Afferent Nerve Firing Rate & Amplitude Increase with Filling in an Isolated Perfused Porcine Bladder Model: Abstract# 23784



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Shields, Michael K¹; Moore MD, Robert H¹; Ghatas, Mina P¹; Feld, Noah¹; Payne, Brayden¹; Pingree, Graham¹; Bednarz MD, Christopher P¹; Burkett MD, MSc, Linda S³; Speich PhD, John E², Klausner MD, Adam P¹

Department of ¹Surgery, Virginia Commonwealth University, Richmond, VA. Department of ²Mechanical and Nuclear Engineering, Virginia Commonwealth University, Richmond, VA. Department of ³Obstetrics and Gynecology, Virginia Commonwealth University, Richmond, VA.

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Hypothesis / Aims of Study

- Afferent nerve signaling in response to bladder filling is important for normal bladder function, and aberrations in signaling may be associated with voiding dysfunction.
- An isolated perfused porcine bladder model has been developed for biomechanics experiments.
- Our purpose was to quantify afferent nerve signals during filling in the perfused porcine bladder model. To our knowledge nerve signaling in an ex-vivo pig bladder model has not been previously reported.

Study Design, Materials, Methods

- N = 5 porcine bladders (harvested from local abattoirs, transported back to lab in physiologic buffer solution).
- Bladders prepared by intubation of vesicular arteries (perfused with physiologic buffer), ligation of bilateral ureters, and cannulation of the urethra with both a urodynamics catheter for filling, and tube for emptying.
- Nerves were isolated and microhook electrodes were placed to record the electroneurogram (ENG).



- Bladders were filled with deionized water at 100ml/min from 0mL to 1000 ml.
 - Filling performed in 1-minute off/1-minute on

Results / Interpretation

Presence of nerve tissue confirmed via immunohistochemistry



Increase in ENG activity as bladders filled



Direct relationship between volume and **Bladder Pressure**, ENG Amplitude, and ENG Firing Rate



- pattern for a total of 20 minutes.
- ENG data filtered with a bandpass filter of 200Hz and 2,000Hz.
- Urodynamic tracings monitored for pressure changes during filling.
- Firing rate was calculated as peaks per minute above threshold (average of first 1 minute off).
- Average pressure, ENG amplitude and firing rate were calculated for each 2-minute interval (one minute off and one minute on) for the volume range of 200 to 1000 ml, and Pearson coefficients were calculated to quantify correlations.
- Nerves emanating from the posterior of the bladder were removed, and immunohistochemical confirmation of nerve histology was performed using anti-beta tubulin antibody (Abcam, ab15568).

- Pearson correlation coefficient...
 - 0.92 between Pressure and ENG Amplitude
 - 0.7 between Pressure and Firing Rate

Conclusion

- ex-vivo perfused porcine bladders can be used to quantify afferent nerve signaling in response to filling.
- This novel model could be used to study afferent nerve activity in response to biomechanical changes of the bladder wall in response to filling.