A model system for study of sex chromosome effects on sexually dimorphic neural and behavioral traits

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摘要

Abstract

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We tested the hypothesis that genes encoded on the sex chromosomes play a direct role in sexual differentiation of brain and behavior. We used mice in which the testis-determining gene (Sry) was moved from the Y chromosome to an autosome (by deletion of Sry from the Y and subsequent insertion of an Sry transgene onto an autosome), so that the determination of testis development occurred independently of the complement of X or Y chromosomes. We compared XX and XY mice with ovaries (females) and XX and XY mice with testes (males). These comparisons allowed us to assess the effect of sex chromosome complement (XX vs XY) independent of gonadal status (testes vs ovaries) on sexually dimorphic neural and behavioral phenotypes. The phenotypes included measures of male copulatory behavior, social exploration behavior, and sexually dimorphic neuroanatomical structures in the septum, hypothalamus, and lumbar spinal cord. Most of the sexually dimorphic phenotypes correlated with the presence of ovaries or testes and

therefore reflect the hormonal output of the gonads. We found, however, that both male and female mice with XY sex chromosomes were more masculine than XX mice in the density of vasopressin-immunoreactive fibers in the lateral septum. Moreover, two male groups differing only in the form of their Sry gene showed differences in behavior. The results show that sex chromosome genes contribute directly to the development of a sex difference in the brain.