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Atrial appendage cell-micrograft therapy for patients undergoing cardiac bypass operation (CABG)

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The loss of cardiac myocytes and the nonreversible decrease in cardiac output are the major challenges of ischemic myocardial injury (MI) and chronic heart failure (HF). Recent studies indicate that cardiac-derived cells offers new potential to repair myocardium with sustained functional benefit. We present here a novel, cost-effective cell-patch method, to non-invasively harvest AA cell-micrograft from surgical left-over tissue of CABG and to deliver them within scaffold to provide easy epicardial targeting and intraoperative treatment of HF. We applied the cellular therapy protocol both in mouse acute MI-model and in human safety-feasibility trial. In mouse, allogeneic mouse AA-cells containing scaffold are place on infarction area. For eight weeks echocardiographic follow-up, the cell-on-scaffold treatment showed statistically higher functional recovery in under curve-analysis of left ventricle ejection fraction (LVEF) than the empty-scaffold and non-treated infarction. Also, remodeling was significantly reduced by scaffold+/-cells, measured by the larger relative wall thickness of the stained collagen in non-treated group. The highest tissue expression of HF identifier, natriuretic peptide, in infarction group further suggests the AA-cell therapy's beneficial effect on heart survival, while empty-scaffold may also provide structural support to ventricle wall. In clinical safety trial, six patients undergoing elective CABG are treated with diameter of 2.5cm cell-on-scaffold. In follow-up of first patient at three months, magnetic resonance imaging revealed good performance of the heart and visible thickened ventricle wall in comparison to pre-operative analysis. The patient's generally good recovery from the operation further suggests that the protocol is feasible for operation room use and the cell-micrograft therapy is safe.

Biography

Milla Lampinen has received her PhD from University of Helsinki in 2003 from Prof. Kari Keinänen's lab, studying glutamate receptor ligand binding determinants. She has completed her Post-doctoral training from Prof. Anu Wartiovaara's group studying mitochondrial disease and at Finnish Red Cross Research and development unit, studying stem cells and product applications thereof. She is currently working on stem cell behavior and cardiac stem cell therapy studies in Dr. Esko Kankuri's group at University of Helsinki.

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