CURRENT TISSUE ENGINEERING TECHNIQUES ARE USELESS FOR URINARY TRACT REGENERATION IN CANCER PATIENTS, STEM CELL TRANSDIFFERENTIATION IS THE KEY

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Introduction: Autologous cells cannot be applied for patients with invasive bladder cancer. The aim of this study was to induce transdifferentiation of hair follicle stem cells (HFSC) and mesenchymal stem cells (MSC) into urothelial and muscle cells, respectively.

Material and methods: Hair follicle stem cells were isolated from rat vibrissae and cultured in epithelial progenitor-cell-targeted medium PCT. The colony-forming assay was performed. HFSC were subcultured under various conditioned media obtained from primary bladder fibroblasts (BF CM), primary urothelial cells (UC CM), primary skeletal muscle cells (SMC CM) and smooth muscle cell line (CRL2018). The effect of TGF-α and co-culture system on HFSC transdifferentiation was checked. MSCs were cultured in TGFβ1 supplemented medium and medium obtained from smooth muscle cell line (CRL2018). The grade of hair HFSC and MSC differentiation was assessed by morphological analysis and immunofluorescence.

Results: HFSC cultivated in various conditioned media for 10d showed differences in growth pattern. In co-culture system, as well as in bladder urothelium conditioned medium HFSC revealed typical epithelial morphology. HFSC changed their phenotype after incubation in conditioned media. CK-7, CK-8 and CK-18 in HFSC were observed. CK7, CK8 and CK-18 were expressed in HFSC cultured in UC CM and BF CM. The SMC CM had the weakest effect on HFSC differentiation. CK-15 decreased only in cells cultured in UC CM. MSC cultivated in TGFβ1 supplemented medium showed expression of α-smooth muscle actin, desmin, myogenin and sarcomeric actin.

Conclusion: Urothelium conditioned medium and TGFβ1 supplemented medium provide a convenient source of inductive signals to initiate reprogramming of HFSC and MSC into urothelial and muscle phenotype. Stem cells can transdifferentiate into urothelium and muscle cells.