



RHSP Reproductive Health Surveillance Program

IMPROVED SUSTAINABILITY THROUGH PATHOLOGY

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How Reproductive Pathology Research Improves Sustainability

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Fertile animals are essential for the sustainability of breeding programs and safe contraception is key to managing a breeding program by temporarily controlling reproduction in selected individuals. However, extended periods of contraception can affect long-term fertility. The **Reproductive Health Surveillance Program** has evolved over the 25 years since its inception. Originally started by Dr. Munson to specifically monitor the adverse effects of contraception in zoo animals, we now examine the effects of additional factors like age and other reproductive management practices (e.g. separating genders), on the development of lesions in the reproductive tract (reproductive pathology) that would affect reproduction.

Why Reproductive Pathology?

The study of reproductive pathology allows us to evaluate the effect of certain management practices (separation, breeding, contraception) on fertility. However, in order to carry out those studies we rely on tissues and history from animals who have died or who have been spayed or castrated. The RHSP then evaluates the association of specific risk factors (such as age, contraception, breeding, etc.), to the occurrence of certain lesions (such as cancer, hyperplasia, inflammation etc.). These associations allow the Reproductive

Management Center (RMC) to update recommendations on which contraceptive or other breeding practice is the preferred method for certain species. In animals that have not been exposed to contraception, this research allows us to identify the common lesions to help avoid them or to treat them by altering management practices.

A Treasure Trove for Comparative Research

The RHSP has compiled a large set of reproductive tracts from a wide variety of species since its inception in 1992. Surveillance archives are key to providing a relatively large number of samples in a short time. Because we can't foresee what challenges or questions lie ahead, a broad collection of tissues provides the material to answer new questions with samples that have already been collected. For long-lived species this could mean 20+ years of samples at the disposal of researchers without having to wait 20 years to collect the samples prospectively. Comparative information about contraceptive or management methods that are no longer used would be impossible to collect prospectively.

The RHSP collects and maintains tissues in formalin, paraffin and glass slides; therefore the collection has genetic material in addition to material for histopathological evaluation. As animal management takes advantage of more and more sophisticated genetics methods, it may be necessary to look at founder animals that have already died (see jaguar project below). An archive such as the RHSP is key to answering questions like: *Was a genetic mutation unknowingly bred into the current population or did it come from the wild? At what age do females start developing uterine disease if they are not bred? Are there different effects on the uterus between the different contraceptives?* These studies cannot be accomplished without a curated archive. To exist, the RHSP needs tissues to be submitted as well as funds to process samples and maintain the archive.

STATS IN A FLASH

- > **>25 YEARS OF DATA**
- > **> 3,000 ARCHIVED REPRO TRACTS**
- > **> 350 SPECIES**
- > **190 ZOOS & AQUARIA PARTICIPATE**
- > **16 UNIVERSITIES PARTICIPATE**
- > **> 40 PUBLICATIONS**
- > **IDEAL FOR COMPARATIVE RESEARCH**
- > **ARCHIVE IS AVAILABLE TO COLLEAGUES FOR COLLABORATIVE PROJECTS**

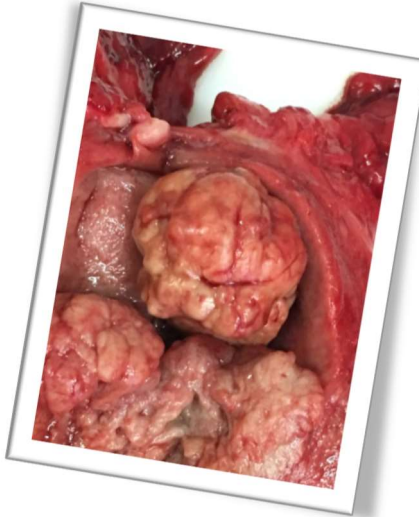
Gorilla Endometrial Adenocarcinoma

Just like women, great apes can get endometrial adenocarcinoma. However, gorillas are more at risk than other great apes. Many gorilla cases present the risk factors seen in women: obesity, no previous offspring, middle-aged, and contraceptive use. But we do not know if any of these risk factors truly have an effect in gorillas. Many features of the species as well as the disease itself are similar between gorillas and humans. As oncology and zoo veterinary medicine progress, we apply treatments developed for women to our great apes. Zoos are limited by the fact that daily chemotherapy is not possible in gorillas. Relatively little is known about the histologic markers in gorilla endometrial cancer: Do the markers used in human medicine work in gorillas? What do they mean? Can we use them to predict disease progression (prognosis)?



Among great apes, gorillas (*Gorilla gorilla*) have the highest risk of developing endometrial adenocarcinoma, a disease that can lead to infertility and even death. Photo: A. Moresco.

Just like in people, endometrial carcinoma that has progressed can cause severe pain in the patient and will permanently hinder reproduction. We are currently validating markers used in humans for use in gorillas. The RHSP archive will provide additional cases to test the markers. The disease presents an invaluable opportunity to carry out comparative research on an important species. **How does this help management?** It helps conservation efforts by providing data that can inform treatment and prevention of this cancer in gorillas, thereby reducing mortality among females in this endangered species.



Gross pathology image of endometrial adenocarcinoma in a gorilla. Photo: A. Moresco.

Reproduction and Contraception in Giraffe

The RHSP archive, the RMC and EAZA Reproductive Management Group databases, the Giraffe SSP, and Colorado State University have pooled their resources to paint a comprehensive picture of what reproduction and contraception look like in managed giraffe populations. Giraffe are very prolific breeders in human care; therefore, contraception has become an important part of their management. But in the wild they are fast disappearing, underscoring the need for an insurance population that is stable in zoos.



Giraffe are successful breeders in managed care, necessitating contraception for their successful management. Photo: A. Moresco

To improve their management we need to learn as much as we can about their reproduction and the effects of the various contraceptives on their health and reproductive ability, including naturally occurring reproductive histologic lesions and those potentially associated with contraception.

For example, we have already learned that calves from first time mothers are not more likely to need hand-raising than calves from more experienced females. We have also learned that males are more likely to die than females in the first couple of weeks of life, but after that, the risk is the same.

This project has also provided an opportunity to involve two master's students, getting the next generation of researchers and conservationists going.



Drs. Anneke Moresco and Dalen Agnew have been Co-directors of the RHSP since 2009. In order to carry out this important work, the RHSP requires ongoing financial support to process, maintain, and study the tissue archives and grow the database. Current funding is inadequate to fully support the goals of the RHSP, but important research is still on-going.

RHSP Mission Statement

The Reproductive Health Surveillance Program (RHSP) is committed to understanding the normal and pathologic processes that affect the reproduction of wild animals through 1) the stewardship of an archive of reproductive tissues and life history data from a wide variety of species; 2) collaboration with zoos and scientists; and 3) communication of these findings to the zoo and wildlife community.