become one of the most dynamic, complex and exciting areas of research in both food and pharmaceutical arenas. Over the last decade the APC has established itself as one of the leading global centres in gut microbiota research. The APC has made several landmark discoveries and has published over 1,000 research articles in peer-reviewed journals, generating many journal covers and associated editorials. The APC comprises over 300 individuals, from the scientific PI's (the APC Faculty) funded by the partner Institutions, the management team, and a dedicated group of research scientists, research assistants and postgraduate students.

About eLife

eLife (<https://elif.eelifesciences.org/about>) is a peer-reviewed open access scientific journal for the biomedical and life sciences. It is a unique non-profit collaboration between the funders and practitioners of research to improve the way important results are presented and shared. It was established at the end of 2012 by the [Howard Hughes Medical Institute](#), [Max Planck Society](#), and [Wellcome Trust](#). The editor-in-chief is [Randy Schekman \(University of California, Berkeley\)](#).—Editorial decisions are made largely by senior editors and members of the board of reviewing editors, all of whom are active scientists working in fields ranging from human genetics and neuroscience to biophysics and epidemiology.

About Science Foundation Ireland

Science Foundation Ireland funds oriented basic and applied research in the areas of science, technology, engineering, and mathematics (STEM) which promotes and assists the development and competitiveness of industry, enterprise and employment in Ireland. The Foundation also promotes and

supports STEM education and engagement, and creates awareness and understanding of the value of STEM to society and to the growth of the economy. Science Foundation Ireland's #BelieveInScience campaign promotes the potential that science and discovery offer Ireland, today and in tomorrow's world. The #BelieveInScience campaign helps to promote an understanding of the ability of STEM to create positive change in the world and to drive a sustainable economy in Ireland. The campaign will see Science Foundation Ireland work in partnership with the Irish research community to share a mutual passion for science with the public. Visit www.ScienceFoundationIreland.ie for more information.

About MY NEWGUT

The MY NEWGUT (www.mynewgut.eu) project (Microbiome's influence on energy balance and brain development/function put into action to tackle diet-related diseases and behaviour) is funded from the European Union's Seventh Framework Programme and researches how the gut microbiota and its genome (microbiome) influence obesity, behavioural- and lifestyle-related disorders and vice versa. It also aims to identify specific dietary strategies to improve the long-term health of the population.