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Prenatal Hormonal Contributions to Sex Differences in Human Cognitive and Personality Development

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INTRODUCTION

This chapter presents an overview of behavioral sexual differentiation in humans and presents data from our laboratory and other laboratories that highlight the importance of early (prenatal and/or postnatal) hormonal stimulation by androgenic substances in this process. Data derived from the study of individuals who were exposed to atypical levels of endogenous hormones or to exogenous compounds with an androgenic potential are presented to provide insight into the normal process underlying the emergence of sex differences (see also Reinisch, Ziemba-Davis, & Sanders, 1991).

The interplay among somatic, hormonal, behavioral, and environmental variables that shape psychosexual development is portrayed in Figure 1. At conception and during embryonic development, both males and females are essentially identical except that the cells of a normal male contain an X and a Y sex chromosome, whereas the female has two X chromosomes. The Y chromosome directs the produc-

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Sexual Differentiation, Volume 11 of *Handbook of Behavioral Neurobiology,* edited by Arnold A. Gerall, Howard Moltz, and Ingeborg L. Ward, Plenum Press, New York, 1992.

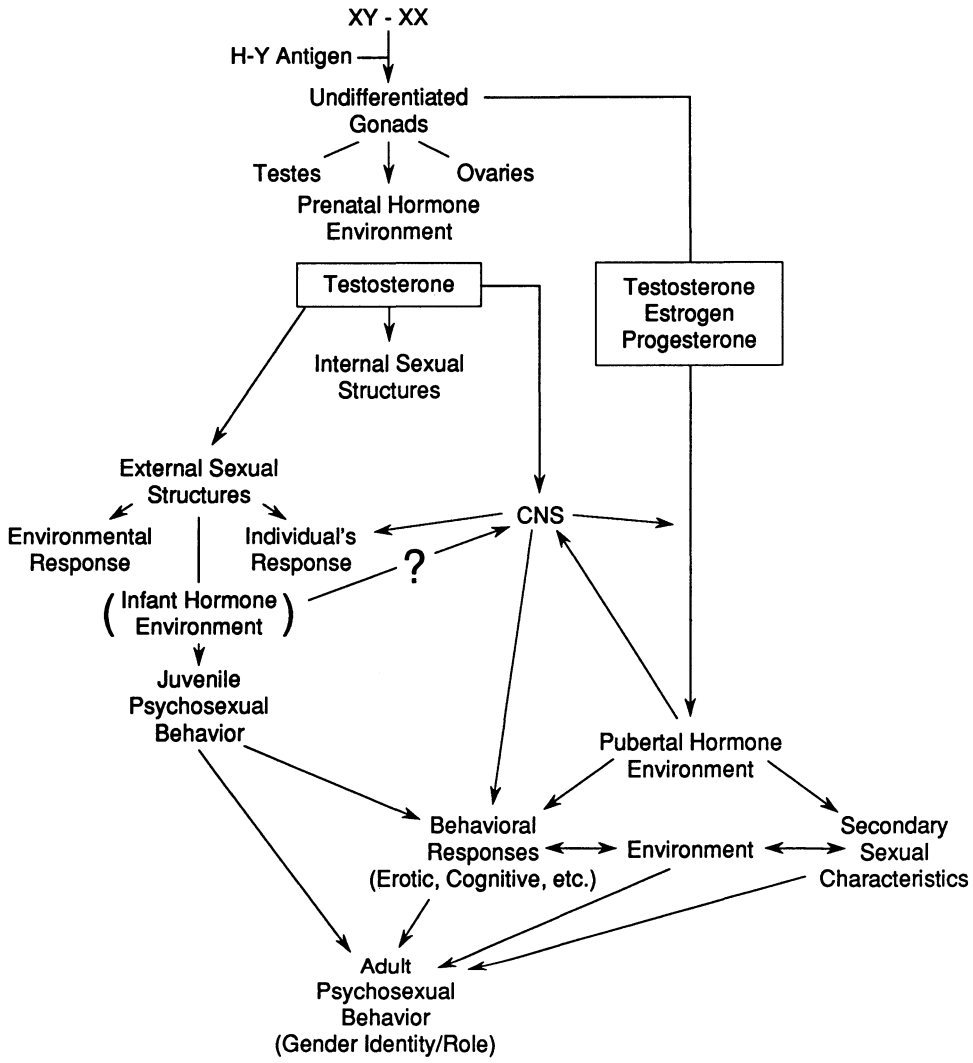

Figure 1. The interplay among somatic, hormonal, behavioral, and environmental variables that shape psychosexual development. (Derived from Money & Ehrhardt, 1972.)

tion of H-Y antigen, which in turn induces the undifferentiated gonads to become testes. In the absence of H-Y antigen or its specific cellular gonadal receptor, the embryonic gonad will eventually become an ovary.

If testes have developed, testosterone production will begin at approximately 7 to 8 weeks post-conception. It is the presence or absence of fetal androgens that determines the differentiation of the internal and external sexual structures into male or female types, respectively. The mammalian central nervous system also appears to become sexually dimorphic as a result of the relative amounts of gonadal hormones in the prenatal and/or early postnatal environment (De Vries, De Bruin, Uylings, & Corner, 1984; Gorski, 1987).

It may be said that nature's first intention is to produce a female and that something must be added to produce a phenotypic male. Concomitant to the more complex process of male differentiation is the increased possibility of developmental anomalies (Gualtieri & Hicks, 1985). As Alfred Jost so eloquently stated, "Be-