Stem cells improve left ventricular function in acute myocardial infarction
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CRD summary
The authors concluded that intracoronary bone marrow stem cell infusion appeared to improve left ventricular systolic function after acute myocardial infarction, but that more research is required. In view of problems in the review, including the small amount of evidence available and heterogeneity between the studies, these conclusions should be interpreted with a degree of caution.

Authors' objectives
To determine the effect of intracoronary bone marrow stem cell therapy on cardiac function in patients with acute myocardial infarction.

Searching
MEDLINE and the Cochrane Central Register of Controlled Trials (CENTRAL) were searched for studies. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) of intracoronary bone marrow stem cell therapy for patients with acute myocardial infarction, who had been successfully reperfused by percutaneous coronary intervention, were eligible for inclusion. Included participants had to have post infarction residual left ventricular dysfunction. Included studies had to report global left ventricular ejection fraction as an outcome (primary review outcome). Comparison groups could receive a control intervention or placebo.

Left ventricular dysfunction was defined in a variety of ways across the included studies (where reported). The intervention consisted of differing doses of stem cells; the timing of the intervention ranged from within 24 hours of myocardial infarction to 18 days post myocardial infarction. Various modalities were used to measure left ventricular ejection fraction, including magnetic resonance imaging, angiography, echocardiography and computed tomography. Participants were followed up in hospital and then for three to six months.

The authors did not state how the papers were selected for the review or how many reviewers performed the selection.

Assessment of study quality
The following aspects of study validity were assessed: method of randomisation, blinding and follow-up rate.

The authors did not state how the assessment was performed.

Data extraction
For each study, the standardised mean difference (SMD) and the mean difference (MD) between treatment groups were calculated, with 95% confidence intervals (CIs).

The authors did not state how the data were extracted for the review or how many reviewers performed the data extraction.

Methods of synthesis
Studies were combined to calculate pooled standardised mean differences and mean differences and 95% confidence intervals, using a random-effects model. Heterogeneity was assessed using the Q statistic.

Results of the review
Seven RCTs were included in the review (n=516 participants, range 20 to 187). All were appropriately randomised,
Intracoronary bone marrow stem cell therapy versus placebo: The change from baseline to follow-up in global left ventricular ejection fraction was significantly higher in the intervention group, with a large effect size (SMD 1.089, 95% CI 0.517 to 1.661; seven RCTs). The pooled mean difference between the two groups in global left ventricular ejection fraction change was 6.1%, significantly favouring the intervention group (MD 6.108, 95% CI 2.672 to 9.543; seven RCTs).

Authors' conclusions
Intracoronary bone marrow stem cell infusion appeared to improve left ventricular systolic function after acute myocardial infarction. More research is required.

CRD commentary
The objectives and inclusion criteria of the review were clear and relevant sources were searched for studies, but only two databases were used. It was not stated whether the search was limited by publication status or language. It was unclear whether steps were taken to minimise the risk of reviewer bias and error, such as having more than one reviewer independently select studies, assess validity and extract data. It was questionable whether optimum methods were use to combine the studies; calculation of a weighted mean difference may have been more appropriate than standard mean difference, since all studies apparently used the same unit of measurement. Although heterogeneity was formally assessed and was explored in the text, it was not adequately addressed; the marked variability evident from scanning the forest plots suggests that the pooling of data was not justified. Consequently, the pooled effect estimates appear unlikely to be reliable. In view of problems in the review, including the small amount of evidence available and heterogeneity between the studies, the authors' conclusions should be interpreted with a degree of caution.

Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors stated that large RCTs are needed to confirm whether intracoronary bone marrow stem cell infusion improves left ventricular systolic function after acute myocardial infarction.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.