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Effect of SERCA gene modified stem cells on functional recovery of diabetic cardiomyopathy

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This study addressed the potential application of genetically modified mesenchymal stem cells (MSCs) with sarcoplasmic reticulum Ca²⁺ ATPase2a (*SERCA2a*) gene in treatment of diabetic cardiomyopathy (DC) focusing on the role of (*SERCA2a*) in the pathogenesis of such dysfunction. 40 rats were divided into four groups: Control (group one), DC (group two), DC treated with either MSCs (group three) or genetically modified MSCs with *SERCA2a* (group four). Serum glucose, insulin and HOMA index were measured. Echocardiography studies were performed; {(left ventricular dimension at systole (LVDs) and diastole (LVDd), ejection fraction (EF) and fraction shortening (FS)}. Gene expression of *SERCA2a*, IGF1, troponin T and immunostaining of both connexin 43 and CD105 as well as histomorphometric study were assessed in cardiac muscles. DC group showed structural and functional abnormalities in myocardium. DC group treated with modified MSCs with *SERCA2a* showed higher cardiac expression of *SERCA2a* than DC groups untreated and treated with MSCs. IGF1 and troponin T were more upregulated in group four than group two. There was significant reduction in LVDs and LVDd and significant increase in EF and FS in the modified treated DC group compared to DC group. EF and FS, major indices of systolic function were almost normalized in group four. Area percentage of degenerated cardiomyocytes was significantly decreased in group four than groups two and three and connexin 43 was highly immunoexpressed. The use of genetically modified MSCs with *SERCA2a* restore the altered cardiac structure and function and provide novel promising strategy for treatment of DC.

Biography

L A Kassem is a Professor of Physiology at German University in Cairo (GUC). He has completed his MD in Physiology from Faculty of Medicine, Cairo University and promoted to Professor. He has completed his Post-doctoral studies from Juntendo University, School of Medicine, Japan. He is the Head of Department of Pharmacology and Toxicology at the GUC. His research interest includes "regenerative medicine, neurodegenerative disorders, cardiomyopathies and skeletal muscle injuries".

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