



Effects of propofol on cortico-cortical evoked potentials in the dorsal language white matter pathway

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(Citation)

Clinical Neurophysiology, 132(8):1919-1926

(Issue Date)

2021-08-01

(Resource Type)

journal article

(Version)

Accepted Manuscript

(Rights)

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<https://hdl.handle.net/20.500.14094/0100476685>



TABLE 1. Patient demographics

	Age/ Sex	Tumor location	Preoperative symptoms	Tumor pathology	Antiepileptic drugs (mg/day)	WAB aphasia quotient (repetition score; maximum 10)		
						Before	After surgery	
						surgery	≤ 6 weeks	≤ 6 months
Patient 1	28/M	Ins, STG	seizure, right hemiparesis	anaplastic astrocytoma	ZNS 200mg	99.9 (10)	99.6 (10)	n.a.
Patient 2	31/F	Ins, MTG, STG	cognitive impairment, quadrantanopsia	WHO grade II-III astrocytoma	ZNS 200mg	nl*	95.6 (9.2)	n.a.
Patient 3	19/F	AG, PoCG, SMG	seizure	DNT	CLB 10mg	100 (10)	100 (10)	n.a.
Patient 4	44/F	AG, PoCG, SMG	seizure	diffuse astrocytoma	CBZ 600mg, LEV 1,000mg, PB 150mg	99.5 (10)	80 (8.2)	100 (10)
Patient 5	60/M	IFG, MFG, SFG	cognitive impairment, right hemiparesis	diffuse astrocytoma	ZNS 200mg	85.9 (10)	92 (10)	n.a.
Patient 6	52/M	ITG	seizure	cavernous hemangioma	CBZ 1,000mg, LTG 225mg	89.6 (9)	93.1 (10)	n.a.
Patient 7	16/M	IFG, MFG	seizure	glioblastoma	CBZ 400mg	92 (9.8)	94.2 (9.4)	n.a.
Patient 8	34/M	IFG, MFG, SFG	cognitive impairment	glioblastoma	LEV 1,000mg, VPA 800mg	91.8 (10)	93 (10)	n.a.
Patient 9	72/M	Ins, ITG, MTG, STG	cognitive impairment	glioblastoma	ZNS 100mg	68 (7.2)	64.2 (4.8)	58.6 (5.7)
Patient 10	44/F	IFG, MFG	seizure	oligodendroglioma	VPA 600mg	99.2 (10)	91.2 (10)	94.8
Patient 11	27/M	ITG, MTG	headache	oligoastrocytoma	ZNS 200mg	98.2 (10)	99.2 (9.8)	n.a.

Patient 12	62/M	ITG, MTG	asymptomatic	anaplastic oligodendroglioma	none	99.2(10)	92.8 (8.4)	96.7 (9.2)
Patient 13	52/F	Hippocampus	seizure	hippocampal sclerosis	LEV 2,000mg, PB 120mg, TPM 50mg	97.2 (10)	97.3 (10)	n.a.
Patient 14	70/M	Ins, MTG, STG	asymptomatic	diffuse astrocytoma	none	99.7 (10)	91.1 (9.2)	n.a.

AG: angular gyrus, CBZ: carbamazepine, CLB: clobazam, DNT: dysembryoplastic neuroepithelial tumor, F: female, IFG: inferior frontal gyrus, Ins: insula, ITG: inferior temporal gyrus, LEV: levetiracetam, LTG: lamotrigine, M: male, MFG: middle frontal gyrus, MTG: middle temporal gyrus, PB: phenobarbital, PHT: phenytoin, PoCG: postcentral gyrus, SFG: superior frontal gyrus, SMG: supramarginal gyrus, SPL: superior parietal lobule, STG: superior temporal gyrus, TPM: topiramate, VPA: valproic acid, ZNS: zonisamide, WAB: western aphasia battery, WHO: world health organization

n.a. = not available

* normal language function by routine clinical examination

TABLE 2. The spatial relationship of CCEP response between under general condition and awake condition

	Locus of the maximum CCEP response site between general anesthesia and awake condition	Number of electrodes showing >6 SD of the baseline fluctuation (general anesthesia/awake condition)	Number of electrodes showing $\geq 20\%$ of the maximum CCEP response (general anesthesia/awake condition)	Distribution correlation ratio ($\geq 20\%$)*	Number of electrodes showing $\geq 60\%$ of the maximum CCEP response (general anesthesia/awake condition)	Distribution correlation ratio ($\geq 60\%$)*
Patient 1	Same	9/9	8/4	0.50	1/1	1.00
Patient 2	Same	4/5	3/1	0.33	1/1	1.00
Patient 3	Same	12/8	12/7	0.58	2/1	0.50
Patient 4	Same	5/2	2/2	1.00	2/2	1.00
Patient 5	Same	8/7	8/7	0.67	1/1	1.00
Patient 6	Same	9/10	9/10	0.90	6/5	0.83
Patient 7	Same	9/11	7/9	0.60	3/3	1.00
Patient 8	Same	12/11	12/11	0.77	5/6	0.57
Patient 9	Same	20/20	12/15	0.87	2/3	0.67
Patient 10	Same	6/8	4/5	0.80	1/1	1.00
Patient 11	Same	15/16	5/5	1.00	1/2	0.50
Patient 12	Same	15/15	8/7	0.88	1/1	1.00
Patient 13	Same	12/18	9/9	0.80	1/1	1.00
Patient 14	Same	1/3	1/3	0.33	1/1	1.00

CCEP: cortico-cortical evoked potential, SD: standard deviation

*Mean correlation ratio ($\geq X\%$) = $(A \cap B)/(A \cup B)$,

where A= the number of electrodes showing $\geq X\%$ of the maximum CCEP response under general anesthesia, and B= the number of electrodes showing $\geq X\%$ of the maximum CCEP response in the awake condition ($X = 20$ or 60)

TABLE 3. Correlation coefficient of CCEP N1 waveforms between under general anesthesia and awake condition

CCEP response site	Waveform correlation coefficient in the maximum	Mean waveform correlation coefficient in 60-99% of the maximum CCEP response (range)
Patient 1	0.92	-
Patient 2	0.91	-
Patient 3	0.98	-
Patient 4	0.98	0.96
Patient 5	0.99	-
Patient 6	0.86	0.94 (0.91-0.95)
Patient 7	0.92	0.95 (0.93-0.96)
Patient 8	0.96	0.97 (0.95-0.98)
Patient 9	0.99	0.94
Patient 10	0.95	-
Patient 11	0.94	-
Patient 12	0.99	-
Patient 13	0.93	-
Patient 14	0.98	-

CCEP: cortico-cortical evoked potential

TABLE 4. Differences of CCEP N1 amplitude and latencies between general anesthesia and awake condition

	Values of BIS monitor	N1 onset latency (ms)	N1 peak latency (ms)	Difference of N1 onset/peak latency (ms)	N1 amplitude (μV)	N1 amplitude increase (%)
	General anesthesia/awake condition	General anesthesia/awake condition	General anesthesia/awake condition	[(awake condition) - (general anesthesia)]	General anesthesia/awake condition	(-: decrease)
Patient 1	55/97	4.2/7.6	23.6/30.8	3.4/7.2	216.3/342.3	58.2
Patient 2	n.a./74	13.2/12.8	28.6/27.4	-0.4/-1.2	523.8/500.3	-4.5
Patient 3	55/83	12.6/12.8	28.8/29.2	0.2/0.4	215.0/311.4	44.9
Patient 4	37/80	11.0/11.0	26.0/25.0	0/-1.0	381.5/383.2	0.5
Patient 5	50/85	10.8/11.2	38.4/29.2	0.4/-9.2	212.0/374.8	76.8
Patient 6	42/97	11.4/11.4	23.2/26.2	0/3.0	74.6/86.8	16.3
Patient 7	54/81	12.0/12.0	29.8/31.0	0/1.2	396.3/320.1	-19.2
Patient 8	48/93	3.0/3.0	26.6/21.8	0/-4.8	104.9/110.9	5.7
Patient 9	52/98	10.8/10.8	33.4/33.4	0/0	238.1/270.1	13.4
Patient 10	40/97	8.8/7.4	28.4/26.6	-1.4/-1.8	188.6/232.6	23.3
Patient 11	38/81	12.6/11.2	35.6/31.8	-1.4/-3.8	997.0/742.2	-25.6
Patient 12	45/93	3.2/3	8.0/8.4	-0.2/0.4	523.1/564.0	7.3
Patient 13	n.a./88	12.4/11.2	30.2/29.2	-1.2/-1.0	350.1/415.5	15.7
Patient 14	48/94	13.6/13.6	33.4/33.8	0/0.4	127.7/162.0	21.2

BIS: bispectral index, CCEP: cortico-cortical evoked potential, n.a. = not available