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Qualitative and Quantitative Characteristics of Pain Syndrome in Hand-Arm Vibration Syndrome

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IEGULDĪJUMS TAVĀ NĀKOTNĒ



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Sverdlovsk region



Sverdlovsk region is a territory with the population of 4393000 people (in 2002 – 4986 000 people), the number of working people is 2343000 people, 1307 000 people out of that number have unfavorable work conditions.

96 430 working people are affected by vibration. Generally equipment with higher vibration which is installed in mines for extraction of bauxite, gold, iron and copper ore and others affect upper limbs of miners.



Nociceptive pain

which occurs as a result of tissue disease or damage but in the presence of a functionally intact sensory nervous system

Mixed pain

Pain with neuropathic and nociceptive components

Neuropathic Pain

pain initiated or caused by a primary lesion or dysfunction in the nervous system

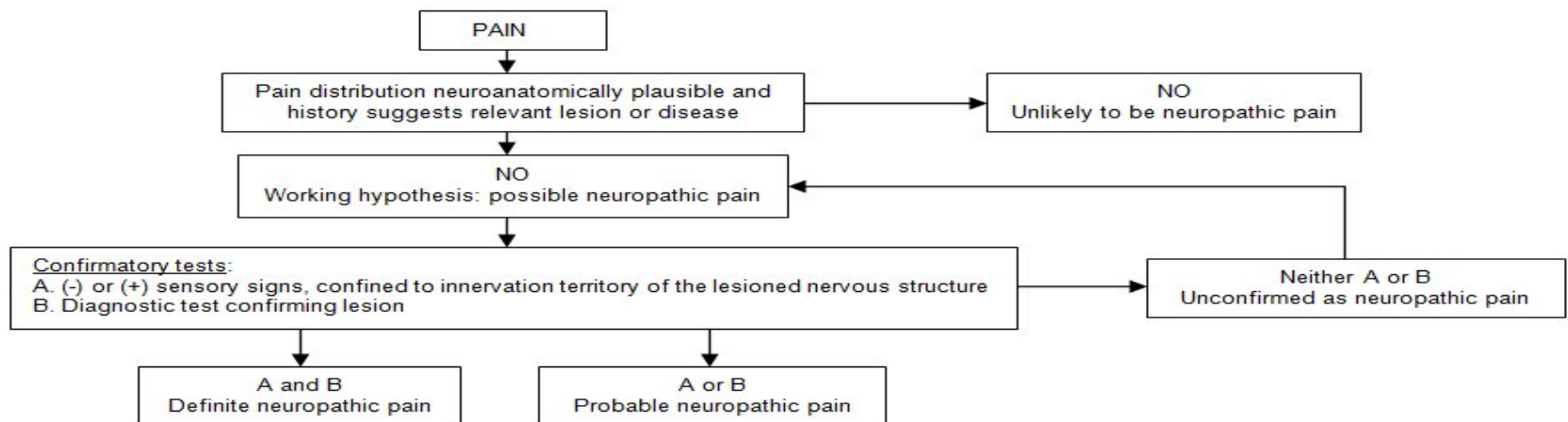
The International Association for the Study of Pain (IASP), 1994

Merskey H, Bogduk N, eds. Classification of Chronic Pain. 2nd ed. Seattle, Wash: IASP Press; 1994:209-214.

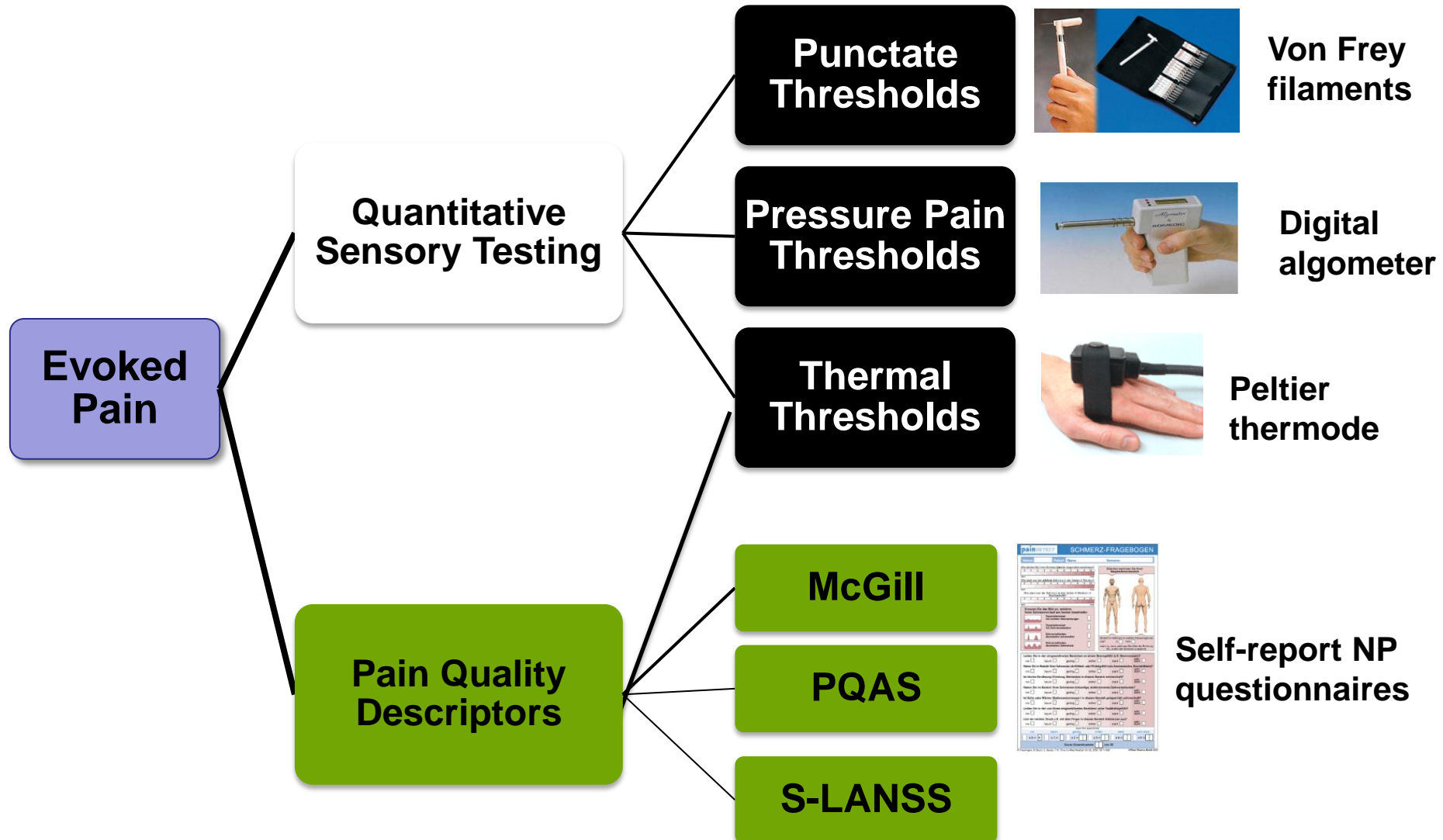
“Pain arising as a direct consequence of a lesion or disease affecting the somatosensory system.”

Special Interest Group on Neuropathic Pain (NeuPSIG)

Treede R, Jensen T, Campbell J, et al. Redefinition of neuropathic pain and a grading system for clinical use: consensus statement on clinical and research diagnostic criteria. *Neurology*. 2008;70:1630-1635.



Assessment of Pain Response



The aim of the present study was to investigate Characteristics of Pain Syndrome in Hand-Arm Vibration Syndrome

METHODS OF RESEARCH

The questionnaires (pain scales):

- Visual Analog Scale (VAS)
- specialized questionnaires screening for neuropathic pain - (DN4)
- Pain Detect (PD) .

Electrophysiological methods:

- electroneurography (ENG):
 - the amplitude of the M-wave,
 - nerve conduction velocity (NCV),
 - latency.
- quantitative sensory testing (QST)

Douleur Neuropathique en 4 questions (DN4)

- This questionnaire consists of two modules: the first module containing 7 questions should be completed on the basis of patient interviewing, and the second module of 3 questions should be completed on the basis of clinical examination. The first module makes it possible to evaluate the positive sensory symptoms. The second module allows physician to identify allodynia and negative sensory symptoms
- If total score is ≥ 4 , the patient probably has neuropathic pain.
- Validity of the DN4 Questionnaire has been confirmed by appropriate study. This questionnaire correctly identifies neuropathic pain in 86 % of patients and has high sensitivity (82.9 %) and specificity (89.9 %).

DN4 Questionnaire

To estimate the probability of neuropathic pain, please answer yes or no for each item of the following four questions.

INTERVIEW OF THE PATIENT

QUESTION 1:

Does the pain have one or more of the following characteristics?	YES	NO
Burning	<input type="checkbox"/>	<input type="checkbox"/>
Painful cold	<input type="checkbox"/>	<input type="checkbox"/>
Electric shocks	<input type="checkbox"/>	<input type="checkbox"/>

QUESTION 2:

Is the pain associated with one or more of the following symptoms in the same area?	YES	NO
Tingling	<input type="checkbox"/>	<input type="checkbox"/>
Pins and needles	<input type="checkbox"/>	<input type="checkbox"/>
Numbness	<input type="checkbox"/>	<input type="checkbox"/>
Itching	<input type="checkbox"/>	<input type="checkbox"/>

EXAMINATION OF THE PATIENT

QUESTION 3:

Is the pain located in an area where the physical examination may reveal one or more of the following characteristics?	YES	NO
Hypoesthesia to touch	<input type="checkbox"/>	<input type="checkbox"/>
Hypoesthesia to pinprick	<input type="checkbox"/>	<input type="checkbox"/>

QUESTION 4:

In the painful area, can the pain be caused or increased by:		
Brushing?	<input type="checkbox"/>	<input type="checkbox"/>

YES = 1 point
NO = 0 points

Patient's Score / 10

PainDETECT

- This questionnaire is designed for completing by physician and comprises a pain disorder distribution diagram in the form of a picture with VAS scale and the questionnaire designed for identification of spontaneous and induced symptoms of neuropathic pain.
- Also, with the use of the picture, pain monitoring is carried out for identification of persistent, paroxysmal, persistent-with-paroxysms or other type or pain. The questionnaire ensures complete documentation of all the possible parameters of pain and enables one to trace, in the most clear manner, the temporal course of pain syndrome pattern.
- painDETECT Questionnaire sensitivity is 83 %.

painDETECT

SCORING OF PAIN QUESTIONNAIRE

Date: _____ Patient: _____ Last name: _____ First name: _____

Please transfer the total score from the pain questionnaire:

Total score

Please add up the following numbers, depending on the marked pain behavior pattern and the pain radiation. Then total up the final score:

	Persistent pain with slight fluctuations	0	
	Persistent pain with pain attacks	- 1	if marked, or
	Pain attacks without pain between them	+ 1	if marked, or
	Pain attacks with pain between them	+ 1	if marked
	Radiating pains?	+ 2	if yes

Final score

painDETECT

PAIN QUESTIONNAIRE

Date: _____ Patient: _____ Last name: _____ First name: _____

How would you assess your pain **now**, at this moment?

0 1 2 3 4 5 6 7 8 9 10

max.

4 weeks?

max.

average?

max.

of your

☐ ☐ ☐ ☐ ☐

Please mark your main area of pain

Does your pain radiate to other regions of your body? yes ☐ no ☐

If yes, please draw the direction in which the pain radiates.

ting nettles) in the marked areas?

moderately ☐ strongly ☐ very strongly ☐

the area of your pain (like crawling ants or electrical

moderately ☐ strongly ☐ very strongly ☐

painful?

moderately ☐ strongly ☐ very strongly ☐

your pain, like electric shocks?

moderately ☐ strongly ☐ very strongly ☐

ally painful?

moderately ☐ strongly ☐ very strongly ☐

he areas that you marked?

moderately ☐ strongly ☐ very strongly ☐

er, trigger pain?

moderately ☐ strongly ☐ very strongly ☐

d out by the physician)

moderately ☐ strongly ☐ very strongly ☐

☐ x 3 = ☐ x 4 = ☐ x 5 =

total score out of 35

Site / Curr Med Res Opin, Vol.22, No. 10 (2006) ©2005 Pfizer Pharma GmbH

Screening Result

Final score

negative

unclear

positive

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38

A neuropathic pain component is unlikely (< 15%)

Result is ambiguous, however a neuropathic pain component can be present

A neuropathic pain component is likely (> 90%)

This sheet does not replace medical diagnostics.
It is used for screening the presence of a neuropathic pain component.

Development/Reference: R. Freynhagen, R. Baron, U. Gockel, T.R. Tölle / Curr Med Res Opin, Vol.22, No. 10 (2006)
©2005 Pfizer Pharma GmbH

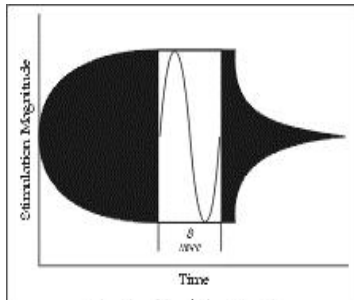
Quantitative sensory testing (QST)

Computer Aided Sensory Evaluator (CASE IV)

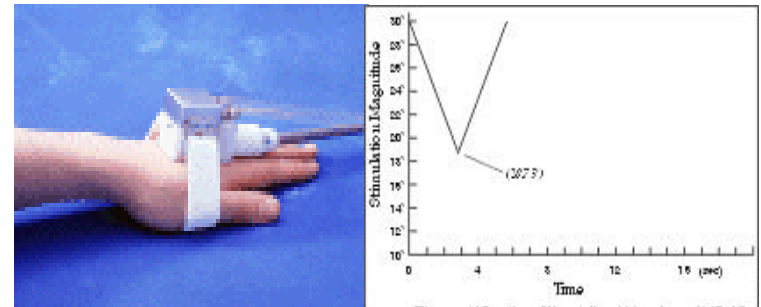
the thermal thresholds (WS),
cold sensitivity (CS),
thermal pain (HP)
cold pain (CP) ,
vibration sensitivity



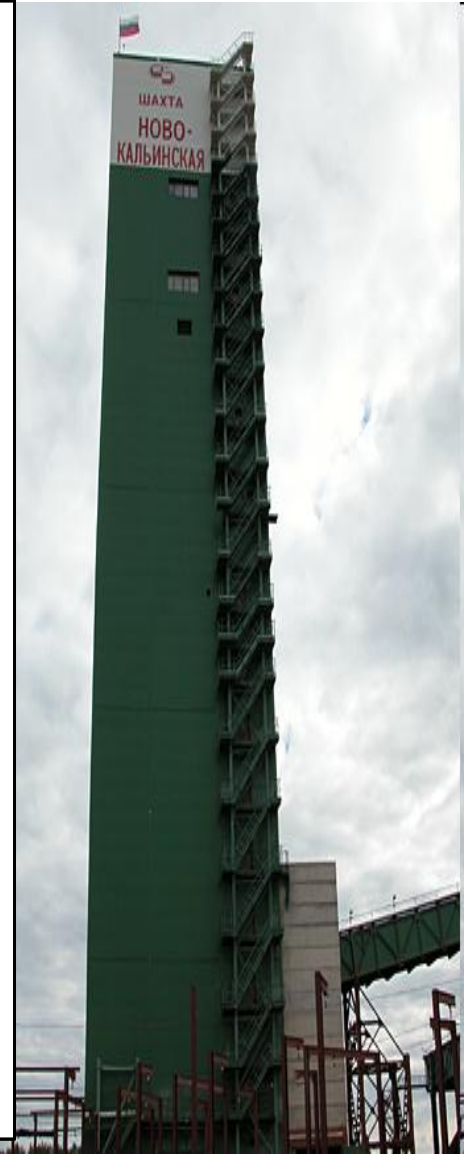
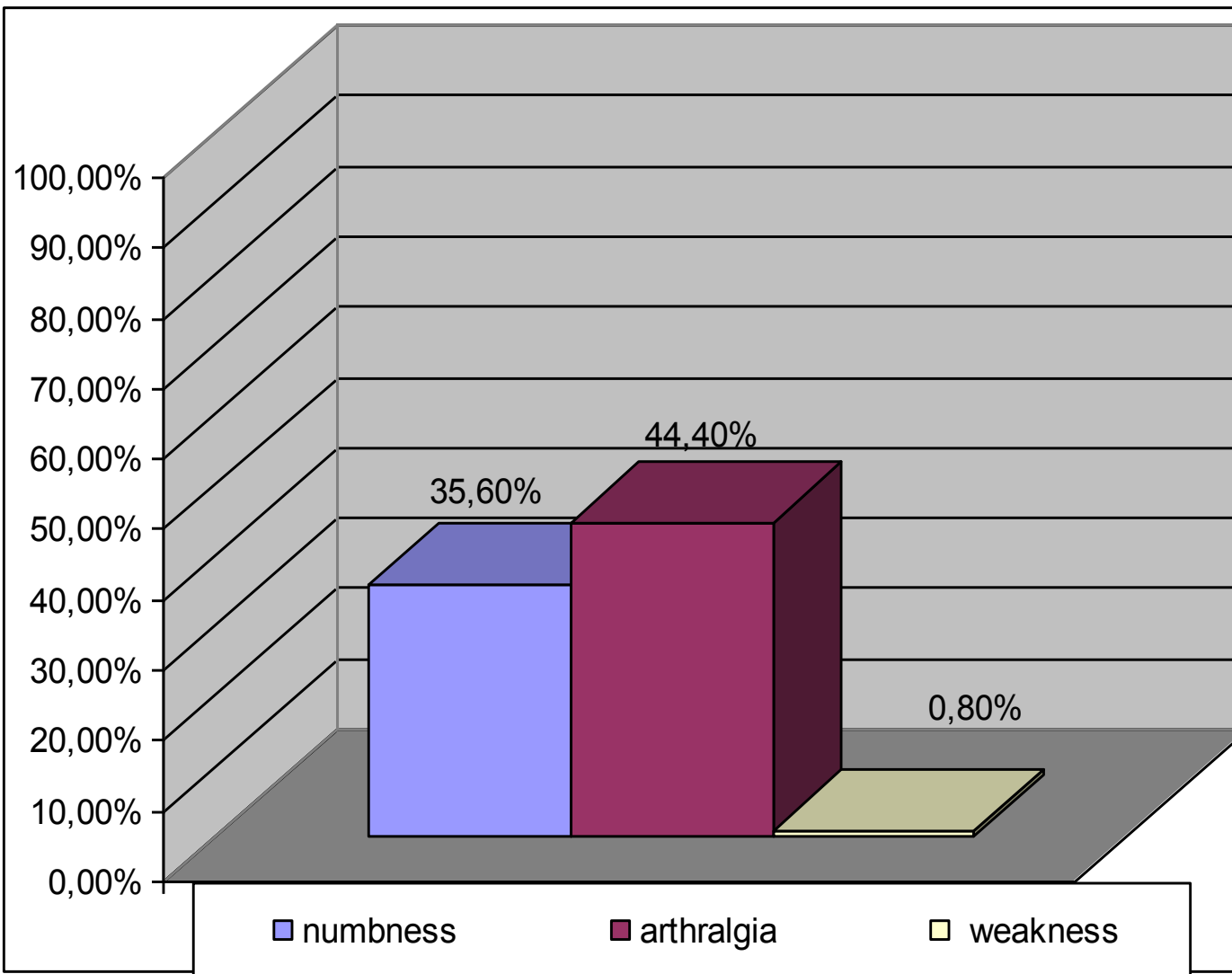
Thermostimulator



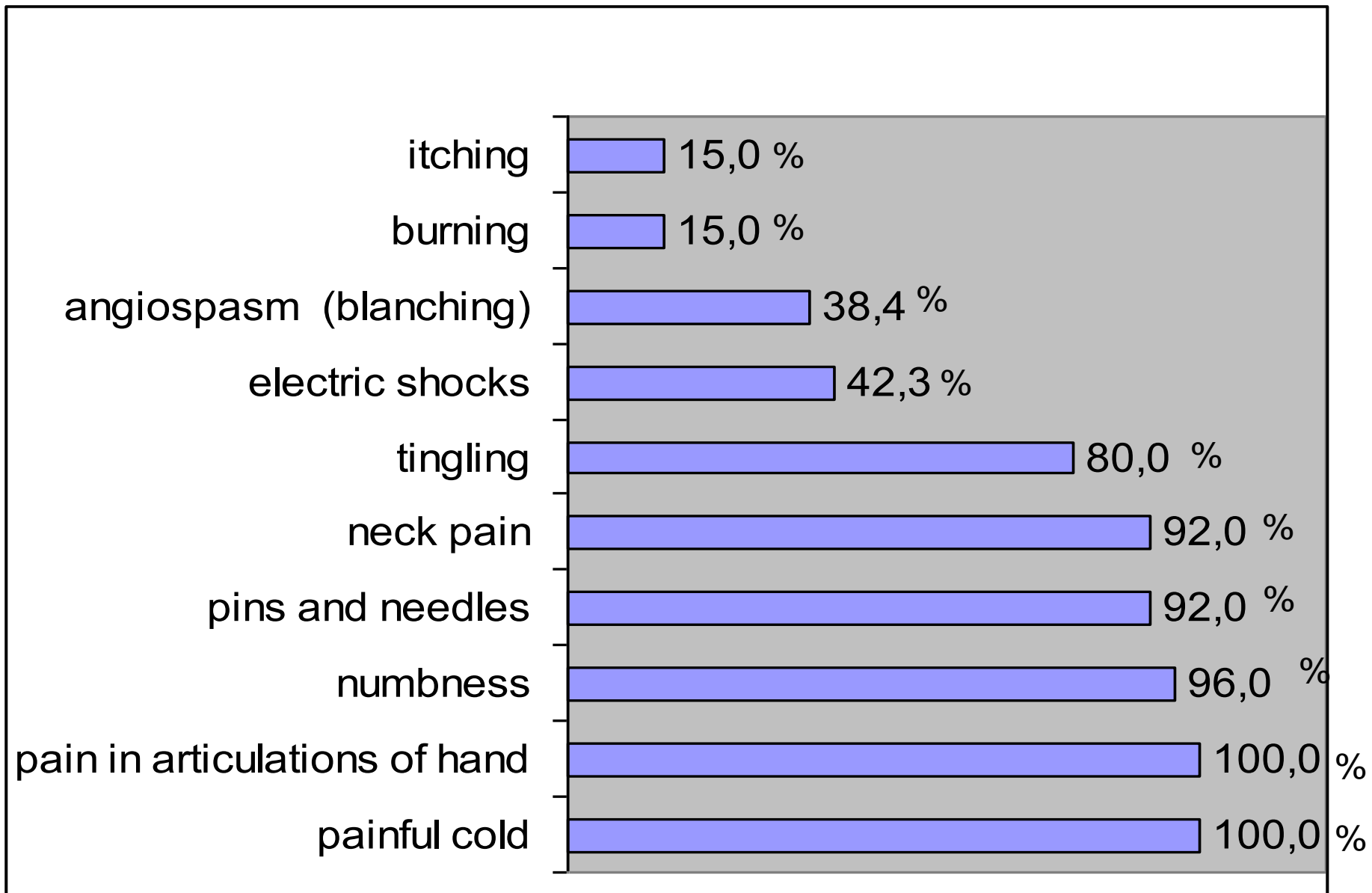
Vibrostimulator



The principal symptoms of the neuropathy of the upper limbs (numbness, arthralgia, weakness) among miners

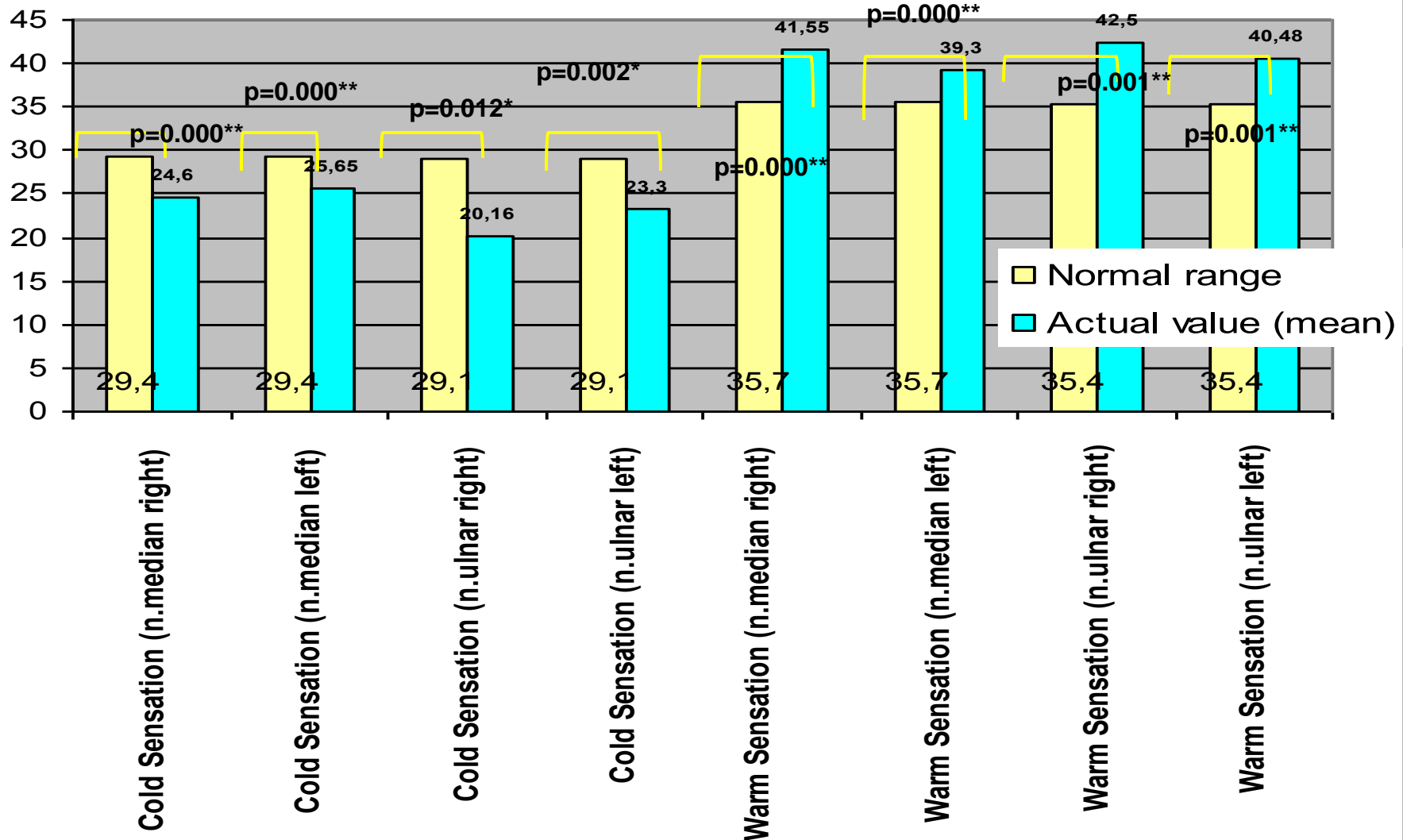


Details of the symptoms(n=26),%

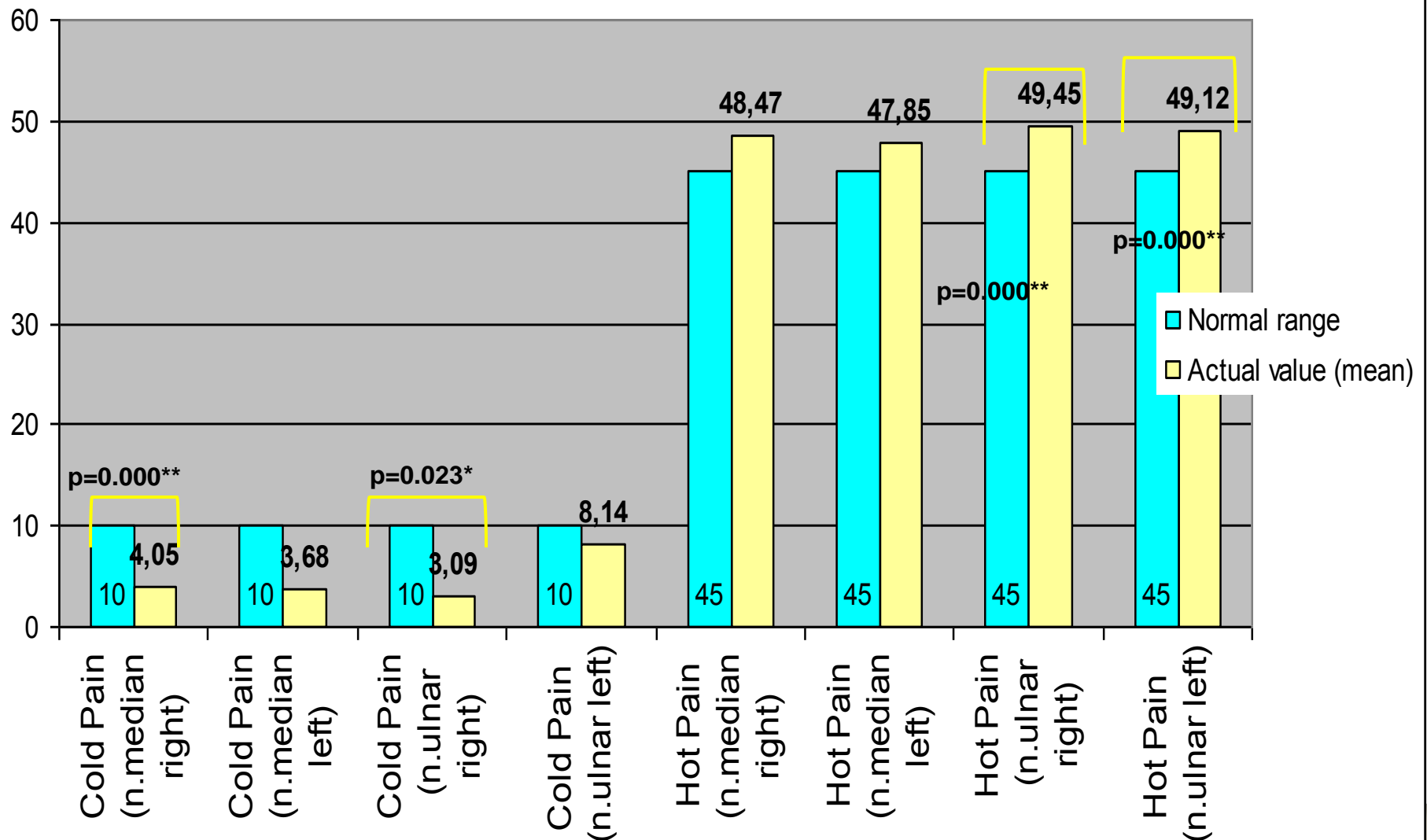


The biggest number of experienced workers give positive answers to the questions on VAS and DN4 as they have a motivation to get social benefits (“yellow flags”)

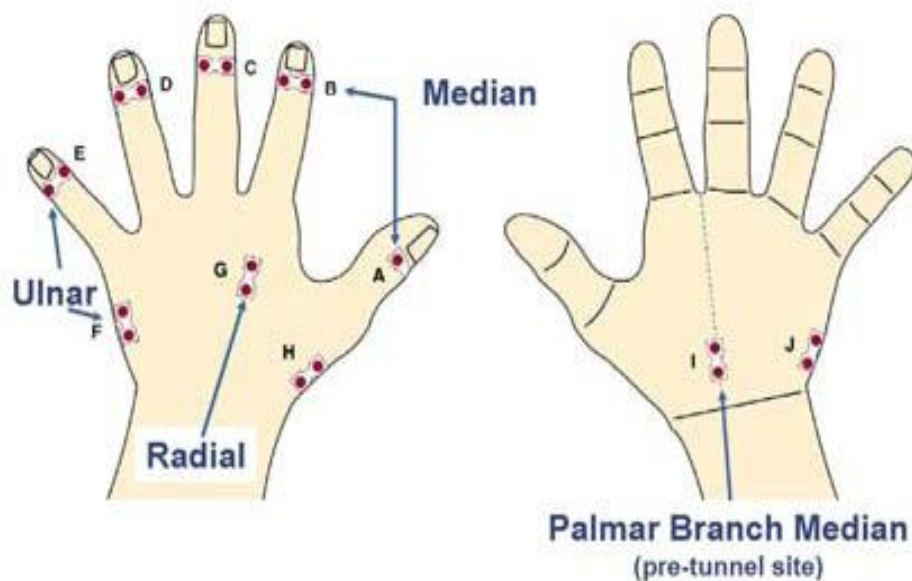
Change in sensation (Heat, Cold)



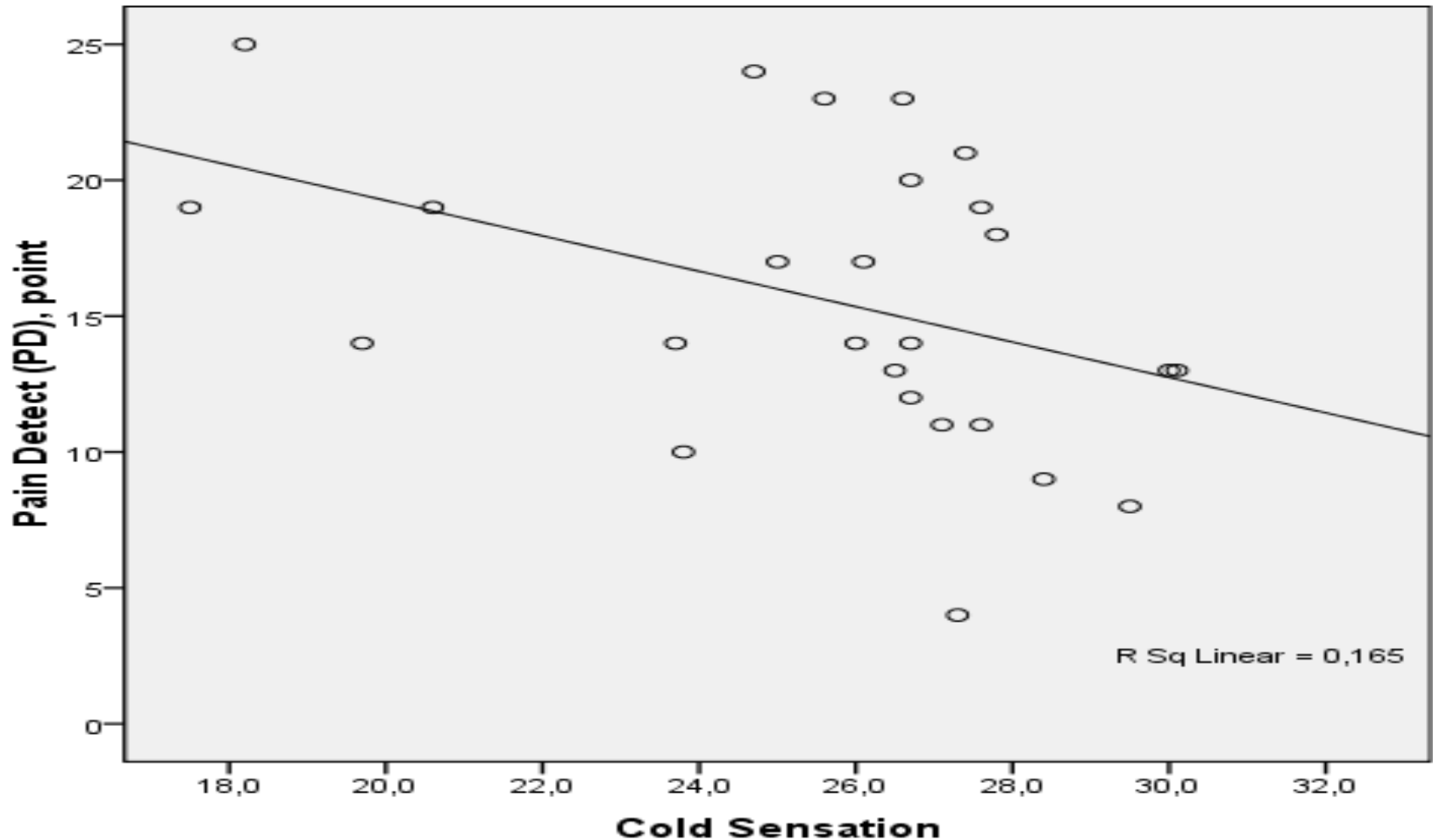
Change in pain threshold (Heat, Cold) (One-sample Test)



Standardized hand test sites. For dermatomal testing:
C6-thumb (A) C7-middle(C) and C8-little finger (E)



Significant negative correlation between questionnaires (Pain Detect) and QST (Cold Sensation) (Sperman`s rho: $r=-0.452^*$, $p=0,02$)

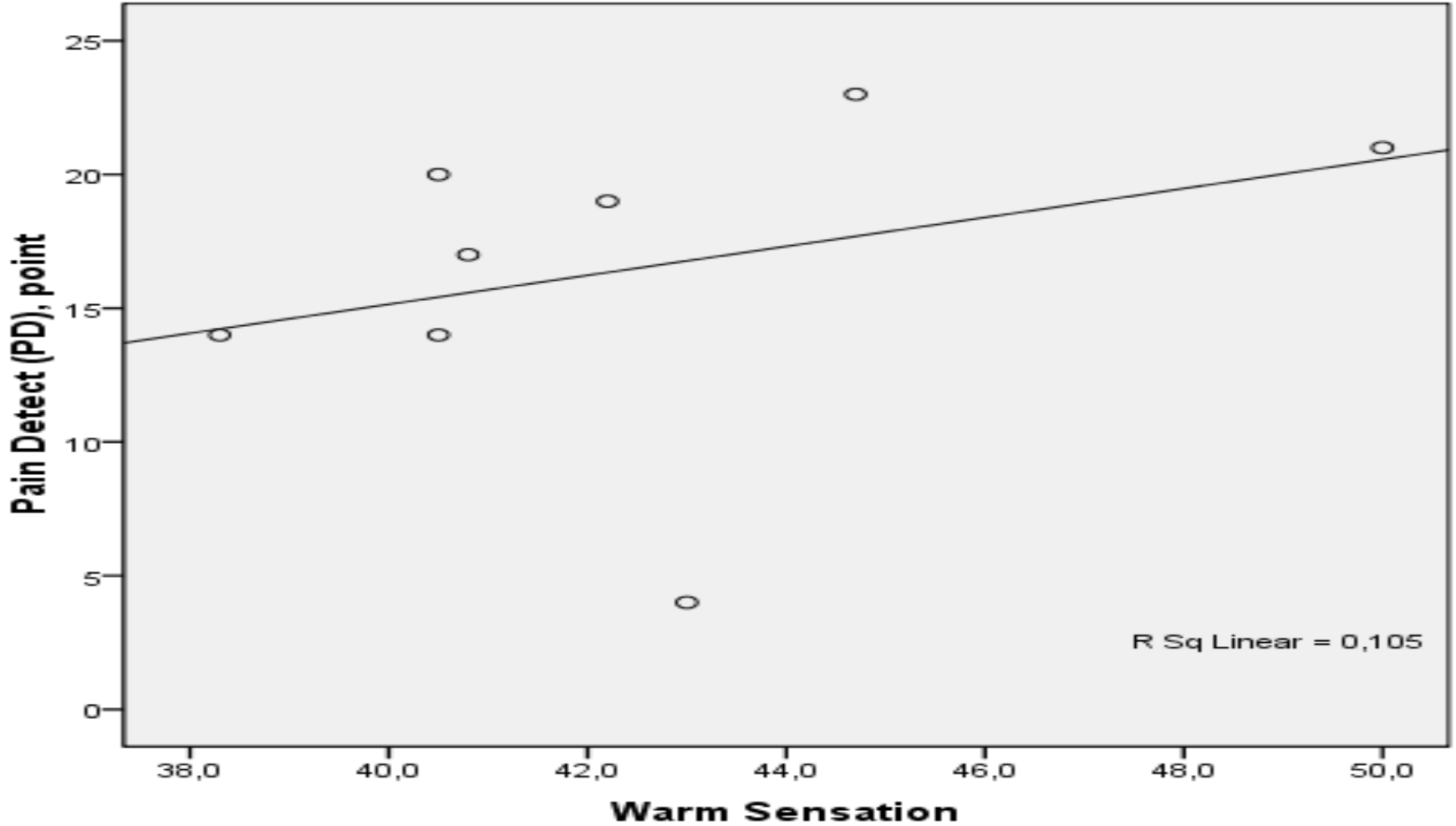


r -correlation coefficient, p -sig.(2-tailed)

Significant positive correlation between questionnaires

PD and QST (Warm Sensation)

(Sperman`s rho: $r=0.635^{**}$, $p=0,000$)

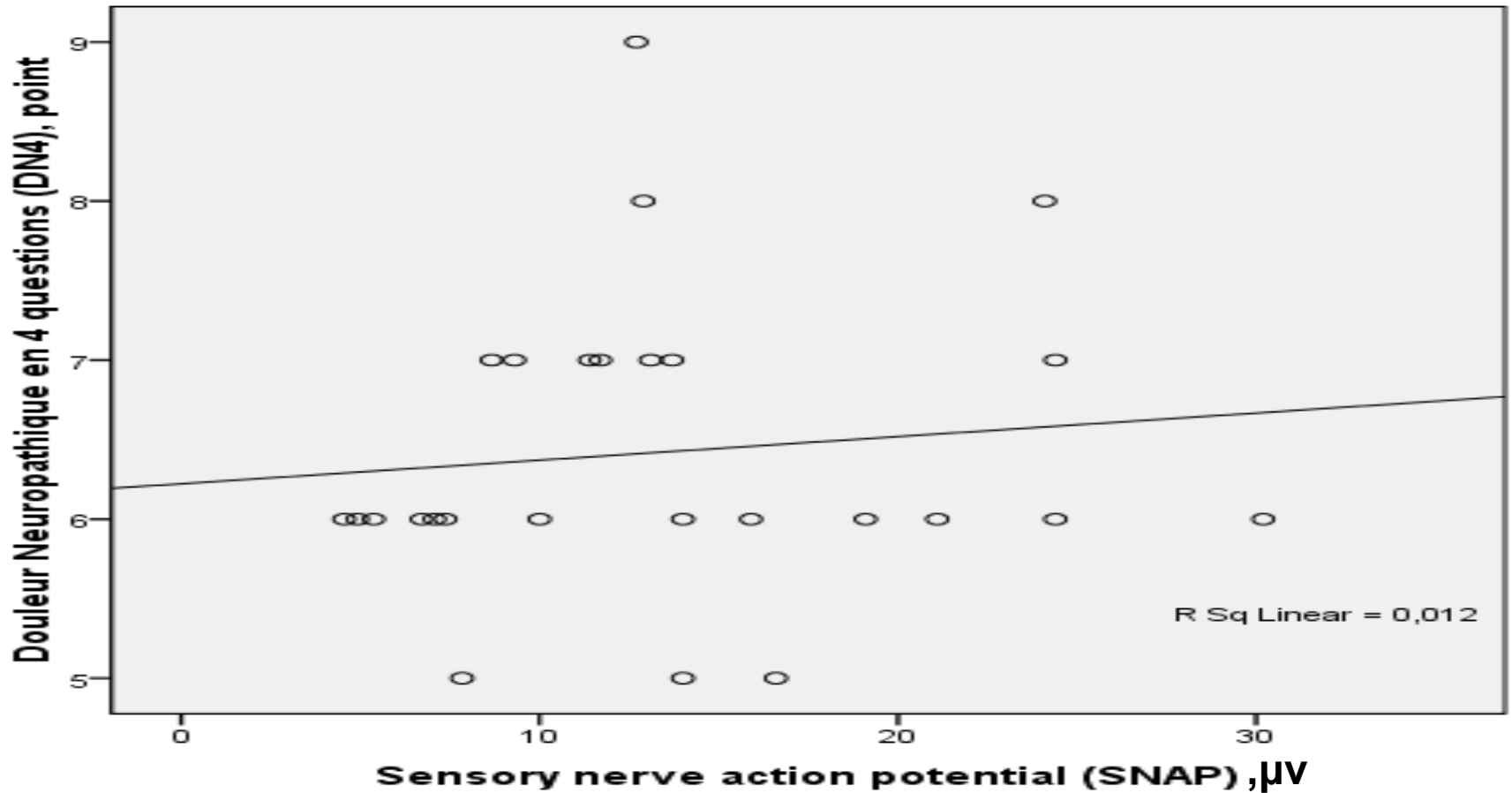


r -correlation coefficient, p -sig.(2-tailed)

Significant positive correlation between questionnaires

DN 4 and ENG (sensory NCV)

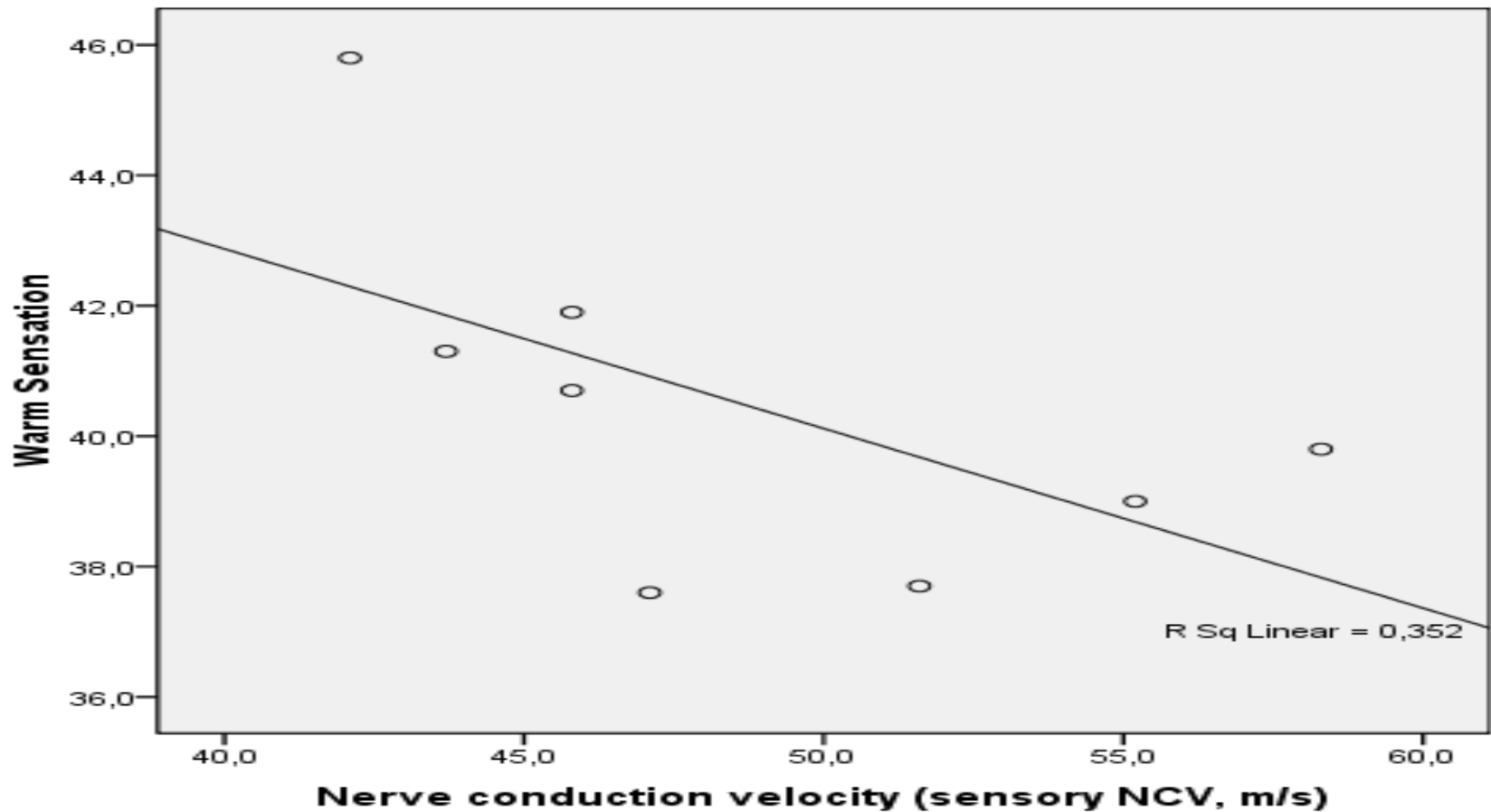
(Sperman`s rho: $r=0.530^*$, $p=0,005$)



r -correlation coefficient, p -sig.(2-tailed)

Significant negative correlation between sensory NCV and QST(Warm Sensation)

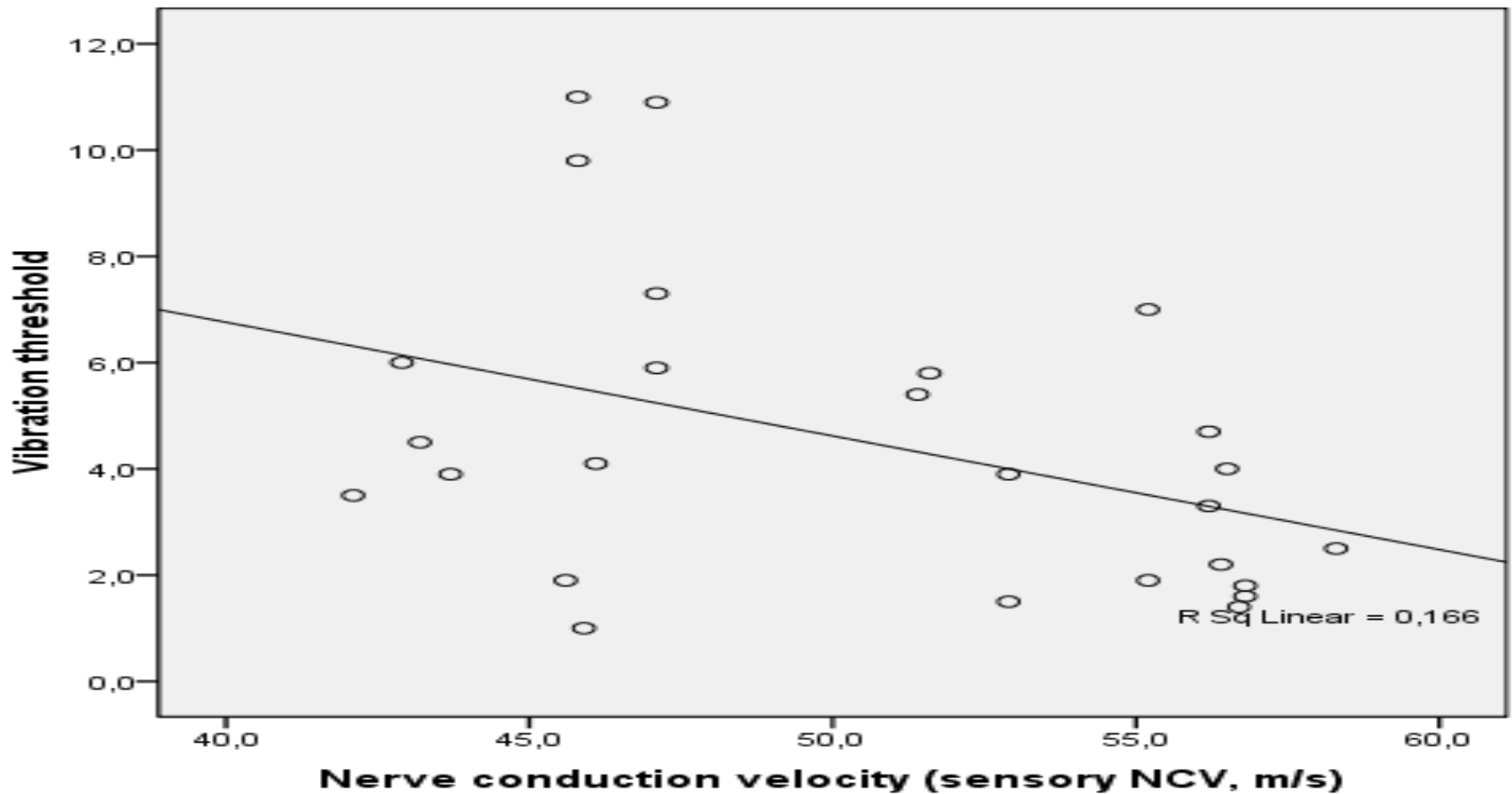
(Sperman`s rho: $r=-0.719^*$, $p=0,045$)



r -correlation coefficient, p -sig.(2-tailed)

Significant negative correlation between ENG (sensory NCV) and QST (Vibration threshold)

(Sperman`s rho: $r=-0.409^*$, $p=0,038$)



r -correlation coefficient, p -sig.(2-tailed)

CONCLUSIONS

- Patients with HAVS have threshold shifts in temperature, vibration and pain sensitivity which correlate with the pain threshold
- In the structure of pain syndrome of QST patients there is a neuropathic component which is proved by the testing results, the QST and ENG data
- The received QST and ENG data prove mainly sensory character of vibration neuropathy.

The received results confirm a difficult structure of a chronic pain syndrome in vibration induced hand disorders.

Complex usage of pain questionnaires and quantitative sensory testing allows to specific components of a chronic pain syndrome and can contribute to optimization of therapeutic tactics (including medicamentary correction).

“Describing pain only in terms of its intensity is like describing music only in terms of its loudness”

von Baeyer CL; Pain Research and Management 11(3) 2006; p.157-162

PALDIES PAR KLAUSĪŠANĀS !

