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Effects of Polydeoxyribonucleotide and Polynucleotide on Healing and Fatty Degeneration of Rotator Cuff in Diabetic Rat Model

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Summary:

Polydeoxyribonucleotide and Polynucleotide have possibility to improve tendon healing and decrease fatty degeneration after cuff repair in diabetic rat model. They might improve tendon healing and decrease fatty degeneration after cuff repair in diabetic human.

Abstract:

Introduction

This study was performed to explore the effects of polydeoxyribonucleotide (PDRN) and polynucleotide (PN) on tendon healing and reversal of fatty degeneration in a chronic rotator cuff tear model using a diabetic rat infraspinatus.

Methods

Fifty six SD male rats were randomly assigned to four groups (14 rats per group: 6 for histological evaluation and 8 for mechanical and blood testing): one normal rat group (saline+repair: NSR, G1), three streptozocin-induced diabetic rat groups (saline+repair: DSR, G2, PDRN+repair: DPR, G3, and PN+repair: DPNR, G4). The right shoulder was used for experimental interventions, and the left served as a control. Four weeks after detaching the infraspinatus, the torn tendon was repaired. Saline, PDRN, and PN were applied to the repair sites. Histological and mechanical evaluation was performed at 4 weeks after repair and blood analysis on vascular endothelial growth factor (VEGF), fibroblast growth factor (FGF), insulin-like growth factor (IGF) was performed using the rats for the mechanical testing at the surgery or repair, 2 and 4 weeks.

Results

At 4 weeks, on biomechanical evaluation, the mean load-to-failures of the DPR group and NSR groups were higher than that of the DSR group ($p=0.013$ and $p=0.036$). The mean plasma VEGF at 4 weeks after repair and the mean plasma FGF at the repair, 2 weeks and 4 weeks after repair showed significant differences among the diabetic groups ($p=0.002$, $p=0.022$, $p=0.005$ and $p=0.006$). The DPR and DPNR group had more parallel collagen fibers and fewer S100 stained cells than the DSR group.

Conclusion

PDRN and PN might have possibility to improve tendon healing and decrease fatty degeneration after cuff repair in diabetic state.

Study design: Controlled laboratory study.