

Study Examines Pregnancy Loss, 'Treg' Cell Relationship

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Some veterinarians hypothesize that overactive immune responses in mares can cause early pregnancy loss, and new research results show that a reduction in a certain kind of immune system cell could be a red flag for diagnosing equine miscarriage.

“Irrespective of the age of the mare, the majority of conceptus losses occurs in early pregnancy (until Day 35 after ovulation),” said Christine Aurich DVM, PhD, professor at the Graf Lehndorff Institute in Neustadt, Germany, and at the University of Veterinary Sciences in Vienna, Austria. “Morphologic defects, inadequate embryonic growth, or an inappropriate embryonic signal are suggested to cause failure of maternal recognition of pregnancy in the horse. However, early pregnancy loss often occurs repeatedly in the same mare, and it seemed worthwhile to look into immunological causes.”

In horses, as in all mammals, an implanting embryo carrying paternal cells is a foreign intruder in the uterus. However, pregnancy usually sets off a series of immune-related events that block the immune system from rejecting the embryo. Scientists have found one particular kind of lymphocyte (a type of white blood cell that plays a central role in directing and coordinating immune response), called “T Regulatory” (or “Treg”) cells, to be particularly helpful in allowing mammal mothers to tolerate their embryos instead of destroying them. So Aurich and her research team set out to investigate how Treg cells relate to the success or failure of equine pregnancies.

In their study the researchers tested 108 broodmares' Treg levels just before pregnancy. The team checked the mares' pregnancy status via ultrasound on Day 40 to determine which animals experienced early pregnancy loss. Pregnancy loss after 40 days in horses is not considered “early” and is not assumed to be related to the mare’s intolerance of her embryo, Aurich said.

Upon reviewing their data, the team found that 17 (16%) of the study mares lost their embryos prior to Day 40, Aurich said, and the average Treg level in these mares' bloodstreams was significantly lower than that of the mares who delivered live foals. Furthermore, 91% of mares that experienced early pregnancy loss had suffered early pregnancy loss in the past. This suggests a problem with the mare and not with the embryo, Aurich said.

The Treg levels were not so different that they could have predicted pregnancy loss, Aurich added, and there were some mares with particularly low Treg levels who did carry to term. Still, a Treg count could help diagnose the reason for an early pregnancy loss, which could help the breeder prepare for future breeding seasons. Currently there is no approved treatment for increasing Treg count in broodmares, Aurich said. However, her team is working on a study that measures Treg levels at different stages of healthy equine pregnancies, which could help veterinarians understand how to manage low Treg levels.

In the meantime, supplementing problem mares with progesterone can be beneficial. “At present the treatment of choice is the application of the progestin altrenogest to mares,” said Aurich. “This treatment has to be started as early as Day 5 after ovulation. In two recent studies we could prove that this treatment enhances endometrial receptivity. In the light of the Treg study, it can be speculated that the progestin treatment also alters maternal tolerance.”

The study, "[Low levels of naturally occurring regulatory T-lymphocytes in blood of mares with early pregnancy loss](#)," has been accepted for publication in *Reproduction, Fertility and Development*.