

## Presentation Abstract

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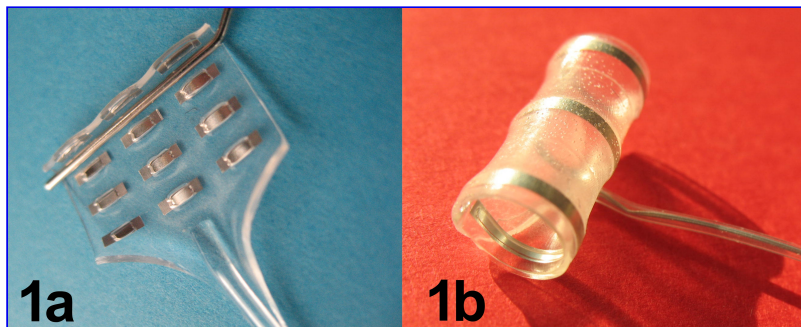
Title: 12-segment cuff is superior to ring cuff for sensing and stimulation of cardiac fibers in the vagal trunk

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Abstract:



**Introduction** The vagal nerve is involved in reflexive control of the heart. We would like to sense vagal activity originating from cardiac sensory neurons, and influence cardiac parameters by electrical stimulation of the vagal nerve. The ability of the 12-segment cuff to influence and sense cardiac fibers in the vagal trunk will be compared with the ring cuff.

**Methods** Experiments were performed in twelve pigs. At the cervical level three cuff electrode configurations were placed on the left vagal nerve for recording and stimulation. The cuffs were 15 mm long and had three circular Pt/Ir electrode contacts with (Fig. 1b). In seven pigs, the third cuff was replaced with a cuff with 12 segments instead of three rings (Fig. 1a). ECG and left ventricular pressure were also recorded.

**Sensing** In twelve pigs sensing was done with a ring cuff and in seven also with a 12-segment cuff. ENG was band-pass filtered at 100-2000Hz, rectified and low-pass filtered at 10Hz, resulting in the envelope of the ENG. Mean activity was removed to obtain only the variations within a cardiac cycle. An ensemble average was determined

from 260 cycles of ENG signal, centered on R-tops of the ECG. A signal was identified as cardiac-modulated if the 95%-CI of the ensemble average had a deviation from zero. **Stimulation** In five pigs the maximal amplitude (300 $\mu$ s, 50Hz) was determined at which, during stimulation with the ring electrode, no coughing occurred. Next in these five pigs, stimulation with this setting was repeated with the ring cuff and the 12-segment cuff.

**Results** A significantly cardiac-modulated vagal signal was measured in 6/7 pigs with the 12-segment cuff and in 6/12 pigs with the ring cuff. The effect of electrical stimulation on left ventricular pressure was significantly greater when stimulating with the 12-segment cuff than with the ring cuff ( $p = 0.03$ ). A significant difference was not reached for R-R ( $p = 0.2$ ) and left ventricular contractility ( $p = 0.07$ ).

**Conclusion** The 12-segment cuff seems superior to the ring cuff, considering selective sensing and stimulation of the cardiac fibers in the cervical vagal trunk.

Disclosures: **S.C. Ordelman:** None. **L. Kornet:** Employment; Medtronic. **R. Cornelussen:** Employment; Medtronic. **H.P.J. Buschman:** Employment; Medtronic. **P.H. Veltink:** None.

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