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## SCIENCE – IN THE NEWS

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### Sex-Differences in the Brain and Motor Control

Until recently, it was commonly held that the morphologic differences between male and female brains arise due to secretion of sex-specific gonadal hormones during fetal development. However, recent studies have shown that there are sex differences in genetic expression before the development of sex gonads. In mammals, sex is determined at conception by a set of sex-specific genes. Expression of these sex-specific genes influences the developing brain by regulating the neuroanatomy and its function.

Sex-determining Region Y (SRY) is a gene located on the Y chromosome that specifies and directs male development. SRY expression is found in a specific subset of tyrosine hydroxylase-expressing neurons in the substantia nigra of males. Tyrosine hydroxylase affects synthesis of dopamine, a stimulatory neurotransmitter that influences motor function. In studies conducted on male rats, knock down of SRY resulted in dopamine deficiency causing abnormal motor function. Reversal of the knock down led to normal SRY levels with, resumption of normal dopamine production and motor function (1).

In males, SRY expression in the substantia nigra clearly plays a physiologic role in the control motor function. This finding may explain why Parkinson's disease, a movement disorder, is more prevalent in men than in women. The disease presents with a loss of motor control, which is caused by deficiency of dopamine – a direct result of the degeneration of dopaminergic neurons in the brain. Currently, there is no cure for Parkinson's disease, but the symptoms can be alleviated by the administration of dopamine. Hopefully, continued investigation into the mechanisms of sexual differentiation will not only elucidate the developmental dynamics of sex-related disease, but also facilitate the creation of innovative therapeutic tools that can be used to prevent and/or reverse these kinds of neurologic disorders. – *Julia L. Baumann*

#### REFERENCE

1. Dewing P, Chiang CW, Sinchak K, Sim H, Fernagut PO, Kelly S, Chesselet MF, Micevych PE, Albrecht KH, Harley VR, Vilain E 2006 Direct regulation of adult brain function by the male-specific factor SRY. *Curr Biol* 16:415–420