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Theriogenology 74 (2010) 1707–1712
Theriogenology
www.theriojournal.com

Technical note

Immunohistochemical localization of aromatase during the development and atresia of ovarian follicles in prepubertal horses

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Received 21 July 2009; received in revised form 15 April 2010; accepted 18 April 2010

Abstract

Ovarian steroidogenesis from the neonatal to pubertal period in horses is poorly understood. This study was designed to immunolocalize cytochrome P450 aromatase in the ovarian follicles of slaughtered fillies ages approximately (I) 6–9 mo (<10MF); (II) 1 y (1YF); and (III) 1.5 y (1.5YF). The ovaries of adult mares were used as controls. In each age group, immunoreactivity for P450arom was observed in the mural granulosa of nonatretic follicles >5 mm in diameter. Staining intensity was dependent on the size and morphology of the follicle. In nonatretic follicles 5–10 mm in diameter, the reaction was weak and heterogeneous, while most intense staining was observed in preovulatory follicles. In follicles (diameter <20 mm) in the groups <10MF and 1YF, the reaction was less intense than in adult mare follicles of similar size. In each age group, several follicles with early or advanced signs of atresia exhibited a heterogeneous staining pattern, which subsequently disappeared in late atretic follicles. No immunoreactivity was detected in the theca interna, preantral follicle, or stroma cells. Our observations reveal that the mural granulosa of viable follicles in fillies about 6–18 mo old contains aromatase, indicating that the ovary is capable of estrogen synthesis. Immunoreactivity for P450arom was dependent on follicle size and disappeared in atretic follicles.

Keywords: Fillies; Follicles; Aromatase; Immunohistochemistry

1. Introduction

In females, the development of ovarian follicles, ovulation, and puberty are strictly related and depend on the hypothalamic-pituitary-ovarian axis. Studies to date have suggested that, unlike the situation in rats [1], sheep [2], or cows [3,4], prepubertal horses (at least 2–10 months old) show no feedback between the ovary and the hypothalamic-pituitary axis [5–7]. Prior to sexual maturity in fillies, FSH secretion and follicular growth seem to occur as independent processes. Follicles grow in a wave-like fashion and then regress, while a low LH concentration prevents the development of the dominant follicle [6,7]. In prepubertal rats, increased estradiol secretion has been shown to stimulate the first, preovulatory surge of LH [1,8]. In 6 mo old cows, exogenous estradiol was found to induce the release of LH and ovulation [4].

Ovarian steroidogenesis from the neonatal to the pubertal period in horses has been poorly investigated. So far, studies have focused on examining blood serum estradiol and/or progesterone concentrations in fillies [9,10]. These studies have identified high concentrations of both hormones in newborn fillies, followed by a decrease to undetectable concentrations in the first weeks of life. Progesterone concentrations seem only to increase during the first estrous cycle, while estradiol

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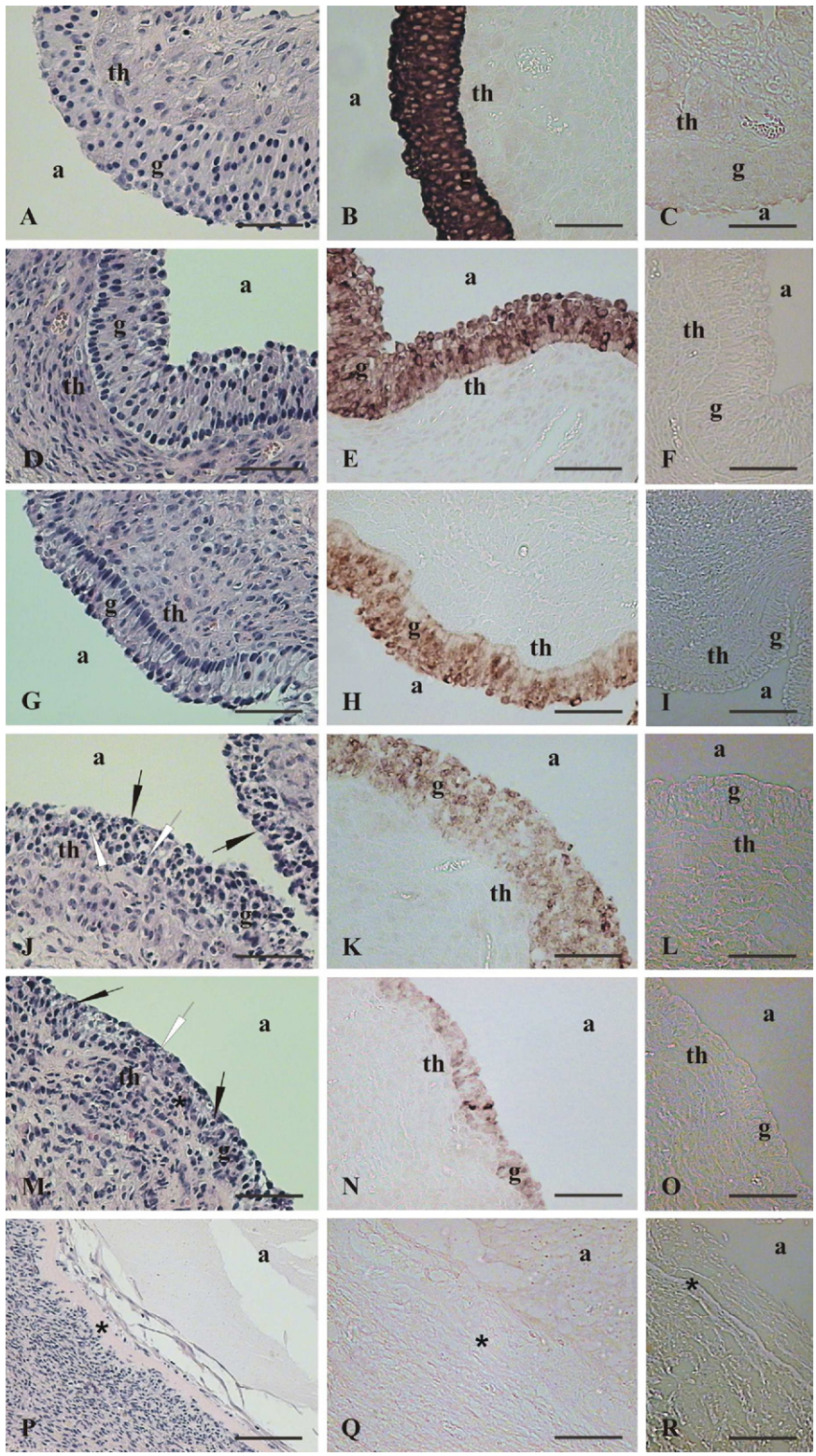
doi:10.1016/j.theriogenology.2010.04.019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