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A gene implicated in speech regulates connectivity of the developing brain

July 7 2011

Foxp2, a gene involved in speech and language, helps regulate the wiring of neurons in the brain, according to a study which will be published on July 7th in the open-access journal *PLoS Genetics*. The researchers identified this functional link by first identifying the major targets of Foxp2 in developing brain tissue and then analysing the function of relevant neurons.

Foxp2 codes for a regulatory protein that provides a window into unusual aspects of brain function. In 2001, scientists discovered that mutations of the human gene cause a rare form of speech and language disorder. The finding triggered a decade of intense research into the human gene and corresponding versions found in other species – for example, it has been shown to affect vocal imitation in songbirds, and learning of rapid movement sequences in mice.

In the PLoS Genetics study, the researchers, led by Dr. Sonja C. Vernes and Dr. Simon E. Fisher (The Wellcome Trust Centre for Human Genetics, University of Oxford), gained insights into the functions of Foxp2 within the developing brain by exploiting its role as a genetic dimmer switch, turning up or down the amount of product made by other genes. In their large-scale screening of embryonic brain tissue, they identified many novel targets regulated by Foxp2. Remarkably, many of these targets were known to be important for connectivity of the central nervous system. The team went on to show that changing Foxp2 levels in neurons impacted on the length and branching of neuronal projections, a key route for modulating the wiring of the developing brain.

"Studies like this are crucial for building bridges between genes and complex aspects of brain function" says Dr. Fisher, who is also director of a newly established Language and Genetics department at the Max Planck Institute for Psycholinguistics, The Netherlands. The research was carried out with mouse models, since they can be used to comprehensively analyse genetic networks in a way that remains difficult in the human brain. However, "the current study provides the most thorough characterisation of Foxp2 target pathways to date," notes Dr. Fisher. "It offers a number of compelling new candidate genes that could be investigated in people with language problems."

More information: Vernes SC, Oliver PL, Spiteri E, Lockstone HE, Puliyadi R, et al. (2011) Foxp2 Regulates Gene Networks Implicated in Neurite Outgrowth in the Developing Brain. *PLoS Genet* 7(7): e1002145. doi:10.1371/journal.pgen.1002145

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