Epilessia e tumori cerebrali

Nuovi approcci chirurgici: quale margine per un risparmio cognitivo

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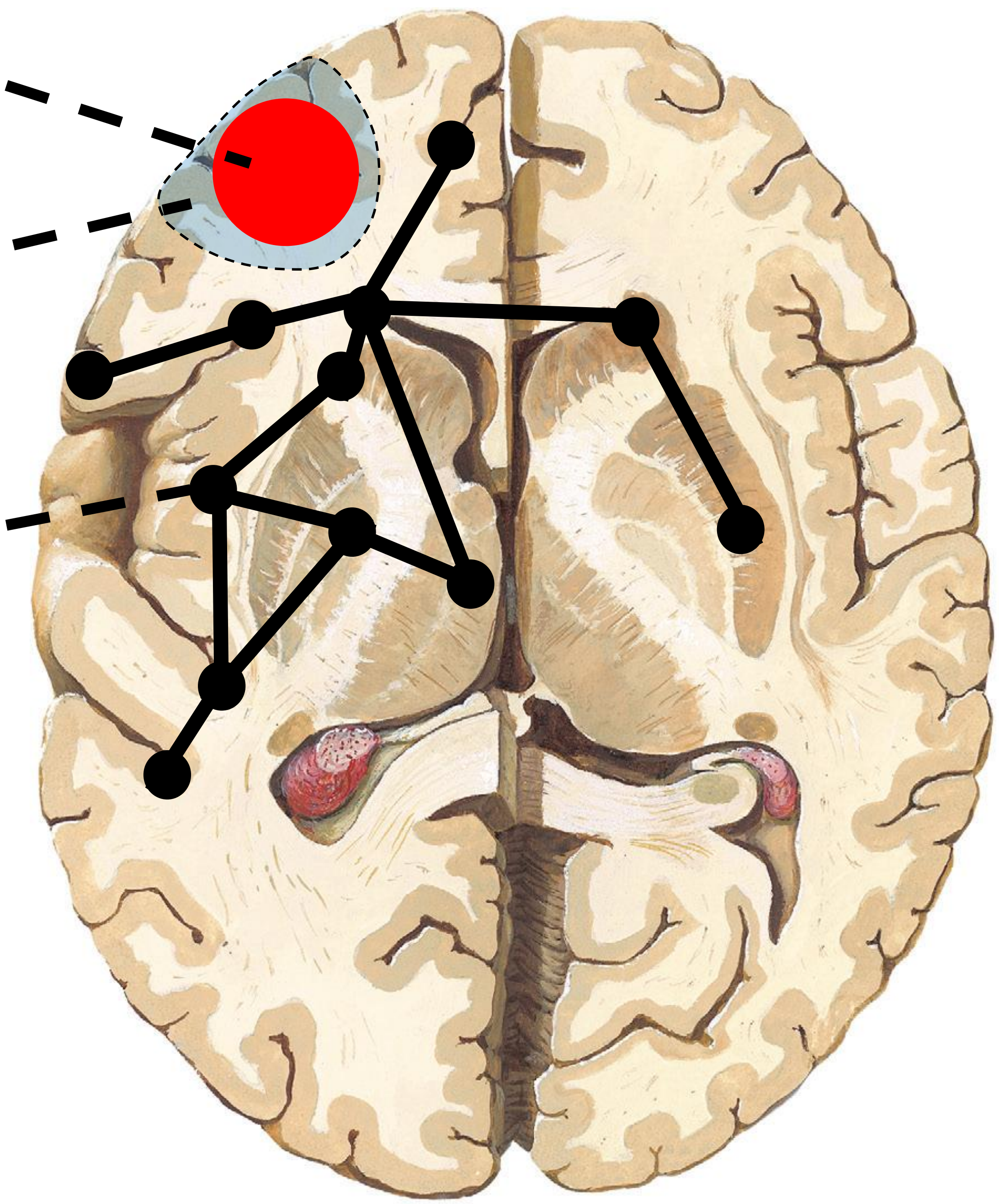
Epilettogenesi

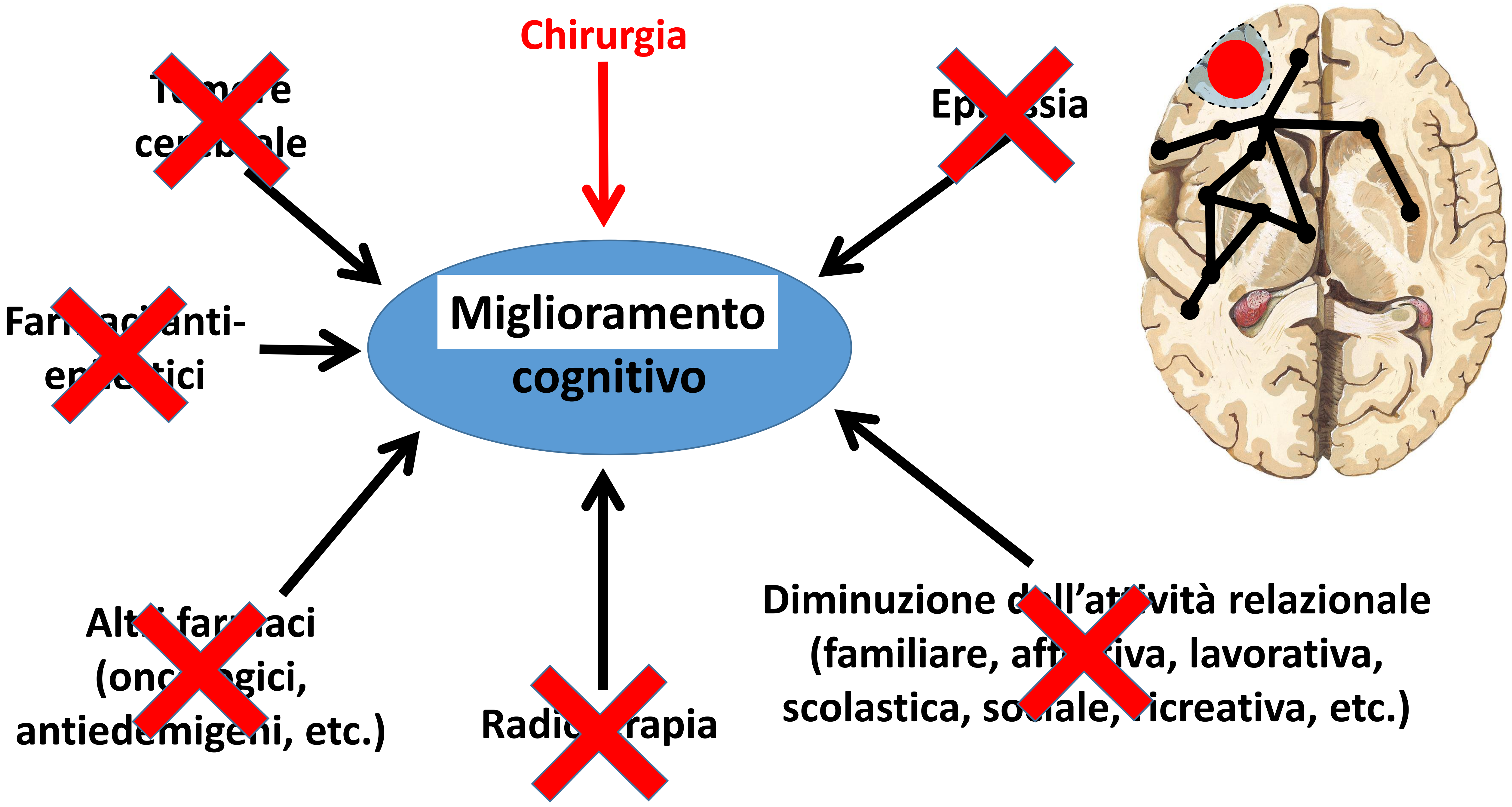



doi:10.1093/brain/awr310 Brain 2012: 135; 1002–1016 | 1002
BRAIN
A JOURNAL OF NEUROLOGY

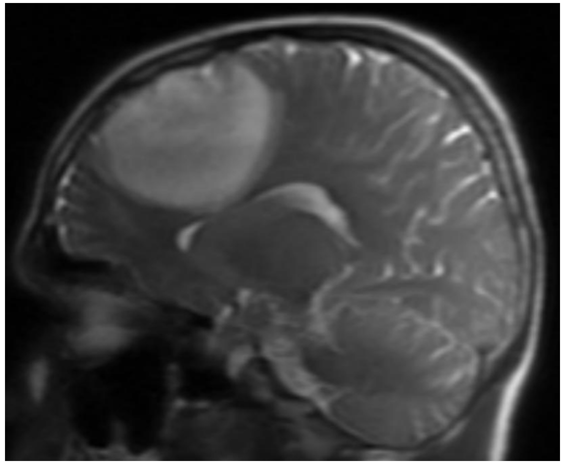
REVIEW ARTICLE

Epilepsy in patients with a brain tumour: focal epilepsy requires focused treatment

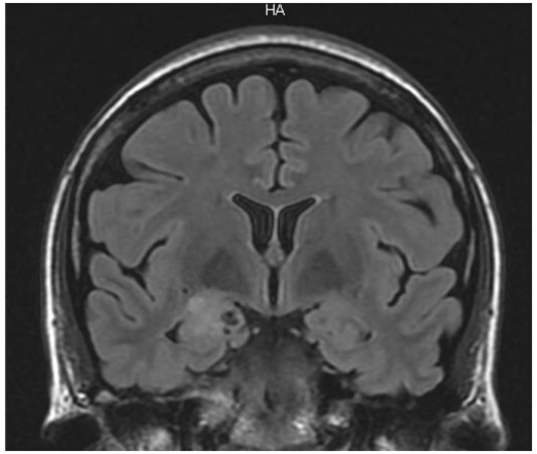
Marjolein de Groot,[1,2] Jaap C. Reijneveld,[1,3] Eleonora Aronica[2,4] and Jan J. Heimans[1]


Chirurgia
Miglioramento cognitivo
Epi ssia
Radic rapia
Diminuzione d ll'at ività relazionale
(familiare, aff iva, lavorativa,
scolastica, so ale, icreativa, etc.)
Alt far aci
(onc gici,
antiede migeni, etc.)
Far aci anti-
ep tici
ce ale

2 tipi di tumori associati ad epilessia



Gliomi: evolutività oncologica, localizzazioni varie. In genere non necessitano di valutazione in un centro dedicato alla Chirurgia dell'Epilessia. L'asportazione radicale del tumore ha un'ottima prognosi sull'epilessia.



LEAT (Long-Term Epilepsy Associated Tumors) o epileptomi: tumori intrinsecamente epilettogeni tipici della giovane età, quasi sempre nel lobo temporale (circa 80%), con scarsa evolutività oncologica. Valutazione in un centro per la Chirurgia dell'Epilessia (non infrequentemente l'asportazione va estesa oltre il tumore per risolvere l'epilessia).

Acta Neuropathol (2014) 128:39–54
DOI 10.1007/s00401-014-1288-9

REVIEW

A neuropathology-based approach to epilepsy surgery in brain tumors and proposal for a new terminology use for long-term epilepsy-associated brain tumors

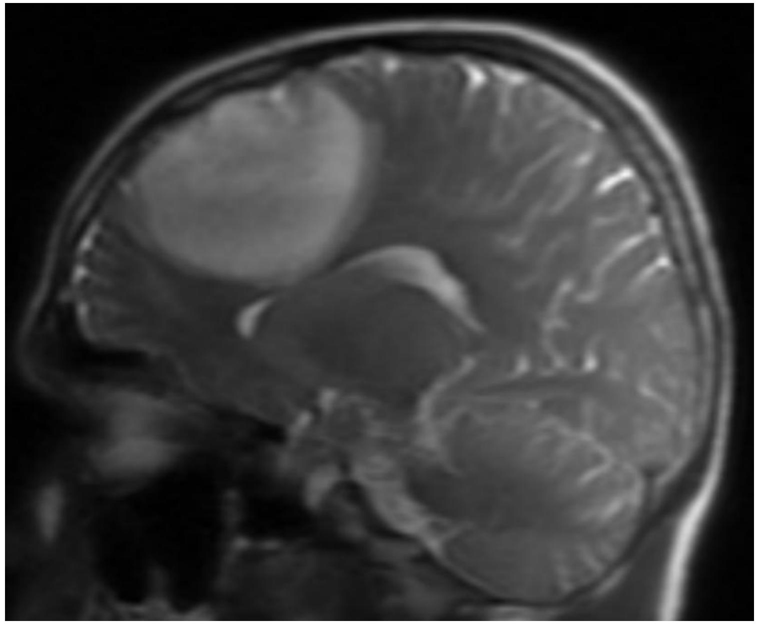
Ingmar Blumcke · Eleonora Aronica · Horst Urbach · Andreas Alexopoulos · Jorge A. Gonzalez-Martinez

1 – Gliomi cerebrali

Tumori con evolutività oncologica
Localizzazioni varie.
In genere non vengono valutati in un centro dedicato alla Chirurgia dell’Epilessia

- le considerazioni oncologiche prevalgono di solito su quelle epilettologiche
- la storia di epilessia è in genere di breve durata (epilettogenesi secondaria rara)
- alta probabilità che il tumore coincida con la zona epilettogena

L’asportazione radicale del tumore ha un’ottima prognosi sull’epilessia.



European Association for Neuro-Oncology (EANO) guideline on the diagnosis and treatment of adult astrocytic and oligodendroglial gliomas

Michael Weller, Martin van den Bent, Jörg C Tonn, Roger Stupp, Matthias Preusser, Elizabeth Cohen-Jonathan-Moyal, Roger Henriksson, Emilie Le Rhun, Carmen Balana, Olivier Chinot, Martin Bendszus, Jaap C Reijneveld, Frederick Dhermain, Pim French, Christine Marosi, Colin Watts, Ingela Oberg, Geoffrey Pilkington, Brigitta G Baumert, Martin J B Taphoorn, Monika Hegi, Manfred Westphal, Guido Reifenberger, Riccardo Soffietti, Wolfgang Wick, for the European Association for Neuro-Oncology (EANO) Task Force on Gliomas

- 4300 nuovi casi di tumore cerebrale/anno
- Incidenza dei gliomi (incluso il glioblastoma): 6 casi/100000/anno
- Causa del 7%/anno dei decessi per tumore in popolazione < 70 anni

www.thelancet.com/oncology, Vol 18 June 2017

European Journal of Neurology 2010, 17: 1124–1133 doi:10.1111/j.1468-1331.2010.03151.x
EFNS GUIDELINES/CME ARTICLE

Guidelines on management of low-grade gliomas: report of an EFNS–EANO* Task Force

R. Soffietti[a], B.G. Baumert[b], L. Bello[c], A. von Deimling[d], H. Duffau[e], M. Frénay[f], W. Grisold[g], R. Grant[h], F. Graus[i], K. Hoang-Xuan[j], M. Klein[k], B. Melin[l], J. Rees[m], T. Siegal[n], A. Smits[o], R. Stupp[p] and W. Wick[q]

- Surgery is necessary to provide tissue for distinguishing between the histologic types, grading the malignancy and assessing the molecular status of tumors. Moreover, there are scenarios that pose problems of differential diagnosis between LGGs and non-neoplastic lesions (demyelination, inflammation or infection), and thus histological verification is mandatory.
- Total resection improves seizure control
- Total/near total resection decreases the incidence of recurrence and the risk of malignant transformation and improves progression free survival and overall survival
- Total resection is achieved in no more than 36% of patients
- **The risk of deferring surgery includes managing at a later timepoint a larger tumor, which may have undergone anaplastic transformation**

Current Concepts in the Surgical Management of Glioma Patients

CrossMark

C. Watts [*,†], S.J. Price [*], T. Santarius [*]

[*] *University of Cambridge, Department of Clinical Neurosciences, Division of Neurosurgery, Addenbrooke's Hospital, Cambridge, UK*
[†] *Department of Clinical Neurosciences, Cambridge Centre for Brain Repair, University of Cambridge, Cambridge, UK*

”The **goal of surgery** is to obtain a histological diagnosis and, where possible, **remove as much of the tumour as possible without damaging the adjacent healthy brain tissue**.“

Clinical Oncology 26 (2014) 385-394,
http://dx.doi.org/10.1016/j.clon.2014.04.001

Resezione chirurgica

Scopi

Controllo della malattia
Risoluzione delle crisi epilettiche

Limiti

- Rispetto delle funzioni corticali e sottocorticali
- Rispetto delle strutture anatomiche profonde
- Vascolarizzazione > complicanze ischemiche post-operatorie

Corteccia motoria
Aree del linguaggio
Aree visive
Insula
Corpo calloso
Nuclei della base
…

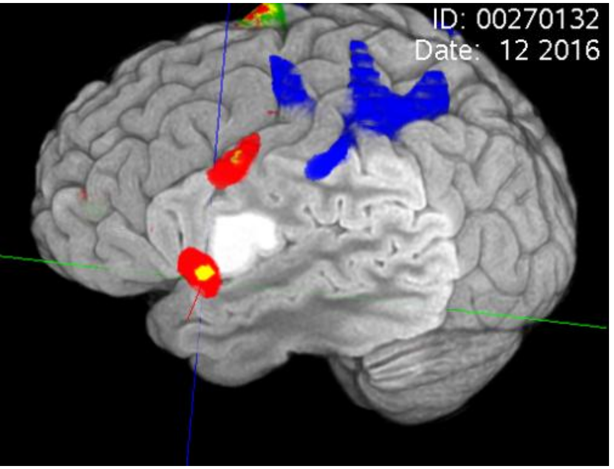
Tratto piramidale
Radiazioni ottiche
IFOF
Fascicolo Arcuato
…

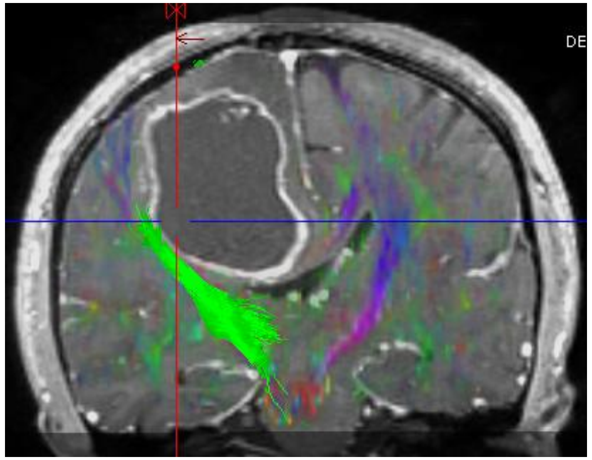
Lacroix et al, J Neurosurg 2001
Duffau et al, Brain 2005

Asportazione massimale: minimizzare le complicanze

Pre-operatorio:

- Valutazione neuropsicologica estesa
- RM funzionale
- Trattografia
- RMN 3D



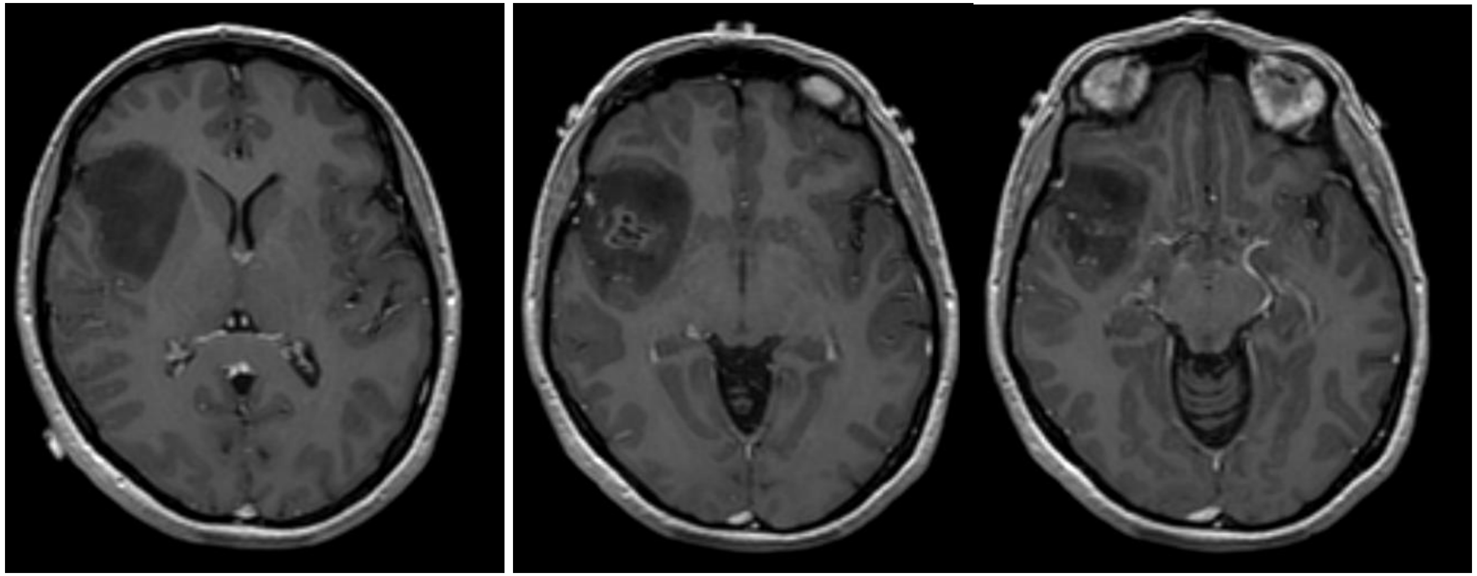


Intra-operatorio:

- Monitoraggio neurofisiologico
- Ricostruzione corticale RMN 3D
- Ecografia intraoperatoria neuronavigata
- Awake surgery (casi selezionati)
- CUSA-radar (CUSA con stimolazione sottocorticale continua)
- Microscopio ad alto ingrandimento, dissezione subpiale
- Chirurgia in 2 tempi
- Esperienza!!

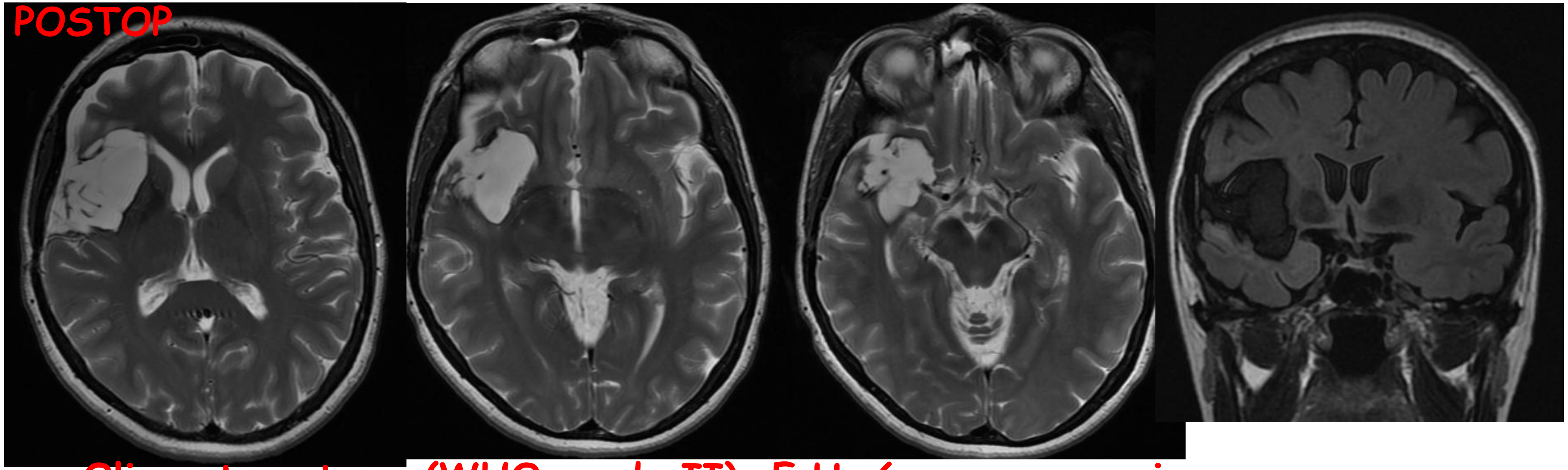
S. N. 42 y.o., F   Partial seizures

PREOP



Operata
26.11.2011

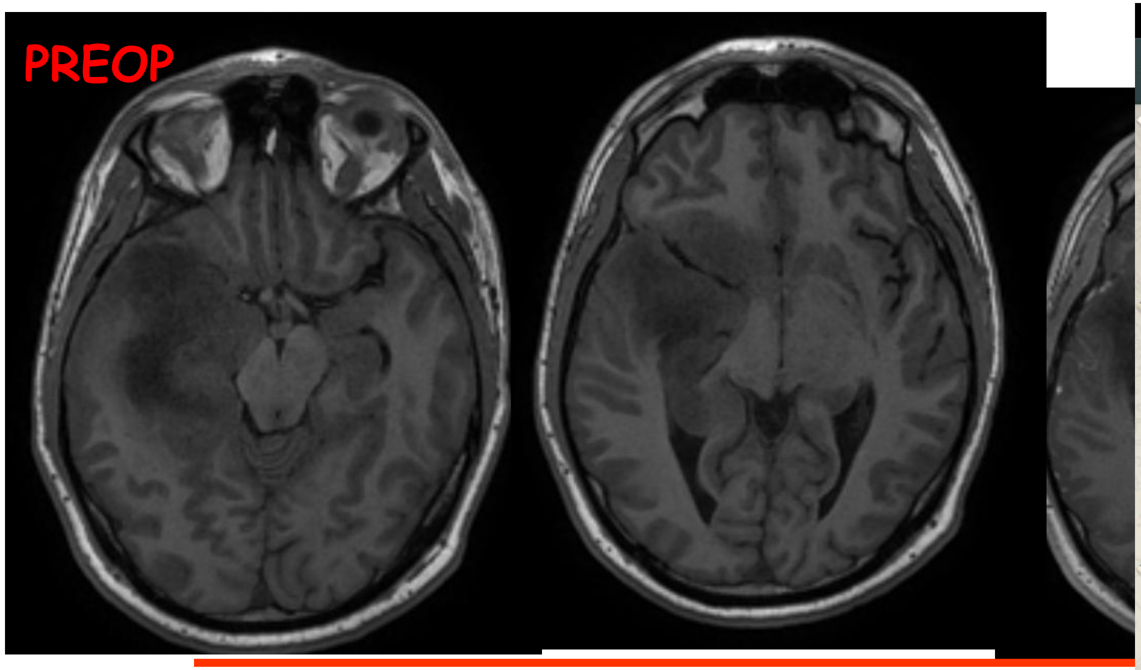
POSTOP

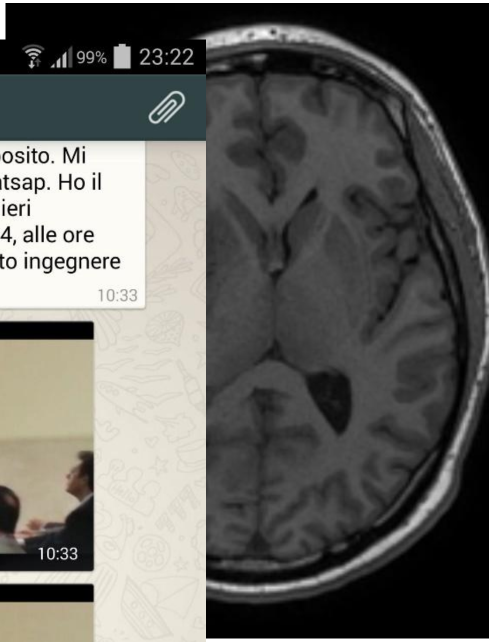


Oligoastrocytoma (WHO grade II), F.U. 6 years, no seizure

L.S. 28 y.o., M Seizures

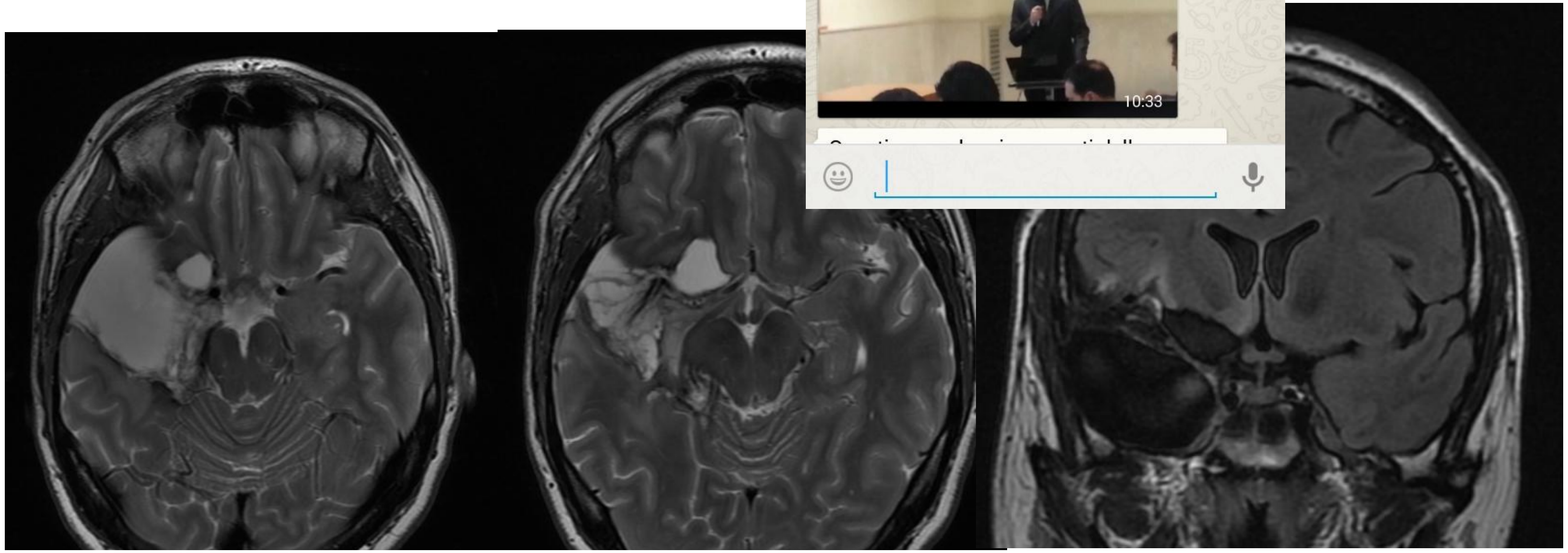
PREOP





Op.
19.02.2014

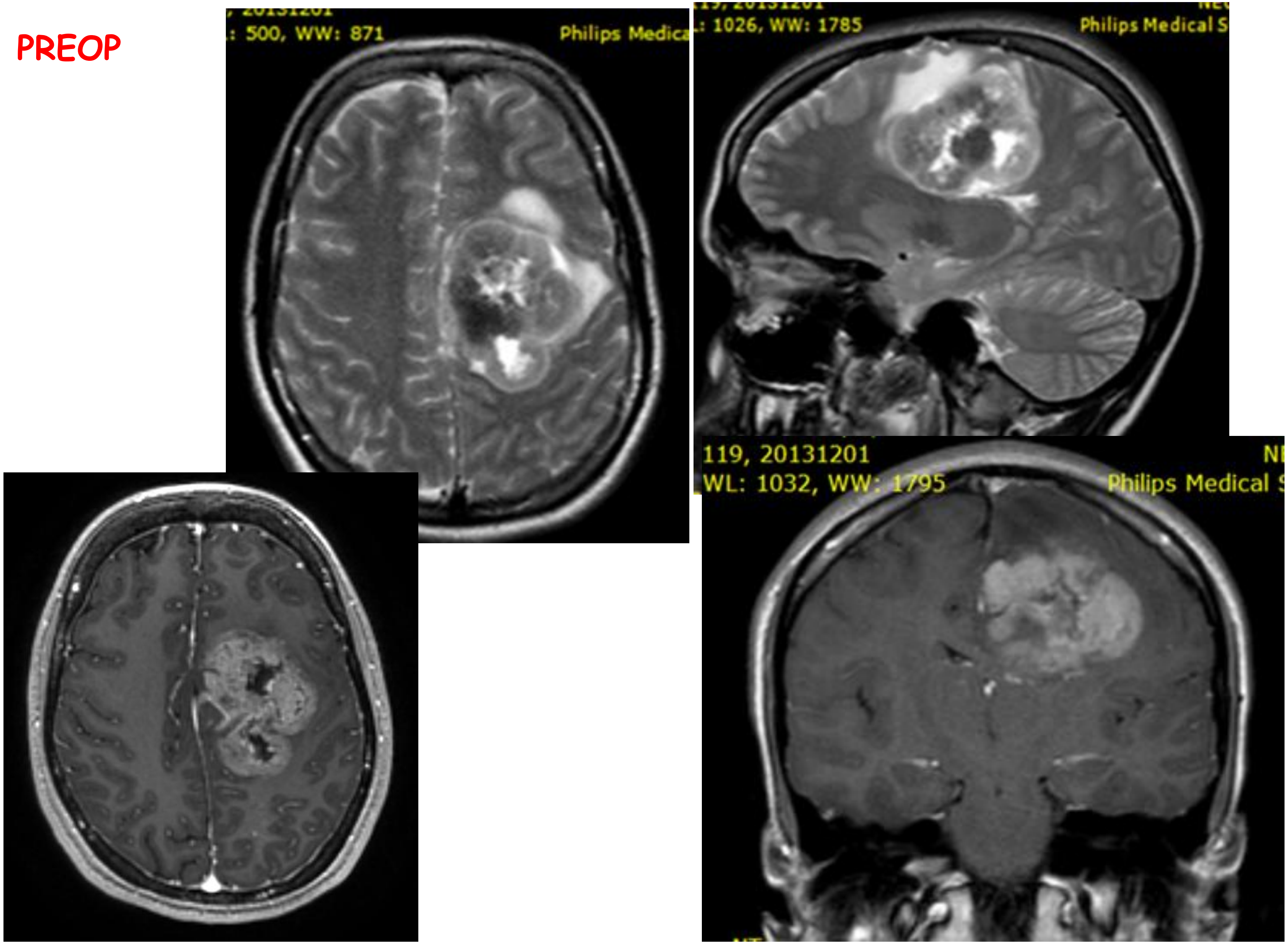
POSTOP

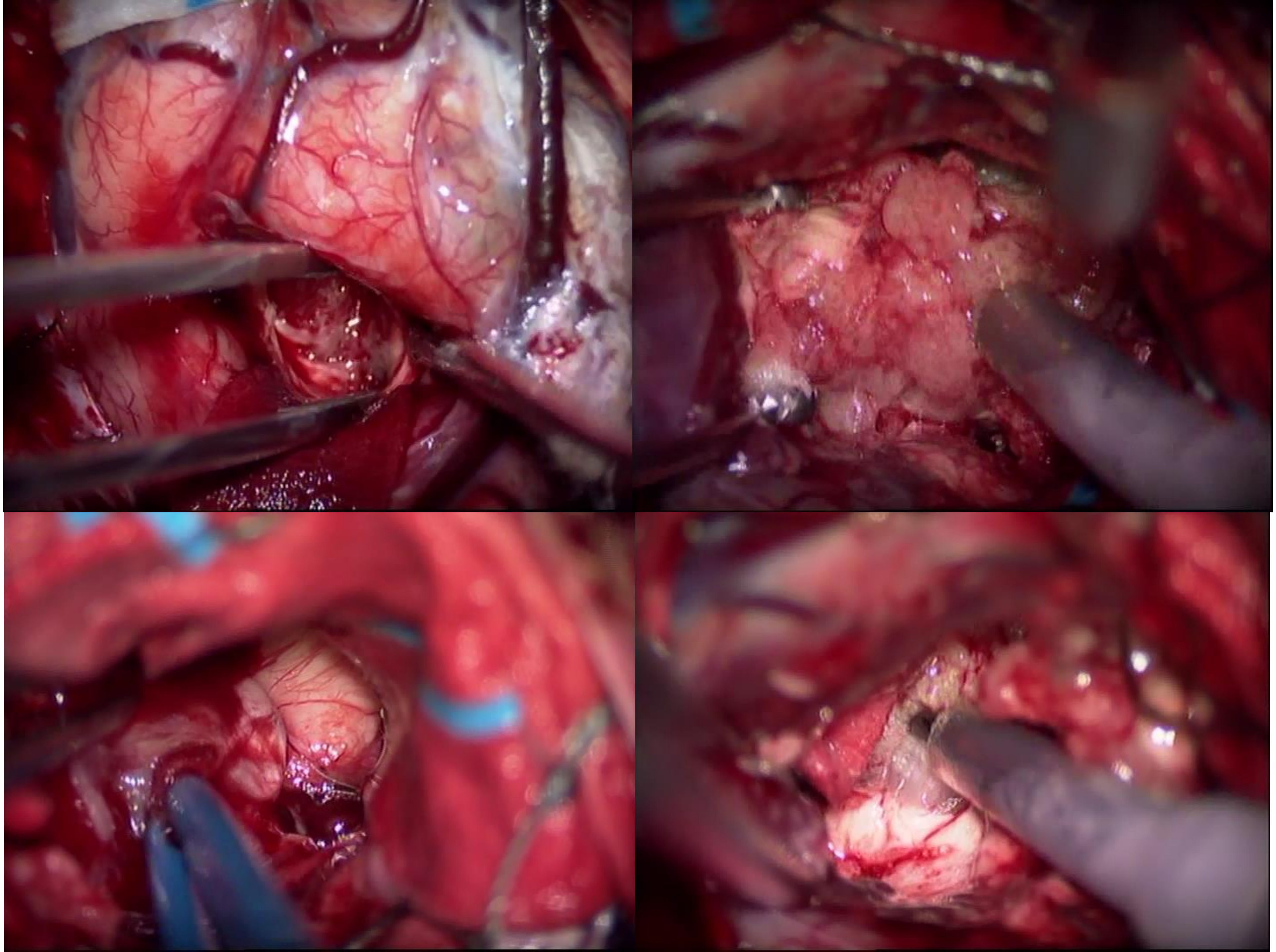


OLIGOASTROCITOMA (WHO grade II), 4 years f.u, no seizures

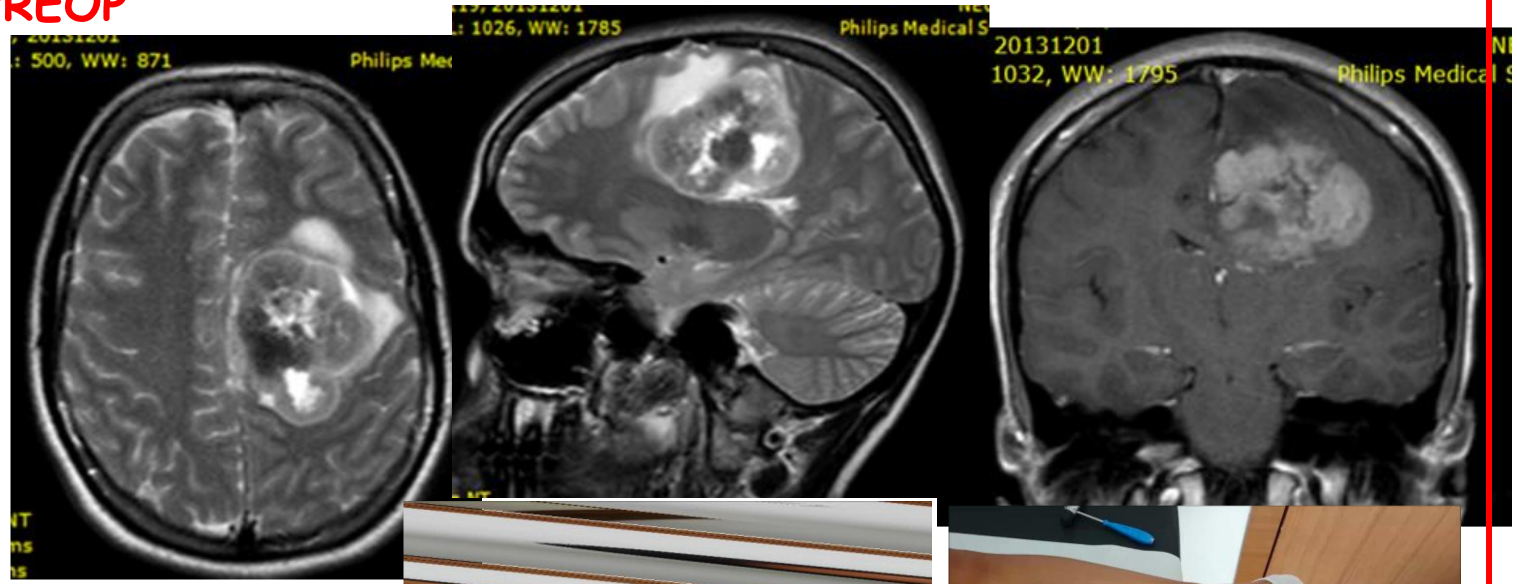
S.D.P. 18 y.o.,F Right hemiparesis and focal motor seizures

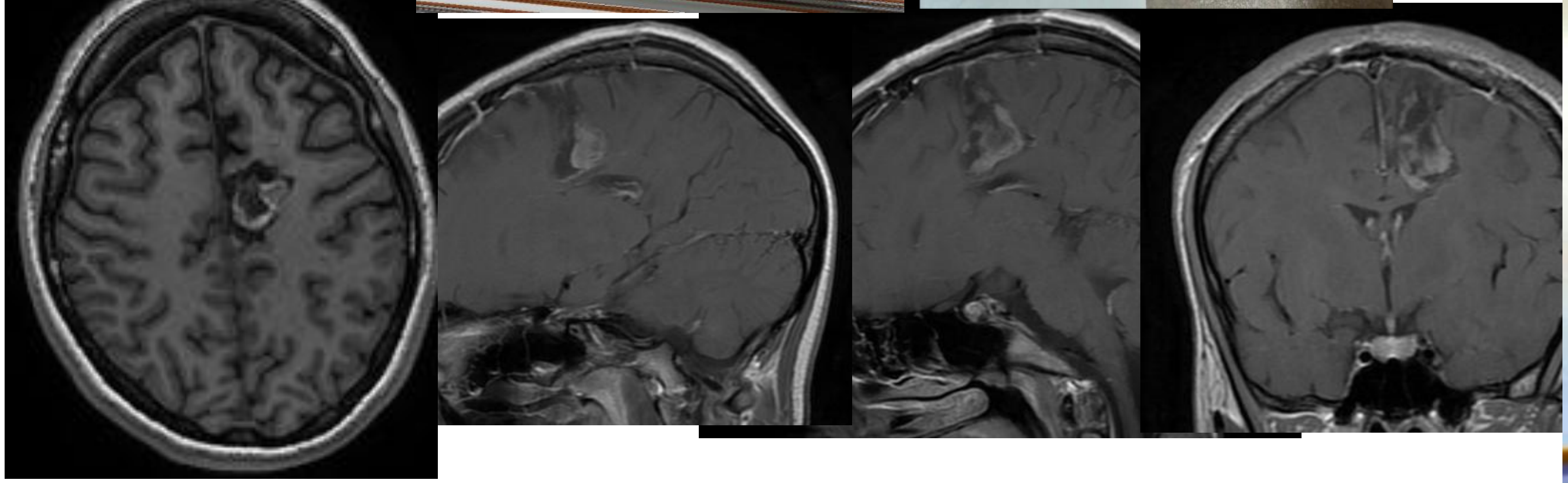
PREOP



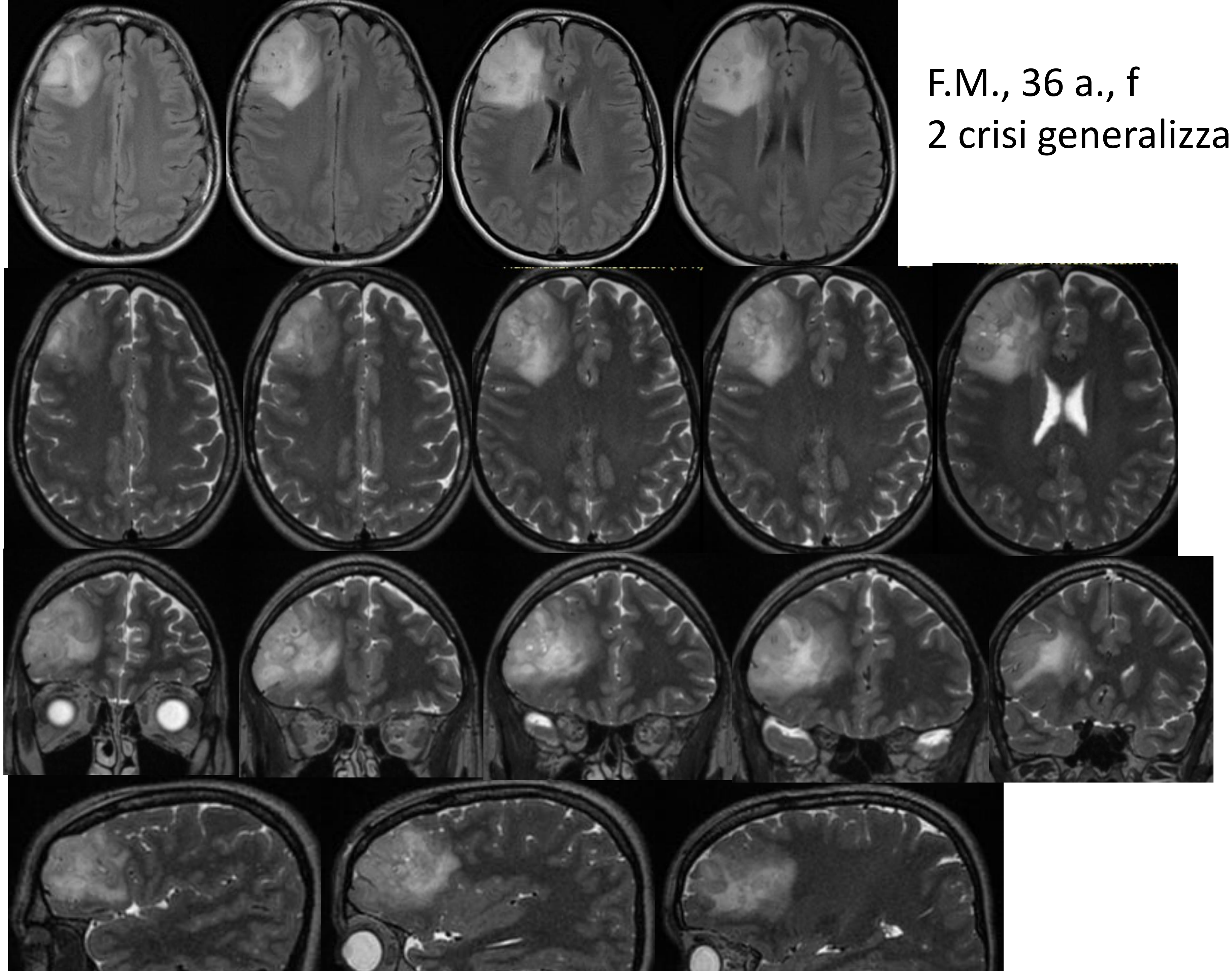


PREOP

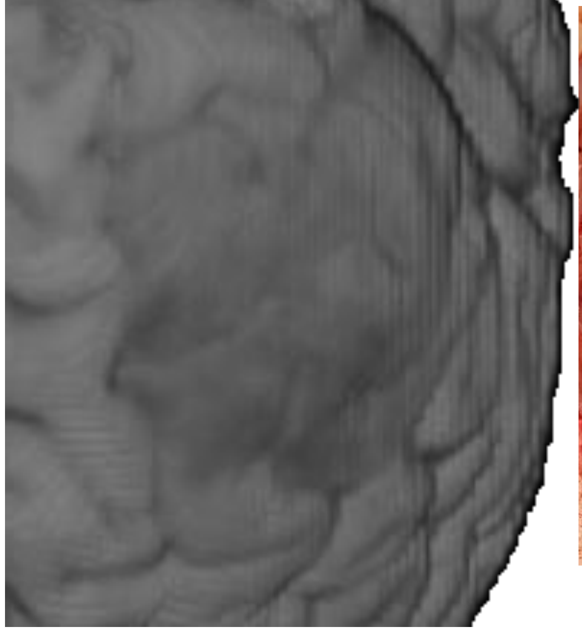


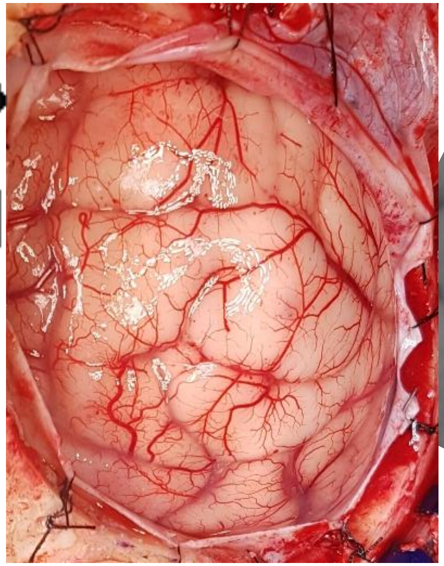


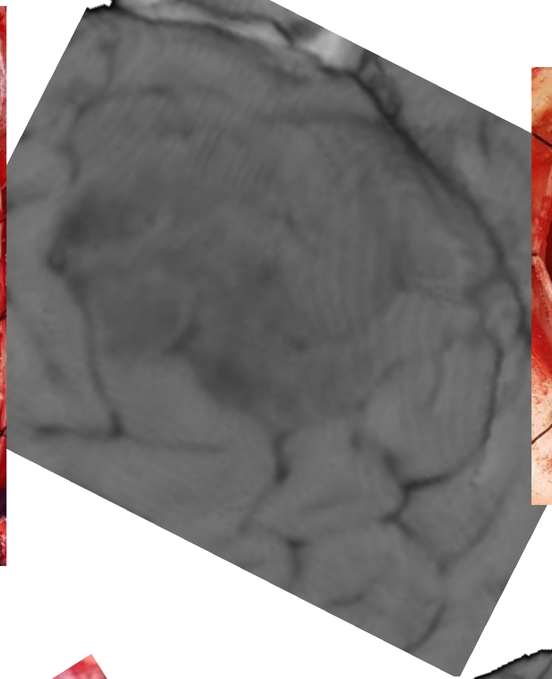
Histology: Astroblastoma, 4 years f.u., no seizures

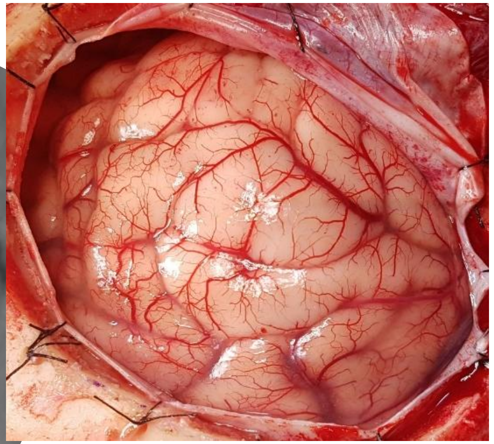


F.M., 36 a., f
2 crisi generalizzate

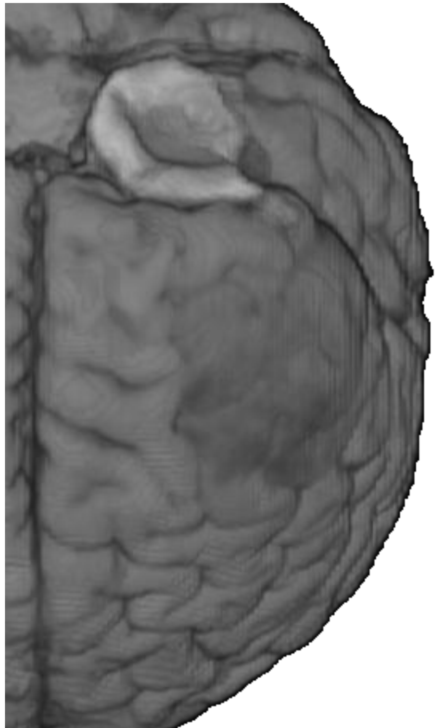


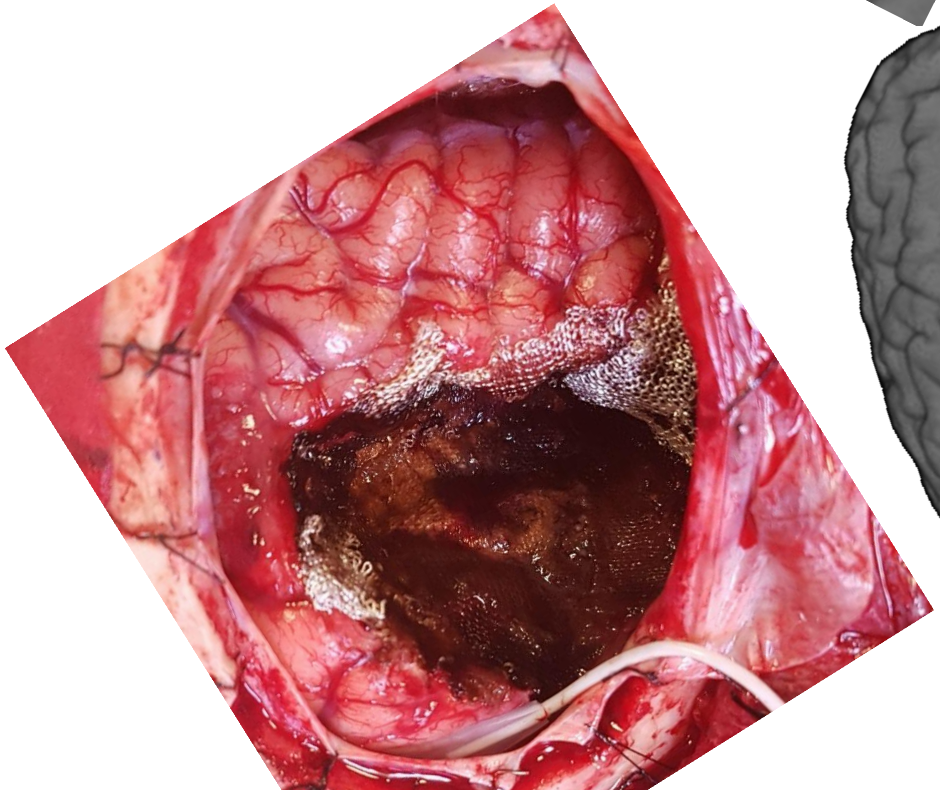


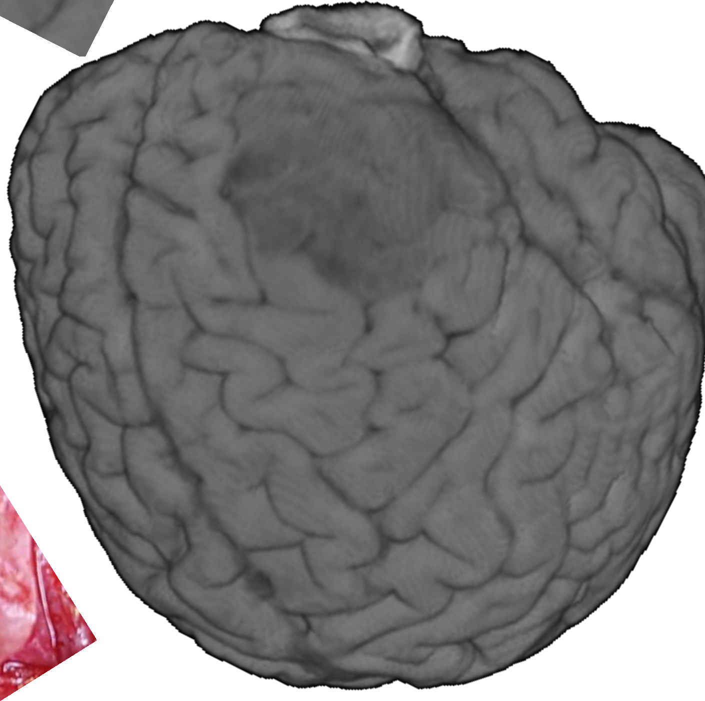


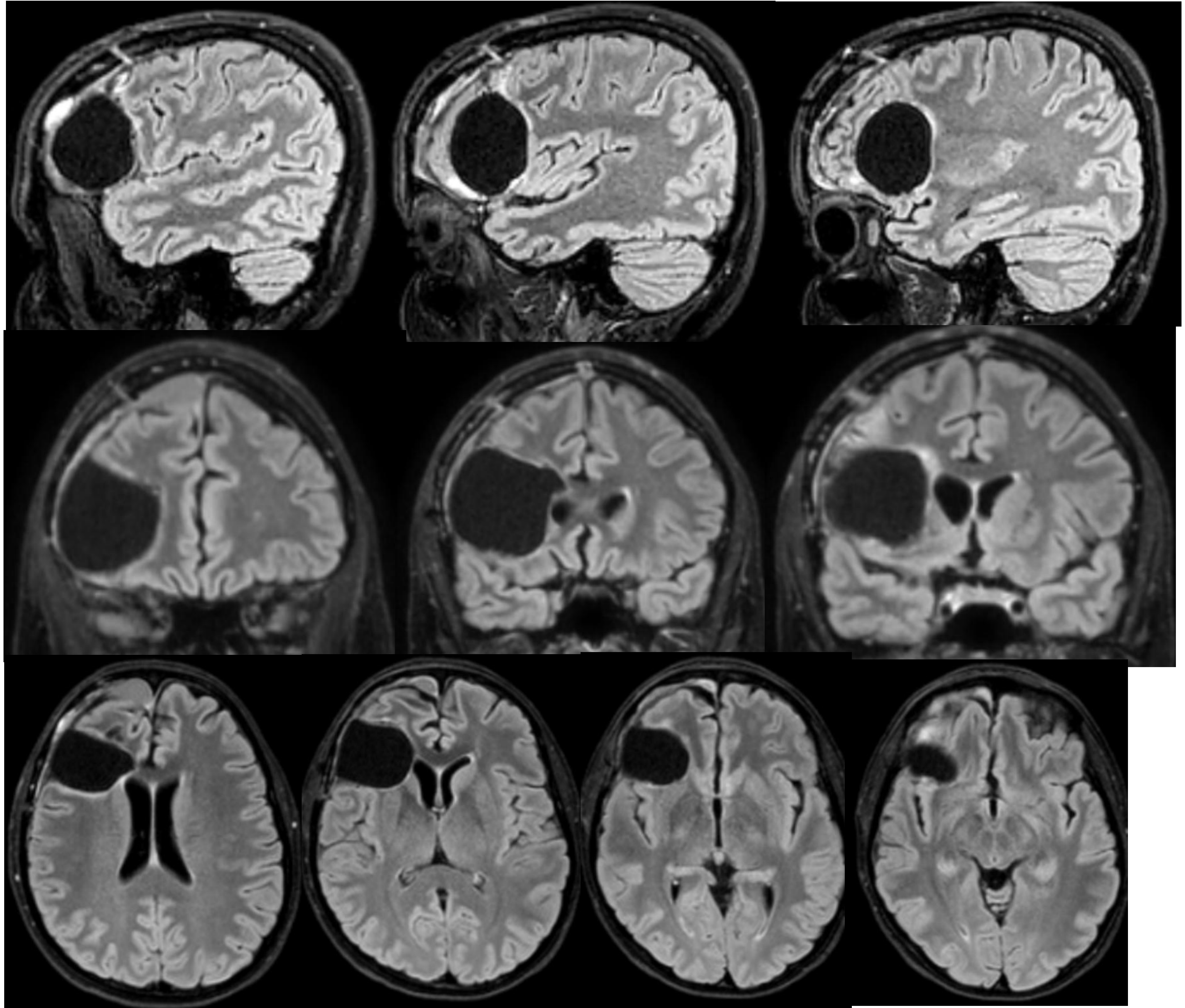


RMN 3D
Tecnica
subpiale



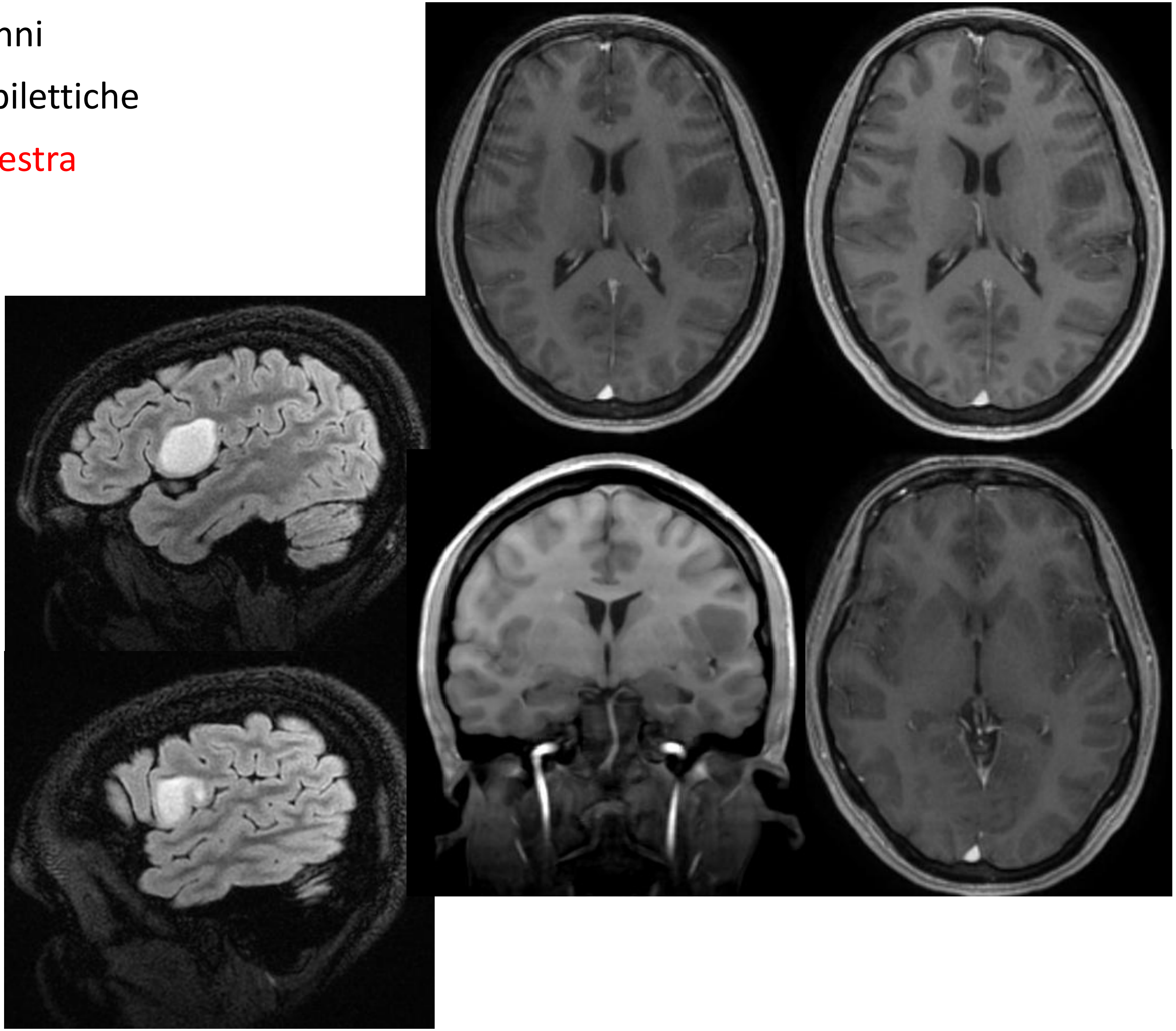


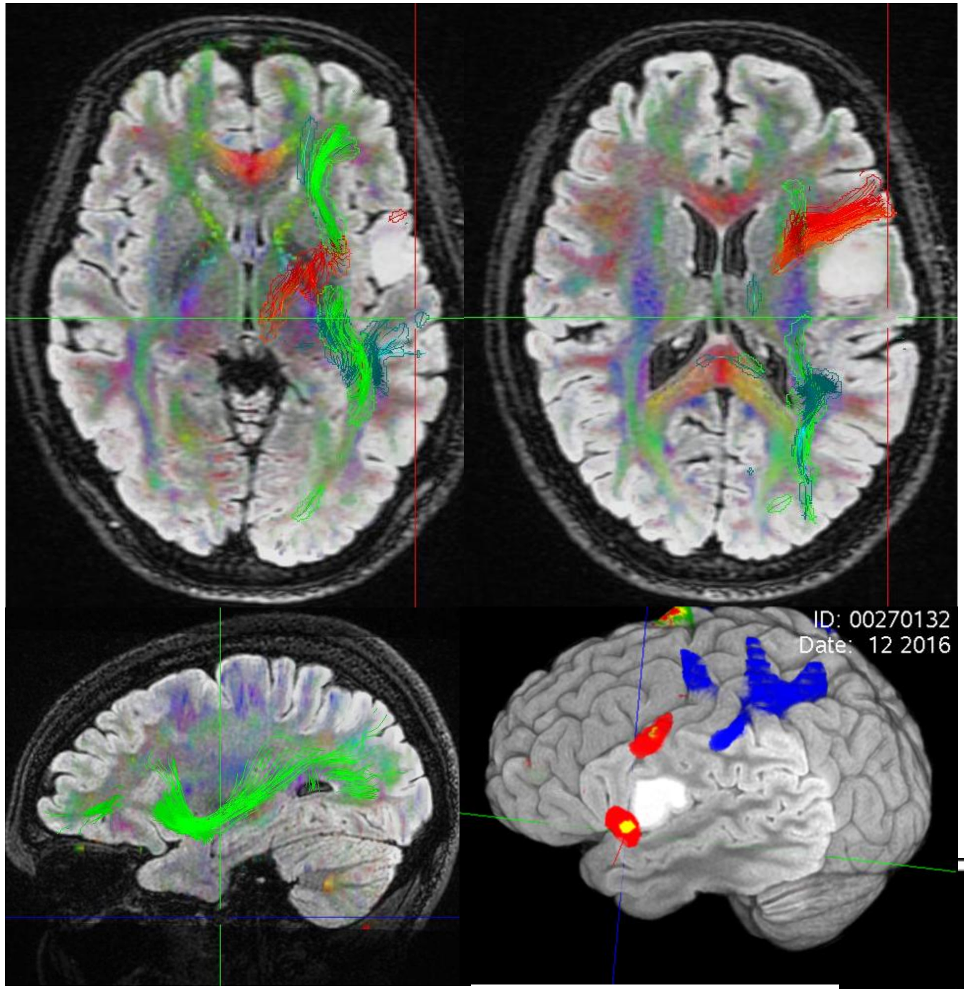


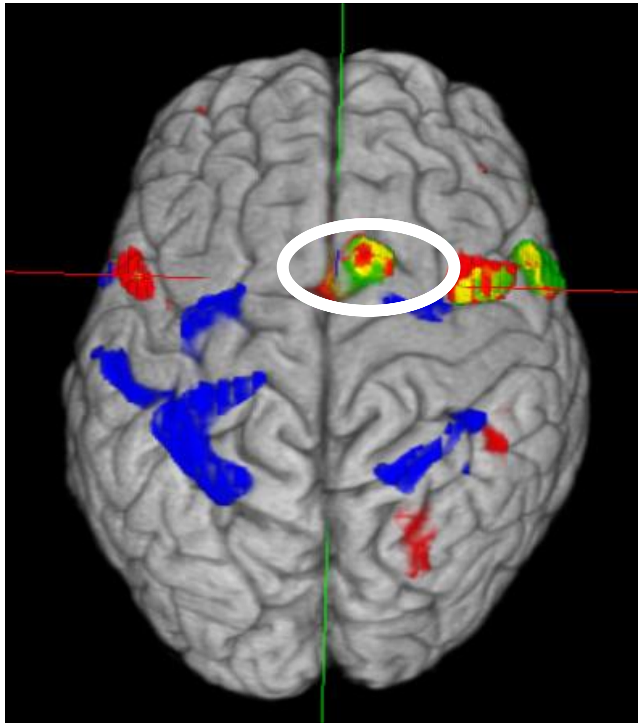


Oligodendroglioma,
WHO Grade II
NO seizures

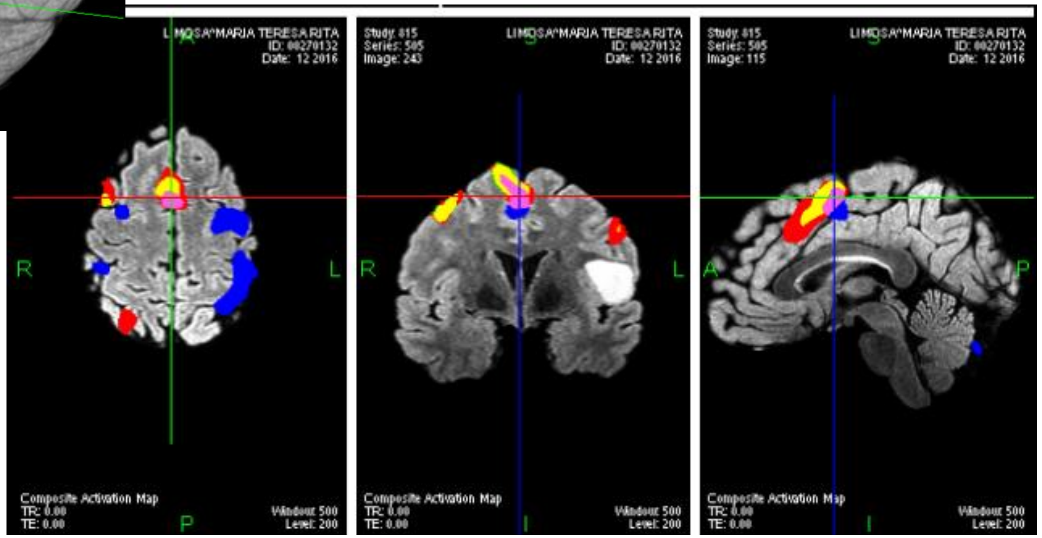
- F, 28 anni
- Crisi epilettiche
- Ambidestra







L'fMRI evidenzia una chiara dominanza emisferica destra.

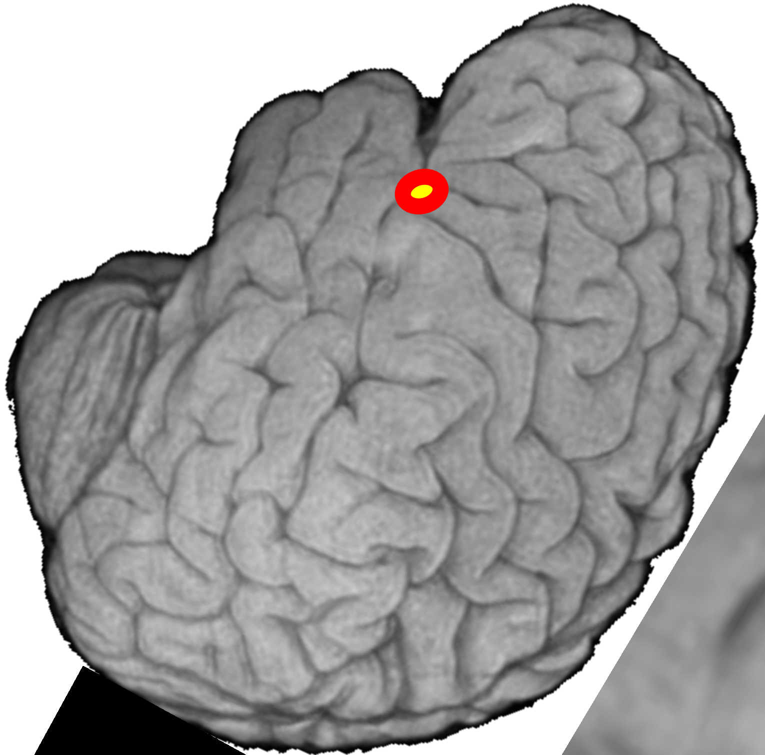


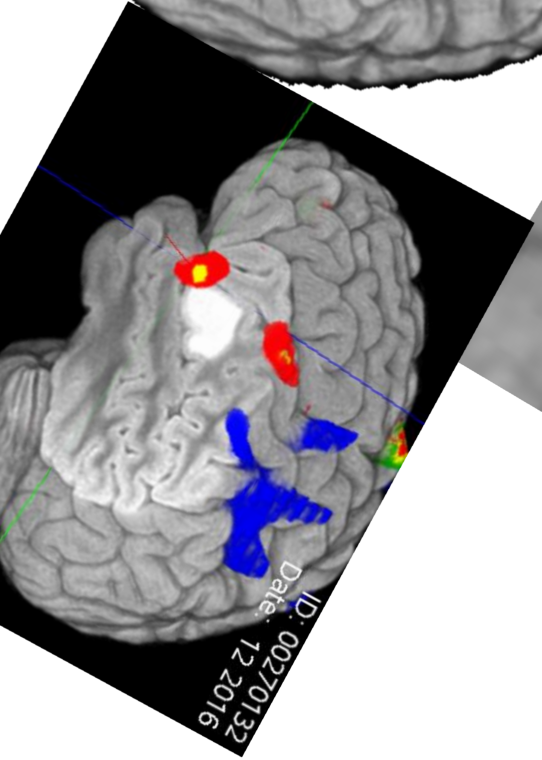
1) Finger tapping
2) Fluenza Semantica
3) Fluenza Fonemica

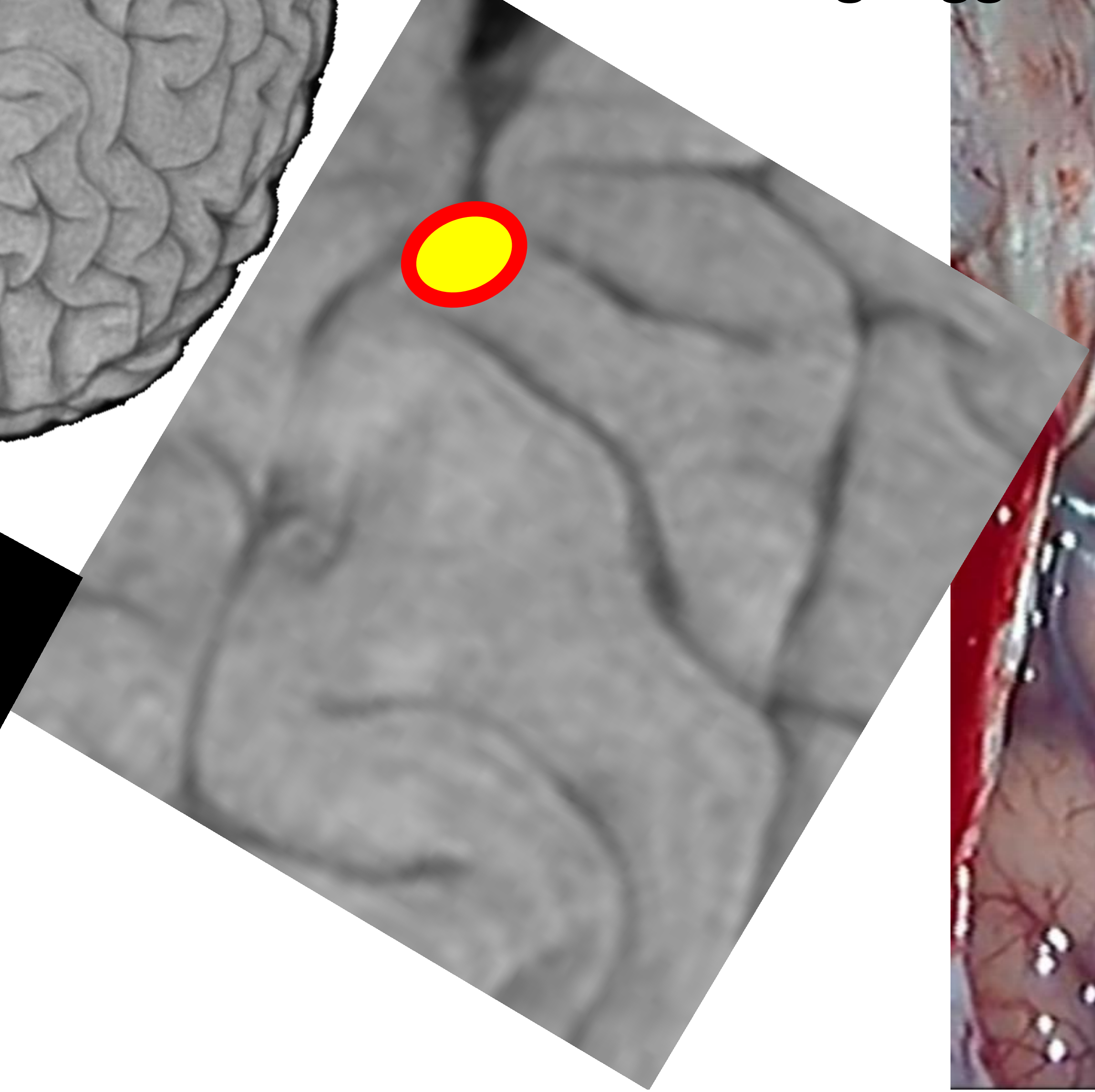
Finger tapping + Fluenza semantica

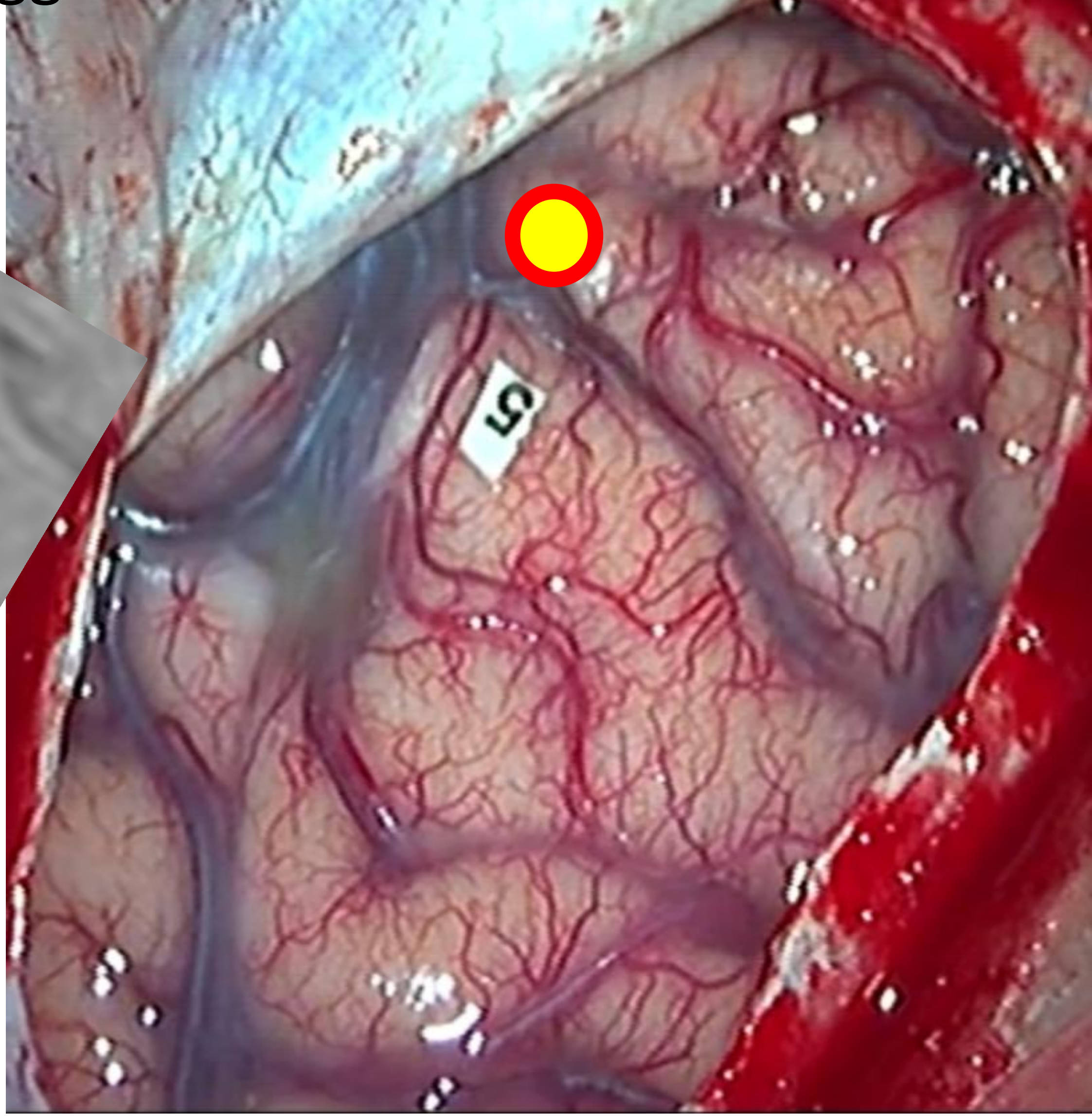
Finger tapping + Fluenza semantica + fluenza fonemica

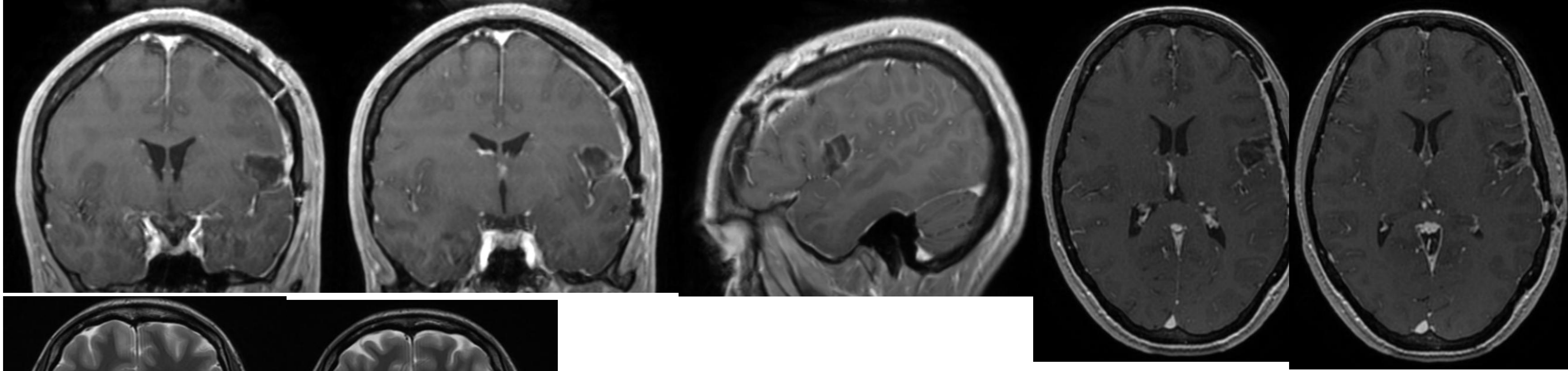
- **Awake surgery**
- **RMN 3D – Tecnica subpiale**
- Test del linguaggio

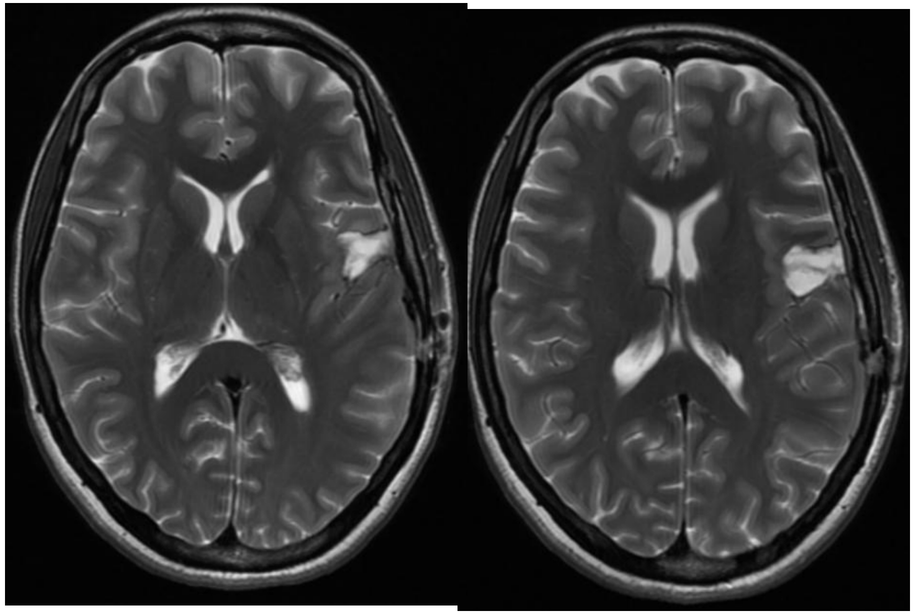








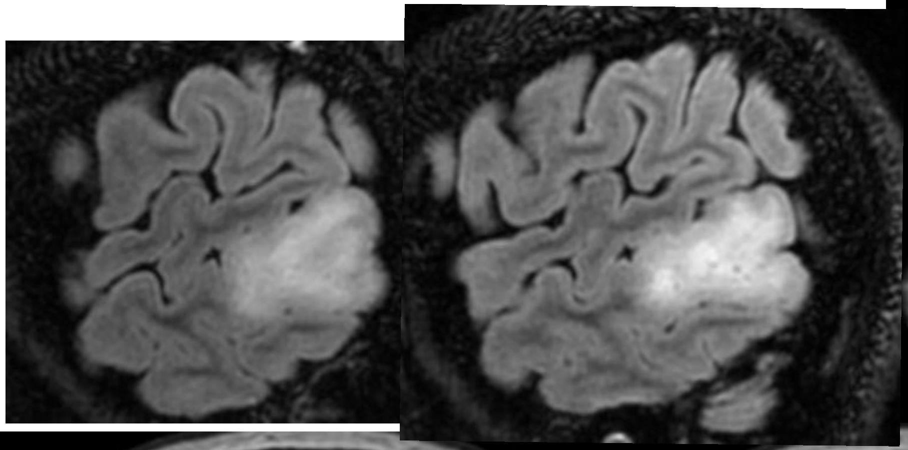


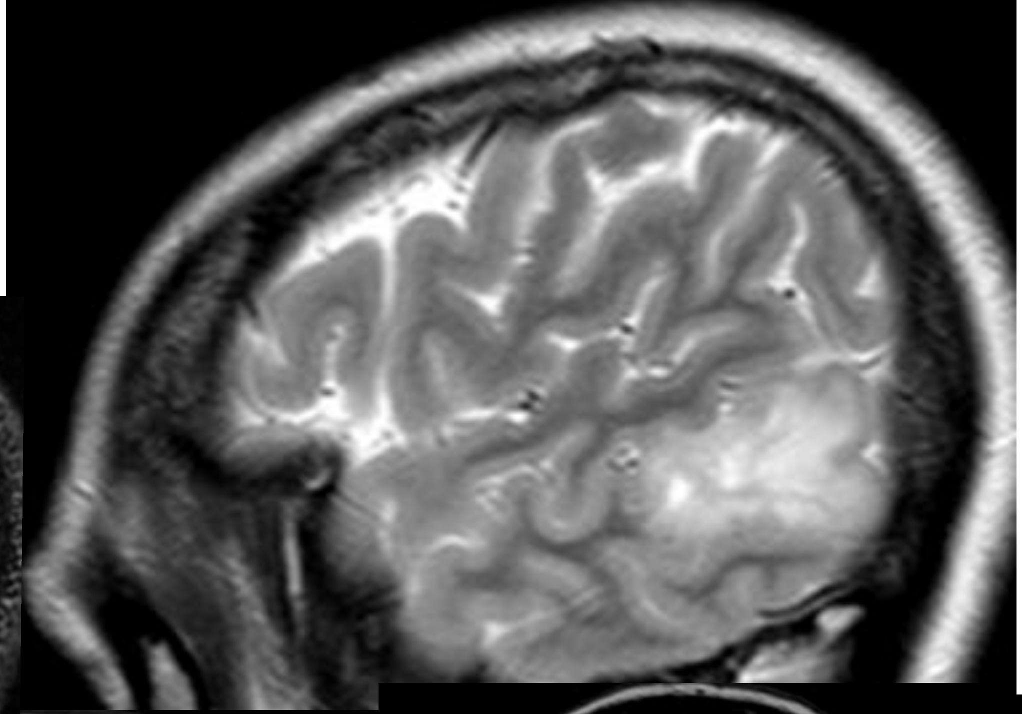


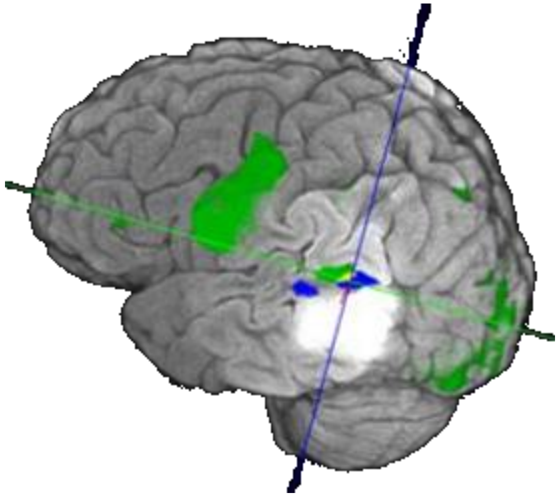
Astrocitoma diffuso grado II WHO

Non crisi

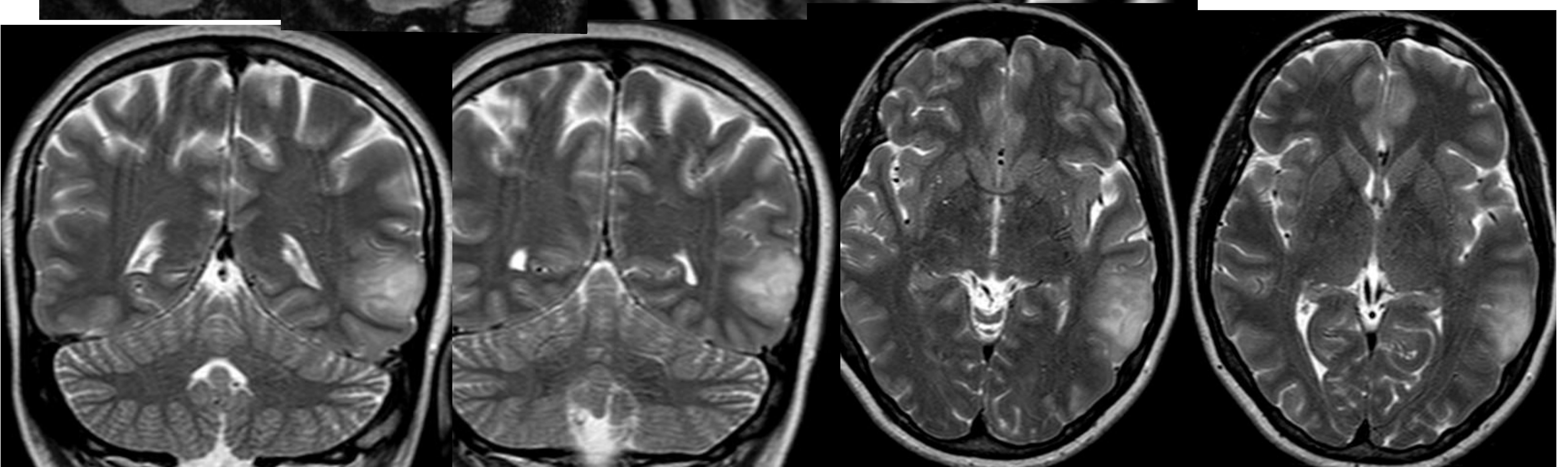
- F, 43 anni
- Crisi epilettiche

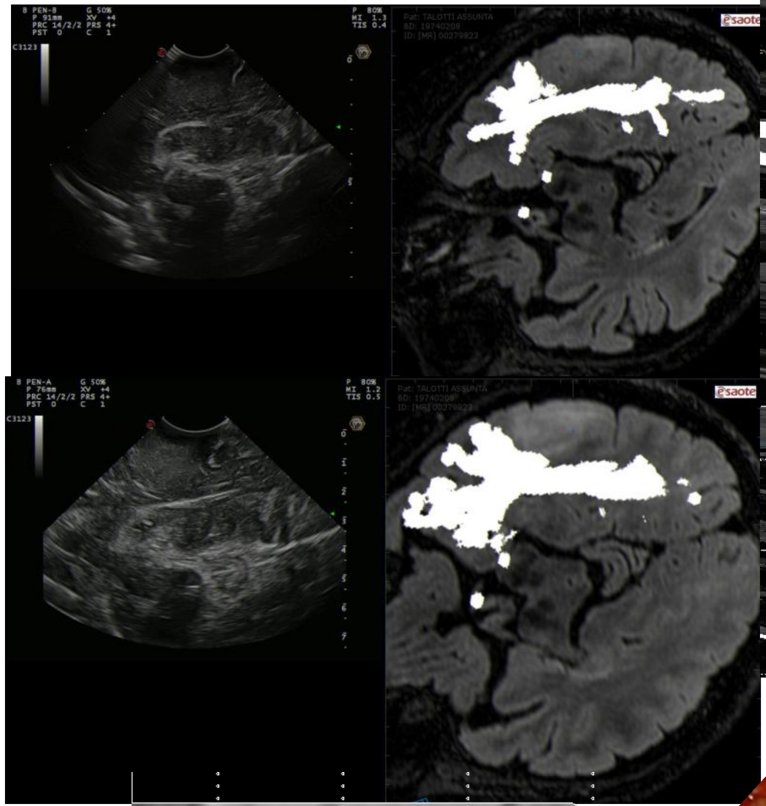


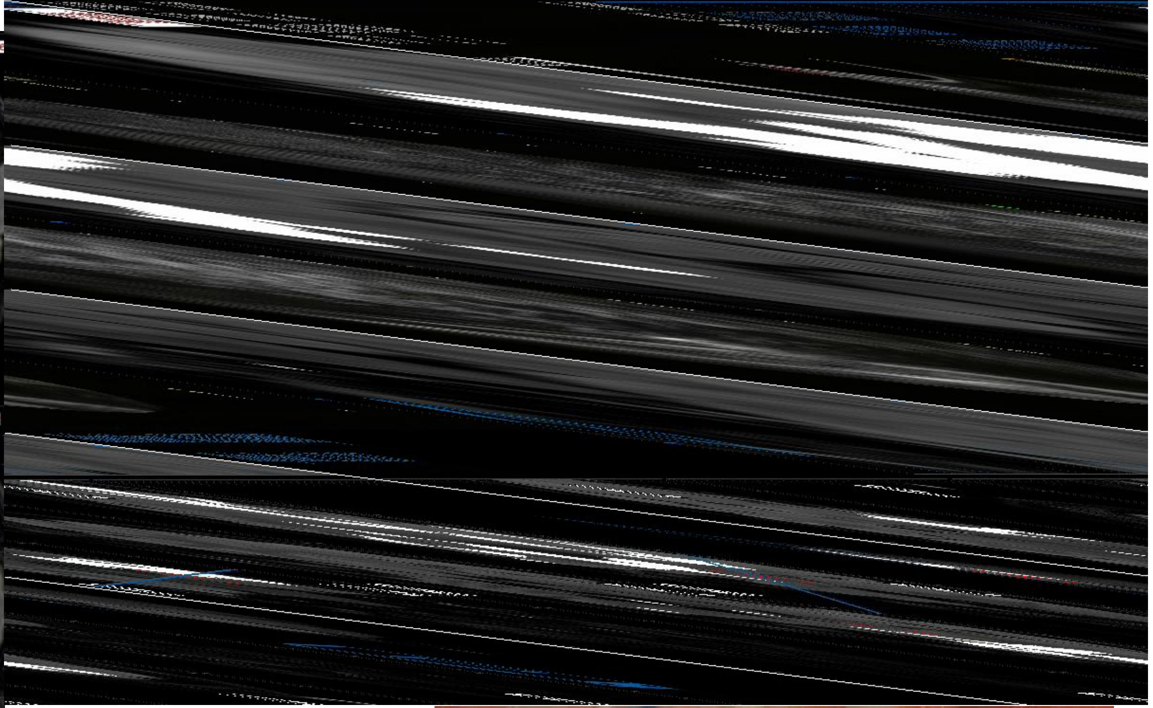




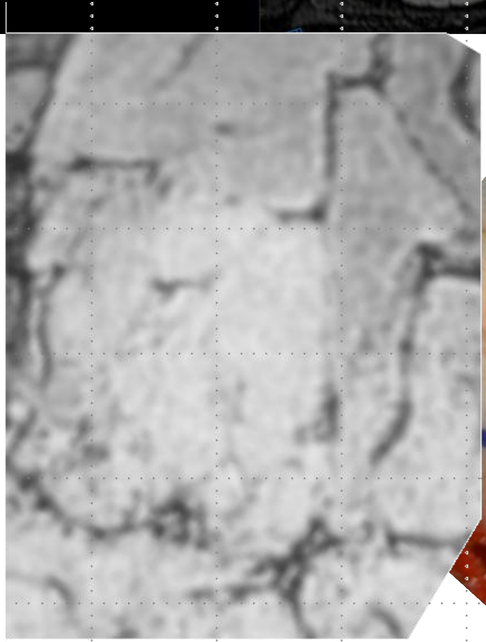
RMN funzionale

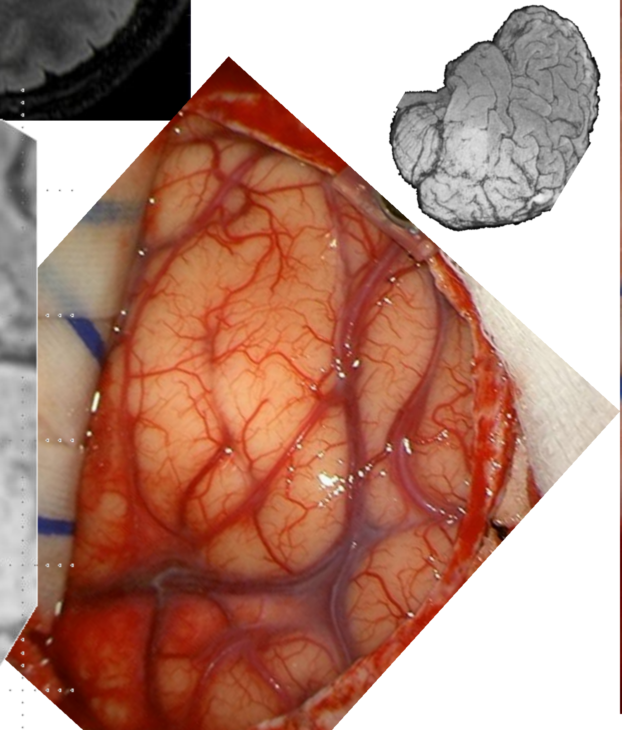


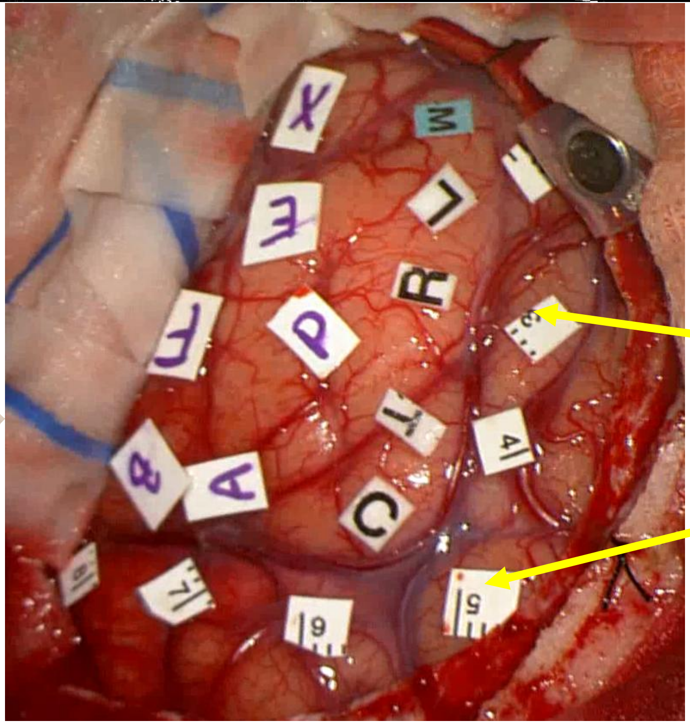




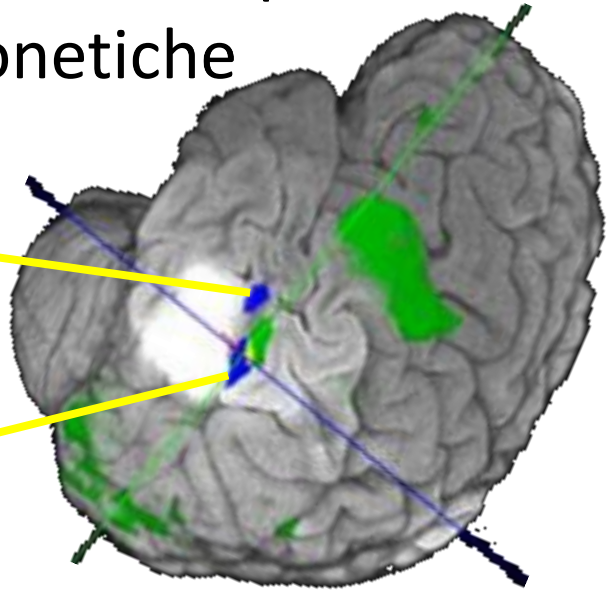
Awake surgery

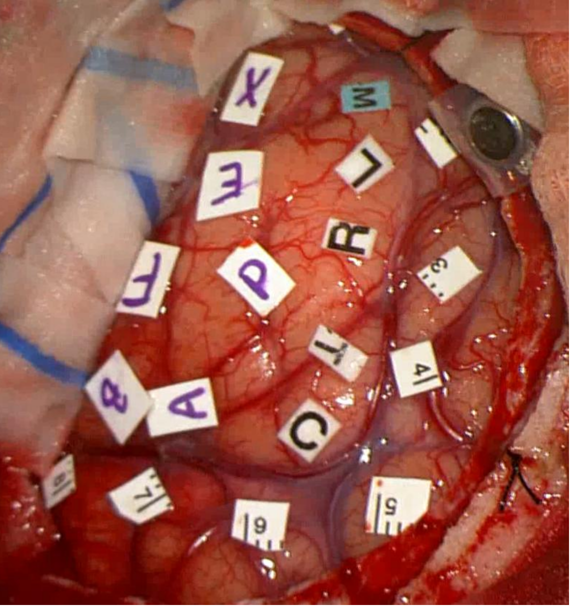


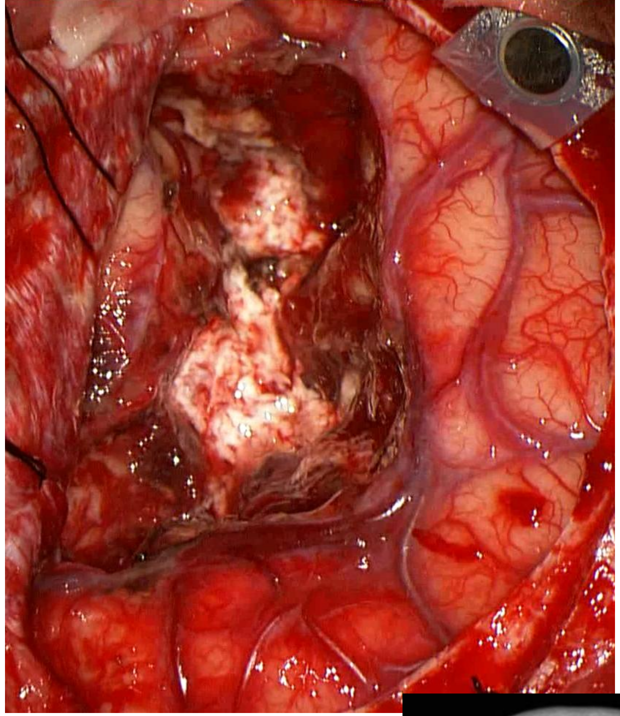




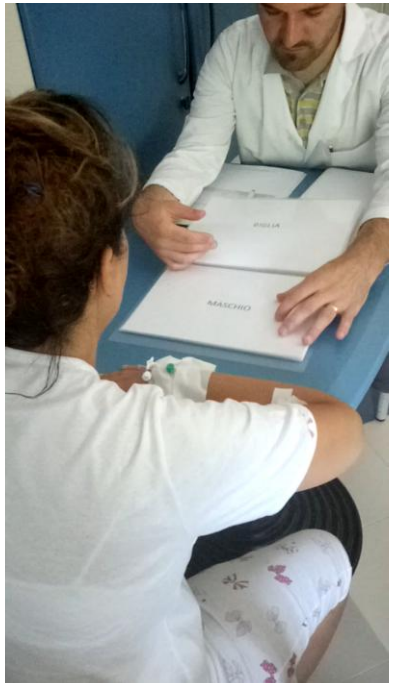
Anomie e parafasie fonetiche

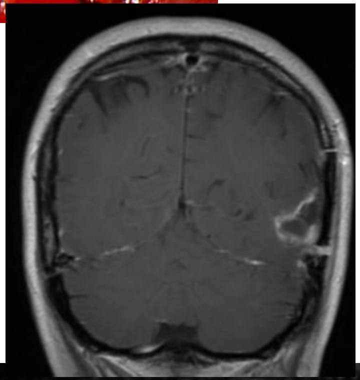




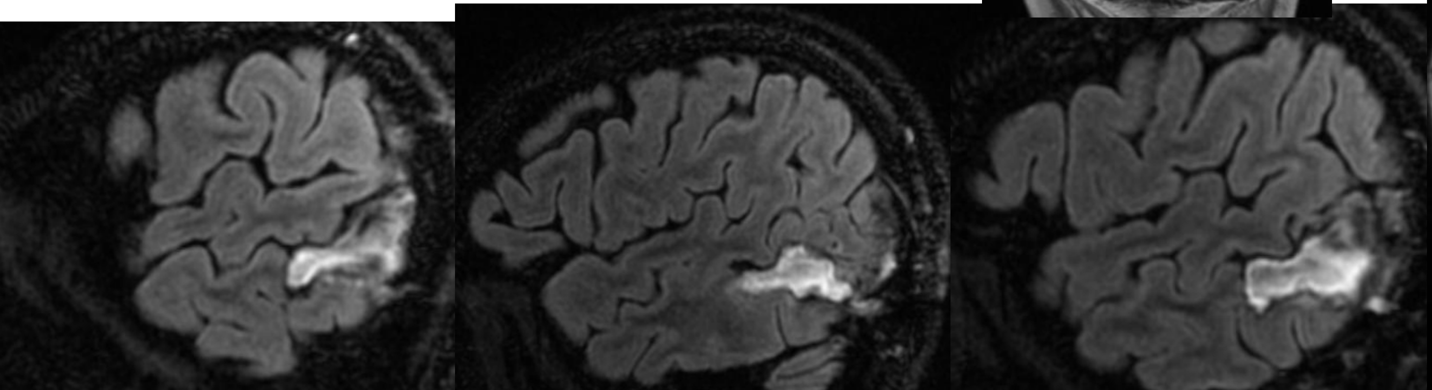


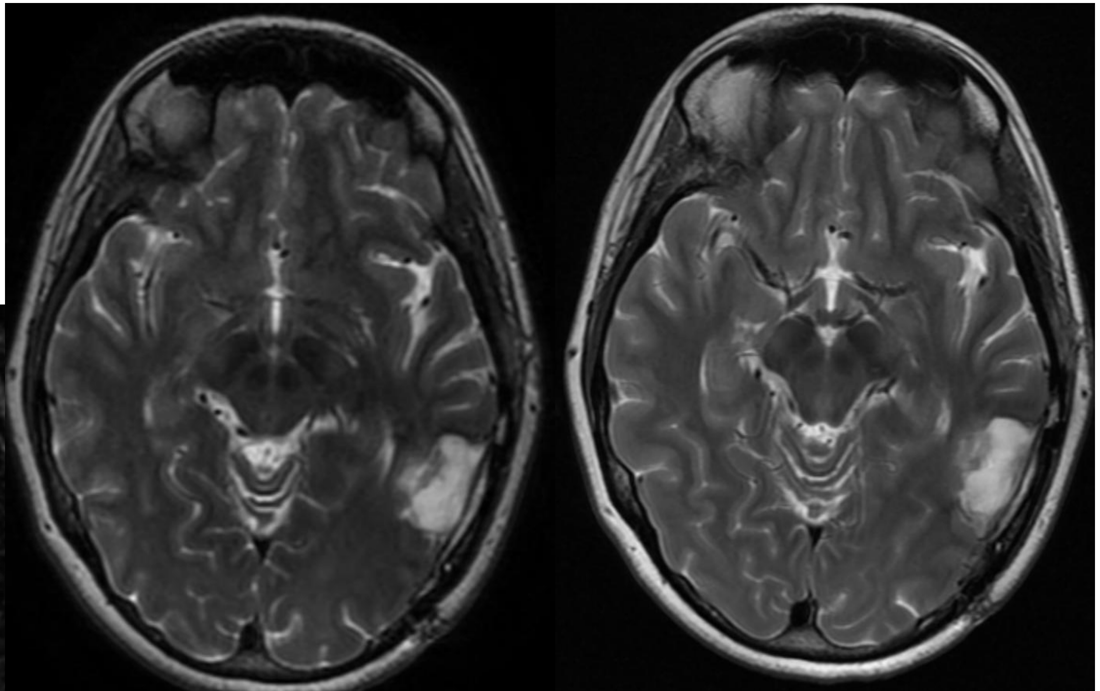
Oligodendroglioma
II grado WHO
Non crisi

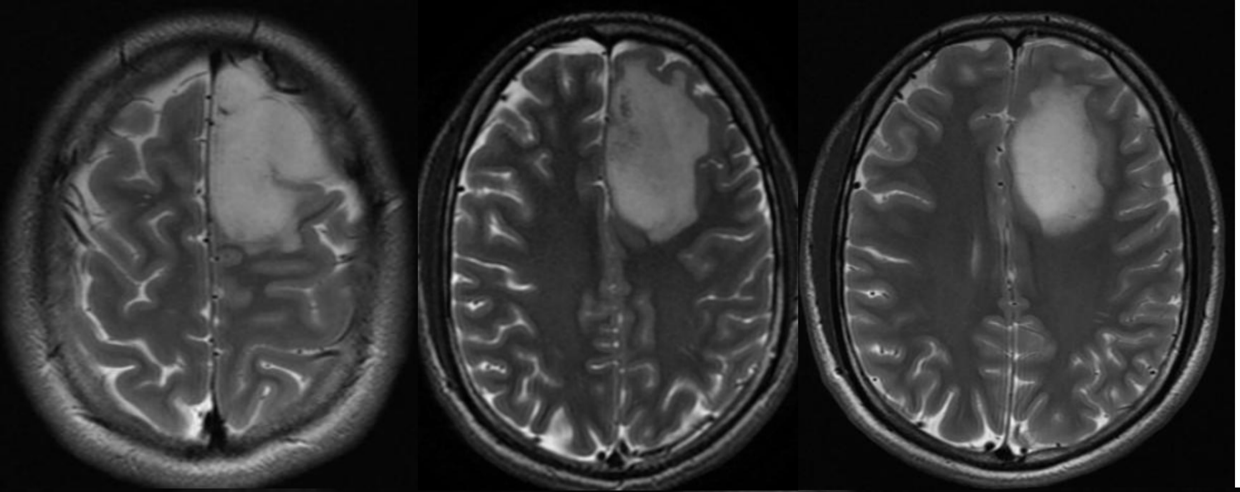


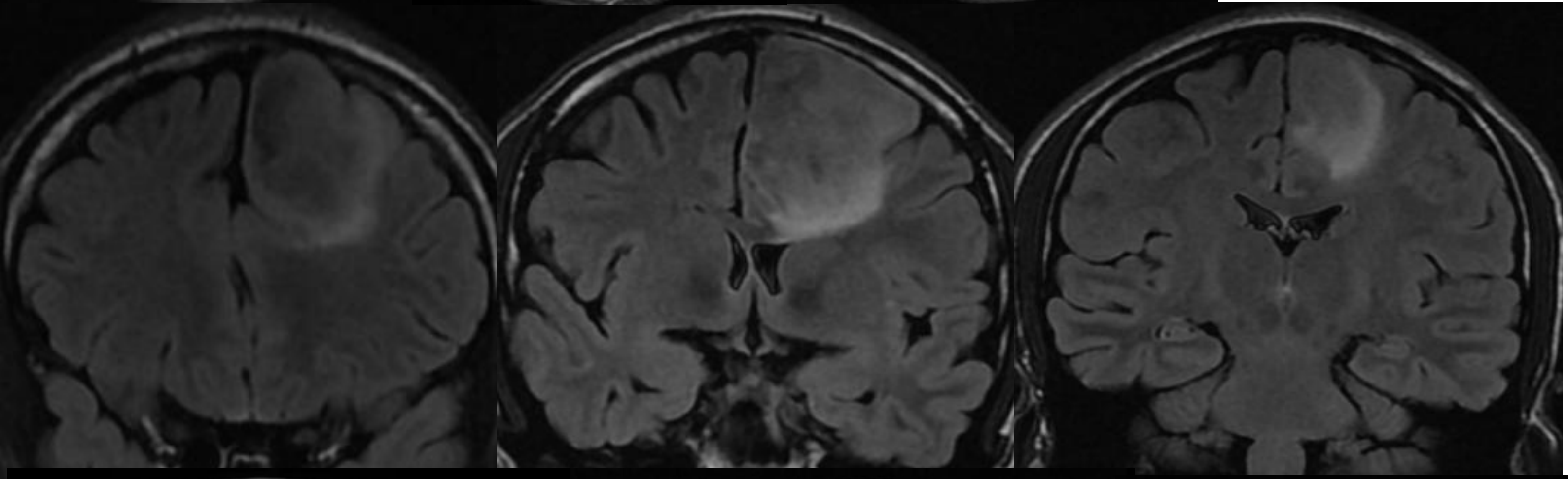


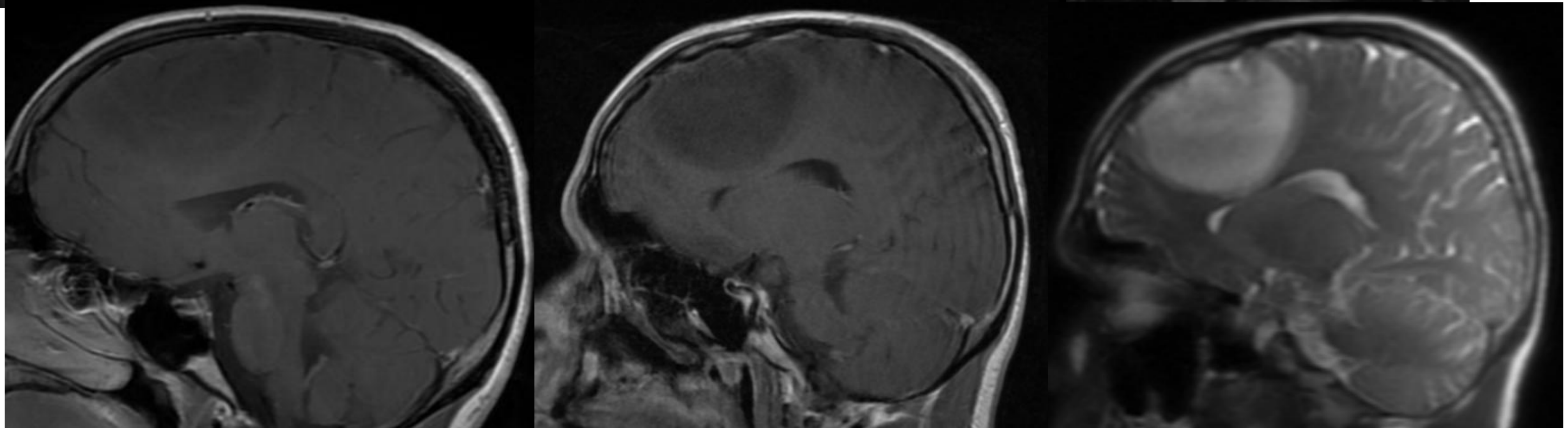
POST-OPERATORIO









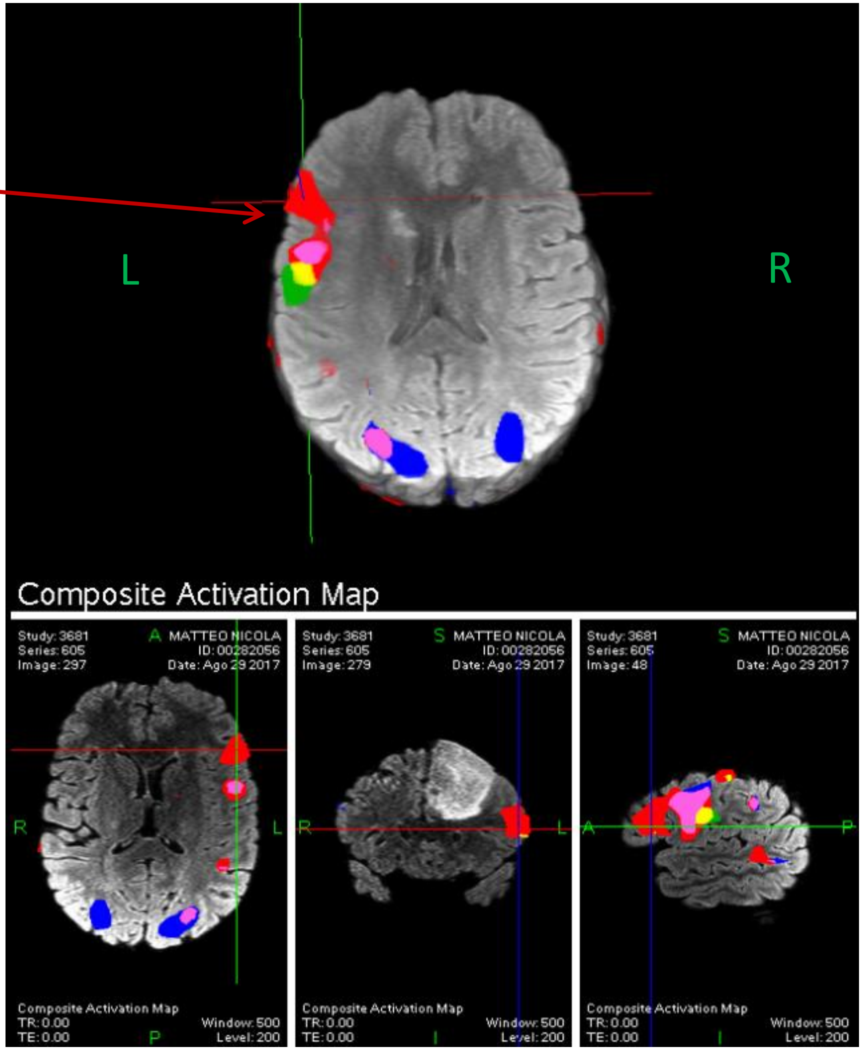


- M, 20 anni
- Crisi epilettiche generalizzate
- Non deficit neurologici
- Mancino

Awake surgery?

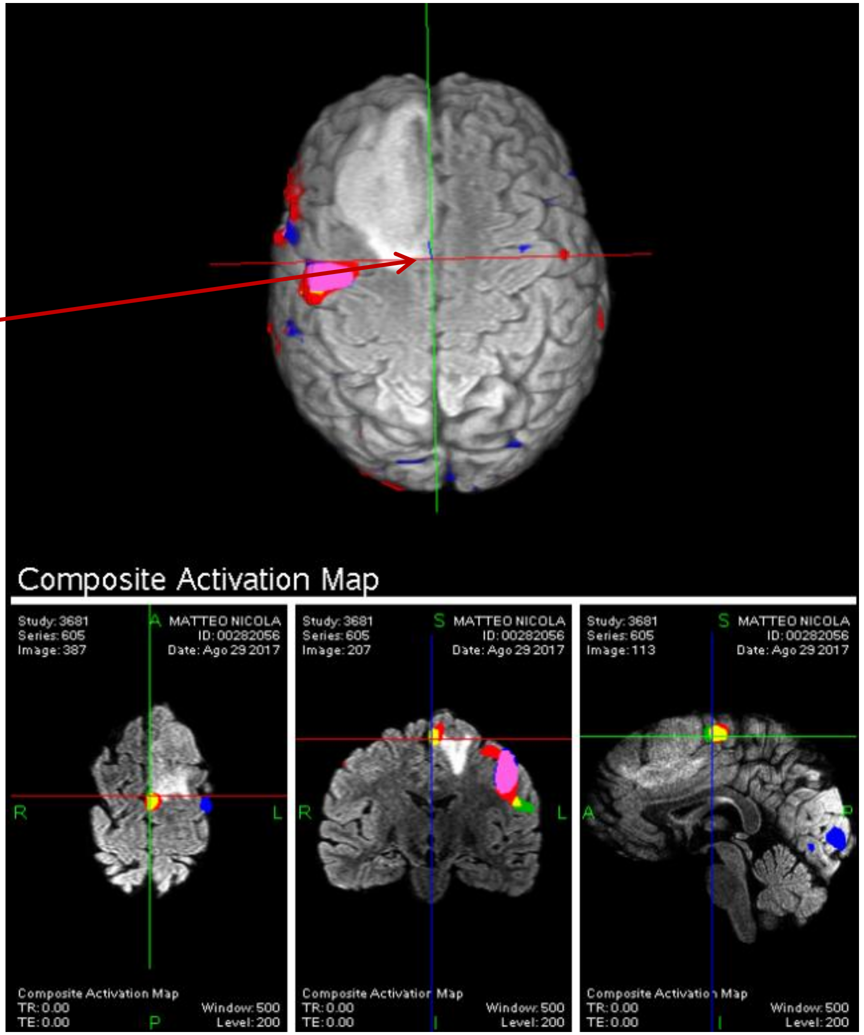
Mapping funzionale del linguaggio: paziente mancino

Dominanza emisferica sinistra



Mapping funzionale del linguaggio:
individuazione delle aree critiche

Area critica (pre-SMA)



Valutazione neuro-psicologica estesa

Awake surgery?

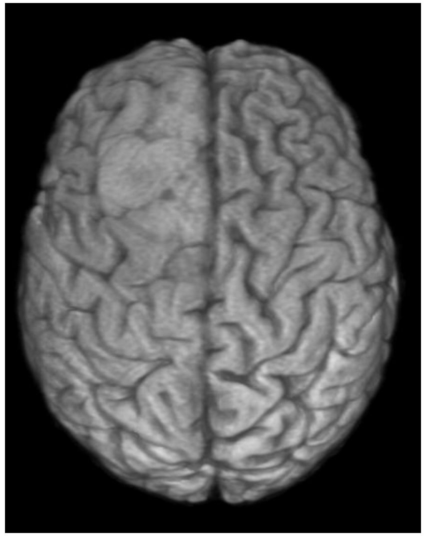
NO

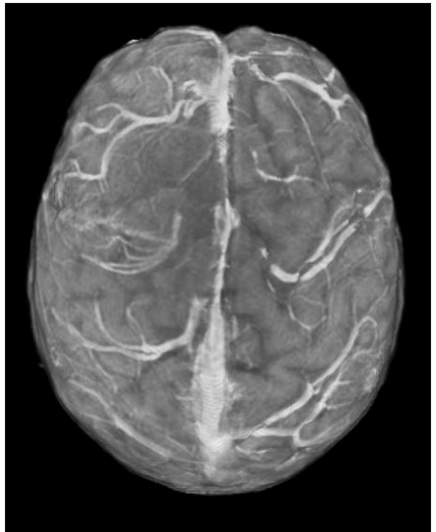

P 87mm XV +3
PRC 14/1/2 PRS 4
PST 0 C 1
3 11
GENERALE LA332E

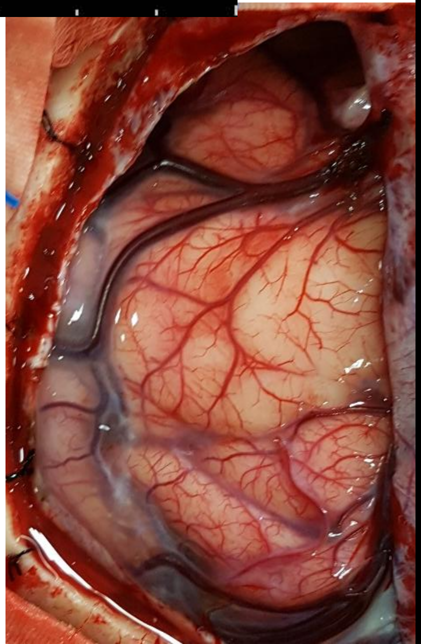
PRE

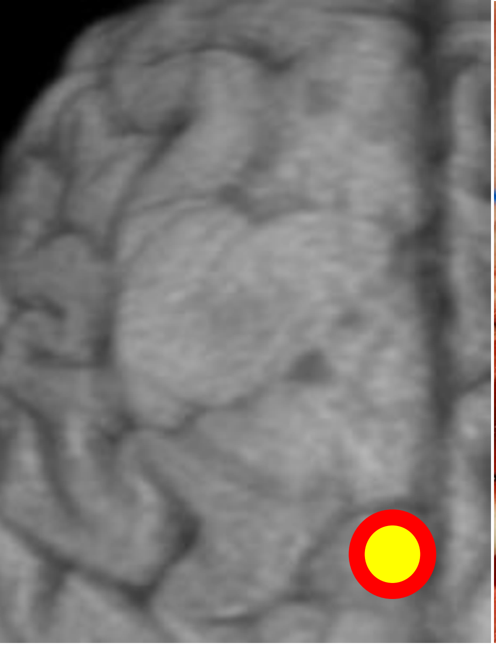
POST

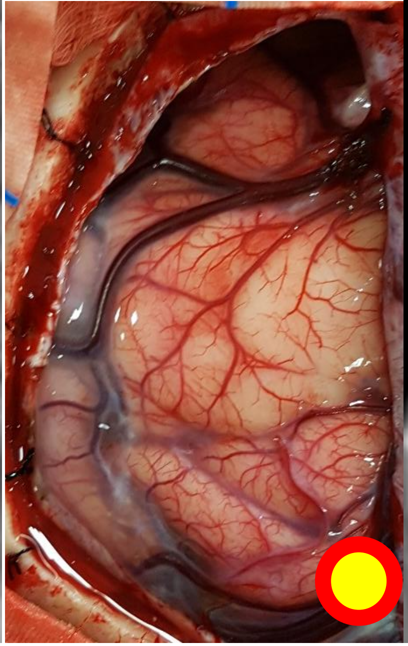

esaote MyLab
NEUROMED
MATTEO, NICOLA, 20 A, ID: 00282056,
02 NOV 2017 15:00
B RIS-B G ---
P 87mm XV +3
PRC 14/1/2 PRS 4
PST 0 C 1
3 11
GENERALE LA332E

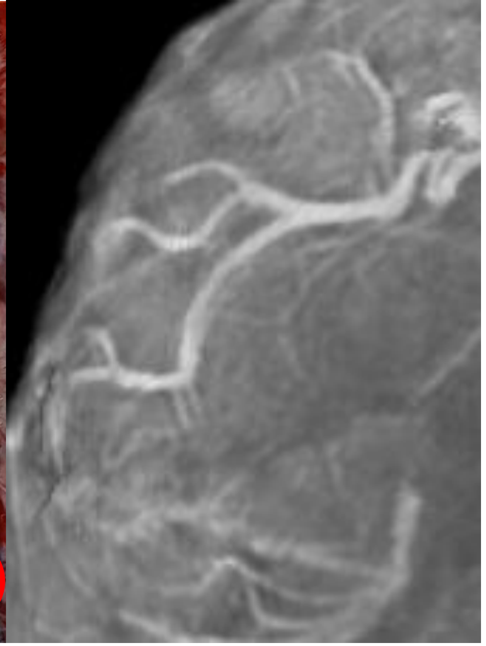




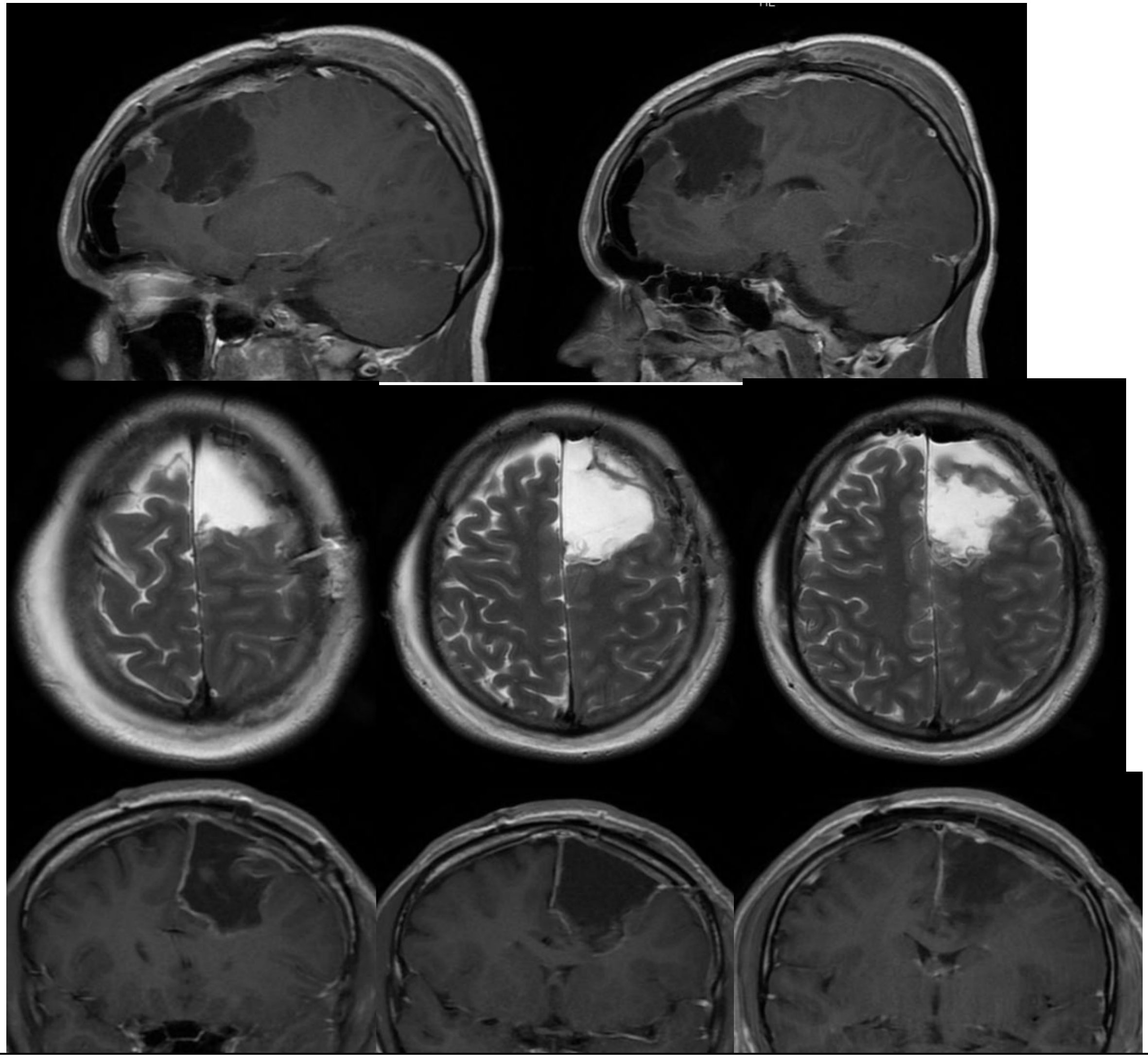




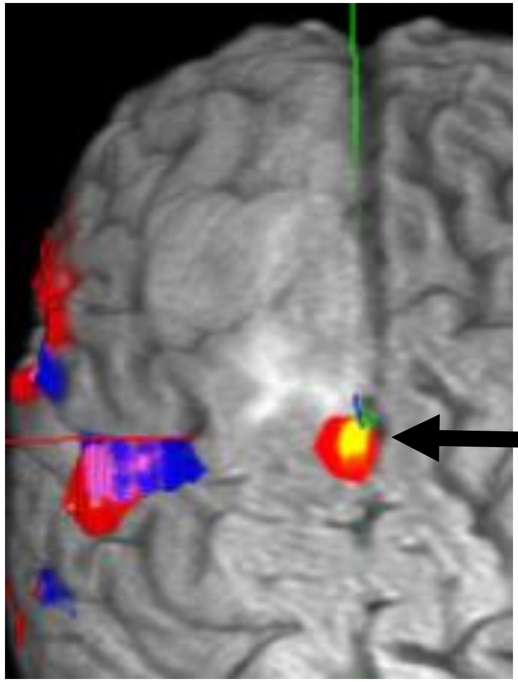




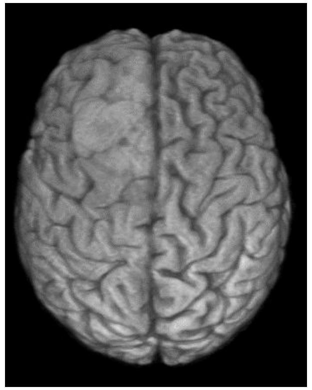
Astrocitoma diffuso II grado WHO
Non crisi

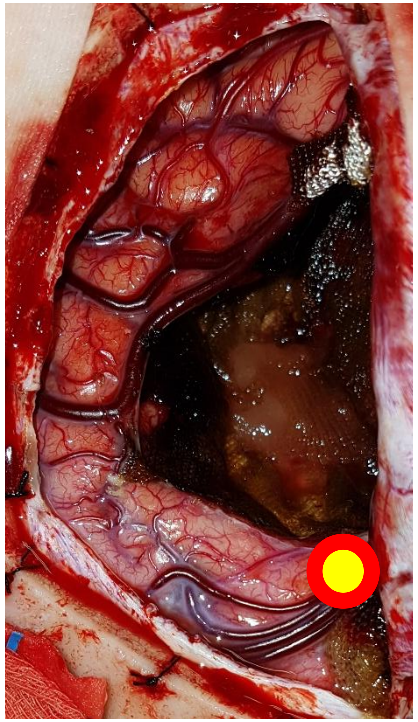


Nessun disturbo del linguaggio

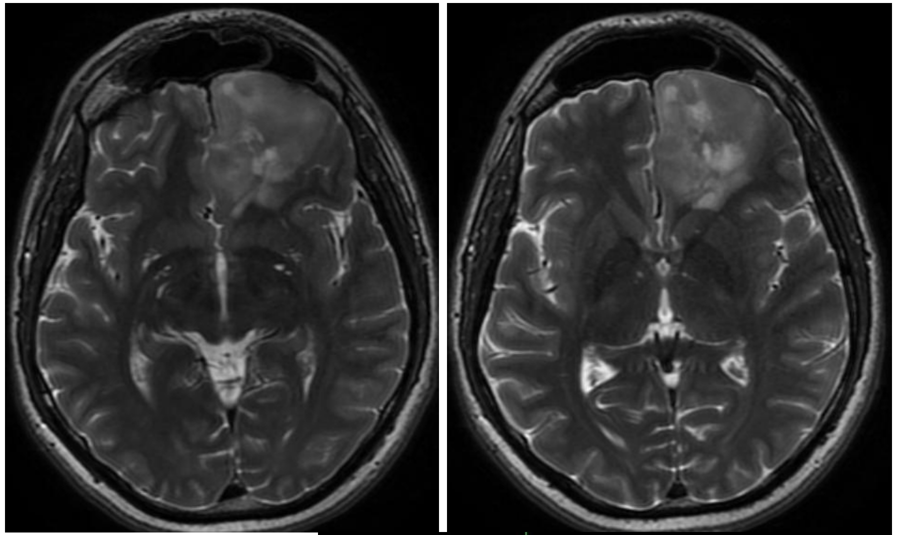


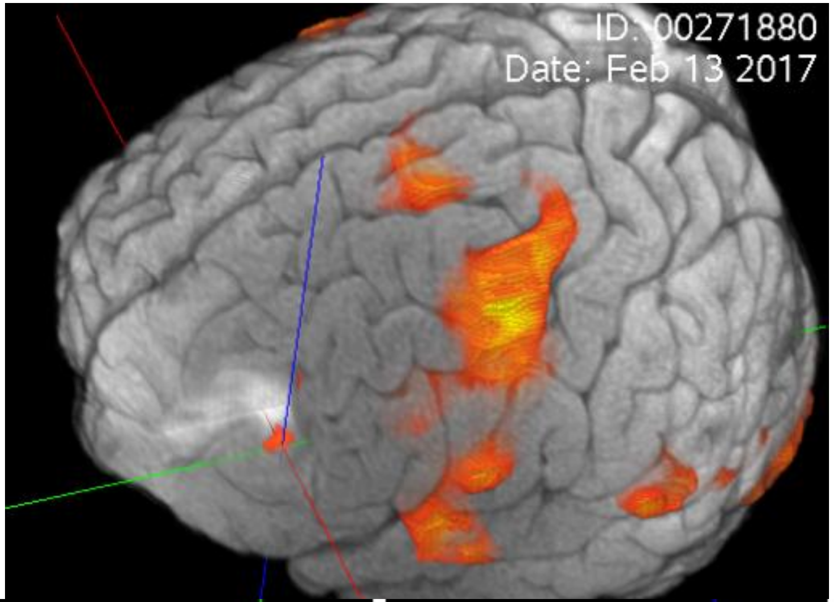
Pre-SMA

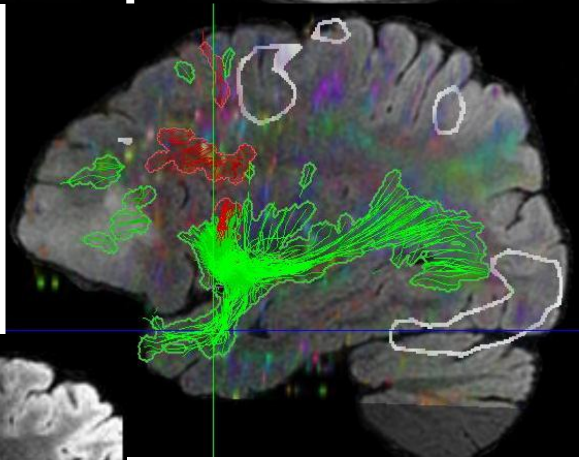


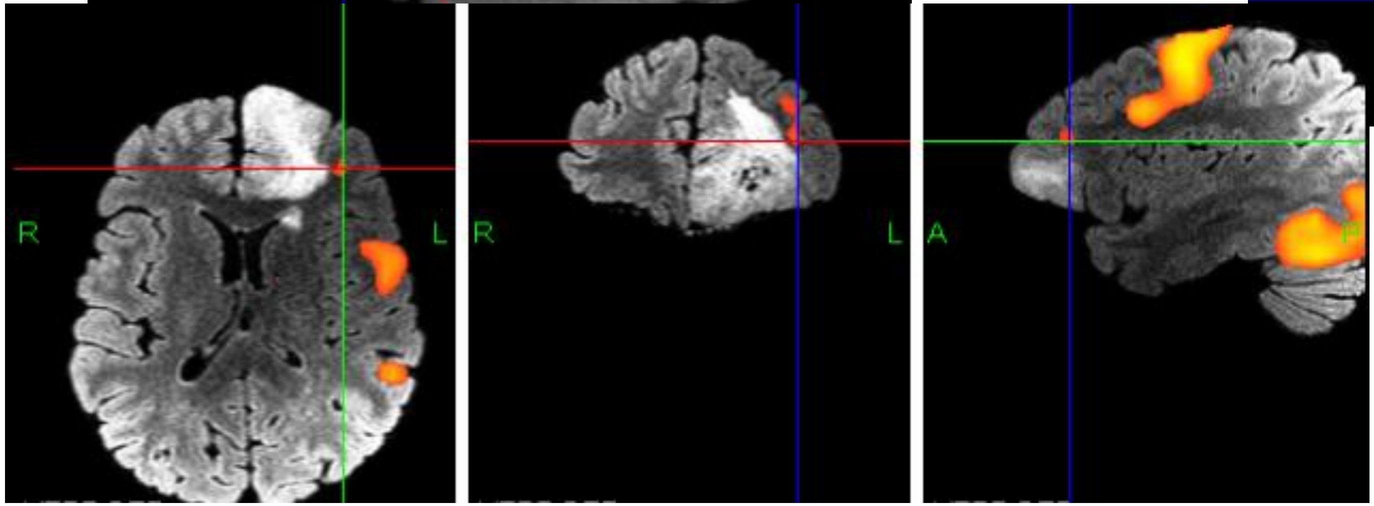


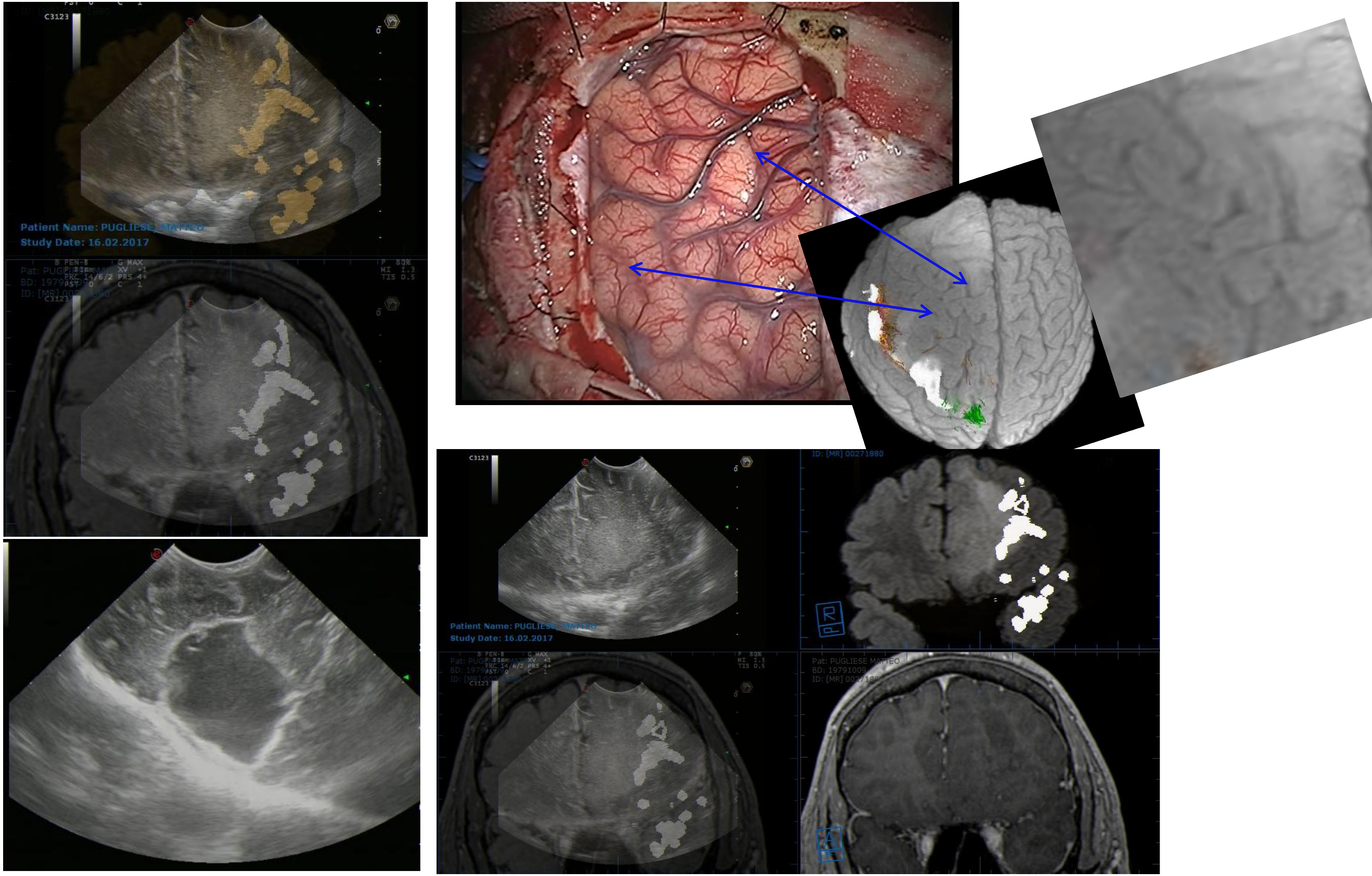
- M, 37 anni
- Esordio con crisi epilettica generalizzata, poi ripetutesi



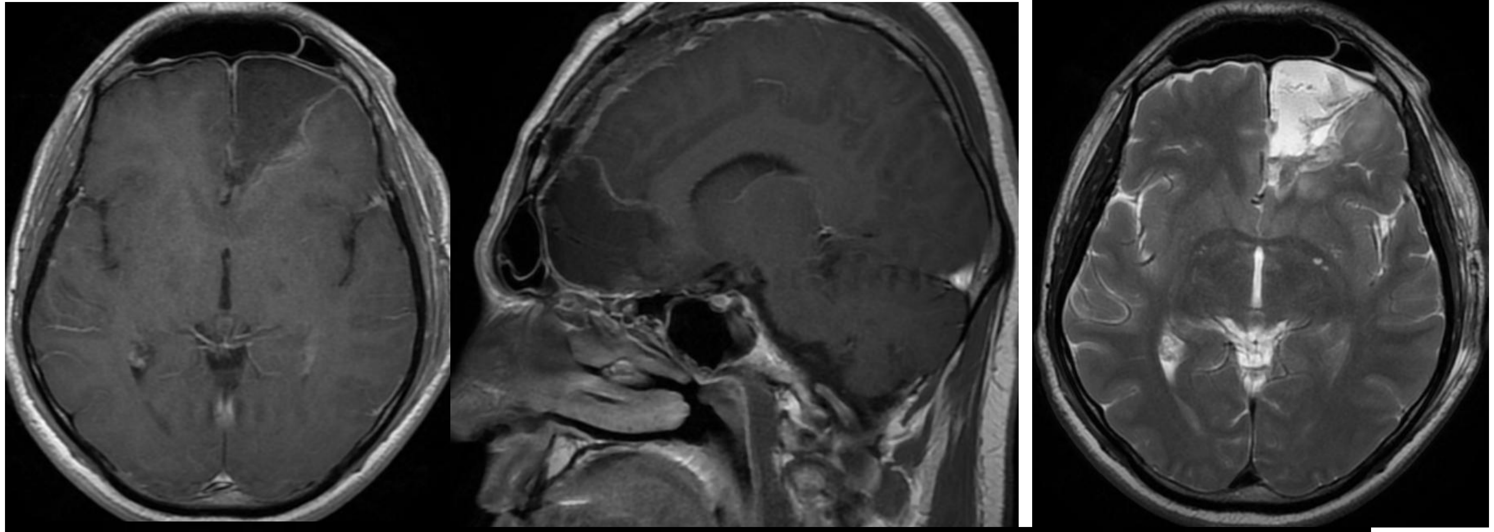








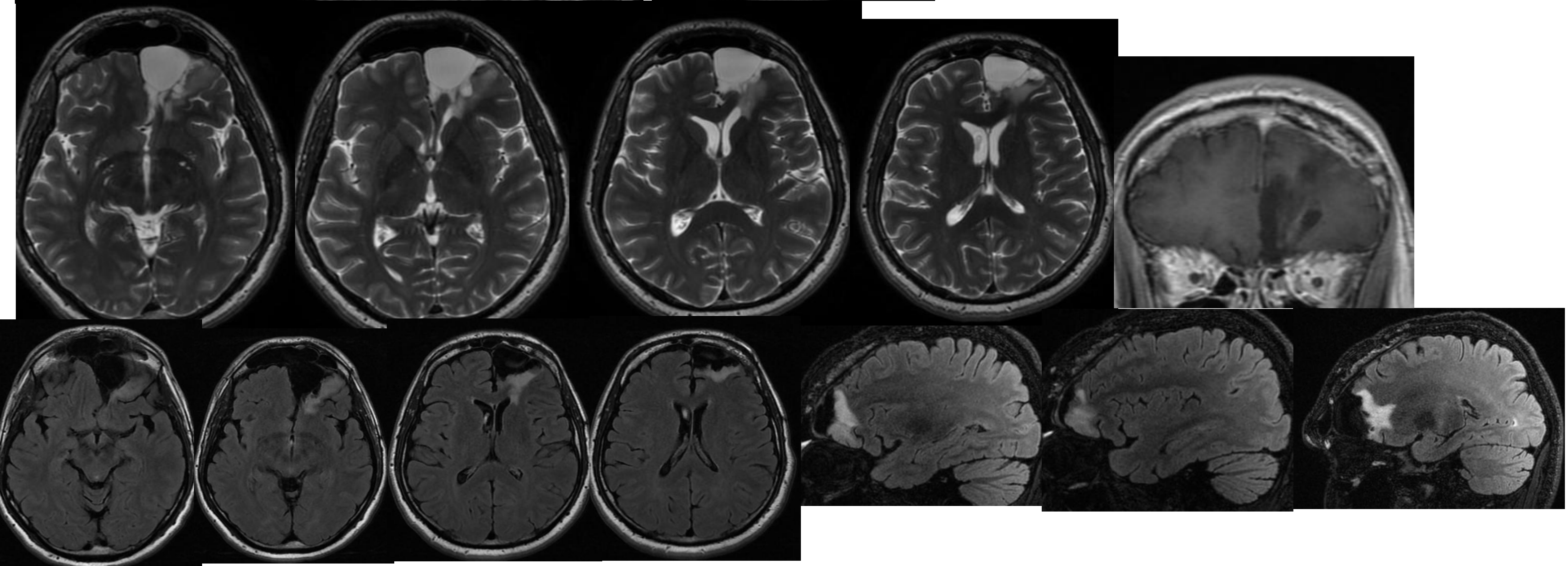
C3123
Patient Name: PUGLIESE_MATTEO
Study Date: 16.02.2017
ID: [MR] 00271880
Pat: PUGLIESE MATTEO
BD: 19791009

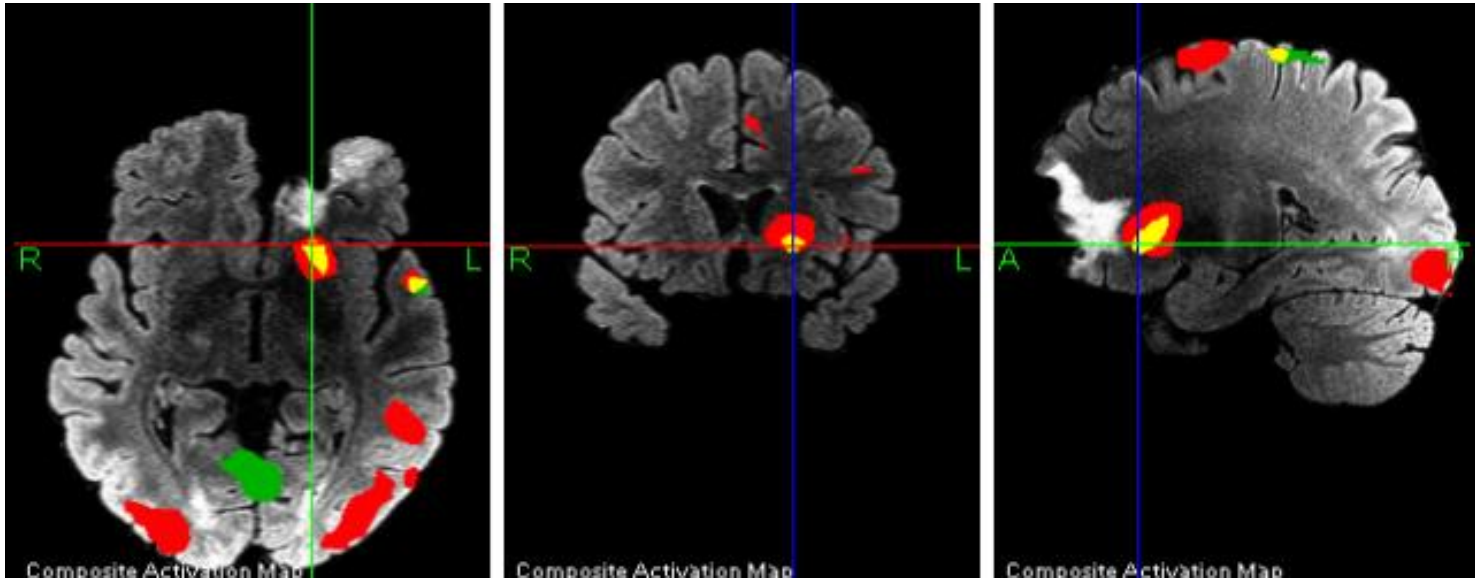


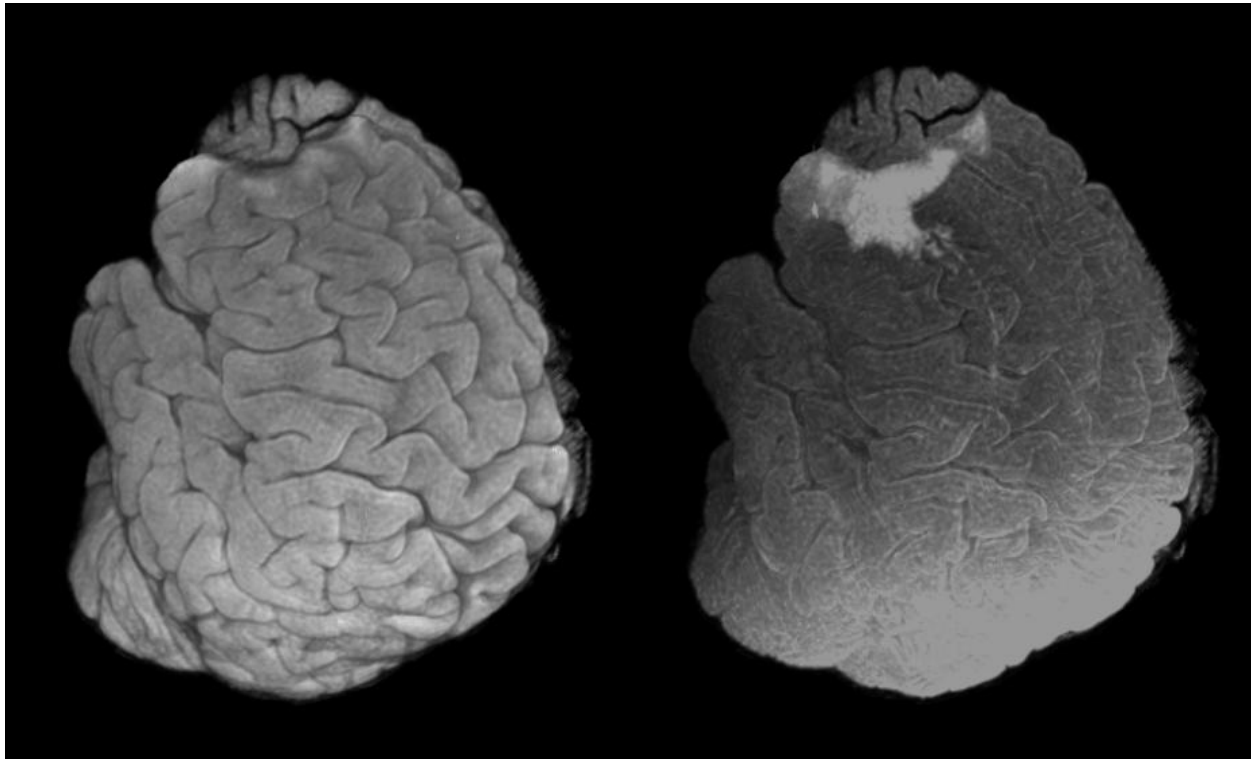
Oligodendroglioma grado II WHO

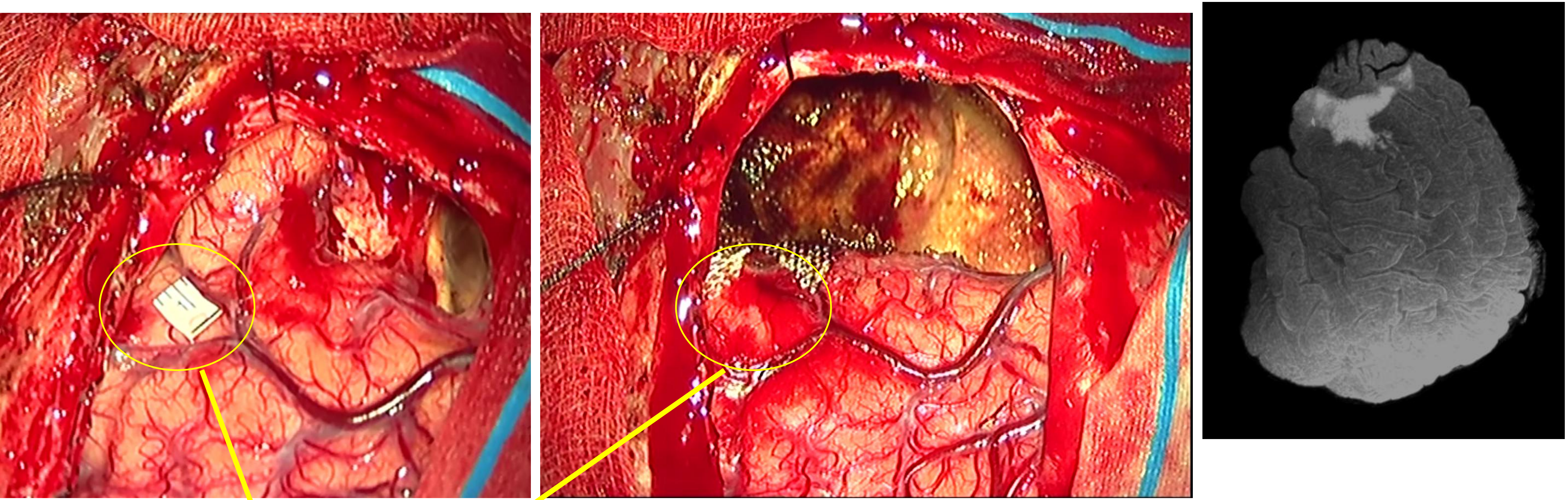
Recidiva delle crisi epilettiche

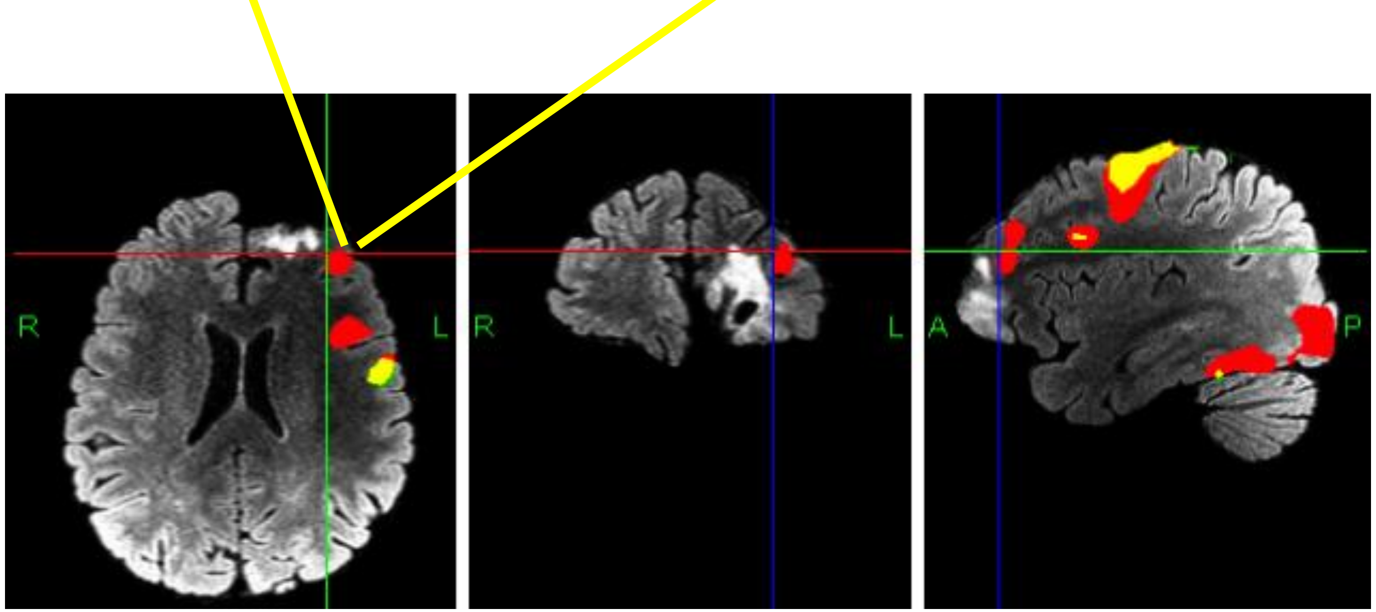
RESIDUO/RECIDIVA:
RE-INTERVENTO DOPO
6 MESI



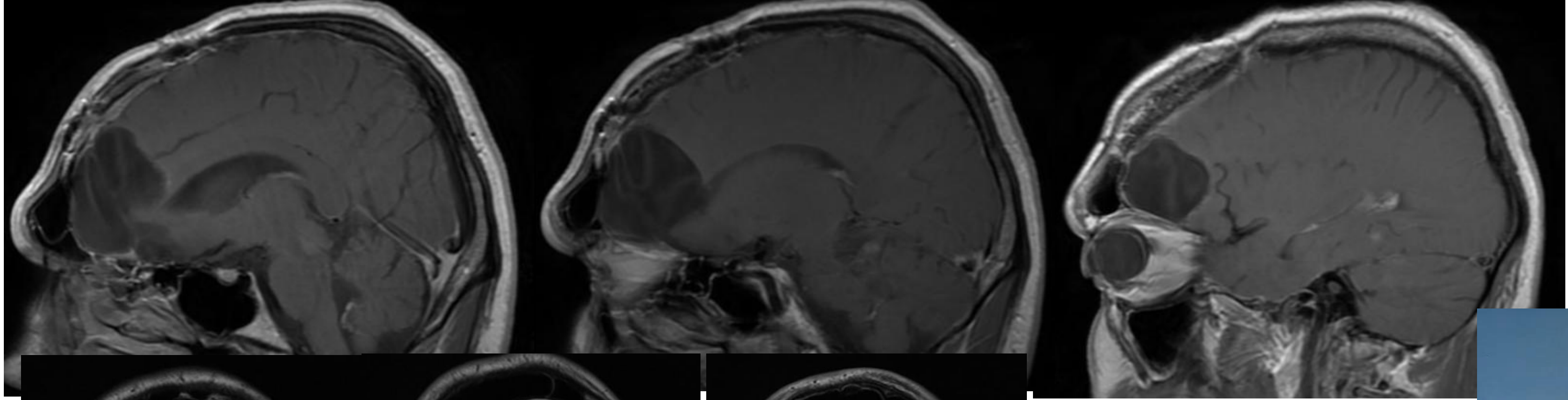

R
L
Composite Activation Map
R
L
Composite Activation Map
A
P
Composite Activation Map

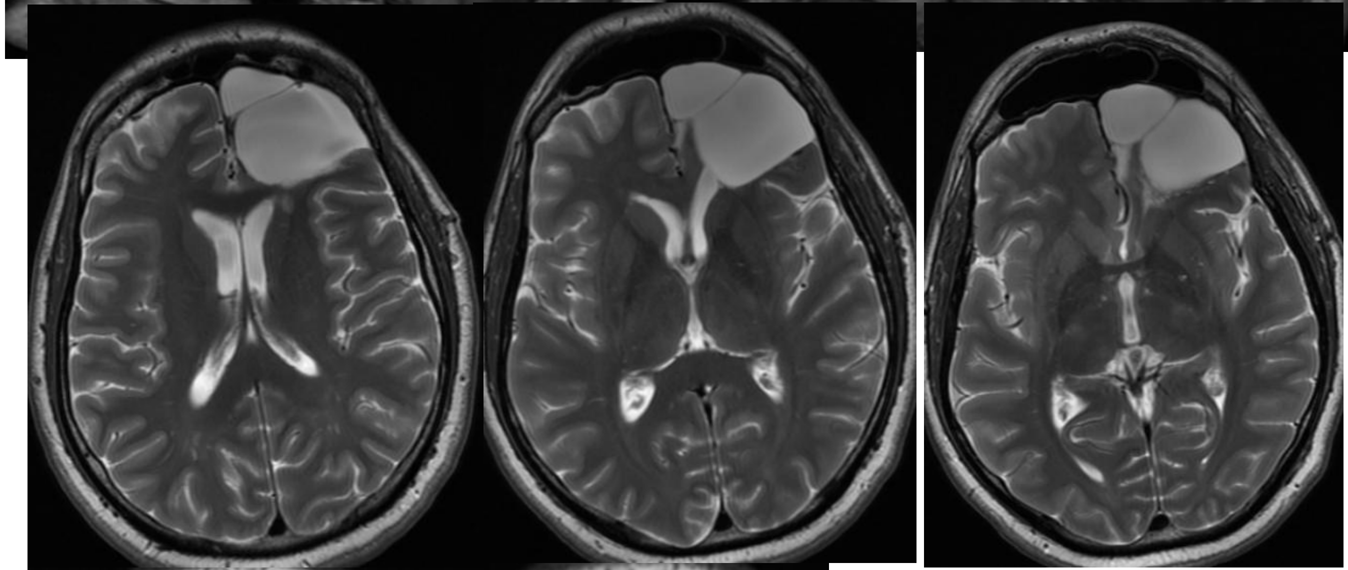


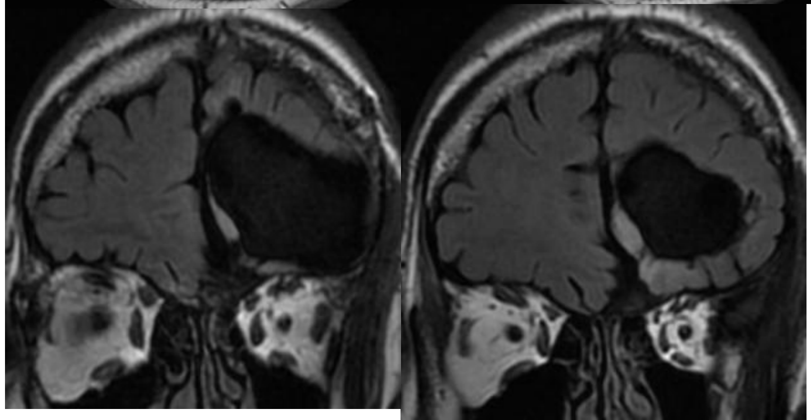




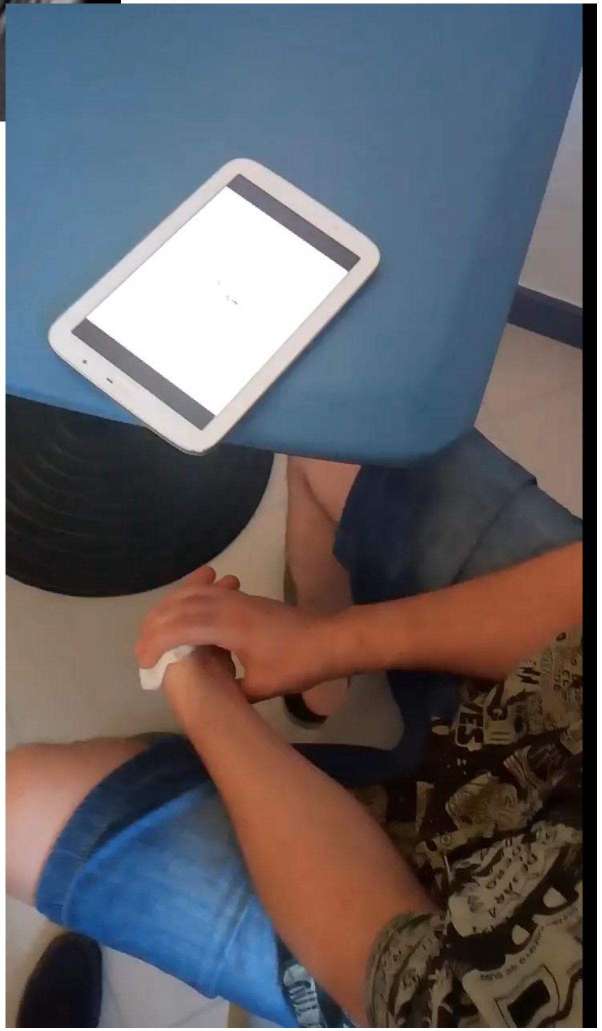
Reintervento in
Awake surgery



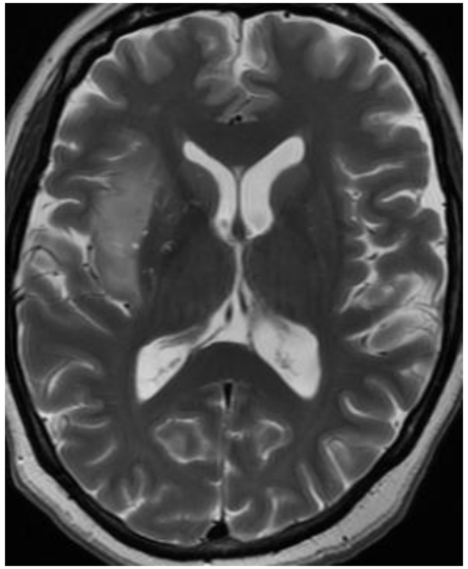


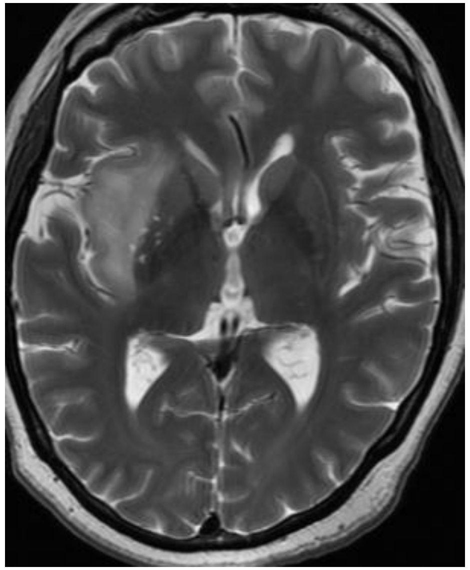


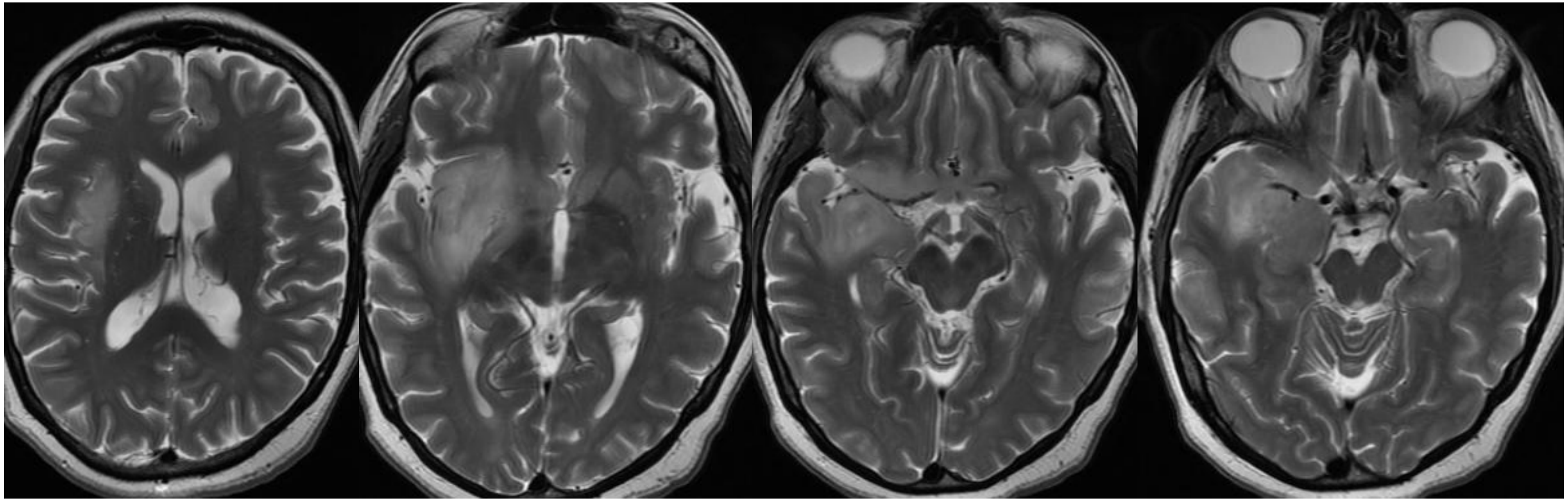
Scomparsa delle crisi epilettiche



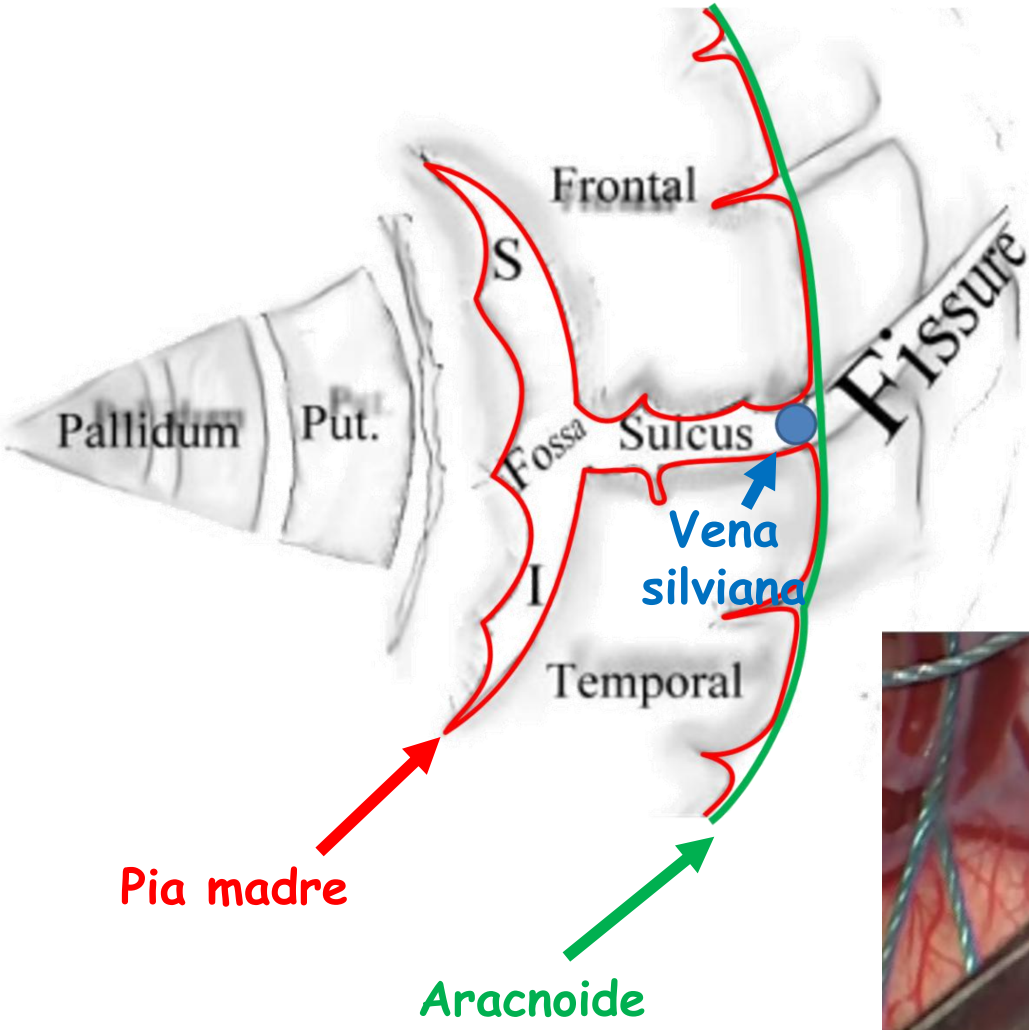
- F, 49 anni, impiegata
- Storia di crisi epilettiche notturne

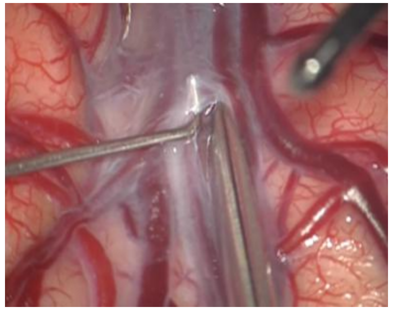


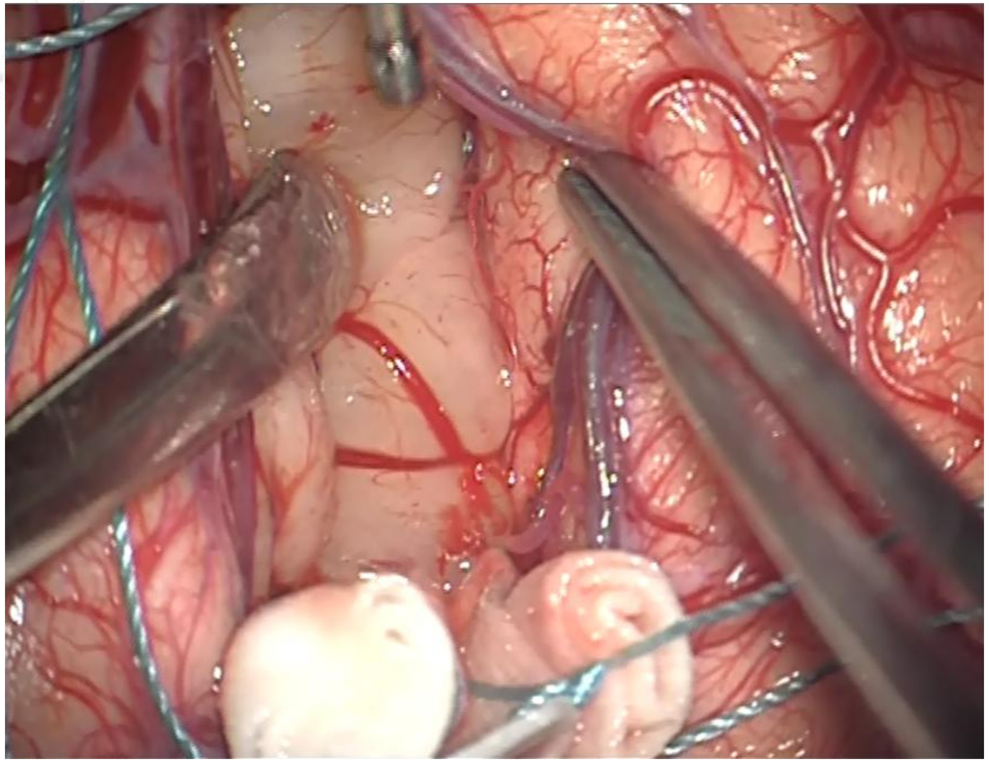


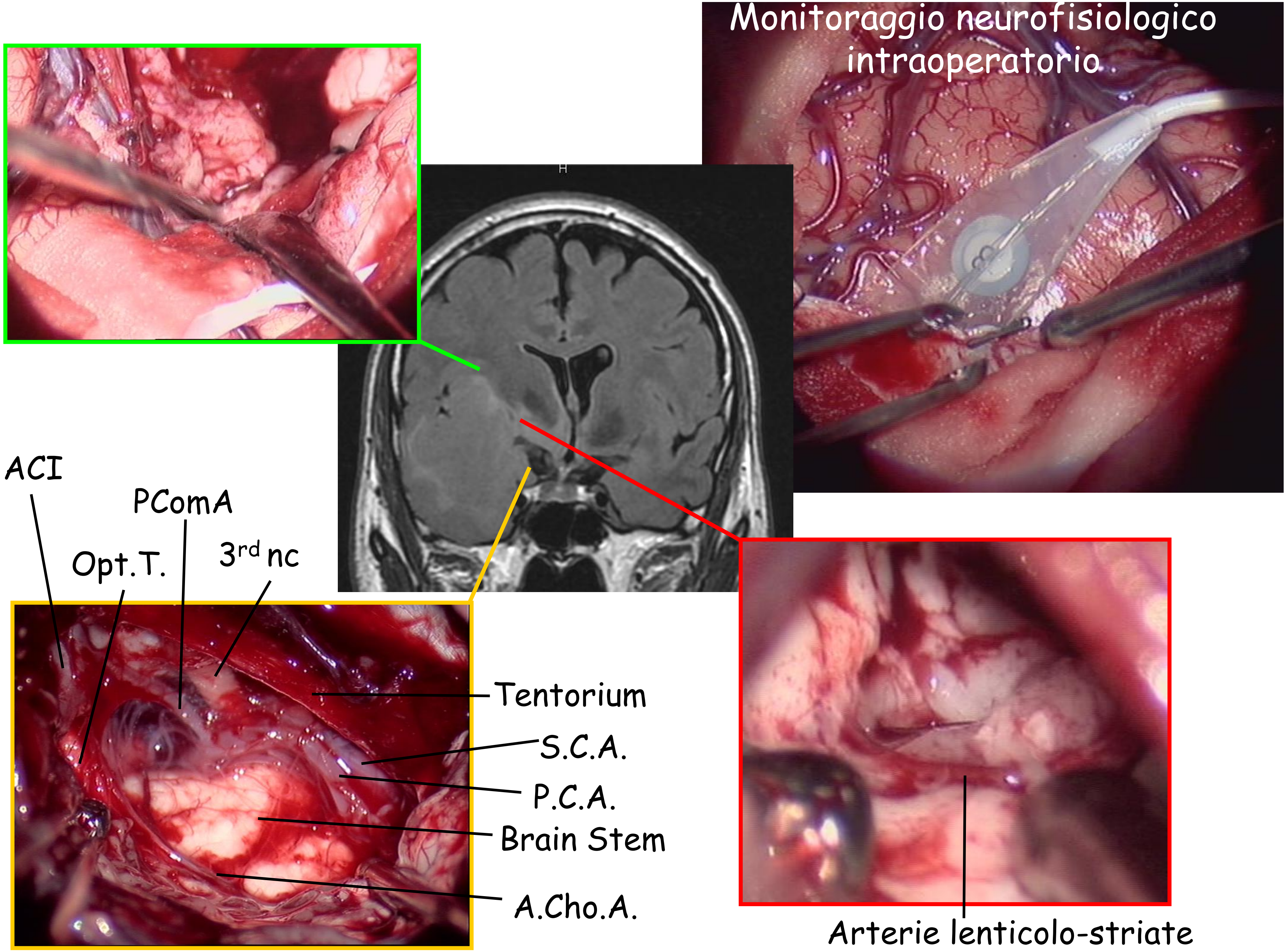


- Microchirurgia ad alto ingrandimento
- Dissezione subpiale

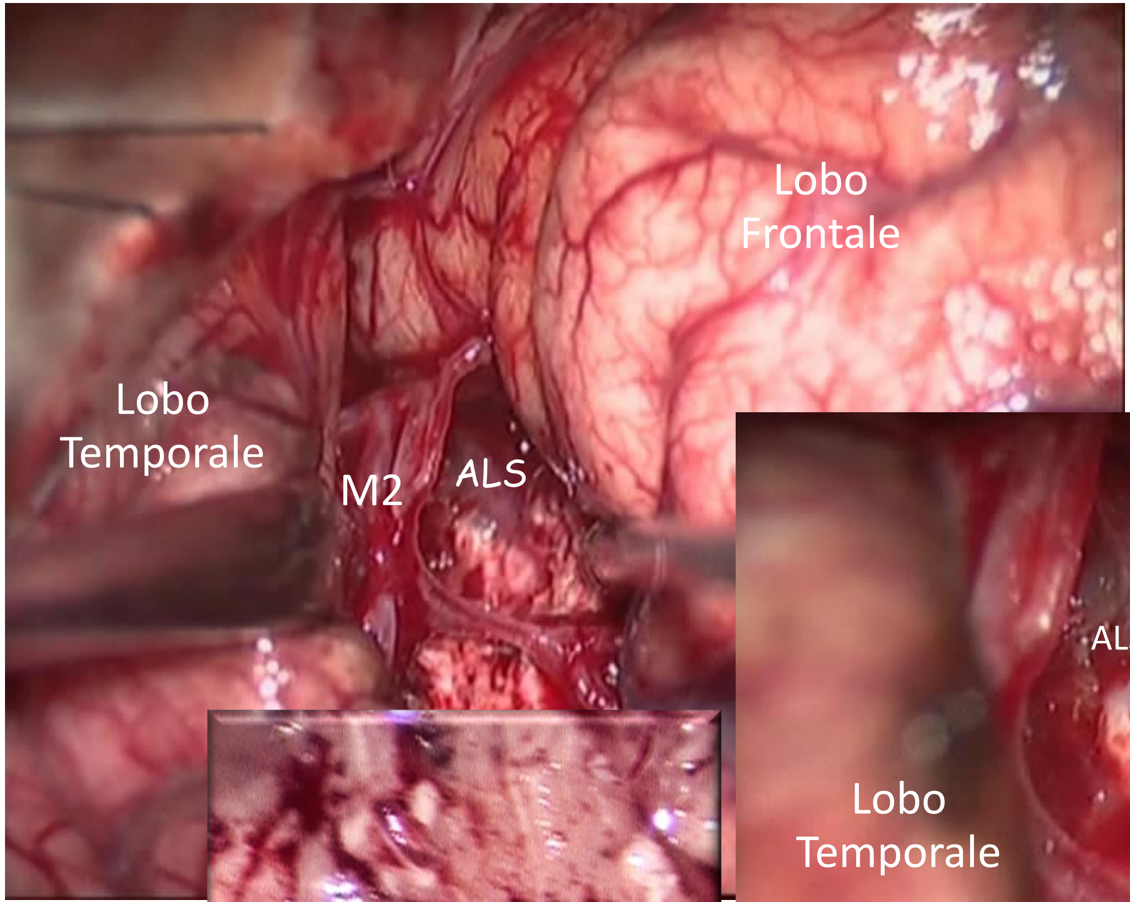


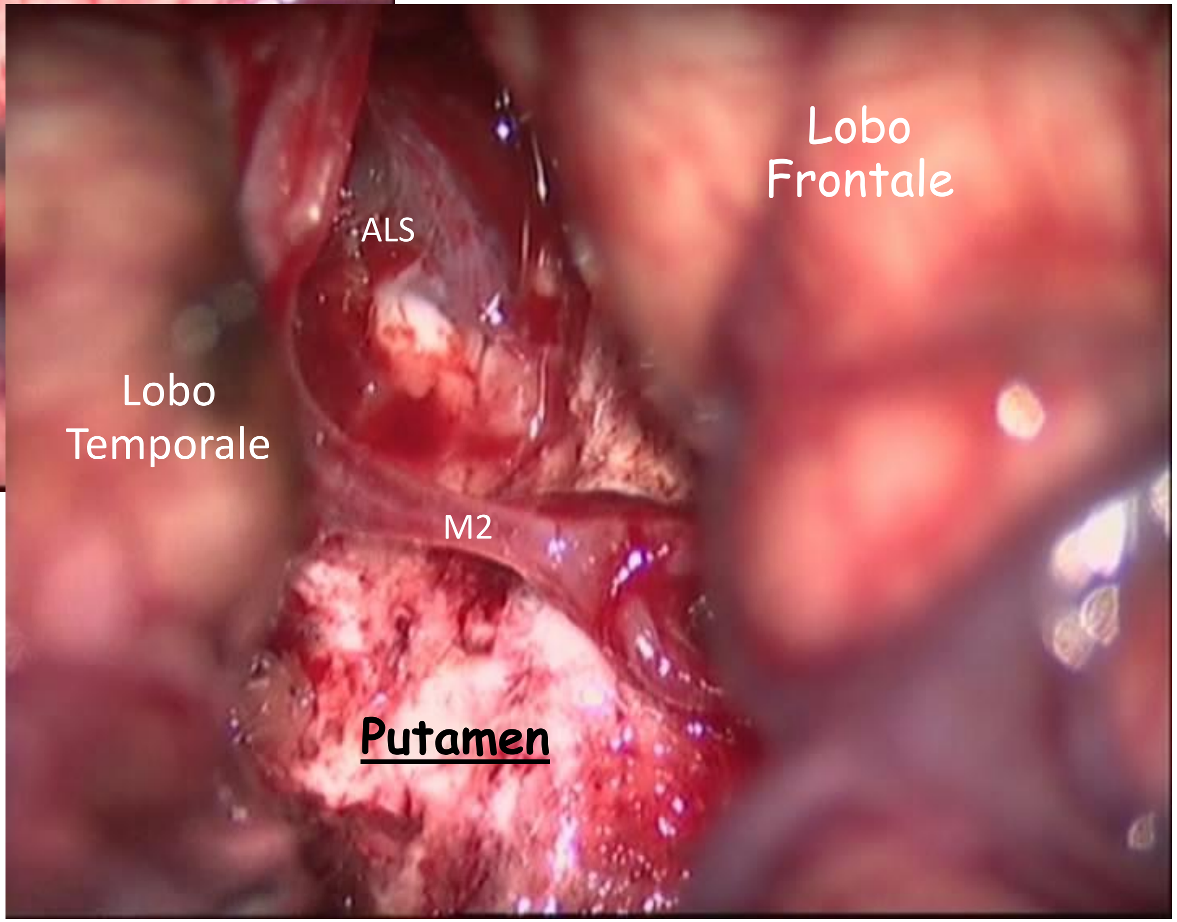


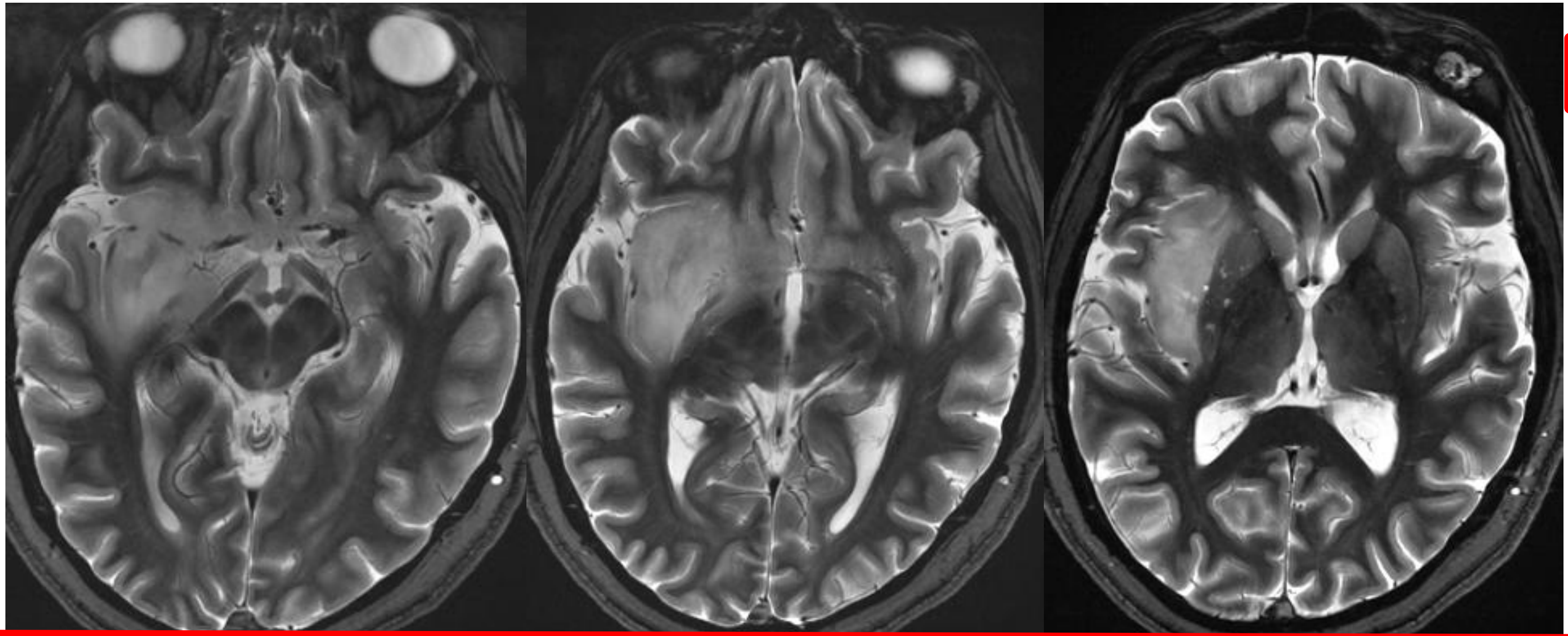



Monitoraggio neurofisiologico intraoperatorio
ACI
PComA
Opt.T.
3rd nc
Tentorium
S.C.A.
P.C.A.
Brain Stem
A.Cho.A.
Arterie lenticolo-striate

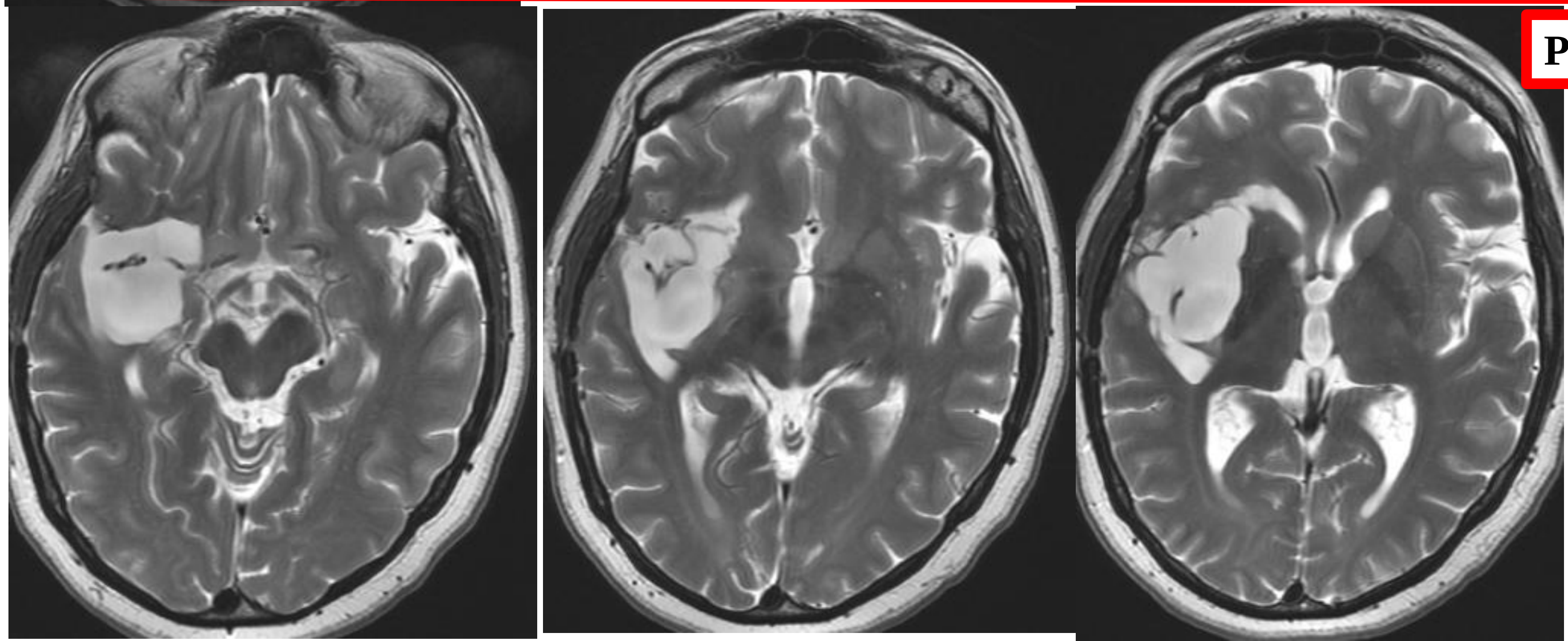
Microchirurgia ad alto ingrandimento







Preop



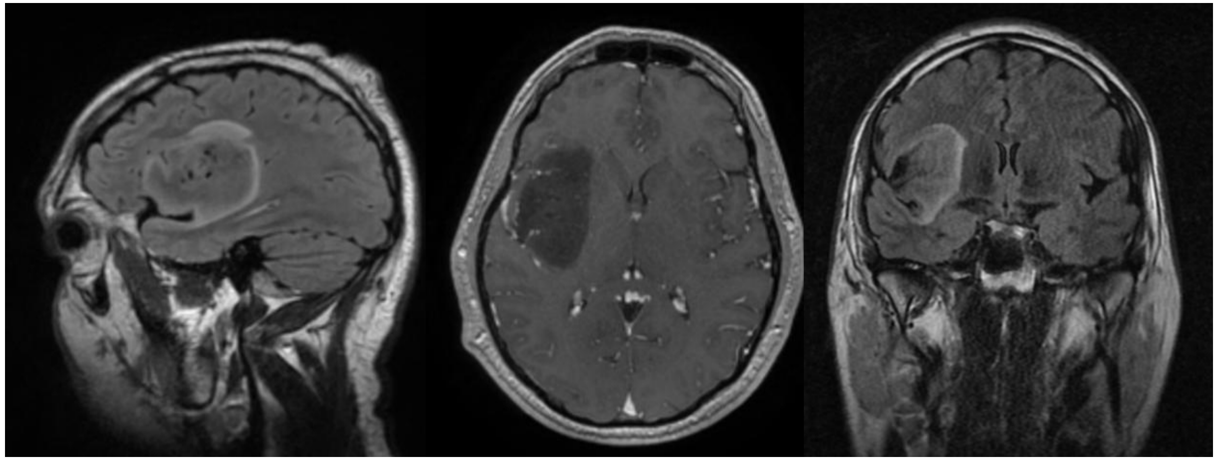
Postop

Oligodendroglioma Grado II WHO

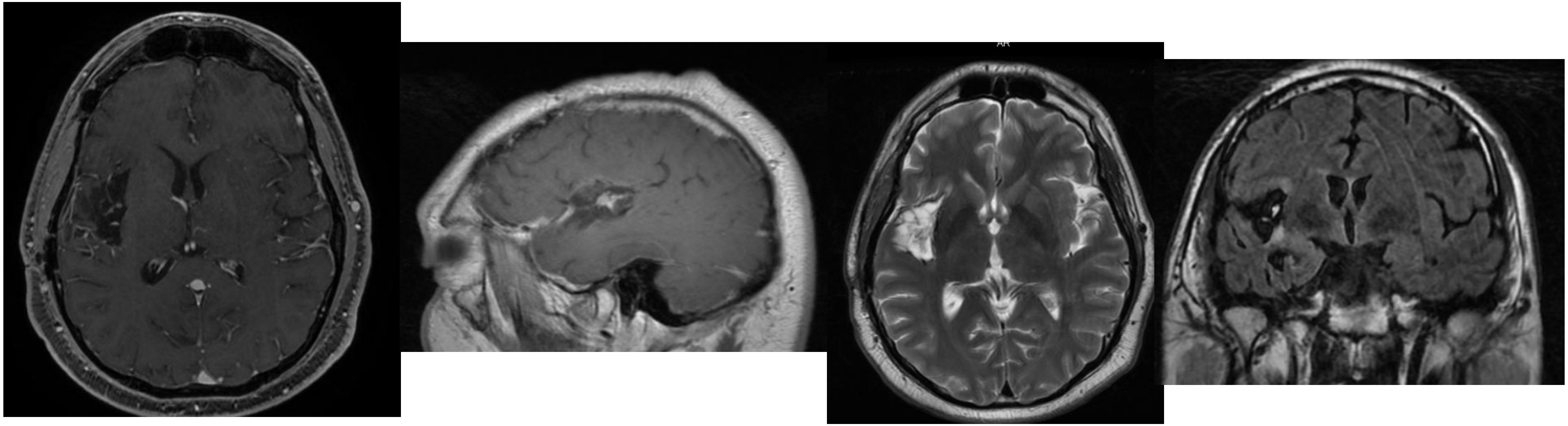
F.U. 3 anni **Scomparsa delle crisi**

- M, 31 anni
- Esordio con crisi epilettiche
- Neoplasia insulare destra

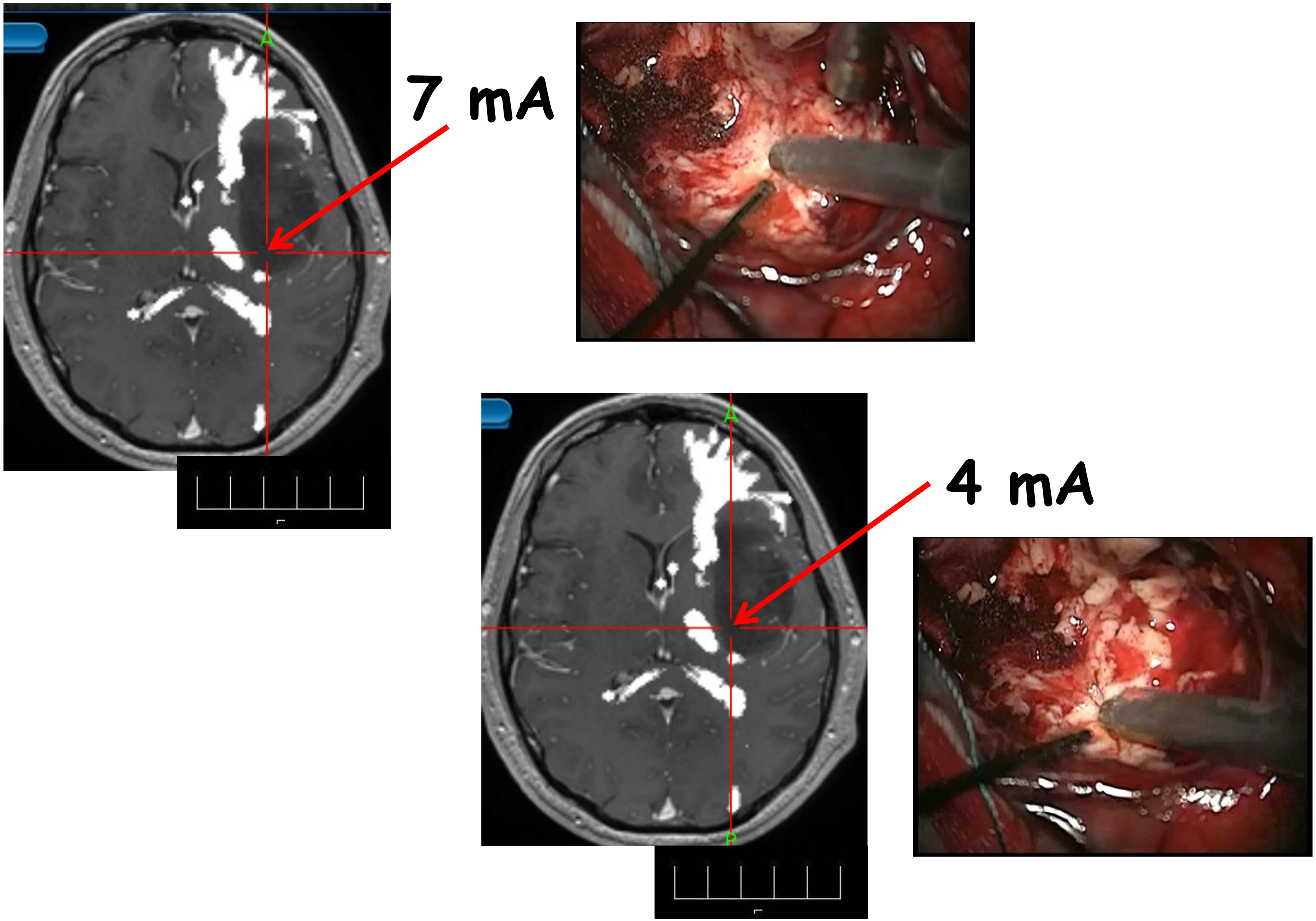
PRE-OPERATORIO



POST-OPERATORIO



- Astrocitoma diffuso II grado WHO
- **Scomparsa delle crisi**


7 mA
4 mA

The motor-evoked potential threshold evaluated by tractography and electrical stimulation

Clinical article

KYOUSUKE KAMADA, M.D., PH.D.,[1] TOMOKI TODO, M.D., PH.D.,[1] TAKAHIRO OTA, M.D.,[1]
KENJI INO, PH.D.,[2] YOSHITAKA MASUTANI, PH.D.,[2] SHIGEKI AOKI, M.D., PH.D.,[2]
FUMIYA TAKEUCHI, PH.D.,[3] KENSUKE KAWAI, M.D., PH.D.,[1]
AND NOBUHITO SAITO, M.D., PH.D.[1]

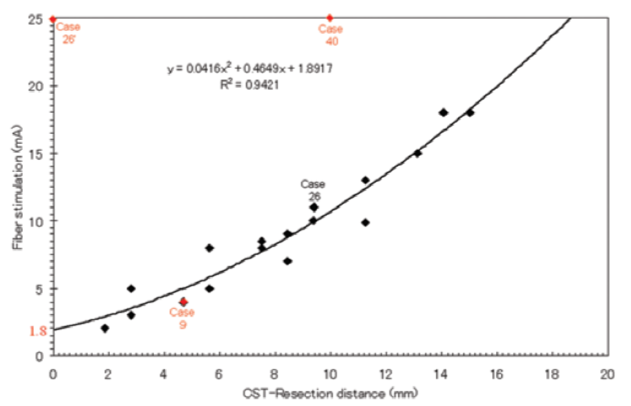


FIG. 3. Scatter plot showing relationship between the stimulus intensity of direct fiber stimulation and the distance between the CST and stimulus points on the postoperative isotopic images. Note that the minimum stimulus intensity with 20, 15, 10, and 5 mA indicated that the stimulus point was ~ 16, 13.2, 9.6, and 4.8 mm from the CST, respectively. The convergent calculation ($y = 0.0416x^2 + 0.4649x + 1.8917$, $R^2 = 0.9421$) formulated 1.8 mA as the electrical threshold of the CST. *Red triangles* indicate cases (9, 26 [recurrence], and 40) with values significantly deviating from the regression line.

J Neurosurg 111:785–795, 2009

Monopolar high-frequency motor mapping
Train-of-five stimuli

Neurosurgery 71 [ONS Suppl 1]: ons104-ons115, 2012

Low-Threshold Monopolar Motor Mapping for Resection of Primary Motor Cortex Tumors

Kathleen Seidel, MD
Jürgen Beck, MD, PhD
Lennart Stieglitz, MD
Philippe Schucht, MD
Andreas Raabe, MD, PhD

Department of Neurosurgery, Inselspital, Bern University Hospital, Bern, Switzerland

BACKGROUND: Microsurgery within eloquent cortex is a controversial approach because of the high risk of permanent neurological deficit. Few data exist showing the relationship between the mapping stimulation intensity required for eliciting a muscle motor evoked potential and the distance to the motor neurons; furthermore, the motor threshold at which no deficit occurs remains to be defined.
OBJECTIVE: To evaluate the safety of low threshold motor evoked potential mapping for tumor resection close to the primary motor cortex.
METHODS: Fourteen patients undergoing tumor surgery were included. Motor threshold was defined as the stimulation intensity that elicited motor evoked potentials

J Neurosurg 118:287-296, 2013

The warning-sign hierarchy between quantitative subcortical motor mapping and continuous motor evoked potential monitoring during resection of supratentorial brain tumors

Clinical article

Kathleen Seidel, M.D.,[1] Jürgen Beck, M.D., Ph.D.,[1] Lennart Stieglitz, M.D.,[1] Philippe Schucht, M.D.,[1] and Andreas Raabe, M.D., Ph.D.[1]

[1]*Department of Neurosurgery, Inselspital, Bern University Hospital, Bern, Switzerland*

J Neurosurg 120:1015-1024, 2014

Continuous dynamic mapping of the corticospinal tract during surgery of motor eloquent brain tumors: evaluation of a new method

Clinical article

Andreas Raabe, M.D., Jürgen Beck, M.D., Philippe Schucht, M.D., and Kathleen Seidel, M.D.

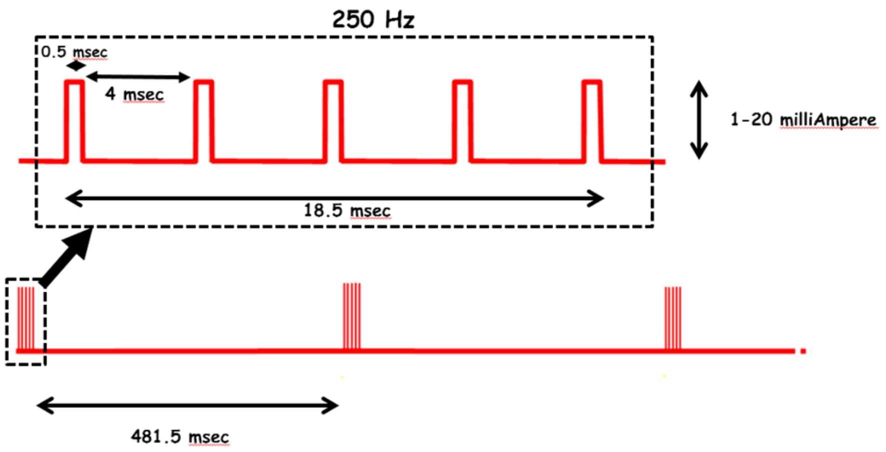
Department of Neurosurgery, Inselspital, Bern University Hospital, Bern, Switzerland

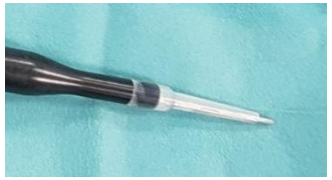
Neurosurg Focus 37 (6):E16, 2014

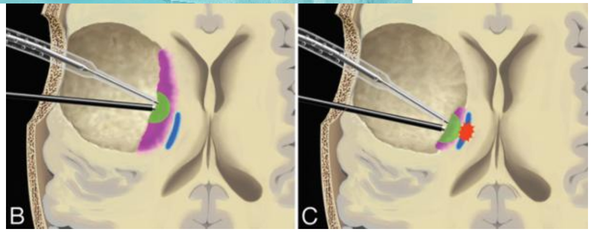
Intraoperative monopolar mapping during 5-ALA–guided resections of glioblastomas adjacent to motor eloquent areas: evaluation of resection rates and neurological outcome

Philippe Schucht, M.D.,[1] Kathleen Seidel, M.D.,[1] Jürgen Beck, M.D.,[1] Michael Murek, M.D.,[1] Astrid Jilch, M.D.,[1] Roland Wiest, M.D.,[2] Christian Fung, M.D.,[1] and Andreas Raabe, M.D.[1]

Departments of [1]Neurosurgery and [2]Neuroradiology, Inselspital, Bern University Hospital, Bern, Switzerland



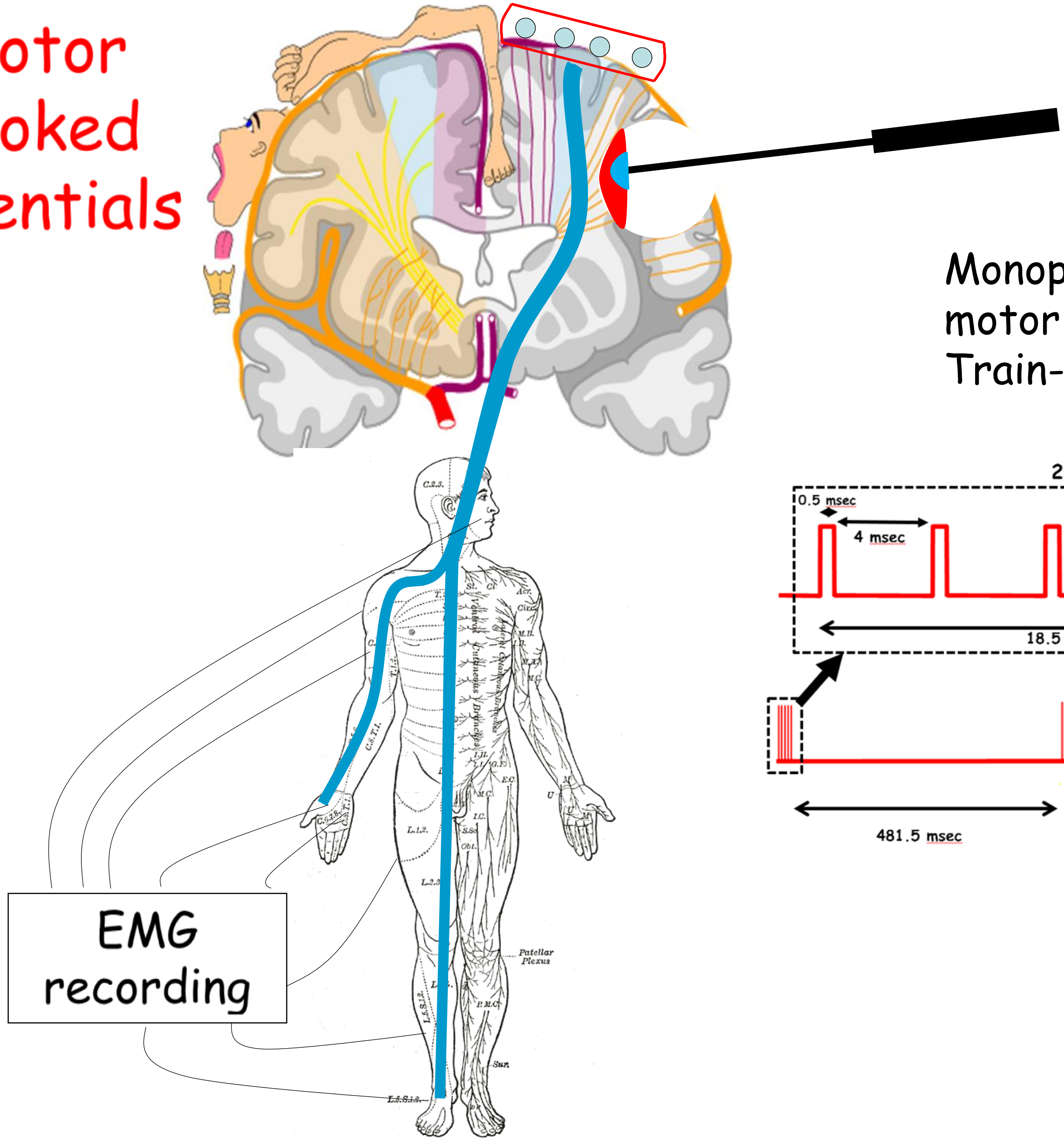


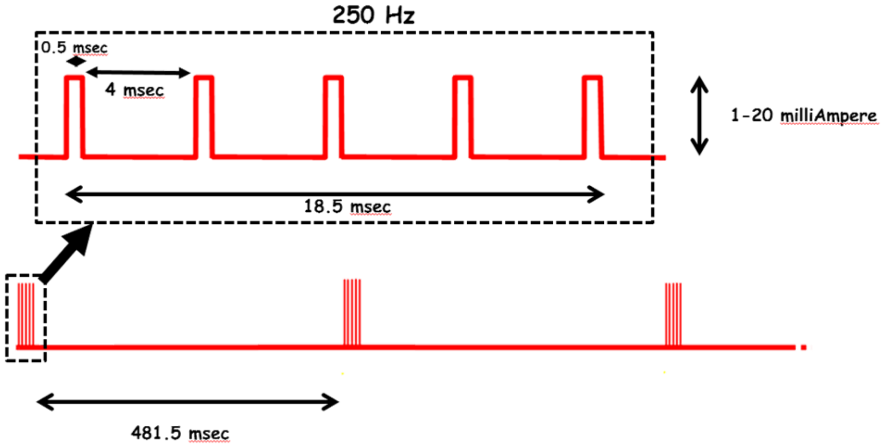


Motor Evoked Potentials

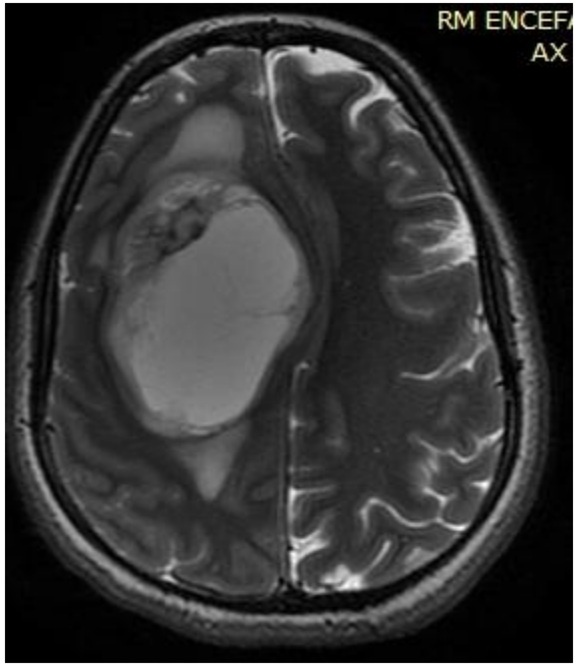
Continuous subcortical mapping

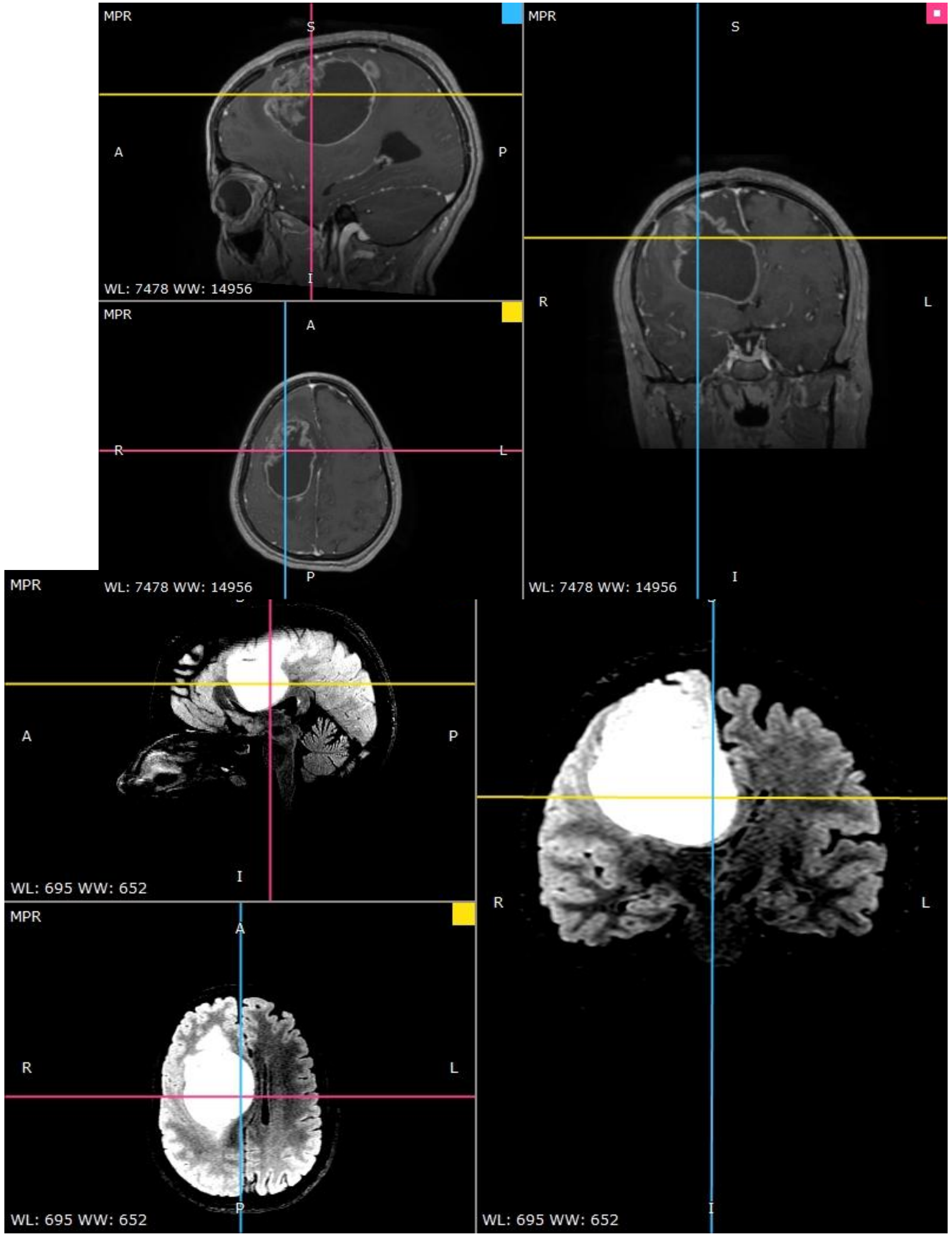
Monopolar high-frequency motor mapping
Train-of-five stimuli

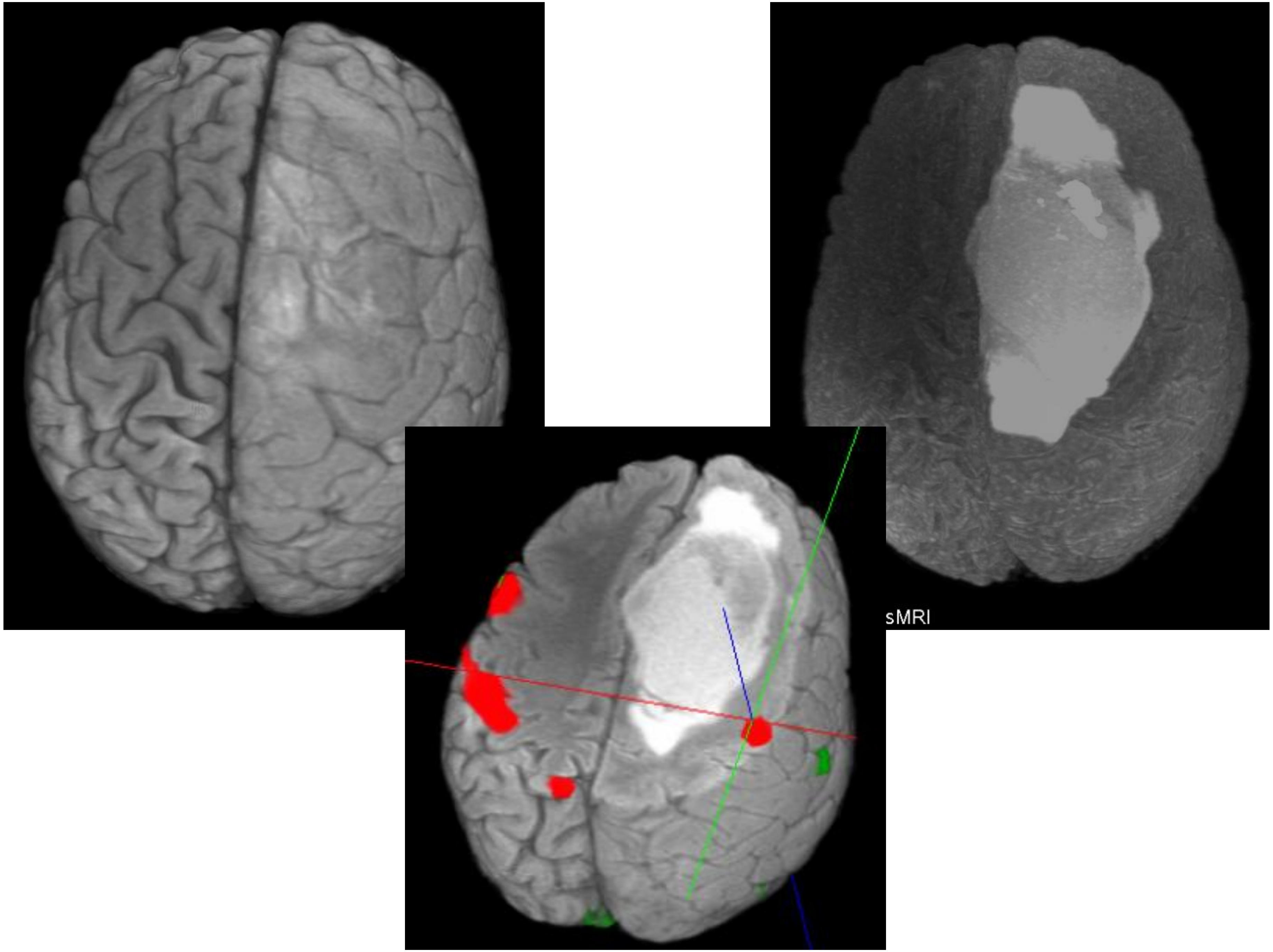


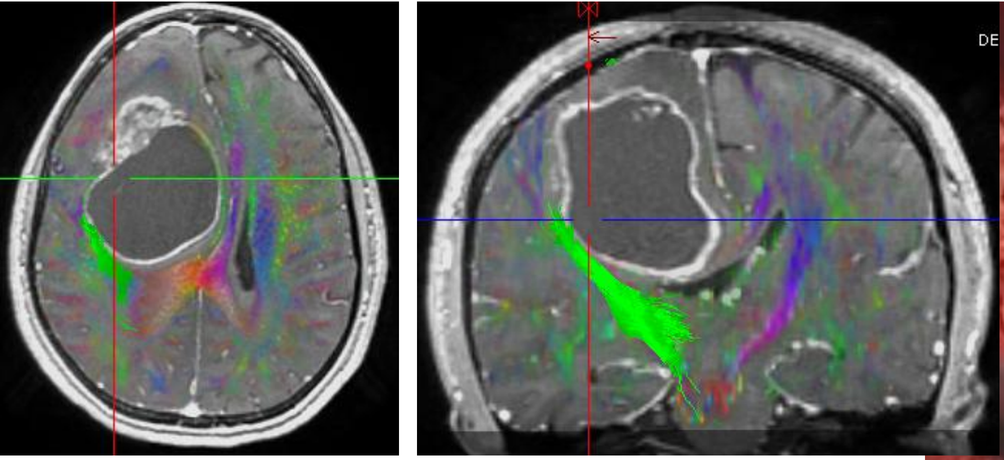


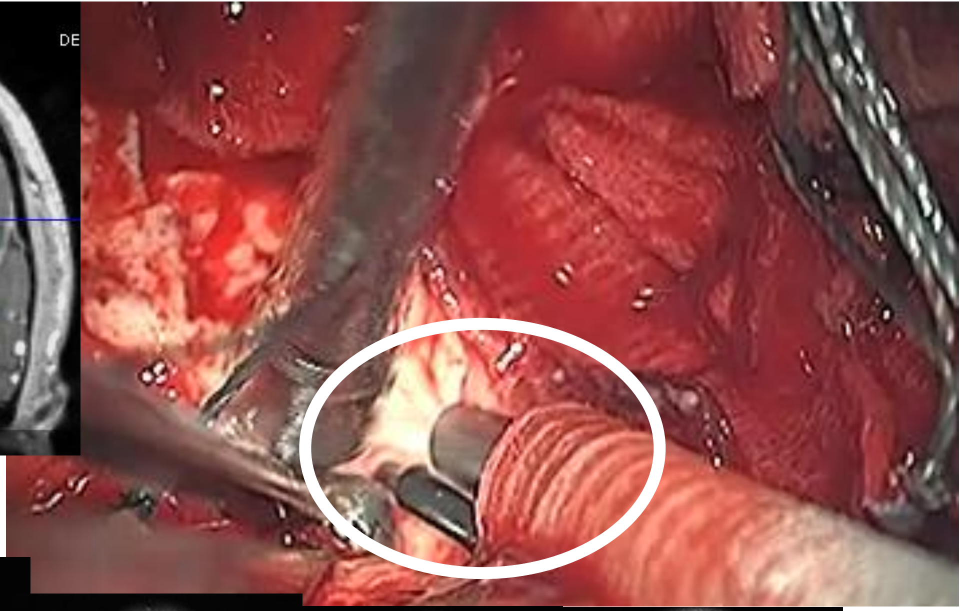
- F, 26 anni
- Già operata 2 anni prima presso altro istituto, <u>asportazione parziale</u>
- Astrocitoma diffuso grado II WHO
- EON: Emiparesi sinistra e crisi epilettiche



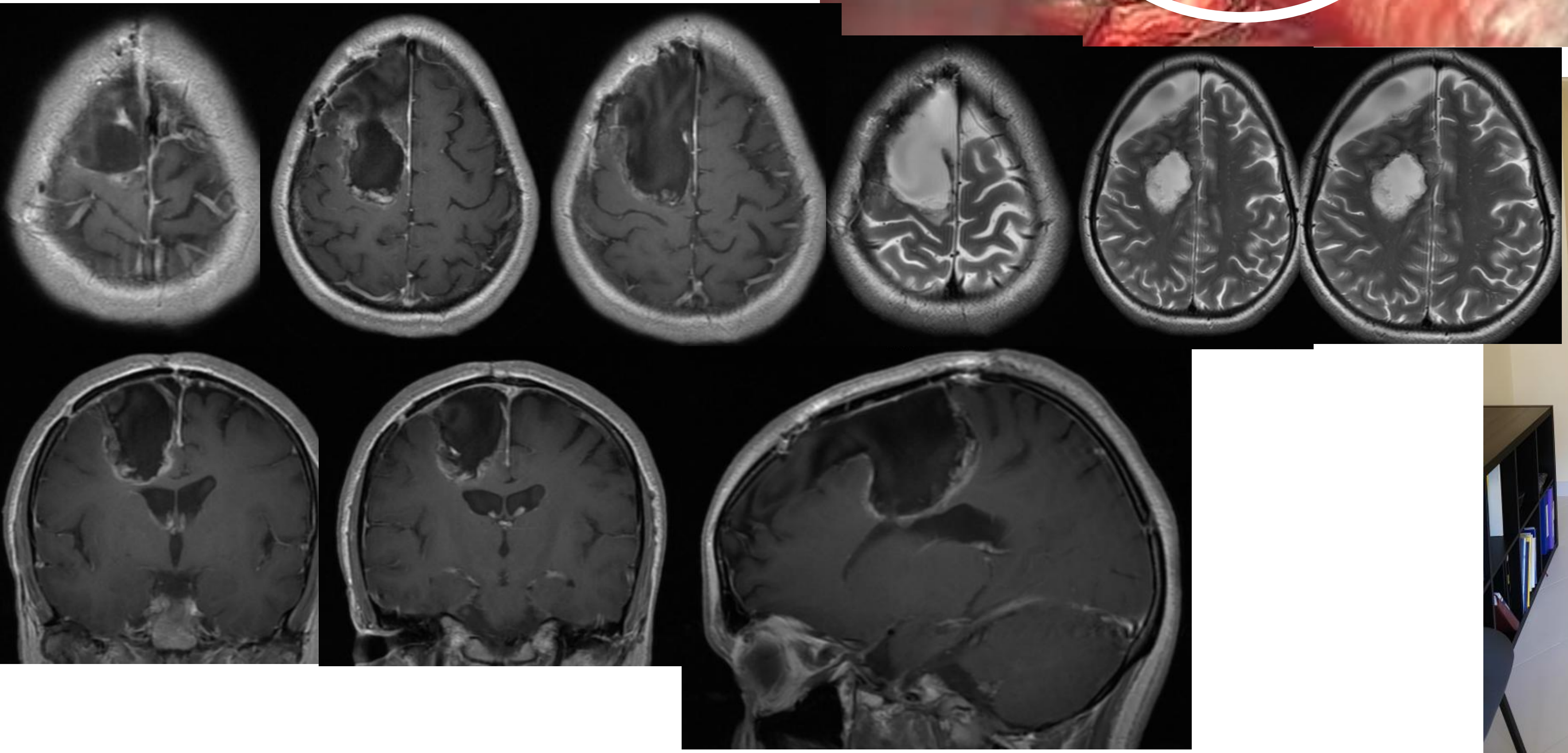



sMRI

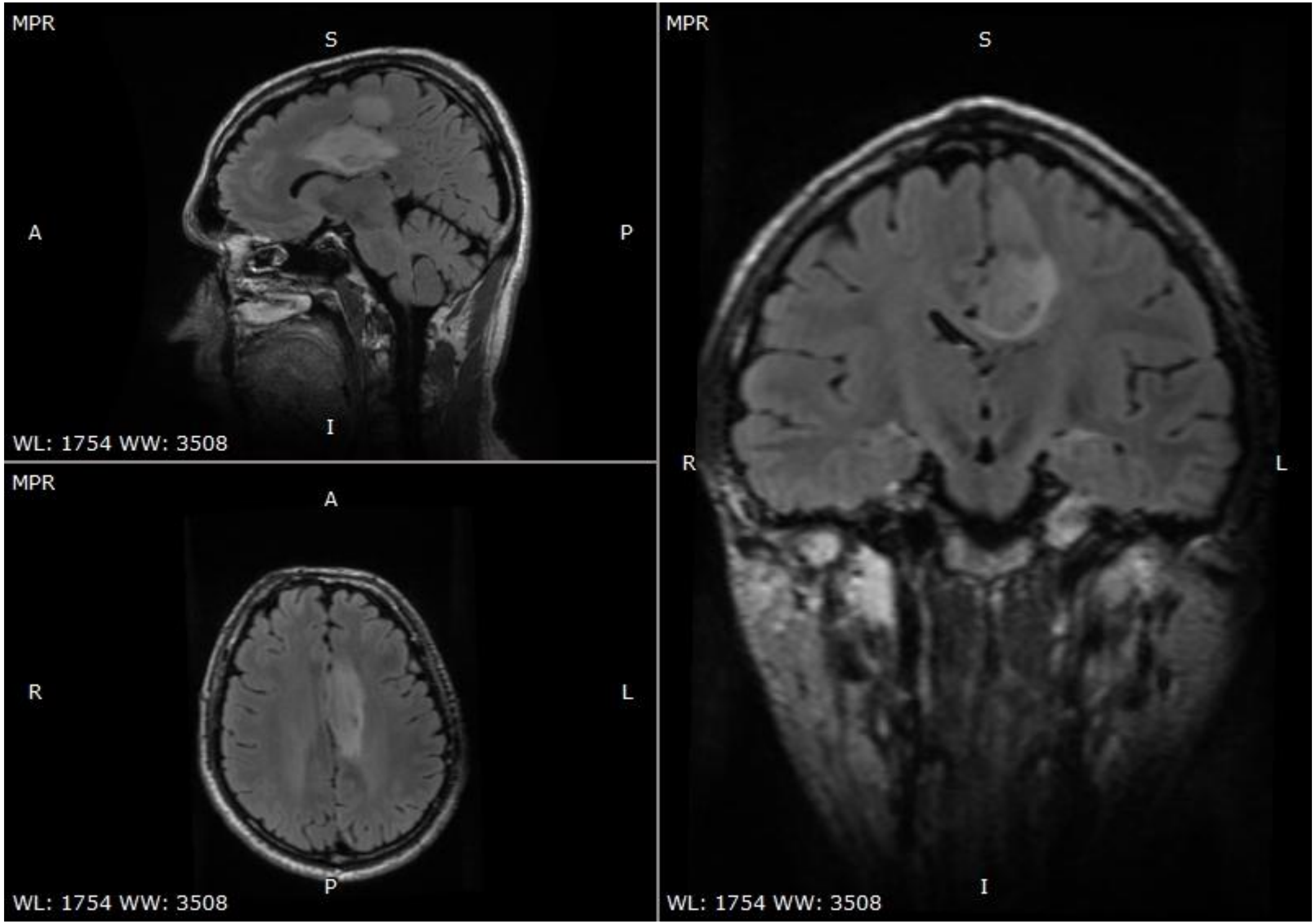


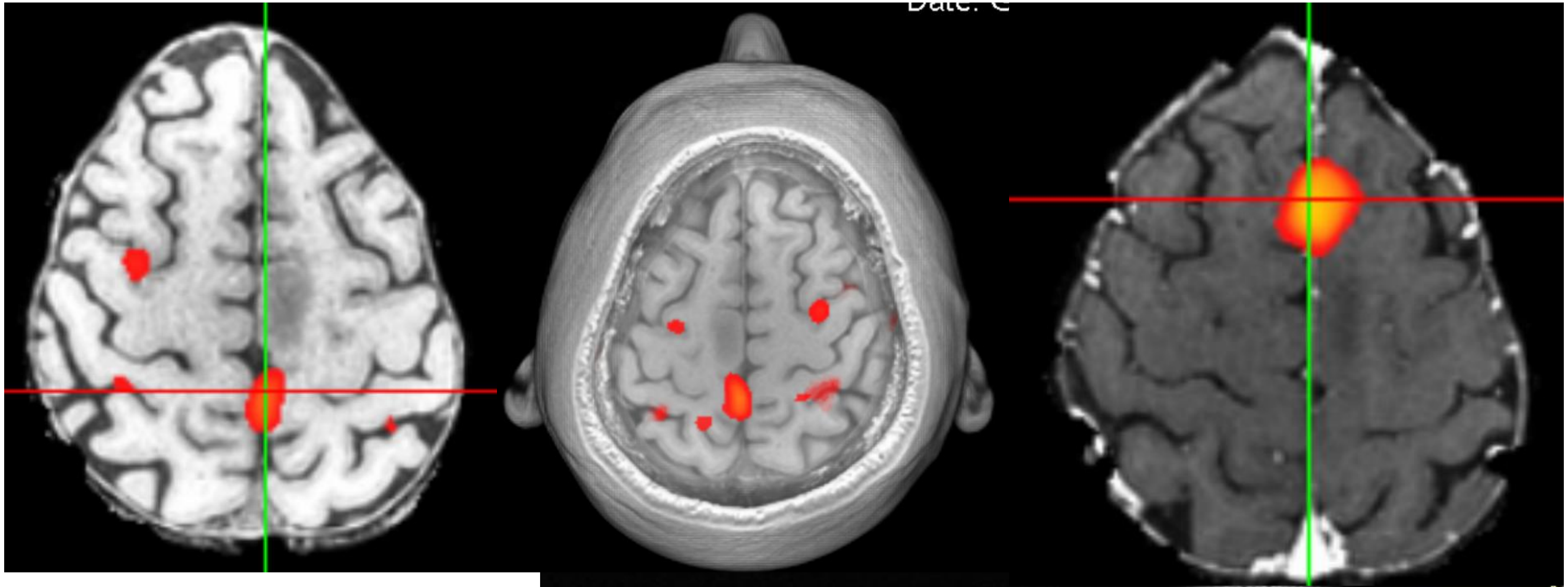


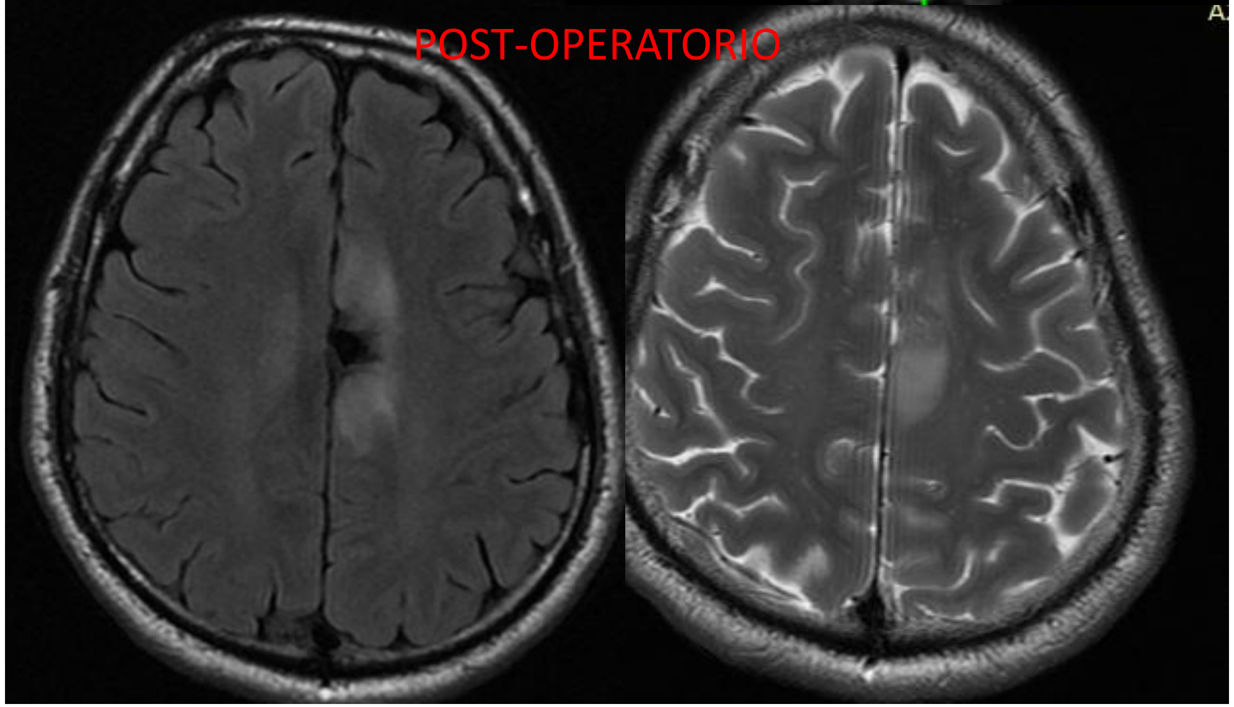
- Peeling del fascio piramidale con **tecnica CUSA – radar** fino a 1 mA
- Transitoria emiparesi sinistra post-operatoria con successivo recupero
- Regressione delle crisi
- **Glioblastoma (grado IV WHO)**



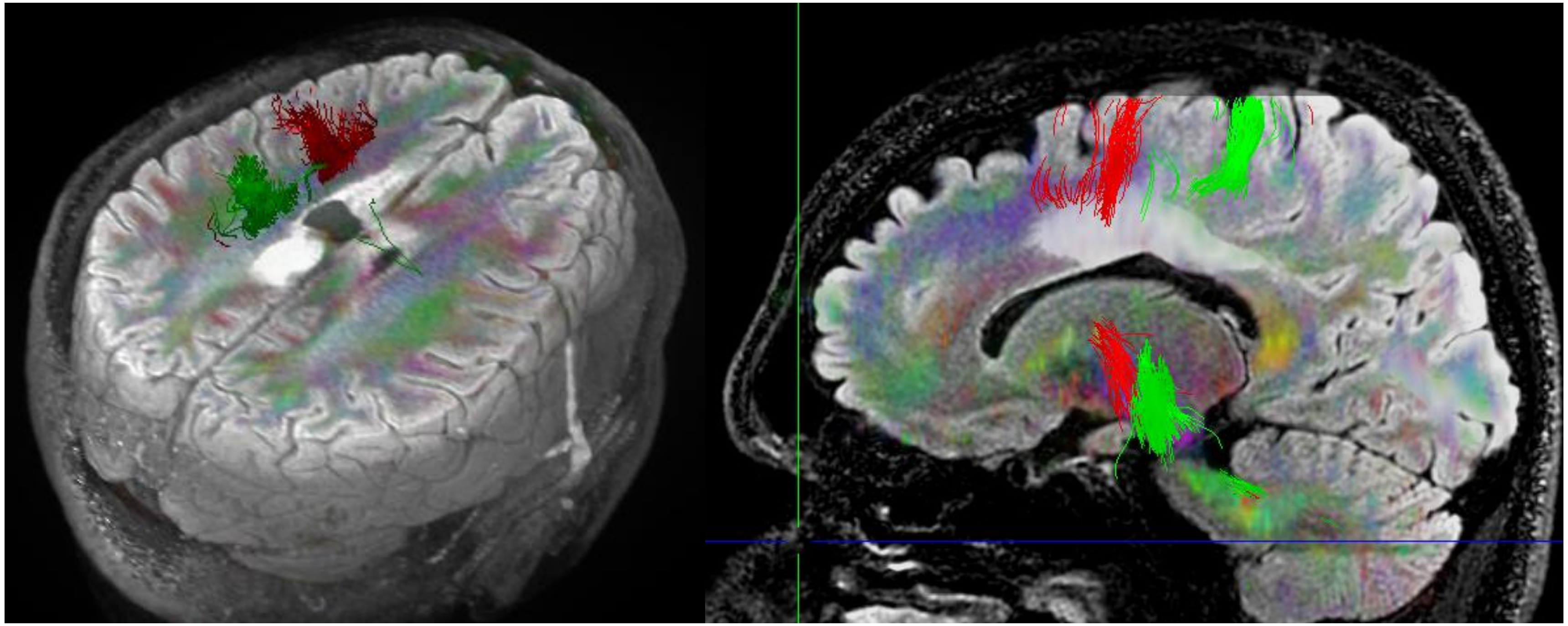
- M, 46 anni
- Esordio con crisi epilettiche



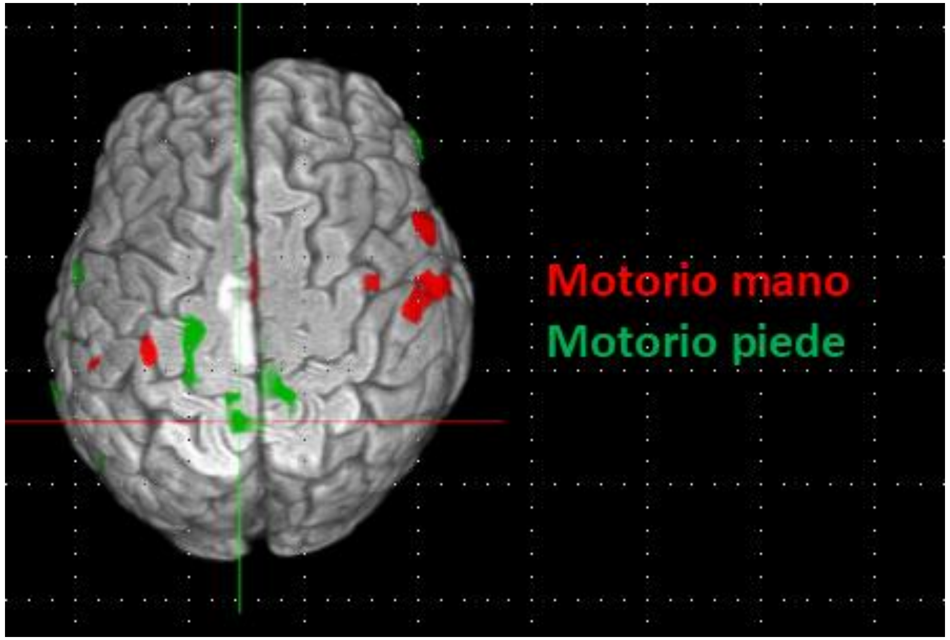


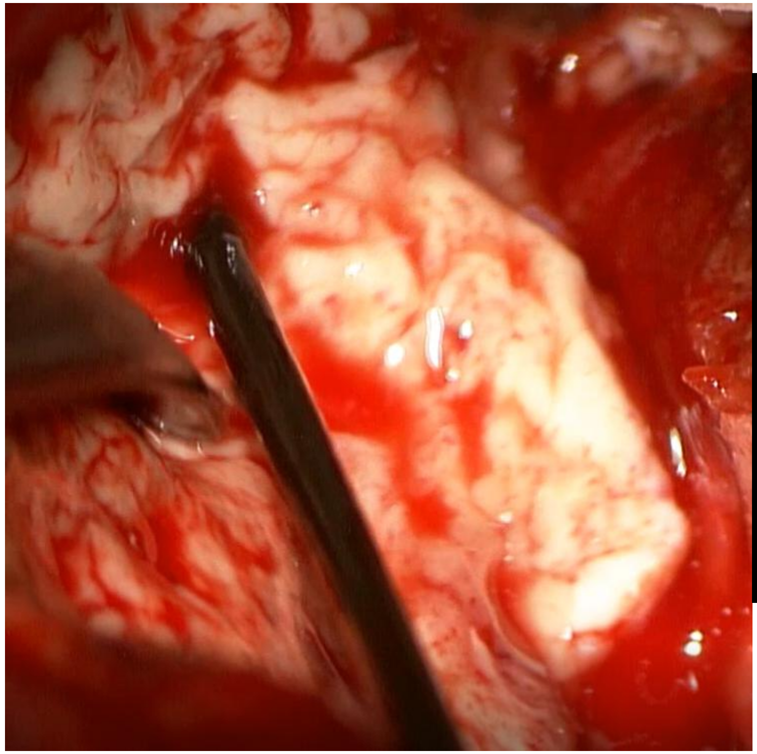


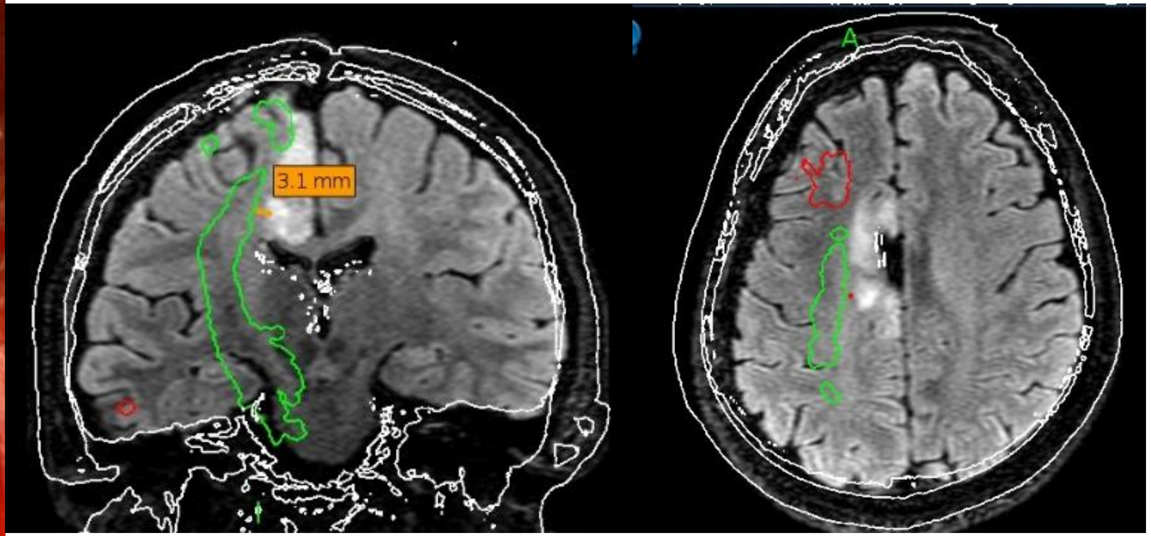
- Asportazione parziale
- Astrocitoma II grado WHO
- Emiparesi destra transitoria ed afasia con completo recupero
- Persistenza delle crisi epilettiche

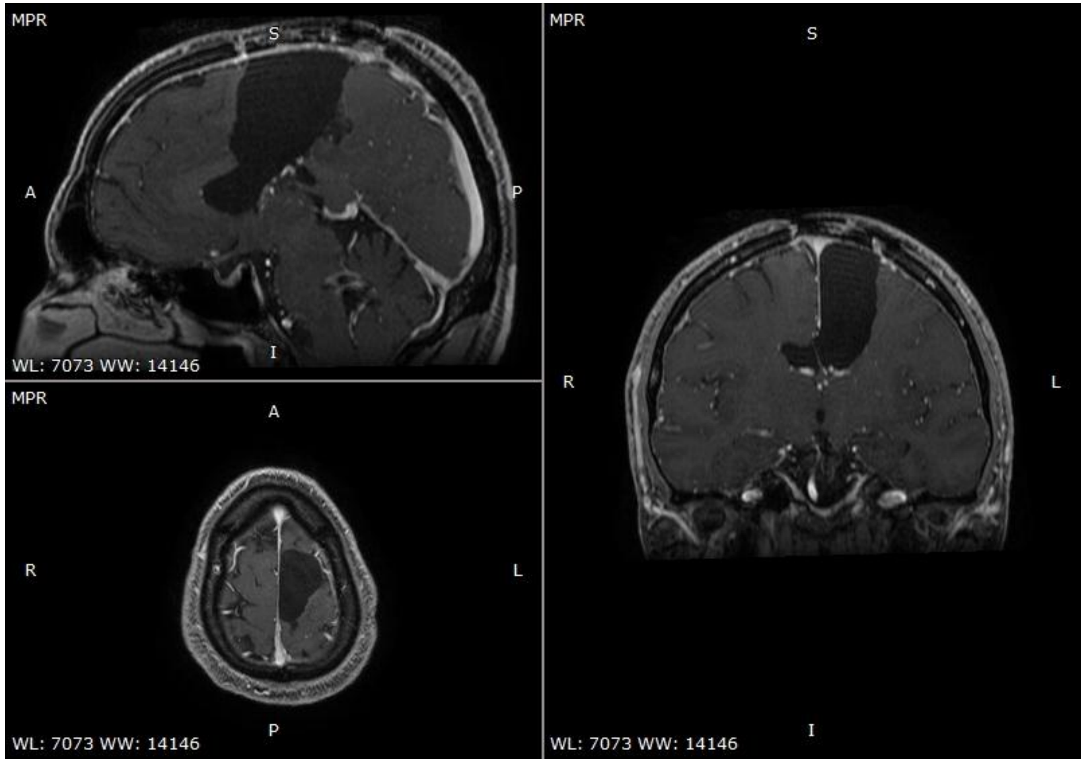


- Aumento volumetrico del residuo tumorale a distanza di 1 anno
- EON: negativo
- **Reintervento**

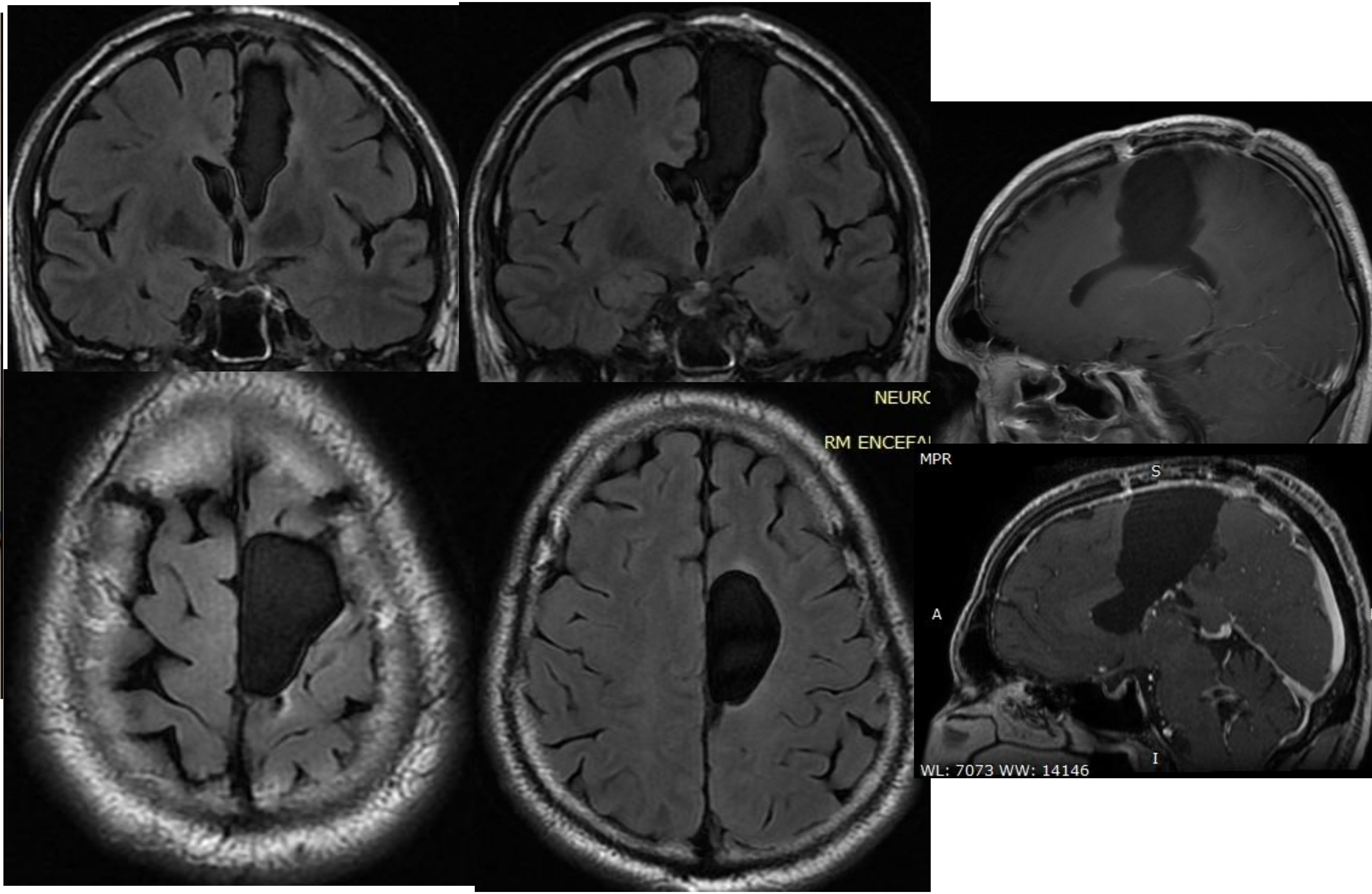








- Peeling del fascio piramidale con **tecnica CUSA-radar**: fino a 2 mA
- Transitoria emiparesi destra posto-operatoria con successivo completo recupero



Scomparsa delle crisi

Integrazione Neuropsicologia-Navigazione DTI-RMN funzionale
Casistica consecutiva settembre 2015 - settembre 2017

N = 82

Asportazione	**GTR=59 (72%)** **Subtot=16 (20%)** **Parziale/subtot=7(8)%**
Clinica postop	Nuovi deficit = 4 (5%) Peggioramento = 26 (31%) Invariato = 41 (47%) Miglioramento = 11 (12%)
Clinica a 1 mese	Nuovi deficit = 4 (5%) Peggioramento = 13 (16%) Invariato = 55 (67%) Miglioramento = 10 (12%)

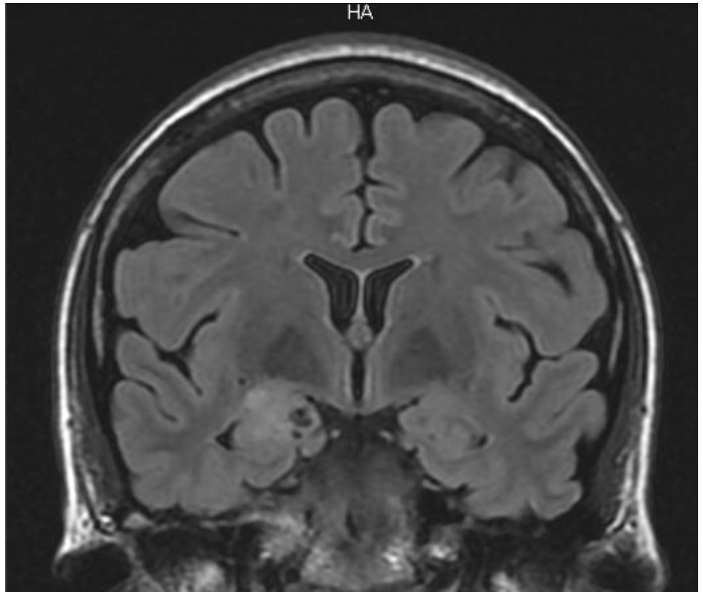
Scomparsa delle crisi epilettiche nei pazienti con asportazione totale:

80%

Gross Total Resection (GTR): residuo <3%; Subtotal: residuo<10% (Lacroix e coll., 2001)

2 - LEAT (Long-Term Epilepsy Associated Tumors) o epileptomi

Scarsa evolutività oncologica nella gran maggioranza dei casi
Tumori intrinsecamente epilettogeni
Tipici della giovane età
Quasi sempre nel lobo temporale (circa 80%)
Valutazione in un centro per la Chirurgia dell'Epilessia (non infrequentemente l'asportazione va estesa oltre il tumore per risolvere l'epilessia).

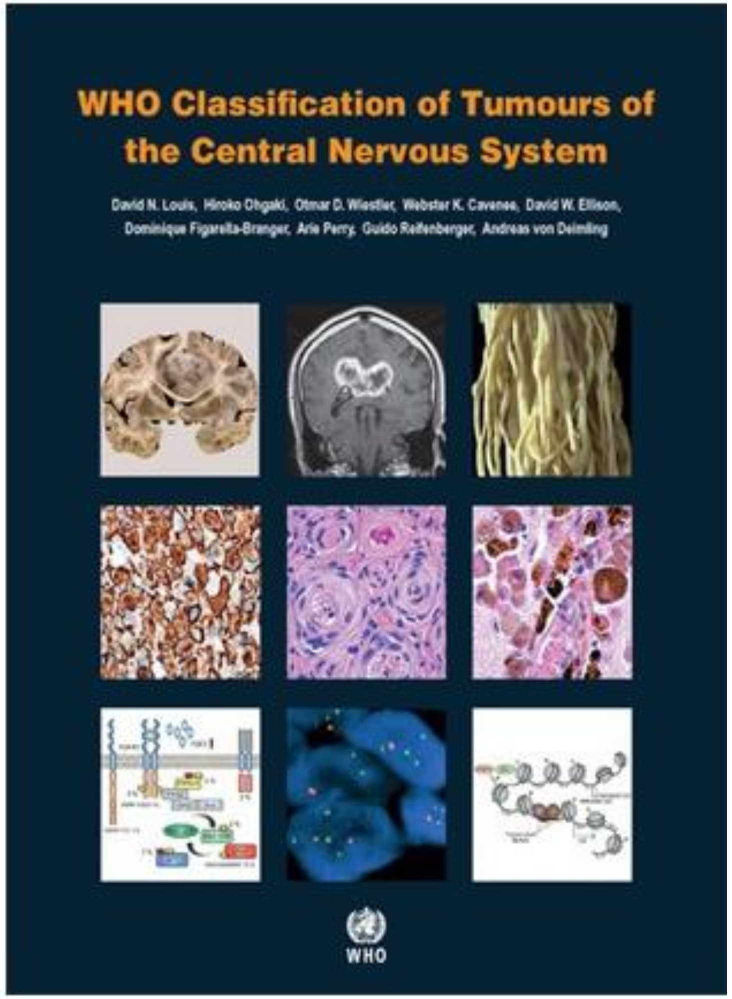


Neuronal and mixed neuronal-glial tumours (WHO Classification)

~ 1,3% DI TUTTI I TUMORI CEREBRALI

Neuronal and mixed neuronal-glial tumours

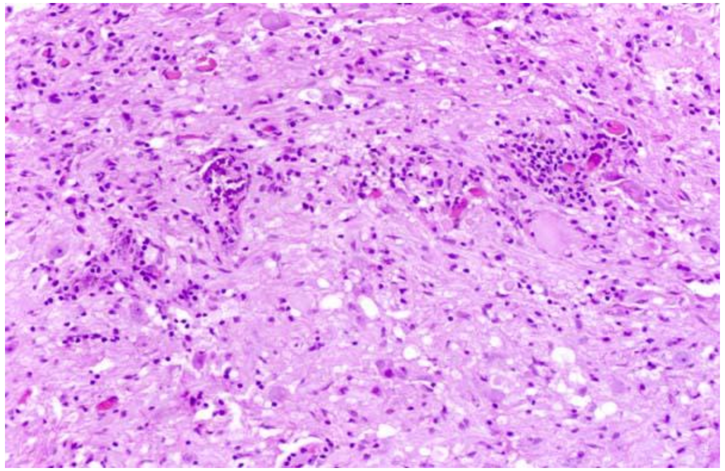
Dysembryoplastic neuroepithelial tumour	9413/0
Gangliocytoma	9492/0
Ganglioglioma	9505/1
Anaplastic ganglioglioma	9505/3
Dysplastic cerebellar gangliocytoma (Lhermitte–Duclos disease)	9493/0
Desmoplastic infantile astrocytoma and ganglioglioma	9412/1
Papillary glioneuronal tumour	9509/1
Rosette-forming glioneuronal tumour	9509/1
Diffuse leptomeningeal glioneuronal tumour	
Central neurocytoma	9506/1
Extraventricular neurocytoma	9506/1
Cerebellar liponeurocytoma	9506/1
Paraganglioma	8693/1



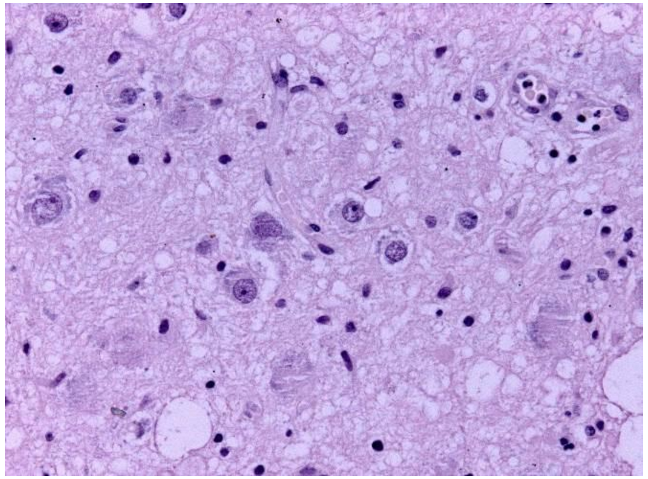
Tumori glioneuronali

Componente neuronale, o neuronale-gliale
Lenta crescita (grado I o II)
Spesso epilettogeni

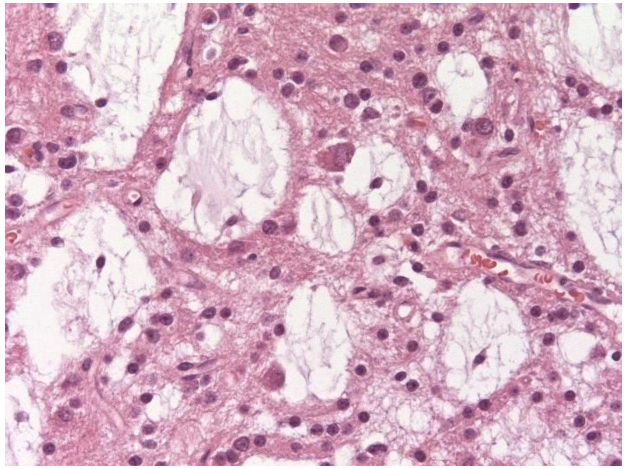
Grado I-IV



Ganglioglioma



Gangliocitoma



Disembrioneuroepitelioma (DNET)

Grado I

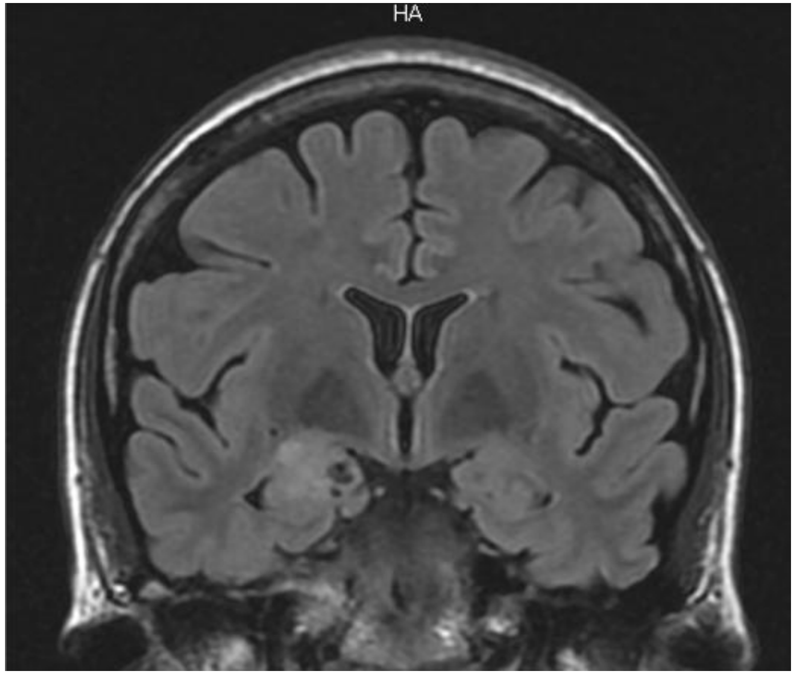
GANGLIOGLIOMI
GANGLIOCITOMI
DISEMBRIONEUROEPITELIOMI (DNT)

Grado I (nella maggior parte dei casi)

PREVALENTE LOCALIZZAZIONE NEL LOBO TEMPORALE

REGIONI TEMPORO-MESIALI

Luyken C, Blümcke I, Fimmers R, Urbach H, Wiestler O, Schramm J Cancer (2004)



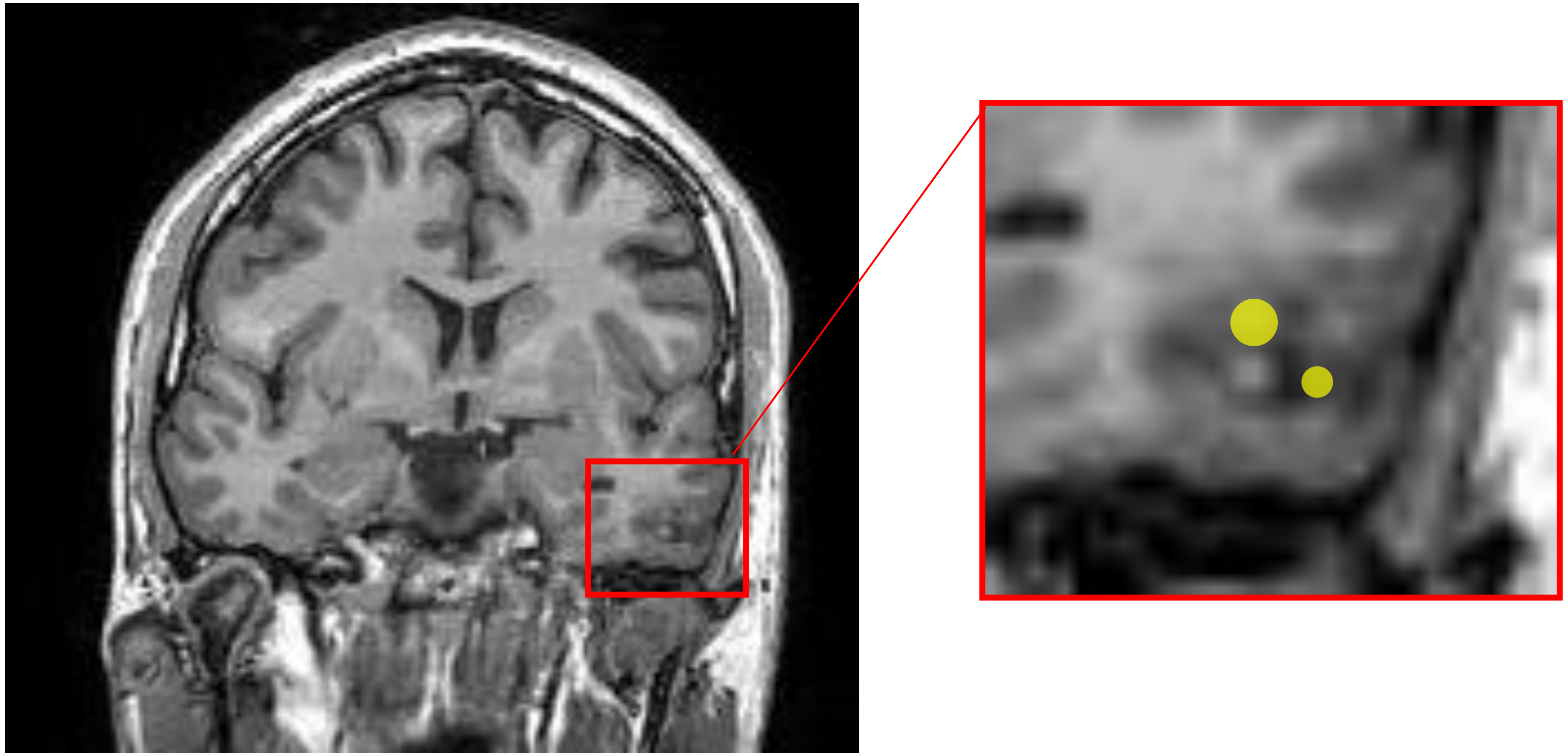
EPILESSIA INTRATTABILE → 90-100%

Rudà R, Trevisan E, Soffietti R (2010) Epilepsy and brain tumors. Curr Opin Oncol 22(6):611-620

TUMORI GLIONEURONALI ED EPILESSIA

MECCANISMI FISIOPATOLOGICI

ATTIVITA' EPILETTOGENA DELLE COMPONENTI NEURONALI DEL TUMORE



Shamji MF, Fric-Shamji EC, Benoit BG (2009) Brain tumors and epilepsy: pathophysiology of peritumoral changes. Neurosurg Rev 32(3):275–285

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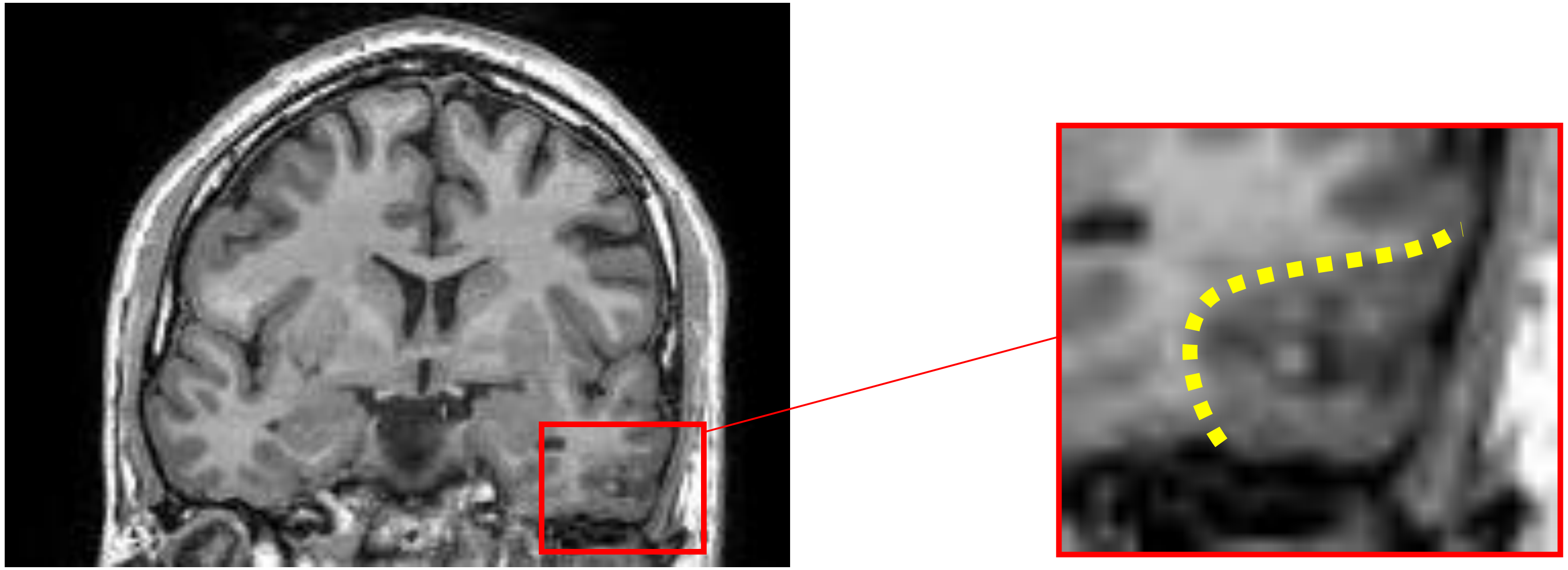
TUMORI GLIONEURONALI ED EPILESSIA

MECCANISMI FISIOPATOLOGICI

ALTERAZIONI BIOCHIMICHE E STRUTTURALI NEL PARENCHIMA CEREBRALE ADIACENTE ("ZONA DI COLLISIONE")

- ✓ ALTERAZIONE DEI LIVELLI DI NEUROTRASMETTITORI
- ✓ REAZIONI INFIAMMATORIE/DANNO IPOSSICO
- ✓ ACCUMULO DI CELLULE MICROGLIALI

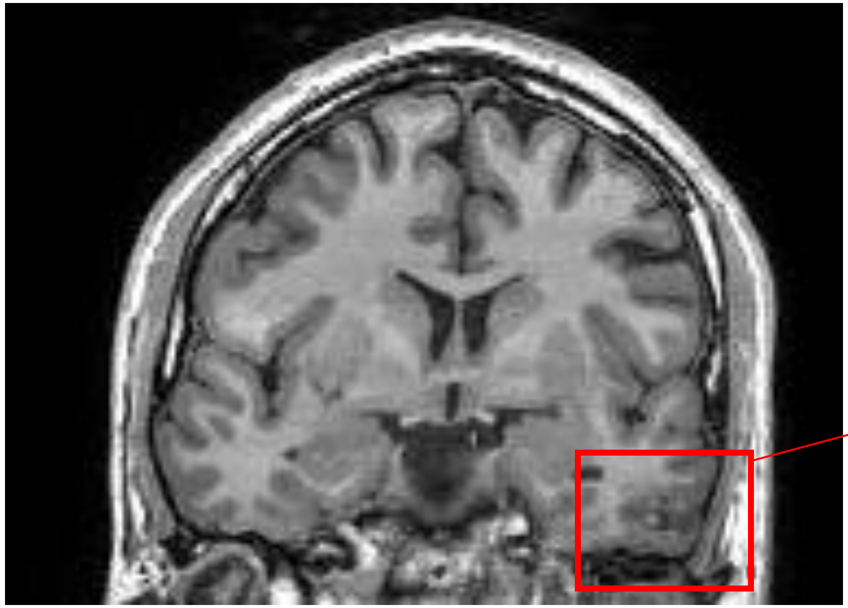


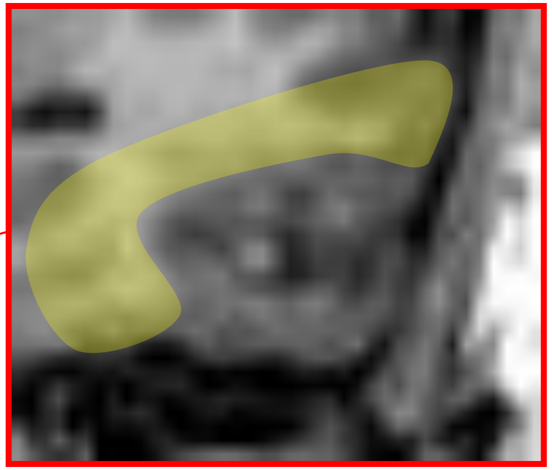
Aronica E, Leenstra S, van Veelen CWM, et al (2001): Glioneuronal tumors and medically intractable epilepsy: a clinical study with long-term follow-up of seizure outcome after surgery. Epilepsy Res 43(3):179–191

TUMORI GLIONEURONALI ED EPILESSIA

MECCANISMI FISIOPATOLOGICI

CONCOMITANTE DISPLASIA PERITUMORALE (DOUBLE PATHOLOGY)





Rajneesh KF, Binder DK (2009) Tumor-associated epilepsy. Neurosurg Focus 27(2):E4

TUMORI GLIONEURONALI ED EPILESSIA

STRATEGIE CHIRURGICHE

Epilepsia, 53(1):51–57, 2012
doi: 10.1111/j.1528-1167.2011.03269.x

FULL-LENGTH ORIGINAL RESEARCH

Factors associated with seizure freedom in the surgical resection of glioneuronal tumors

Dario J. Englot, Mitchel S. Berger, Nicholas M. Barbaro, and Edward F. Chang

Department of Neurological Surgery, University of California, San Francisco, California, U.S.A.

Table 1. Studies included in analysis

Alexiou et al. (2009)	Lee et al. (2000)
Aronica et al. (2001)	Lombardi et al. (1997)
Bauer et al. (2007)	Luyken et al. (2003)
Benifla et al. (2006)	Minkin et al. (2008)
Bilginer et al. (2009)	Morioka et al. (2007)
Cataltepe et al. (2005)	Morris et al. (1998)
Chan et al. (2006)	Nolan et al. (2004)
Chang et al. (2010)	Ogiwara et al. (2010)
Choi et al. (2004)	Panda et al. (2005)
Devaux et al. (1997)	Park et al. (2008)
Drake et al. (1987)	Pilcher et al. (1993)
Giulioni et al. (2005)	Radhakrishnan et al. (2006)
Giulioni et al. (2006)	Raymond et al. (1995)
Giulioni et al. (2009)	Sandberg et al. (2005)
Jooma et al. (1995)	Sharma et al. (2009)
Kameyama et al. (2001)	Tran et al. (1997)
Khajavi et al. (1994)	Wennberg et al. (1999)
Khajavi et al. (1999)	Zaatreh et al. (2003)
Kim et al. (1995)	Zentner et al. (1997)
Kirkpatrick et al. (1993)	

39 STUDI

TOT. 910 PAZIENTI

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Table 2. Seizure outcomes stratified across factors of interest

	Engel I	Engel II–IV	χ^2	p-value
Patient age				
<18 years old	215 (83)	44 (17)	0.53	0.49
≥18 years old	104 (80)	26 (20)		
Tumor location				
Temporal	519 (81)	124 (19)	1.51	0.229
Extratemporal	155 (77)	47 (23)		
Pathologic diagnosis				
Ganglioglioma	409 (78)	119 (23)	3.41	0.067
DNET	315 (83)	67 (18)		
Seizure control[a]				
Controlled	46 (84)	9 (16)	0.45	0.601
Refractory	589 (80)	148 (20)		
Seizure semiology				
Partial only	181 (87)	27 (13)	13.00	<0.001[b]
Generalized/mixed	147 (73)	55 (27)		
Duration of epilepsy				
≤1 year	63 (97)	2 (3)	13.71	<0.001[b]
>1 year	246 (77)	74 (23)		
Extent of resection				
Gross-total	552 (87)	80 (13)	79.60	<0.001[b]
Subtotal	88 (55)	72 (45)		
Intraoperative ECoG				
Used	124 (84)	23 (16)	1.97	0.200
Not used	441 (79)	116 (21)		
Total	724 (80)	186 (20)		

Number of patients (%) across all studies that were seizure-free (Engel class I) or continued to have seizures (Engel class II–IV) in each group postoperatively.

[a]Seizures medically controlled or refractory preoperatively.

[b]Significant value ($p < 0.02$).

Table 3. Seizure outcomes stratified by extent of resection and location in temporal lobe tumors

	Engel I	Engel II–IV	OR (95% CI)	p-value
(A) Extent of resection[a]				
Subtotal lesionectomy	28 (37)	47 (63)	0.16 (0.09–0.29)	<0.001[b]
Gross-total lesionectomy (GTR)	178 (78)	49 (22)	1 [Reference]	–
GTR + hippocampectomy	64 (94)	4 (6)	4.40 (1.53–12.69)	<0.01[b]
GTR + corticectomy	38 (95)	2 (5)	5.23 (1.21–22.45)	0.01[b]
GTR + hippocampectomy + corticectomy	146 (90)	16 (10)	2.51 (1.37–4.60)	<0.01[b]
(B) Location in temporal lobe				
Mesial temporal lobe	121 (82)	27 (18)	1 [Reference]	–
Lateral temporal lobe	58 (81)	14 (19)	0.92 (0.45–1.89)	0.85
Mixed	15 (65)	8 (35)	0.42 (0.16–1.09)	0.09
Not specified	260 (79)	69 (21)	0.84 (0.51–1.38)	0.29
Total	454 (79)	118 (20)		

Data shown are number of patients (%).

[a]Note: Ns not equal to data in Table 2, as only temporal lobe tumors with extent of resection data are included here.

[b]Significant value ($p < 0.02$).

Fattori prognostici sull’andamento postoperatorio dell’epilessia

Favorevoli

- Durata dell’epilessia uguale o inferiore a un anno
- Lesionectomia totale
- Resezioni chirurgiche estese (amigdalo-ippocampectomia e/o corticectomia) nelle lesioni del lobo temporale

Sfavorevoli

- Crisi epilettiche preoperatorie con generalizzazione secondaria

I fattori critici sul risultato epilettologico sono:
- intervento precoce
- resezione totale

FULL-LENGTH ORIGINAL RESEARCH

Epilepsy surgery of "low grade epilepsy associated neuroepithelial tumors": A retrospective nationwide Italian study

[1]Marco Giulioni, [2,3]Gianluca Marucci, [4]Veronica Pelliccia, [4]Francesca Gozzo, [5]Carmen Barba, [6]Giuseppe Didato, [6]Flavio Villani, [7]Giancarlo Di Gennaro, [7]Pier Paolo Quarato, [7,8]Vincenzo Esposito, [9]Alessandro Consales, [1,10]Matteo Martinoni, [1]Gianfranco Vornetti, [11]Corrado Zenesini, [12]Carlo Efisio Marras, [13]Nicola Specchio, [13]Luca De Palma, [14]Raffaele Rocchi, [15]Flavio Giordano, [16]Giovanni Tringali, [17]Paolo Nozza, [18]Gabriella Colicchio, [19,20]Guido Rubboli, [4]Giorgio Lo Russo, [5,21]Renzo Guerrini, [20,22]Paolo Tinuper, [4]Francesco Cardinale, and [4]Massimo Cossu, On behalf of the Commission for Epilepsy Surgery of the Italian League Against Epilepsy

Epilepsia, **(*):1–10, 2017
doi: 10.1111/epi.13866

339 consecutive patients with LEATs who underwent surgery between January 2009 and June 2015.

Epilepsy surgery of LEATs led to a favorable seizure outcome in **88%** of drug-resistant patients and in **98%** of drug-responsive patients

Younger age at surgery, temporal resection site, and complete tumor removal are predictors of a favorable seizure outcome in refractory epilepsy

A **timely surgical treatment**, oriented to optimize epileptologic, neuropsychological, and oncologic outcome should be nowadays warranted

NEUROMED 2002-2017

103 pazienti

Tipo	N.	Età Media	Temporale	Epilessia	Durata Epil.
Gangliogliomi	70	29	52	53	16
DNT	21	22	14	18	10
Gangliocitomi	12	39	6	5	13
Tot.	103	30	72 (69%)	76 (74%)	13

GANGLIOGLIOMA I WHO*	65
GANGLIOGLIOMA III WHO	5
DNT I WHO	21
GANGLIOCITOMA I WHO	12
RESEZIONE TOTALE	**103**

*2 Reinterventi per recidiva, 2ª diagnosi: ganglioglioma grado I

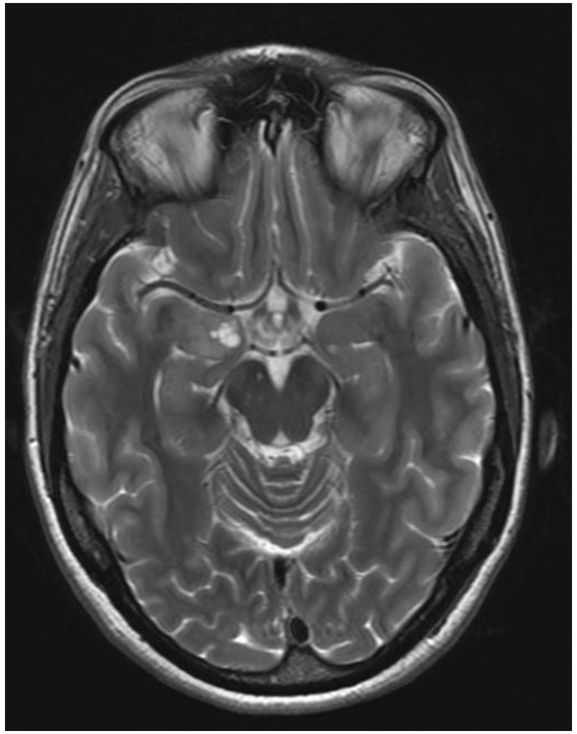
- Morbidità Permanente 1 emiparesi brachiocrurale lieve (1 %)
- Mortalità 0
- Engel I

(completa assenza di crisi) **85%**

INDAGINI PRECHIRURGICHE

OBBLIGATORIE NEI PAZIENTI CON EPILESSIA FARMACORESISTENTE

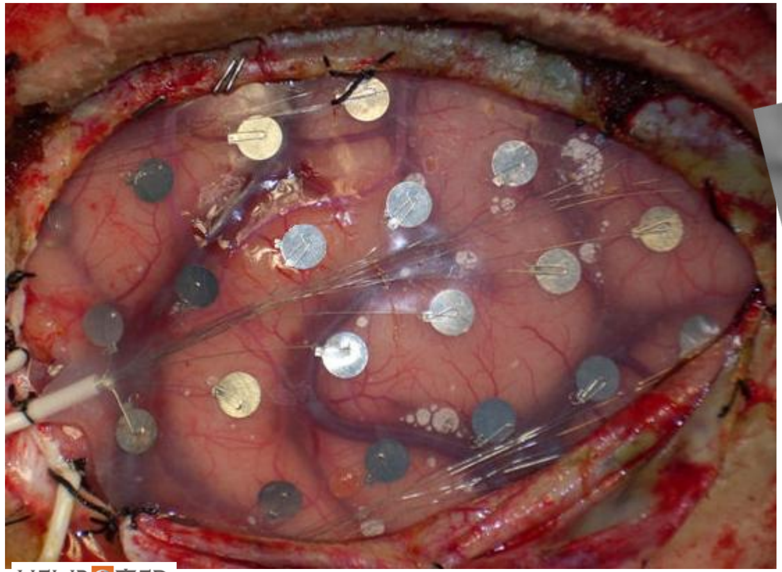
Neuroimaging

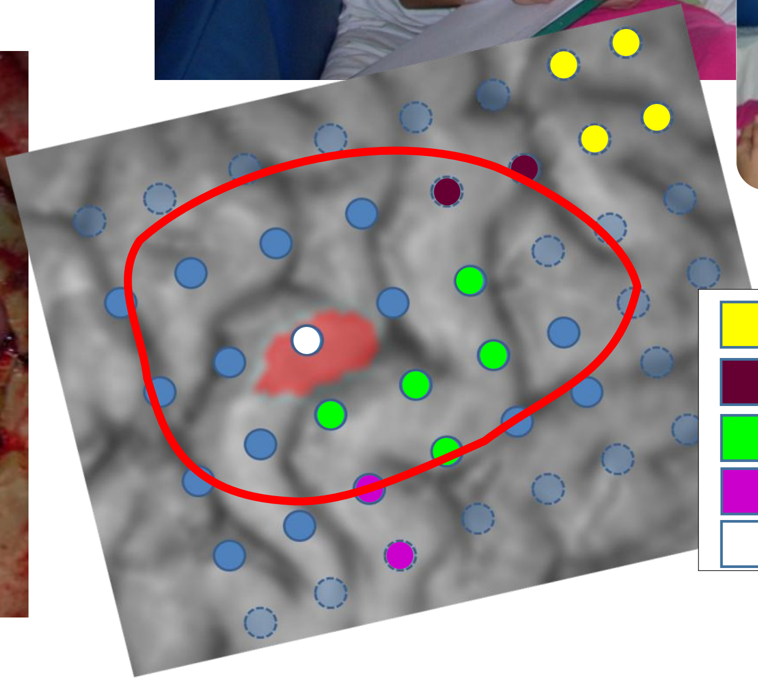


Video-EEG

Valutazione neuropsicologica

INDAGINI PRECHIRURGICHE INVASIVE (21%)



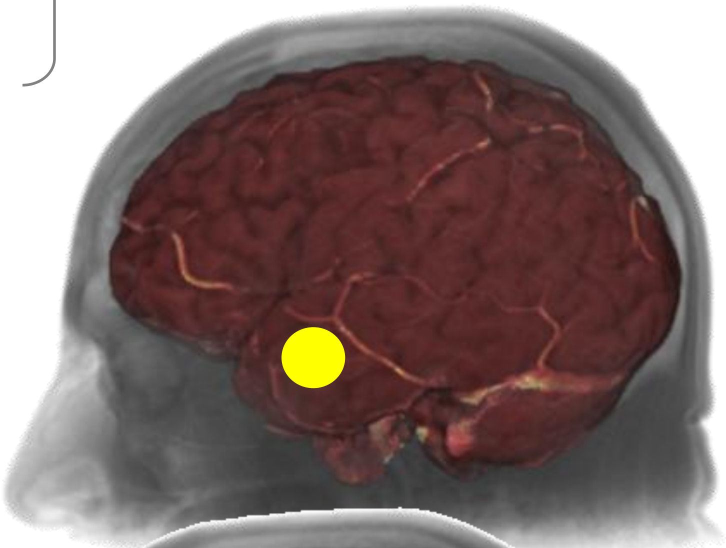


PROCEDURE CHIRURGICHE EFFETTUATE

GANGLIOGLIOMI
DNT
GANGLIOCITOMI

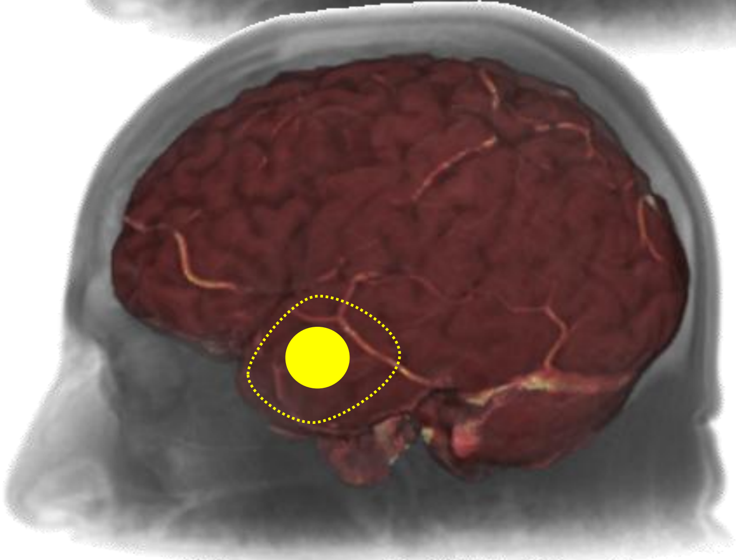
Pazienti epilettici

LESIONECTOMIA



60%

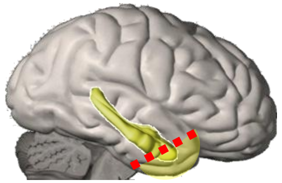
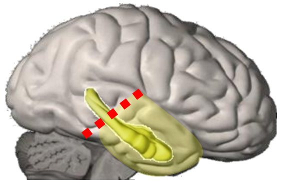
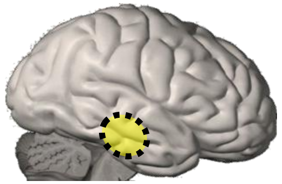
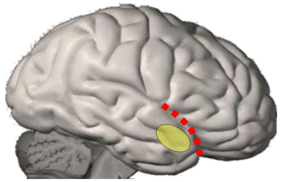
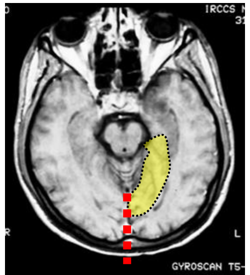
LESIONECTOMIA
+ CORTECTOMIA

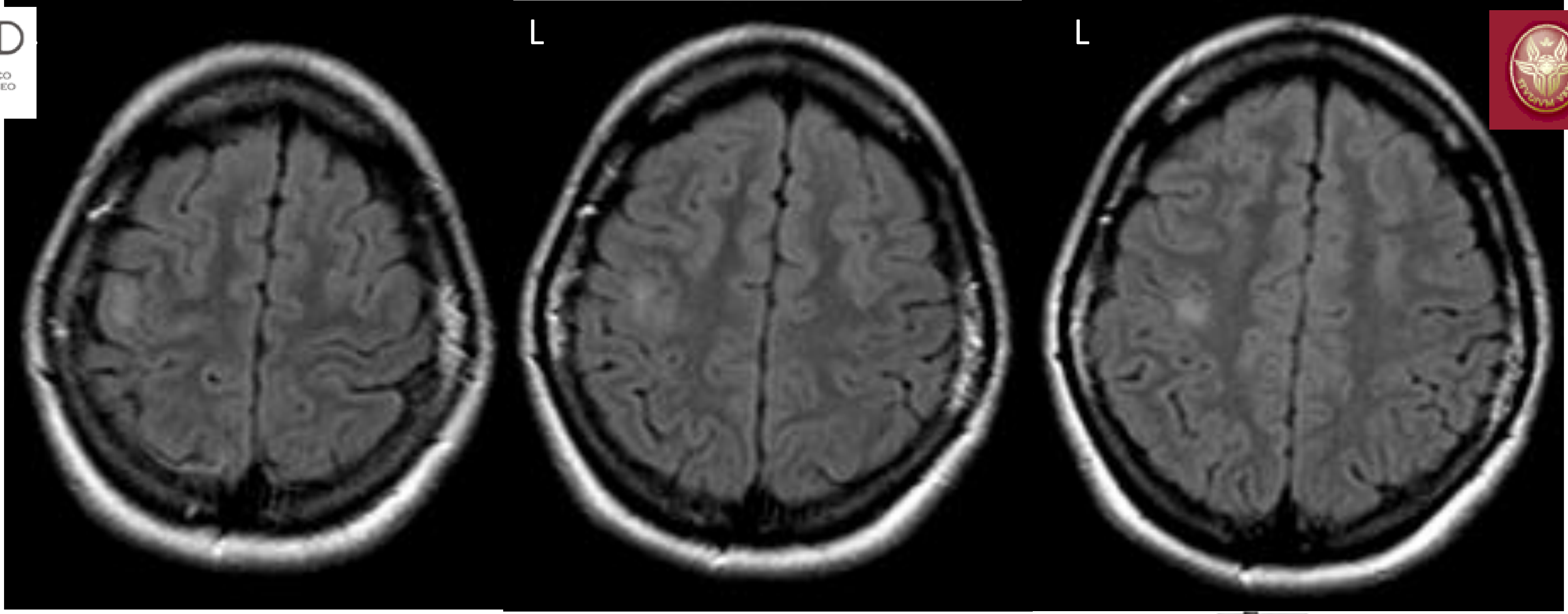


40%

PROCEDURE CHIRURGICHE EFFETTUATE

LOBO TEMPORALE (TOT 58 pazienti)

	Lobectomie Temporo-Mesiali Anteriori	**18 (31%)**
	Lobectomie Temporali Estese	**4 (7%)**
	Lesionectomia Lesioni laterali e basali	**20 (35%)**
	Lesionectomia **(APPROCCIO TRANSILVIANO)** Lesioni mesiali	**13 (22%)**
	Lesionectomia **(APPROCCIO INTEREMISFERICO)** Lesioni mesiali temporo-occipitali	**3 (5%)**



M.T. , 23 anni, ♀
Da 2 anni crisi motorie alla mano destra
Fino a 100 crisi al giorno !!

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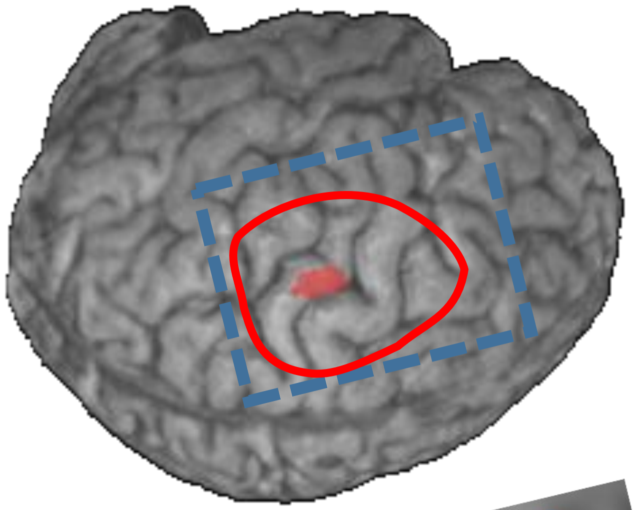

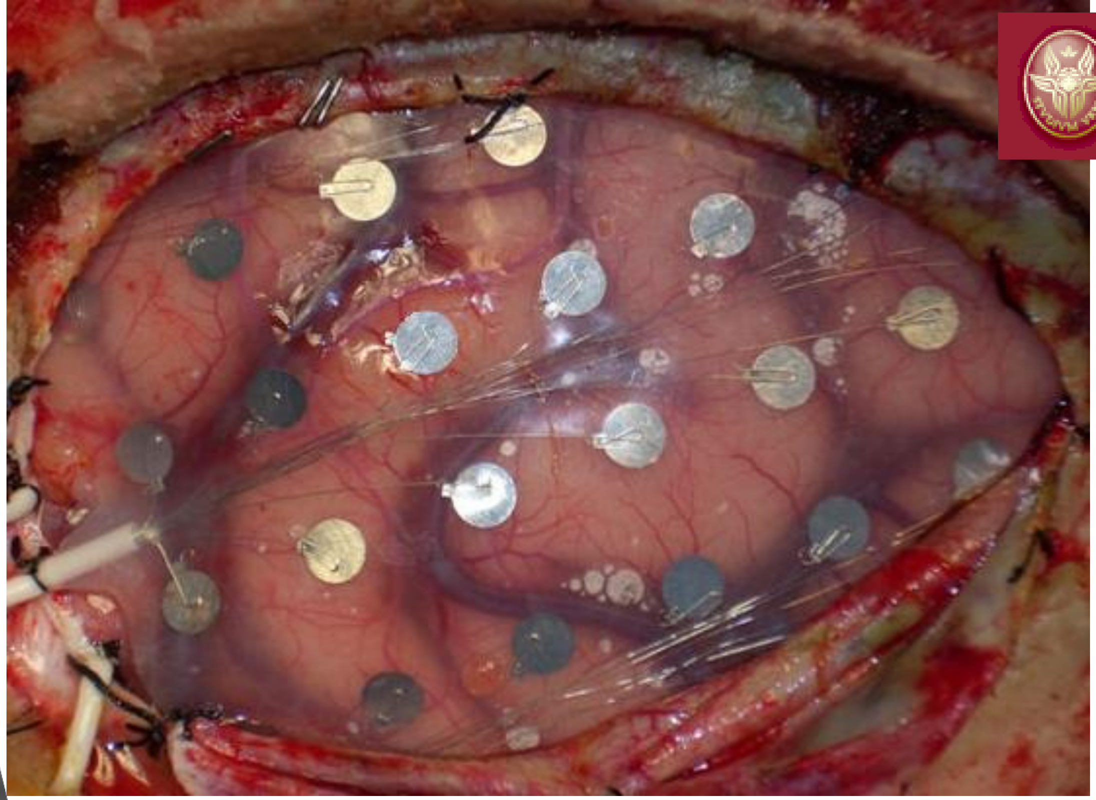

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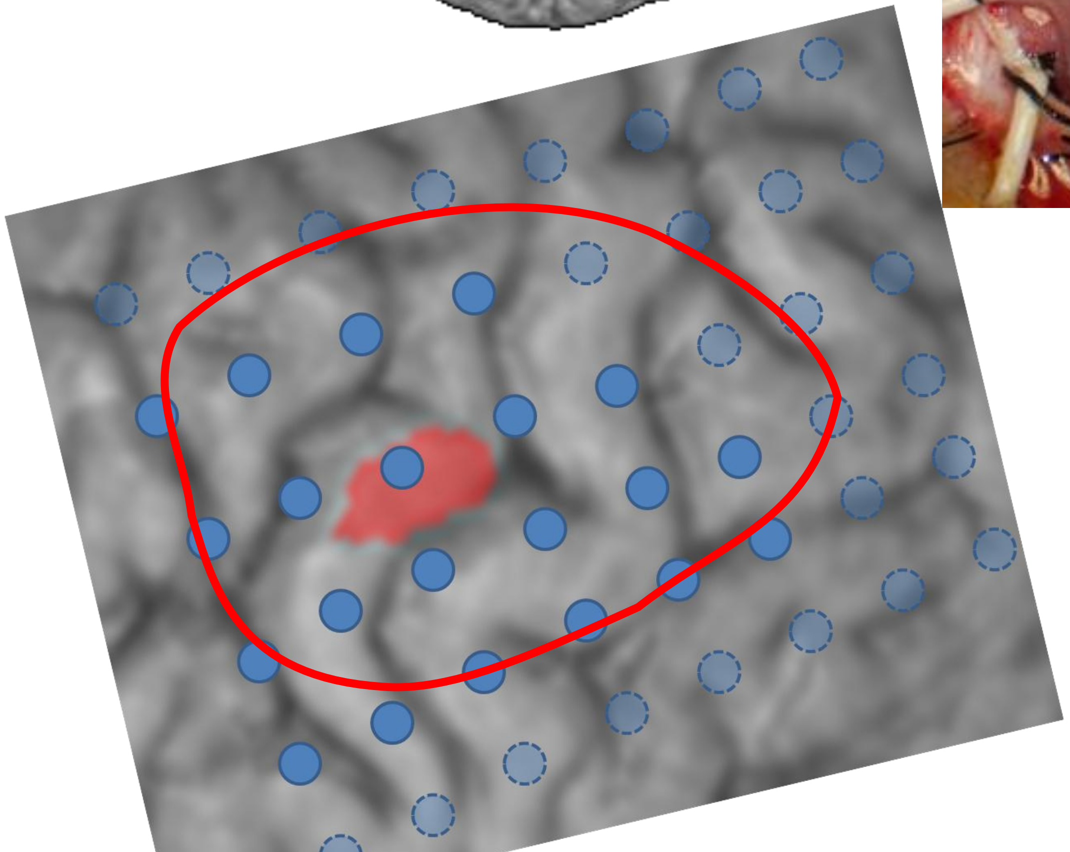
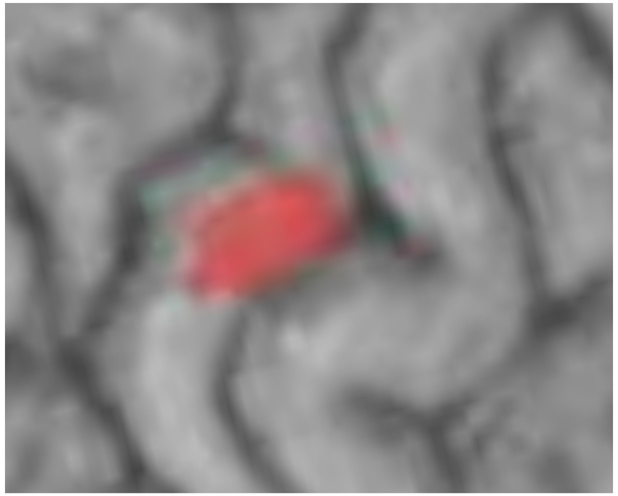
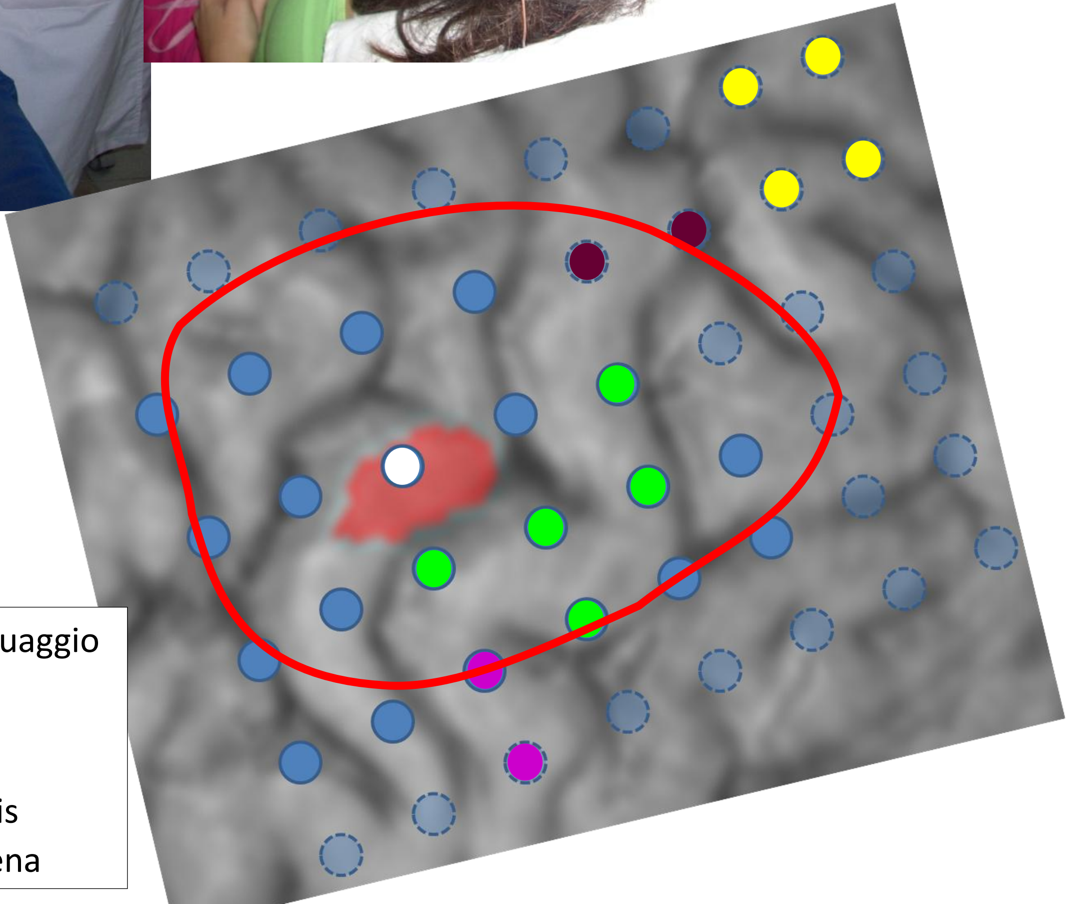
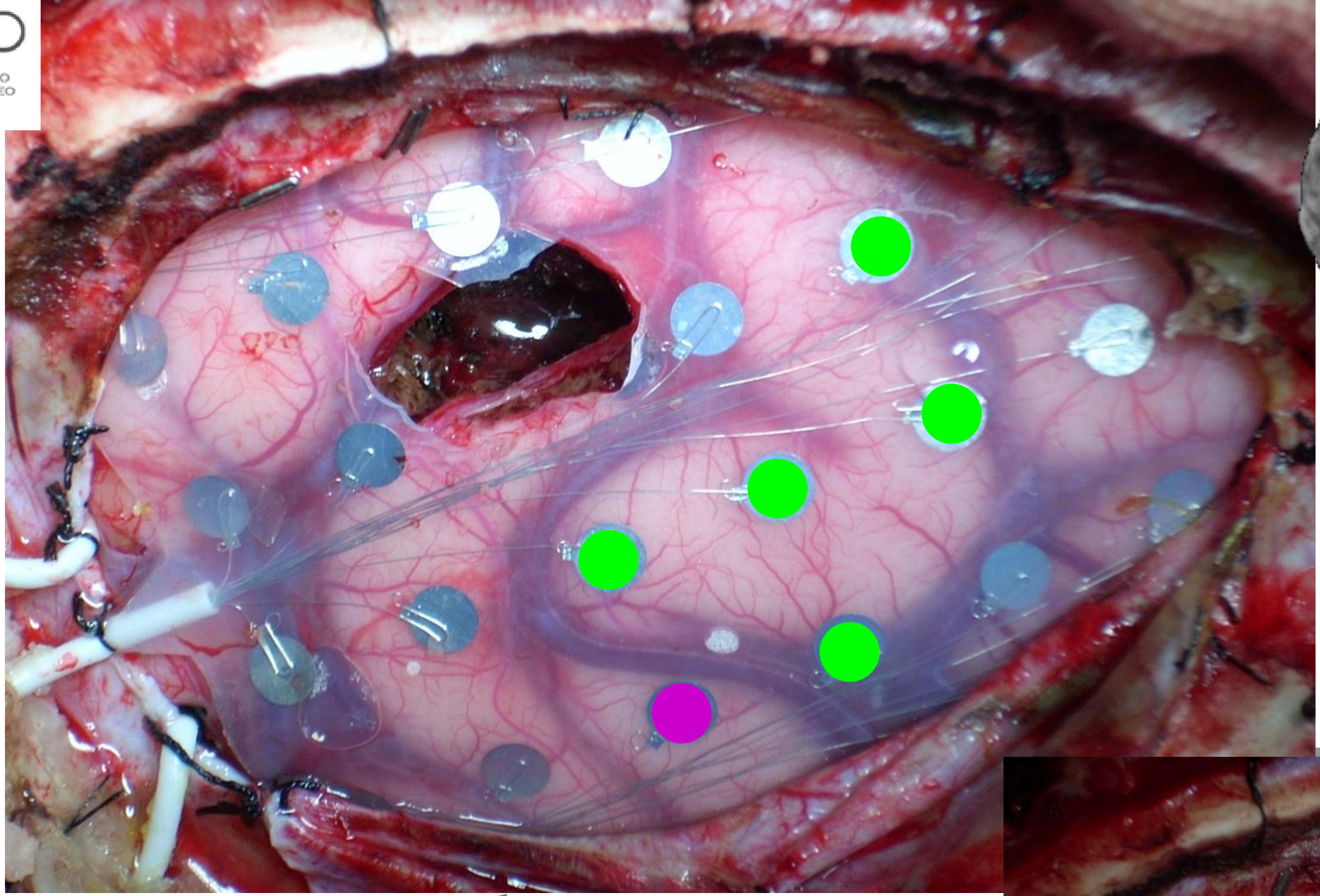


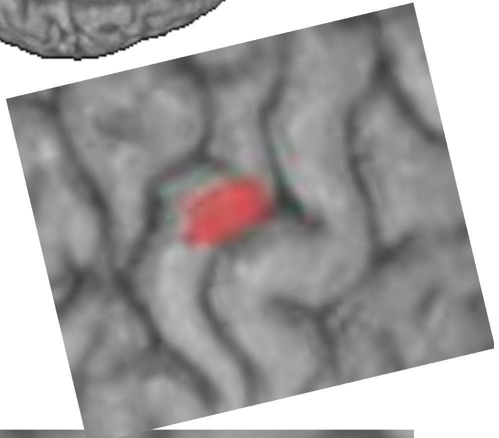


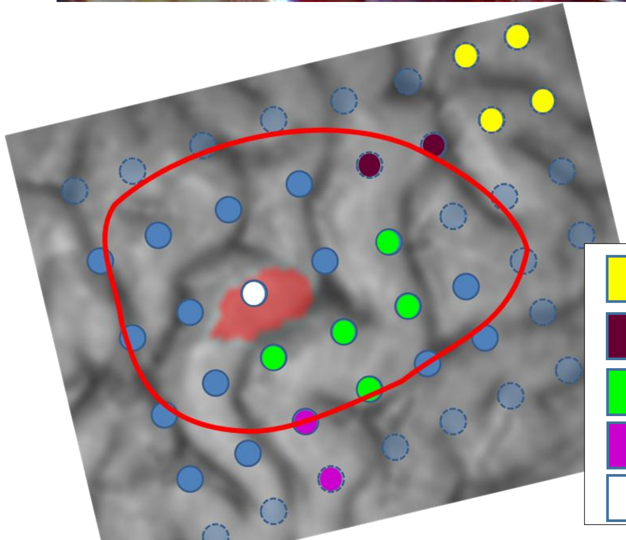


- Arresto del linguaggio
- Movim. Faccia
- Movim. Mano
- Biceps brachialis
- Zona Epilettogena

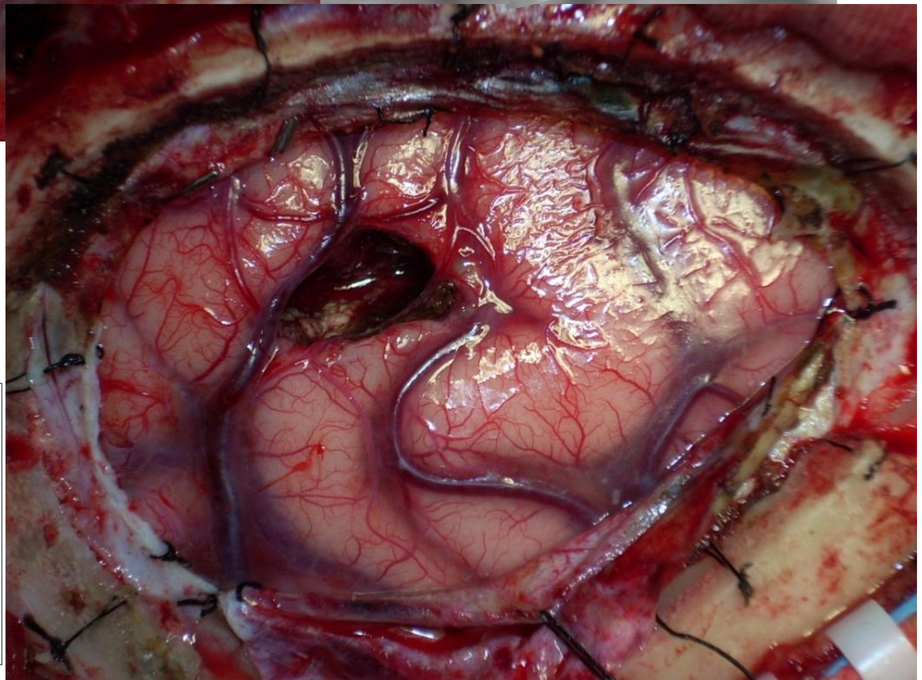
Operata
Novembre 2007

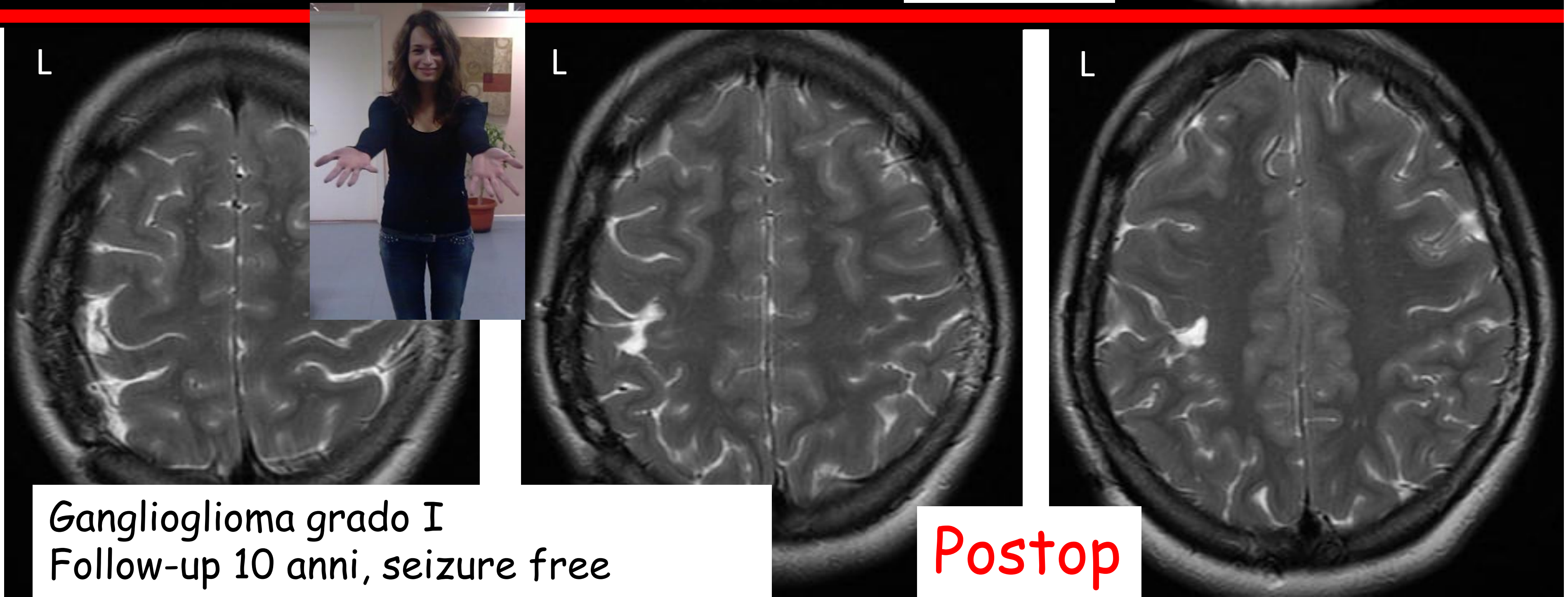




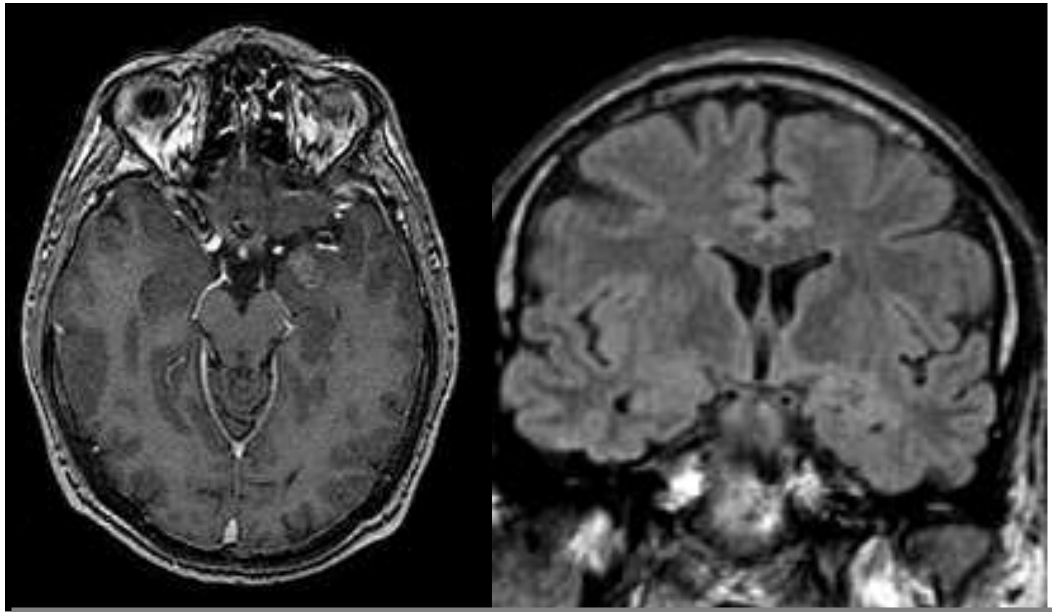


- Arresto del linguaggio
- Movim. Faccia
- Movim. Mano
- Biceps brachialis
- Zona Epilettogena





Ganglioglioma grado I
Follow-up 10 anni, seizure free



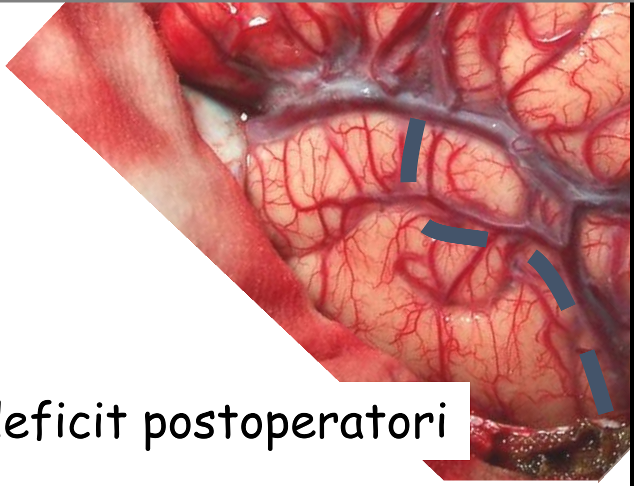
m 41 aa, destrimane

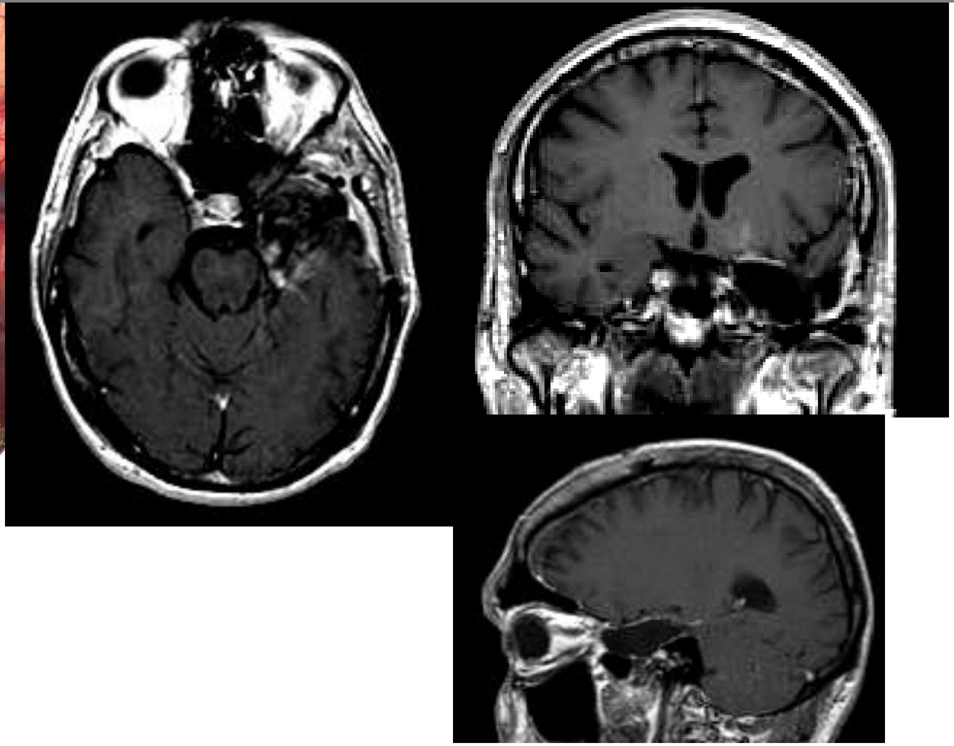
Epilessia farmacoresistente (durata 19 aa)

Crisi parziali complesse

Frequenza plurisettimanale

Video-EEG: pattern elettroclinico latero-mesiale





No deficit postoperatori

Libero da crisi (Engel I) follow-up 5 aa

Ganglioglioma (I WHO)

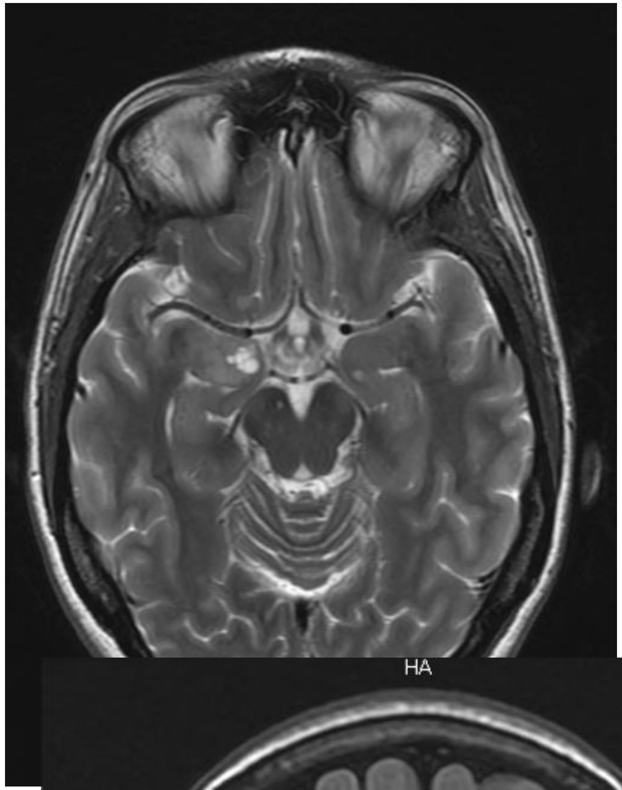
f 39 aa, mancina corretta

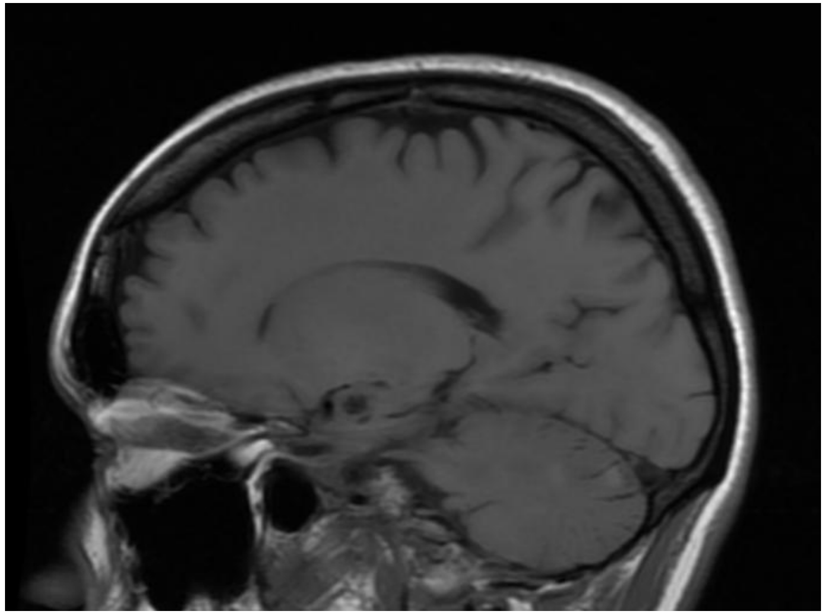
Epilessia farmacoresistente
(durata 15 aa)

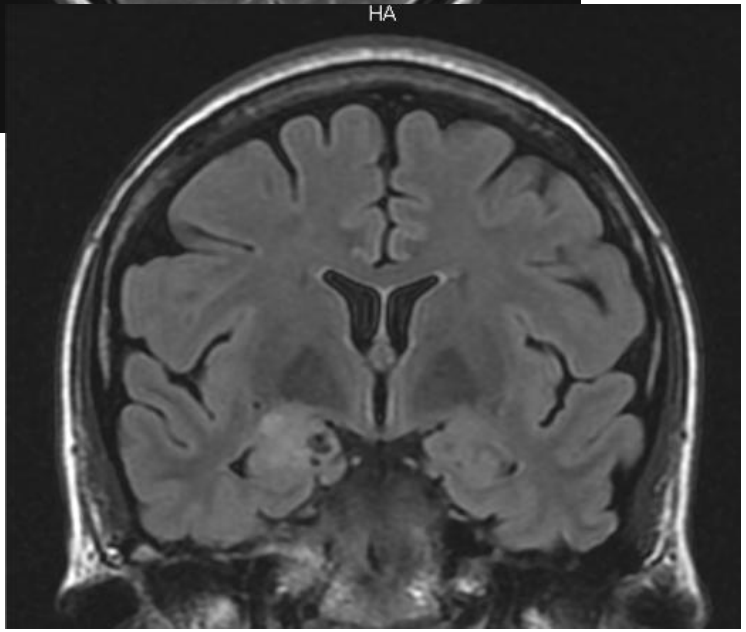
Crisi parziali semplici

Frequenza plurimensile

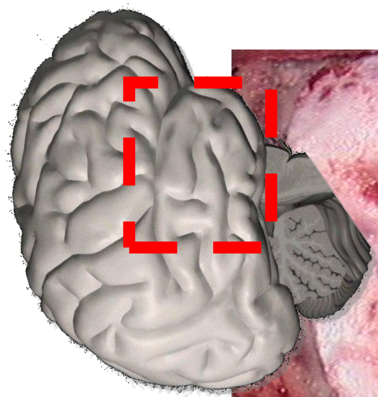
Video-EEG: pattern elettroclinico mesiale

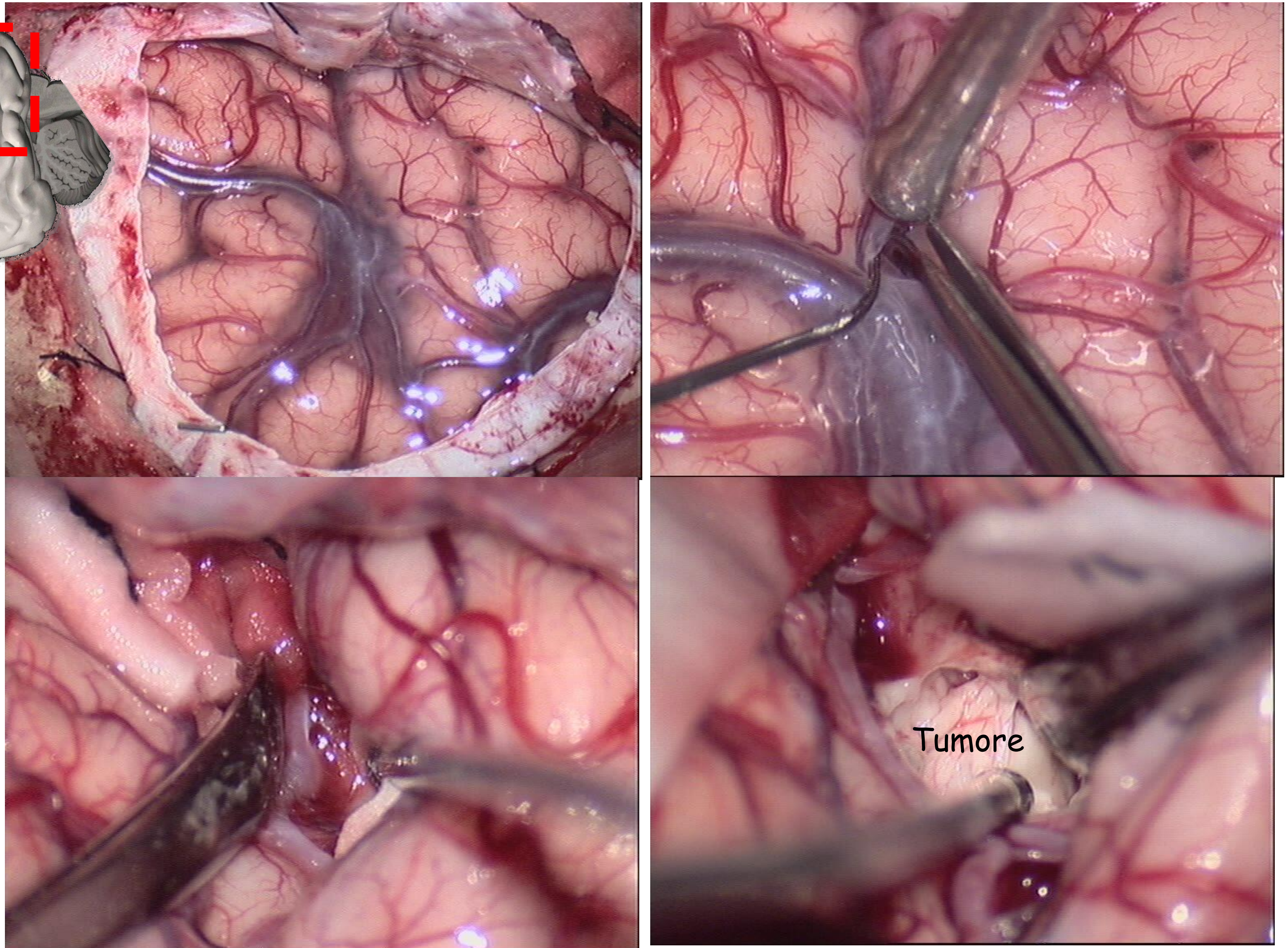


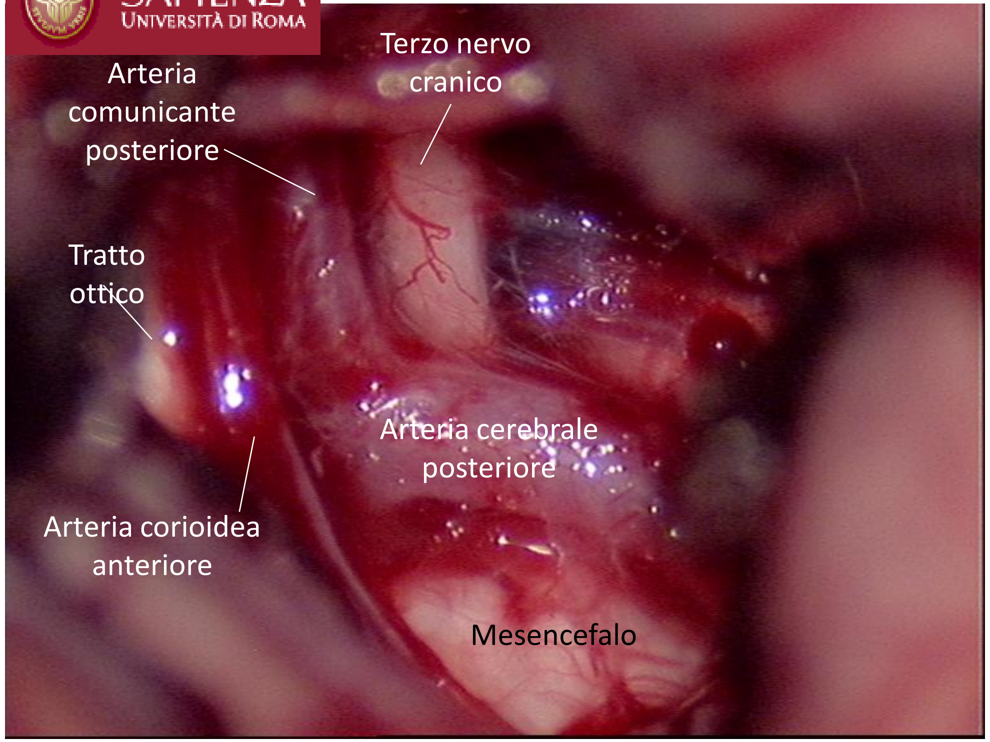


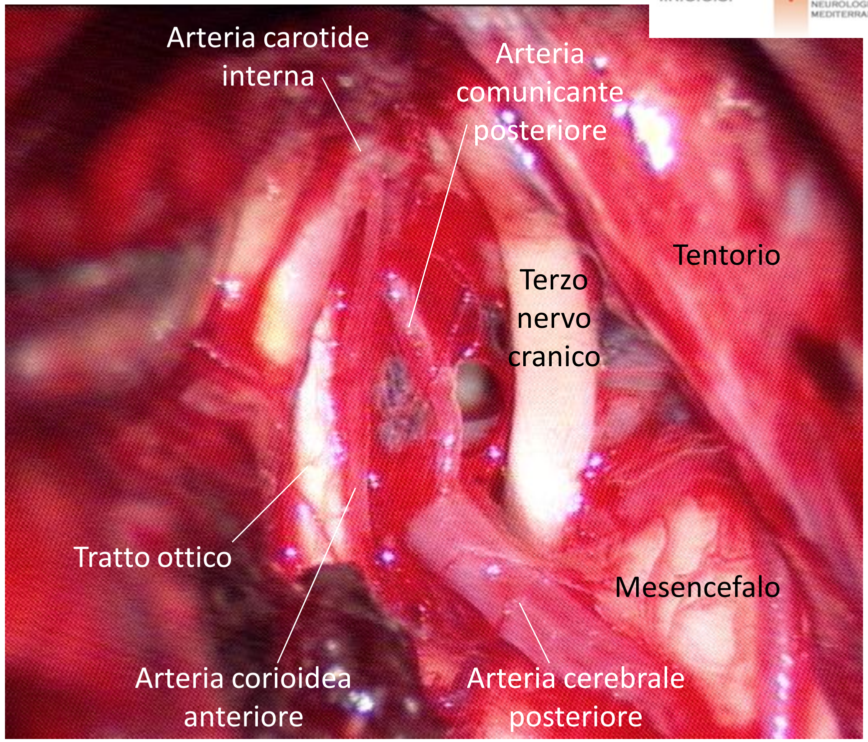


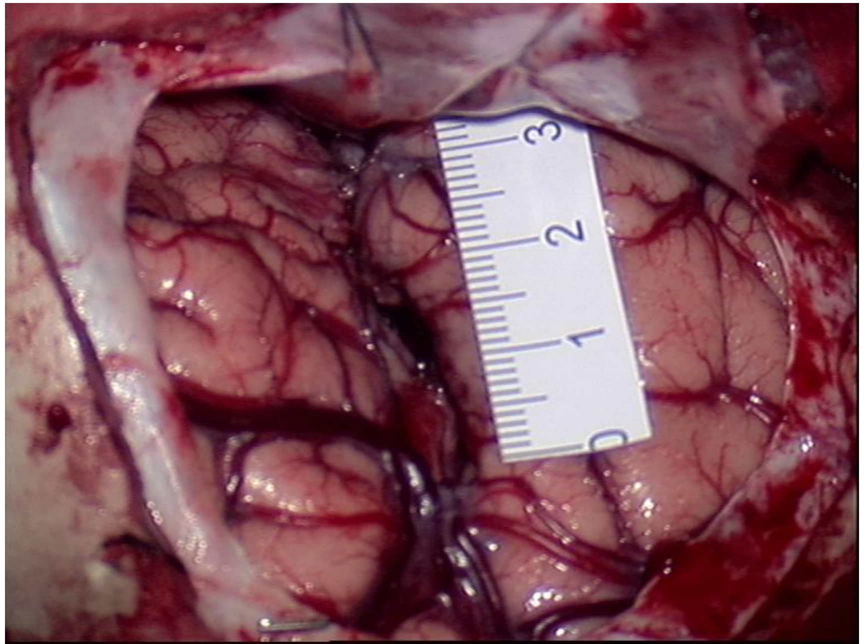
ViaTrans-silviana






Terzo nervo cranico
Arteria comunicante posteriore
Tratto ottico
Arteria cerebrale posteriore
Arteria corioidea anteriore
Mesencefalo


Arteria carotide interna
Arteria comunicante posteriore
Tentorio
Terzo nervo cranico
Tratto ottico
Mesencefalo
Arteria corioidea anteriore
Arteria cerebrale posteriore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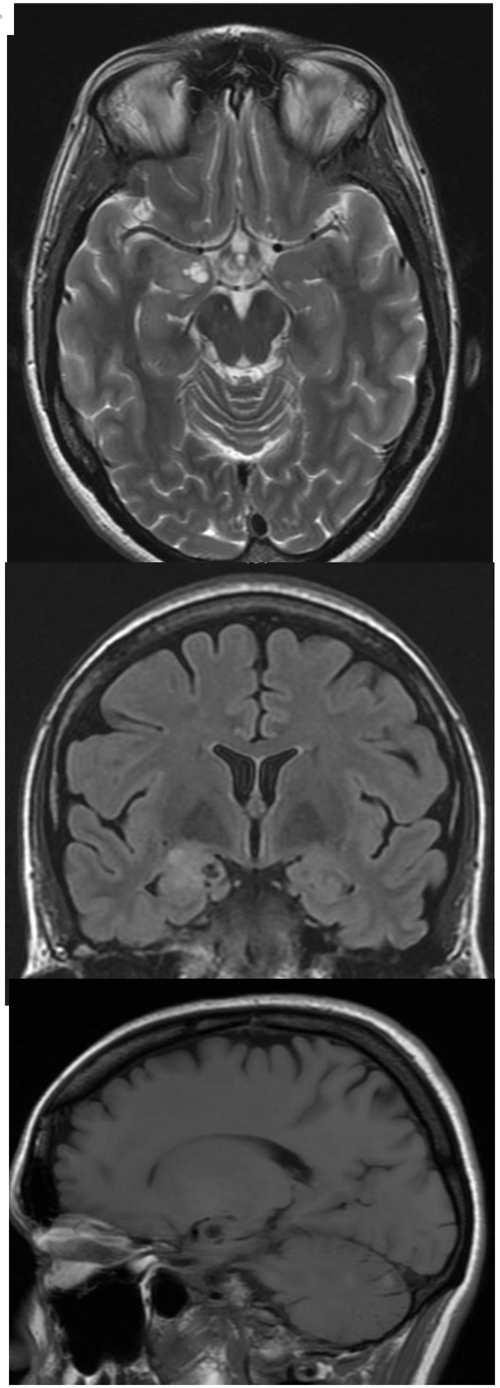
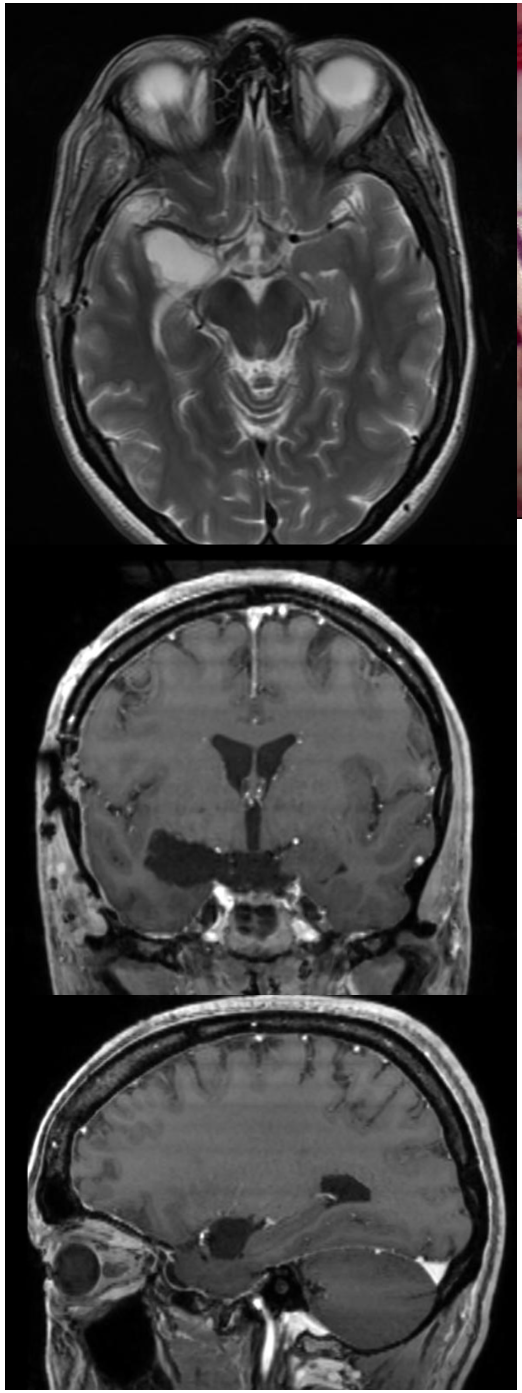


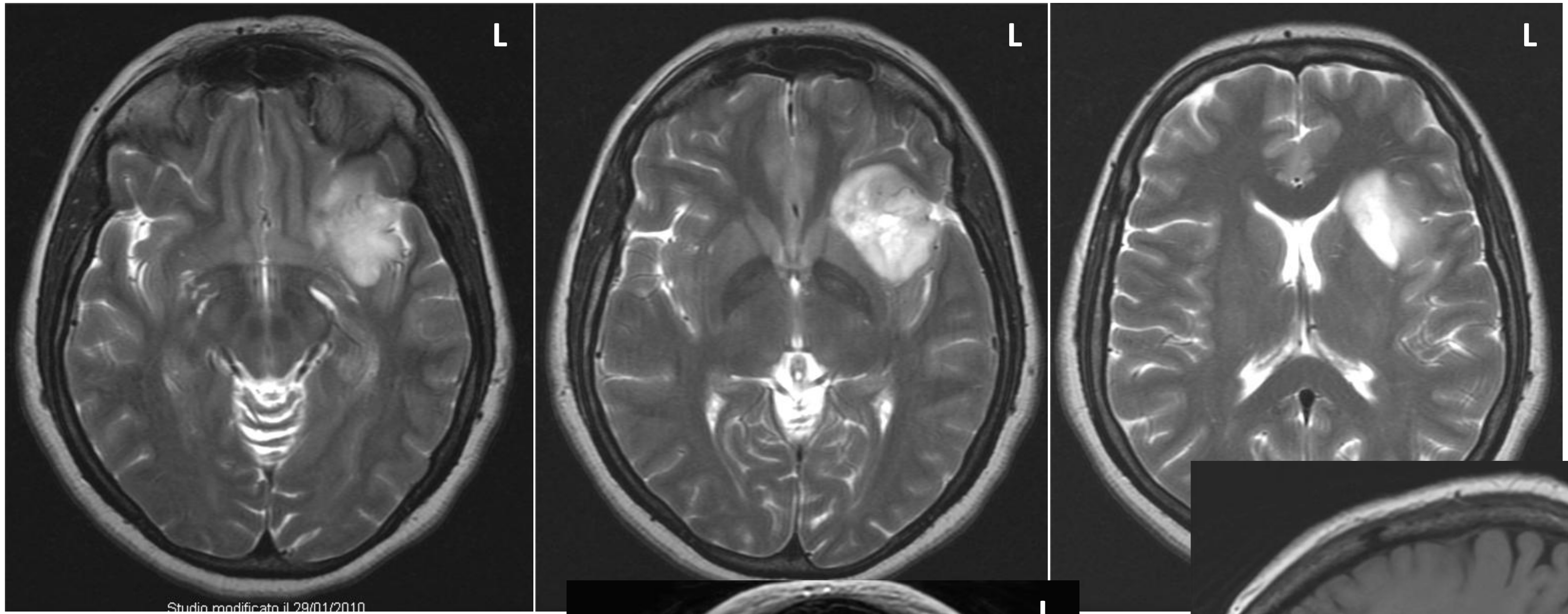


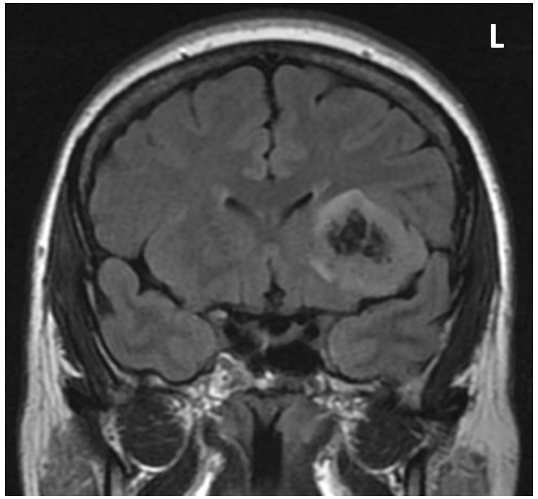
DNT (I WHO)

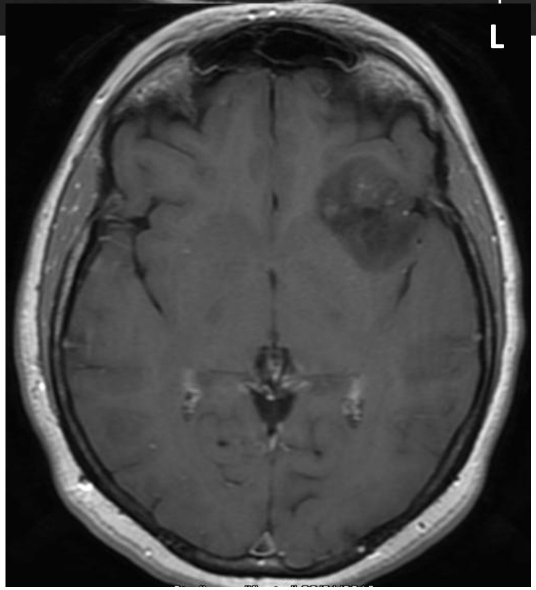
Libera da crisi (Engel I)
Follow-up 6 aa

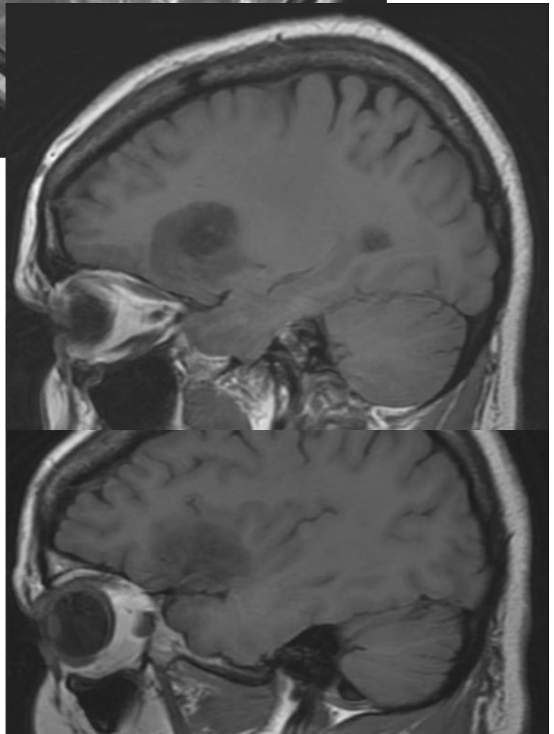
G.R., f, 38 a. Crisi epilettiche

Esame obiettivo neurologico normale



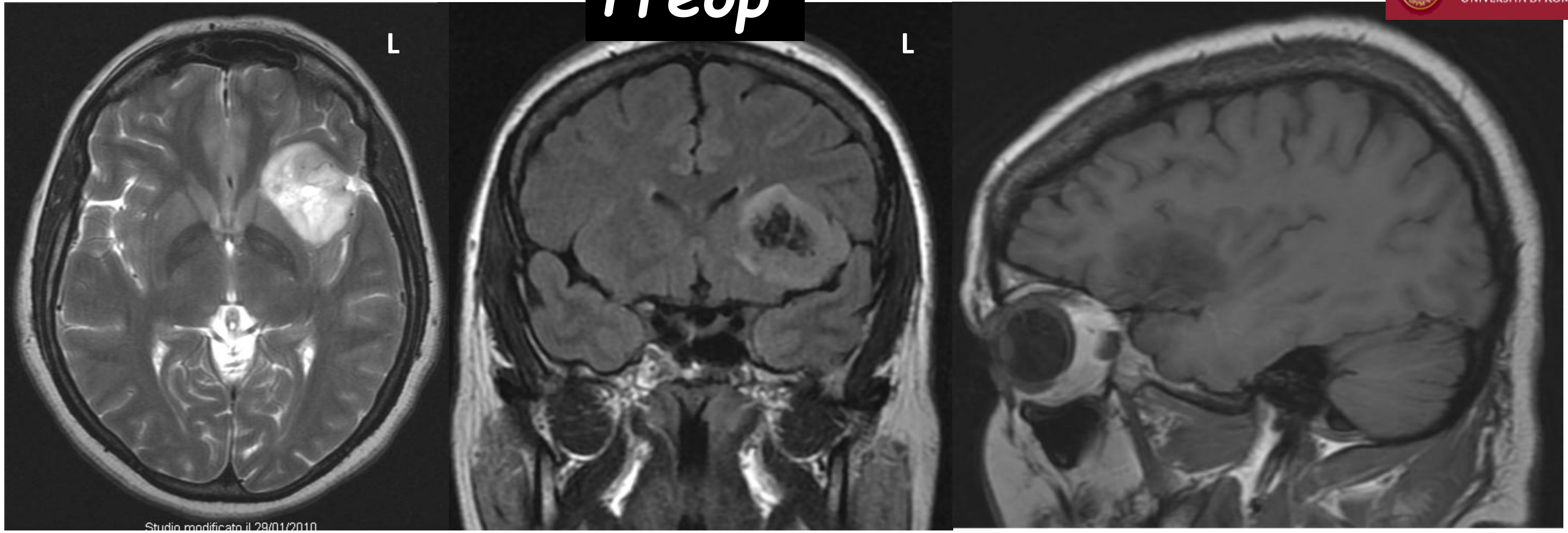




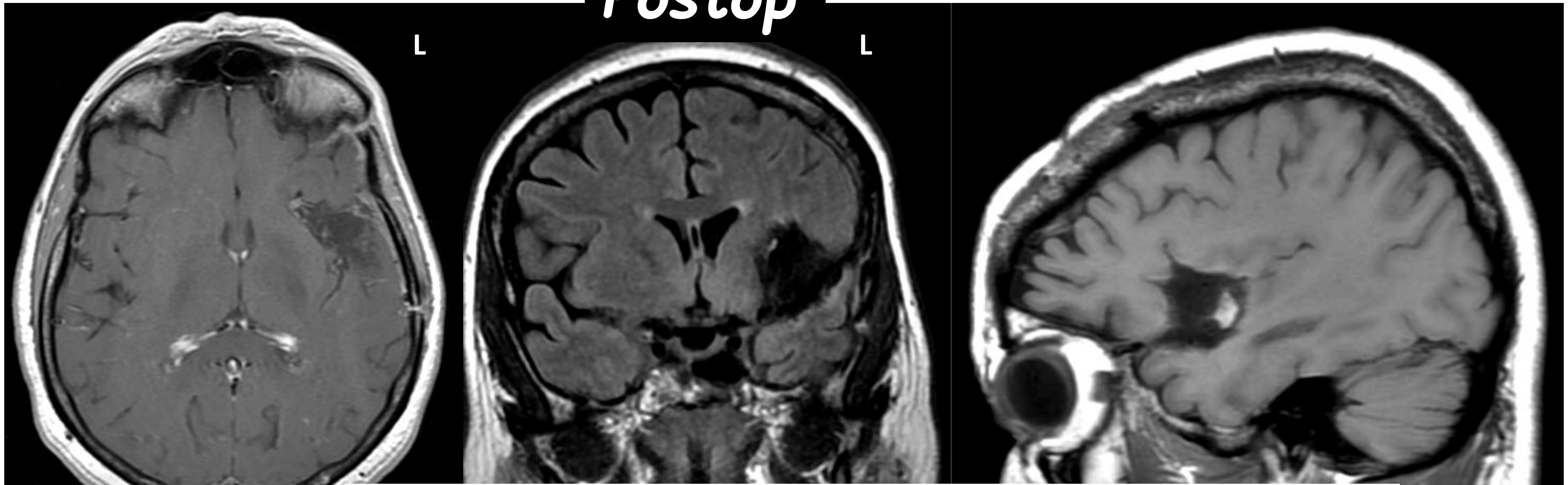


Novembre 2009

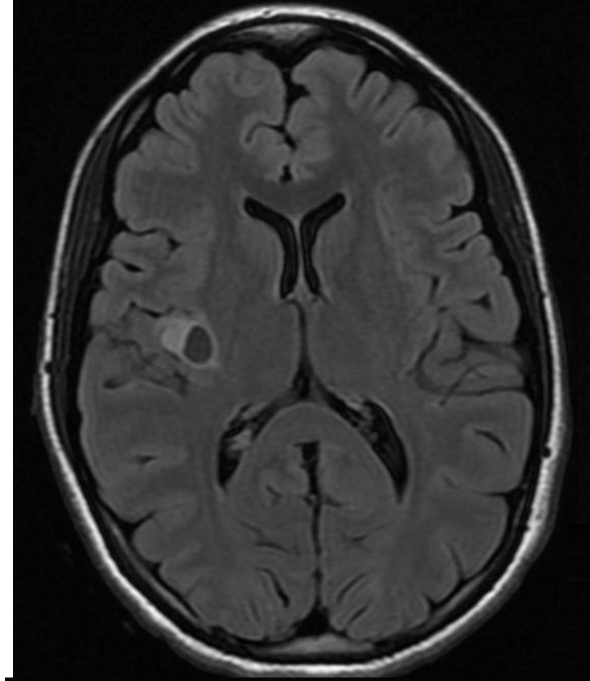
Preop

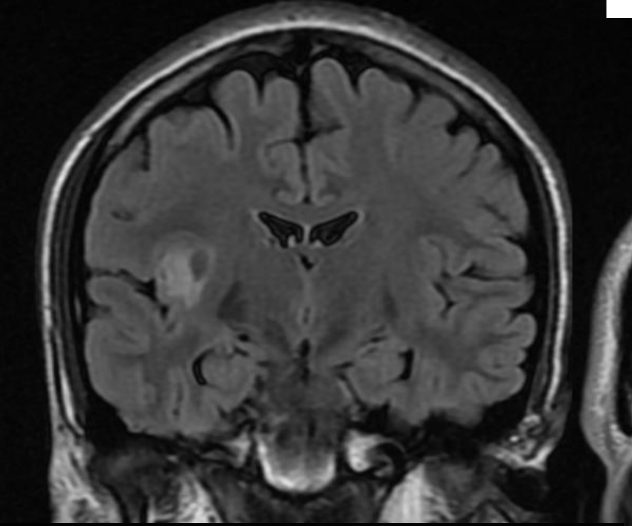


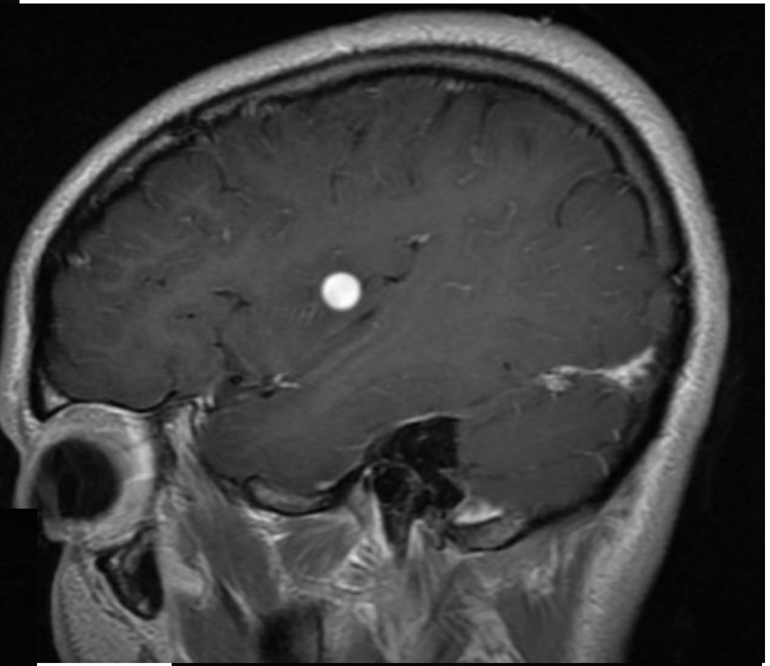
Postop

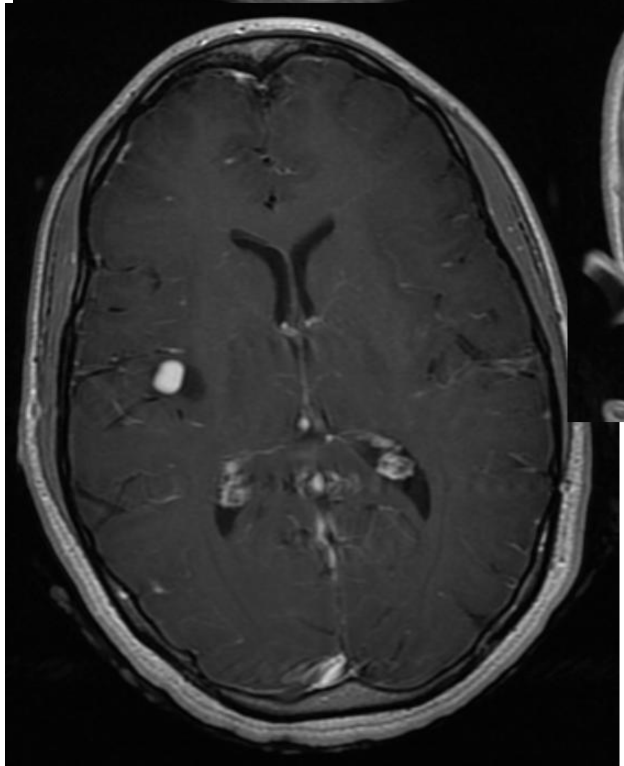


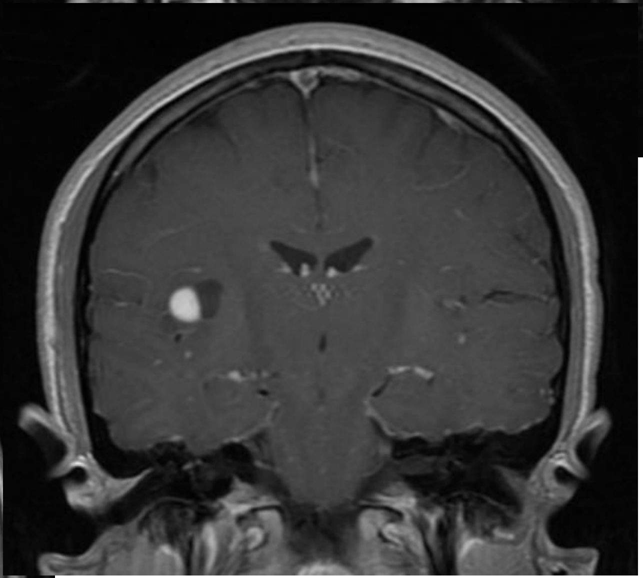
Ganglioglioma grado I. Operata 18.11.2009



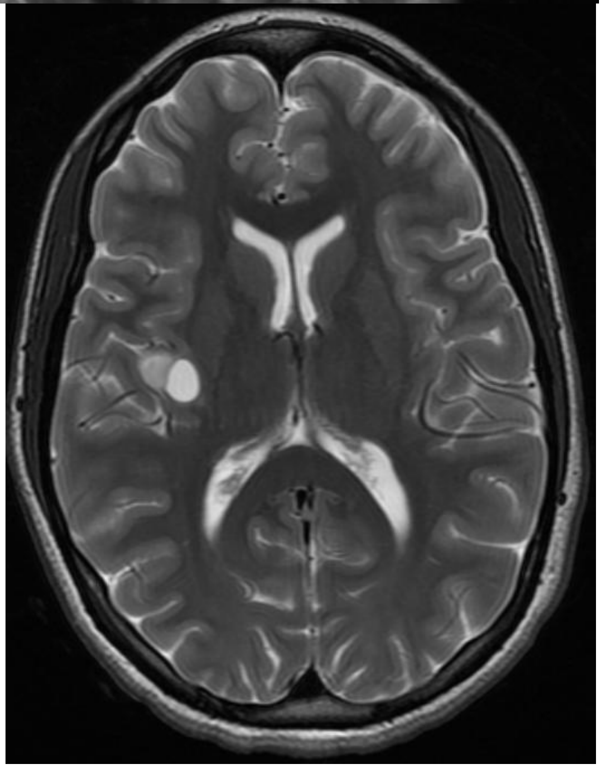


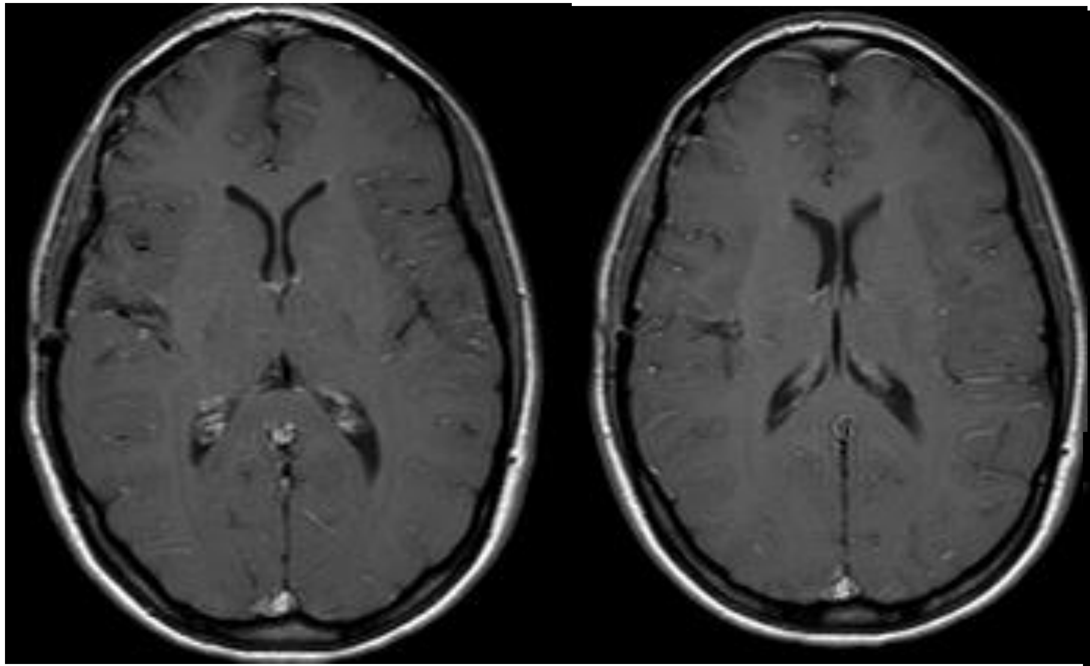


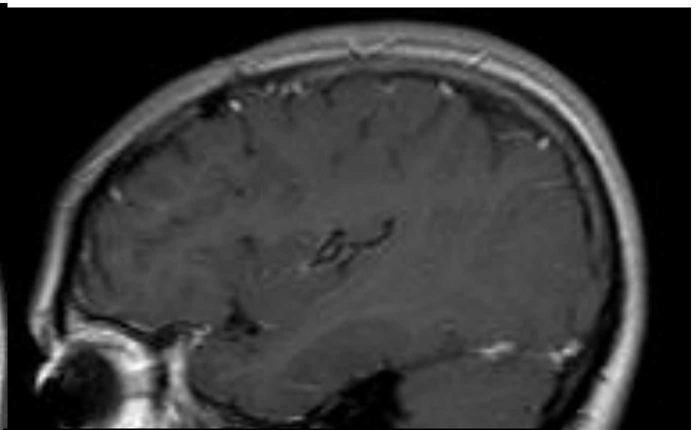


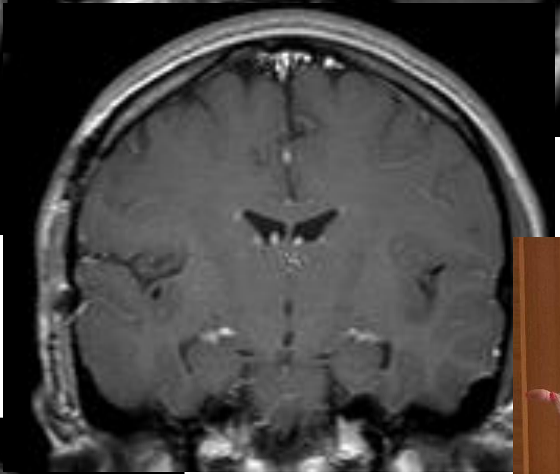


G F, 17 y.o., F
5-month history of partial seizures

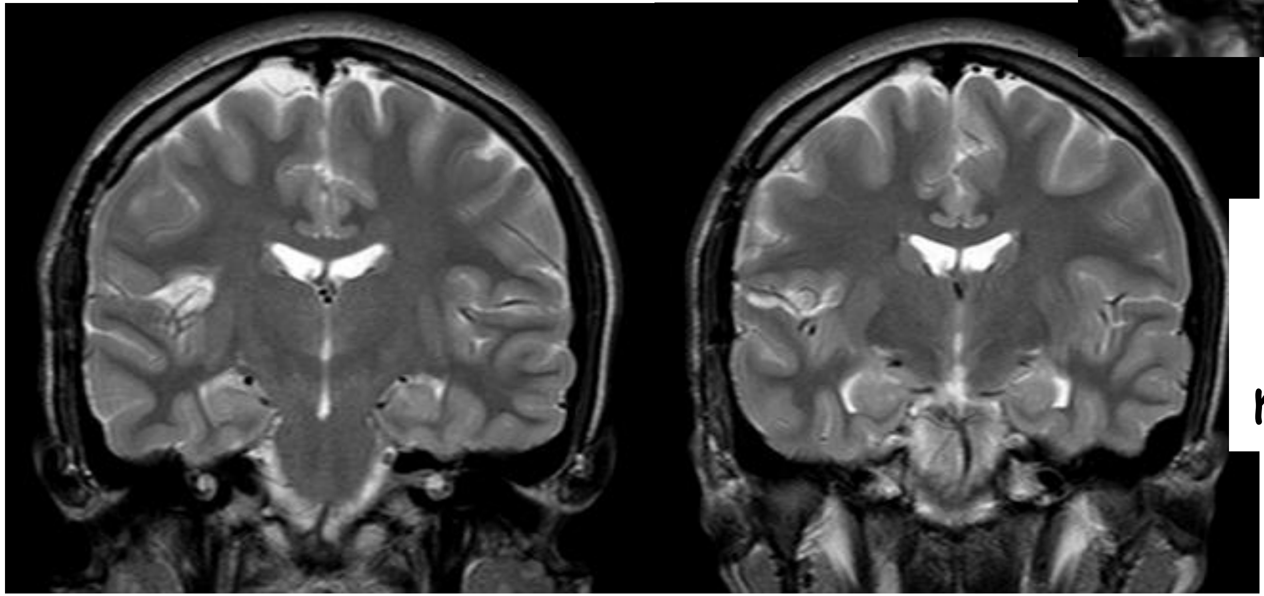








Ganglioglioma, WHO grade I
4 years F.U., no seizures



After transylvian microsurgery

Conclusioni - 1

I gliomi, specie se di basso grado, **vanno operati precocemente, per migliorare la qualità della vita (crisi epilettiche) e ritardare l'inevitabile progressione a gradi più elevati**

Incrementare la resezione

Diminuire la morbidità

Migliorare l'outcome cognitivo

Eliminare l'epilessia

- **Studio neuropsicologico** pre-, intra- e post-operatorio
- RMN funzionale
- Trattografia
- **RMN 3D**
- Ecografia navigata intraoperatoria
- **Microchirurgia ad alto ingrandimento, tecnica subpiale**
- Chirurgia in 2 tempi
- Awake surgery
- CUSA/radar (stimolazione sottocorticale continua)
- Monitoraggio neurofisiologico intraoperatorio

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SAPIENZA UNIVERSITÀ DI ROMA

CONCLUSIONI- 2

Nei tumori glioneuronali, i fattori critici sul risultato epilettologico e cognitivo sono:

- intervento precoce
- resezione totale

I pazienti con epilessia farmacoresistente necessitano di una valutazione prechirurgica epilettologica, in particolare nell'epilessia temporale (nel 40% dei casi è stata eseguita una resezione estesa al di là della asportazione della lesione, tutti con storia di epilessia superiore ad un anno)

Outcome epilettologico buono (85% di Engel I). Miglioramento cognitivo molto frequente, legato alla guarigione dell'epilessia e alla sospensione dei farmaci antiepilettici