

Evidence that Equine Relaxin Is a Good Indicator of Placental Insufficiency in the Mare

Peter Ryan, PhD; Wendy Vaala, VMD; and Carol Bagnell, PhD

Data presented here support the hypothesis that serum relaxin is a reliable indicator of placental insufficiency in mares. Relaxin, as a biological marker of placental function and fetal well-being, may provide veterinarians with a useful diagnostic tool to help reduce the incidence of late-term abortions and stillbirths in horses. Authors' addresses: Dept. of Molecular Biology, Princeton University, Princeton, NJ 08544 (Ryan); Mid-Atlantic Veterinary Clinic, P.O. Box 188, Ringoes, NJ 08551 (Vaala); and Dept. of Animal Sciences, Rutgers University, New Brunswick, NJ 08903 (Bagnell). © 1998 AAEP.

1. Introduction

There is a need to identify a hormonal indicator that reflects placental and fetal well-being in the horse. Pregnancy loss during the third trimester and perinatal mortality of foals are unacceptably high. Relaxin is an important hormone during pregnancy and parturition in a number of species.¹ It is a reliable indicator of early pregnancy loss in women, and it has been suggested that relaxin might be a useful epidemiological tool in these cases.² There is evidence that the aborting horse³ and dog⁴ exhibit depressed serum relaxin prior to pregnancy loss. Giles and colleagues⁵ reviewed pathology case records of 3500 aborted fetuses, stillbirths, and foals that died within 24 h of birth, and they determined that over 60% of the deaths were associated with placental insufficiency. Subsequent studies have identified placentitis as the single most common factor contributing to late-term abortion and perinatal death of foals.⁶ Since the placenta is the primary source of relaxin in the mare, the objective of this study was to survey serum relaxin concentra-

tions in mares with normal pregnancies and those with problematic pregnancies (placental insufficiency) and parturient complications.

2. Materials and Methods

Blood samples were drawn (weekly) from 12 mares (light breeds) with pregnancy complications from time of admission to the New Bolton Center, University of Pennsylvania, until delivery. Samples were obtained from mares with placentitis, premature placental separation, pituitary tumor, twin pregnancies, prolonged gestation, hydrops, oligohydrallantois, thrombocytopenia, and dystocia. Serum from ten Standardbred mares with normal pregnancies and deliveries served as controls. The relaxin concentration in serum was determined by using a homologous equine relaxin radioimmunoassay.⁷ The pregnancies of control mares were normalized to obtain an average length of gestation of 343 days. Serum relaxin comparisons were made on blood samples collected during the last 15 weeks of gestation. Results were analyzed by an analysis of vari-

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ance and Fisher's protected least-squares difference test.

3. Results

Normal serum concentrations of relaxin in pregnant Standardbred (control) mares in the last trimester ranged from 45 to 85 ng/ml, with a mean weekly value of 63 ± 5.0 ng/ml during the last 7 weeks. Our results showed that there was a significant ($p < 0.05$) decline in serum relaxin concentrations in mares with problematic pregnancies. In one mare with placentitis, relaxin concentrations declined during the last 45 days of gestation from 53 ng/ml (day 298 of gestation) to a low of 33 ng/ml (day 312), with an average concentration of 46 ± 4.4 ng/ml. Serum relaxin was severely depressed in two mares with pituitary tumors, with mean levels of 14.1 ± 0.9 and 8.6 ± 1.8 ng/ml. Two mares with pregnancy-related fluid problems, one with hydrops and the other with oligohydrallantois, had variable relaxin titers, with mean values of 33.2 ± 8.4 and 42.3 ± 4.4 ng/ml, respectively. The foal from the latter mare was euthanized at birth as a result of severe hypoxia and sepsis. The average serum relaxin concentrations in a mare with a twin pregnancy were 32 ± 13.7 ng/ml (day 244 = 68.9 ng/ml; day 301 = 6.1 ng/ml; delivered on day 332; and one foal died at birth and the second was euthanized at 4 weeks of age). The average serum relaxin concentrations in one mare with prolonged gestation were 36.2 ng/ml ± 4.1 . In contrast, the relaxin profile of a mare experiencing dystocia at term was not markedly different from that of mares with normal pregnancies and deliveries. In all pregnancies in which serum relaxin concentrations were low, foals were born hypoxic and dysmature but survived with medical intervention.

4. Discussion

These preliminary findings support the hypothesis that relaxin has the potential to serve as a hormonal marker for assessing placental function and fetal well-being in the mare. To our knowledge, at present there is no simple biochemical diagnostic aid that is available to veterinarians to predict problematic pregnancies and deliveries and reduce the incidence of late-term abortions and stillbirths in horses.^{5,6} Further studies are necessary to correlate more precisely the relationship between complicated pregnancies, placental insufficiency, and serum relaxin concentrations in horses.

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