

Semiquantitative Analysis of β -Adrenoceptor Subtypes Expression Among Urothelium, Interstitial Cells and Detrusor Muscles in the Human Urinary Bladder

Introduction and Objective: Sympathetic nervous system is involved in urinary storage by relaxing detrusor smooth muscle via activation of β -ARs. Three β -AR subtypes (β_1 -, β_2 - and β_3 -AR) have been identified in the human detrusor and urothelium; however, pharmacological studies in vitro have demonstrated that β_3 -AR is predominantly responsible for detrusor relaxation in humans. Recent scientific interests in bladder physiology have focused on urothelial or interstitial cells of the urinary bladder. However, in humans, there is no evidence demonstrating the expression level of β -adrenoceptor (AR) subtypes in urothelium, interstitial cells and detrusor muscles in the human urinary bladder. Thus, we semiquantitatively analyzed the expression of β -adrenoceptor (AR) subtypes in urothelium, interstitial cells and detrusor muscles in the human urinary bladder.

Materials and Methods: Paraffin sections of the human urinary bladder were taken from histologically normal or formalin-fixed specimens removed for bladder carcinoma. Double-labeling immunohistochemical methods using antibodies against each β -AR subtype or vimentin were performed. The immunohistochemical staining intensity of each β -AR subtype was semiquantitatively analyzed among urothelium, interstitial cells and detrusor muscles. Written informed consent was obtained from all patients, and the protocol of the study was approved by the local ethics committee.

Results: Positive staining for β_1 -, β_2 - and β_3 -AR was observed in urothelium and detrusor muscles of the human urinary bladder. Further, double-positive staining for each β -AR subtype was observed in vimentin-positive suburothelial interstitial cells. The rank order of the staining intensity was urothelium > interstitial cells = detrusor muscles in β_1 -AR, and urothelium > interstitial cells > detrusor muscles in β_2 -AR; whereas, that of the staining intensity was interstitial cells = detrusor muscles > urothelium in β_3 -AR.

Conclusions: β -ARs expressed in either urothelium or interstitial cells may play an important role in human bladder function. However, further studies are needed to clarify the functional role of β -ARs expressed in these structures.