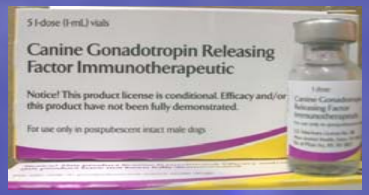
Gonadotropin Releasing Hormone Vaccination for Immunocastration in Male Dogs

Katherine M. Peed[a], Steve Lamb[b], Michelle A. Kutzler[c]
[a]Bioresource Research Major, Oregon State University, Corvallis, OR, USA
[b]Endocrinology Laboratory, Animal Health Diagnostic Center, Cornell University, Ithaca, NY, USA
[c]Companion Animal Industries, Department of Animal Sciences, College of Agricultural Sciences, Oregon State University, Corvallis, OR, USA



Introduction

•The Humane Society of the United States estimates that each year between four and six million dogs and cats are euthanized because there are not enough homes for them.
•Many veterinarians within the U.S. recommend surgical sterilization (neutering) for population control in dogs and cats. However, non-surgical methods exist for the control of reproduction.
•Over the past two decades, efforts have been made to develop a vaccine that could suppress fertility in both female and male canids and felids. Several targets of immunocontraception have been identified including Gonadotropin releasing hormone (GnRH).
•Development of GnRH vaccines for immunocontraception is problematic because GnRH is a small decapeptide hormone that is not immunogenic. Subsequently, administration of a vaccine derived from only GnRH results in no antibody production.
•However, if GnRH is altered in a way that induces recognition of itself as a foreign material, such as coupling it with another molecule with many antigenic determinants, an IgG response will occur.[1]
•The purpose of this study was to determine if a commercially-available canine gonadotropin releasing hormone (GnRH) vaccine[2], labeled for the twice annual (every 6 months) management of benign prostatic hyperplasia, would also be effective for immunocastration in male dogs.
•The hypothesis was that, in addition to stimulating anti-GnRH antibody formation, vaccination against GnRH would also decrease testosterone concentration and testes size for at least six months.

[1]Mitchison WA. The carrier effect in the secondary response to hapten protein conjugate. *Eur J Immunol* 1971;1:10-18.
[2]Due to insufficient product sales, this vaccine is no longer commercially-available.

Materials & Methods

•Canine Gonadotropin Releasing Factor Immunotherapeutic® (Pfizer Animal Health; Exton, PA) was subcutaneously administered (1 mL) to intact male dogs (n=6) twice at 4 week intervals.
•Testicular volume was determined at 4 week intervals.
•Venous blood samples (3-5 mL) were collected prior to vaccination and then every four weeks.
•Blood was centrifuged and serum was separated. Serum samples were maintained at -20°C until analyzed.
•Serum GnRH antibody concentrations were determined every 4 weeks for the duration of the study using an enzyme-linked immunosorbent assay.
•Serum testosterone concentrations were measured using a double-antibody radioimmunoassay (Diagnostic Products Corporation, Los Angeles, CA).
•Data were compared using a one-way ANOVA and significance was defined at $p<0.05$.

Results

•Testicular volume was significantly reduced at week 8 compared to weeks 0 and 4 but no longer different after 12 weeks following vaccination (**Fig. 1**).
•Testosterone concentrations were significantly reduced at weeks 8 and 12 compared to week 0 but not after 16 weeks following vaccination (**Fig. 2**).
•No GnRH antibodies were detected at week 0 but all dogs had detectable titers by week 8, which began to decrease by 12 weeks following vaccination (**Fig. 3**).

Conclusion

•The results of this study indicate that *Canine Gonadotropin Releasing Factor Immunotherapeutic®* induces a short-lived humoral response against GnRH with a reduction in testosterone concentration and testicular volume. However, the brief duration of efficacy following vaccination makes this protocol not clinically applicable for immunocastration.

Acknowledgements

• We thank Pfizer Animal Health for product donation and Susan Craig for assistance with poster preparation.

Figures

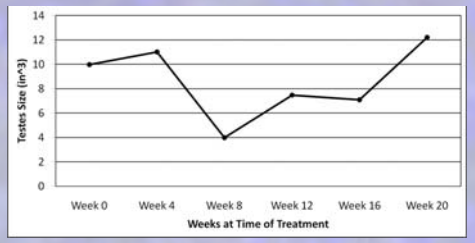


Figure 1. Mean testicular volume following GnRH vaccination.

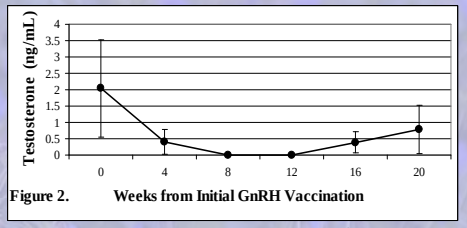


Figure 2. Mean ± SD testosterone concentrations following GnRH vaccination.

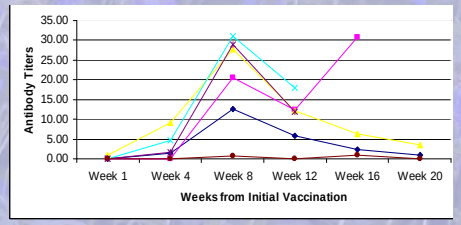


Figure 3. Individual GnRH antibody titers following GnRH vaccination.