



Ovarian Follicular Structures in Mexican Wolves: Clues to Infertility



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Background

Mexican wolves are carefully monitored and their reproduction controlled due to their endangered status. The genetic variability in this species is low due to inbreeding, which lowers their reproductive success and overall population health. Initial review of archived ovarian specimens identified multiple abnormal and normal variations between the animals. Among these, variations in the degrees of follicular atresia were identified for more detailed investigation. Follicular atresia is a common part of development, and typically occurs at the antral stage (follicles > 17 mm in size). A high incidence of follicular atresia in underdeveloped follicles may serve as a clue to this species' low reproductive success. The incidence of atresia was recorded to identify possible correlations with age, parity, and other diseases.

By understanding the role and possible causes of pre-antral atresia in Mexican wolves' reproductive tracts, we can target interventions in poorly reproducing animals in the Mexican wolf population.



Purpose

Objective: To determine the factors that influence the presence and extent of follicular atresia in the Mexican wolf ovaries.

Hypothesis: The incidence of atresia in pre-antral ovarian follicles will be influenced by stage of the estrous cycle, previous pregnancy, presence of other disease states, and past contraception.

Materials

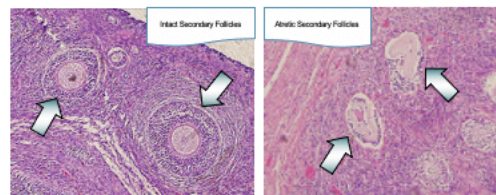
Stained H&E 5 um thick sections of ovarian tissue taken from captive Mexican wolves in the Reproductive Health Surveillance Program archive were gathered for analysis (see "Reproductive Health Surveillance In Zoo And Wildlife Medicine" by Agnew and Moresco for details). These ovaries were collected and submitted after elective sterilization or post-mortem examination. Samples included tracts from 29 female wolves, taken at sterilization or death. The contraceptive and medical history of each animal was provided by the submitting institutions.

Methods

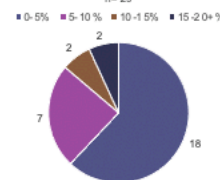
Slides were examined using an Olympus BX41 microscope, digital images were collected, and then analyzed using Image Pro® software. Ovarian structures were analyzed and scored subjectively based on the degree of follicular atresia present in individual follicles.

Structures such as corpora lutea and tertiary follicles were identified in order to establish the stage of the estrous cycle.

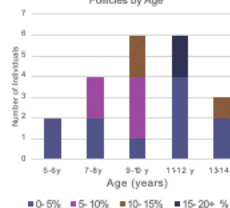
Results



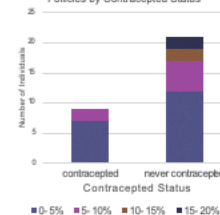
Incidence of Atresia in Secondary Follicles
n= 29



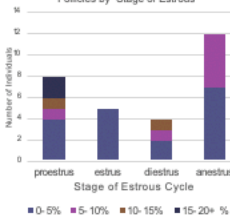
Incidence of Atresia in Secondary Follicles by Age



Incidence of Atresia in Secondary Follicles by Contracepted Status



Incidence of Atresia in Secondary Follicles by Stage of Estrous



Conclusion

Follicular atresia is a common phenomenon in Mexican Wolf ovaries, and the results of this study show that it may be correlated with factors such as age, contracepted status, and stage of the estrous cycle.

Previous research has indicated that the incidence of follicular atresia is influenced by stage of the estrous cycle (Rasby and Vinton), age (Vollenhoven and Hunt), as well as contracepted status (Danforth and Hodgen). The results of this study do not contradict any of these findings, but the sample size is admittedly too small to confirm or deny these previous findings.

These results indicate that the incidence of pre-antral atresia increases with age and decreases when contraceptives are used. In addition, the highest incidence of atresia is found in the follicular phase (proestrus and estrus) of the Mexican wolf's estrous cycle.

The mean incidence of atresia in secondary follicles was found to be 5.4% (n = 29).



Next Steps

Because these samples can only be collected opportunistically, sufficient numbers in each category of contraceptive history, parity, and health status at the time of sample collection could not be controlled. Future studies may be able to achieve a larger sample size and reliably obtain intact ovarian tissues for each case.

Moving forward, we plan to look at other features including inflammation and ovarian dysfunction as possible effects of inbreeding on the reproductive health of this species. In addition, identifying any correlation between ovarian changes and genetic background by tracing the familial ties within this species may allow us to find genetically-linked diseases that undermine the overall population health.

References and Acknowledgements

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