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The effect of intracavernous injection of adipose tissue-derived stem cells on hyperlipidemia-associated erectile dysfunction in a rat model.

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Source

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Abstract

INTRODUCTION:

Hyperlipidemia has been associated with erectile dysfunction (ED) via damage to the cavernous endothelium and nerves. Adipose tissue-derived stem cells (ADSC) have been shown to differentiate into endothelial cells and secrete vasculotrophic and neurotrophic factors.

AIM:

To assess whether ADSC have therapeutic effects on hyperlipidemia-associated ED.

METHODS:

Twenty-eight male rats were induced to develop hyperlipidemia with a high-fat diet (hyperlipidemic rats, HR). Ten additional male rats were fed a normal diet to serve as controls (normal rats, NR). Five months later, all rats were subjected to ADSC isolation from paragonadal fat. The cells were cultured for 1 week, labeled with 5-ethynyl-2'-deoxyuridine (EdU), and then injected autologously into the corpus cavernosum of 18 HR. The remaining 10 HR rats were injected with phosphate buffered saline (PBS). At 2 and 14 days post-transplantation, four rats in the HR + ADSC group were sacrificed for tracking of the transplanted cells. At 28 days post-transplantation, all remaining rats were analyzed for serum biochemistry, erectile function, and penile histology.

MAIN OUTCOME MEASURES:

Erectile function was assessed by intracavernous pressure (ICP) measurement during electrostimulation of the cavernous nerve. Cavernous nerves, endothelium, and smooth muscle were assessed by immunohistochemistry.

RESULTS:

Serum total cholesterol and low-density lipoprotein levels were significantly higher in HR than in NR. High-density lipoprotein level was significantly lower in HR than in NR. Mean ICP/mean arterial pressure ratio was significantly lower in HR + PBS than in NR + PBS or HR + ADSC. Neuronal nitric oxide synthase (nNOS)-positive nerve fibers and endothelial cells were fewer in HR + PBS than in HR + ADSC. Smooth muscle content was significantly higher in both HR groups than in NR.

CONCLUSIONS:

Hyperlipidemia is associated with abnormalities in both the nerves and endothelium. Treatment with ADSC ameliorates these adverse effects and holds promise as a potential new therapy for ED.