Periparturient Neutrophil Function Suppression is Associated with Endometritis and Fever in Lactating Dairy Cows

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Introduction

Endometritis and fever are common health disorders that affect dairy cows during the immediate postparturient period and are temporally associated with periparturient immune suppression. The aim of this study was to test the hypothesis that endometritis and fever in dairy cows are associated with suppressed neutrophil functions during the periparturient period.

Materials and Methods

Eighty-three multiparous Holstein cows were used to investigate the association between periparturient neutrophil function and endometritis and fever in dairy cows. Blood samples were collected at one week prepartum, the week of calving, and at one, two, three, four, five and eight weeks postpartum for neutrophil function determination. Cows were examined at week three postpartum for clinical endometritis (purulent cervical discharge on vaginal examination) and at week four postpartum for subclinical endometritis (presence of neutrophils on endometrial cytological exam). Rectal temperatures were recorded from day 1 to day 10 postpartum, and fever was defined as a rectal temperature greater than 103°F (39.4° C) for 2 days or more. Neutrophil killing ability was evaluated by determining myeloperoxidase activity and cytochrome C reduction activity in isolated neutrophils. Differences in neutrophil myeloperoxidase activity and cytochrome C reduction for cows with clinical endometritis subclinical endometritis and fever were determined by repeated measures ANOVA.

Results

Of 83 cows, 13 (16%) developed clinical endometritis, 61 (73%) developed subclinical endometritis and 18 (22%) developed fever. For cows with subclinical endometritis, neutrophil myeloperoxidase activity tended ($P = 0.06$) to be suppressed beginning prior to calving and lasting until two weeks postpartum, compared to cows without subclinical endometritis. For cows with clinical endometritis, neutrophil myeloperoxidase activity was significantly ($P < 0.01$) suppressed and neutrophil cytochrome C reduction tended ($P = 0.09$) to be suppressed beginning prior to calving and lasting until four weeks postpartum, compared to cows without clinical endometritis. For cows with fever, neutrophil myeloperoxidase activity ($P < 0.01$) and neutrophil cytochrome C reduction ($P = 0.03$) were significantly suppressed beginning one week prepartum and lasting until one week postpartum.

Significance

These data demonstrate that endometritis and fever in dairy cows are associated with suppressed neutrophil function. Since neutrophil function declined before the onset of these disorders, the study suggests suppressed neutrophil function increases the risk of endometritis and fever developing in the fresh cow.