Extra-operative Neurostimulation Mapping Survey

1. Approximately how many patients in the following age categories have undergone extraoperative stimulation mapping at your center during 2008?

Language: ____Under age 5 ____ 6-9 ____ 10-17 _____ 18 – 60 _____ over 60

Total: ____Under age 5 ____ 6-9 ____ 10-17 _____ 18 – 60 _____ over 60

Language Testing

2. What personnel are typically involved in language mapping procedures? Check all that apply.

_____ Epileptologist/Neurophysiologist
_____ Neuropsychologist
_____ EEG technologist
_____ Other MD including fellows/residents (assisting, not just observing)
       _____ Other PhD including neuropsychology fellows (assisting, not just observing)

_____ Other (please specify) _____

3. Which tests do you use to establish baseline language function?

_____ Boston Naming Test   _____ Phonemic fluency
_____ Columbia Auditory Naming Test   _____ Semantic fluency
_____ Columbia Visual Naming Test
_____ Other (please specify) _____

4. Preoperative language lateralization/localization: Please indicate with check marks which procedures are in use at your center and the approximate proportion of patients who undergo each prior to extraoperative language mapping.

	Not used	1-25%	26 – 50%	51-75%	76-100%
Wada	___	___	___	___	___
fMRI	___	___	___	___	___
MEG	___	___	___	___	___

5. Which of the following types of language testing do you <u>routinely</u> perform during extra-operative mapping? Check all that apply.

_____Spontaneous speech   _____Oral comprehension/following commands
_____Counting   _____Sentence completion (e,g., "I take milk .
_____Automatic speech such as over learned   and sugar in my ___")
     poem/song (e.g., Pledge of Allegiance)   _____Repetition
_____Visual object/picture naming   _____Writing
                                             _____Phonemic fluency
_____Auditory description naming   _____Semantic fluency
_____Reading   _____Phoneme identification

_____Other: _____

6. Which types of responses during stimulation do you consider an error? Check all that apply.

_____ No verbal response   _____ Hesitation
_____ Anomia (e.g, "this is a …I know it…")   _____ Perseveration
_____ Paraphasic error

7. What is the minimum number of trials per task that you administer at each site? _____

8. What is the proportion of errors required to consider a site "positive for language"?

_____25 %   ____ 50 %   ____ 67%   _____ 75%   _____ 100%

Other (please describe) _____

9. If tongue motor or sensory function is found do you test for language at that site?

___Yes, routinely   ____Yes, if finding is subtle   ___No

10. In preserving a positive site, how close can the resection boundary be (check closest answer)?

_____0 cm   ____ 0.5 cm   ____ 1 cm   _____ 1.5 cm   _____2.0 cm   ___adjacent gyrus

11. Do you typically map these regions? Check all that apply.

___Basal temporal region   ___Insular cortex (via grid or depth electrodes)
___Anterolateral temporal region

12. Please indicate the approximate proportion of patients (%) who have experienced a transient or persistent decline after resection of any of the following positive sites (leave blank if not applicable).

	Transient	Persistent (>= 1 year)
Visual picture naming in anterior/inferior temporal cortex	_____	_____
Visual picture naming in superior temporal gyrus	_____	_____
Visual picture naming in basal temporal region	_____	_____
Auditory description naming	_____	_____
Reading	_____	_____
Other: _____	_____	_____

13. Have you had a persistent postoperative language deficit occur despite not removing any positive sites?

_____Yes   ____No

14. If so, to what did you attribute the decline (check all that apply):

_____resection was too close to identified positive site
_____inadequate electrode coverage
_____insufficient functions tested
_____unable to completely test resection area due to afterdischarges or induced seizures
_____resection included subcortical structures or white matter tracts
_____multiple subpial transections over eloquent cortex
_____unrelated surgical complication
_____unable to speculate
Other:_____

Comments on language mapping:

Motor Testing

15. Do you routinely localize hand motor/sensory areas prior to mapping? Check all that apply.

    ___No
    ___Yes, by locating mu rhythm on intracranial EEG recording (iEEG)
    ___Yes, with median nerve SSEP intraoperatively
    ___Yes, with median nerve SSEP extraoperatively
    ___Yes, by measuring induced gamma activity on iEEG

    ___Other procedure (please specify): _____

16. Do you use any special procedures to distinguish primary motor from premotor or associative areas?

    ___No
    ___Yes, by testing entrainment to 1 Hz stimulation
    ___Yes, by looking for negative motor findings with stimulation

    ___Yes, other method/criteria (please describe):_____

17. Please indicate the <u>approximate</u> proportion of patients (%) who have experienced a transient or persistent decline after resection of any of the following positive sites. (Leave blank if not applicable).

	Transient	Persistent
Clonic tongue movements	_____%	_____%
Tongue deviation	_____	_____
Induced motor weakness	_____	_____
Lower face clonic movements	_____	_____
Upper face clonic movements	_____	_____
Other 1: _____	_____	_____
Other 2: _____	_____	_____

Comments on motor mapping:

Neurostimulation

18. What manufacturer and model stimulator do you use?   (Please note: this question is not for marketing or other commercial purposes, and will not be shared with any manufacturers.)

_____

19. Indicate the frequencies that you routinely use for each test modality. Circle all that apply. If the same settings are used for motor and language testing, check the appropriate response and leave the language column blank.

Motor	Language, if different	
1 Hz	1 Hz	____ I use the same frequencies for
5 Hz	5 Hz	both language and motor mapping
10 Hz	10 Hz	
20 Hz	20 Hz	
30 Hz	30 Hz	
50 Hz or higher	50 Hz or higher	

20. What settings for pulse duration do you normally use? Circle all that apply. If the same settings are used for adult and pediatric testing, check the appropriate response and leave the pediatric column blank.

Adult	Pediatric (< age 10), if different	
0.2 ms	0.2 ms	____ I use the same pulse duration for
0.3 ms	0.3 ms	both adult and pediatric mappings
0.5 ms	0.5 ms	
1 ms	1 ms	
2 ms	2 ms	
Other____	Other____	

21. How long is your maximum train of stimulation?

Motor mapping:_____ seconds   Language mapping:_____ seconds

22. What are the minimum settings you consider sufficient to classify an electrode pair as a negative site? Leave blank if you never base this decision on absolute settings.

	Adult	Pediatric (< age 10), if different	
Motor:	____ mA	____ mA	____ I use the same criteria for
	____ Hz	____ Hz	both adult and pediatric mappings
Other	_____	_____	
Language:	____ mA	____ mA	____ I use the same criteria for
	____ Hz	____ Hz	both language and motor mapping
Other	_____	_____	

23. What is the maximum current setting that you use for

	Adult	Pediatric (< age 10), if different	
Motor testing?	____ mA	____ mA	___ I use the same setting for both adult and pediatric mappings
Language testing?	____ mA	____ mA	___ I use the same setting for both language and motor mapping

24. What strategy do you use to increase stimulation parameters at each site? Check all that apply.

Increase current to threshold/maximum ____ Adult ____ Pediatric
Increase pulse width and amperage together to threshold/maximum ____ Adult ___ Pediatric
Other (describe):_____

25. What is the longest time you will map in one session?

_____ One hour
_____ Two hours
_____ Three hours
_____ No pre-set time limit
_____ No pre-set time limit, instead I use a clinical indicator (check all that apply):
　　　___Decline in baseline functioning
　　　___Increased focal iEEG slowing
　　　___Total charge delivered exceeds set limit
　　　How do you determine total charge?_____
___Other (describe):_____

26. What electrode pairing strategy do you use? Check all that apply.

___Pair all electrodes to be tested with a distant negative (cleared) site
___Test adjacent pairs first, then:
　　　___ Re-test positive sites by pairing each electrode with an adjacent, negative electrode
　　　___ Re-test positive sites by pairing each electrode with a distant negative electrode
_____ Test adjacent electrode pairs only
Other (describe):_____

27. How do you define an afterdischarge?

_____ One or more discharges following stimulation
_____ Run of two or more discharges following stimulation
_____ Sustained train of discharges for a minimum of 1 second following stimulation
_____ Other (describe) _____

28. When the afterdischarge threshold is below the minimum setting you consider necessary to adequately test a site, how do you respond? Please rank the following interventions by indicating "1" for the intervention you do first, "2" for the second intervention, etc. Leave interventions blank if this is not something you would do routinely.

_____ Wait 1-5 minutes and try again

_____ Reduce frequency

_____ Reduce pulse width

_____ Reduce pulse train length

_____ Stop mapping and give medication, then try again

_____ Other (describe): _____

29. Do you test function during a sustained afterdischarge?   _____Yes ___No

    If yes, do you consider the site negative if no motor or language disruption is noted
        during the stimulation that preceded the afterdischarge? _____Yes ___No
        after the stimulation and during the afterdischarge?   _____Yes ___No

    If yes, do you consider the site positive if motor or language disruption is noted
        during the stimulation that preceded the afterdischarge? _____Yes ___No
        after the stimulation and during the afterdischarge?   _____Yes ___No

30. How do you manage anticonvulsant medications (AEDs) for a mapping?

_____ Medication reduction is not a contraindication to mapping
_____ Restart oral AEDs then map later the same day
_____ Restart oral AEDs then map the next day
_____ Restart oral AEDs and pretreat with an IV medication, then map later the same day
_____ Pretreat with an IV medication, then map later the same day

_____ Other:_____

31. What medications do you use for pretreating, if any, and what are your typical starting doses? Complete all that apply.

IV: lorazepam   _____   levetiracetam _____

    midazolam   _____   valproic acid _____

    diazepam   _____   phenobarbital _____

    fosphenytoin _____   lacosamide _____

    Other: (specify agent, dose, and route)_____

Comments on neurostimulation: