

**Research Summary – Quantitative Sensory Testing (QST) – Pain**

<b>Author Year Country Research Design Setting</b>	<b>Demographics and Injury Characteristics of Sample</b>	<b>Validity</b>	<b>Reliability</b>	<b>Responsiveness Interpretability</b>
<p><a href="#">Felix &amp; Widerstrom-Noga (2009)</a></p> <p>Test-retest</p> <p>Miami Department of Veterans Affairs (VA) Medical Center and the University of Miami medical campus, including The Miami Project to Cure Paralysis</p>	<p>N=22 SCI participants with neuropathic pain (19 men, 3 women)                      Mean age: 41.7±15.5                      Mean years post-injury: 6.6±5.7</p> <p>Level of injury:                      12 cervical                      10 below cervical</p> <p>Completeness of injury:                      10 incomplete                      12 complete</p> <p>Race/Ethnicity:                      10 White non-hispanic                      10 Hispanic                      2 African-American</p>	<p>The z- scores obtained for the two measures of thermal detection (CDT and WDT) and the two measures of thermal pain (CPT and HPT) were significantly correlated with one other (0.73 and 0.71, respectively).</p>	<p><b>Test-retest, Inter-rater, Intra-rater:</b></p> <p>Subjects in the reliability portion of the study completed two identical test sessions with approximately 1 to 4 weeks between each session (mean SCI between-session interval = 22.2 days).</p> <p>Threshold measures for MDT, VDT, CDT, and WDT showed substantial reliability, with ICCs ranging from 0.84 to 0.95, while threshold measures for CPT and HPT were somewhat less reliable (ICCs = 0.50).</p> <p>ICC's and 95% CI:</p>	

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			<p>Log MDT: 0.84 (0.75-0.90)                      Log VDT: 0.90 (0.84-0.94)                      Log CDT: 0.90 (0.83-0.94)                      Log WDT: 0.95 (0.91-0.97)                      CPT: 0.50 (0.28-0.67)                      HPT: 0.50 (0.28-0.66)</p> <p>Multicollinearity was detected between z-scores for CDT and WDT (<math>r = 0.73</math>) and between CPT and HPT (<math>r = 0.71</math>) in persons with SCI and neuropathic pain.</p>	
<p><a href="#">Hayes et al. (2002)</a></p> <p>Test-retest</p> <p>Regional SCI Rehab Centre, Canada</p>	<p>N=33 (27M, 6F)                      Mean age 38.9±14.4yrs</p> <p>AIS B (10), C (9) and D (14); levels C4-T12.                      Mean DOI 88.9±73.1months</p>	<p>Sensory status as described by QST scores (warm, cold and vibration) was compared to that of ASIA light touch and pinprick scores.L4, L5 and S1 dermatomes</p>	<p><b>Test-retest, Inter-rater, Intra-rater:</b>                      QST was performed on 2 occasions, 3 weeks apart.</p> <p>There was considerable variation</p>	<p><b>Mean (SD) perceptual threshold for each QST Modality:</b>  <i>Cold threshold (°C):</i>                      L4 (Left)=17.4 (11.1); (Right)=13.7 (11.5)                      L5 (L)=19.1 (9.5); (R)=14.7 (11.7)</p>

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		<p>were tested (except not S1 for vibration).</p> <p>The QST method classified a greater number of patients as having abnormal sensation compared to the ASIA method for all modalities tested and in the majority of dermatomes.</p> <p><b>Kappa statistic (K).</b></p> <p>Correlations were generally low between the two methods. Significant (P&lt;.05) correlations were found between warm sensation and light touch (right L4, K=0.31), cold sensation and light touch (right L4, K=0.30; left S1,</p>	<p>in scores between the two test sessions, the worst of which was cold pain perception. (No values were given.)</p>	<p>S1 (L)=17.9 (10.0); (R)=15.3 (9.9)  <i>Warm threshold (°C):</i>                      L4 (L)=42.4 (4.5); (R)=45.3 (3.8)                      L5 (L)=42.6 (4.4); (R)=44.3(4.0)                      S1 (L)=42.2 (4.3); (R)=43.4 (4.6)  <i>Vibration (µm):</i>                      L4 (L)=55.2 (54.5); (R)=56.4 (51.8)                      L5 (L)=47.8 (52.8); (R)=45.6 (50.1)                      S1 = Not tested</p>

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		<p>K=0.28), vibration and light touch (right L4, K=0.25; left L4, K=0.29), cold sensation and pinprick (right L5, K=0.29) and vibration and pinprick (right L4, K=0.33).</p> <p>QST vibration scores were compared to cortical sensory evoked potentials (SEPs).</p> <p><b>One-way ANOVA with unspecified post-hoc test.</b></p> <p>There were significant (P&lt;.05) differences between the groups for both the medial malleollus (L4) and metatarsal (L5) sites. Patients classified as having impaired SEPs</p>		

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		and normal SEPs had significantly lower mean vibration amplitudes compared to patients classified as having absent SEPs.		
<p><a href="#">Krassioukov et al. (1999)</a></p> <p>Test-retest</p> <p>Regional SCI Rehab Centre, Canada</p>	<p>SCI: N=21 (15M, 6F) Mean age 38.9±14.4yrs</p> <p>Controls: N=14 (6M, 8F) Mean age 33.9±9.6yrs</p> <p>All incomplete injuries – AIS B (n=6), C (n=4) and D (n=11) Mean DOI 78.1±66.7 months</p>		<p><b>Test-retest, Inter-rater, Intra-rater:</b></p> <p>Cold and warm sensation and cold pain were tested bilaterally on three dermatomes (L4, L5 and S1), and vibratory sensation was tested bilaterally on two (L4 and L5). Two sessions were conducted, separated by 3 weeks.</p> <p>ICC values for vibration threshold and cold pain ranged from 0.65 to 0.90. ICC values for cold and warm sensation</p>	

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			<p>ranged from 0.23 to 0.81.</p> <p>Inspection of the variance estimates showed that the between-day variance was much larger than the between-subjects or between-trial (within one session) variance. The authors detail projections of ICC values given various combinations of numbers of sessions and trials.</p>	