

MALE TO FEMALE TRANSSEXUAL INDIVIDUALS HAVE FEMALE NEURON NUMBERS IN THE CENTRAL SUBDIVISION OF THE BED NUCLEUS OF THE STRIA TERMINALIS

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SYNOPSIS

This study followed one similar piece of research on much of the same brain material, and was thus only the second of its kind to be done on human brains. The research team focussed on a part of the brain understood to be sexually dimorphic, the central subdivision of the bed-nucleus of the stria terminalis [BSTc]. The main neuron population of the BSTc is somatostatin-expressing [SOM] neurons.* The team sought to determine the number of SOM neurons in the BSTc [only those with visible nucleolus were counted], in relation to sex, sexual orientation, gender identity and past or present hormonal status.

42 human brains were collected in total: eight [8] gender dysphoric individuals, six [6] of whom were male-to-female individuals (MtF, transwomen) and had undergone transition, including hormone treatment and surgery, one [1] male-to-female individual who had undergone no treatment whatever, but who had always strongly identified as female, and one [1] female-to-male individual (FtM, transman).

The control group of 34 individuals included: nine [9] homosexual men, nine [9] heterosexual men, ten [10] presumed heterosexual women, three [3] women with hormone disorders, three [3] men with hormone disorders.

The findings indicated that, regardless of sexual orientation, men had almost twice as many SOM neurons as women ($P < 0.006$). The number of SOM neurons in the BSTc of the transwomen [MtF] was similar to the other women ($P = 0.83$). In contrast, the neuron number of a transman [FtM] was found to be in the male range. Hormone treatment or sex hormone level variations in adulthood seemed to have no impact on BSTc neuron numbers. The relative volumes of the BSTc were also measured. All of the men, regardless of sexual orientation, had volumes which were similar; the women and the transwomen [MtF] had similar volumes; the transman [FtM] fell into the same range as the other men. The volumes of all men versus all women and transwomen [MtF] were statistically highly significant ($P < 0.01$)

No statistical differences were found for age, post-mortem time, fixation time, storage time or cause of death, nor were any differences found between early, rather than late, recognition of gender dysphoria/transsexualism. The effects of variations in levels of estrogen, testosterone, antiandrogen treatments and orchidectomy were also tested and appeared to have no effect on the BSTc.

The finding of SOM neuronal sex differences in the BSTc and the sex reversal of these differences in the brains of gender dysphoric individuals, clearly supports the paradigm that in these individuals, the sex differentiation of the brain and the genitals may go in opposite directions. This points to a neurobiological basis, established during early development, for the condition of gender dysphoria.

* somatostatin is a polypeptide hormone, produced in the brain (and also the pancreas), which appears to inhibit the secretion of other hormones.

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