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(Thermal) Quantitative Sensory Testing—tQST

Description

Quantitative sensory testing (QST) is a collection of individual tests designed to assess the somatosensory system, particularly of patients with neuropathic pain or suspected neurologic disease (Rolke et al 2006b, Shy et al 2003). Pressure algometry, one of the individual QST tests, has previously been discussed in *Clinimetrics* (Ylinen 2007); this article focuses on the thermal component of the QST protocol (tQST), which requires the use of a Thermal Sensory Analyser[a] (TSA) or an Modular Sensory Analyser[b] (MSA) (Rolke et al 2006a).

The tQST protocol is used to detect cold and warm thresholds, paradoxical heat sensations, and cold and heat pain thresholds (Rolke et al 2006a, Rolke et al 2006b). The most common method for threshold determination is the 'method of limits'. This involves the patient indicating as soon as he or she detects either a hot or cold stimulus as the strength of the signal gradually increases. Alternatively, depending on the particular test, the patient may indicate when the stimulus is no longer detected as its strength is gradually decreased (Rolke et al 2006a, Shy et al 2003).

***Clinimetrics*:** The tQST protocol described by Rolke and colleagues comprises a series of tests primarily intended to assist with the diagnosis of pain mechanisms, for example central sensitisation (Rolke et al 2006b). Although the individual component tests of the protocol have been previously validated, further studies are needed to evaluate the validity of the complete QST battery (Rolke et al 2006b). There is also a lack of data on the validity of the tQST protocol to diagnose specific neurological conditions, the absence of which has probably limited the acceptance of tQST in the clinical management of painful conditions (Backonja et al 2009, Shy et al 2003).

tQST has been found to demonstrate good reproducibility, performed with the method of limits at different test intervals (Heldestad et al 2010). For example coefficients of repeatability (the minimal detectable change between measurements, expressed in C°) between testing on Days 1, 2, and 7 ranged from 0.62 to 1.35 for both warm and cold thresholds. However, as values ranged from 1.64 to 3.14 when heat and cold pain thresholds preceded threshold testing, Heldestad et al (2010) have stressed the importance of conducting thermal threshold testing prior to pain thresholds so that reproducibility is optimised. Significant correlations in tQST results have been found over two days in a sample of chronic pain sufferers and healthy subjects (range r = 0.41 to 0.62) (Agostinho et al 2009).

Footnotes

[a]MEDOC, [b]SOMEDIC

Commentary

tQST is best suited to quantifying positive sensory phenomena, such as allodynia and hyperalgesia; it is most suitable as a within-patient outcome measure of pharmacological and non-pharmacological treatment effect on somatosensory function in those with neuropathic pain (Backonja et al 2009, Cruccu et al 2010, Rolke et al 2006a).

QST normative values have been published and serve as a reference against which patients' results can be evaluated (Rolke et al 2006a). However, as many variables can affect the results of an assessment comparing scores from different subjects, examiners, settings or, perhaps most significantly, testing apparatus, can be difficult (Shy et al 2003).

As with any psychophysical test (ie, a test requiring co-operation from the patient) care must be taken in the interpretation of results. This is particularly relevant with the interpretation of tQST scores since the tests rely heavily on patient perceptions and responses (Backonja et al 2009, Shy et al 2003). In order to optimise the reliability of the measure, there is a critical need for standardised physical properties of the stimulus, closely standardised instruction, and investigator training (Backonja et al 2009).

The lack of evidence-based diagnostic criteria for tQST for neurological conditions is a likely explanation of why tQST is more common in the neuroscience research setting than in clinics. Practical considerations and cost are likely to also play a significant role (the tQST assessment takes around 45 minutes to set up, perform, and record, and tQST units can cost around AU$40 000). However the study of neuropathic pain is a rapidly developing area of clinical research in which tQST is likely to play an increasingly significant role. With appropriate application and interpretation the tool will likely be utilised more in clinical practice (Backonja et al 2009). tQST robustness will ultimately depend on investigator training and method, and its results are likely best interpreted in light of the broader clinical picture.

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