

Aerosol Transfer of Bladder Urothelial and Smooth Muscle Cells onto Demucosalized Colonic Segments for Bladder Augmentation *In Vivo*: Long-Term and Functional Results

Introduction and Objectives: In order to prevent the absorptive and secretory complication of the intestinal mucosa augmented bladder, we developed a cell transfer technology for rapid coverage of demucosalized colonic segments, with a mixture of autologous cell suspensions of bladder urothelial, bladder smooth muscle cells and fibrin glue, that sprayed over demucosalize colon. In this study we performed long-term and functional evaluation of this technique.

Materials and Methods: Nine swine were divided into 3 groups. Group 1: Control group underwent colocystoplasty, group 2 and 3: underwent colonic demucosalization with aerosol application of fibrin glue with urothelial cells only and urethelial with smooth muscle cells on the colonic segment respectively. Animals were kept for six months. We measure the intestinal segment surface area and performed histology analysis. Absorptive function was assessed by ligating the two ureters and measuring the volume of preinstalled 300ml distilled water for one hour in the bladder. Secretory function was assessed by measuring the total urine sediment after vigorous centrifugation as well as total urine protein content (measured by Lowri protein assay).

Results: The surface area of the augmented segments showed an increase in the control group 1, and stabilization in groups 2 and 3. On hematoxylin and eosin staining all group 1 animals showed normal colonic epithelium of the augment. All animals in groups 2 and 3 showed confluent epithelial covering with no fibrosis or inflammatory changes. There was no evidence of colonic epithelial re-growth in any animal in groups 2 and 3. 10% of distilled water installed in the bladder was absorbed in the control group and non in group 2 and 3. Total urine sediment and protein was significantly higher in the control group compare to group 2 and 3.

Conclusions: This long-term study showed that aerosol transfer of bladder urothelial and smooth muscle cells onto the demucosalized intestinal segment for bladder augmentation is viable technique that offers a histologically normal, confluent urothelium, without colonic mucosa regrowth or sub-mucosal fibrosis. This method reduces the absorptive and secretory complication of incorporation gastrointestinal segment in the urinary system.