SPONTANEOUS CONTRACTIONS IN THE HUMAN PROSTATE GLAND

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Introduction: All men show characteristics of benign prostatic hyperplasia (BPH) upon aging; it is the most common benign neoplasm in men. When the prostate is enlarged it causes a narrowing of the urethra leading to bladder outlet obstruction and reduced urine flow. The symptoms vary and include nocturia, incomplete emptying, urinary hesitance, weak stream, urgency and frequency to the development of acute urinary retention and renal insufficiency. BPH occurs in the transition zone, rather than the peripheral zone, where cancer more commonly occurs. Lack of fundamental understanding of the basic biology of the gland remains a significant barrier to developing new and more effective treatments for BPH. Our overall hypothesis is that age-related changes in the mechanisms regulating spontaneous contractile (and electrical) activity of the prostate gland, significantly contribute to the pathogenesis of BPH. In this study, we characterized the spontaneous contractile activity of the transition zone in prostate specimens from 12 men (<65yo).

Methods: Transition zone tissue (15mm X 15mm) from the prostate gland was obtained from consenting patients. Transition zone tissue was placed into ice-cold RPMI medium supplemented with 5% fetal calf serum and antibiotics (penicillin at 300 units/ml, streptomycin at 300 µg/ml and amphotericin at 1 µg/ml) and subsequently transferred to Kreb’s solution bubbled with carbogen. Contractile recordings were made from prostatic preparations (3mm X 10mm) using standard tension recording techniques.

Results: All specimens contracted spontaneously at a frequency of >2 contractions per minute; the duration of each contraction was 15 +/- 2 seconds (n=12) and the basal tension was 5.8 +/- 0.4 mN. Spontaneous contractions were abolished by the L-type Ca2+ channel blocker, nifedipine (1 µM). Current pharmacotherapy for BPH includes the use of alpha 1 antagonists to reduce the elevated smooth muscle tone of the prostate. Preliminary results indicate that the clinically used alpha 1 antagonist, tamsulosin (0.1-3nM) did not significantly affect spontaneous contractility or tone.

Discussion: This study demonstrates that the human prostate gland contracts spontaneously at rest (i.e. without nerve stimulation), thereby providing novel insight to the basic physiology of the human prostate gland; such information may lead to the development of better drugs to manage the obstructive and irritative symptoms associated with BPH thereby improving the quality of life for patients.