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Immune relevant gene expression of mammary epithelial cells and their influence on leukocyte chemotaxis in response to different mastitis pathogens

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Different mastitis pathogens induce different courses of infection, i.e. more or less severe. Mammary epithelial cells play an important role in the initial combat against microorganisms by expression of cytokines and acute phase proteins that regulate the immune response. The objective of the present study was to investigate the involvement of the epithelial cells into the outcome of mastitis induced by different pathogens. Primary epithelial cell cultures isolated from milk were used to test the immune response by measuring the mRNA expression of immunomodulators and their influence on polymorph nuclear chemotaxis. Because the cells showed different responses to isolated bacterial endotoxins (lipopolysaccharide, lipoteichoic acid, and peptidoglycans) compared to whole bacteria, they were treated with heat inactivated (10 MOI) gram-negative *Escherichia coli*, a very common pathogen causing acute intra-mammary infections, with *Staphylococcus aureus*, a prevalent cause of chronic, and, *Streptococcus uberis*, an inducer of acute and chronic mastitis. *E. coli* induced an increased mRNA expression of interleukin (IL)-8 within a 1 h treatment. A treatment for 6 h with *E. coli* and *S. aureus* induced increased mRNA expression of IL-6, IL-8, TNF- α and serum amyloid A (SAA). After a 24 h treatment the expression of these immunomodulators was still elevated, except in the *E. coli* treatment the SAA expression showed no differences to control cells anymore. Interestingly, *Str. uberis* in the same concentration did only induce the expression of IL-8 after a 6 h treatment but had no influence on other immunomodulator mRNA expression. Cell culture supernatants of *E. coli* and *S. aureus* treated cells for 12 h increased leukocyte chemotaxis in a 96-well MultiScreenTM MIC-plate. *S. aureus* seemed to induce increased chemotaxis after shorter treatments than *E. coli*. In conclusion, mammary epithelial cells are involved in the different immune response to various mastitis pathogens, and the induction of chemotaxis of leukocytes from blood to milk during mastitis. Therefore, most likely epithelial cells play a role in the differential pattern of immunomediators stimulated by different pathogens.

Keywords:infection; mammary gland; *Escherichia coli*; *Staphylococcus aureus*; *Streptococcus uberis*
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