Pain-Orientated Sensory Testing (‘POST’) Guidelines

PREAMBLE

These guidelines outline standardised terminology, equipment and techniques for Pain-Orientated Sensory Testing (‘POST’) during clinical examination, for Fellows and Trainees of the Faculty of Pain Medicine, Australian and New Zealand College of Anaesthetists (FPM).

Because such a wide variety of sensory testing techniques are used in clinical practice, the Faculty developed these guidelines to facilitate a consistent and practical approach for pain medicine practitioners, particularly those presenting for FPM examinations.

POST is based on the publications listed in the references [1-5], and on the Faculty’s Pain Oriented Physical Examination (POPE) guidelines [6].

‘POST’ STANDARDISED EQUIPMENT CHECKLIST

- Camel hair brush (1 cm brush width)
- Cotton wool balls
- Cocktail sticks (toothpicks)
- Neurotips™ (optional)
- 128 Hz stainless steel tuning fork ('large' size with a flat base plate)
- 50 mm paper clips (for two-point discrimination testing)
- Tendon hammer (larger size)
- Tape measure (flexible) (two-point discrimination testing & measuring surface area)
- Marker pen (for mapping areas of altered skin sensation)
- Timer/stopwatch
- Alcohol wipes (for sterilisation of camel hair brush between patients)
- Sharps container
- OPTIONAL: Water bath, thermometer & C-size batteries (warmth allodynia testing)

COMPARING ‘SIDES’ AND ‘SITES’ IN SENSORY TESTING

In order to detect altered skin and soft tissue sensation which is the aim of ‘POST’, always compare symmetrical anatomical sites (right versus left) and ‘abnormal’ with (presumably) ‘normal’ sites, in a systematic fashion.
‘POST’ TERMINOLOGY AND CLINICAL TESTING TECHNIQUES

ALLODYNIA

✓ “Pain due to a stimulus that does not normally provoke pain”.¹
✓ “Pain in response to a non-noxious stimulus” OR, “a situation where a ‘non-noxious’ stimulus leads to an unexpectedly painful response”.¹
✓ Allodynia is a clinical term. It does not imply a specific mechanism¹ although it is considered a ‘clinical test’ for the presence of central sensitization.

a) Dynamic Mechanical Allodynia (brush-evoked)

Tangentially stroke the skin with a camel hair brush OR a cotton wool ball. Apply a 2 cm long ‘brush-stroke’ over 1 second*, then repeat.

Pattern: — — — —

*Counting “one thousand-and-one” = 1 second

b) Punctate Mechanical Allodynia

Stimulate the skin with a cocktail stick (toothpick) OR the ‘blunt’ end of a Neurotips™. Apply 2 stimuli per second*, then repeat.

Pattern: I I I I I I I I

*Counting “one thousand-and-one” = 1 second

c) Pressure-evoked Mechanical Allodynia

Apply pressure to soft tissues with the tip of your index finger, until your nail bed ‘blanches’. Apply the stimulus for 1 second*, then repeat.

Pattern: — — — —

*Counting “one thousand-and-one” = 1 second

d) Cold Allodynia

Apply the cold ‘prongs’ of a stainless steel tuning fork to the skin. Apply the stimulus for 1 second*, then repeat.

(Stainless steel acts as a ‘heat sink’ at approximately 20˚C) (Non-noxious ‘cold’)

Pattern: — — — —

*Counting “one thousand-and-one” = 1 second

e) Warmth Allodynia (optional test)

Warm a C-size battery in water at 45˚C for 5 minutes. Then apply base of the battery to the skin. Apply the stimulus for 1 second*, then repeat.

(Battery acts as a ‘heat source’ at 45˚C) (Non-noxious ‘warmth’)

Pattern: — — — —

*Counting “one thousand-and-one” = 1 second
HYPERALGESIA
✓ “Increased pain from a stimulus that normally provokes pain”.¹
✓ Increased pain response to a stimulus that is ‘noxious’ (‘tissue damaging’).
✓ Increased pain response associated with supra-threshold stimulation.
✓ Analogous to punctate mechanical allodynia (see ‘b’ above).
✓ By definition, the examiner must deliberately apply a painful stimulus to the subject in order to demonstrate hyperalgesia.

Punctate Hyperalgesia (optional test)
Apply a Neurotips™ needle to the skin as a ‘pin-prick’ (noxious) stimulus.
Apply 2 stimuli per second*, then repeat.
Pattern: I I I I I I

*Counting “one thousand-and-one” = 1 second

HYPERPATHIA
✓ “A painful syndrome characterized by an abnormally painful reaction to a... repetitive stimulus, as well as an increased threshold”.¹
✓ Sometimes called ‘temporal summation’, hyperpathia is the clinical analogue of the experimental paradigm known as “wind-up”.
✓ Stimulus frequencies vary in the literature from 2 Hz for 30 seconds, to 1 Hz for 10 seconds repeated over 5 cycles.

Hyperpathia
• Stimulate a localised area of skin with a cocktail stick (toothpick) or Neurotips™ needle (optional).
• As a baseline, briefly test as per punctate mechanical allodynia (‘b’) (or hyperalgesia, if using a needle); ask the subject how painful this is as a VNRS score (baseline).
• Then stimulate the skin repeatedly at a rate of 2 stimuli per second* (2 Hz), for 30 seconds (use timer).
• Ask for a post-test VNRS pain score immediately after the last stimulus (ie: at the 30 second mark).
• Increase in pain score compared with baseline demonstrates hyperpathia.
• Also, determine if pain continues after stimulation stops (‘after-sensations’).
Pattern: I I I I I I (VNRS?) I I I I I I I I I I I I I I I (30s) (VNRS?)

*Counting “one thousand-and-one” = 1 second  (VNRS) Verbal Numerical Rating Scale
SENSORY AREA MAPPING

• Ask the patient to point to the area of altered skin sensation.
• Mark the approximate centre of this area with an ‘X’, using the marker pen.
• With an appropriate stimulus (cotton wool ball, brush, cocktail stick, Neurotip™, steel tuning fork), start outside the affected area and move inwards towards the ‘X’ in 10 cm long parallel vectors, asking the patient to report the exact moment when sensation changes—mark these points on the skin with the pen.
• Outline the ‘boundary’ of altered skin sensation with the pen.
• The area of altered sensation (cm²) can be quantified using the measuring tape.

TWO-POINT DISCRIMINATION TESTING

✓ Impaired two-point discrimination may be demonstrated in patients with chronic regional pain syndromes, possibly reflecting altered (CNS) neuro-processing?

Two-point discrimination testing

• ‘Unfold’ both ends of a 50 mm paperclip into a ∏ shape to form two points.
• Adjust the distance (mm) between the two points to the desired discrimination threshold, using the measuring tape.
• Discrimination thresholds for various body regions – finger tip: 5 mm; palms & soles: 10 mm; face (excluding lips) 15 mm; limbs: 40 mm; back & torso: 40 mm.
• Apply the two-point stimulus for 1 second*, then repeat.
• Record ‘yes’ if the subject feels 2 points and ‘no’ if they feel 1 point or nothing at all.
• If ‘no’ at the appropriate discrimination threshold, then there is reduced two-point discrimination at that site.

Pattern: ∏ (site 1: Y/N?) ∏ (site 2: Y/N?) ∏ (site 3: Y/N?)

*Counting “one thousand-and-one” = 1 second
REFERENCES:


**APPENDIX 1**

**POST definitions, equipment and clinical techniques.**

<table>
<thead>
<tr>
<th>Terminology</th>
<th>Equipment</th>
<th>Technique</th>
<th>Transmission</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Mechanical Allodynia (Brush-evoked)</td>
<td>Camel hair brush OR Cotton wool ball</td>
<td>Tangentially stroke the skin 2 cm brush stroke over 1 sec, then repeat</td>
<td>Aβ → 2˚ neuron</td>
<td>central sensitization of nociception</td>
</tr>
<tr>
<td>Punctate Mechanical Allodynia</td>
<td>Cocktail stick (toothpick) OR blunt end of Neurotips™</td>
<td>Stimulate the skin using a cocktail stick OR blunt end of Neurotips™ 2 stimuli/sec, repeat</td>
<td>Aδ → 2˚ neuron</td>
<td>central sensitization of nociception</td>
</tr>
<tr>
<td>Pressure-evoked Mechanical Allodynia</td>
<td>Index finger</td>
<td>Press soft tissues with tip of index finger until nail bed &quot;blanches&quot; Apply the stimulus for 1 sec, then repeat</td>
<td>Aδ → 2˚ neuron (C fibre?)</td>
<td>central sensitization of nociception</td>
</tr>
<tr>
<td>Cold Allodynia</td>
<td>128 Hz steel tuning fork</td>
<td>Apply the steel ‘prongs’ of a tuning fork to the skin Apply the stimulus for 1 sec, then repeat</td>
<td>Aδ → 2˚ neuron</td>
<td>central sensitization of nociception</td>
</tr>
<tr>
<td>Warmth Allodynia (Optional)</td>
<td>C-sized battery warm water bath (such as baby-bottle warmer), thermometer, stopwatch</td>
<td>Warm battery in water at 45˚C for 5 minutes; apply base of battery to the skin Apply the stimulus for 1 sec, then repeat</td>
<td>C fibre → 2˚ neuron</td>
<td>peripheral sensitization of nociception</td>
</tr>
<tr>
<td>Hyperpathia Temporal Summation</td>
<td>Cocktail stick (toothpick) OR Neurotips™ needle (optional)</td>
<td>Stimulate skin at 2 stimuli per second (2 Hz) for 30 seconds &amp; assess for change in pain scores, and after-sensations</td>
<td>Aδ → 2˚ neuron</td>
<td>central sensitization of nociception clinical analogue of 'wind-up'</td>
</tr>
<tr>
<td>Terminology</td>
<td>Equipment</td>
<td>Technique</td>
<td>Transmission</td>
<td>Inference</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>--------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hyperalgesia (Optional)</td>
<td>Neurotips™ needle</td>
<td>Stimulate the skin using Neurotips™ needle 2 stimuli/sec, repeat</td>
<td>Aδ → 2° neuron</td>
<td>Central sensitization of nociception</td>
</tr>
<tr>
<td>Touch Sensation</td>
<td>Cotton wool</td>
<td>Touch the skin using a single ‘dabbing’ motion</td>
<td>aβ fibre → dorsal columns</td>
<td>Intact aβ fibre &amp; dorsal columns function</td>
</tr>
<tr>
<td>Vibration Sensation</td>
<td>128 Hz steel tuning fork</td>
<td></td>
<td>aβ fibre → dorsal columns</td>
<td>Intact aβ fibre &amp; dorsal columns function</td>
</tr>
<tr>
<td>Two-point Discrimination</td>
<td>50 mm paper clip Bent into</td>
<td>Thresholds: finger: 5mm palm:10mm sole: 10 mm face: 15 mm limb: 40 mm back: 40 mm torso: 40 mm</td>
<td>aβ fibre → dorsal columns</td>
<td>Intact aβ fibre &amp; dorsal columns function ↓discrimination due to altered CNS processing?</td>
</tr>
<tr>
<td>Sensory Area Mapping</td>
<td>Marker pen and tape measure</td>
<td>Map area of altered skin sensation, using various stimulus modalities; calculate area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep Tendon Reflexes</td>
<td>Tendon hammer</td>
<td></td>
<td>I a &amp; II sensory afferents → α motor neuron</td>
<td>motor reflex arc</td>
</tr>
</tbody>
</table>