Endocrine and molecular changes in the equine follicle associated with ageing in mares
A. Claes, B.A. Ball, K.E. Scoggin, C.E. Fedorka, E.L. Squires, M.H.T Troedsson
Gluck Equine Research Center, Department of Veterinary Science, University of Kentucky, Lexington, KY

Reproductive ageing in mares is an important process that is associated with reduced fertility. The objective of this study was to examine age-related differences in follicular dynamics, hormone concentrations, and gene expression in granulosa cells of growing and dominant follicles in mares of various ages. Young (n=10), middle-aged (n=16), and old (n=17) mares were examined using transrectal ultrasonography to track follicular growth during two to three estrous cycles, and total antral follicle counts were determined at least once during each estrous cycle. Granulosa cells were collected from small growing (n=17, 15-20 mm) and dominant follicles (n=14, 35 mm) of excised ovaries after completion of the study. Progesterone and follicle stimulating hormone (FSH) concentrations were measured during the first estrous cycle using an ELISA and RIA, respectively. The gene expression of the FSH receptor (FSHR), luteinizing hormone (LH), LH receptor (LHR), and estrogen receptor β (ERβ) in granulosa cells was examined by qRT-PCR. The influence of age on reproductive parameters and mRNA transcripts was examined using a mixed model. Old mares had a significantly longer inter-ovulatory interval and follicular phase, lower number of antral follicles, and the day of deviation occurred later than in younger mares. The diameter of the pre-ovulatory follicle had a tendency to be smaller in old mares. Concentrations of FSH were significantly higher during the follicular phase in old mares, while progesterone concentrations had a tendency to be higher in old and middle-aged mares. Finally, the expression of FSHR, LHR, and ERβ within growing or dominant follicles was not significantly influenced by mare age. In contrast, the FSHR and ERβ were significantly upregulated in growing follicles compared to dominant follicles whereas the LHR was upregulated in dominant follicles. In conclusion, ageing in mares is associated with reproductive and endocrine changes, whereas molecular changes within the follicle are related to the stage of follicular development, rather than mare age.

Keywords: Age, mare, follicular dynamics, endocrinology, gene expression