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INFLUENCE OF PARACRINE FACTORS PRODUCED BY ADIPOCYTES ON PROLIFERATIVE ACTIVITY AND VIABILITY OF BOVINE MAMMARY EPITHELIAL CELLS

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Functional development of the mammary gland occurs mainly in the postnatal life of mammals, especially during puberty, pregnancy and lactation. The cycles of proliferation, differentiation and regression of Mammary Epithelial Cells (MECs) is repeated at each lactation cycle. Mammary gland is an organ comprised of branched ductal network of epithelium terminated by secretory alveoli. These structures are embedded in the stroma composed of adipocytes, fibroblasts, plasma cells and extracellular matrix. Main part of *in vitro* and *in vivo* studies on the role of stromal tissue in MECs function has been performed on human and rodents models. However, bovine mammary gland is one of the most exploited ones due to significant role in dairy production. Thus, it is important to improve our knowledge about bovine mammary gland physiology, because of the differences in mammary gland morphology among various mammalian species. The aim of the present study was to investigate the role of stromal cells as effective regulators of viability and functional differentiation of bovine MECs, focusing on the paracrine interactions. Adipose-Derived Stem Cells (ASCs) were isolated from bovine pararenal fat and differentiated into adipocytes under *in vitro* conditions. Three types of Conditioned Media (CM) were collected at different stages of adipocytes differentiation (preadipocytes – preA, adipocytes on 8th day of differentiation – pDA and mature adipocytes – MA). Next, primary bovine Mammary Epithelial Cells (bMEC) were cultured in the collected CM for 24 h in order to evaluate MECs viability (MTT test) and proliferative activity (CyQUANT Cell Proliferation Assay). The results obtained demonstrated that paracrine factors secreted by adipocytes significantly enhanced the viability, and regulated the proliferative activity of bovine MECs. In conclusion, paracrine factors secreted by mature adipocytes support the proliferative activity of bMECs, which points at the pivotal role of surrounding stromal cells in the development of bovine mammary epithelium.

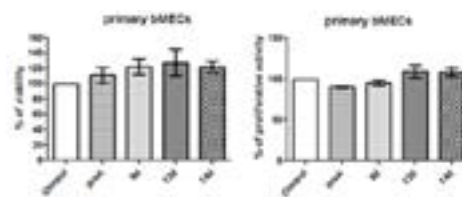


Fig.1 Effect of conditioned media collected from undifferentiated preadipocytes (preA) and bovine adipocytes at different stages of adipogenic differentiation (days 0, 12 and 16) on viability and proliferation of primary bovine mammary epithelial cells (primary bMECs) cultured for 24h in experimental media. In control conditions cells were grown in standard growth medium (DMEM/F12 with 10% FBS). Cell viability and proliferation in control conditions was considered 100%.

Recent Publications

1. Slupecka-Ziemilska M, Wolinski J, Herman A P, Romanowicz K, Dziegielewska Z, et al. (2017) Influence of preterm delivery on ghrelin and obestatin concentrations in maternal plasm, milk and their expression in mammary epithelial cells. *J Physiol Pharmacol* 68(5):693–698.
2. Zielniok K, Sobolewska A and Gajewska M (2017) Mechanisms of autophagy induction by sex steroids in bovine mammary epithelial cells. *J Mol Endocrinol*. 59(1):29–48.
3. Zielniok K, Motyl T and Gajewska M (2014) Functional interactions between 17 β -estradiol and progesterone regulate autophagy during acini formation by bovine mammary epithelial cells in 3D cultures. *Biomed Res Int*. 2014:382653.
4. Gajewska M, Zielniok K, Debski B and Motyl T (2013) IGF-I retards proper development of acinar structures formed by bovine mammary epithelial cells via sustained activation of Akt kinase. *Domest Anim Endocrinol*. 45(3):111–21.

Veterinary and Animal Sciences

Biography

Zaneta Dziegielewska obtained her Diploma in Doctor of Veterinary Medicine (DVM) in 2016 from the Faculty of Veterinary Medicine, Warsaw University of Life Sciences. After graduation she began her PhD studies under the supervision of Professor Małgorzata Gajewska, who specializes in studies on molecular mechanism controlling development and functional differentiation of bovine mammary gland epithelium. Her research focuses on the role of stromal adipo-

cytes in regulation of proliferative activity, viability and secretory functions of bovine MECs. Her studies are conducted within the frame of a research project entitled, "Development of an *In Vitro* method of co-culture of primary bovine mammary epithelial cells and adipocytes to study the influence of adipose tissue on development of mammary epithelium in cattle", funded by the KNOW (Leading National Research Centre) Scientific Consortium, "Healthy Animal-Safe Food".

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