the strongest and most unique findings was the correlation between vessel diameters in our subgroup and the total vessel number from the DIEA.

CONCLUSION: The evaluation of the CTA and data revealed several interesting findings. It would make sense that there is no correlation between vessel number and BMI as perforators must pierce the fascia to supply the abdominal soft tissue and it would be difficult to believe this value changes throughout a patients lifetime. However, the correlation between vessel number and diameter was not inverse as initially proposed, it was the opposite. Vessel Diameter increased with BMI to most likely meet the demands of increased blood flow required to supply the larger amount of abdominal soft tissue. The subgroup (area most likely used to harvest an abdominal free flap perforator) correlated strongly with BMI and strangely with overall number of perforators on its respective side, but not with the number of perforators within the zone. These findings can help in surgical planning for free abdominal flap reconstruction.

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QS16

Co-culturing Human Adipose Derived Stem Cells And Schwann Cells On Spider Silk - A New Approach In Nerve Regeneration After Peripheral Nerve Injury

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PURPOSE: Innovative options for nerve reconstruction after peripheral nerve injury are of great interest in plastic and reconstructive surgery. Treatment of nerve defect injuries by autologous nerve transplantation represents the gold standard when a tension free end-to-end-coaptation is not achievable. However, with regard to donor site morbidity, nerve availability is limited. Recently, many studies focused on finding valid alternatives. Nerve conduits made of biodegradable materials were developed to guide and redirect proximal nerve growth. These conduits can be seeded with cells to improve recovery. Schwann cells represent the key to nerve regeneration by producing extracellular matrix molecules, integrins and trophic factors. Since clinical use of isolated Schwann cells is limited due to donor site morbidity and slow growth in vitro, adipose derived stem cells (ADSCs) have been identified as viable alternative. Compared with other stem cells, ADSCs can be harvested by less invasive procedures (e.g. liposuction) and cultured with a greater proliferation rate. As shown in many studies ADSCs provide the potential to differentiate into several functional cell types (e.g. adipocyte, osteoblast, chondrocyte and neural phenotypes) and are therefore of high interest for research purposes. Additionally, ADSCs secret multiple growth factors and cytokines, which might further support and enhance the regeneration process of injured nerve axons. The use of spider silk could provide an additional guidance tool to improve regeneration after peripheral nerve injury. With its biocompatibility, it doesn’t need any modifications to its applications. Studies using stem cells isolated from rats seeded on spider silk showed good results concerning proliferation and regeneration rates.

METHODS: Native spider silk harvested directly from Nephilia edulis was woven on a steel frame and sterilized by autoclaving. Human ADSCs were isolated from the lipoaspirat of healthy patients undergoing liposuction. Cells were characterized by immunostaining with monoclonal mouse and rabbit antibodies against CD90, CD44, CD34, CD45 as well as stro-1. Immunofluorescence showed positivity for CD90 and CD44, cells were negative for CD34, CD45 and stro-1. The human Schwann cells were isolated from the ischiadic nerve of an organ donor. After immunocytochemical staining cells were positive for anti-S100 in the immunofluorescence. After isolation and characterization 0,5 x 10^6 (50% ADSCs (passage 2), 50% Schwann cells (passage 1)) were seeded on spider silk.

RESULTS: In our experiment, human Schwann cells and human ADSCs were seeded in co-culture on spider silk, in order to combine the benefits of the silk and the ADSCs regarding improved proliferations and differentiation. Results so far showed that cells started to attached on the silk and aligned along the silk fibers. Proliferation could be observed starting in the corners where the fibers cross each other slowly stretching out over the mesh.

CONCLUSION: Silk as matrix for cell adhesion is of great interest for research on nerve regeneration. By seeding Schwann cells and ADSCs on the silk fibres regeneration and guidance of the healing nerve may be improved. Further experiments, control trials and analyses by characterization
via immunofluorescence staining and ELISA for growth factor production are planned to prove significance of our findings.

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QS17

Ex vivo Angiogenic Cell Expansion System Increases The Number and Vasculogenic Potential of Endothelial Progenitor Cells by Switching the Culture Gravity Condition

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PURPOSE: A serum-free, ex vivo cell expansion system called the mononuclear cell quality and quantity control culture (MNC-QQC) system can increase the number of CD34-positive cells, which are an indicator for endothelial progenitor cells (EPCs). MNC-QQC cells have angiogenic potential that is 30 times higher than that of MNCs. Although MNC-QQC is already an effective therapy, we investigated whether microgravity (MG) can increase the potential of this culture system. MG was reported to increase the stem cell culture functionality. This study aimed to evaluate the effect of MG on MNC-QQC to increase the number and improve the function of angiogenic cells, such as EPCs.

METHODS: MNCs were isolated from peripheral blood of healthy volunteers (n = 8). MNC-QQC was performed under four different conditions: (1) normal MNC-QQC (Normal Control; NC), (2) earth gravity (EG) for 7 days in Disposable cell container (DCC), (3) MG for 7 days in DCC, and (4) MG for 3 days followed by EG for 4 days in DCC (Microgravity and Earth Gravity; ME). After 7 days of MNC-QQC, the total number and percentage of CD34-positive cells, an indicator of EPCs, were measured by FACS analysis. The vascular regeneration ability of MNC-QQC cells was evaluated by identifying definitive EPC colony-forming units (dEPC-CFU) and primitive EPC CFU (pEPC-CFU) in colony forming assays. EPC number was measured by EPC-culture assay, and gene expression was quantified by real-time PCR.

RESULTS: While none of the culture conditions changed the total cell number, the CD34-positive cell number was significantly higher in the MG and ME groups than in the NC group [MG vs. NC (4.90 ± 1.21 vs. 1.12 ± 0.3, p < 0.05) and ME vs. NC (5.5 ± 1.64 vs. 1.21 ± 0.3, p < 0.05)]. EPC number was significantly increased in the ME group compared to the NC and EG groups (ME: 233.4 ± 18.4 vs. NC: 104 ± 27.7 vs. EG: 182.1 ± 15.3, p < 0.05). dEPC-CFU were significantly increased in the ME group compared to the NC and EG groups (dEPC-CFU/ME: 967.1 ± 197.8, NC: 594.8 ± 186.3, EG: 386.1 ± 77.2, p < 0.05). Furthermore, VEGF-A expression increased in the ME group compared to the NC group [ME vs. NC (3.84 ± 0.34 vs. 2.33 ± 0.34, p < 0.05)].

CONCLUSION: Stimulation of MNC-QQC cells with MG increased the number of EPCs, such as CD34-positive cells, by enhancing their proliferation capacity. Furthermore, EG culture after MG stimulation induced vasculogenic differentiation of CD34 cells. This study indicated that MNC-QQC in combination with MG-EG conditions might be a more effective angiogenic cell expansion culture method and could be a valuable tool for therapeutic vasculogenesis and tissue regeneration.

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QS18

Adipose Derived Stem Cells Isolated from Premature Aging Mice Show Sustained Stemness: Implications for Regenerative Medicine

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