

SEM low vacuum study of fat transfer Coleman's technique: effect of centrifugation and sedimentation on adipocyte morphology

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Introduction. The concept of beauty has always been important for man, if we think that cosmetics existed in ancient times and the body care had a crucial role. Among various techniques to repair physical defects exist lipofilling, that is an explant of fat tissue from a part of body and the implant in other areas; however, autologous fat graft is not very simple and often it causes damages to the cells. The procedure used is Coleman's technique and, in literature, we find many variations of this method to overcome its limitations such as reabsorption of the implanted cells, formation of oil cysts and fibrous tissue. Today, there are some works that study what kind of modifications we can find utilizing Coleman's technique but no one of these analyses with SEM the alterations that may suffer the fat. Therefore, our work is to evaluate changes induced by this procedure and to validate SEM for analyses of the tissue explanted.

Materials and Methods. From 10 clinical surgeries of lipofilling we used: a) fragments of adipose tissue taken with Coleman's technique. These fragments were divided in: untreated specimen, sedimented specimen for 15 minutes and centrifuged specimen at 1500 rpm for 3 minutes. Purpose of sedimentation and centrifugation was to remove blood and tryglicerides released by adipocytes during explants; b) a biopsy specimen of adipose tissue taken from the site of graft, as a control. Each fat graft specimen was freshly washed in PBS, fixed in glutaraldehyde and osmium tetroxide and observed at SEM FEI Quanta 200 in low vacuum.

Results. The technique of lipofilling we studied causes different types of damage on the adipocytes during liposuction. The modifications we observed compared to control are: presence of oily surface veil, above all detectable in sedimented specimens and in centrifuged specimens; a reduction of the numbers of adipose cells up to 50% and an augmentation of damages to cell membrane about in 20% of adipocytes of centrifuged fragments. There aren't differences of diameter of the cells after sedimentation and centrifugation. In the three observed specimens about a 90% of adipose cells with a normal structure without changements of volume and a 10-20% of altered cells was found.

Conclusions. We can say that adipose tissue during fat graft has some modifications mainly due to the technique utilized. It justifies the higher engraftment of sedimented specimens compared to those centrifuged. We can say also that SEM in low vacuum can be easily applied to study new methods of lipofilling to improve Coleman's technique.

Keywords: Skin, Adipose tissue, Lipofilling, SEM low vacuum