

# Study identifies changes to DNA in major depression and suicide

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Autopsies usually point to a cause of death but now a study of brain tissue collected during these procedures, may explain an underlying cause of major depression and suicide. The international research group, led by Dr. Michael O. Poulter of Robarts Research Institute at The University of Western Ontario and Dr. Hymie Anisman of the Neuroscience Research Institute at Carleton University, is the first to show that proteins that modify DNA directly are more highly expressed in the brains of people who commit suicide.

These proteins are involved in chemically modifying DNA in a process called epigenomic regulation. The paper is published in *Biological Psychiatry*.

The researchers compared the brains of people who committed suicide with those of a control group who died suddenly, from heart attacks and other causes. They found that the genome in depressed people who had committed suicide was chemically modified by a process that is normally involved in regulating the essential characteristics of all cells in the body. As Poulter explains, "We have about 40,000 genes in every cell and the main reason a brain cell is a brain cell is because only a small fraction of the genes are turned on. The remaining genes that are not expressed are shut down by an epigenetic process called DNA methylation."

The rate of methylation in the suicide brains was found to be much greater than that of the control group. Importantly, one of the genes they

studied was shown to be heavily chemically modified and its expression was reduced. This particular gene plays a major role in regulating brain activity. "Interestingly, the nature of this chemical modification is long term and hard to reverse, and this fits with depression," says Poulter.

"The whole idea that the genome is so malleable in the brain is surprising. Finding that epigenetic mechanisms continue to influence gene expression is pretty unusual," says Poulter, who is also a professor in the Department of Physiology and Pharmacology at Western's Schulich School of Medicine & Dentistry. "These observations open an entirely new avenue of research and potential therapeutic interventions." The research was funded through the Canadian Institutes of Health Research.

Source: University of Western Ontario

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