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Ultrastructure of fat tissue, used for lipofilling with laser irradiation.

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Usage of own fat tissue to correct shapes and sizes of body parts and organs – lipofilling is ever more widely used in plastic surgery. The method is characterized as having good cosmetic effect and by the fact that it does not leave any pathologic reactions or scars.
We have carried out a morphologic assessment of aspirates, including that with scanning electron microscopy (SEM). The studies proved that good vascularization of transplant plays key role in achieving the highest effect from lipofilling. [1,2].

One of the means of stimulating vasculogenesis is low intensive laser irradiation-LILI. [2]. There were no studies concerning the changes of ultrastructure of fat tissue, exposed to LILI and used for lipofilling. This have determined the aim of present study: to evaluate with electron microscopy the influences of LILI on fat tissue used for lipofilling.

The structural features of fat used for lipofilling were studied with TEM, SEM and light microscopies. Samples were fixed in 2.5% glutaraldehyde solution on phosphate buffer (pH 7.4). After dehydrating in alcohols of ascending concentration, TEM samples were embedded into epon-araldite mixture and ultrathin section, after double contrasting, were studied in “Hitachi H-600” TEM. SEM samples, dried by processing through critical point in nitrous oxide in “HCP-2” (Hitachi) and being ion sputtered in IB-3” (Eiko, Japan), were studied with “Hitachi S-405A” SEM.

Local irradiation was performed with “Mustang 017-MCS-PC” with attached to it magnetic nozzle or “Erga”, having magnetic field strength of 50 and 90 mlT; the time of exposition to irradiation -5 min, frequency 1000 Hz. All types of laser exposures were performed daily, with 5-10 session in total.
The influences of laser on the area of fat accumulation of proposed grafts cause intensification of neovasculogenesis in them. (Figure.1,2.). Although there were ethical and aesthetical peculiarities, restricting possibility to perform full scope morphologic monitoring, the carried out studies showed that LILI improves vascularization of transplanted fat and therefore provides its better survivability rate. This was also accompanied by “rejuvenation” of fat tissue, appearance of various sized adipocytes (Figure.3), and led to increase of relative volume of microvessels.

It was noted that implantation of well vascularized adipose tissue, even into poorly vascularized environment, enhances survivability of grafts. This circumstance requires directional laser influencing on transplants.

The use of local LILI in esthetic surgery facilitates neovasculogenesis, accelerates traceless healing of wounds, restores normal ratio among various forms of RBC, all of which, consequently, lead to marked clinical benefit.

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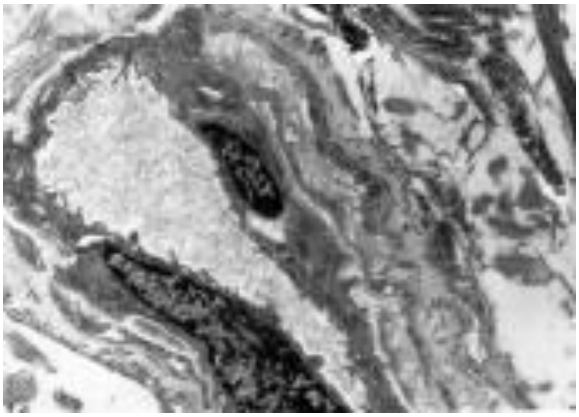

Figure 1. Microvessel of graft derma with signs of its functional activation after LILI. TEM x 7500

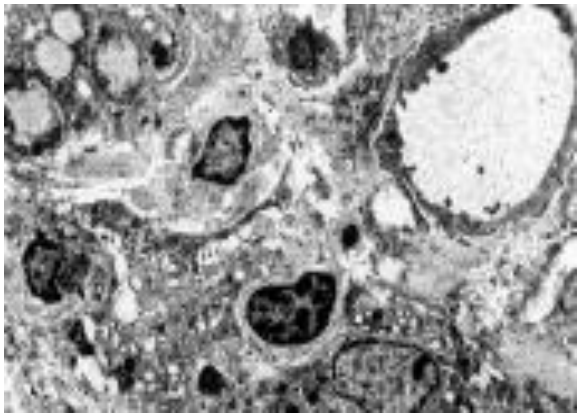

Figure 2. Same. TEM x 3000

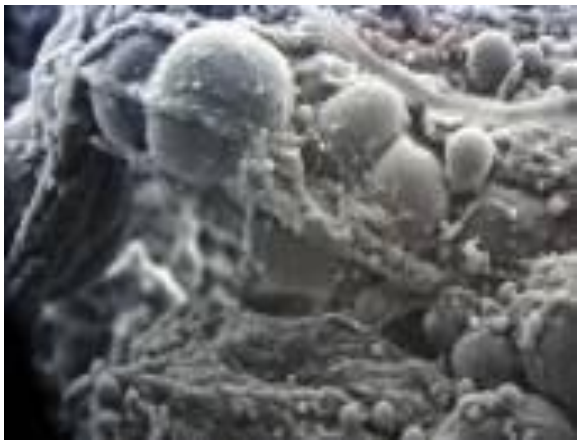

Figure 3. Adipose tissue after LILI. SEM x 1000