The Practical Neurological Examination, Part 5: Assessment of Sensory Function

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There are five primary sensory modalities typically tested in a routine neurological examination. Three of these, vibration, joint position sense and pinprick, are the focus of this discussion. Light touch and temperature are discussed, but not described in detail. Likewise, higher sensory functions such as stereognosis and graphesthesia are not discussed, as they are seldom the reason for presentation in a chiropractic practice.

Light touch is carried in two separate spinal cord tracts, the posterior column and the spinothalamic tract. This makes it difficult to detect abnormalities unless there are pathologies affecting both tracks. A quick, simple way to test temperature is to touch the patient with a tuning fork. The metal instrument at room temperature is cooler than the patient’s skin temperature and should feel cold. If this does not hold true, more formal testing using tubes of hot and cold water can be used.

In testing vibration, joint position and pinprick sensation, emphasis should be placed on testing each modality at the distal end of the extremities. The rational for this is based on the fact that if a modality is intact at the most distal end of the extremity, then it is intact proximally.

Testing Vibration

A 128 Hz tuning fork is recommended for testing vibration. Following a brief description and demonstration for the patient of how the test will be performed, the patient is asked to close their eyes and the doctor proceeds by placing the tuning fork on the great toes and the distal end of the index fingers. Placement of the tuning fork should be performed with the fork vibrating and not vibrating in a random order. The patient should be able to differentiate between the two.

If the patient is not able to detect or differentiate the sensation, the examiner proceeds by testing in a distal to proximal direction. The tuning fork should be placed on the following landmarks in the lower extremities: the malleoli of the ankles, the shins, knee caps and the anterior superior iliac spine. The tuning fork should be placed on the following landmarks in the upper extremities: the styloid process of the wrist, the olecranon
process at the elbow and the clavicle near the acromioclavicular joint. Points on the trunk and head can also be tested. Placement should be on the sternum and mentum of the mandible (chin).

Problems with vibration can be related to the peripheral nerve, the sensory portion of the nerve root, a plexus, the posterior column and/or the higher brain centers that interpret vibration sense. Abnormalities must be compared to the findings of other neurological tests for differential diagnosis.

**Testing Joint Position Sense**

Joint position sense should also be tested using the great toes and the index fingers. Following a brief description and demonstration for the patient of how the test will be performed, the patient is asked to close their eyes and the doctor proceeds by flexing and extending the toe or finger. Testing can also be performed by maintaining the toe or finger in a neutral position. The patient is to identify the position.

The examiner should hold the digits by the lateral and medial sides during testing. Contact with the nail bed should be avoided, as pressure sense of the nail bed may help identify the position of the digit for a patient.

If the patient is not able to determine the position of the joint(s), the examiner proceeds by testing in a distal to proximal direction. Position of the ankle, knee and hip should be tested in the lower extremities. The wrist, elbow and shoulder should be tested in the upper extremities.

Problems with joint position sensation can be related to the peripheral nerve, the sensory portion of the nerve root, a plexus, the posterior column and/or the higher brain centers. Abnormalities must be compared to the findings of other neurological tests for differential diagnosis.

**Testing Pinprick Sensation**

Pinprick sensation can be tested using a variety of instruments. Safety pins, pin wheels and needles are common. For safety reasons (preventing the drawing of blood) and questions of sanitation/sterilization, the use of toothpicks is recommend. They are cheap and disposable.

As with vibration and joint position, pinprick testing will occur distally and only move in a proximal direction if abnormalities are detected. Testing is performed by poking the patient in the recommended areas. The areas recommended are said to be the areas of purest innervation for the nerve roots and peripheral nerves listed.¹
For the upper extremities, the dorsal aspect of the thumb web is tested (radial nerve, C6), followed by the tip of the index finger (median nerve, C6), the tip of the middle finger (median nerve, C7) and the tip of the little finger (ulnar nerve, C7). For the lower extremities the medial side of the foot (L4, tibial nerve), the top of the foot (L5, superficial peroneal nerve) and the lateral side of the foot (S1, sural nerve) are tested.

If flat toothpicks are used, bear in mind that they have a flat end and a pointy end, so dull and sharp sensations can also be tested. In either case, if an abnormality is detected, additional dermatomes and areas of peripheral nerve innervation must be tested. The challenge here is determining the truest areas of innervation. Dermatome and peripheral nerve charts vary greatly from one test to the next. This author prefers those found in Hoppenfeld’s Orthopedic Neurology.

As with vibration and joint position sense, problems with pinprick sensation can be related to the peripheral nerve, the sensory portion of the nerve root, a plexus, the spinothalamic tract and/or the higher brain centers. Abnormalities must be compared to the findings of other neurological tests for differential diagnosis.

Testing sensory modalities can be an important part of neurological testing. However, it must be remembered that it is the least reliable. Responses are highly dependant upon patient perception, making them more subjective than other types of testing. The examiner must keep this in mind and remember to compare the results of sensory testing to other neurological tests in differential diagnosis.

References


This article is the fifth of six written to provide practical knowledge and examples of how to incorporate all six components of the neurological assessment into a standard examination in an efficient and productive manner. Part 1 of this series appeared in the Feb. 12, 2011 issue; part 2 appeared in the April 9 issue; and part 3 ran in the June 17 issue, and part 4 appeared in the Aug. 12 issue.
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