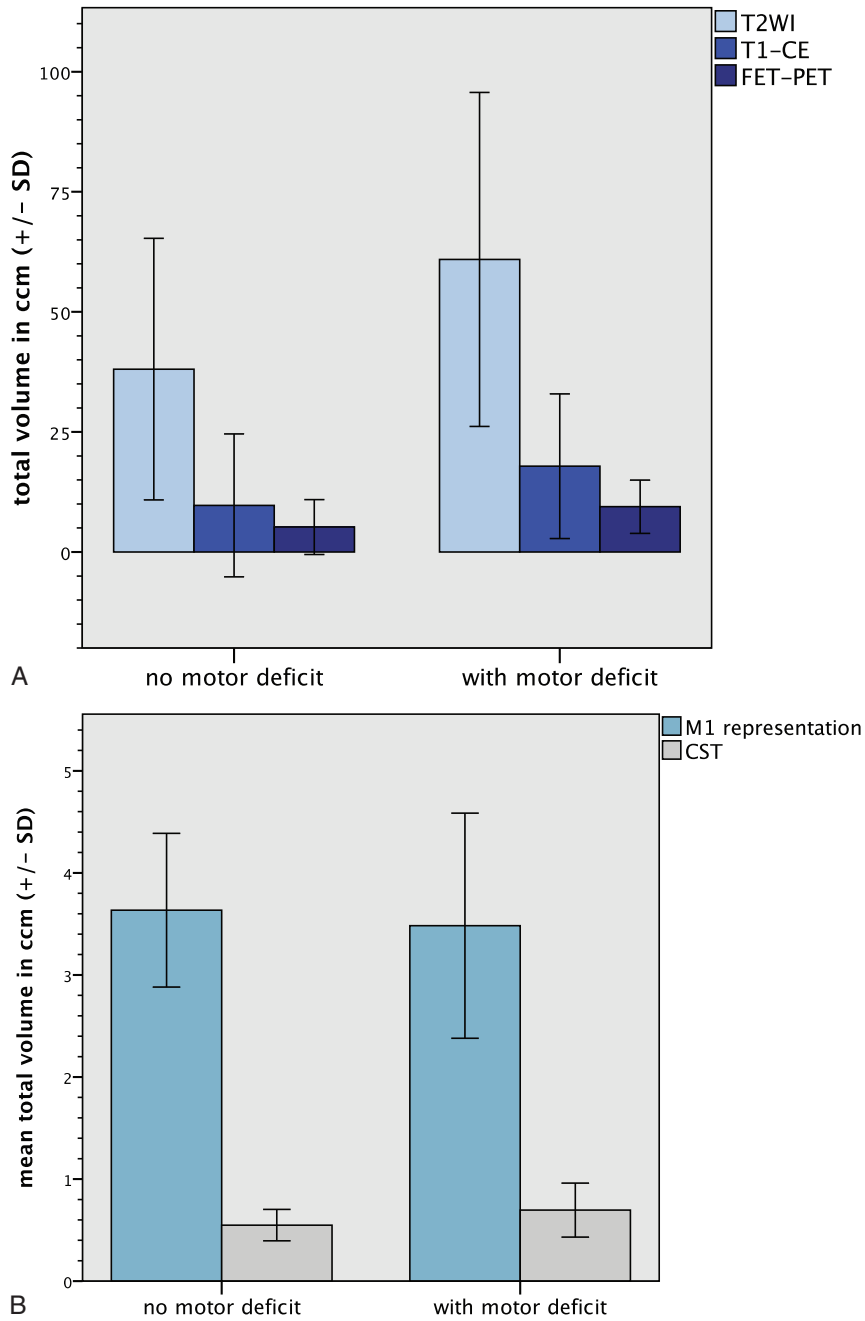
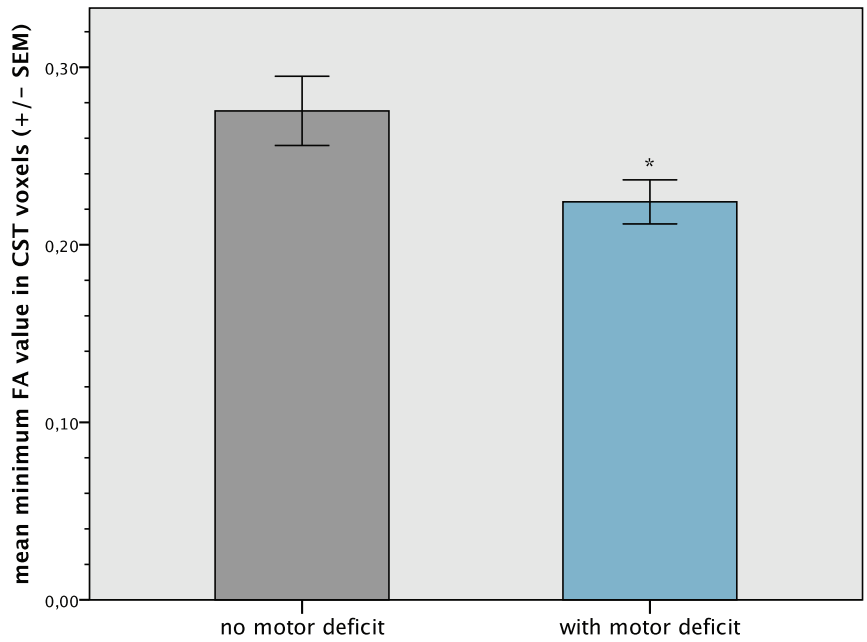


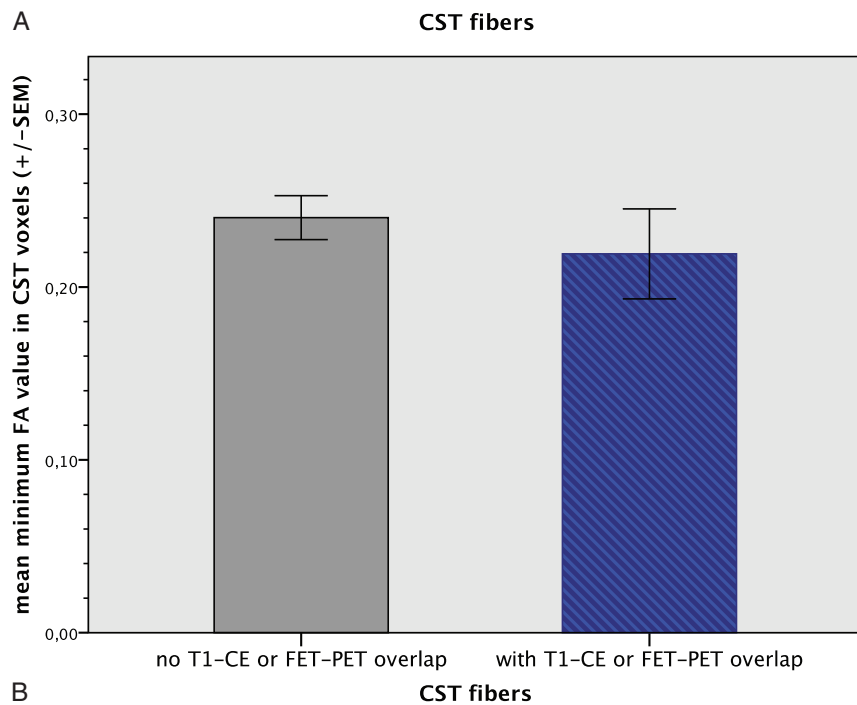
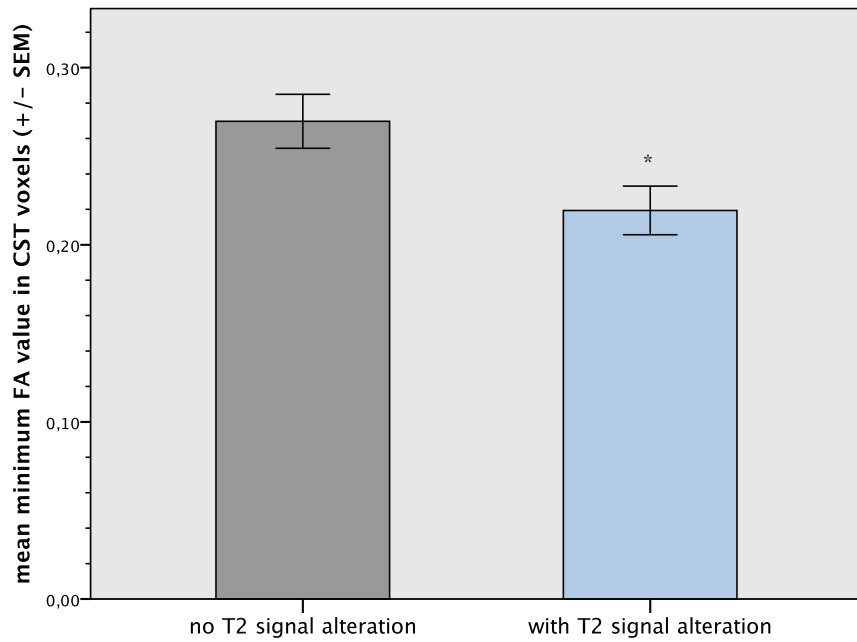
ON-LINE FIG 1. The mean resting motor threshold of the hand (abductor pollicis brevis: 36.8 ± 14.4 U), foot (plantaris toe flexors: 58.0 ± 19.5 U), and face representation (lateral tongue muscles: 40.3 ± 11.5 U) of the patients with motor impairment does not differ from that in patients without motor deficits (hand: 37.8 ± 8.5 U; foot: 63.5 ± 11.9 U; face: 44.2 ± 8.1 U; $P > .1$).



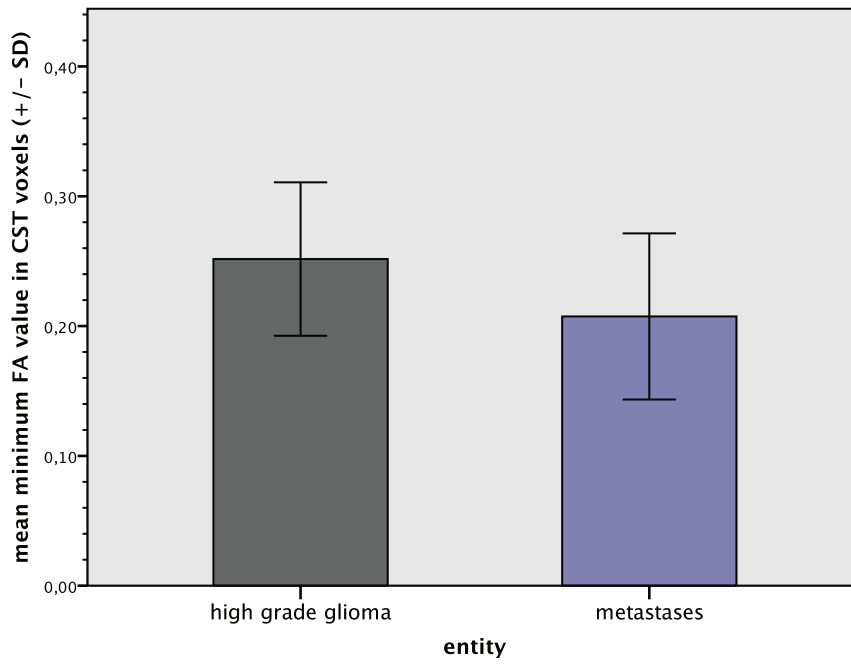
ON-LINE FIG 2. A, The total tumor size based on the T1-CE or FET-PET lesion volumes does not differ between the patients with and without motor deficits ($P > .1$). A statistical trend of the total peritumoral T2WI lesion being greater in the impaired patients compared with the others ($P = .08$) was noted. B, The mean size of the cortical M1 representations and the CST is not significantly different between the 2 groups ($P > .1$).



ON-LINE FIG 3. The mean minimum FA value in the voxels of the CST is significantly lower in the group of patients with a primary motor deficit than in those with preserved function. The asterisk indicates $P < .05$.



ON-LINE FIG 4. A, Besides the clinical motor function, the FA values of the CST affected by altered T2WI signal overlap (0.22 ± 0.06 U, $n = 19$) are significantly lower than those of the unaffected ones (0.27 ± 0.05 U, $n = 11$). The asterisk indicates $P = .02$. B, There is no difference detected in the FA values of motor fibers infiltrated by the T1-CE or FET-PET lesion (0.22 ± 0.06 U, $n = 7$) compared with the unaffected fibers (0.24 ± 0.06 U, $n = 23$, $P > .1$).



ON-LINE FIG 5. With regard to the tumor entity, there was no statistical difference detected in the mean FA values of the CST of patients with a high-grade glial ($n = 21$) versus a metastatic lesion ($n = 7$) ($P > .1$).

On-line Table 1: Clinical characteristics

Pt. No.	Sex	Age (yr)	Brain Tumor Location (L/R)	Histopathologic Diagnosis, WHO Grade	Initial Primary Motor Deficit	KPS at Admission (%)	Motor Deficit Post-Surgery ^a	Gross Total Tumor Resection Achieved	KPS at Discharge (%)	Steroid Therapy Preoperatively	Epilepsy, Anticonvulsive Therapy
1	M	48	Frontotemporal, L	GBM, IV (rec)	None	100	→	Yes	100	No	Yes, yes
2	M	77	Postcentral, R	Metastasis	None	90	→	No	80	Yes	No, no
3	F	33	Frontotemporal, L	GBM, IV	None	90	→	Yes	90	Yes	Yes, yes
4	M	56	Precentral, L	Anaplastic astrocytoma, III	None	100	→	Yes	90	Yes	Yes, yes
5	M	51	Postcentral, L	GBM, IV	None	100	→	Yes	100	Yes	No, no
6	F	66	Postcentral, L	GBM, IV	None	70	→	No	60	Yes	No, no
7	M	47	Frontal, R	Anaplastic astrocytoma, III	None	100	→	No	80	No	Yes, yes
8	F	28	Postcentral, R	Metastasis	None	90	→	No	90	Yes	No, no
9	F	76	Precentral, R	Metastasis	Upper limb	70	↓	Yes	50	Yes	Yes, yes
10	M	79	Frontal, R	GBM, IV	Hemiparesis	80	↑	Yes	80	Yes	No, no
11	F	43	Frontotemporal, L	GBM, IV	Hemiparesis	80	↑	No	80	Yes	Yes, yes
12	F	70	Occipital ventricle, L	Anaplastic ependymoma, III (rec)	Hemiparesis	70	↑	Yes	80	Yes	No, no
13	M	77	Temporoparietal, R	GBM, IV	Hemiparesis	80	→	No	60	Yes	Yes, yes
14	F	72	Postcentral, L	GBM, IV	Hemiparesis	70	↑	No	80	Yes	No, no
15	M	60	Precentral, L	GBM, IV	Hemiparesis	80	↑	No	90	Yes	No, no
16	M	60	Precentral, L	GBM, IV	Facial	100	→	No	100	No	Yes, yes
17	M	72	Central, R	Metastasis	Upper limb	80	↑	No	80	No	Yes, yes
18	M	68	Precentral, L	GBM, IV	Facial	90	↓	No	80	Yes	No, no
19	M	46	Central, R	GBM, IV (rec)	Facial	90	→	Yes	100	Yes	Yes, yes
20	F	65	Precentral, L	Metastasis	Hemiparesis	90	↑	Yes	90	Yes	No, no
21	F	74	Central, L	GBM, IV	Upper limb	90	↑	Yes	100	Yes	No, no
22	F	69	Precentral, L	GBM, IV (rec)	Upper limb	100	↓	No	80	Yes	No, no
23	M	65	Precentral, R	GBM, IV	Hemiparesis	90	↑	Yes	90	Yes	Yes, yes
24	F	64	Precentral, R	Lymphoma ^b	Hemiparesis	80	↑	Yes	80	No	No, no
25	F	63	Frontal, R	GBM, IV	Hemiparesis	70	N.O.	N.O.	70	Yes	No, no
26	M	69	Postcentral, L	GBM, IV	Hemiparesis	90	→	Yes	80	No	No, no
27	M	54	Precentral, L	GBM, IV	Upper limb	90	↑	Yes	90	Yes	No, no
28	F	51	Postcentral, L	GBM, IV	Hemiparesis	90	↑	Yes	90	Yes	Yes, yes
29	F	58	Central, R	Metastasis	Hemiparesis	90	↑	No	90	Yes	Yes, yes
30	M	46	Precentral, R	Metastasis (rec)	Facial	90	↓	Yes	90	Yes	Yes, yes

Note:—WHO indicates World Health Organization; Pt., patient; KPS, Karnofsky Performance Scale; GBM, glioblastoma multiforme; L, Left; R, right; N.O., not operated; rec, recurrent disease; ↑, improved; →, unchanged; ↓, deteriorated.

^a At discharge.

^b Atypical appearance on preoperative diagnostics and inconclusive intraoperative pathologic report led to the unusual aim of gross total tumor resection.

On-line Table 2: Inclusion and exclusion study criteria

Inclusion Criteria	Exclusion Criteria
18–79 Years of age	Therapy-resistant epilepsy
Sufficient contractual capability	Pregnancy
Space-occupying lesion of suspicious malignancy close to the MI region or the CST	Severe psychiatric disorders
	Karnofsky Performance Scale <70%
	Pre-existing motor deficits
	Contraindications to MRI

On-line Table 3. Hybrid MRI-PET and nTMS protocol

No.	Sequence	Characteristics	Acquisition Time (min:sec)
Hybrid MRI-PET			
1	Localizer		00:27
2	T1-MPRAGE	TE = 3.93 ms, TR = 2.250 ms, TI = 900 ms, 192 sagittal sections, matrix size = 256 × 256 × 192	04:40
3	T2-SPACE	TR = 5000 ms, TE = 453 ms, FOV = 256 mm, 176 sagittal sections, voxel size = 1.0 × 1.0 × 1.0 mm ³	09:40
4	DTI	TE = 81 ms, TR = 7000 ms, matrix size = 112 × 112, 62 sections with a voxel size of 2.0 × 2.0 × 2.0 mm ³ , 30 diffusion gradient directions, b-value of 800 and a single acquisition with a b-value of 0	07:09
5	T1-CE-MPRAGE	TE = 3.93 ms, TR = 2.250 ms, TI = 900 ms, 192 sagittal sections, matrix size = 256 × 256 × 192, after intravenous injection of 0.3 mmol/kg body weight of Dotarem	04:40
6	FET-PET	Hybrid acquisition technique: 16-frame total after the injection of 200 mBq of FET: 10 × 1-minute frame intervals at the beginning and 6 × 5-minute frames at the end	40:00
Subtotal hybrid MR-PET nTMS			40–50 min
1	Coregistration	Neuronavigational SPACE sequence coregistration with a maximum error of 2 mm	01:00
2	Resting motor threshold determination for the hand, foot, and face representation	Motor-evoked potentials of the abductor pollicis brevis muscle (latency range, 17–27 ms), the plantar toe flexors (latency range, 34–50 ms), and the anterior lateral tongue muscles (latency range, 7–15 ms) using surface electrodes were recorded	09:00
3	Motor mapping	110% Stimulation intensity of the respective resting motor threshold; for each muscle representation, 150–250 pulses (depending on the size) on the cortical surface representation of the lesional hemisphere (grid node space: 5 mm, 2–3 pulses per grid section)	30:00
Subtotal nTMS			40–60 min
Total MRI/PET/nTMS			80–110 min

On-line Table 4: Contingency table of the overlap of functional tissue with T1-CE lesion signal and FET-PET, respectively, in relation to the presence of a motor deficit before the operation^a

		Motor Deficit		Total
		No	Yes	
Functional T1-CE/FET-PET overlap No	T1-CE-PET, <i>n</i>	7/8	11/7	18/15
	% Within functional T1-CE/FET-PET overlap	38.9/53.3%	61.1/46.7%	100/100%
	% Within motor deficit	87.5/100%	50.0/36.8%	60.0/55.6%
Yes	T1-CE/FET-PET, <i>n</i>	1/0	11/12	12/12
	% Within functional T1-CE/FET-PET overlap	8.3/0.0%	91.7/100%	100/100%
	% Within motor deficit	12.5/0.0%	50.0/63.2%	40.0/44.4%
Total	T1-CE/FET-PET, <i>n</i>	8/8	22/19	30/27
	Percentage of total	26.7/29.6%	73.3/70.4%	100/100%

^a Two-tailed Fisher exact test: functional T1-CE overlap: *P* = .099; functional PET overlap: *P* < .01.

On-line Table 5: Contingency table of the overlap of functional tissue with T1-CE lesion signal and FET-PET, respectively, on presurgical maps in relation to motor function after the operation^a

		Motor Function		Total
		Unchanged or Improved	Deteriorated	
Functional T1-CE/FET-PET overlap No	T1-CE/FET-PET, <i>n</i>	17/15	0/0	17/15
	% Within functional T1-CE/FET-PET overlap	100/100%	0/0%	100/100%
	% Within motor function	68.0/65.2%	0/0%	58.6/55.6%
Yes	T1-CE/FET-PET, <i>n</i>	8/8	4/4	12/12
	% Within functional T1-CE/FET-PET overlap	66.7/66.7%	33.3/33.3%	100/100%
	% Within motor function	32.0/34.8%	100/100%	41.4/44.4%
Total	T1-CE/FET-PET, <i>n</i>	25/23	4/4	29/27
	Percentage of total	86.2/85.2%	13.8/14.8%	100/100%

^a Two-tailed Fisher exact test: functional T1-CE overlap, *P* < .05; functional/PET overlap, *P* < .05.

On-line Table 6: Contingency table of the overlap of functional tissue with the T2WI lesion in relation to the presence of a motor deficit before the operation

		Motor Deficit		
		No	Yes	Total
In total ^a				
Functional T2WI overlap				
No	<i>n</i>	6	1	7
	% Within functional/T2WI overlap	85.7%	14.3%	100%
	% Within motor deficit	75.0%	4.5%	23.3%
Yes	<i>n</i>	2	21	23
	% Within functional/T2WI overlap	8.7%	91.3%	100%
	% Within motor deficit	25.0%	95.5%	76.7%
Total	<i>n</i>	8	22	30
	Percentage of total	26.7%	73.3%	100%
With respect to tumor entity (metastases vs high-grade glioma) ^b				
Functional T2WI overlap				
No	Metastases/gliomas, <i>n</i>	1/5	0/1	1/6
	% Within functional/T2WI overlap	100/83.3%	0/16.7%	100/100%
	% Within motor deficit	50.0/83.3%	0/6.7%	14.3/28.6%
Yes	Metastases/gliomas, <i>n</i>	1/1	5/14	6/15
	% Within functional/T2WI overlap	16.7/6.7%	83.3/93.3%	100/100%
	% Within motor deficit	50.0/16.7%	100/93.3%	85.7/71.4%
Total	Metastases/gliomas, <i>n</i>	2/6	5/15	7/21
	Percentage of total	28.6/28.6%	71.4/71.4%	100/100%

^a Two-tailed Fisher exact test: $P < .001$.

^b Two-tailed Fisher exact test: metastases, $P = .29$; high grade gliomas, $P < .01$.

On-line Table 7: Contingency table of the overlap of functional tissue with the T2WI lesion on presurgical maps in relation to motor function recovery after the operation in patients with motor impairment^a

Functional T2WI Overlap		Motor Function		Total
		Unchanged or Deteriorated	Improved	
No	<i>n</i>	6	6	12
	% Within functional T2WI overlap	50.0%	50.0%	100%
	% Within motor function	85.7%	46.2%	60.0%
Yes	<i>n</i>	1	7	8
	% Within functional T2WI overlap	12.5%	87.5%	100%
	% Within motor function	14.3%	53.8%	40.0%
Total	<i>n</i>	7	13	20
	Percentage of total	35.0%	65.0%	100%

^a Two-tailed Fisher exact test: $P = .16$.