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**Title: Regulation of Spermatogenesis: an evolutionary biologist´s perspective**

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Abstract

This review describes the regulation of spermatogenesis taking into consideration the hypothalamic-pituitary gonadal axis, the male reproductive organs and the endocrine and paracrine factors involved in the control of sperm production and the release of androgens. Instead of detailed descriptions of many hormones and growth factors, we attempt to provide an integrative and evolutionary view by comparing different species and considering their specific needs for successful male reproduction. The review focuses on species specific differences in the structural organization of spermatogenesis and indicates that the crucial regulatory mechanisms controlling sperm output are targeted towards differentiating spermatogonia when they initiate clonal expansion. We argue that the further differentiation of germ cells is following a highly coordinated and strictly predetermined morphogenetic cascade widely independent of hormonal control. We propose a hypothetical “ancient” model. Spermatogenesis and steroidogenesis are controlled by a master switch (GnRH pulse generator) under whose control two separate feedback systems provide independent control of androgen (LH-testosterone) and sperm production (FSH-inhibin). This scenario offers high flexibility and has seen uncountable adaptions to optimize the specific needs of different species. Models for the hormonal regulation in hamsters, laboratory rodents and primates are presented to illustrate the species specific diversity.

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