

Aims: The aim of the SCIENCE trial was to investigate whether a single treatment with direct intramyocardial injections of adipose tissue-derived mesenchymal stromal cells (CSCC_ASCs) was safe and improved cardiac function in patients with chronic ischaemic heart failure with reduced ejection fraction (HFrEF).

Methods and results: The study was a European multicentre, double-blind, placebo-controlled phase II trial using allogeneic CSCC_ASCs from healthy donors or placebo (2:1 randomization). Main inclusion criteria were New York Heart Association (NYHA) class II-III, left ventricular ejection fraction (LVEF) <45%, and N-terminal pro-B-type natriuretic peptide (NT-proBNP) levels >300 pg/ml. CSCC_ASCs or placebo (isotonic saline) were injected directly into viable myocardium. The primary endpoint was change in left ventricular end-systolic volume (LVESV) at 6-month follow-up measured by echocardiography. A total of 133 symptomatic HFrEF patients were included. The treatment was safe without any drug-related severe adverse events or difference in cardiac-related adverse events during a 3-year follow-up period. There were no significant differences between groups during follow-up in LVESV (0.3 ± 5.0 ml, $p = 0.945$), nor in secondary endpoints of left ventricular end-diastolic volume (-2.0 ± 6.0 ml, $p = 0.736$) and LVEF ($-1.6 \pm 1.0\%$, $p = 0.119$). The NYHA class improved slightly within the first year in both groups without any difference between groups. There were no changes in 6-min walk test, NT-proBNP, C-reactive protein or quality of life the first year in any groups.

Conclusion: The SCIENCE trial demonstrated safety of intramyocardial allogeneic CSCC_ASC therapy in patients with chronic HFrEF. However, it was not possible to improve the pre-defined endpoints and induce restoration of cardiac function or clinical symptoms.