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Importance of adult stem cells in the treatment of heart diseases

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Cardiovascular disease (CVD) produces immense health and economic burden in India as well as globally. Both myocardial infarction (MI) and chronic heart diseases occur mostly in elderly people but nowadays they are witnessed more frequently in younger people too owing to an unhealthy lifestyle. Troponin T, a protein found in heart muscle when gets reduced encourages the risk of heart failure. The heart of elderly people contains a very less amount of this troponin T while younger people and children contain more amount of troponin T in the heart which prevents them from heart diseases. Troponin T test helps the doctors to diagnose a heart attack and also helps to determine future heart failure. Over the last few years, coronary artery bypass grafting (CABG) is used widely as an interventional and surgical treatment to reduce the mortality rate of coronary heart disease but nowadays stem cell therapy is emerging as a new option. In patients with permanent myocardial damage, stem cells used as autograft transplantation have brought tissue functionality back to normal resulting in the long-term survival of patients. To enhance tissue-resident stem cells of the heart, microbeads embedded with growth factors could be transplanted in the infarcted area. According to reports, the expansion and differentiation of cardiomyocytes from resident stem cells have restored cell loss and promoted healing in myocardial infarction. In general, adult stem cells could be extracted from a patient through various clinical ways. These cells are isolated, cultured and reprogrammed or modified in vitro and later transplanted into the patient’s heart to heal the myocardium infarcted heart. The procedure of using embryonic stem cells (ESC) and induced pluripotent stem cells (iPSC) is very expensive therefore many clinicians lean towards utilisation of autologous adult cardiac stem cells. Adult stem cells are not blocked by any ethical barriers and immune rejection. Once these cells are injected into the heart through intracoronary injection, they demonstrate extremely deficient rates of survival in the ischaemic and post-myocardial infarcted heart. Certain growth factors can also be used to biochemically manipulate adult stem cells. These cells are also known to optimise and provide methods to reduce myocardial infarct scars and promote cell proliferation and healing, thereby increasing angiogenesis, i.e. formation of new blood vessels and neovascularisation for improvement of cardiac activity.

Keywords: Adult stem cells, Ischaemic heart disease, Troponin T, Heart failure, Stem cell therapy

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