

## **Title: Effects of Obesity on the Angiogenic and Vasculogenic Potential of Adipose Stromal Cells in a Microfluidic Device**

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### **Abstract**

Human adipose stromal/stem cells (ASC) are attractive candidates for therapies requiring tissue repair and regeneration. Their therapeutic potential has been observed for many disorders such as vascular pathologies. ASC have the potential to either establish or stabilize the micro vessels in a tissue reconstruct. The expansion of adipose tissue in obesity deteriorates angiogenic functions of ASC. Therefore, considering the importance of donor weight on ASC pericytic functions, this study aims to analyze the effects of obesity on ASC when used for cell-based therapies.

ASC were isolated from adipose tissue samples obtained from donors undergoing bariatric surgery, before (obASC) and after (wASC) weight loss. ob/wASC were cocultured with green fluorescent protein tagged human umbilical vein endothelial cells (GFP-HUVECs) in a commercial microfluidic device. Vessel quantification such as, average diameter, vessel area and vessel length were measured with Image J. To study the pericyte coverage and cell-cell adhesion of ob/wASC in cocultures, immunostaining was performed and quantified with AND function in Image J. Also, gene expression was studied to clarify the vasculogenic and angiogenic potential of ob/wASC in mono- and cocultures.

Concomitantly with the weight loss, average vessel diameter increased while vessel length decreased in wASC cocultures compared to obASC cocultures. Conversely, gene expression markers, CDH5, ANGPT1 and CD36 significantly decreased while KDR significantly increased in wASC monocultures compared to obASC monocultures. However, there was no change in the studied gene expression between the cocultures of ob/wASC.

Our results show that obesity might have affected the angiogenic and vasculogenic properties of ASC.