



ELSEVIER

Contents lists available at ScienceDirect

European Journal of Pain

journal homepage: www.EuropeanJournalPain.com



Commentary

Recommendations on terminology and practice of psychophysical DNIC testing

David Yarnitsky^{a,b,*}, Lars Arendt-Nielsen^c, Didier Bouhassira^d, Robert R. Edwards^e, Roger B. Fillingim^f, Michal Granot^g, Per Hansson^h, Stefan Lautenbacherⁱ, Serge Marchand^j, Oliver Wilder-Smith^k

^a Department of Neurology, Rambam Health Care Campus, Technion Faculty of Medicine, Haifa, Israel

^b Department of Diagnostic Sciences, UMDNJ, Newark, NJ, USA

^c Laboratory of Experimental Pain Research, Aalborg University, Aalborg, Denmark

^d Hopital Ambroise Pare, Boulogne Billancourt, France

^e Department of Anesthesiology, Brigham and Women's Hospital, Harvard Medical School Boston, MA, USA

^f College of Dentistry, University of Florida, Gainesville, FL, USA

^g Faculty of Health and Welfare Studies, University of Haifa, Haifa, Israel

^h Department of Molecular Medicine and Surgery, Karolinska Hospital/Institutet, Stockholm, Sweden

ⁱ Department of Psychology, Bamberg University, Bamberg, Germany

^j Department of Surgery and Neurosurgery, Faculty of Medicine, Sherbrooke University, Sherbrooke, QC, Canada

^k Department of Anesthesiology, Radboud University, Nijmegen, Netherlands

As psychophysically based human studies on the modulation of pain by conditioning stimuli become more prevalent, and since a variety of methods and terms are being used by different researchers, there is a need for unified methods and terms. A group of interested researchers had met to discuss the relevant issues. The meeting was held in Lisbon, on September 9th, 2009. The following summarizes the recommendations of this forum:

1. Terminology

The term 'Diffuse Noxious Inhibitory Controls' (DNIC) was originally used in animal based research to describe a specific lower brainstem mediated inhibitory mechanism. It is now indiscriminately adopted into human psychophysical research, where specific mechanisms cannot be discerned; rather the net effect of complex facilitatory and inhibitory mechanisms of pain processing is being registered. The often-used term 'Heterotopic Noxious Conditioning Stimulation' (HNCS) implicates specific parameters, and relates mostly to the conditioning stimulus. The use of the following terms is suggested:

- The painful stimulus upon which the conditioning effect is tested should be termed: '**test-stimulus**'.
- The stimulus used to induce the change in pain perception should be termed: '**conditioning stimulus**'.
- The phenomenon through which the conditioning stimulus affects the test stimulus should be termed: '**Conditioned Pain Modulation**' (CPM). Description of the specific properties (i.e. 'non-painful CPM'), or results (i.e. 'inhibitory CPM', 'facilitatory CPM', etc.) can be added.

2. Testing paradigms

There are not sufficient data at the current time to support recommendations on the technical parameters to be used in the psychophysical lab or clinic when exploring CPM. These include: modalities of both stimuli, type of stimuli (i.e. tonic vs. phasic), intensity (i.e. fixed or tailored), test paradigm (i.e. parallel or sequential), tissue type (skin, muscle or viscera), whether a control condition is included, etc. More data, mainly related to clinical relevance is awaited. When reporting their findings, authors must provide detailed information on their stimulation parameters.

3. Results presentation

The change in perceived *test stimulus* induced by the *conditioning stimulus* should be reported using both changes in the absolute values and percent changes of the sensation or the physical units used (e.g. temperatures, kPa's, numerical rating scale (NRS) units, etc.). However, it is important to recognize that some pain measures are not amenable to computation of percent change; temperature changes in degree centigrade, for example, cannot be expressed as percentages since centigrade is a relative scale. Further, the absolute magnitude of changes may be meaningless without a measure of variability. In the issue of whether a reduction of *test-stimulus* pain due to *conditioning stimulus* should be denoted as a positive or a negative change (and vice versa for increase in *test-stimulus* pain), no consensus had been achieved, mainly due to the fact that direction of change also depends on the parameters used (i.e. increase in threshold is equivalent to decrease in pain estimation). Consequently, reports should specify whether pain processing was facilitated or inhibited subsequent to the conditioning manipulation, regardless of the modality of measurement used by the authors.

The forum encourages additional research to determine the differential effects of varying stimulus parameters, especially in the clinical context.

The organization of this consensus meeting was supported by a grant from Medoc.

* Corresponding author. Address: Department of Neurology, Rambam Health Care Campus, Technion Faculty of Medicine, Haifa, Israel. Tel.: +97248542605; fax: +97248542944.

E-mail address: davidy@technion.ac.il (D. Yarnitsky).