

# Kiss1 and Kiss1 receptor expression in the rhesus monkey testis: a possible local regulator of testicular function

## Research Article

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Received 18 January 2013; Accepted 25 May 2013

**Abstract:** Background: Kisspeptin, a *KISS1* gene product, stimulates GnRH neurons in the hypothalamus, but some recent studies have also suggested a direct effect on gonads. We aimed to localise Kiss and Kiss1 receptor (Kiss1r) in adult rhesus monkey testis. Experimental Procedures: Expression of Kiss1 and Kiss1r was detected in testicular tissue of rhesus monkey using immunohistochemistry and reverse transcriptase PCR (RT-PCR). Dual immunohistochemistry was used to colocalize Kiss1 with germ cell marker T4 and Kiss1r with inhibin (Sertoli cell marker) using specific antibodies for all. Immunohistochemistry of testis was conducted on formaldehyde fixed tissues using 5  $\mu$  thick sections. Using gene specific primers, RT-PCR was carried out to find expression of Kiss1 and *Kiss1r* mRNAs in testis. Results: Kiss1 immunoreactivity was localised to spermatocytes and spermatids and Kiss1r was observed in spermatocytes and Sertoli cells. Double-label immunohistochemistry co-localized Kiss1 and T4 in spermatids and Kiss1r and inhibin were co-localized in Sertoli cells. RT-PCR showed mRNA expression of *Kiss1* and *Kiss1r* in adult rhesus monkey testis. Conclusions: Present results indicate for the first time the presence of Kiss1 and Kiss1r in adult primate testis. These suggest a possible autocrine/paracrine role of kisspeptin in non-human primate testis. Kiss1-Kiss1r in testis suggests possible direct involvement in the regulatory network involved in spermatogenesis.

**Keywords:** Immunohistochemistry • Spermatogenesis • Germ cells • Sertoli cells

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## 1. Introduction

Kisspeptins (Kiss1) are encoded by the *KISS1* gene and act through GPR54 (now termed Kiss1r) [reviewed in 1]. The gene was originally discovered as a metastasis-suppressor in 1996 [2] and the gene product is a 145-amino acid peptide, from which is cleaved a 54-amino acid protein known as kisspeptin-54 [3], Kiss1r was initially described in the rat in 1999 [4] and shortly thereafter, the human homolog of GPR54 (KISS1R) was identified [5]. Kiss1 are products of the *KISS1* gene and are RF-amide (Arg-Phe-NH<sub>2</sub>) peptides that were described in 2001 as ligands for Kiss1r [5-7].

Kiss1 neurons are found in the arcuate nucleus and the anteroventral preoptic nucleus in the brain [8,9] and the Kiss1 peptides play a significant role in initiating

puberty and reproductive function. Two research groups working independently in 2003 described a pivotal role of Kiss1-Kissr signaling in reproduction specifically that mutations in *KISS1R* were associated with the idiopathic hypothalamic hypogonadism and impaired pubertal maturation found in their patients [10,11]. Studies in a wide range of species now show that Kiss1 stimulates gonadotropin secretion [reviewed in 12]. Kisspeptin-10 is the shortest form of Kiss1 and elicits secretion of GnRH as measured in the CSF of sheep [13] and in hypophysial portal blood [14]. Consistent with its role within the brain, the *Kiss1r* is expressed by GnRH neurons [13,15,16].

Peripheral expression of Kiss1 and Kiss1r has also been observed in several tissues. The human placenta expresses *KISS1* and *KISS1R* and lower levels of

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