ASSESSMENT AND DIAGNOSIS

Overview

Diagnosing Neuropathic Pain Is Challenging

Diverse symptoms

Difficulties in communicating and understanding symptoms

Multiple, complex mechanisms

Diagnostic challenges

Recognition of comorbidities

Harden N, Cohen M. J Pain Symptom Manage 2003; 25(5 Suppl):S12-7; Woolf CJ, Mannion RJ. Lancet 1999; 353(9168):1959-64.

Physicians Find Neuropathic Pain More Difficult to Recognize in Some Conditions Than in Others

How challenging is it to recognize neuropathic pain in patients with the following conditions? (n = 1230; including 35% GPs, 9% pain medicine specialists)



AIDS = acquired immunodeficiency syndrome; CIS = carpai tunnel syndrome; DPN = diabetic peripheral neuropathy; GP = general practitioner HIV = human immuodeficiency virus; MS = multiple sclerosis; PHN = postherpetic neuropathy; RSD = reflex sympathetic dystriophy; SCI = spinal cord injury; TGN = trigeminal neuralgia Pfizer Inc. Data on file, Neuropathic Pain Patient Flow Survey.

The 3L Approach to Diagnosis¹

Listen^{1,2}

Patient verbal descriptors of pain, questions and answers



Somatosensory nervous system lesion or disease Look^{1,4}

Sensory abnormalities in the painful area

Freynhagen R, Bennett MI. *BMJ* 2009; 339:b3002; 2. Bennett MI *et al. Pain* 2007; 127(3):199-203;
 Freynhagen R *et al. Pain* 2008; 135(1-2):65-74; 4. Freynhagen R *et al. Curr Pain Headache Rep* 2009; 13(3):185-90.

Neuropathic Pain Screening Tools

	LANSS	DN4	NPQ	painDETECT	ID Pair
Symptoms					
Pricking, tingling, pins and needles	x	x	X	x	X
Electric shocks of shooting	X Neuropathic pain screening tools		ools Dal		
Hot or burning	X	X descriptors of pain			
Numbness		х	х	Х	Х
Pain Painf Select tool(s) b	ased on n the lo	ease	e of u	se and	X
Clinicar examination			ngad	, ge	
Brush allodynia		v			
Raised soft touch threshold		incl	ude beo	dside neurologic	al
Altered pin prick threshold	Jx		exa	amination	
)N4 = Douleur Neuropathique en 4 Questions (DN4) questionnaire; ANSS = Leeds Assessment of Neuropathic Symptoms and Signs: NPC) = Neuropathic Pa	in Question	naire	1 / en	

Bennett MI et al. Pain 2007; 127(3):199-203; Haanpää M et al. Pain 2011; 152(1):14-27.

Sensitivity and Specificity of Neuropathic Pain Screening Tools

Name	Description	Sensitivity*	Specificity*
Interview-bas	sed		
NPQ	10 sensory-related items + 2 affect items	66%	74%
ID-Pain	5 sensory items + 1 pain location	NR	NR
painDETECT	7 sensory items + 2 spatial characteristics items	85%	80%
Interview + p	hysical tests		
LANSS	5 symptom items + 2 clinical exam items	82–91%	80–94%
DN4	7 symptom items + 3 clinical exam items	83%	90%

Tests incorporating both interview questions **and** physical tests have higher sensitivity and specificity than tools that rely only on interview questions

*Compared with clinical diagnosis DN4 = Douleur neuropathic en 4 questions; LANSS = Leeds Assessment of Neuropathic Symptoms and Signs; NPQ = Neuropathic Pain Questionnaire; NR = not reported Bennett MI *et al. Pain* 2007; 127(3):199-203.

LANSS Scale

	THE LANSS PAIL Leeds Assessment of Neuropath	N SCALE ic Symptoms and Signs	
NA	ME	DATE	
Thi nor pai	is pain scale can help to determine whether the nerves th mally or not. It is important to find this out in case diff n.	hat are carrying your pain signals are working erent treatments are needed to control your	
А.	PAIN QUESTIONNAIRE		
•	Think about how your pain has felt over the last	week.	
	Please say whether any of the descriptions mater	ensetions in your skin? Words like	
1)	pricking, tingling, pins and needles might des	cribe these sensations.	
	a) NO - My pain doesn't really feel like this		
	b) YES - I get these sensations quite a lot		
2)	Door your pain make the skin in the painful		
2)	Words like mottled or looking more red or	B. SENSORY TESTING	
	a) NO - My pain doesn't affect the colour of my	Skin sensitivity can be examined by comparing th	e painful area with a contralateral or
	b) YES - I've noticed that the pain does make m	adjacent non-painful area for the presence of alloc (PPT)	lynia and an altered pin-prick threshold
3) 4)	Does your pain make the affected skin abn unpleasant sensations when lightly stroking tight clothes might describe the abnormal so a) NO - My pain doesn't make my skin shnom b) YES - My skin seems abnormally sensitive to Does your pain come on suddenly and in by still. Words like clettric shocks, jumping a	 ALLODYNIA Examine the response to lightly stroking c then the painful area. If normal sensations are pain or unpleasant sensations (ingling, nauser stroking, allodynia in spresent. a) NO, normal sensation in both areas b) YFS, adaborain in panella area only 	otton wool across the non-painful area and experienced in the non-painful site, but) are experienced in the painful area when (0)
		o,	
	 a) NO - My pain doesn't really feel like this 	2) ALTERED PIN-PRICK THRESHOLD	
	b) YES - I get these sensations quite a lot	Determine the pin-prick threshold by compa- needle mounted inside a 2 ml syringe barrel n	uring the response to a 23 gauge (blue)
5)	Does your pain feel as if the skin temperatu	and then painful areas.	area genny en te ure sant in a non paintar
	a) NO - I don't really get these sensations	If a sharp pin prick is felt in the non-painful	area, but a different sensation is
	 b) YES - I get these sensations quite a lot 	sensation (lowered PPT), an altered PPT is pro-	esent.
		If a pinprick is not felt in either area, mount	the syringe onto the needle to increase the
		weight and repeat.	
		 a) NO, equal sensation in both areas 	(0)
		b) YES, altered PPT in painful area	
		SCORING:	
		Add values in parentheses for sensory description score.	and examination findings to obtain overall
		TOTAL SCORE (maximum 24)	
		If score < 12, neuropathic mechanisms are unlike	by to be contribution to the patient's pain
		If score ≥ 12, neuropathic mechanisms are likely	to be contributing to the patient's pain

- Completed by physician ٠ in office
- **Differentiates neuropathic** • from nociceptive pain
- 5 pain questions and • 2 skin sensitivity tests
- Identifies contribution of • neuropathic mechanisms to pain
- Validated •

LANSS = Leeds Assessment of Neuropathic Symptoms and Signs Bennett M. Pain 2001; 92(1-2):147-57.

DN4



Time Please complete this questionnaire by ticking one answer for each Item In the four questions below. A YES score of ≥4 is diagnostic of

Interview of the patient

Question 1. Does the pain have one or more of the following characteristics?

	YES	NO
1. Burning		
2. Painful Cold		
3. Electric Shocks		

Question 2. Is the pain associated with one or more of the following symptoms in the same area?

	YES	NO
4. Tingling		
5. Pins and Needles		
6. Numbness		
7. Itching		

Examination of the patient

Question 3. Is the pain located in an area where the physical examination may reveal one of more of the following characteristics?

	YES	NO
8. Touch Hypoaesthesia		
9. Pricking Hypoaesthesia		

Question 4. In the painful area, can the pain be caused or increased by:

	YES	NO
10. Brushing (s.g. aato o Ven Prey tot or brast)		
Patient score		/10

DN4 = Douleur neuropathique en 4 questions Bouhassira D et al. Pain 2005; 114(1-2):29-36.

- Completed by physician in office •
- Differentiates neuropathic from nociceptive pain
- 2 pain questions (7 items) •
- 2 skin sensitivity tests (3 items) •
- Score \geq 4 is an indicator for • neuropathic pain
- Validated

painDETECT

Paindetect	PAIN QUESTIONNAIRE	
Date: Patient: L	st name:	
How would you assess your pain now, at this r	7 8 9 10 Please mark your main area of pain	
none How strong was the strongest pain during the	max.	
rone		
How strong was the pain during the past 4 we 0 1 2 3 4 5 6	ks on average?	
Mark the picture that best describes	me c X s c + s	
the course of your pain: Persistent pain with Sight fluctuations		
Persistent pain with parteries		
Pain attacks without		
Pain attacks with pain between them	Does your pain radiate to other regions of your body? yes no financial in the direction in	
	which the pain radiates.	
Do you suffer from a burning sensation (e.g	stinging nettles) in the marked areas?	
Do you have a tingling or prickling se never hardly noticed		ESTIONNAIRE
Is light touching (clothing, a blanket)		LOTIONINA
Do you have sudden pain attacks in t	Date: Patient: Last name: First	t name:
is cold or heat (both water) in this are		uestionnaire:
never hardly noticed		
never hardly noticed	Please add up the following numbers, depending on the marked pa pain radiation. Then total up the final score:	n behavior pattern and the
never hardly noticed	Persistent pain with slight fluctuations 0	
never hardly noticed	Persistent pain with pain - 1 if m	arked, or
xu = [0] x i = [Pain attacks without +1 if m	arked, or
R. Freynhagen, R. Baron, U. Gockal, T.R. Tölle, Curtile	Pain attacks with pain +1 if m	arked
	+2 #	-
	A Radiating pain?	
	Final score	
	Screening Result	
		ocitivo
	p	
	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 Result is ambiguous, A pain component however a pa is unlikely neuropathic pain	neuropathic n component is likely
	(< 15%) component can be present	(> 90%)
	This sheet does not replace medical diagn	ostics.
	it is used for screening the presence of a neuropathic	pain component.

- Patient-based, easy-to-use screening questionnaire
- Developed to distinguish between neuropathic pain and non-neuropathic pain*
- Validated: high sensitivity, specificity and positive predictive accuracy
- Seven questions about quality and three about severity of pain
- Questions about location, radiation and time course

ID Pain

On the diagram below, shade in the areas where you feel pain. If you have more than one painful area, circle the area that bothers you the most.



Mark 'Yes' to the following items that describe your pain over the past week and 'No 'to the ones that do not.

Question	Sci	ore
	Yes	No
1. Did the pain feel like pins and needles?	1	0
2. Did the pain feel hot/burning?	1	0
3. Did the pain feel numb?	1	0
4. Did the pain feel like electrical shocks?	1	0
5. Is the pain made worse with the touch of clothing or bed sheets?	1	0
6. Is the pain limited to your joints?	-1	0

- Patient-completed screening tool
- Includes 6 yes/no questions and pain-location diagram
- Developed to differentiate between nociceptive and neuropathic pain
- Validated

Portenoy R. Curr Med Res Opin 2006; 22(8):1555-65

History

Listen to the Patient Description of Pain



- **Question** patients about their pain¹
- Be alert and ask for common verbal descriptors of neuropathic pain²
- Use analogue or numerical scales to quantify the pain²
- Use screening and assessment tools to distinguish neuropathic pain from non-neuropathic pain³

Listen: Pain History in Neuropathic Pain

Identify the Following:

- Duration
- Frequency
- Quality
- Intensity
- Distribution and location of pain
- Extent of interference with daily activity

Areas of Further Exploration

- Previous medical history
- Exposure to toxins or other drug treatment (e.g., cancer chemotherapy, radiation)
- Use of pain medications
- Associated psychological and mood disturbance

Listen: Recognizing Neuropathic Pain

Be alert for common verbal descriptors of neuropathic pain:



Burning

Tingling



Shooting



Electric shock-like



Numbness

Baron R et al. Lancet Neurol 2010; 9(8):807-19; Gilron I et al. CMAJ 2006; 175(3):265-75.

Descriptions of Symptoms Reported by Patients with Neuropathic Pain*

How would you describe the pain? (n = 1172)



*Includes peripheral, central and mixed pain states Pfizer Inc. Data on file, Neuropathic Pain Patient Flow Survey.

Characteristics of Chronic Neuropathic Pain Differ from Chronic Non-neuropathic Pain

Comparison of NPS Item Scores for Respondents Reporting Chronic Pain



NPS = Neuropathic Pain Scale, a series of 0 to 10 numerical rating scales that address specific features of the experience of the pain reported Adapted from: Smith BH *et al. Clin J Pain* 2007; 23(2):143-9.

Common Symptoms Across Different Neuropathic Pain States

Descriptors Chosen by More than One-Third of Patients

	Disc disease (n = 10)	Cancer pain (n = 8)	Phantom limb pain (n = 8)	Postherpetic neuralgia (n = 6)
Sharp	60%	50%	38%	84%
Throbbing	40%		38%	
Burning		50%	50%	
Shooting	50%	50%		
Stabbing	40%		50%	
Gnawing		50%		
Cramping	40%		50%	
Aching	40%		38%	50%
Heavy	40%	50%		
Tender	50%			83%

Listen: Sensory Symptoms of Neuropathic Pain

Lesion or disease of the somatosensory nervous system

Positive symptoms (due to excessive neural activity)

> Spontaneous pain Allodynia Hyperalgesia Dysesthesia Paresthesia

Negative symptoms (due to deficit of function)

Hypoesthesia Anesthesia Hypoalgesia Analgesia

Sensory abnormalities and pain paradoxically *co-exist* Each patient may have a combination of symptoms that may change over time (even within a single etiology)

Baron R et al. Lancet Neurol 2010; 9(8):807-19; Jensen TS et al. Eur J Pharmacol 2001; 429(1-3):1-11.

Incidence of Positive and Negative Symptoms Among Patients with Postherpetic Neuralgia

	% of patients (n = 158)		
	Present	Absent	Uncertain
Hyperethesia, dysesthesia, or allodynia to light stroking	65%	28%	7%
Analgesia or hypoalgesia to pin prick	92 %	5%	3%
Anesthesia or hypoesthesia to light touch	90%	8%	2%

Positive symptoms; negative symptoms

Watson CP et al. Pain 1988; 35(3):289-97.

Listen: Positive Sensory Symptoms of Neuropathic Pain

Positive symptom	Definition	Typical verbal descriptors
Spontaneous pain	Painful sensations felt with no evident stimulus	Electric shock-like, burning
Allodynia	Pain due to a stimulus that does not normally provoke pain (e.g., touching, movement, cold, heat)	Vary with stimulus
Hyperalgesia	An increased response to a stimulus that is normally painful (e.g., cold, heat, pinprick)	Vary with stimulus
Dysesthesia	An unpleasant abnormal sensation, whether spontaneous or evoked	Shooting, piercing, burning
Paresthesia	An abnormal sensation, whether spontaneous or evoked	Tingling, buzzing, vibrating

Listen: Negative Sensory Symptoms of Neuropathic Pain

Negative symptom	Definition	Typical verbal descriptor
Hypoesthesia	Diminished sensitivity to stimulation	Numbness
Anesthesia	Total loss of sensation (especially tactile sensitivity)	Numbness
Hypoalgesia	Diminished pain in response to a normally painful stimulus	Numbness
Analgesia	Absence of pain in response to stimulation that would normally be painful	Numbness

Adapted from: Jensen TS, Baron R. *Pain* 2003; 102(1-2):1-8; Merskey H, Bogduk N (eds). In: *Classification of Chronic Pain*. 2nd ed. IASP Press; Seattle, WA: 2011.

Signs and Symptoms of Diabetic Peripheral Neuropathy

- Numbness or insensitivity to pain or temperature
- Tingling, burning or prickling sensation
- Sharp pains or cramps
- Extreme sensitivity to touch, even light touch
- Loss of balance and coordination
- Muscle weakness and loss of reflexes
- Symptoms are often worse at night



National Institute of Diabetes and Digestive and Kidney Diseases. *Diabetic Neuropathies: The Nerve Damage of Diabetes*. Available at: http://diabetes.niddk.nih.gov/dm/pubs/neuropathies/neuropathies.pdf. Accessed: July 15, 2009.

Listen: Neuropathic Signs and Symptoms Can Vary Widely



Between Individuals



- Wide spectrum of signs and symptoms often co-exist at the same time
- Signs and symptoms may vary within an individual over time
- Signs and symptoms vary among individuals with the same underlying etiology
- Signs and symptoms are shared across neuropathic pain states

Dworkin RH. *Clin J Pain* 2002; 18(6):343-9; Harden N, Cohen M. *J Pain Symptom Manage* 2003; 25(5 Suppl):S12-7); Jensen TS, Baron R. *Pain* 2003; 102(1-2):1-8; Krause SJ, Bajckonja MM. *Clin J Pain* 2003; 19(5):306-14.

Determine Pain Intensity



International Association for the Study of Pain. *Faces Pain Scale – Revised*. Available at: <u>http://www.iasp-pain.org/Content/NavigationMenu/GeneralResourceLinks/FacesPainScaleRevised/default.htm</u>. Accessed: July 15, 2013; Iverson RE *et al. Plast Reconstr Surg* 2006; 118(4):1060-9.

Locate the Region of Pain

Correlate the region of pain to the lesion in the somatosensory nervous system*



*Note that in cases of referred neuropathic pain, as can occur for example in some cases of spinal cord injury, the location of the pain and of the lesion/dysfunction may not be correlated

Gilron I et al. CMAJ 2006; 175(3):265-75; Soler MD et al. Pain 2010; 150(1):192-8; Walk D et al. Clin J Pain 2009; 25(7):632-40.

In Diabetic Peripheral Neuropathy, Sensorimotor Impairment May Occur in a "Sock-and-Glove" Pattern



Boulton AJ et al. Diabetes Care 2004; 27(6):1458-86; Boulton AJ et al. Diabetes Care 2005; 28(4):956-62.

Localization of Postherpetic Neuropathy Pain Varies from Person to Person



Body regions where postherpetic neuropathy pain was localized are shown for the 11 participants. Color code is number of patients overlapping with symptoms at indicated body region. Geha PY *et al. Pain* 2007; 128(1-2):88-100.

Physical Examination

Look for Sensory and/or Physical Abnormalities

- Inspect the painful body area and compare it with the corresponding healthy area^{1,2}
- Conduct simple bedside tests to confirm sensory abnormalities¹⁻⁴





1. Baron R, Tölle TR. *Curr Opin Support Palliat Care* 2008; 2(1):1-8; 2. Freynhagen R, Bennett MI. *BMJ* 2009; 339:b3002; 3. Haanpää ML *et al. Am J Med* 2009; 122(10 Suppl):S13-21; 4. Gilron I *et al. CMAJ* 2006; 175(3):265-75.

Look: Simple Bedside Tests

Stroke skin with brush, cotton or apply acetone





Sharp, burning superficial pain



Light manual pinprick with safety pin or sharp stick







Baron R. Clin J Pain 2000; 16(2 Suppl):S12-20; Jensen TS, Baron R. Pain 2003; 102(1-2):1-8.

Allodynia*: Simple Tests and Expected Responses

Type of allodynia	Test	Expected response	
Mechanical static	Manual light pressure on skin	Dull pain	
Mechanical punctate	Light manual pinprick with sharp stick	Sharp, superficial pain	
Mechanical dynamic	Stroke skin with brush, gauze or cotton	Sharp, burning, superficial pain	
Thermal warm	Touch skin with an object at ~40°C	Painful, burning sensation	
Thermal cold	Touch skin with object at ~20 °C	Painful, burning sensation	

*Allodynia: pain due to a stimulus that does not normally provoke pain Baron R. *Clin J Pain* 2000; 16(2 Suppl):S12-20; Jensen TS, Baron R. *Pain* 2003; 102(1-2):1-8

Hyperalgesia*: Simple Tests and Expected Responses

Type of hyperalgesia	Test	Expected response
Mechanical pinprick	Manual pinprick with a safety pin	Sharp, superficial pain
Thermal warm	Touch skin with an object at ~46°C	Painful, burning sensation
Thermal cold	Touch skin with coolants (acetone)	Painful, burning sensation

*Hyperalgesia: increased response to a stimulus which is normally painful Baron R. *Clin J Pain* 2000; 16(2 Suppl):S12-20; Jensen TS, Baron R. *Pain* 2003; 102(1-2):1-8

Simple Tests to Assess Potential Hypoesthesia (Loss of Sensation)





10-Gram Semmes-Weinstein Monofilament

128-Hz Vibration Tuning Fork

Such tests should be part of regular foot examinations in patients with diabetes

Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Can J Diabetes 2013; 37(Suppl 1):S1-212.

How to Perform a Proper Foot Exam in Patients with Diabetes



Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Can J Diabetes 2013; 37(Suppl 1):S1-212.

Foot Exam Forms Can Help Simplify Assessment

		Date:	ID#:	
I. Presence of Diabetes Complications 2. Any change in the evaluation? Y 1. Check all that apply. 9. Any shoe problem Deripheral Neuropathy 3. Any shoe problem Retinopathy 4. Any blood or dis herein the service of the se		e foot since the last N ns? YN charge on socks or yN oglobin A1c result _date	Measure, draw in, and label the patient's skin condition, using the key and the foot diagram below. C=Callus U=Ulcer Pl=Pre-Ulcer F=Fissure M=Maceration R=Redness 5=5welling W=Warmth D=Dryness 2. Note Musculoskeletal Deformities Toe deformities	
Current ulcer or history of a foot ulcer? YN	III. Foot Exam 1. Skin, Hair, and Nail Condition		 Bunions (Hallus Valgus) Charcot foot Foot drop 	
For Sections II & III, fill in the blanks with "Y" or "N" or with an "R," "L" or B" for positive findings on the right, left, or both feet. I. Current History 1. Is there pain in the calf muscles when walking that is relieved by rest? Y N	hairless? Y N_ Are the nails thicl ingrown, or infect disease? Y N_		Prominent Metatarsal Heads Redal Pulses Fill in the blanks with a 'P' or an 'A' to indicate present or absent. Posterior tibial Left Right Dorsalis pedis_Left Right	
ß	000	01000	Notes	
Right Foot			Notes	
Right Foot			Notes	
Right Foot V. Risk Categorization Check appropriate . Low Risk Patient I of the following: Pedal pulses present Pedal pulses present No prior foot ulcer No prior foot ulcer No prior foot ulcer No amputation Prior an Pri	box. sk Patient ore of the protective on pedal pulses of foot ulcer mputation	VII. Management PI 1. Self-management Provide patient edu Provide patient edu Of self-are. Date: 2. Diagnostic studie U Hemoglobul Hemoglobul U Hemoglobul Hemoglobul	Notes	
Right Foot V. Risk Categorization Check appropriate Low Risk Patient Low Risk Patient Low Risk Patient Check appropriate Low Risk Patient Check appropriate Low Risk Patient Low Risk Patient Check appropriate Risk Patient Risk Patie	box. sk Patient ore of the protective on pedal pulses sformity of foot ulcer mputation k 27 Y N d7 Y N	VII. Management PI 1. Self-management Provide patient edu Provide patient edu Provide patient edu of self-are. Date: 2. Diagnostic studie O devider are of the O devider	Notes	

Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Can J Diabetes 2013; 37(Suppl 1):S1-212; Boulton AJM et al. Diabetes Care 2008; 31(8):1679-85; National Institutes of Health. Annual Comprehensive Diabetes Foot Exam Form. Available at: http://ndep.nih.gov/media/FootExamForm.pdf. Accessed: August 23, 2013.

Imaging and Other Tests

Newer Neuropathic Pain Assessment Techniques

- Newer, more objective assessment techniques for neuropathic pain include:
 - Laser-evoked potentials
 - Skin biopsy
 - Quantitative sensory testing

Patient with diabetic small-fibre neuropathy³



Arrows = IENFs, arrowheads = dermal nerve bundles. Bright-field immunohistochemistry in 50 μ m sections stained with anti-PGP 9.5 antibody. Bar = 80 μ m.

IENF = intra-epidermal nerve fiber

Jovin Z et al. Curr Top Neurol Psychiatr Relat Discip 2010; 18(2):30-7; Lauria G, Devigili G. Nature Clin Practice Neurol 2007; 3(10):546-57.

Laser-Evoked Potentials

How They Work

- Detect dysfunction of pain and temperature pathways, which are the basis of neuropathic pain development²
- Laser-generated radiant heat pulses selectively excite free nerve endings in the superficial skin layers³
- Brain responses are recorded⁴
- Late laser evoked potentials reflect activity of Aδ nerve endings in superficial skin layers¹
- Laser evoked potential magnitudes may accurately gauge subjective experience of pain⁴

Potential Place in Practice

- Easiest, most reliable, and most sensitive neurophysiological way to assess the function of nociceptive pathways¹
- EFNS has recommended the use of laser evoked potentials as an ancillary tool in the evaluation of neuropathic pain²
- Use in diagnosis currently limited by availability of equipment²

EFNS = European Federation of Neurological Societies

- 1. Cruccu G et al. Eur J Neurol 2010; 17(8):1010-8; Garcia-Larrea L, Godinho F. Eur Neurolog Disease 2007; 2:39-41;
- 2. Truini A et al. Clin Neurophysiol 2005; 116(4):821-6; Garcia-Larrea L et al. Brain 2002; 125(Pt 12):2766-81.

Skin Biopsy

- Circular punch is used to excise a hairy skin sample, usually from distal part of the leg
- Lidocaine used as a topical anesthetic
- No sutures are required
- No side effects
- Wound heals quickly



Lauria G *et al. Eur J Neurol* 2005; 12(10):747-58; Lauria G, Devigili G. *Nature Clin Practice Neurol* 2007; 3(10):546-57; Lauria G, Lombardi R. *BMJ* 2007; 334(7604):1159-62.

Quantitative Sensory Testing

How It Works

- Involves measuring the responses evoked by mechanical and thermal stimuli of controlled intensity²
- Stimuli are applied to the skin in ascending and descending order³
 - Mechanical sensitivity: assessed using plastic filaments and pin prick sensation with weighted needles³
 - Vibration sensitivity: assessed using an electronic vibrameter³
 - Thermal sensitivity: assessed using a probe that operates on a thermoelectric principle³

Limitations

- Relies on the patient's subjective assessment of pain³
- Outcomes of quantitative sensory testing and bedside testing do not necessarily coincide²
- Quantitative sensory testing abnormalities cannot be taken as conclusive demonstration of neuropathic pain⁴ because they also occur in other conditions, such as rheumatoid arthritis³
- Time consuming and requires expensive equipment⁴
- Results can be influenced by various factors (e.g., model or make of equipment, room temperature, site of stimulus, patient characteristics)²

1. Rolke R et al. Pain 2006; 123(3):231-43; 2. Hansson P et al. Pain 2007; 129(3):256-9;

3. Jovin Z et al. Curr Top Neurol Psychiatr Relat Discip 2010; 18(2):30-7; 4. Cruccu G, Truini A. Neurol Sci 2006; 27(Suppl 4):S288-90.

Routine Nerve Conduction Studies: Pearls and Pitfalls

- Only test **large diameter** myelinated fast conducting nerve fibers, and potentially **miss** small myelinated and unmyelinated nerve fibers affected in neuropathic pain
 - If *normal*: will not rule out neuropathic pain
 - If *abnormal:* indicate that the neuropathic process is more severe (involving large and small nerve fibers)
- Potential utility:
 - Helpful in assessing length-dependent neuropathies
 - Coupled with electromyography can help rule out other causes of neuropathy and concomitant myopathies
 - Sympathetic skin responses, if *abnormal*, may be indirect evidence of small fiber neuropathy

Kimura J. Electrodiagnosis in Diseases of Nerve and Muscle: Principles and Practice. 3rd ed. New York, NY: Oxford University Press; 2001.

Diagnosis

Clinical Approach to Suspected Neuropathic Pain



1. Freynhagen R, Bennett MI. *BMJ* 2009; 339:b3002; 2. Haanpää ML *et al. Am J Med* 2009; 122(10 Suppl):S13-21; 3. Treede RD *et al. Neurology* 2008; 70(18):1630-5.

Diagnostic Certainty of Diabetic Peripheral Neuropathy

The Toronto Diabetic Neuropathy Consensus Panel

Possible

Symptoms or signs of diabetic peripheral neuropathy

Probable

Symptoms and signs of diabetic peripheral neuropathy

Confirmed

Symptoms or signs of diabetic peripheral neuropathy and nerve conduction abnormality

Subclinical

Nerve conduction abnormality only

Tesfaye S et al. Diabetes Care 2010; 33(10):2285-93.

When is pain after herpes zoster called postherpetic neuralgia?



El-Ansary M. In: Kopf A, Patel NB (eds). Guide to Pain Management in Low-Resource Settings. IASP Press; Seattle, WA: 2010.

Summary

Assessment and Diagnosis: Summary

Applying the 3L approach differentiates neuropathic from nociceptive pain.

	Listen ^{1,4,5}	Locate ¹	Look ¹⁻³
Neuropathic	Positive result on LANSS, NPQ or DN4 screening tools. Common descriptors include "shooting", "electric shock", "burning", "tingling", "itching" and "numbness". ⁴	Painful region may not necessarily be the same as the site of injury.	Bedside tests demonstrate sensory abnormalities.
Nociceptive	Common descriptors include "aching" and "throbbing".	Painful region is typically localized to site of injury. Physical manipulation causes pain at site of injury.	Sensory abnormalities not indicated.

DN4 = Douleur neuropathic en 4 questions; LANSS pain scale = Leeds Assessment of Neuropathic Symptoms and Signs pain scale; NPQ = Neuropathic Pain Questionnaire

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