

**Akter, Syeda Hasina (2011):**

**Histomorphological and immunohistochemical characterization of different fat depots of dairy cows during early lactation**

Early lactation is attended by massive fat mobilization, decreased insulin sensitivity and immunosuppression. The aim of this dissertation was to study the effects of lactation and conjugated linoleic acid (CLA) on adipocyte size and on the invasion of phagocytic immune cells in different fat depots of dairy cows during the first 105 days in milk (DIM). The present study focused on two aspects: First, mean adipocyte areas ( $\mu\text{m}^2$ ) of different subcutaneous (SC) and visceral (VC) fat depots were assessed to investigate the effects of CLA on adipocyte size, with regards to the changes during early lactation. Second, adipose tissue (AT) sections were immunohistochemically stained to characterize different fat depots of early-lactating dairy cows in terms of phagocytic immune cell present. In addition, the changes in the portion of phagocytic immune cells in AT of early-lactating cows were compared with non-pregnant, over-conditioned heifers. The timely changes of adipocyte size were non-uniform in different SC and VC fat depots: retroperitoneal adipocyte sizes were significantly smaller at 105 DIM compared to 1 DIM, whereas SC adipocytes remained unchanged. When comparing the control and CLA group, adipocyte sizes were smaller both in SC and in VC fat depots to different extent in CLA supplemented cows. Immunohistochemical analyses of different fat depots revealed a low incidence of phagocytic immune cell infiltration in early-lactating cows. The average portion of macrophages in a few positive AT samples was slightly lower in SC versus VC depots. No significant alterations in this infiltration phenomenon, with regards to DIM and CLA supplementation were observed during early lactation. Moreover, increased accumulation of phagocytic immune cells in the SC fat of non-pregnant, over-conditioned heifers might be related to large adipocytes, secreting higher amounts of chemoattractant adipokines. In conclusion, dietary CLA supplements have site-specific effects on adipocyte size of different fat depots in dairy cows. CLA-induced decreases in adipocyte size indicate lipolytic and/or antilipogenic effects of CLA on AT. Moreover, early-lactating cows are not 'obese' and may thus lack significant infiltration of phagocytic cells into AT and therefore, these immune cells might have no major role in the immunologic and metabolic adaptations during early lactation. The results are of general importance to Animal Science and provide a general basis for understanding CLA effects on body fat depots in dairy cattle.