1. Date of scan:
2. Equipment:
3. MEG Sensor Array (dewar) Type (choose one):

Whole Cortex/Head  Partial Coverage  Other, specify:

1. MEG Sensor/Channels (choose one):

37  74  120  151  275  360  Other, specify:

1. Coil Configuration (choose one):

Magnetometer  Axial gradiometer  Planar gradiometer  Other, specify:

1. Name of the scanner manufacturer:

Elekta/Neuromag  CTF/VSM/MISL  Biomag/4D  Yokogawa

Tristan  Other, specify:

1. Number of different MEG scanners used:

Hardware/software updates/changes during study  Other, specify:

1. Quality Assurance:
2. Head localization for measuring head movement during MEG recording

Before and after recording  Before recording  After recording  Real time head-position tracking  Other, specify:

1. Head movement tolerance during MEG recording

5 mm  10 mm  Other, specify:

1. Assessment of Magnetic noise

Questionnaire for screening magnetic noise  Pre-test system noise recording (no subjects,~2 minutes)  Task free (resting state) noise recording  Other, specify:

1. Assessment of artifacts

Simultaneous ECG/EKG recording  Simultaneous EOG (horizontal and/or vertical) recording  Simultaneous EMG recording  Other, specify:

1. Co-registration of MEG data and anatomical data

Three-fiducial points (left pre-auricular point, right pre-auricular points, nasion)  Surface-matching  Digitized headshape;  Bite-bar-based fiducials;  Photography of fiducial points  Other, specify:

1. Data acquisition protocol:
2. Acquisition mode:

Spontaneous recording (no synchronized trigger);  Evoked/elicited recording (acquisition triggered by synchronized tasks);  Single epoch (trial) ;  Multiple epochs (trials)  Other, specify:

1. Acquisition parameters:
   1. Sampling rate: (Hz)
   2. Epoch (trial) time: (ms)
   3. Pre-trigger (base-line): time: (ms)
   4. Minimum inter-epoch(trial) time: (ms)

Random-interval (range): minimum and maximum (ms);  Fixed interval: (ms);  Response-based interval: (ms) ;  Other, specify:

* 1. Channel groups:

MEG;  MEG + EEG;  MEG+EEG+Trigger ;  Customized group  Other, specify:

* 1. Total epochs (trials):
  2. Total acquisition time:
     1. Anticipated: (ms/second)
     2. Actually used: (ms/second)
  3. On-line filter:  Low pass-filter  High pass-filter  Power-line (60/50 Hz) filter
  4. On-line averaging:  On  Off
  5. Video monitoring during data acquisition:  On  Off
  6. Audio monitoring during data acquisition:  On  Off
  7. Stimulation/task delivery system status during data acquisition:

Visual projector:  On  Off

Auditory tubes:  On  Off

Somatosensory (Electrical/mechanic stimulus) devices:  On  Off

Response boxes/pads (motor):  On  Off

Other, specify:

* 1. Accompany person in the magnetic shielded room:  Yes  No
     1. If Yes, number of persons:

1. Other facilities
2. Demagnetization before data acquisition:  Yes  No
3. Clinical recording (particularly for pediatrics):
   * 1. Sedation/anesthesia

Sedation, provide drug(s) and dosage

General anesthesia: provide drug(s), dosage, and time

Blood pressure monitor:  Yes  No

Breath monitor:  Yes  No

Other, specify:

* + 1. Safety monitoring system (e.g. Oxygen level):  On  Off
    2. Specify other devices/systems in the magnetic shielded room:

1. Preprocessing:
2. The data format exported from the MEG scanner to local workstations/computers.

: Elekta/Neuromag \*.fif: CTF/VSM .ds;  Europen Data Format: \*.edf;  Others, specify

1. Bad channel identified

Yes No Artifact/noise threshold (e.g. > 6 pT),  List of bad channels (name and ID):

1. Bad epoch (trials) identified

Yes No Artifact/noise threshold (e.g. > 6 pT), List of bad trials:

1. Methods for artifact removal (ex. ICA)?  Yes  No
2. Criteria for noise, artifact and motion:
3. Processing and Analysis:
4. Waveform average
   1. All trial averaging
   2. Trigger based averaging
   3. Classification based averaging
   4. Other, specify:
5. Waveform filter
   1. Band-pass filter:
      1. Low pass filter:
      2. High pass filter:
   2. Power-line filter:  60 Hz  50 Hz
      1. Width of filter:
      2. Number of harmonics:
   3. Direct-current (DC) offset applied:

Entire epoch (trial)  Pre-trigger base-line Selected range Other, specify:

1. Waveform mark/classify
   1. Evoked/elicited neuromagnetic responses:

Number of responses (deflection)  Latency of response  Amplitude of response  Habituation  Other, specify:

* 1. Epileptic spikes/spike-wave-discharges (SWD)

Number of spikes/SWD  Rhythmic bursts Abnormal baseline  Other, specify:

Visual inspection  Pattern recognition (automatic spike detection)  Other, specify:

* 1. Segmentation/classification:

Marked bad-segments  Marked good-segments Multiple-type of segments are classified Other, specify:

1. Integration of MEG and other anatomical imaging
   1. Registration technique used:  Fiducial points Head shape match
   2. Structural imaging modality:  MRI CT Other, specify:
   3. Structural imaging sources:  Individual MRI/CT  Averaged (group) MRI/CT  Other, specify:
2. Time-frequency analysis methods:

Fourier transform (FT), fast FT (FFT)  Wavelet  S-transform  Other, specify:

1. Reconstruction method used:
   1. Dipole modeling:  Single dipole Multiple dipole  Moving dipole  Other, specify
   2. Beamforming (spatial filtering):  Vector beamformer Scalar beamformer  Synthetic Aperture Magnetometry (SAM) Vector-scale beamformer (2 Step) Other, specify
2. What processing tool(s)/package(s) type and version was used for analyzing the data? (Choose all that apply)

Native software from MEG manufacturer (Neuromag, CTF, Biomag, Other)

BESA

Curry

ASA

MEG Processor

Brainstorm

FieldTrip

MNE

EEGLab

EEG Studio

Magnetic Source Locator (MSL)

ESME

NutMEG

SPM

Other, specify:

1. Analysis approach:
   1. Waveform morphology:  Abnormal response (deflection)  Missing response  Other, specify:
   2. Latency:  Delay of all responses;  Delay of selected response  Other, specify:
   3. Amplitude:  Increased amplitude  Decreased amplitude  Other, specify:
   4. Topographic distribution:  Spatial pattern  Diffusive;  Focal  Other, specify:
   5. Spectral pattern:  Frequency components  Temporal component  Other, specify:
   6. Spectral latency:  Delay of all components;  Delay of selected component  Other, specify:
   7. Spectral magnitude:  Increased magnitude  Decreased magnitude  Other, specify:
   8. Topographic distribution:  Spatial pattern  Diffusive  Focal  Other, specify:
   9. Source imaging:  Number of Source  Source location;  source strength;  Other, specify:
2. Reporting:
3. Waveform latency/amplitude/habituation measures/comparison results:
4. Spectral time/frequency components measures/comparison results:
5. Source location measures/comparison results:
6. Source strength measures/comparison results:
7. Topographic measures/comparison results:
8. Abnormal activity/activation (compared with normal controls): location, number and strength
9. Indicate the p-values used for comparisons between cohorts or the group averages:
10. Describe the rationale for choosing the statistical thresholds for the results:
11. Describe the method chosen for multiple comparisons correction:
12. If applicable, indicate the coordinates of significant clusters:  N/A
    1. If applicable, indicate the size of the significant clusters:  N/A
13. If applicable, indicate the p-values used for any correlative analysis:  N/A
14. Timing of recordings:

ictal (during headache)

inter-ictal (at least separated by 72h from a headache attack)

peri-ictal (time before or after a headache attack: in minutes/hours

## General Instructions

This CRF contains data that would be collected when a MEG study is performed.

Headache or migraine specific elements/measures that are not captured on this form but are important to the imaging analysis should be collected on other study-specific source documentation (e.g. Headache Diary, Concomitant Medications).

Important note: All elements on this CRF are considered Supplemental and should only be collected if the research team considers them appropriate for their study.

## Specific Instructions

Please see the Data Dictionary for definitions for each of the data elements included in this CRF Module.

The CRF includes all instructions available for the data elements at this time.

* Date of scan – Record the date/time according to the ISO 8601, the International Standard for the representation of dates and times ([The International Organization of Standardization Homepage](http://www.iso.org/iso/home.html)). The date/time should be recorded to the level of granularity known (e.g., year, year and month, complete date plus hours and minutes, etc.).
* Number of MEG sensors – Choose one
* Coil configuration – Choose one
* Name of the scanner manufacturer – Choose one
* Number of different MEG systems used – Report the number of different MEG systems that were used for recording MEG data from participants during the study
* What measures of quality assurance scans were used? – Examples include visual inspection by MEG/EEG technician.
* Patient movement – Report the technique used for measuring head movement in the MEG recording
* Magnetic noise – Report the technique used to detect magnetic noise in MEG data
* Examination of MEG waveforms for gross brain activity/activation abnormalities – Report the technique used for detecting gross functional abnormalities (e.g. waveforms inspected by epileptologists)
* Data acquisition protocols – No additional instructions
* Data acquisition parameters – No additional instructions
* Acquisition time duration – No additional instructions
* What format was the data exported from the MEG systems to local workstations/computers? – No additional instructions
* Was quality analysis performed on the data for artifact detection and potential exclusion of the subject data from analysis? – No additional instructions
* Were there any corrections for artifact removal (ex. ICA)? – No additional instructions
* Describe criteria for motion – Describe parameters for excluding patient data due to excessive head movement
* Was a registration technique used to overlap MEG sources to anatomical imaging (MRI/CT)? – No additional instructions
  + Registration technique used – Choose all that apply
  + Report the individual or standard average brain used – No additional instructions
* Source localization method used – No additional instructions
* Processing – What processing tool(s)/package(s) type and version was used for analyzing the data? –Choose all that apply
* Analysis approach – No additional instructions
* Brain activation latency/amplitude measures/comparison results – No additional instructions
* Brain activation amplitude measures/comparison results – No additional instructions
* Magnetic source location measures/ comparison results – No additional instructions
* Magnetic source strength measures/comparison results – No additional instructions
* Spectral measures/comparison results – No additional instructions
* Aberrant brain activation: locations, number and strength – No additional instructions
* Indicate the p-values used for comparisons between cohorts or the group averages – No additional instructions
* Describe the rationale for choosing the thresholds for thresholding the results – No additional instructions
* Describe the method chosen for correcting for multiple comparisons – No additional instructions
* If applicable, indicate the coordinate of significant clusters. If not applicable, select ‘N/A’
* If applicable, indicate the size of significant clusters. If not applicable, select ‘N/A’
* If applicable, indicate the p-values used for any correlative analysis. If not applicable, select ‘N/A’

## References

* Xiang J, Degrauw X, Korostenskaja M, Korman AM, O'Brien HL, Kabbouche MA, Powers SW, Hershey AD. (2013) Altered Cortical Activation in Adolescents with Acute Migraine. J Pain. 14(12):1553-63
* Leiken KA, Xiang J, Curry E, Fujiwara H, Rose DF, Allen JR, Kacperski JE, O'Brien HL, Kabbouche MA, Powers SW, Hershey AD. (2016) Quantitative neuromagnetic signatures of aberrant cortical excitability in pediatric chronic migraine. The Journal of Headache and Pain. 17(1):46.