Ultra long-term EEG
- a step towards seizure freedom
An objective measure of the seizure burden
A clinical challenge in Epilepsy

More than 30% of people with epilepsy struggle to get their seizures under control\textsuperscript{1-2} and their quality of life is among the lowest compared to other health conditions.\textsuperscript{3}

Scalp EEG - limited time frame

Today, epilepsy is often diagnosed and treated based on an interview with the patient and a 30 min routine EEG.\textsuperscript{4} However, many patients with epilepsy only experience seizures once a week or less.\textsuperscript{5}

Long-term video-EEG during hospital admission can to some extent remedy this problem, but it is costly, inconvenient and removes the patient from their natural environment in which seizure provoking factors may be more likely.\textsuperscript{6-9}

Furthermore, inpatient video-EEG is normally limited to five to ten days, which might be insufficient for patients with infrequent seizures and it exposes the patients to a variety of safety issues, that might be avoidable in an ambulatory setting.\textsuperscript{5,10}
Patient diaries – low sensitivity

The seizure diaries, filled in by patients and/or caregivers, play an important role for guiding treatment but unawareness of seizures and post-ictal confusion is a barrier to accurate seizure reporting.\textsuperscript{11-12}

A study of 91 adult inpatients with focal epilepsy have shown a self-reporting as low as 45% and even lower for nocturnal seizures.\textsuperscript{11}

Unmet clinical need

Achieving an objective measure of the individual patient’s seizure burden to guide treatment, remains a challenge with the current tools available.
Ultra long-term monitoring
Identifying the seizure burden

Our solution

The 24/7 EEG™ SubQ solution offers an innovative approach to identify the seizure burden, as identified by EEG-pattern, in patients with Epilepsy. This can aid in closing the gap when routine or video-EEG and patient seizure diaries are inadequate.

The UNEEG™ SubQ implant is designed to stay implanted up to 12 months and the external device is developed with the capability to store 30+ days of recorded EEG data at a time. Together they provide you with a new solution to obtain off-line ultra long-term EEG data in an outpatient setting.

Objective seizure detection

The 24/7 EEG™ SubQ solution can, as the first device available on the market, capture EEG signals in daily life for periods of time extending over months.

11,000+ hours of accumulated EEG data from Epilepsy patients (Jan 2019).
NEEG™ SubQ
Minimally invasive implant

The UNEEG™ SubQ is implanted subcutaneously and provides two channel measurements from a single location. The electrode can be positioned in various directions to accommodate the relevant clinical question.

24/7 EEG™ SubQ
Discreet external device

The small external device ensures power supply to the implant and stores the data. The device has a battery life of 24+ hours.

UNEEG™ EpiSight
User friendly software

- Software for analysing and visualising EEG data
- Easy overview of seizure activity identified by EEG pattern
- Several months of recordings in one file
- EDF+ file format
EEG signal quality with **24/7 EEG™ SubQ**

The UNEEG™ SubQ electrode provides excellent signal quality allowing high reproducibility of scientific and clinical data.

The quality of the EEG recording from the 24/7 EEG™ SubQ device is equivalent to that of scalp EEG recordings from the same position in a clinical setting.

### Signal quality

**SubQ™ EEG vs Scalp EEG**

Visual comparison of standard scalp EEG and the subcutaneous EEG. *: significant at $\alpha = 0.01$ level.

- Rest with eyes closed (60)
- Rest with eyes open (60)
- Chewing (10)
- Eye blinking (10)
- Eye movement side to side (10)
- Mental task (60)
- Relaxed jumping (10)

#### Temporal lobe seizure

Example of one typical temporal lobe seizure in time and time-frequency domains. A: 10-s excerpt at the start of the seizure in the time domain displayed in scalp channel P7–T7 and subcutaneous channel PSQ-CSQ. B: longer excerpt of the same seizure displayed in the time-frequency domain as a spectrogram.

### Impedance and artefacts

The electrode impedance is $<5 \, k\Omega$ for the 24/7 EEG™ SubQ device.

Artefacts are well known when working with EEG and will also be found in 24/7 EEG™ SubQ data.

---


Ideal for use in real life

The discreet design and the ease-of-use of the 24/7 EEG™ SubQ, makes it ideal for everyday use in a home environment.

High compliance in ultra long-term use

The convenient and unobtrusive design facilitates high compliance.

In a three months study the patients with Epilepsy on average recorded 18.5 hours per day. Some patients reached a recording time of nearly 22 hours per day. Compliance at nighttime was exceptionally high and this closes a major gap identified with self-reporting of nocturnal seizures.

No serious adverse events related to the use of the device or implantation procedure have been reported during the clinical investigation with the 24/7 EEG™SubQ device.
Identifying the seizure burden
A step towards seizure freedom

24/7 EEG™ SubQ solution

Ultra long-term objective seizure detection
• 11,000+ hours EEG data in patients with Epilepsy (Jan 2019)
• UNEEG™ SubQ electrode designed to remain implanted up to 12 months
• Discreet, convenient external device with 30+ days storage
• High patient compliance
• UNEEG™ EpiSight for easy EEG data overview

Ask us for more information
UNEEG™ medical A/S
Nymøllevej 6 - 3540 Lynge - Denmark
Tel. +45 3010 1454 - UNEEG@UNEEG.com

References

UNEEG™ EpiSight A registered trademark owned by UNEEG medical A/S. Legal manufacturer: AIT Austrian Institute of Technology GMBH.