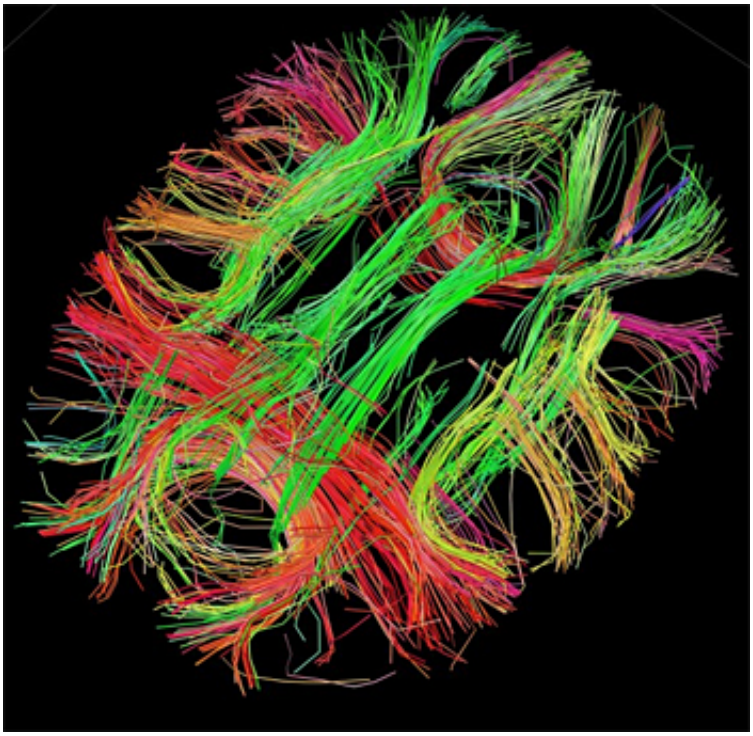
MedicalXpress

Neuroscientists reveal mechanism crucial to molding male brains

November 11 2014



White matter fiber architecture of the brain. Credit: Human Connectome Project.

University of Otago researchers have discovered that neural circuitry they previously showed was vital to triggering ovulation and maintaining fertility also plays a key role in moulding the male brain.

In new research appearing in the *Journal of Neuroscience*, a team led by

Professor Allan Herbison shows that male-specific signalling in the Gonadotropin-releasing hormone (GnRH) neurons of new-born mice is crucial to generating a testosterone surge that occurs up to five hours after birth.

This brief but powerful increase in testosterone blood levels, which only takes place in males, is known to cause their brains to develop differently to females.

Among other effects, these brain differences are implicated in the patterns of neurological disorders that men and women suffer.

Professor Herbison says that sex differences in brain function are established during the later stages of foetal development and around birth, but the actual cellular mechanisms underlying these important actions remained unknown.

Through a series of investigations in mice, he and his colleagues have now shown that a small group of GnRH neurons in the brain's hypothalamus become active only in new-born males, and not females.

Additionally, they found that a small population of kisspeptin neurons also appear at this time, once again only in males. Kisspeptin is a small protein that potently stimulates GnRH neurons. Last year Professor Herbison and colleagues published a landmark study detailing how it acts as a master controller of reproduction.

In their latest investigations, the researchers also show that male mice lacking kisspeptin receptors on their GnRH neurons do not experience the usual testosterone surge following birth. They also determined that, as adult males, such mice had female-like brain characteristics.

Professor Herbison says the team's new findings reveal that kisspeptin,

which has only been discovered to play any role in fertility in the past decade or so, is a much more remarkable molecule than previously thought. (Kisspeptin was originally named after the Hershey Kiss chocolate by US cancer researchers based in Hershey, Pennsylvania. At the time they had no idea that it had a role in fertility.)

"Not only does kisspeptin signalling act as a master switch for puberty and ovulation, we now show how in the first hours of drawing breath it also triggers our brains to develop differently according to our sex."

Provided by University of Otago