METHODS FOR SENSORY NERVE CONDUCTION STUDIES WITH NEAR NERVE NEEDLE ELECTRODES

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**N. cutaneus femoris lateralis**

**Type of measurement:** Orthodromic

**Position of patient:** Patient supine

**Type of recording electrodes:** Near nerve needle electrodes.

**Placement of recording electrode:** 5-10 mm above spina ilica anterior superior. Depth of electrode placement depends on the amount of subcutaneous fat. In lean persons the depth is around 10-15 mm and in obese persons it may be 30-40 mm (when you place the electrode deeper than 15 mm try to direct it slightly lateral to avoid penetration of the peritoneum).

**Placement of reference electrode:** Subcutaneously 20-30 mm proximal to the recording electrode. A surface *reference electrode* may be used instead of a needle.

**Type of stimulating electrodes:** Surface electrodes.

**Stimulation site:**

1. Over the anterior-lateral portion of the thigh around 100-140 mm distal to the recording electrode. Often it is necessary to search for the site.

**Note:** Often it is possible to place the recording electrode blindly and find a good recording site. Sometimes it is helpful to stimulate with the recording electrode to ascertain that the electrode is close to the nerve. If the patient has a paresthetic sensation in radiating into the lateral side of the thigh with a stimulus intensity of 1-2 mA (0.2 ms duration) the electrode is very close to the nerve. Often it is difficult to obtain this and acceptable responses may be recorded with 3-5 mA stimulus thresholds for the sensation.

**N. ilioinguinalis**

*This is not a standard method that is commonly used.*

**Type of measurement:** Orthodromic

**Position of patient:** Patient supine

**Type of recording electrodes:** Near nerve needle electrodes.

**Placement of recording electrode:** 5-10 mm above spina ilica anterior superior. Depth of electrode placement depends on the amount of subcutaneous fat. In lean persons the depth is around 10-15 mm and in obese persons it may be 30-40 mm (when you place the electrode deeper than 15 mm try to direct it slightly lateral to avoid penetration of the peritoneum).

**Placement of reference electrode:** Subcutaneously 20-30 mm proximal to the recording electrode. A surface *reference electrode* may be used instead of a needle.

**Type of stimulating electrodes:** Surface electrodes.

**Stimulation site:**

1. Over the inguinal ligament 80-120 mm from the medial to the recording electrode.
Note: This is a difficult nerve to record. In lean subjects it may be possible to obtain satisfactory recordings. In obese subjects it may not be possible to obtain any response. Sometimes it is possible to place the recording electrode blindly and find a good recording site. N.ilioinguinalis is close to n.cutaneus femoris lateralis which may be helpful in the electrode placement. Sometimes it is helpful to stimulate with the recording electrode to ascertain that the electrode is close to the nerve. If the patient has a paresthetic sensation in radiating into the lateral side of the thigh (n.cutaneus femoris lateralis) with a stimulus intensity of 1-2 mA (0,2 ms duration) the electrode is close to the nerve. Often it is difficult to obtain this and acceptable responses may be recorded with 3-5 mA stimulus thresholds for the sensation

N digitalis I-V plantaris medialis

Type of measurement: Orthodromic
Position of patient: Patient supine or sitting
Type of recording electrodes: Near nerve needle electrodes.
Placement of recording electrode: 10-20 mm above the medial malleolus. To place the electrode close to the tibial nerve the recording electrode is used to stimulate and the motor response is picked up from m.abductor hallucis with surface electrodes. When the threshold for a motor response is around 1mA (stimulus duration 0.2 ms) the position of the recording electrode is excellent. Thresholds of more than 3 mA rarely give satisfactory recordings.
Placement of reference electrode: Subcutaneously 20-30 mm proximal to the recording electrode. A surface reference electrode may be used instead of a needle.
Type of stimulating electrodes: Near nerve needle electrodes.
Stimulation site:

1. The cathode is placed on the medial side close to the base of the toe. Each toe, I-V, is studied separately. The cathode is inserted trough the skin from the dorsal side around midway of the toe. The needle is advanced until the tip of the electrode can be felt just under the skin on the plantar side of the toe. The anode is placed distal to the cathode on the same side of the toe.

Stimulus intensity: Optimal stimulus intensity is 3-4 mA (duration 0.2 ms). With high stimulus intensities, > 6-10 mA there is the possibility that the plantar digital nerve on the lateral side of the toe is stimulated.

Averaging: Averaging is required in most subjects. In a young person, less than 30 years of age the responses can usually be seen in the unaveraged trace. Mostly 100-300 stimuli need to be averaged for satisfactory recordings. Sometimes 1000 stimuli are required in older subjects.

N digitalis I-IV plantaris lateralis
**Type of measurement**: Orthodromic  
**Position of patient**: Patient supine or sitting  
**Type of recording electrodes**: Near nerve needle electrodes.

**Placement of recording electrode**: 10-20 mm above the medial malleolus. To place the electrode close to the tibial nerve the recording electrode is used to stimulate and the motor response is picked up from m.abductor hallucis with surface electrodes. When the threshold for a motor response is around 1mA (stimulus duration 0.2 ms) the position of the recording electrode is excellent. Thresholds of more than 3 mA rarely give satisfactory recording.

**Placement of reference electrode**: Subcutaneously 20-30 mm proximal to the recording electrode. A surface *reference electrode* may be used instead of a needle.

**Type of stimulating electrodes**: Near nerve needle electrodes.

**Stimulation site**:  
1. The cathode is placed on the lateral side close to the base of the toe. Each toe, I-IV (n.suralis innervates the lateral side of toe V), is studied separately. The cathode is inserted through the skin from the dorsal side around midway of the toe. The needle is advanced until the tip of the electrode can be felt just under the skin on the plantar side of the toe.

   The anode is placed distal to the cathode on the same side of the toe.

**Stimulus intensity**: Optimal stimulus intensity is 3-4 mA (duration 0.2 ms). With high stimulus intensities, > 6-10 mA there is the possibility that the plantar digital nerve on the medial side of the toe is stimulated.

**Note**: Averaging is required in most subjects. In a young person, less than 30 years of age the responses can usually be seen in the unaveraged trace. Mostly 100-300 stimuli need to be averaged for satisfactory recordings. Sometimes 1000 stimuli are required in older subjects.

**N plantaris medialis**

**Type of measurement**: Orthodromic  
**Position of patient**: Patient supine or sitting  
**Type of recording electrodes**: Near nerve needle electrodes.

**Placement of recording electrode**: 10-20 mm above the medial malleolus. To place the electrode close to the tibial nerve the recording electrode is used to stimulate and the motor response is picked up from m.abductor hallucis with surface electrodes. When the threshold for a motor response is around 1mA (stimulus duration 0.2 ms) the position of the recording electrode is excellent. Thresholds of more than 3 mA rarely give satisfactory recording.

**Placement of reference electrode**: Subcutaneously 20-30 mm proximal to the recording electrode. A surface *reference electrode* may be used instead of a needle.

**Type of stimulating electrodes**: Surface electrodes.
Stimulation site:
1. On the medial side of the sole (over the I or II metatarsal bone) of the foot
100-140 mm distal to the recording electrode

**N plantaris lateralis**

**Type of measurement:** Orthodromic

**Position of patient:** Patient supine or sitting

**Type of recording electrodes:** Near nerve needle electrodes.

**Placement of recording electrode:** 20 mm above the medial malleolus. To place the electrode close to the tibial nerve the recording electrode is used to stimulate and the motor response is picked up from m. abductor hallucis with surface electrodes. When the threshold for a motor response is around 1 mA (stimulus duration 0.2 ms) the position of the recording electrode is excellent. Thresholds of more than 3 mA rarely give satisfactory recording.

**Placement of reference electrode:** Subcutaneously 20-30 mm proximal to the recording electrode. A surface reference electrode may be used instead of a needle.

**Type of stimulating electrodes:** Surface electrodes.

**Stimulation site:**
1. On the lateral side (over the IV metatarsal bone) of the sole of the foot 100-140 mm distal to the recording electrode.