

Sarcoglycans in the adipose organs during trans-differentiation by genistein

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The adipose organ is a highly dynamic organ, and it is formed by white and brown adipocytes. This organ is allocated in multi-depots, which can be found in the subcutaneous and visceral areas. These depots include the two different types of cells: white and brown adipocytes. These areas can be called 'brownish' area or brown adipose tissue (BAT) and white area or white adipose tissue (WAT) by the predominant parenchymal cell with different vascularization and innervation. BAT is highly vascularized and innervated, instead, WAT has lower vascularization and innervation. White and brown adipocytes have also different functional roles. The white adipocytes stores energy in fatty acid because they have one single lipid droplet, to maximise the volume and minimise the space occupation. The brown adipocytes burn fatty acid and glucose to produce heat having more lipid droplets, to enhance the thermogenesis. Recent studies have shown that the adipose organ can trans-differentiate from WAT to BAT and possibly from BAT to WAT. Trans-differentiation can proceed with multiple types of stimuli like cold exposition, or by stimulation of the adrenergic or estrogenic receptor. Previous our studies demonstrated the presence of sarcoglycans, glycoproteins connecting the cytoskeleton to the extracellular matrix in the skeletal muscle, also in the adipose organs showing an increase of all sarcoglycans in cold exposure experiment [1]. On this basis, here we studied the sarcoglycans in adipose tissue, performing an immunostaining labeling by cell culture, with genistein, an isoflavone binding to the Estrogen Receptor Beta (ERb); moreover, this protein can also acts as browning agent to induce white-to-brown adipocyte trans-differentiation. In particular, 3T3-L1 cell cultures were differentiated and treated with genistein at 50mM for up to 24hrs in order to induce the trans-differentiation. Cell cultures were fixed and processed for immunolabeling. Our results showed that sarcoglycans were increased in brown adipocytes than in white adipocytes. These data, similar to our previous results by cold trans-differentiation, showed that sarcoglycans, in trans-differentiation culture cells by estrogenic stimulation, could play a key role in modulation of differentiation during the "browning".

References

- [1] Anastasi (2010) Sarcoglycans are not muscle-specific: hypothetical roles. *Ital J Anat Embryol.* 115: 19-24.

Key words

Adipose organ, adipocyte, sarcoglycans, browning.