

5<sup>th</sup> International Conference on

# Tissue Engineering & Regenerative Medicine

September 12-14, 2016 Berlin, Germany

## Placental mesenchymal stem cells are a promising tool for biofunctional vascular grafts

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We recently showed that placental-derived mesenchymal stem/stromal cells (PMSC) enhance endothelial cell viability and network formation of endothelial cells *in vitro* and induce angiogenesis in a mouse model *in vivo* by the secretion of paracrine factors or direct cell-cell contact. Thus, beside potential therapeutic aspects in disorders caused by insufficient angiogenesis such as chronic wounds, PMSC are promising tools for supporting vessel formation in engineered tissue constructs. Here, we assessed the impact of PMSC on the integrity and stability of endothelial cells in vascular grafts exposed to shear stress. ePTFE grafts were used to culture endothelial cells derived from the human placenta (hPEC) and PMSC in a 3D tissue culture model. hPEC were attached to the inner graft surface and a constant low (0.015 dyne/cm<sup>2</sup>) or physiological flow (0.92 dyne/cm<sup>2</sup>) was applied by a perfusion system. hPEC were supported by PMSC attached to the outer graft surface. PMSC improved the viability of hPEC exposed to 0.015 and 0.92 dyne/cm<sup>2</sup> as shown by a decreased LDH release of 18% and 47%, respectively. Angiogenesis array analysis revealed that hPEC exposed to 0.92 dyne/cm<sup>2</sup> secreted decreased levels of GRO, MCP-1, TIMP1, TIMP2 and angiogenin under co-culture with hAMSC. hPEC exposed to flow stimulated the migration of hAMSC. Our data demonstrate that PMSC improve adhesion, viability, and stability of endothelial cells in perfused vascular prostheses. Increased angiogenic properties and enhanced migration of cells favor endothelialization in order to provide a non-thrombogenic surface of small diameter vascular grafts in clinical use.

### Biography

Ingrid Lang has completed her Masters and her PhD degree from Karl-Franzens University, Graz. After additional studies and experience as High School Teacher in Biology, she was appointed as Assistant Professor and subsequently as Associate Professor of Histology and Embryology at the Institute of Cell Biology, Histology and Embryology, Medical University Graz. She has established a method for the isolation and characterization of fetal and adult endothelial cells from the macro and the microvasculature. She has experience in the field of "placenta research, stem cells and vascular biology". She has published more than 60 articles in reputed journals.

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