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8-11 MARCH, 2016, BUDAPEST, HUNGARY

EPNS Training Course 2016

INDICATIONS & PROGNOSIS OF SURGICAL TREATMENT IN CHILDREN

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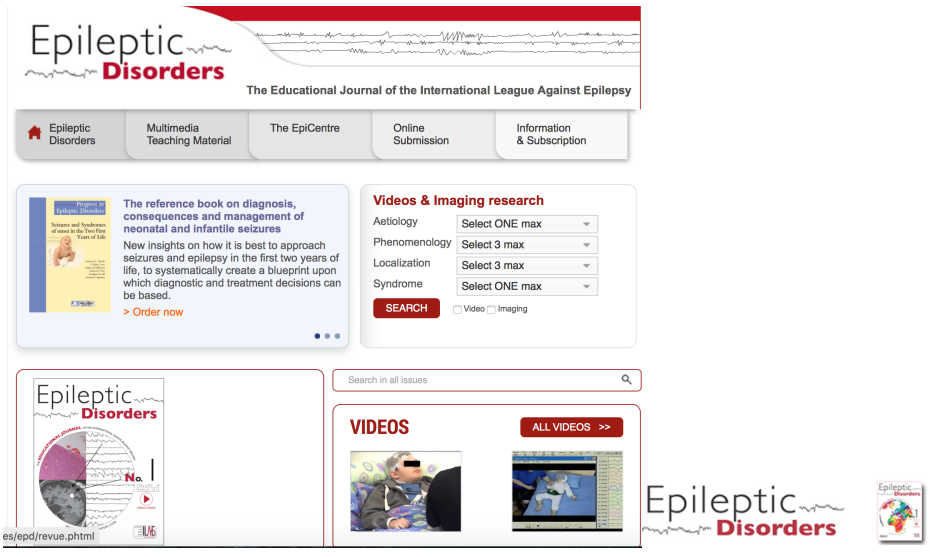
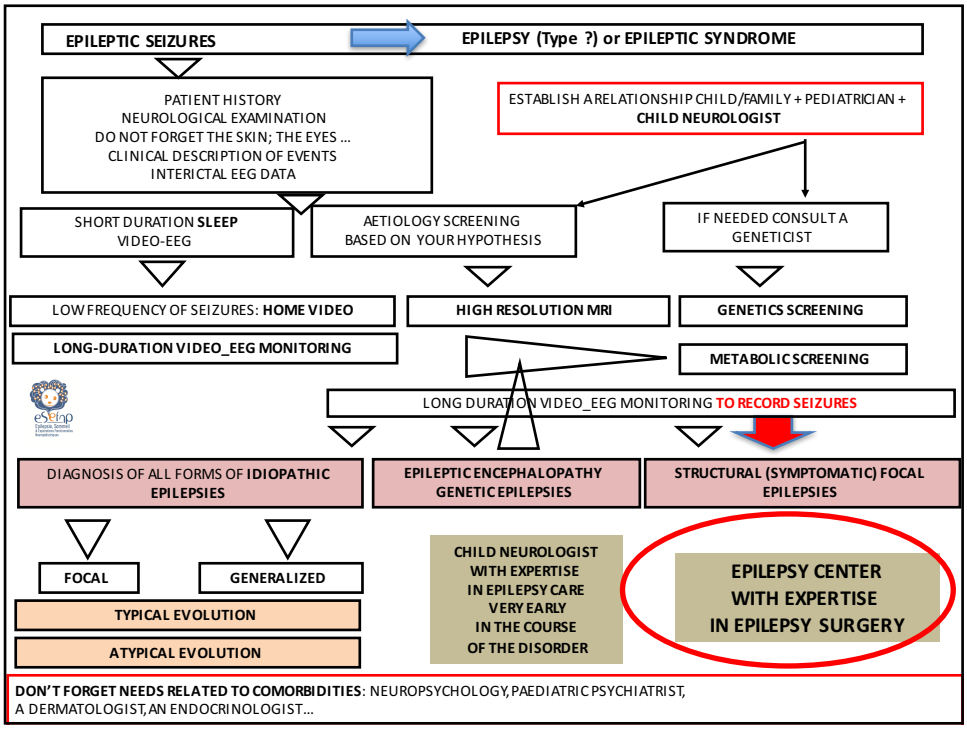




Make sure we are talking the same language;

Epilepsia, 51(6):1069–1077, 2010
doi: 10.1111/j.1528-1167.2009.02397.x

SPECIAL REPORT

Definition of drug resistant epilepsy: Consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies

*[1]Patrick Kwan, †Alexis Arzimanoglou, ‡Anne T. Berg, §Martin J. Brodie, ¶W. Allen Hauser, #[2]Gary Mathern, **Solomon L. Moshé, ††Emilio Perucca, ‡‡Samuel Wiebe, and §§[2]Jacqueline French

*Absence of **complete seizure control** of a properly diagnosed epilepsy syndrome,*

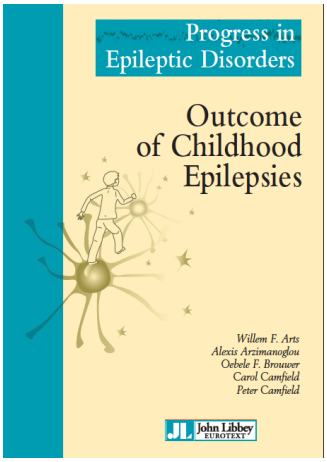
*for a period of **at least 12 months**, following adequate trial of **two** tolerated and appropriately chosen **AEDs**.*

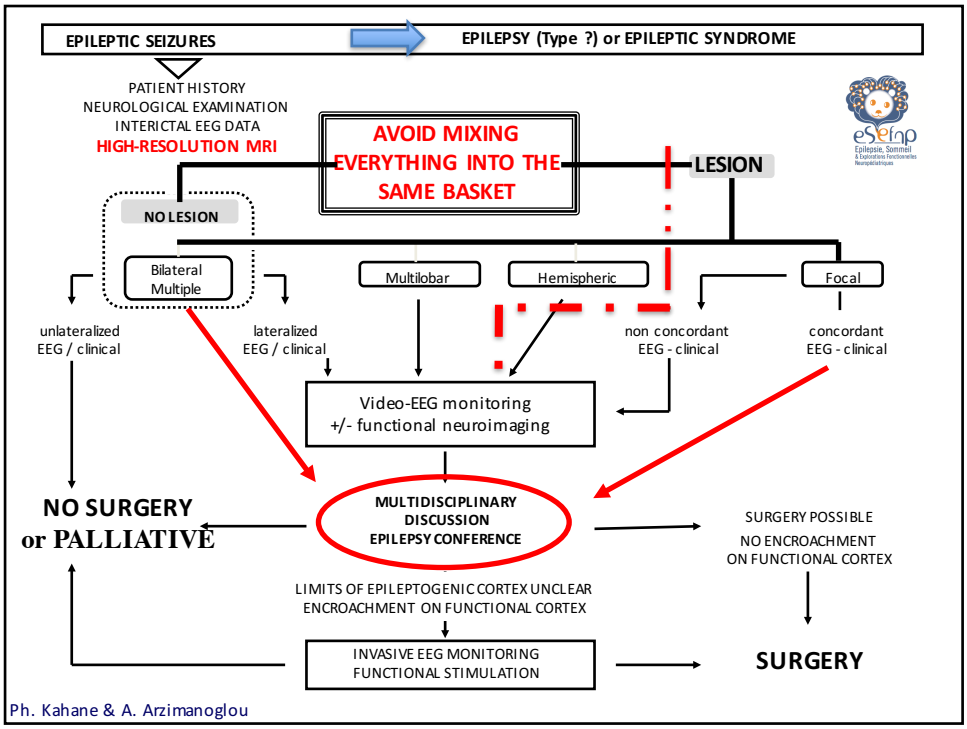
Make sure we are talking the same language;

A devastating confusion in understanding the terms we are using !!!

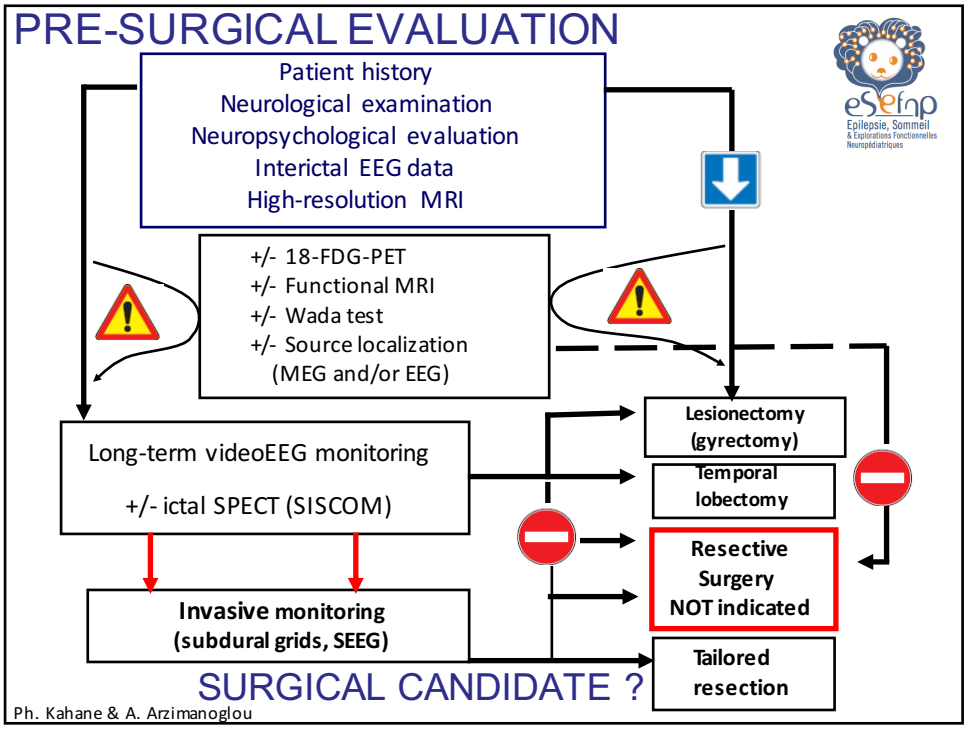
-"Drug-resistant" is NOT equivalent to "Prognosis" or "Outcome";
-"Drug-resistant" is NOT a definite diagnostic label, it only refers to a new challenge for the treating physician;

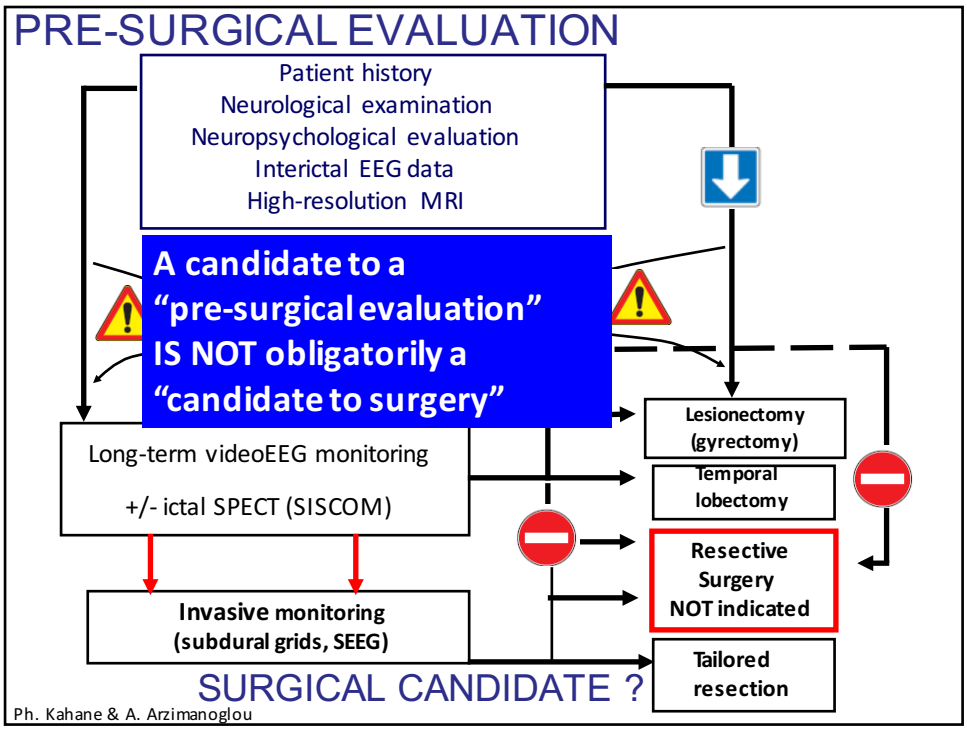
- Candidate to surgery is NOT " equivalent to "Candidate to pre-surgical evaluation";
- Stop discussing all focal epilepsies as if they were one (Etiology factor) !!





Ph. Kahane & A. Arzimanoglou


PRE-SURGICAL EVALUATION
Patient history
Neurological examination
Neuropsychological evaluation
Interictal EEG data
High-resolution MRI
+/- 18-FDG-PET
+/- Functional MRI
+/- Wada test
+/- Source localization
(MEG and/or EEG)
Long-term videoEEG monitoring
+/- ictal SPECT (SISCOM)
Invasive monitoring
(subdural grids, SEEG)
Lesionectomy
(gyrectomy)
Temporal
lobectomy
Resective
Surgery
NOT indicated
Tailored
resection
SURGICAL CANDIDATE ?
Ph. Kahane & A. Arzimanoglou


PRE-SURGICAL EVALUATION
Patient history
Neurological examination
Neuropsychological evaluation
Interictal EEG data
High-resolution MRI
A candidate to a
"pre-surgical evaluation"
IS NOT obligatorily a
"candidate to surgery"
Long-term videoEEG monitoring
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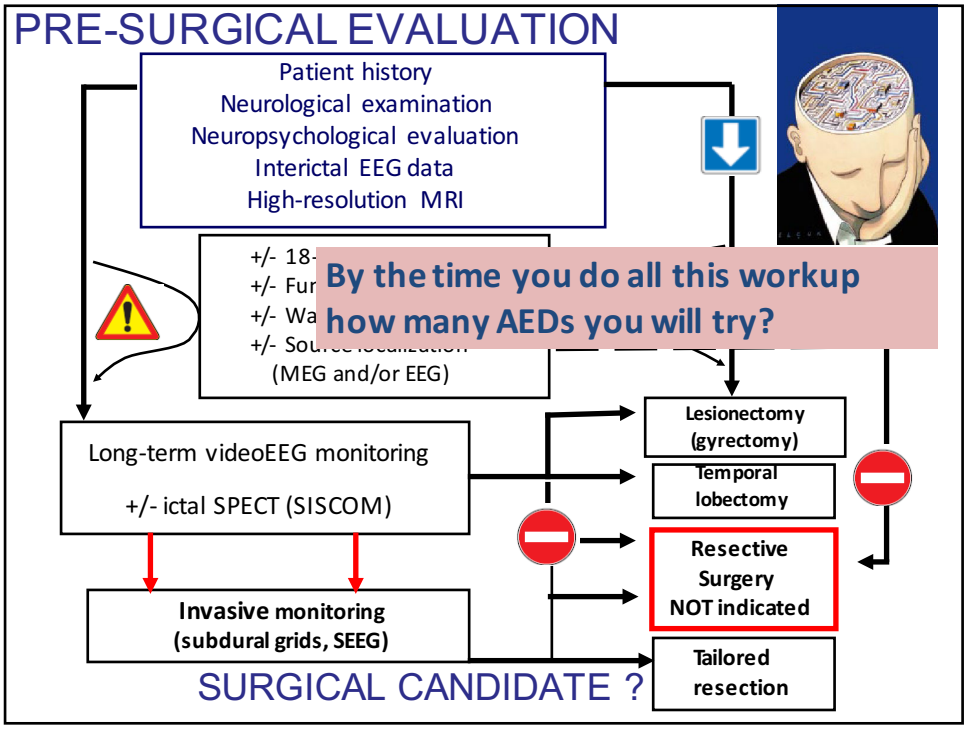


When doing your bibliography work
first choose your topic of interest of the moment,
do not try covering all related issues
as if they were one !

For example, if you want to work on "does epilepsy surgery change the prognosis of a focal or multi-focal epilepsy" don't forget that you are also asked to compare

medical versus surgical treatment,

including the risk/benefit ratio of AEDs

but also the risk/benefit ratio of surgery per se

(both as a treatment for epilepsy and as a medical decision)

A number of different issues:

1. *Developmental issues;*
2. *Seizure semiology (… in children)*
3. *EEG patterns*
4. *Neuroimaging (structural; functional)*
5. *Aetiologies*
6. *Invasive electrodes choices*
7. *Results in terms of …*

   Seizure status; Cognitive status; Behaviour;
   Quality of Life; Social integration; …
8. *Follow-up; Failures; Successes; …*

Could the same result be obtained otherwise ?

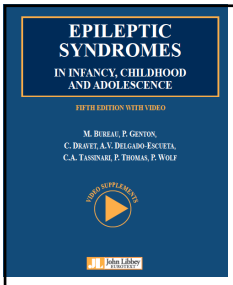
Seizure control: AEDs or Surgery ?

In focal epilepsies etiology plays a major role

For AEDs lack of controlled trials per aetiology and/or localization;

Surgery: children

A wealth of evidence PER AETIOLOGY that seizure freedom can be achieved in a significant proportion of selected epilepsy surgery candidates



CHAPTER 29

STRUCTURAL (SYMPTOMATIC) FOCAL EPILEPSIES OF CHILDHOOD

Hans HOLTHAUSEN[1], Andras FOGARASI[2], Alexis ARZIMANOGLOU[3], Philippe KAHANE[4]

eSEnp Epilepsie, Sommeil & Explorations fonctionnelles Neurophysiologiques

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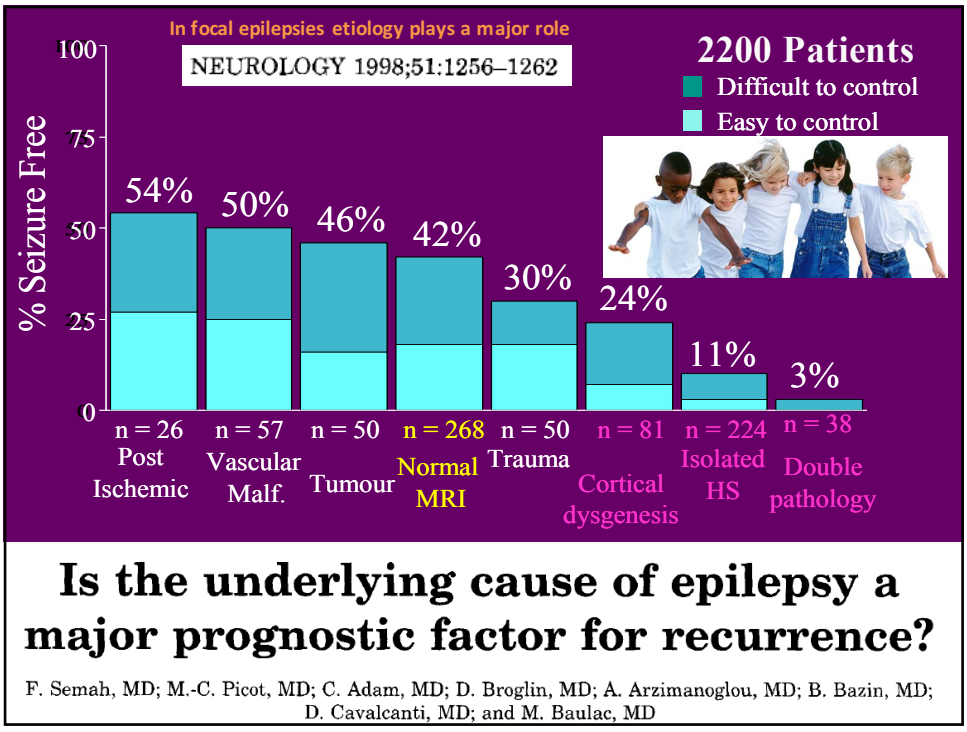

Is the underlying cause of epilepsy a major prognostic factor for recurrence?

F. Semah, MD; M.-C. Picot, MD; C. Adam, MD; D. Broglin, MD; A. Arzimanoglou, MD; B. Bazin, MD; D. Cavalcanti, MD; and M. Baulac, MD

Epilepsy Surgery in FCDs: which type, when and how

Epilepsia, 52(1):158–174, 2011
doi: 10.1111/j.1528-1167.2010.02777.x

SPECIAL REPORT

The clinicopathologic spectrum of focal cortical dysplasias: A consensus classification proposed by an ad hoc Task Force of the ILAE Diagnostic Methods Commission[1]

*[2]Ingmar Blümcke, †Maria Thom, ‡Eleonora Aronica, §Dawna D. Armstrong, ¶Harry V. Vinters, #Andre Palmini, **Thomas S. Jacques, ††Giuliano Avanzini, ‡‡A. James Barkovich, §§Giorgio Battaglia, ¶¶Albert Becker, ##Carlos Cepeda, ***[3]Fernando Cendes, †††Nadia Colombo, ‡‡‡Peter Crino, §§§J. Helen Cross, ¶¶¶Olivier Delalande, ###François Dubeau, ****John Duncan, ††††Renzo Guerrini, ‡‡‡‡Philippe Kahane, §§§§Gary Mathern, ¶¶¶¶Imad Najm, ####Çiğdem Özkara, *****Charles Raybaud, †††††Alfonso Represa, ‡‡‡‡‡Steven N. Roper, §§§§§Noriko Salamon, ¶¶¶¶¶Andreas Schulze-Bonhage, #####Laura Tassi, ******Annamaria Vezzani, and ††Roberto Spreafico

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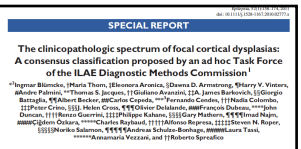
Epilepsy Surgery in FCDs: which type, when and how


SPECIAL REPORT

The clinicopathologic spectrum of focal cortical dysplasias: A consensus classification proposed by an ad hoc Task Force of the ILAE Diagnostic Methods Commission[1]

Table 1. The three-tiered ILAE classification system of focal cortical dysplasia (FCD) distinguishes isolated forms (FCD Types I and II) from those associated with another principal lesion (FCD Type III).

FCD Type I (isolated)	Focal cortical dysplasia with abnormal radial cortical lamination (FCD Type Ia)	Focal cortical dysplasia with abnormal tangential cortical lamination (FCD Type Ib)	Focal cortical dysplasia with abnormal radial and tangential cortical lamination (FCD Type Ic)	
FCD Type II (isolated)	Focal cortical dysplasia with dysmorphic neurons (FCD Type IIa)		Focal cortical dysplasia with dysmorphic neurons and balloon cells (FCD Type IIb)	
FCD Type III (associated with principal lesion)	Cortical lamination abnormalities in the temporal lobe associated with hippocampal sclerosis (FCD Type IIIa)	Cortical lamination abnormalities adjacent to a glial or glioneuronal tumor (FCD Type IIIb)	Cortical lamination abnormalities adjacent to vascular malformation (FCD Type IIIc)	Cortical lamination abnormalities adjacent to any other lesion acquired during early life, e.g., trauma, ischemic injury, encephalitis (FCD Type IIId)

International recommendation for a comprehensive neuropathologic workup of epilepsy surgery brain tissue: A consensus Task Force report from the ILAE Commission on Diagnostic Methods

*†[1]Ingmar Blümcke, ‡§Eleonora Aronica, ¶Hajime Miyata, #Harvey B. Samat, **Maria Thom, ††Karl Roessler, ‡‡§§[2]Bertil Rydenhag, †Lara Jehi, ¶¶Pavel Krsek, ##Samuel Wiebe, and ***Roberto Spreafico

Epilepsia, **(*):1–11, 2016
doi: 10.1111/epi.13319

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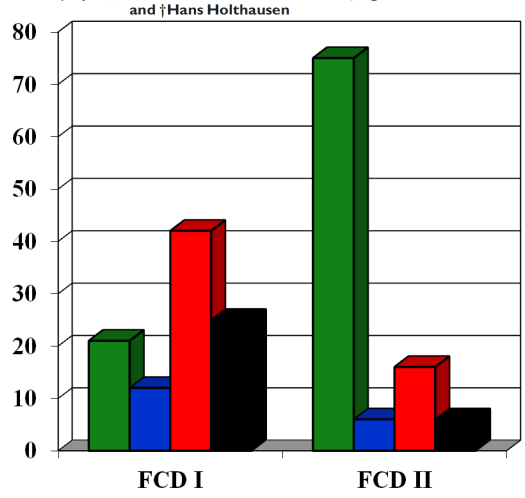
Epilepsia, 50(1):125–137, 2009
doi: 10.1111/j.1528-1167.2008.01682.x

FULL-LENGTH ORIGINAL RESEARCH

Different presurgical characteristics and seizure outcomes in children with focal cortical dysplasia type I or II

*Pavel Krsek, †Tom Pieper, †Anja Karlmeier, ‡Michelle Hildebrandt, §Dieter Kolodziejczyk, ¶Peter Winkler, #Elisabeth Pauli, ‡Ingmar Blümcke, and †Hans Holthausen



Courtesy Pavel Krsek

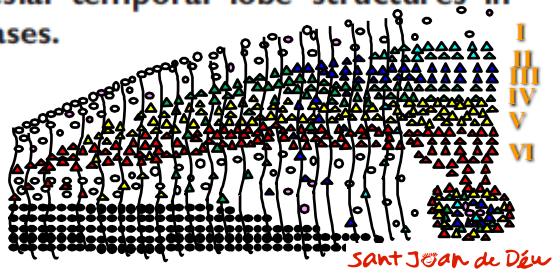
Epilepsia, 54(2):296–304, 2013
doi: 10.1111/j.1528-1167.2012.03667.x

FULL-LENGTH ORIGINAL RESEARCH

Intracranial evaluation of the epileptogenic zone in regional infrasylvian polymicrogyria

*Georgia Ramantani, ††§Laurent Koessler, ††Sophie Colnat-Coulbois, ††§Jean-Pierre Vignal, ¶Jean Isnard, ¶Hélène Catenoix, ††§Jacques Jonas, #Josef Zentner, *Andreas Schulze-Bonhage, and ††§Louis Georges Maillard

temporal structures. Consistent with these findings a favorable outcome (Engel class I in three of four patients; Engel class II in one of four) at last follow-up was obtained by a resection involving parts of the PMG cortex in three of four and anteromesial temporal lobe structures in another three of four cases.



Tuberous Sclerosis Complex – Epilepsy Surgery

Center (Publication)	Median/Mean Age at Surgery	Presurgical Evaluation	Intracranial EEG/Total	Seizure free (signif red'n)	Mean/median Follow-up (yrs)
Rochester (Jarrar, 2004)	12.5	MRI, EEG, +/- SPECT	5/22	59% 1yr 42% 5yr	8.9
Systematic review (25) (Jansen, 2007)*	6	MRI, EEG, +/- SPECT, PET, MEG	47/177	57% (18%)	3.7
Multicenter (Madhavan, 2007)*	9.9	MRI, EEG, +/- SPECT, PET, MEG	43/70	53% (11%)	NA
Utrecht (Jansen, 2007)	11	MRI, EEG, MEG	0/6	67%	2.7
Milan/NYU (Teutonico, 2008)*	7	MRI, EEG, +/- MEG	4/11	45% Engel I&II	6
NYU (Weiner, 2006)*	4	MRI, EEG, +/- SPECT, PET, MEG	25/25	68%	2.3
Toronto (Sugiyama, 2009)	6.8	MRI, EEG, MEG	8/8	75%	0.9
UCLA (Wu, 2010)	5.4	MRI, EEG, FDG-PET, MEG	0/18	67%	4.1
Beijing (Liang, 2010)	14	MRI, EEG	16/25	72% 1yr 55% 5yr	NA
Melbourne (Mohamed, 2011)	3.2	MRI, EEG, SPECT	19/45	56% (42%)	2.9

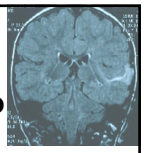
Surgical Outcome in Tuberous Sclerosis Complex: A Multicenter Survey

*Deepak Madhavan, *Sarah Schaffer, §Alexei Yankovsky, †Alexis Arzimanoglou, †Florence Renaldo, *Charles M. Zaroff, *Josiane LaJoie, *Howard L. Weiner, §Eva Andermann, ¶David N. Franz, ¶Jennifer Leonard, **Mary Connolly, ††Greg D. Cascino, and *Orrin Devinsky

Surgical Procedure	No. Patients	Engel Class I (%)
Corpus callosotomy	6	1 (16.7)
Lesionectomy (tuberectomy)	14	6 (42.9)
Lobar resection	8	2 (25.0)
Lesionectomy and Lobar resection	39	26 (66.7)

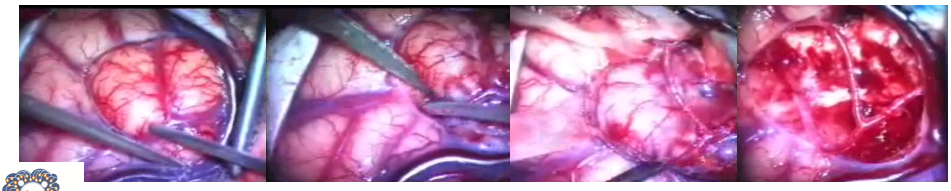
- Most centers attempt complete removal of the primary epileptogenic zone
- Completeness of resection correlated with seizure-freedom
- How does completeness correlate with procedure type?

Developmental tumors: is completeness of the lesion the only issue?



- Gross-total resection of DNET is associated with greater seizure freedom than sub-total resection, particularly in cases that involve drug-resistant epilepsy[1,2].

1, Chang et al. J Neurosurg 2006
2, Ozlen et al. Arch Neurochir. 2010



Epilepsia, **(*):1–7, 2011
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)	

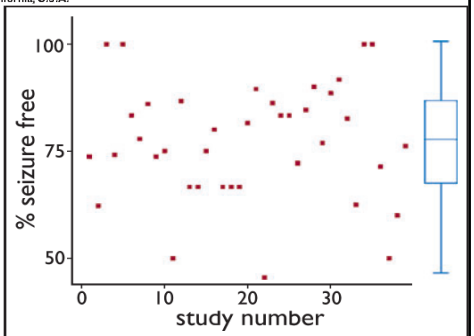


Figure 1.
Seizure freedom after glioneuronal tumor resection across 39 studies. Each point on the scatter-plot represents one study (see Table 1), organized from 1 to 39 in order of decreasing sample size. Seizure freedom (Engel class I outcome) ranged from 45–100%. The summary box-plot depicts median (center), 25th percentile, and 99th percentile of reported seizure-freedom rates across all studies.

22

DNET & GGN tumors

- The majority of publications report good results following resection of neurodevelopmental tumors with **≥80% seizure free patients.**
- Complete resection of neurodevelopmental tumors is the goal due in order to:
  - Maximise the probability of seizure freedom
  - Minimise the low but actual risk for malignification in a residual portion
- Keep in mind FCD type III

Meta-analysis of Epilepsy Surgery for HH

Kerrigan JK. For ILAE Pediatric Epilepsy Surgery Task Force, Florence, 2011

- PubMed search in June 2011, English language only, "hypothalamic hamartoma AND epilepsy" (N=227)
- included surgery with > 1 yr follow-up and ≥ 10 pts
- 13 Class III publications, 304 pts, self-controlled

Surgery	N	Seizure-Free
transcallosal resection	55	53%
endoscopic resection/disconnection	81	45%
stereotactic RF thermocoagulation	29	44%
Gamma Knife radiosurgery	47	39%
stereotactic interstitial radiosurgery	24	38%
pterional resection/disconnection	23	28%
"historical"	45	13%

Hypothalamic Hamartomas:

Removal, Disconnection, Irradiation or Coagulation?

It probably doesn't matter what you do,

more important is:

- where you do it in the HH
- how much collateral damage you cause on the way to HH
- whether the patient can tolerate delayed efficacy and potential cognitive side effects, or not

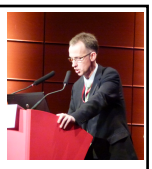
EEG and video-EEG seizure monitoring has limited utility in patients with hypothalamic hamartoma and epilepsy

*†‡[1]Matthew Troester, ‡[1]Rachel Haine-Schlagel, *†Yu-tze Ng, *†Kevin Chapman, †Steve Chung, †Cornelia Drees, §Erin Prenger, ¶Harold Rekate, and *†John F. Kerrigan

Epilepsia, 52(6):1137–1143, 2011

Hypothalamic Hamartomas:

Removal, Disconnection, Irradiation or Coagulation?



Individualise the treatment approach based on:

- patient's age and cognitive/behavioural abilities
- characteristics of the HH (size, attachment) and 3rd ventricle
- **your surgical resources and skills**

ELSEVIER

Seminars in Pediatric Neurology

Epilepsy in Hypothalamic Hamartoma: Clinical and EEG Features

A. Simon Harvey, MD, and Jeremy L. Freeman, MB, BS

Electroencephalogr Clin Neurophysiol. 1995 Sep;95(3):154-60.

Role of the hypothalamic hamartoma in the genesis of gelastic fits (a video-stereo-EEG study).

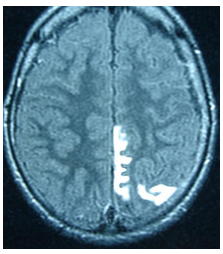
Munari C, Kahane P, Francione S, Hoffmann D, Tassi L, Cusmai R, Vigevano F, Pasquier B, Betti OO.
Neurosciences Dpt, CHRU Grenoble, France.

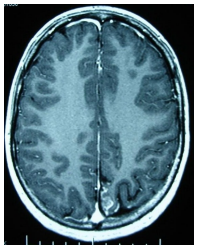
NEUROLOGY 2000;55:1472–1479

Sturge–Weber syndrome

Indications and results of surgery in 20 patients

A.A. Arzimanoglou, MD; F. Andermann, MD; J. Aicardi, MD; C. Sainte–Rose, MD; M.-A. Beaulieu, MD; J.-G. Villemure, MD; A. Olivier, MD; and Th. Rasmussen, MD





Surgical treatment of epilepsy in Sturge–Weber syndrome in children

Marie Bourgeois, Darach William Crimmins, Ricardo Santos De Oliveira, Alexis Arzimanoglou, Matthew Garnett, Thomas Roujeau, Federico Di Rocco, Christian Sainte-Rose

Journal of Neurosurgery 2007

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Review of surgical cases of Sturge-Weber

Authors and years	No of patients	Age at Operation	Operation	Seizure free (%)
Falconer & Rushworth, 1960	5	3,5-16 y	Hemispherectomy	5 (100)
Hoffman *et al.*, 1979	7	1 mo-7 y	Hemispherectomy	5 (71)
Di Trapani *et al.*, 1982	2	8 mo-3 y	Hemispherectomy	2 (100)
Chevrie *et al.*, 1988	3	4, 10 & 16 y	Lobectomy/resection	2 (67)
Ogunmekan *et al.*, 1989	10	3 mo-9 y	Hemispherectomy	10 (100)
Ito *et al.*, 1990	3	2 mo-4 y	Hemispherectomy	3 (100)
Sujansky & Conradie, 1995	9	4 mo-20 y	Hemispherectomy	4 (44)
Carson *et al.*, 1996	3	1-3 y	Hemispherectomy	1 (33)
Vining *et al.*, 1997	3	1-2 y	Hemispherectomy	1 (33)
Sugimoto *et al.*, 1999	5	5-7 mo	Hemispherectomy	4 (80)
Arzimanoglou *et al.*, 2000	20	8 mo-34 y	Hemispherectomy; lobectomy/resection; callosotomy	13 (65)
Kossof *et al.*, 2002	32	3 mo-17 y	Hemispherectomy	26 (81)
Tuxhorn & Pannek, 2002	2	18 mo-1y	Hemispherectomy	2 (100)
Bourgeois *et al.*, 2007	27	5 mo-16 y	Hemispherectomy/ hemispherotomy ; lobectomy/resection	19 (70)
Steinbok *et al.*, 2009	15	1-35 mo	Hemispherectomy/ hemispherotomy ; lobectomy/resection	14 (93)

Conclusion:

- **15** studies and **146 patients** included
- Hemispherectomy > lobectomy/resection
- Seizure-free: **76%** (111/146)

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Review of surgical cases of Sturge-Weber

Improvement of developmental status after surgery, was significantly affected by **completeness of resection (p<0.005) and age at surgery**

Complete resection or disconnection of the lesion is the most important factor for good post surgical outcome.

Patients with generalized seizures or generalized EEG abnormalities are still candidates for epilepsy surgery

Seizure outcomes after temporal lobectomy in pediatric patients

A systematic review

DARIO J. ENGLOT, M.D., PH.D.,[1] JOHN D. ROLSTON, M.D., PH.D.,[1] DORIS D. WANG, M.D., PH.D.,[1] PETER P. SUN, M.D.,[1,2] EDWARD F. CHANG, M.D.,[1] AND KURTIS I. AUGUSTE, M.D.[1,2]

J Neurosurg: Pediatrics / June 14, 2013

TABLE 2: Seizure outcomes by epilepsy etiology*

Etiology	Engel Class I	Engel Class II–IV
mesial temporal sclerosis	309 (78)	85 (22)
tumor	288 (83)	58 (17)
idiopathic	49 (73)	18 (27)
cortical dysplasia	31 (61)	20 (39)
infection	12 (52)	11 (48)
trauma	11 (69)	5 (31)
tuberous sclerosis	6 (100)	0 (0)
vascular malformation	5 (100)	0 (0)
lesional NOS†	51 (85)	9 (15)
nonlesional NOS†	25 (57)	19 (43)

TEMPORAL 76%

36 studies including 10 or more pediatric patients;

1318 patients with a mean age of 10.7 +/- 0.3 years

Overall Engel Class I : 1002 patients (76%)

Seizure outcomes after resective surgery for extra–temporal lobe epilepsy in pediatric patients

J Neurosurg: Pediatrics / June 14, 2013

EXTRA-TEMPORAL 56%

Dario J. Englot, M.D., Ph.D.,[1] Jonathan D. Breshears, M.D.,[1] Peter P. Sun, M.D.,[1,2] Edward F. Chang, M.D.,[1] and Kurtis I. Auguste, M.D.[1,2]

TABLE 2: Seizure outcomes by epilepsy etiology*

Etiology	Engel Class I	Engel Class II–IV
cortical dysplasia	138 (55)	111 (45)
tumor	122 (77)	36 (23)
idiopathic	21 (34)	41 (66)
gliosis only	25 (43)	33 (57)
tuberous sclerosis	27 (59)	19 (41)
lesional NOS†	21 (60)	14 (40)
nonlesional NOS†	21 (62)	13 (38)
infection	7 (35)	13 (65)
vascular malformation	11 (79)	3 (21)
trauma	3 (43)	4 (57)
cyst	3 (50)	3 (50)
perinatal injury	2 (33)	4 (67)

36 studies including 10 or more pediatric patients;

1259 patients

Overall Engel Class I : 704 patients (56%)

Shorter epilepsy duration (≤ 7 years, the median value in this study) was more predictive of seizure freedom than longer

Outcome after epilepsy surgery in children with MRI-negative non-idiopathic focal epilepsies

Thomas Bast

Epilepsy Center Kork, Kehl, Germany

Epileptic Disord 2013; 15 (2): 105-13

Open Access on www.epilepticdisoders.com

Epileptic Disorders

Authors	Year of publication	Cohort	Aim of study	N	Period of recruitment	Follow-up (years)	Seizure-free outcome (%)	Outcome: Engel class I (%)	Outcome: Other (%)
Téllez-Zenteno *et al.*	2010	C+A	Meta-analysis for comparing MR+ and MR-	398	1995-2007	≥1	43		
		C		93			45		
Bell *et al.*	2009	C+A	Outcome MR- TLE	40	1997-2005	≥1	60		
Bien *et al.*	2009	C+A	Outcome MR+ and MR-	29	2000-2006	≥0.5	38	45	
Chapman *et al.*	2005	C+A	Outcome MR-	24	1994-2001	≥1	37	45	
Cukiert *et al.*	2001	C+A	Outcome and iEEG in MR-/diffuse MRI	10	1997-2000	≥1	90		
Dorward *et al.*	2011	C	Outcome in MR- ETLE	22	1994-2007	≥2		36	
Jayakar *et al.*	2008	C+(A)	Outcome MR-	102	?	≥2	44		
Krsek *et al.*	2009	C+(A)	FCD study	26	1986-2006	≥2		54	
Lee *et al.*	2005	C+A	Outcome MR-	89	1995-2002	≥2	47		
McGonigal *et al.*	2007	C+A	iEEG	20	2000-2006	1	55		
Park *et al.*	2002	C+A	iEEG	18	1995-2000	≥1			44 (>90% seizure reduction)
RamachandranNair *et al.*	2007	C	Functional imaging	22	1998-2005	≥0.75	36		77 (<Engel IIIa)
Schneider *et al.*	2012	C+A	Functional imaging	18	2008-2010	≥2	56		
Seo *et al.*	2011	C	Functional imaging	25	2006-2009	≥1	48		
Siegel *et al.*	2001	A	MR- outcome	24	1992-1999	≥2		83	
Thivard *et al.*	2011	A	(Functional) imaging	12	2003-2006	NR		67	
Wetjen *et al.*	2009	C+A	iEEG and MR- outcome	28	1992-2002	>1	36	50	
Wu *et al.*	2013	A	Functional imaging	18	1990-2009	≥1	22		55 (Engel I+II)
Zhang *et al.*	2011	C+A	Functional imaging	20	2006-2009	≥1	35		

Bast, Epileptic Disord. 2013; 15(2): 105-113

Outcome after epilepsy surgery in children with MRI-negative non-idiopathic focal epilepsies

Thomas Bast
Epilepsy Center Kork, Kehl, Germany

- The proportion of MRI-negative patients in reported epilepsy surgery cohorts ranges from 16 to 47%.
- Most MRI-negative patients undergo invasive long-term EEG recordings before a final decision regarding resection is possible.
- Post-operative seizure freedom rates, with few exceptions, range from 40 to 50%.

A number of different issues:

1. *Developmental issues;*
2. *Seizure semiology (… in children)*
3. *EEG patterns*
4. *Neuroimaging (structural; functionnal)*
5. *Aetiologies*
6. ***Invasive electrodes choices***
7. *Results in terms of …*
   - Seizure status; Cognitive status; Behaviour;
   - Quality of Life; Social integration; …
8. *Follow-up; Failures; Successes; …*

Could the same (or a better) result be obtained otherwise ?

Repeat a critical reading of the general guidelines

Proposed Criteria for Referral and Evaluation of Children for Epilepsy Surgery: Recommendations of the Subcommission for Pediatric Epilepsy Surgery

*J. Helen Cross, *Prasanna Jayakar, *Doug Nordli, *Olivier Delalande, *Michael Duchowny, †Heinz G. Wieser, ‡Renzo Guerrini, and *Gary W. Mathern

Epilepsia, 47(6):952–959, 2006

Dordogne 2003

Read again results of existing cohorts, general or per etiology

Surgery: adults compared to children

Level 2 cohort studies comparing rates of seizure-freedom in medically and surgically treated adults support findings of the Wiebe *et al* (2001) RCT

CRITICAL REVIEW AND INVITED COMMENTARY

Long-term seizure outcome of surgery versus no surgery for drug-resistant partial epilepsy: A review of controlled studies

*Dieter Schmidt and †‡Knut Stavem

Overall, 719 of 1,621 (**44%**) of patients with mostly temporal lobe surgery were seizure-free compared to 139 of 1113 (**12%**) of non-operated controls

[pooled random effects relative risk (RR) 4.26, 95% confidence interval (CI) 3.03–5.98].

The pooled risk difference in favour of surgery was 42% (95% CI 32–51%).

Read again results of existing cohorts, general or per etiology

FULL-LENGTH ORIGINAL RESEARCH

Epilepsy Surgery in Children: Results and Predictors of Outcome on Seizures

*Massimo Cossu, *Giorgio Lo Russo, *Stefano Francione, *Roberto Mai, *Lino Nobili, *Ivana Sartori, *Laura Tassi, †Alberto Citterio, †Nadia Colombo, ‡Manuela Bramerio, ‡Carlo Galli, *Laura Castana, and *Francesco Cardinale

Epilepsia, **(*):1–8, 2007

Surgical outcome and prognostic factors of frontal lobe epilepsy surgery

Lara E. Jeha,[1] Imad Najm,[1] William Bingaman,[2] Dudley Dinner,[1] Peter Widdess-Walsh[2] and Hans Lüders[1]

Brain (2007), **130**, 574–584

Improved outcomes in pediatric epilepsy surgery

The UCLA experience, 1986–2008

Despite similarities in seizure frequency, age at seizure onset, and age at surgery, the post-1997 series had :

- more lobar/focal and fewer multilobar resections;

- more patients with tuberous sclerosis complex;

- fewer cases of non-specific gliosis

compared with the pre-1997 group.

Improved outcomes in pediatric epilepsy surgery

The UCLA experience, 1986–2008

In terms of outcome, the post-1997 series had :

- **More seizure-free patients at** 0.5 (83%, 16%), 1 (81%, 18%), 2 (77%, 19%), and 5 (74%, 29%) years;

- More seizure-free patients were on medications at 0.5 (97%, 6%), 1 (88%, 9%), and 2 (76%,29%), but not 5 (64%,8%) years after surgery.

- **Fewer cases had intracranial EEG studies** in the post-1997 (0.8%) compared with the pre-1997 group (9%).

- There were fewer complications and reoperations in the post-1997 series compared with the pre-1997 group.

Successful surgery for epilepsy due to early brain lesions despite generalized EEG findings

NEUROLOGY 2007;69:389-397

E. Wyllie, MD
D.K. Lachhwani, MBBS, MD
A. Gupta, MD
A. Chirla, RN
G. Cosmo, REEGT
S. Worley, MS
P. Kotagal, MD
P. Ruggieri, MD
W.E. Bingaman, MD

THINK "CHILDREN" = Development

Brain & Development xxx (2013)

Towards early diagnosis and treatment to save children from catastrophic epilepsy – Focus on epilepsy surgery ☆

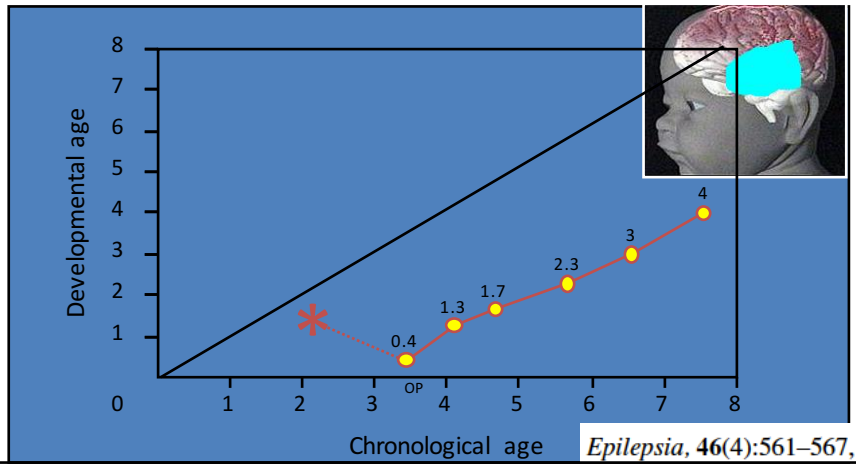
Hans Holthausen [a,*], Tom Pieper [a], Manfred Kudernatsch [b]

Epilepsy Surgery in the First Three Years of Life

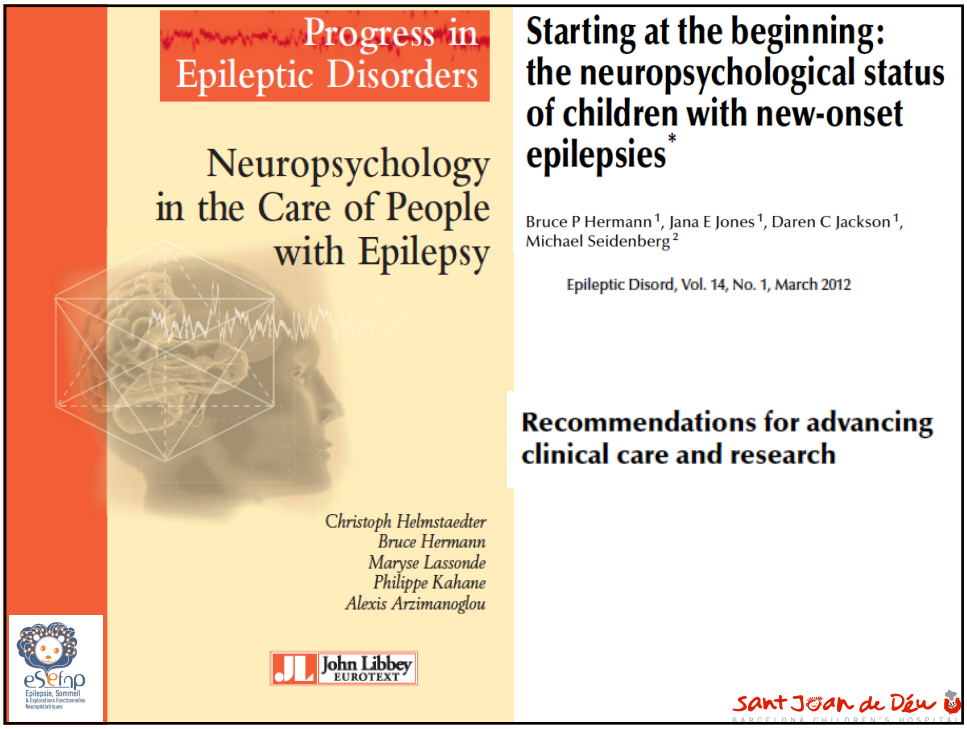
Epilepsia, **39**(7):737–743, 1998

M. Duchowny, P. Jayakar, T. Resnick, *A. S. Harvey, L. Alvarez, P. Dean, J. Gilman, I. Yaylali, G. Morrison, A. Prats, N. Altman, S. Birchansky, and †J. Bruce

Cognitive Function in Preschool Children after Epilepsy Surgery: Rationale for Early Intervention



Epilepsia, **46**(4):561–567, 2005



From surgery back to AEDs !!

Lancet Neurol 2012; 11: 784–91

Timing of antiepileptic drug withdrawal and long-term seizure outcome after paediatric epilepsy surgery (TimeToStop): a retrospective observational study

*Kim Boshuisen, Alexis Arzimanoglou, J Helen Cross, Cuno S P M Uiterwaal, Tilman Polster, Onno van Nieuwenhuizen, Kees P J Braun, for the TimeToStop study group**

Interpretation Early AED withdrawal does not affect long-term seizure outcome or cure. It might unmask incomplete surgical success sooner, identifying children who need continuous drug treatment and preventing unnecessary continuation of AEDs in others. A prospective randomised trial is needed to study the possible cognitive effects and confirm the safety of early AED withdrawal after epilepsy surgery in children.

TimeToStop included patients aged under 18 years from 15 centres in Europe who underwent surgery between Jan 1, 2000, and Oct 1, 2008, had at least 1 year of postoperative follow-up, and who started AED reduction after having reached postoperative seizure freedom.

Table 1. ILAE Task force and commission panel

(A) Pediatric Epilepsy Surgery Sub-commission members contributing to Florence

J. Helen Cross	London, England
William D. Gaillard	Washington, DC, U.S.A.
Prasanna Jayakar	Miami, Florida, U.S.A.
Renzo Guerrini	Florence, Italy
A. Simon Harvey	Melbourne, Australia
Hans Holthausen	Vogtareuth, Germany
Philippe Kahane	Grenoble, France
Gary Mathern	Los Angeles, California, U.S.A.
Brian Neville	London, England
Alexis Arzimanoglou	Lyon, France
Carmen Barba	Florence, Italy
Eduardo Barragan	Ciudad de, Mexico
Christine Bulteau	Paris, France
Sarat Chandra	New Delhi, India
Arthur Cukiert	Sao Paolo, Brazil
Deepak Gill	Sydney, Australia
Adam Hartman	Baltimore, Maryland, U.S.A.
Nathalie Jette	Calgary, Canada
Jack Kerrigan	Phoenix, Arizona, U.S.A.
Pavel Krsek	Prague, Czech Republic
Mark Libenson	Boston, Massachusetts, U.S.A.
Guoming Luan	Beijing, China
Liisa Metsahonkala	Helsinki, Finland
Taisuke Otsuki	Tokyo, Japan
Bertil Rydenhag	Gothenburg, Sweden
Manjari Tripathi	New Delhi, India
Angus Wilfong	Houston, Texas, U.S.A.
Jo Wilmshurst	Cape Town, South Africa
Nandan Yardi	Pune, India
Flavio Giordano	Florence, Italy
Yu-Tze Ng	Oklahoma City, U.S.A.

Diagnostic test utilization in evaluation for resective epilepsy surgery in children

*Prasanna Jayakar, †William D. Gaillard, ‡Manjari Tripathi, §Mark H. Libenson, ¶Gary W. Mathern, #J. Helen Cross, on behalf of the Task Force for Paediatric Epilepsy Surgery, Commission for Paediatrics, and the Diagnostic Commission of the International League Against Epilepsy

Epilepsia, **(*):1–12, 2014

INTERNATIONAL LEAGUE AGAINST EPILEPSY

ESEFAP Epilepsie, Sommeil & Explorations Fonctionnelles Neuropédiatriques

Diagnostic test utilization in evaluation for resective epilepsy surgery in children

*Prasanna Jayakar, †William D. Gaillard, ‡Manjari Tripathi, §Mark H. Libenson, ¶Gary W. Mathern, #J. Helen Cross, on behalf of the Task Force for Paediatric Epilepsy Surgery, Commission for Paediatrics, and the Diagnostic Commission of the International League Against Epilepsy

Epilepsia, **(*):1–12, 2014

Table 2. Diagnostic test utility voting results in major clinical cohorts

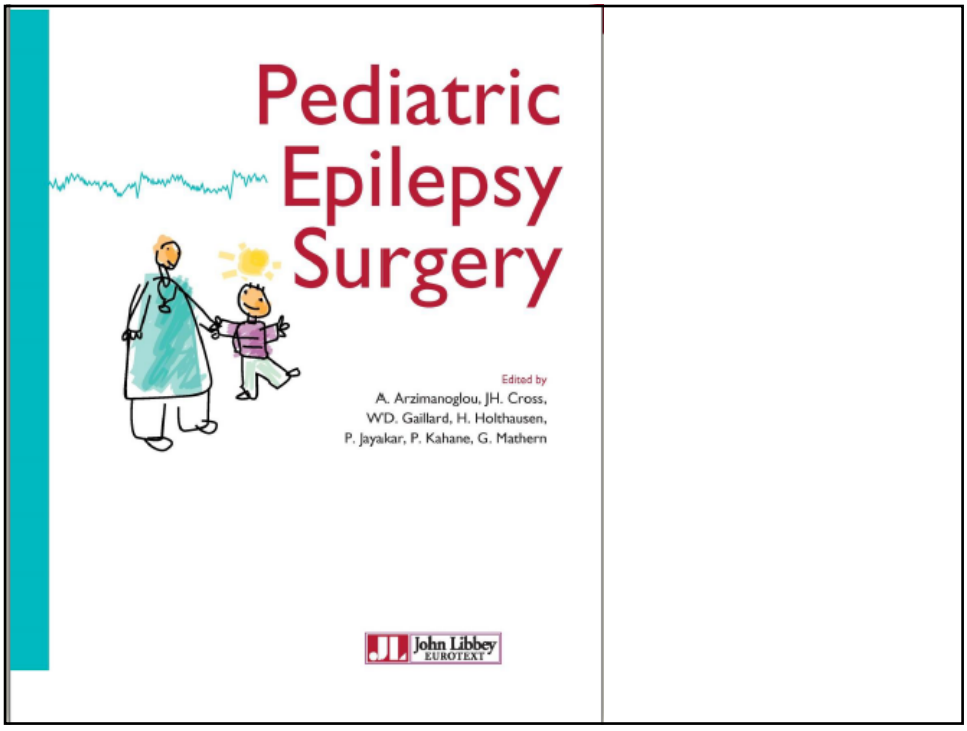
100%	
>85%	
60-85%	
40-60%	
15-40%	
<15%	
0	

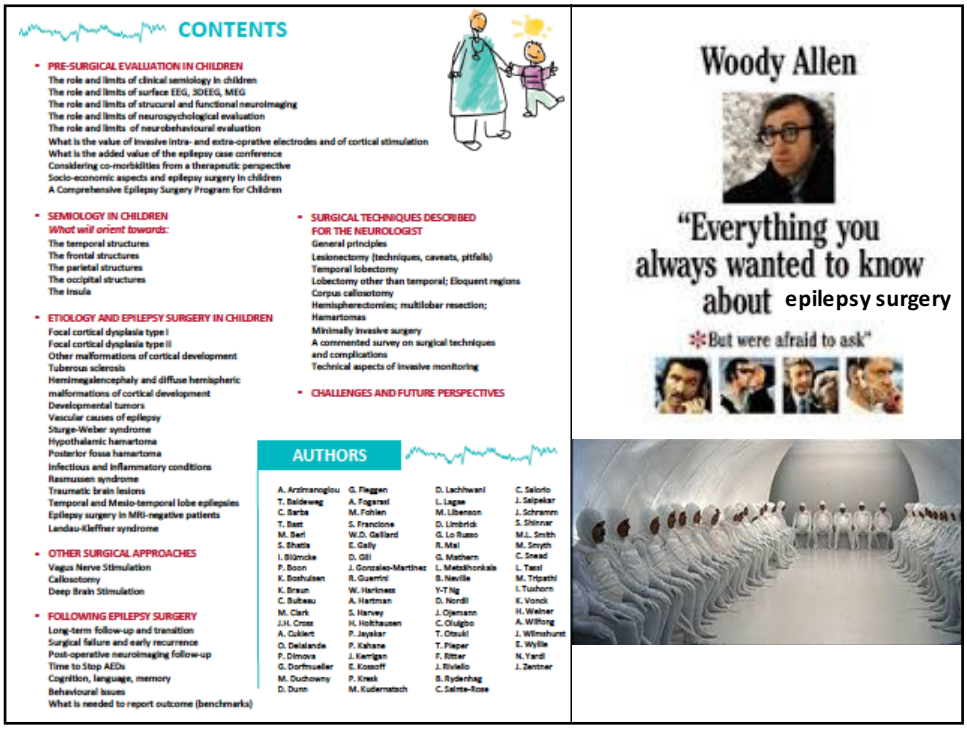
Etiology	II EEG					Video EEG					MRI					3D EEG/MEG					FDG-PET					SPECT					ECoG					IEM				
Single Lesion	M	H	O	L	U	M	H	O	L	U	M	H	O	L	U	M	H	O	L	U	M	H	O	L	U	M	H	O	L	U	M	H	O	L	U	M	H	O	L	U
Dev. Tumors																																							
FCD I																																							
FCD II																																							
Hipp. Sclerosis																																							
Hypo.Hamar.																																							
Vascular																																							
Cavernoma																																							
Hemispheric																																							
HME																																							
PMG																																							
Rasmussen																																							
Sturge-Weber																																							
Other																																							
Tuberous Scl.																																							
Sturge Weber Focal																																							
Post infectious																																							
MRI negative																																							

Penfield and Paine, 1955

"It is not enough whether a radical surgery procedure has stopped attacks or not.

We must know its effect upon the patients' ability to work, to hold a job, to study; the effect on physical and mental function, the effect on behavior and on happiness of the patient and friends."





Absolutely no doubt that to do epilepsy surgery you need to collaborate with a competent paediatric neurosurgeon.

BUT selection of candidates, decision-making about complementary investigations, synthesis of available data, **are and will remain under your responsibility as clinicians**.

And whenever you do not know … do as Woody Allen:

ASK