Effects of altrenogest treatment and age of the mare on conceptus growth and secretion of reproductive hormones during early pregnancy

Jörg Aurich, a,b Conrad Willmann, a Gerhard Schuler, b Bernd Hoffmann, c Nahid Parvizi, d Christine Aurich, a,b
a Graf Lehndorff Institute for Equine Science, Neustadt (Dosse), Germany; b University of Veterinary Sciences, Vienna, Austria; c Faculty of Veterinary Medicine, Justus Liebig University, Giessen, Germany; d Institute for Animal Science, Federal Animal Health Research Center, Mariensee, Germany

Embryonic mortality is a major reason for low reproductive efficiency in mares. Treatment of mares with repeated early embryonic loss with the synthetic progestin altrenogest has become routine in stud farm practice. However, no controlled studies on the efficiency of altrenogest administration to prevent embryonic losses and the potential mechanisms behind such treatment are available so far. In the present study, we have investigated effects of altrenogest treatment on conceptus development and the secretion of luteinizing hormone (LH), progesterone and equine chorionic gonadotropin (eCG) until day 100 of pregnancy in fertile broodmares of two age groups (4-8 years, >8 years). Mares were inseminated with fresh semen using standard procedures and treated orally with altrenogest (0.044 mg/kg once daily, Regumate®, Intervet/Schering-Plough Animal Health, Millsboro, DE) or placebo (sunflower oil, 10 ml once daily) from day 6 to 100 after ovulation. Blood samples were collected throughout the study and size of the embryonic vesicle and embryo/fetus was determined by ultrasound. Statistical comparisons were made with the SPSS statistics package (SPSS, Chicago, IL) by ANOVA using a general linear model for repeated measures. In case of overall significance, values differing from each other were identified by testing for least significant differences. A *P*-value < 0.05 was considered significant. Data given are means±SEM.

No difference in the per cycle pregnancy rate between altrenogest-treated (75%) and control mares (74%) was detected and all mares pregnant on day 12 after ovulation gave birth to healthy foals the next spring. A significant effect of age group but not altrenogest treatment on diameter of the embryonic vesicle was found on day 15 (control, 4-8 years: 22.9±1.0 mm, >8 years: 22.0±1.7 mm, altrenogest, 4-8 years: 26.1±2.0 mm, >8 years: 20.4±1.0 mm, *p*<0.05). Age of mares also significantly influenced size of the embryo on day 30 (*p*<0.05). Conceptus development is thus inferior in mares aged >8 years compared to mares 4 to 8 years of age. A positive effect of altrenogest on size of the embryo/fetus was detected on days 35 and 40 (*p*<0.05). In the control but not the altrenogest group, size of the embryo respective fetus was negatively correlated with age of the mares (day 30: *r*=-0.834, *p*<0.05; day 35: *r*=-0.506, *p*<0.05). The concentration of LH was neither affected by age nor by treatment of mares. For progesterone concentration, an interaction between day, treatment and group was detected between days 35 and 50 (*p*<0.05). An increase in eCG between day 40 and 49 was neither affected by age or treatment, but on days 79 and 89, a significant interaction of age and treatment (*p*<0.05) indicates a positive effect of altrenogest on eCG secretion in 4 to 8 year-old mares.

In conclusion, the present study demonstrates a positive influence of altrenogest treatment on delayed conceptus development in pregnant mares. This effect did not occur in early pregnancy but during the second critical phase of pregnancy when organogenesis is completed and placentation initiated between days 35 and 40. This justifies altrenogest treatment of older mares or those with a history of early embryonic death to support conceptus development.

Acknowledgement

This study was supported by the Mehl-Muelhens Foundation.