

Identification of key microRNAs in diabetes mellitus erectile dysfunction rats with stem cell therapy by bioinformatic analysis of deep sequencing data

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Abstract

Diabetes mellitus erectile dysfunction (DMED) is a common resulting complication of diabetes. Studies have shown mesenchymal stem cell (MSC)-based therapy was beneficial in alleviating erectile function of DMED rats. While the pathogenesis of DMED and the mechanism MSCs actions are unclear. We constructed a rat model of DMED with or without intracavernous injection of MSCs, and performed microRNA (miRNA) sequencing of corpora cavernosa tissues. We identified three overlapping differentially expressed miRNAs (rno-miR-1298, rno-miR-122-5p, and rno-miR-6321) of the normal control group, DMED group, and DMED+MSCs group. We predicted 285 target genes of three miRNAs through RNAhybrid and miRanda database and constructed a miRNA-target gene network through Cytoscape. Next, we constructed protein-protein interaction networks through STRING database and identified the top 10 hub genes with highest connectivity scores. Five GO terms including cellular response to growth factor stimulus (GO:0071363), ossification (GO:0001503), response to steroid hormone (GO:0048545), angiogenesis (GO:0001525), positive regulation of apoptotic process (GO:0043065), and one Reactome pathway (Innate Immune System) were significantly enriched by 10 hub genes using the Metascape database. We selected the GSE2457 dataset to validate the expression of hub genes and found only the expression of B4galt1 was statistically different ($P < 0.001$). B4galt1 was highly expressed in penile tissues of diabetic rats and would be negatively regulated by rno-miR-1298. Three key miRNAs were identified in DMED rats with stem cell therapy and the miR-1298/B4GalT1 axis might exert function in stem cell therapy for ED.

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Biography

Xiaoqiang Liu is a surgeon by profession and works in Tianjin Medical University General Hospital. He holds a doctoral degree and studied in Tokyo University of Japan for one year. He is mainly engaged in clinical work and basic

research of urological oncology and andrology. He has made great contributions to the use of stem cells for the treatment of erectile dysfunction