Mapping Suction Probe by Raabe
The combination of a surgical suction tube and a monopolar electrical stimulation probe combines suction during tumor resection with simultaneous continuous dynamic mapping of the corticospinal tract. Use of the Mapping Suction Probe makes it possible to achieve maximal tumor removal minimising the possibility of damage to the corticospinal tract. The ability to resect a tumor down to low motor thresholds is a significant refinement of the classic subcortical mapping of the corticospinal tract.

1. **Scenario preparation for the NeuroExplorer software**

   The use of the mapping suction probe can easily be integrated into NeuroExplorer scenarios. Typically the subcortical mapping is performed in the Triggered EMG measurement window.

   - **Triggered EMG window settings**

     To set the parameters and a train stimulation in the Triggered EMG window, the I-Check stimulation must be activated:

     A. Open setup-window (right mouse click over the Triggered EMG window)
     B. Set HS as the stimulator type
     C. Activate I-Check stimulation
     D. Set relevant stimulation parameters

2. **Recommended stimulation parameters**

   The monopolar electrical stimulation is delivered at the tip of the mapping suction probe. The shaft of the mapping suction probe is insulated to ensure that the electrical contact is restricted to the tip of the mapping suction probe only. Stimulation parameters and the routine application of the stimulation probe is identical to the parameters of a standard monopolar stimulation probe.

   - **Stimulation parameters (\*)**

     1. Stimulator type: HS
        - Pulse width: 500 µs
        - Max. stimulation current: 15 mA
        - Stimulation frequency: 0.4 – 2 Hz (1 Hz)

     2. Stimulation output: 5
        - Max. Voltage: 80 V
        - Pulse form:
          - \textit{negative} for subcortical stimulation (cathodal stimulation)
          - \textit{positive} for direct cortical stimulation (anodal stimulation)

     3. Number of pulses: 5 (Train of five)
        - ISI (Interstimulus Intervall): 4 ms

The use of the mapping suction probe in conjunction with EMG delivers continuous audio feedback during electrical stimulation. The audio feedback available during the procedure provides an indication of the patient’s electrophysiological status and a response to anatomical changes taking place as a result of tumor resection. The BEEP BOOP synthetic sound function can be activated in the sound setting menu of the EMG window as follows:

A. Open the sound menu in EMG window by clicking on the loudspeaker symbol
B. Activate BEEP BOOP
C. Position cursors in triggered EMG window

Cursor positioning

Following BEEP BOOP sound activation, a cursor is displayed on each channel. The amplitude value can be set with each cursor. The amplitude value is the trigger and determines the point at which the audio sound will be generated. The cursors should be set after the stimulation artefact and prior to the response signal. The amplitude of the cursors should be set just above the ambient noise level seen in the EMG signal.

The amplitude setting of the detection threshold cursor is greater than the amplitude of the signal
The amplitude setting of the detection threshold cursor is smaller than the amplitude of the signal

HIGH-PITCHED SOUND
The signal does not exceed the amplitude of the cursor. In this case the high-pitched sound is delivered when current confirm is activated and there is no motor response allowing a continuation of resection.

LOW-PITCHED SOUND
The software detects the signal as a muscle response.

Failure in setting and positioning of the cursors generates always a high-pitched sound:

The amplitude setting of the detection threshold cursor is greater than the amplitude of the signal and the detection threshold cursor is positioned prior to the response signal:

HIGH-PITCHED SOUND
The signal does not exceed the amplitude of the cursor. The software detects the signal not as a muscle response.

The amplitude setting of the detection threshold cursor is smaller than the amplitude of the signal and the detection threshold cursor is positioned behind the response signal:

HIGH-PITCHED SOUND
The signal is always detected as an artefact.
4. Mapping suction probe connection to the IOM System

The red connection cable of the stimulator is attached directly to the mapping suction probe. The mapping suction probe is connected to stimulators with 1.5 mm Touchproof connectors.

- Mapping Suction Probe
- Counter electrode

The Mapping Suction Probe is connected to the IOM System via the stimulation adaptor (Art.-Nr. 540511/Art.-Nr. 540510) in channel 5.

5. Method

» The suction tip is at any time on the same place where the resection is performed and enables continuous mapping.

The method (*) is based on resection, where no MEPs will be triggered:

- Mapping starts with 10 mA (ca. 10 mm distance to the corticospinal tract)
- Current intensity is proportional to the distance of the corticospinal tract (Rule of thumb: 1 mm = 1 mA)
- If no motor response is triggered the resection can be continued.

- As soon as a motor response is triggered, the resection shall continue on a more distant position to the corticospinal tract. If a motor response is triggered on further distant positions, the current should be reduced in 2 mA steps.

- These steps can be repeated until 5 mA is reached.

- The tumor resection should be terminated by the surgeon considering the progress of the operation and appropriate current intensity of the cortical MEPs.


(**) CST: corticospinal tract

Mapping Suction Probe – order information:

Art.-Nr. 525 650
Mapping Suction Probe with connecting cable and black counter electrode

More information and further accessories: www.inomed.com