

## Evaluation of Anti-Müllerian Hormone Plasma Levels as a Predictor of Pregnancy Outcome in the Rhesus Macaque

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Due to their close evolutionary relationship to humans and aptness of the species for creating disease and developmental models, the rhesus macaque is one of the most utilized non-human primates in biomedical research. To maintain an appropriate population for research progress, and provide developmental models for study, the success of time-mated breeding programs is critical. Key factors in time-mated breeding include menstrual and hormone tracking, ovulatory phase assessment, timed-pairing, and early pregnancy confirmation. Here, we focused our efforts on evaluating if ovarian cycle day 3 plasma levels of anti-Müllerian hormone (AMH), a known biomarker for ovarian reserve, can predict pregnancy outcome in naturally cycling rhesus macaques.

Previously, our laboratory demonstrated that day 3 plasma levels of AMH could be used as a predictor of oocyte yield following a controlled ovarian stimulation; therefore, we hypothesized that a correlation between AMH collected on day 3 could also be used to predict pregnancy outcome in a naturally cycling population. A total of  $n=83$  plasma samples from  $n=44$  animals were collected and AMH levels were quantified by ELISA (AnshLabs, AL-105). Data were interrogated by Pearson's coefficient and Point-biserial correlation coefficient; our results indicated no significant correlations between AMH levels and pregnancy outcomes for a given cycle ( $r_{pb} = -.110$ ,  $p = .322$ ). There was also no relationship between AMH and number of previous pregnancies ( $r_{pb} = -.183$ ,  $p = .097$ ), nor AMH and total number of pregnancies ( $r_{pb} = -.179$ ,  $p = .105$ ). As expected, we observed a negative correlation between AMH levels and age of the animal ( $r = -.231$ ,  $p = .035$ ), in that the older the animal, the lower the AMH value. Interestingly, we observed a positive correlation between AMH levels and estradiol surge day ( $r = .306$ ,  $p = .005$ ), but not peak estradiol levels ( $r = .034$ ,  $p = .762$ ).

We conclude that AMH does not serve as a reliable metric for determining animal success, characterized by pregnancy outcome, in a time-mated breeding program. These data indicate that the connection between AMH and age may aid in establishing a screening metric for reproductive potential when selecting new animals, and in assessing animals currently within the time-mated breeding program. Additionally, taking the relationship between estradiol peak day and AMH into consideration may allow for more accurate assessments of individual animals' ovulation cycles. This is an essential component in time-mated breeding in advising appropriate day of pairing, in addition to tailoring total number of days paired to match predicted ovulation days. The correlation between AMH and estradiol surge day indicates a relationship to ovulation; investigation of AMH and ovulatory factors, such as luteinizing hormone, should be assessed. Further research on prematurely diminishing or non-cycling levels, as well as supplementation, of AMH in the rhesus macaque is needed to identify possibilities of promoting or extending reproductive fecundity.