# Proteome analysis of mesenchymal stem cells derived microvesicles

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**Background:** Microvesicles are spherical microstructures surrounded by a cytoplasmic membrane and containing biologically active molecules. Recent findings demonstrated that mesenchymal stem cells derived microvesicles (MVs) stimulate proliferation, migration, viability of cell, angiogenesis and regeneration. The MSCs-derived MVs are promising instrument of regenerative medicine. The aims of our work were to increase the yield of MVs using cytochalasin B and characterize the proteome and immunophenotype of cytochalasin B-induced microvesicles.

**Materials and methods:** Human mesenchymal stem cells (MSCs) were used for the production of cytochalsin B-induced microvesicles (CIMVs). Immunostaining with subsequent flow cytometry analysis were used to characterize the immunophenotype of CIMV. Proteome analysis was conducted using liquid chromatography mass spectrometry method (LC-MS / MS).

**Results:** Proteome analysis identified 373 proteins in human MSCs and 362 proteins in CIMVs-MSCs lysates. The majority (252 molecules) of proteins were similar between MSCs and CIMVs-MSCs while 121 and 110 proteins were unique in MSC and CIMVs-MSCs, respectively. The unique proteins in CIMVs-MSCs included proteins associated with peroxisome (0.9%), lysosome (1.8%), mitochondria (6.5%), cytoplasm/nucleus (12%), cytoskeleton (20.4%), cell membrane (26%) and cytoplasm (32.4%). Analysis of the CIMVs-MSCs content revealed an increased proteins linked to cytoskeleton, peroxisomes, cell membrane and cytoplasm. In contrast, mitochondria and cytoplasm/nucleus proteins were decreased, while nucleus and secreted proteins were significantly depleted as compared to MSCs. MSCs surface receptors play role in cell to cell contact, immunomodulation and activation of signaling in target cells. We found that CIMVs-MSCs have the surface receptors similar to that of the parental human MSCs: $CD90^+$ (83%), $CD29^+$ (72%), $CD44^+$ (36%), $CD73^+$ (66%).

**Conclusions:** Our findings suggest that CIMVs «inherit» MSCs surface receptors and contain peripheral proteins and organelles of parental MSCs. We believe that human CIMVs-MSCs could be developed for cell-free therapy**.**