Sleep Bruxism
Customer Support Document

Version 2.0
Latest Revision 9 July 2013
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## Contents

- Overview .................................................................................................................................................. 3  
- Scoring Rules for Sleep Bruxism .................................................................................................................. 3  
- Configuring the T3 Device for Bruxism Recording ....................................................................................... 4  
- Placing the Electrodes on the Patient ............................................................................................................. 4  
- Analyzing Bruxism in Noxurnal ....................................................................................................................... 6  
- Examples of Bruxism Events in Noxurnal ........................................................................................................ 7  
- Generating Reports ....................................................................................................................................... 8  
- References and literature recommendations .................................................................................................... 10
**Overview**

This knowledge base article describes the scoring rules for bruxism, how to setup a bruxism recording, and how bruxism is analyzed and reported in the Noxturnal software.

A criticism to the detection of bruxism with any other than PSG studies has always been the missing possibility to discriminate between native sleep bruxism events and other oro-facial activities including coughing and talking. The American Academy of Sleep Medicine (AASM) also refers to the requirement to have audio recordings available in addition to EMG in order to differentiate those events. Therefore the Nox T3 device, with its built-in true audio and EMG recording capabilities, is ideal for diagnosing bruxism. The audio recording detects grinding sounds and the EMG detects typical jaw movements. The Noxturnal software offers automatic bruxism analysis of both phasic and tonic events along with bruxism reports. The bruxism analysis was developed in-house according to the standards set forth in the Principles and Practices of Sleep Medicine, 4th edition. The T3 is featuring calibrated audio recording so that the actual signal amplitude is directly measured. The automatic bruxism analysis looks at the background activity and changes from the background activity as being possible bruxism. A double check by the user on the automatically analyzed events with consulting the audio recordings will make the scoring result more precise.

**Scoring Rules for Sleep Bruxism**

1. **EMG, 10-100 Hz band-pass filtered, AASM 2007 criteria**
   - Bruxism may consist if the chin EMG activities are at least twice the amplitude of the background EMG.
   - Types of bruxism episodes:
     - PHASIC: at least 3 EMG bursts lasting ≥ 0.25 seconds and < 2 seconds
     - TONIC: 1 EMG burst lasting > 2 seconds
     - MIXED: phasic and tonic bursts
   
   Note: EMG bursts must not be separated by > 3 seconds to be considered part of the same episode.

2. **Sounds**
   - Teeth grinding and exclusion of other oro-facial activities by listening.

3. **Additionally autonomic arousals can be marked in the following manner:**
   - Mark spontaneous arousals if the pulse wave amplitude (PWA) drops by 30% or more in a 20 second period before Rhythmic Masticatory Muscle Activity (RMMA)

Even though the Nox T3 recorder is not a full polysomnograph device, it and its software, Noxturnal, fulfill with all the rules, described in the AASM 2007 manual, to assess bruxism.
Configuring the T3 Device for Bruxism Recording

To prepare a T3 device for a sleep bruxism recording, start the Noxturnal application and connect the device to the computer. Click on the Start a New Recording button on the Start Page. A wizard opens up which guides you through configuring the T3 device.

- Check **Snore Sound**.
- Check **Channel 1** and/or **Channel 2** to record one or two EMG signals and use the drop-down lists to select “Cheek Bruxism, 200Hz”.
- Check **Show Signal Status on Device** if you want to be able to view the signal status on the T3 display.
- Click the **Next** button to move to the next page where you can either schedule the recording time of the T3 device or choose to start the recording manually.
- Click the **Next** button to continue to the battery type selection page. On this page you need to select which battery type you are going to use with the T3 device.
- Click the **Next** button to continue to the patient information page where you may enter detailed information about the patient.
- After you press the **Finish** button the T3 device is configured and ready for bruxism recording.

Placing the Electrodes on the Patient

Sleep bruxism activity is assessed based on the EMG activity in the masticatory muscles (M. masseter and/or M. temporalis). The EMG electrodes are positioned on the skin parallel to the direction of the muscle fibers and the ground electrode is placed on electrically neutral tissue. If only bruxism EMG is recorded, the ground electrode can be placed below the left earlobe. If any other torso electrodes are used as well, the ground electrode is often placed on the right hip bone.
For optimal results for using the two bipolar channels in the T3 recorder we recommend the three following placement options:

**Option 1:** One bipolar channel placed on the M. masseter and another bipolar channel placed on the M. temporalis, both channels on the same side (Figure 2)

![Figure 2 Electrodes placed on both M. masseter and M. temporalis on the same side](image)

**Option 2:** One bipolar channel placed on the M. masseter on each side (Figure 3)

![Figure 3 Electrodes placed on M. masseter on each side](image)

**Option 3:** One bipolar channel placed on the M. masseter on one side and another bipolar channel placed on the M. temporalis on the other side (Figure 4)

![Figure 4 Electrodes placed on both M. masseter and M. temporalis on the each side](image)
Patients can be instructed on how to apply the electrodes by themselves at home:

1. Remove the plastic cover of the electrodes and put the electrodes on the locations shown in figures 2-4.
2. Apply the supplied bandage over the electrodes so they do not fall off during the night.

### Analyzing Bruxism in Noxturnal

To download recorded data from a T3 device to the computer ensure that Noxturnal is running and then connect the T3 device with a USB cable to your computer. Click on the Download and View Recording button on the Start Page and Noxturnal will start downloading recordings from the T3 device to the computer. After downloading data from a T3 device or viewing existing recordings in Noxturnal the Recording Result page is shown where you can open and analyze your study.

- If the bruxism analysis is not part of your default analysis profile used during the download, run the specific automatic analysis in Noxturnal. In the Analysis menu choose Bruxism on the toolbar and the software will run the automatic bruxism analysis. To always run the bruxism analysis automatically after downloading select Tools > Options > Automation and select Bruxism in Analysis Protocol.
- Then inspect bruxism events identified by Noxturnal and look for other potential events missed by automatic scoring.
- Bruxism events should be removed if one of the following event is present:
  - The patient changes sleeping positions.
    By selecting “Exclude markers during movement” in the Bruxism Analysis Protocol, the bruxism events are automatically not scored during the patient’s movement.
  - There are a lot of movements.
    By selecting “Exclude markers during movement” in the Bruxism Analysis Protocol, the bruxism events are automatically not scored during the patient’s movement.
  - Listening to the sound reveals other oro-facial activity such as swallowing, sighing, sleep talking or coughing. Mark those events as oro-facial activity. If there are rustle sounds, e.g. bed covers sounds; bruxism events should also be removed.
Examples of Bruxism Events in Noxturnal

Figure 5 Phasic and tonic types of bruxism event

Figure 6 Mixed type of bruxism event
Generating Reports

In the Reports menu choose Bruxism Report. There you can find a report that contains relevant information such as:

- Bruxism episode index: number of episodes per hour of sleep (phasic, tonic and mixed)
- Bruxism burst index: number of EMG bursts per hour of sleep
- Apnea to bruxism index: number of episodes per hour of sleep (phasic, tonic and mixed) where apnea is scored after each episode of bruxism.
- Arousal to bruxism index: number of episodes per hour of sleep (phasic, tonic and mixed) where arousal is scored after each episode of bruxism.

Bruxism Report

Patient Information

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<tr>
<th>Full Name</th>
<th>Date of Birth</th>
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<tr>
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<table>
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Recording Information

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<th>Recording Duration</th>
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<td>11h 44m 39s</td>
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Bruxism Overview

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<td>Bruxism Bursts Index:</td>
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</tbody>
</table>

| Apnea to Bruxism Index: | 5,9 /h |
| Arousal to Bruxism Index: | 0,0 /h |

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<tr>
<th>Bruxism Episodes:</th>
<th>Count</th>
<th>Index (#/h)</th>
<th>Shortest (s)</th>
<th>Longest (s)</th>
<th>Average (s)</th>
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<td>5,5</td>
<td>2,1</td>
<td>10,9</td>
<td>6,3</td>
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<td>Tonic Episodes:</td>
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<td>10,3</td>
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<td>Mixed Episodes:</td>
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<td>3,2</td>
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<td>13,4</td>
<td>8,8</td>
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<td>w/ Tooth Grind:</td>
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<td>77,9</td>
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Patient Notes

Interpretation Notes

Figure 7 Example of a part bruxism report in Noxturnal

To export a report, select Export Report... This will open a new window where you can specify the file format and the file name. Click the Save button when done and the report will be saved on your computer.
References and literature recommendations


