With the strong rise of fat grafting and lipofilling procedures, the scientific discussion and research about the viability of adipose tissue from different liposuction and fat grafting methods has provided new relevant findings.

**Mesenchymal stem cells with water-jet assisted liposuction (WAL) – Commentary by Peter Rubin and N. Vial**

In a recent paper published in Aesthetic Surgery Journal 2015*, J. Peter Rubin and Ivan N. Vial (Department of Plastic Surgery, University of Pittsburgh, USA), comment on the article “Isolation and Differentiation Potential of Human Mesenchymal Stem Cells from Adipose Tissue Harvested by Water Jet-Assisted Liposuction, by Meyer et al..

Vial and Rubin “applaud the authors on this well conducted study validating the quality of fat harvested by WAL, including a favorable MSC yield and cell function. WAL harvested fat has been applied successfully for total breast reconstruction, and this study provides data to support the tissue quality for this application.“

Peter Rubin explains in his commentary that

- “WAL uses simultaneous infiltration and suction to dissect and extract fat during liposuction. Using water to dissect tissues is an idea that evolved in the last century and was later geared towards the dissection of fat in 2001.”

- “Since that time, a number of studies have suggested advantages to the use of WAL, including decreased pain, decreased intraoperative swelling, better contouring, and decreased need for anesthesia. The gentle nature of WAL has been utilized in the treatment of lipoedema, where clinicians noted that this aspiration method may induce less trauma to lymphatics.”

- “With the evolution of fat grafting, the utility of WAL for fat harvest has been explored. The Harvest method can certainly impact graft healing and affect the characteristics of the graft. In this study, the authors sought to characterize the mesenchymal stem cell (MSC) content of fat grafts harvested by WAL, including yield and plasticity. Additionally, they assessed the viability of the graft material using a live/dead assay.”
WAL of adipose tissue is well suited for autologous fat grafting because it retains tissue viability. Furthermore it is a valid source for the subsequent isolation of adMSC with multipotent differentiation potential.

This is the conclusion of the article “Isolation and Differentiation Potential of Human Mesenchymal Stem Cells From Adipose Tissue Harvested by Water Jet-Assisted Liposuction” by J. Meyer et al. (published in Aesthetic Surgery Journal 2015*).

The authors characterize the content, viability and differentiation potential of mesenchymal stem cells in WAL fat. They summarized that:

- The authors analyzed tissue integrity of WAL tissue particles via fluorescence microscopy. The adMSC content was determined by isolating the cells from the tissue. The mesenchymal differentiation capacity was confirmed with cytochemical staining methods.

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Results: “The stromal vascular fraction of WAL tissue showed high viability and contained an average of 2.6 × 10^5 CD34-positive cells per milliliter of tissue. Thus WAL tissue contains a high number of stem cells. Furthermore adMSC isolated from WAL tissue showed typical mesenchymal differentiation potential.”

WAL contains a high number of stem cells. Furthermore adMSC CD34-positive cells per milliliter of tissue. Thus WAL tissue is well suited for autologous fat grafting because it retains tissue viability. Furthermore it is a valid source for the subsequent isolation of adMSC with multipotent differentiation potential.

Conclusions: “WAL of adipose tissue is well suited for autologous fat grafting because it retains tissue viability. Furthermore it is a valid source for the subsequent isolation of adMSC with multipotent differentiation potential.”

The authors Shilu Yin et al. compare water-jet assisted lipo-suction (WAL) versus manual fat harvesting:

“Human lipoaspirates were obtained from healthy Chinese female volunteers for body shaping. Lipoaspirates were harvested by a single surgeon using the same material and machine; water-jet assistance was the only variance in this study. At the beginning of surgery, the authors randomly performed conventional manual liposuction without water-jet assistance for one side to obtain 50 ml of lipoaspirate (group A). At the corresponding area of the other side, the authors used water-jet-assisted liposuction to obtain another 50 ml of lipoaspirate (group A). All of the harvested lipoaspirates were used in the in vitro and in vivo experiments to evaluate the effect of water-jet force on the vitality and postoperative fat survival of fresh lipoaspirates.”

The authors investigate the:

1. Adipocyte viability by histological analysis and glucose transport tests in fresh lipoaspirates,
2. Multidirectional differentiation ability of the SVF fraction/adipose stem cells,
3. Fat survival in a nude mice model,
4. Vascularization of the fat graft,
5. Apoptosis (cell death) in grafted adipose tissues.

All results are in favor of the water-jet assisted fat harvesting.

Results: “Fresh lipoaspirates from group A had greater viability and a higher percentage of CD34+ cells than group B. Grafted lipoaspirates in group A had better weight retention, less apoptosis, and greater angiogenesis.”

The systematic, comparative, randomized, controlled study by Yin et al. “Does Water-Jet Force Make a Difference in Fat Grafting? In Vitro and In Vivo Evidence of Improved Lipoaspirate Viability and Fat Graft Survival” demonstrates the effect of the water-jet method on the vitality and postoperative fat survival of fresh lipoaspirates (published in Plastic & Reconstructive Surgery 2015*).
Conclusions: “The fate of grafted lipoaspirates was affected by water-jet force. With the assistance of water-jet force during the harvesting procedure, the authors could obtain more viable lipoaspirates and achieve better fat survival.”