Qualitative differences in the uterine luminal fluid proteome between normal mares and mares with endometritis or endometrosis

Firdous A. Khan, Mariana Diel De Amorim, Elizabeth L. Scholtz, Tracey S. Chenier
Department of Population Medicine, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Comparison of the uterine luminal fluid proteome in mares with a healthy uterus versus mares with uterine disease may help in elucidating the mechanisms underlying normal uterine function and uterine pathology. The objectives of this study were: (a) to evaluate the qualitative differences in the uterine luminal fluid proteome between normal mares and mares with endometritis or endometrosis (chronic degenerative endometrial disease) and (b) to perform a functional classification of the uterine luminal fluid proteome. Uterine luminal fluid samples were collected by low volume lavage from normal mares (n=8) and mares with endometritis (n=23) or endometrosis (n=7). Proteomic analysis was performed using label-free liquid chromatography-tandem mass spectrometry and the data was validated using Scaffold (version Scaffold_4.4.8, Proteome Software Inc., Portland, OR). Proteins that were exclusively present in one of the three groups of mares or common to two or all three groups were identified using the Venn diagram feature available in the Scaffold software. A total of 221 proteins were identified: 147 proteins were common to all three groups; one protein (prostasin) was exclusively identified in normal mares; 39 proteins were exclusively identified in mares with endometritis; 10 proteins were identified in mares with endometritis and mares with endometrosis but not in normal mares; 24 proteins were identified in normal mares and mares with endometritis but not in mares with endometrosis. Functional classification of the proteins using PANTHER (www.pantherdb.org) revealed that 4 proteins exclusively identified in mares with endometritis and 2 proteins common to mares with endometritis and mares with endometrosis were associated with lytic enzyme activity (proteolytic, hydrolytic, or lysozyme activity). The differential presence of these lytic proteins and the absence of prostasin in mares with endometritis and endometrosis may explain, in part, why the uterine environment is not conducive to pregnancy maintenance in mares with these conditions. Although the role of prostasin in equine pregnancy is not yet known, it has been shown to be involved in in endometrial tissue remodeling and trophoblast cell proliferation and invasion during early pregnancy in primates. The results of the present study provide a springboard for future evaluation of specific proteins as potential biomarkers of uterine health and disease and for investigation of their roles in establishment and maintenance of pregnancy.

Keywords: Equine, uterine proteome, endometritis, endometrosis, functional classification