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Gillespie J[1], Drake M[1], Lagou M[1]
1. The University of Newcastle

# LOCAL REFLEXES IN THE BLADDER WALL REGULATING NON MICTURITION ACTIVITY

## Hypothesis / aims of study

This study examined the effects of changes in bladder volume on muscarinic augmented phasic activity in the isolated whole bladder. The hypothesis examined is that there are local reflexes in the bladder wall which influence bladder activity.

## Study design, materials and methods

All experiments were done on isolated whole guinea pig bladders. These isolated bladders generate complex contractile responses in the absence of inputs from the central nervous system similar to non micturition activity. The activity generates phasic rises in intravesical pressure comprising propagating waves of contraction and local stretches. The frequency of the phasic activity can be increased by ATP and substance P and inhibited by noradrenaline (1,2). Such observation have led to the suggestion that this system is an integral component in the generation and modulation of bladder sensations (3). The isolation of the bladder, maintenance *in vitro* and pressure recording have been described previously (1).

## Results

Data from an experiment demonstrating the effects of 200 l step increases in bladder volume on phasic activity induced by muscarinic stimulation (100 nM carbachol/100 nM arecaidine) is shown in Figure 1. At an initial volume of 700 l the frequency of the phasic activity was 0.021 +/- 0.003 transients/sec. As the volume was increased the frequency increased reaching 0.074 +/- 0.015 transients/sec at a volume of 1700 l. On reduction of the bladder volume there was an immediate fall in frequency to 0.011 +/- 0.006 transients/sec. With increasing time the frequency returned to pre expansion values. Data similar was seen in 5 other bladders.

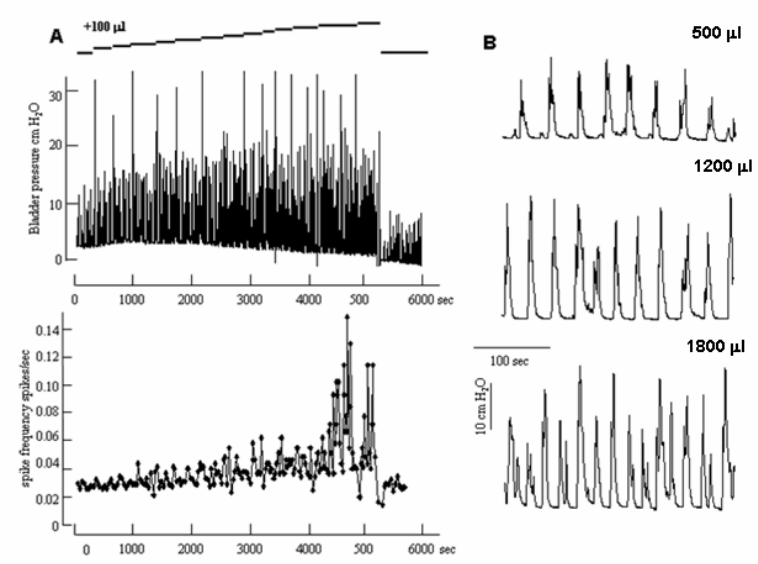


**Figure 1:** The effects of increasing intravesical volume on muscarinic induced phasic activity in the isolated whole guinea pig bladder. A, upper panel shows an original record from an experiment where the intravesical volume was increased from an initial value of 500 l in increments of 100 l to a final volume of 1800 l. The lower panel shows an analysis in which the instantaneous frequency (reciprocal of inter spike interval) is plotted against time. B shows sections of the record at specified volumes on an expanded scale.

**Interpretation of results**

It has been assumed that stretch or deformation of the bladder wall during filling activates sensory fibres which, via spinal reflexes, can activate detrusor contractions. The present observations show that, in the total absence of central nervous influences, changes in bladder volume modulate non micturition bladder activity. The urothelium and stretch receptors in the wall are known to respond to bladder distension. These data suggest that there must be a link within the bladder wall connecting these sensing elements and the detrusor. Several possibilities can be postulated a neural network involving intramural ganglia, local afferent axon collateral fibres or a network of interstitial cells.

**Concluding message**

The bladder wall is capable of autonomous responses which may be important in the generation of sensation in the bladder wall and which could be potential site for the origin of pathological bladder overactivity.

**References**

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