Guest Editorial

Mating-induced endometritis: Physiology or pathology?

The article on mating-induced endometritis by Dr. Sarah Freeman and her colleagues at the University of Nottingham, published in a recent issue of The Veterinary Journal, provides further evidence for the clinical importance of mating-induced uterine inflammation and its potential role in reduced fertility of selected females (Freeman et al., 2013). Uterine inflammation in response to mating has been described in several domestic species, and although its mechanism might differ somewhat between species, the fundamentals seem to be consistent (Troedsson et al., 2002; Robertson, 2007; England et al., 2013).

Spermatozoa and, potentially, bacteria introduced into the uterus during mating, stimulate an innate immune response dominated by a rapid influx of polymorphonuclear neutrophils (PMNs) into the uterine lumen (Kotilainen et al., 1994; Rozeboom et al., 1999). The influx of PMNs is accompanied by an up-regulation of pro- and anti-inflammatory cytokines, resulting in the activation of multiple inflammatory pathways (Woodward et al., 2013). The inflammation is transient and in most cases is brief (Katila, 1995). PMN influx is a physiological reaction designed to eliminate excess spermatozoa and contaminating bacteria from the uterus, suggesting an essential role in normal fertility. The data presented by Freeman et al. (2013) and previous reports from the same group, support the concept that mating results in an inflammatory reaction characterized by an influx of PMNs into the uterine lumen in normal bitches.

However, if there is an underlying condition resulting in the persistence of mating-induced endometritis for a prolonged period of time, the inflammation can develop into a clinical condition. The group from the University of Nottingham has previously identified bitches with endometrial hyperplasia as susceptible to a clinical form of mating-induced endometritis, and they now suggest that post-mating inflammation could reduce fertility by reducing binding between spermatozoa and the uterine epithelium. Reduced fertility has also been associated with persistent mating-induced endometritis in sows and mares (Pycock and Newcombe, 1996; Rozeboom et al., 1997).

The reduced binding of spermatozoa to the endometrial epithelium in the presence of PMNs and some other unidentified factors in the uterine fluid is interesting and warrants further investigation. The interaction between spermatozoa and PMNs has been studied extensively in horses, and it has been demonstrated that sperm are bound to and then phagocytosed by PMNs, which reduces their ability to bind to epithelial cells (Troedsson et al., 2002; Alghamdi et al., 2004). Furthermore, extruded DNA from PMNs can trap spermatozoa, preventing binding to epithelial cells, as well as preventing transport to the oviducts (Alghamdi and Foster, 2005). It would be interesting to know if any of these mechanisms are present in bitches and if they are involved in reduced binding of spermatozoa to the uterine epithelium in the presence of inflammation.

Recent studies have implemented seminal plasma proteins in selective PMN-binding to dead, but not live spermatozoa (Troedsson et al., 2005). In contrast, cysteine-rich secretory protein 3 (CRISP-3) in seminal plasma was shown to reduce binding between live equine spermatozoa and PMNs, suggesting that this population of sperm can be safely transported to storage sites in the female reproductive tract even in the presence of an inflammation (Doty et al., 2011). It is not known if any of these seminal proteins also interact in the binding between spermatozoa and epithelial cells, or if proteins in canine seminal fluids are involved in binding between spermatozoa and the uterine epithelium.

All taken together, mating induced endometritis appears to be a beneficial physiological mechanism that can develop into a clinical condition with negative effects on fertility. Further knowledge of the physiological, pathophysiological and molecular mechanisms of the condition might shed light on currently unexplained causes of infertility. Identifying individuals at risk of clinical mating-induced endometritis, as well as developing effective treatment strategies to optimize fertility in these females, will be of great importance to veterinary clinicians and breeders. Research investigating mating-induced endometritis in all relevant species should be encouraged, and the article by Freeman et al. (2013) provides valuable information to build upon.

Mats H.T. Troedsson
Maxwell H. Gluck Equine Research Center, University of Kentucky, Lexington, KY 40546-0099, USA
E-mail address: m.troedsson@uky.edu

References


