

**Brain Study Focuses on Gender Identity  
Findings challenge the theory that hormones alone define male and female brain differences.**

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UCLA scientists have uncovered genetic differences in developing male and female mouse brains that may contribute to the subtle and not so subtle differences between adults of the two genders.

The study, to be published today in the journal *Molecular Brain Research*, is likely to also apply to humans, its authors said. It might one day provide doctors with a diagnostic test for assigning a gender to children born with ambiguous genitalia.

Neuroscientists know that male and female brains, although far more alike than different, have certain distinctions.

For instance, in human beings a structure called the corpus callosum, which carries communications between the two brain hemispheres, is generally larger in women's brains. Female brains also tend to be more symmetrical. The significance of these and other differences is unclear, but researchers often invoke them to explain men's generally superior performance at spatial reasoning and women's often superior verbal skills.

Men and women, on average, also possess documented differences in certain thinking tasks and in behaviors such as aggression that are thought by many to be biologically rooted.

Scientists have long assumed that these differences arise because the male brain is subject to the influences of testosterone and other male hormones after the formation of the testes.

In the study, a team led by Dr. Eric Vilain, professor of human genetics, pediatrics and urology, extracted genetic material from the brains of 10-day-old mouse embryos. Analysis revealed that more than 50 of the mouse's many thousands of genes had different levels of activity in male and female brains. Some genes were active — switched on — in female embryos but were less strongly active or inactive in male embryos. Others were switched on more strongly in the male embryos.

Vilain said the function of many of these genes was unclear, but he said it was quite likely they caused some nerves in the brain to develop along gender lines. His group is beginning to study the genes individually to understand what influence they may have on brain structures.

The study is significant because it is one of several recent studies challenging the theory that hormones are the be-all and end-all in male-female brain differences, said Charles Roselli, a neuroscientist at Oregon Health and Science University in Portland. Hormones couldn't be behind the observed gene differences because they occurred well before the embryo started producing sex hormones.