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Temporal Changes in Serum Luteinizing Hormone following Ovariohysterectomy and Gonadotropin Releasing Hormone Vaccination in Domestic Cats

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Luteinizing hormone dynamics in domestic cats are well-characterized for natural breeding and induced ovulation, but other aspects of the feline hypothalamic-pituitary-gonadal (HPG) axis are poorly understood. From an applied perspective, measurement of circulating LH concentrations and its temporal changes following ovariohysterectomy (OHE) or possibly GnRH vaccination may be informative for assessing fertility or contraceptive status of cats. In dogs, for example, spayed females exhibit higher LH levels than in intact bitches, providing veterinarians with a potentially useful method for diagnosing previous sterilization[1]. In cats, a similar relationship has been suggested, but comparative LH data for intact vs. spayed females are limited[2]. In this study, our objectives were to 1) assess acute changes in serum LH levels following OHE of domestic cats; 2) compare basal LH levels in cats prior to OHE vs. multiple years after OHE; and 3) evaluate changes in LH values in spayed cats following treatment with a GnRH vaccine. For this study, blood samples were collected from six intact female cats prior to OHE and at 30, 60, 90 and 120 days post-OHE. Blood samples also were collected from four females subjected to OHE 1.6 years previously. These four cats then were treated (1 or 2 injections, 60 days apart) with a GonaCon immunocontraception vaccine (National Wildlife Research Center, APHIS, USDA) and additional blood samples collected for 3-5 months post-vaccination. All frozen (-80°C) serum samples were thawed and assessed for LH concentrations on the same day using an enzyme-immuno assay previously validated for domestic cats[3]. Basal serum LH concentrations (2.67 ± 0.43 ng/ml; mean ± SEM) in intact females increased (P<0.01) by 30 days post OHE (5.65 ± 0.87 ng/ml) but then declined (P<0.05) to pre-OHE levels (mean range, 3.26 - 3.62 ng/ml) at day 60 to 120 post-OHE. Serum LH (3.84 ± 0.51 ng/ml) in four females spayed 1.6 years previously tended to be higher (P=0.10) than those of intact females prior to OHE. Three months following first or second GonaCon treatment the serum LH values in the long-term spayed females decreased (P<0.05) to concentrations (2.07 ± 0.37 ng/ml) that were similar to those observed in intact females. In this study, selective disruption of the HPG axis, through OHE and GnRH vaccination, has provided us with new insights into the functionality of the feline gonadotrope. Our preliminary results suggest that OHE of domestic cats causes a marked increase in basal LH levels within the first few weeks after spaying followed by a return to pre-OHE basal values over the next several months. Similar to findings in dogs, LH levels in cats greater than one year after OHE appear to be elevated compared to non-spayed females. It is unknown if elevated LH has any health consequences in spayed cats, but treatment with a GnRH vaccine may be beneficial for returning LH to basal concentrations observed prior to OHE.