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TRANSPLANTATION OF MATURE ADIPOCYTE-DERIVED DEDIFFERENTIATED FAT (DFAT) CELLS IMPROVED LEAK POINT PRESSURE (LPP) IN A RAT VAGINAL DISTENTION (VD) MODEL.

Hypothesis / aims of study

We have shown that mature adipocyte-derived dedifferentiated fat (DFAT) cells have the ability to differentiate into multiple mesenchymal cell lineages including smooth muscle cells (1). In the present study, we examined the effects of DFAT cell transplantation on leak point pressure (LPP) and urethra tissue regeneration in a rat vaginal distention (VD) model.

Study design, materials and methods

Sixteen female SD rats (200 gm) were used for the experiments. 10Fr folley catheter was inserted into vagina and dilated for 3 hours. After VD, GFP-labelled DFAT cells (1x10^6 in 10 µl saline, DFAT group n=8) or saline (10 µl, Control group, n=8) were injected into paraurethral connective tissue of the SD rats with 10-µl Hamilton microsyringe. LPP was measured 2 weeks after the injury. Then urethra tissues were harvested, fixed and sectioned. Immunohistochemical analysis was performed using anti-GFP, alpha-smooth muscle actin (ASMA), and sarcomeric actin antibodies.

Results

The rat VD model was characterized by destruction of longitudinal smooth muscle layer of urethra tissue and showed a significant decrease in LPP compared to non-injured rats. LPP was significantly higher in DFAT group than that in Control group (37.3 ± 6.4 vs 21.7 ± 5.7 mmHg, $p<0.05$). Immunohistochemical analysis revealed that thickness of longitudinal smooth muscle layer of urethra in DFAT group was significantly larger than that in Control group (181 vs 101µm, $p=0.01$) In DFAT group, GFP-positive DFAT cells were observed in paraurethra and occasionally showed positive stining for ASMA, suggesting transdifferentiation into smooth muscle cells. DFAT cell transplantation did not affect the thickness of sarcomeric actin-positive sphincter muscle layer.

Interpretation of results

In the rat VD model, DFAT cell transplantation improved LPP and promoted smooth muscle regeneration of urethra.

Concluding message

DFAT cell transplantation may be a new therapeutic strategy for urethra smooth muscle regeneration.

References

(1) J. Cell. Physiol. (2008) 215: 210-222

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