

Stem cell therapies for myocardial infarction in clinical trials: bioengineering and biomaterial aspects

ABSTRACT

Cardiovascular disease remains the leading cause of death and disability in advanced countries. Stem cell transplantation has emerged as a promising therapeutic strategy for acute and chronic ischemic cardiomyopathy. The current status of stem cell therapies for patients with myocardial infarction is discussed from a bioengineering and biomaterial perspective in this review. We describe (a) the current status of clinical trials of human pluripotent stem cells (hPSCs) compared with clinical trials of human adult or fetal stem cells, (b) the gap between fundamental research and application of human stem cells, (c) the use of biomaterials in clinical and pre-clinical studies of stem cells, and finally (d) trends in bioengineering to promote stem cell therapies for patients with myocardial infarction. We explain why the number of clinical trials using hPSCs is so limited compared with clinical trials using human adult and fetal stem cells such as bone marrow-derived stem cells.

Keyword: Stem cell transplantation; Cardiovascular; Human stem cells