

DETRUSOR RELAXATION CAPACITY AND CHANGES IN β RECEPTORS IN RATS WITH TYPE 2 DIABETES MELLITUS

Hypothesis / aims of study

To investigate the changes in relaxation capacity and expression of β receptors, as with the advanced disease severity, in rats with type 2 diabetes mellitus.

Study design, materials and methods

Detrusor strips, when stimulated in vitro by isoprenaline, a β receptor, at increasing concentrations ($1 \times 10^{-9} \sim 3 \times 10^{-5}$), were employed to conduct the contraction/relaxation test. This may allow the determination of the changes in contractility at various time points in rats with diabetes mellitus (DM) and normal controls. Flow cytometry was adopted to examine the alteration in β 3 receptors on the cellular membrane following digestion of detrusor cells. The cells of bladder were homogenized for subsequent assessment of the changes in G protein subtypes at various time points by Western blotting.

Results

In the current study where detrusor strips were subjected to isoprenaline stimulation at various concentrations, rats with DM were associated with a lower half maximal inhibitory concentration (IC50) yet higher maximal distention (Emax) when compared with normal controls at week 8 ($P < 0.05$ and 0.01 , respectively). An opposite trend was noted at week 16 ($P < 0.01$ and 0.05 , respectively). A lower IC50 and profoundly reduced Emax were found in rats with DM at week 24 (both $P < 0.01$). At week 8, rats with DM yielded increased expression of β 3 receptors on the cellular membrane ($P < 0.05$). However, suppression of β 3 receptor expression was noted at week 16 when compared with that of normal controls ($P < 0.05$), as suggested by the intensity of fluorescence. The reduction in β 3 receptor expression in rats with DM was further aggravated at week 24 ($P < 0.01$).

Interpretation of results

Increased relaxation capacity is associated with a higher sensitivity to isoprenaline at the early stage of disease in rats with DM, the results that coincided with raised, but not suppressed, β 3 receptor expression in the detrusor that could have stemmed from compensation.

Concluding message

The severity advance of diabetes cystopathy may result in suppressed β 3 receptor expression leading to aberrant signaling transmission and decreased relaxation capacity of detrusor.

Disclosures

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