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OBSERVER REPRODUCIBILITY IN QUANTITATIVE MEASUREMENT OF THE CURRENT PERCEPTION THRESHOLD (CPT) OF BLADDER SENSORY FUNCTION USING A NEUROMETER

Aims of Study

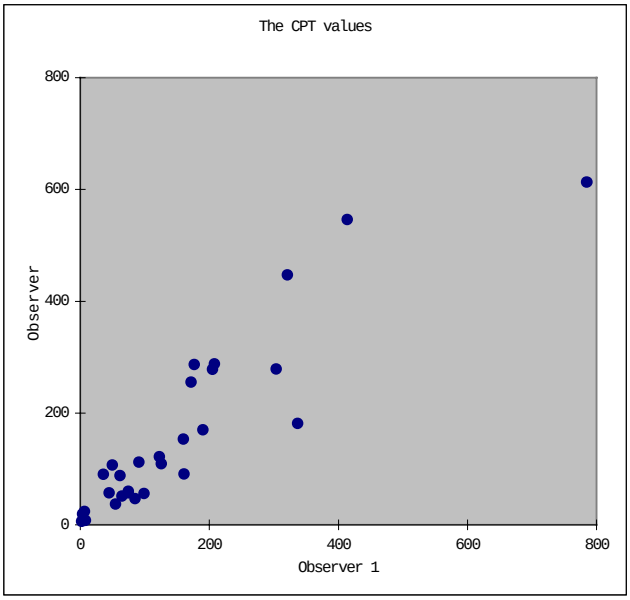
Recently, we reported the first application of a computerized automated neuro-diagnostic device, the neurometer, to assess the human bladder sensory function of three different types of nerve fibers selectively, including Aβ,Aδ, and C fibers (1). Using an intra-vesical electrode, the quantitative measurement of the CPT values of the three different fibers in the bladder wall could be successfully assessed, and hyper-, or hypo-sensitivity could be determined, compared with the mean and standard deviations of control values in healthy volunteers. Importantly, the definition of differences in the distribution of sensory nerve fibers could help to determine an individual therapeutic strategy for a patient with neurogenic bladder (2). In a new clinical evaluation modality, however, reliability of measurement is the critical issue. This study was designed to test observer reproducibility of measurement of the CPT values using the neurometer.

Methods

Measurements of the minimum threshold for perception were taken consecutively by two observers at three different frequencies of 2000 (Aβ-fiber), 250 (Aδ-fiber), and 5Hz (C-fiber) in a patient. In 10 patients, a total of 60 measurements of CPT values in the bladder wall were collected. CPT values were measured using a neurometer (Neuroton, Baltimore, MD), with attachment of the electrode tip on the bladder wall, and confirmed using trans-abdominal ultrasound. Measurement procedures using the neurometer have been detailed previously (1, 3). One observer's results were concealed from the other. Observer variation was evaluated using Spearman's correlation coefficient by rank test. A paired *t*-test was employed to compare data and observer variation was evaluated using the standard deviation of the difference between a pair of measurements. Limits of agreement were interpreted as the range over 95% of paired observations, which could be expected to differ. These statistical analyses were performed using commercially available software (StatView(R), Abacus Concepts, Berkeley, CA). A *p* value less than 0.05 was defined as statistically significant.

Results

The Spearman's statistics correlation co-efficiencies in the measurements of the CPT values by the two observers were r=0.909 ($p<0.0001$) for overall (figure). In detail, table shows the statistics in the measurements of the three different types of nerve fibers. The paired differences between the CPT value measurements by the two observers ranged from –132 to 172 (mean –0.7±104.3) for Aβ-fibers, from -73 to 70 (mean 7.02±38.5) for Aδ-fibers, and from -110 to 38 (mean –26.5±45.9) for C fibers. A paired t-test revealed no statistically significant differences between all the CPT values measured by the two observers (Aβ-fibers ; p=0.984, Aδ-fibers ; p=0.602, and C-fibers ; p=0.103). Based on the mean and standard deviation of control values of the three different fibers as previously reported, both observers were able to determine successfully that of these 10 patients, 4 were normosensitive, 2 were hypo-sensitive, and the remaining 4 were hyper-sensitive.



	r	p
A-β	0.884	0.007
A-δ	0.910	0.016
C	0.950	0.011

Conclusions

The measurement of CPT values in the human bladder sensory function by neurometer was reproducible by two blinded observers. In the measurement of CPT values of both Aδ-fibers and C-fibers, inter-observer reproducibility was better established, than it was in Aβ-fibers. Further multi-institutional study is necessary before the wide spread use of this modality.

References

(1) Neurol Urodyn 20: 573-574, 2001
(2) Neurol Urodyn 20: 333-334, 2002
(3) Arch Phys Med Rehabil 68: 210-213, 1987