Inhibin A and Antral Follicle Numbers Correlate in Mares Subjected to Follicular Growth Manipulation

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The optimal time for a mare's oocytes to be collected for the purposes of in-vitro fertilization (IVF) and efficient in-vitro production (IVP) of embryos is complex and riddled with uncertainty. In order to increase the odds that the greatest number of IVP embryos will be obtained, the current culture within the world of assisted reproduction is to transvaginally aspirate (TVA) oocytes from follicles, but only after peak follicle numbers have been counted following repeated transrectal ultrasonographic examinations (US). A quantifiable biomarker able to identify the ideal time to perform TVA within a mare's estrous cycle, essentially replacing the need for repeated invasive and labor-intensive US exams, is non-existent. Inhibins originating from the gonads are protein complexes that possess an alpha subunit and give rise to inhibin A or inhibin B forms. These glycoprotein hormones play a pivotal role in follicular dynamics by regulating follicle stimulating hormone (FSH) release from the pituitary gland. Historically, these two biologically active forms of inhibin (A and B) have been difficult to individually quantify due to the lack of antisera specificity during inhibin assay development. The aim of our project was to determine if serum concentrations of inhibin A correlated with the number of antral follicles present on mare ovaries as determined by repeated US examinations. If such a correlation exists, identification of the ideal day(s) for TVA of oocytes by real-time measurement of inhibin A may be futuristically feasible. As part of another ongoing trial, six mares underwent treatment with a Proprietary Drug(designed to manipulate follicular growth), while four mares were utilized as untreated Controls. On Day 0, all mares underwent TVA of ovarian follicles for the purposes of ablation/synchronization; thereafter, on Days 1-5 and 8, transrectal US was performed, the number of antral follicles were documented, and serum was collected and stored for inhibin-A ELISA. There was no difference in inhibin A serum concentrations or antral follicle numbers between the Proprietary Drug and the Control mares (T-Test, $p = 0.42$ and $p = 0.48$, respectively); therefore, the following results are reported utilizing pooled data. The mean serum concentration of inhibin A was 22.3 pg/mL (range of 0 - 86.79 pg/mL) and the mean antral follicle count was 2.79 follicles; on Day 1, mare antral follicle numbers ranged from 0-2 and by Day 8 ranged from 2-11. A positive correlation between inhibin A concentration and antral follicle number was identified (Corr SAS, $p = 0.047$). Recent work has speculated that inhibin A is a more accurate biomarker and indicator of the ovarian-pituitary axis response to ovarian gonadotropin stimulation compared to inhibin B and anti-mullerian hormone. Inhibin A peaks around the time of ovulation in the mare and reaches its lowest point around the time of mid-luteal phase (i.e. the two weeks following ovulation); utilizing this information in combination with our results, inhibin A provides promise as a biomarker for identifying the ideal day(s) for TVA of oocytes and increasing the efficiency of IVP of embryos.

Keywords: Equine, inhibin A, antral follicle, in vitro