



# Encéphalites et abcès cérébraux

Dr Marion Le Maréchal

DIU Stratégies Thérapeutiques et Préventives

en Pathologie Infectieuse

22 janvier 2025

# PARTIE 1 : ENCÉPHALITES

# 1. Référentiels

# Référentiels conseillés – Recommandations françaises



## **Recommandation SPILF 2017** **Encéphalites infectieuses** **aiguës de l'adulte**

Jeu de diapositives réalisées par le comité  
des référentiels de la SPILF  
7 avril 2017

Synthèse réalisée par la SPILF



Disponible en ligne sur

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Elsevier Masson France

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**Médecine et  
maladies infectieuses**

*Médecine et maladies infectieuses* 47 (2017) 179–194

Recommendations/Recommandations

## Guidelines on the management of infectious encephalitis in adults

*Recommandations de prise en charge des encéphalites infectieuses de l'adulte*

J.P. Stahl<sup>a,\*,1</sup>, P. Azouvi<sup>b</sup>, F. Bruneel<sup>c</sup>, T. De Broucker<sup>d</sup>, X. Duval<sup>e</sup>, B. Fantin<sup>f</sup>, N. Girard<sup>g</sup>,  
J.L. Herrmann<sup>h</sup>, J. Honnorat<sup>i</sup>, M. Lecuit<sup>j,k</sup>, A. Mailles<sup>l,1</sup>,  
L. Martinez-Almoyna<sup>m</sup>, P. Morand<sup>n</sup>, L. Piroth<sup>o</sup>, P. Tattevin<sup>p,1</sup>, The reviewing group<sup>2</sup>

# Référentiels conseillés – Recommandations américaines

IDSA GUIDELINES

## The Management of Encephalitis: Clinical Practice Guidelines by the Infectious Diseases Society of America

**Allan R. Tunkel,<sup>1</sup> Carol A. Glaser,<sup>2</sup> Karen C. Bloch,<sup>3</sup> James J. Sejvar,<sup>4</sup> Christina M. Marra,<sup>5</sup> Karen L. Roos,<sup>6</sup>  
Barry J. Hartman,<sup>7</sup> Sheldon L. Kaplan,<sup>8</sup> W. Michael Scheld,<sup>9</sup> and Richard J. Whitley<sup>10</sup>**

<sup>1</sup>Monmouth Medical Center, Long Branch, New Jersey; <sup>2</sup>California Department of Health Services, Richmond; <sup>3</sup>Vanderbilt University School of Medicine, Nashville, Tennessee; <sup>4</sup>Centers for Disease Control and Prevention, Atlanta, Georgia; <sup>5</sup>University of Washington School of Medicine, Seattle; <sup>6</sup>Indiana University School of Medicine, Indianapolis; <sup>7</sup>Weill Cornell Medical Center, New York, New York; <sup>8</sup>Baylor College of Medicine, Houston, Texas; <sup>9</sup>University of Virginia School of Medicine, Charlottesville; and <sup>10</sup>University of Alabama at Birmingham

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# Référentiels conseillés – Définitions de l'IEC

MAJOR ARTICLE

## Case Definitions, Diagnostic Algorithms, and Priorities in Encephalitis: Consensus Statement of the International Encephalitis Consortium

A. Venkatesan,<sup>1</sup> A. R. Tunkel,<sup>2</sup> K. C. Bloch,<sup>3,4</sup> A. S. Luring,<sup>5</sup> J. Sejvar,<sup>6</sup> A. Bitnun,<sup>7</sup> J-P. Stahl,<sup>8</sup> A. Mailles,<sup>9</sup> M. Drebot,<sup>10</sup> C. E. Rupprecht,<sup>11</sup> J. Yoder,<sup>12</sup> J. R. Cope,<sup>12</sup> M. R. Wilson,<sup>13,14</sup> R. J. Whitley,<sup>15,16,17,18</sup> J. Sullivan,<sup>19</sup> J. Granerod,<sup>20</sup> C. Jones,<sup>21,22</sup> K. Eastwood,<sup>23</sup> K. N. Ward,<sup>20,24</sup> D. N. Durrheim,<sup>25,26</sup> M. V. Solbrig,<sup>27</sup> L. Guo-Dong,<sup>28</sup> and C. A. Glaser,<sup>29</sup> on behalf of the International Encephalitis Consortium

# Référentiels conseillés – A venir

- Recommandations européennes de l'ESCMID de la prise en charge des encéphalites
- Recommandations françaises de la SPILF des séquelles d'encéphalites

## 2. Épidémiologie

# Épidémiologie en France



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[www.em-consulte.com/en](http://www.em-consulte.com/en)



Original article

## Changing profile of encephalitis: Results of a 4-year study in France

A. Mailles<sup>a,b,\*</sup>, X. Argemi<sup>c</sup>, C. Biron<sup>d</sup>, P. Fillatre<sup>b,e</sup>, T. De Broucker<sup>f</sup>, R. Buzelé<sup>g</sup>,  
A. Gagneux-Brunon<sup>h</sup>, I. Gueit<sup>i</sup>, C. Henry<sup>f</sup>, S. Patrat-Delon<sup>j</sup>, A. Makinson<sup>k</sup>, E. Piet<sup>l</sup>,  
H. Wille<sup>m</sup>, M.O. Vareil<sup>m</sup>, O. Epaulard<sup>b,n</sup>, M. Martinot<sup>o</sup>, P. Tattevin<sup>b,j</sup>, J.P. Stahl<sup>b,n</sup>,  
the scientific committee<sup>1</sup> the investigators<sup>2</sup>,



# Épidémiologie en France

Cause of encephalitis	N =	% of cases identified	Total %	Confirmed	Probable	Possible
HSV	132	40,7	26,7	131	0	0
VZV	65	20,1	13,2	64	0	1
TBEV	26	8,0	5,3	12	12	2
<i>Listeria monocytogenes</i>	23	7,1	4,7	21	2	0
<i>Mycobacterium tuberculosis</i>	11	3,4	2,2	8	2	1
Inconnu	170	-	34,4	-	-	-

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# Épidémiologie en France

**Table 1. Diagnostic Criteria for Encephalitis and Encephalopathy of Presumed Infectious or Autoimmune Etiology**

Major Criterion (required):

Patients presenting to medical attention with altered mental status (defined as decreased or altered level of consciousness, lethargy or personality change) lasting  $\geq 24$  h with no alternative cause identified.

Minor Criteria (2 required for possible encephalitis;  $\geq 3$  required for probable or confirmed<sup>a</sup> encephalitis):

Documented fever  $\geq 38^{\circ}$  C ( $100.4^{\circ}$ F) within the 72 h before or after presentation<sup>b</sup>

Generalized or partial seizures not fully attributable to a preexisting seizure disorder<sup>c</sup>

New onset of focal neurologic findings

CSF WBC count  $\geq 5$ /cubic mm<sup>d</sup>

Abnormality of brain parenchyma on neuroimaging suggestive of encephalitis that is either new from prior studies or appears acute in onset<sup>e</sup>

Abnormality on electroencephalography that is consistent with encephalitis and not attributable to another cause.<sup>f</sup>

Abbreviations: CNS, central nervous system; CSF, cerebral spinal fluid; EEG, electroencephalogram; RBC, red blood cell; WBC, white blood cell.

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# Épidémiologie en France

**2009**

Cause of encephalitis	N =	% of cases identified	Total (253) %
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CMV	3	2,3	1,2
Inconnu	122		48,2

**2022**

Cause of encephalitis	N =	% of cases identified	Total (494) %
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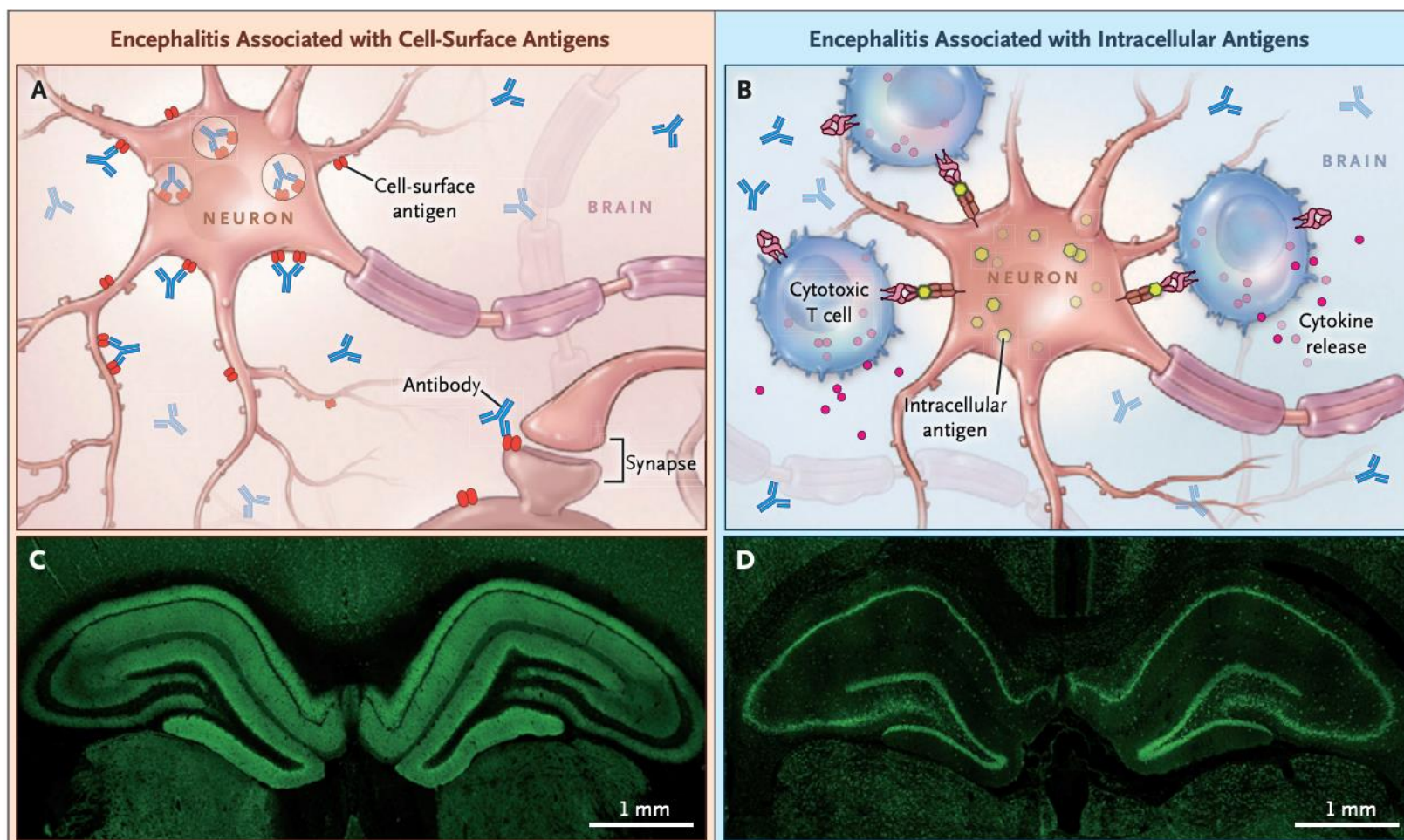
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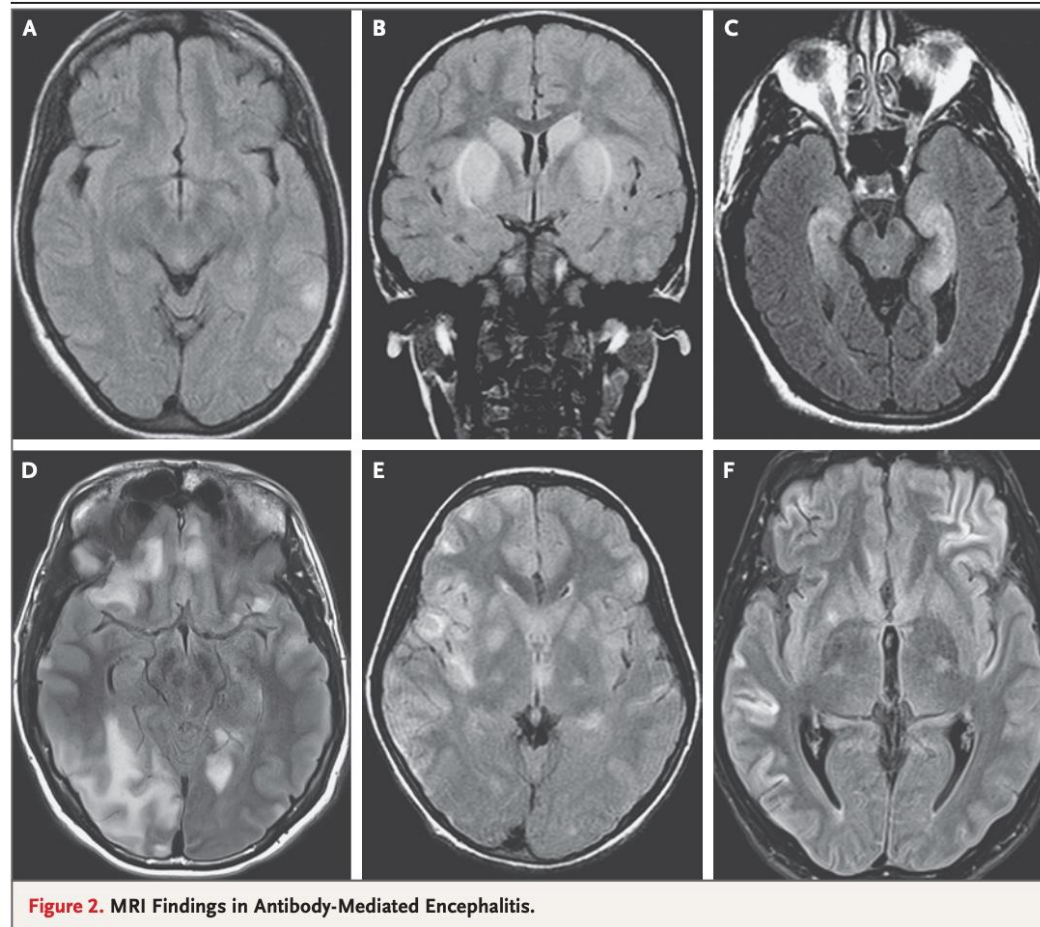
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# Et les encéphalites auto-immunes ?



# Et les encéphalites auto-immunes ?



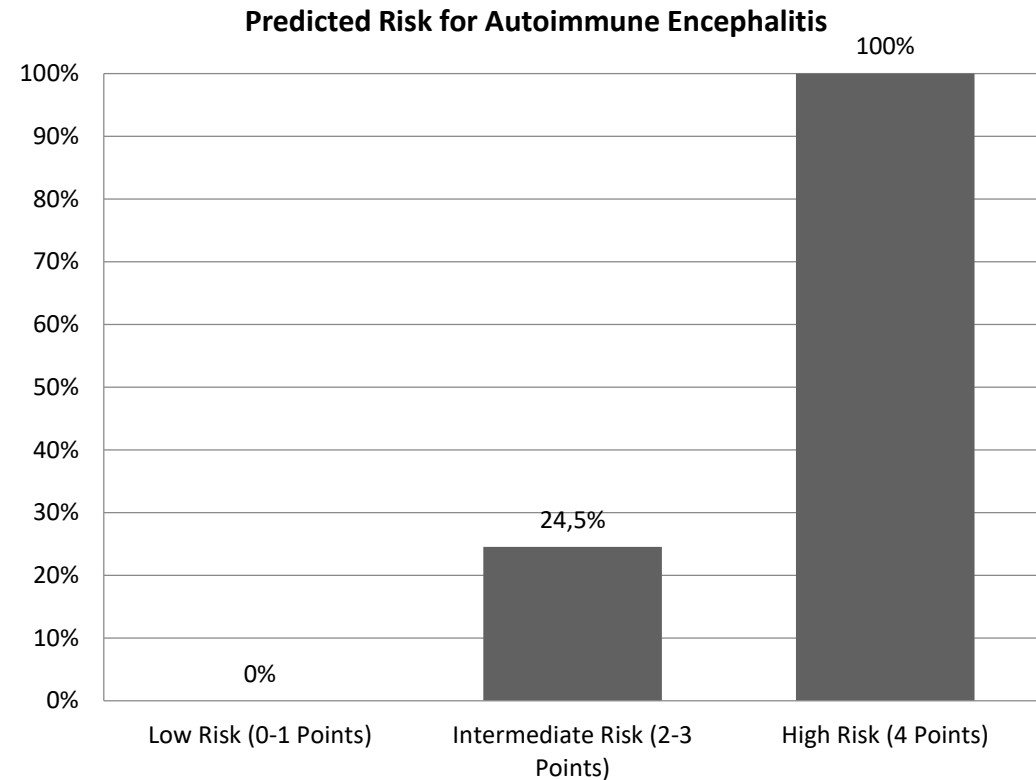
# Et les encéphalites auto-immunes ?

Incidence encéphalite auto-immune : 5-8/100,000

Incidence encéphalite infectieuse : 8/100,000

# Et les encéphalites auto-immunes ?

- Début subaigue
- Charlson < 2
- Signes mémoire/psy
- Peu d'inflammation à la PL



### 3. Démarche diagnostique

# Clinique

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# Clinique

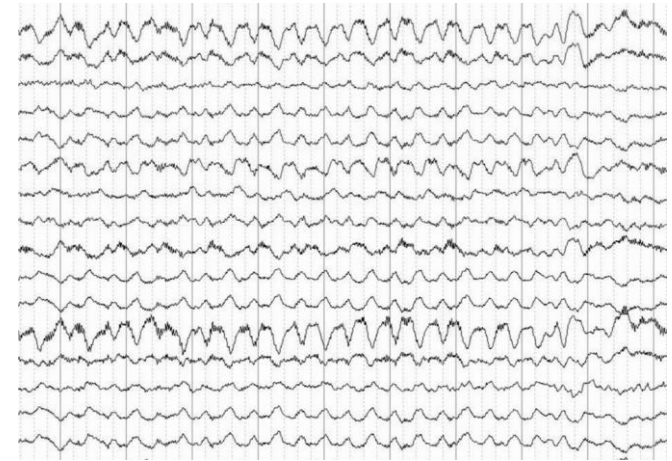
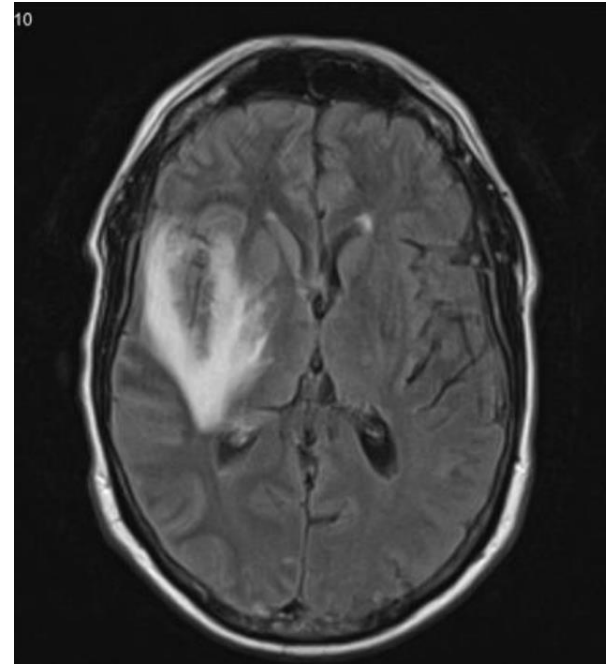
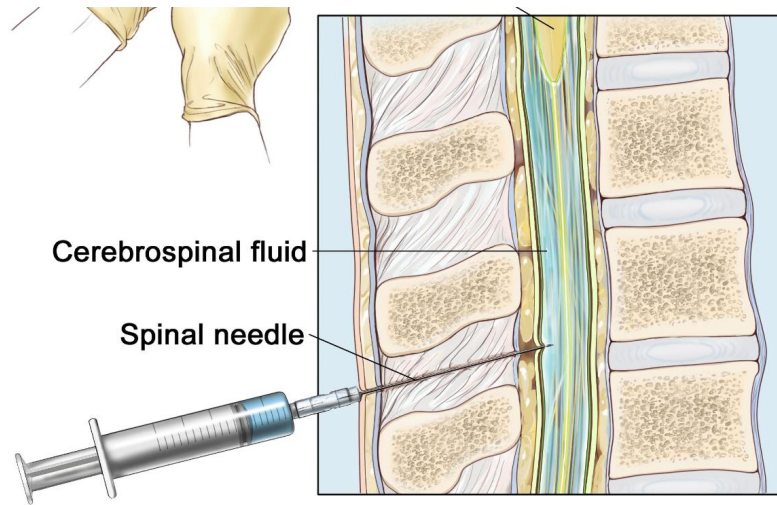
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# Paraclinique



# Paraclinique – Ponction lombaire



0,5mL par tube = 10 gouttes par tube

- 1) Biochimie
- 2) Bactériologie
- 3) Cytologie
- 4) Analyses moléculaires (PCR)
- 5) +/- Ac onco-neuronaux

# Paraclinique – Ponction lombaire – BioFire

Virus	Bactéries	Levure
<ul style="list-style-type: none"><li>● Cytomégalovirus (CMV)</li><li>● Entérovirus</li><li>● Virus herpès simplex 1 (HSV-1)</li><li>● Virus herpès simplex 2 (HSV-2)</li><li>● Herpèsvirus humain 6 (HHV-6)</li><li>● Paréchovirus humain</li><li>● Virus varicelle-zona (VZV)</li></ul>	<ul style="list-style-type: none"><li>● <i>Escherichia coli</i> K1</li><li>● <i>Haemophilus influenzae</i></li><li>● <i>Listeria monocytogenes</i></li><li>● <i>Neisseria meningitidis</i></li><li>● <i>Streptococcus agalactiae</i></li><li>● <i>Streptococcus pneumoniae</i></li></ul>	<ul style="list-style-type: none"><li>● <i>Cryptococcus neoformans / gattii</i></li></ul>

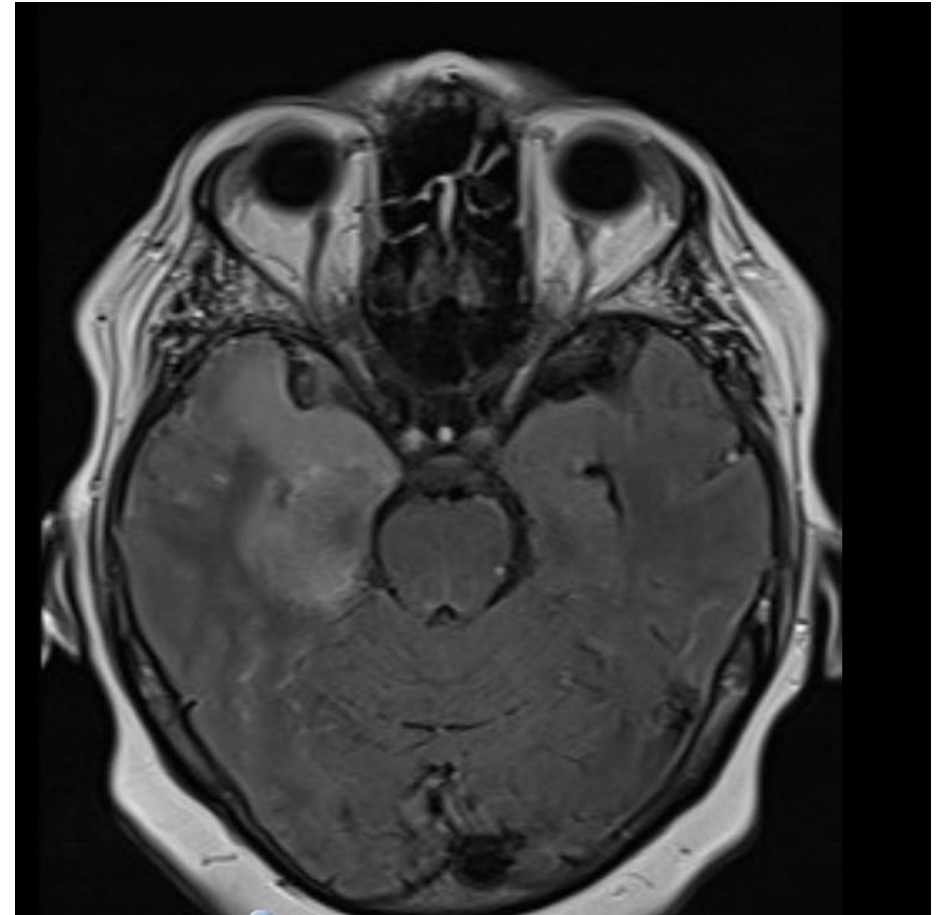
# Paraclinique – Ponction lombaire – BioFire

- Les avantages :
  - 14 pathogènes screenés
  - Disponible en 90 min
  - Peut être fait sans validation biologiste / horaires de garde
  - Petit volume (200µL/4 gouttes)
- Les inconvénients :
  - Résultat négatif peut être « faussement » rassurant
  - Mauvaise sensibilité sur Listeria
  - Panel peu intéressant en terme de cibles (panel ID ?)

# Paraclinique – IRM



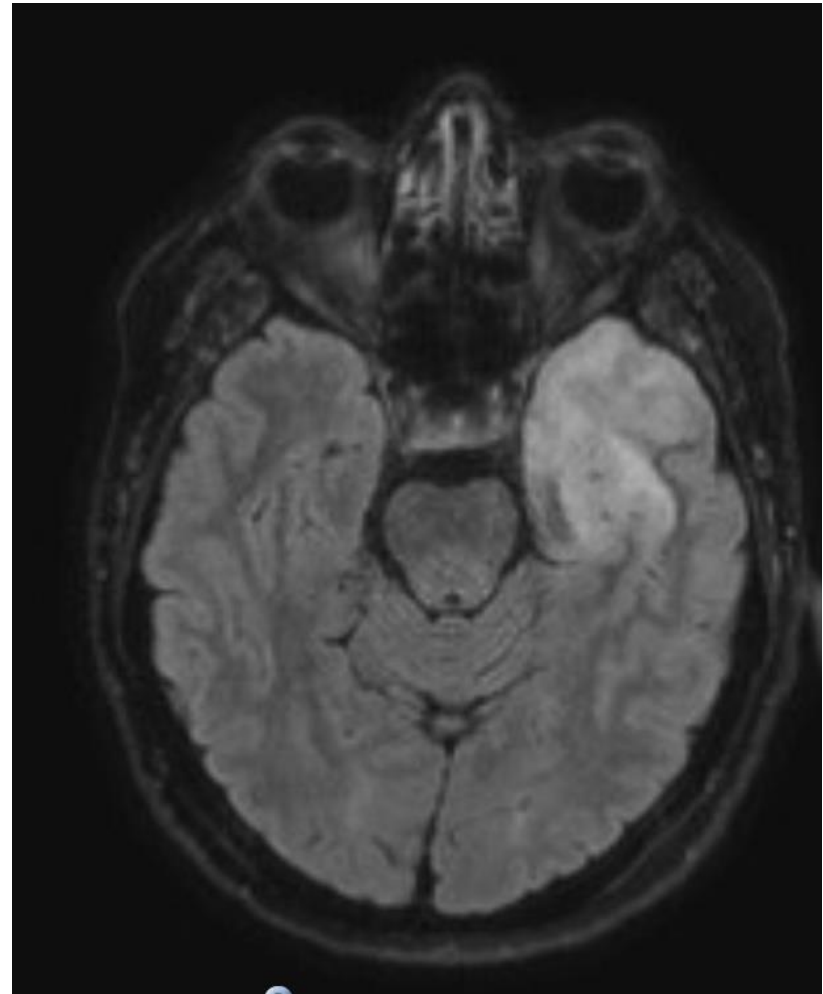
# Paraclinique – IRM



# Paraclinique – IRM



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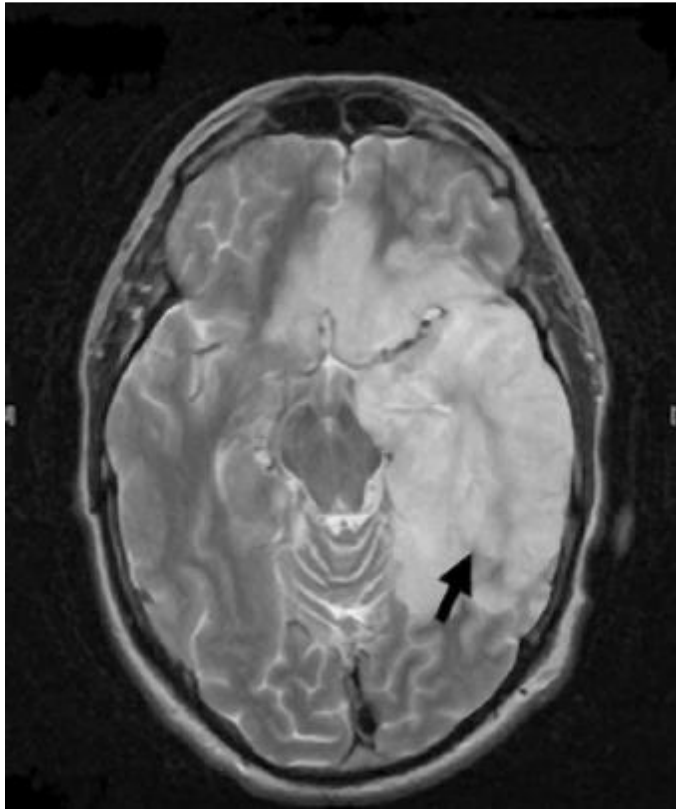


# Paraclinique – EEG

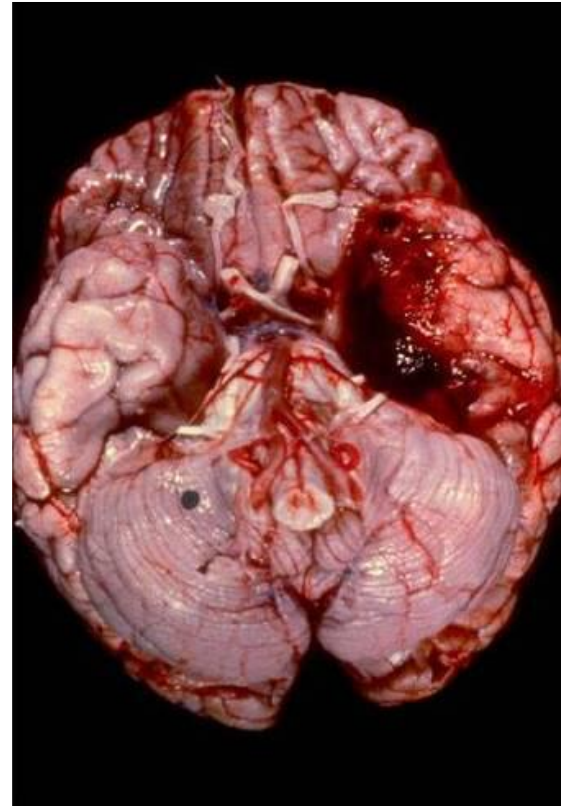
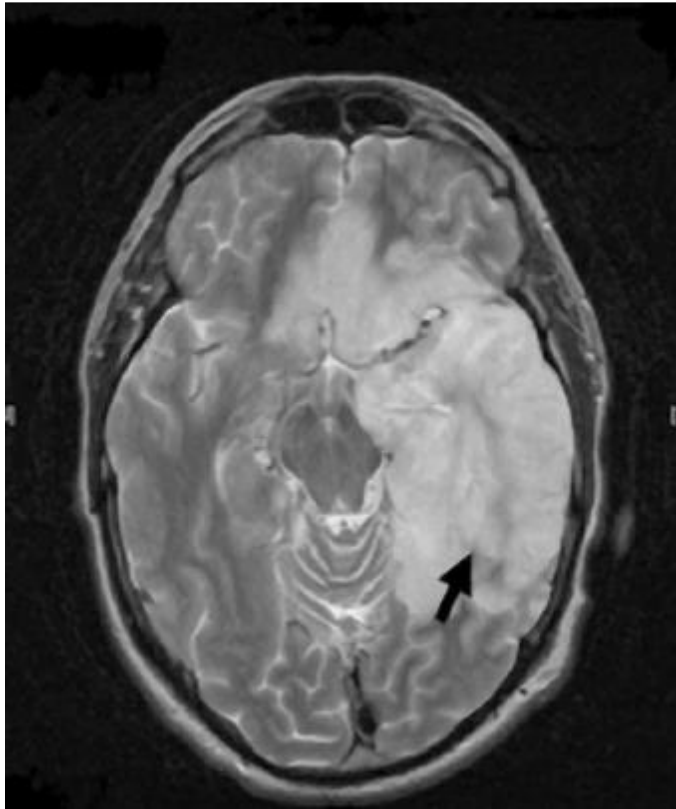
- A faire systématiquement en aigu
- Témoin de la souffrance aiguë
- Aide au diagnostic si anomalie
- Anomalies secondaires peuvent se mettre en place

## 4. Prise en charge thérapeutique

# Quelle gravité des encéphalites ?



# Quelle gravité des encéphalites ?



# Quelle gravité des encéphalites ?

Status at start of treatment	Treatment and outcome (no of patients)									
	No or minor sequelae		Moderate sequelae		Severe sequelae		Died		All patients	
	Acyclovir	Vidar	Acyclovir	Vidar	Acyclovir	Vidar	Acyclovir	Vidar	Acyclovir	Vidar
Lethargy	11*	3*	3	1	1	5	2	2	17	11
Semicoma/coma	4	0	0	1	3	2	3†	10†	10	13
Total	15‡	3‡	3	2	4	7	5§	12§	27	24

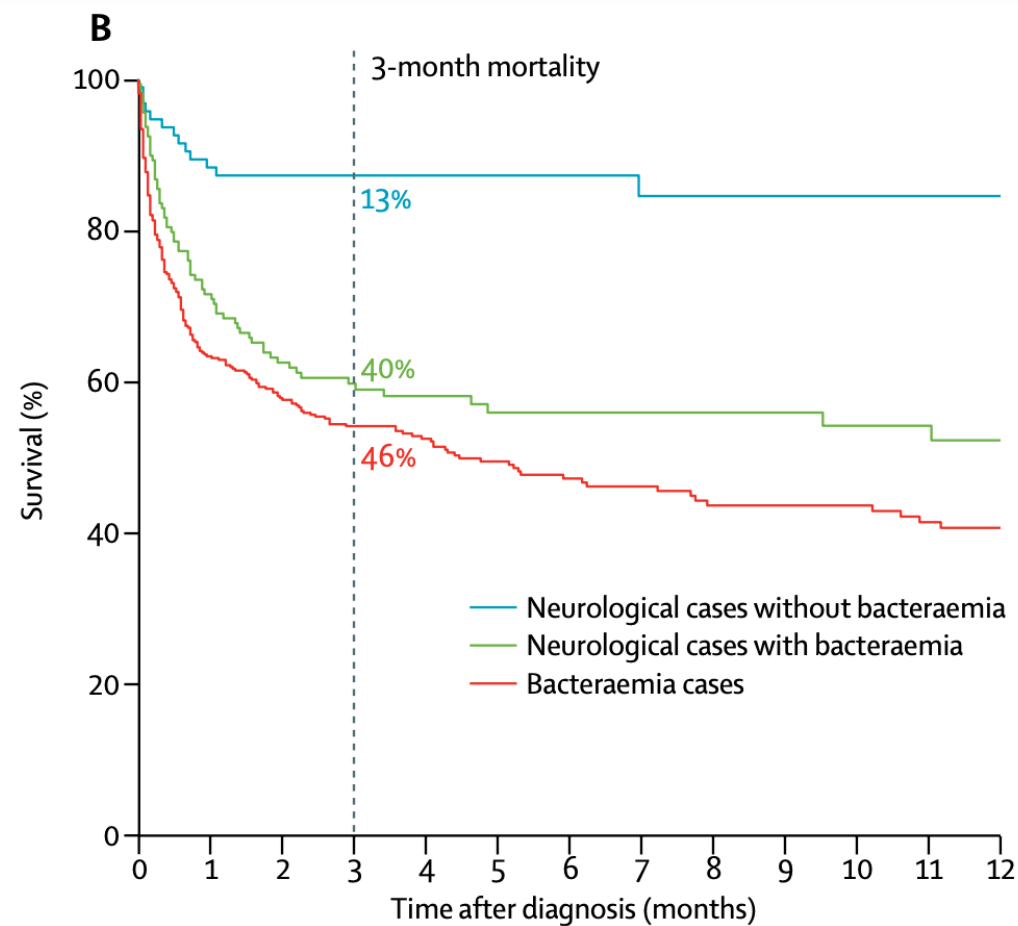
# Quelle gravité des encéphalites ?

**Table 3. Univariate analysis of factors associated with outcomes at 6 months for 85 patients with herpes simplex encephalitis.**

Characteristic	Patients with favorable outcome (n = 55)	Patients with poor outcome (n = 30)	P
Age, mean years ± SD	50 ± 16.2	56.6 ± 16.8	.1
MacCabe score, mean ± SD	0.11 ± 0.4	0.1 ± 0.3	.92
Knaus score, mean ± SD	1.16 ± 0.4	1.43 ± 0.7	.04
GCS score, mean ± SD	13.7 ± 2.5	12.5 ± 3.4	.03
SAPS II, mean ± SD	27.6 ± 16.1	29.6 ± 12.1	.45
SAPS II >27, no. (%) of patients	9 (16)	17 (57)	.0001
Seizures, no. (%) of patients	18 (33)	9 (30)	.79
Focal neurological deficit, no. (%) of patients	11 (20)	9 (30)	.3
Serum sodium level, mean mM ± SD	132.4 ± 5.5	131.3 ± 5	.32
CSF parameters, mean ± SD			
Leukocyte count, cells/mL × 10 <sup>3</sup>	250 ± 546	170 ± 197	.39
Protein level, g/L	0.83 ± 0.6	0.78 ± 0.4	.39
Less than 2 days between hospital admission and initiation of acyclovir therapy, no. (%) of patients	41 (75)	9 (30)	.00008
Mechanical ventilation, no. (%) of patients	23 (42)	18 (60)	.97
Hospital-acquired infection, no. (%) of patients	17 (31)	20 (67)	.001

**NOTE.** GCS, Glasgow Coma Scale; SAPS, Simplified Acute Physiology Score.

# Quelle gravité des encéphalites ?



	0	1	2	3	4	5	6	7	8	9	10	11	12
Neurological cases without bacteraemia	94	76	49	35	30	26	25						
Neurological cases with bacteraemia	158	93	59	41	35	29	23						
Bacteraemia cases	423	235	149	94	68	59	53						

# Rappel de l'épidémiologie en France

Cause of encephalitis	N =	% of cases identified	Total %	
HSV	132	40,7	26,7	Cause traitable par ACICLOVIR
VZV	65	20,1	13,2	
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<i>Listeria monocytogenes</i>	23	7,1	4,7	Cause traitable par AMOXICILLINE

# Conduite initiale (premières 48 h)



- **Traitements anti-infectieux (1)**

- ✓ A débiter en urgence
- ✓ Absence d'orientation étiologique (clinique ou biologique),
  - Acyclovir : 10 mg/kg IV toutes les 8 heures **et**
  - Amoxicilline : 200 mg/kg/jour en au moins 4 perfusions, ou en administration continue
  - Réévaluation systématique à 48h.
- ✓ Si vésicules cutanées ou signes de vasculopathie à l'imagerie
  - Acyclovir : 15 mg/kg IV toutes les 8 heures.

# Néphrotoxicité de l'acyclovir

**Table 2**  
Intervention-related risk factors for AKI in patients treated with aciclovir.

Factor (Y/N)	AKI n = 35 (%)	No AKI n = 234 (%)	P value	Odds ratio (95% CI)/ 95% CI of difference
Any nephrotoxic	26/9 (74)	173/61 (74)	1	1.0 (0.4–2.2)
Aminoglycoside	0/35 (0)	10/224 (4)	0.370	N/A
Beta-lactam	14/21 (40)	85/1549 (36)	0.708	1.2 (0.6–2.4)
Glycopeptide	0/35 (0)	2/232 (1)	1	N/A
Antiviral	0/35 (0)	13/221 (6)	0.387	N/A
Antifungal	1/34 (3)	9/225 (4)	1	0.7 (0.1–6.0)
Immunosuppressive	1/34 (3)	16/218 (7)	0.488	0.4 (0.1–3.1)
ACE inhibitors	4/31 (11)	21/213 (9)	0.753	1.3 (0.4–4.1)
Diuretics	4/31 (11)	28/206 (12)	1	1.0 (0.3–2.9)
Chemotherapy	0/35 (0)	0/234 (0)	1	N/A
Other nephrotoxics	4/31 (11)	28/206 (12)	1	1.0 (0.3–2.9)
Contrast	16/19 (46)	81/153 (35)	0.258	1.6 (0.8–3.3)
Aciclovir dose				
Mean daily dose (mg)	2173.7 (1952.7–2394.7)	1819.9 (1738.4–1901.3)	<b>0.004</b>	111.8–595.9
Mean cumulative dose (mg)	7848.2 (4665.6–11030.8)	9664.7 (8386.0–10943.3)	0.417	1487.4–2145.5



## Case report

## Aciclovir-induced neurotoxicity: Utility of CSF and serum CMMG levels in diagnosis

L. Berry\*, P. Venkatesan

Department of Infectious Diseases, Nottingham City Hospital, Hucknall Road, Nottingham NG5 1PB, United Kingdom<sup>1</sup>CMMG : 9-carboxymethoxymethylguanine  
(métabolite de l'aciclovir)

L. Berry, P. Venkatesan / Journal of Clinical Virology 61 (2014) 608–610

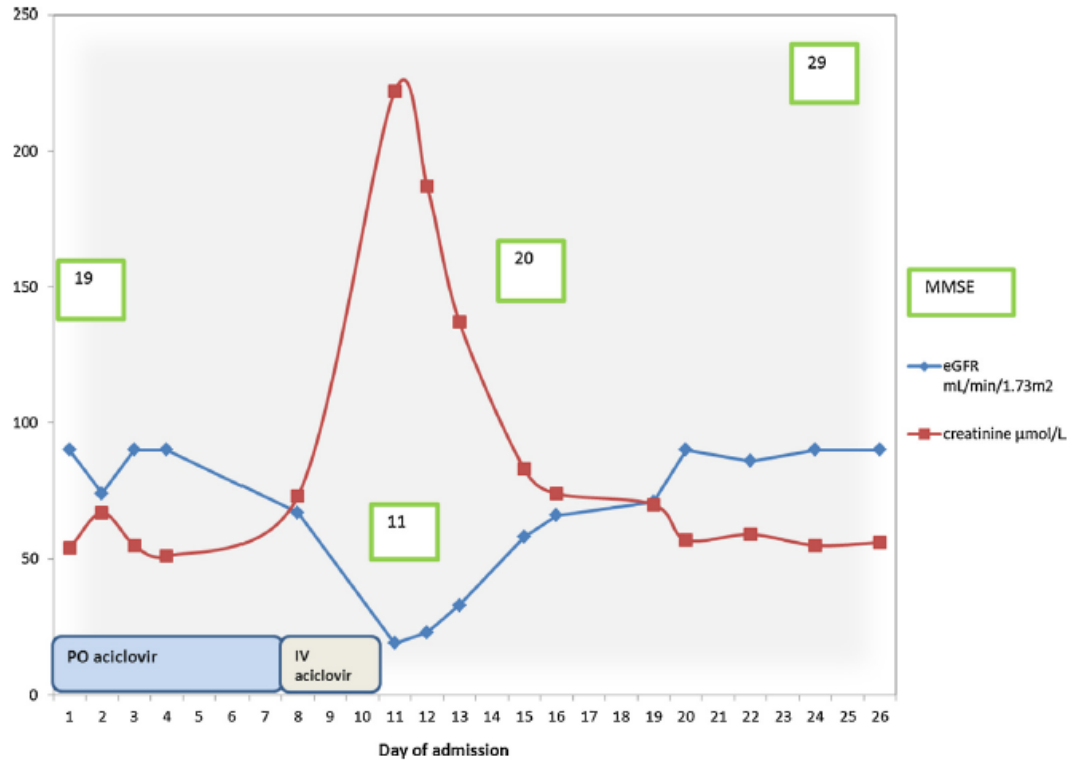


Fig. 1. Results of patient's creatinine, eGFR and MMSE level during admission.

Table 1

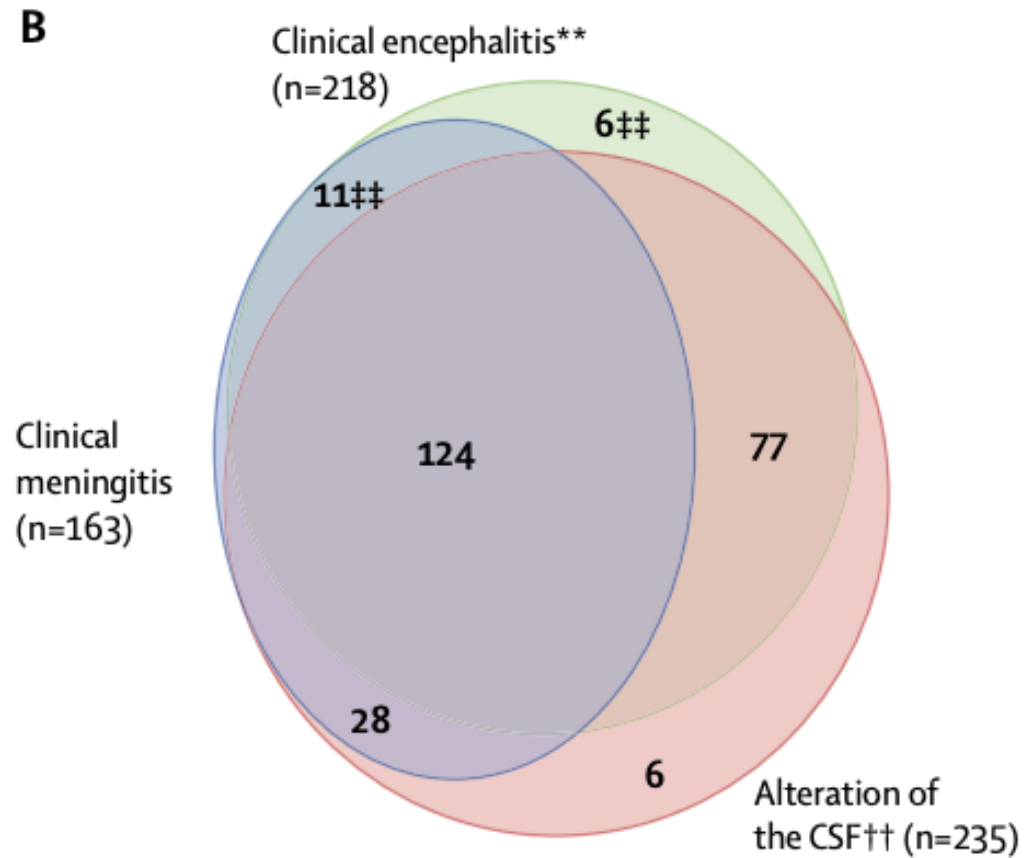
Patient's CSF and serum CMMG and aciclovir levels.

	CSF (day 5 of admission) (μmol/L)	Serum (day 8 of admission) (μmol/L)
CMMG	1.6	57.3
Aciclovir	0.88	182.2

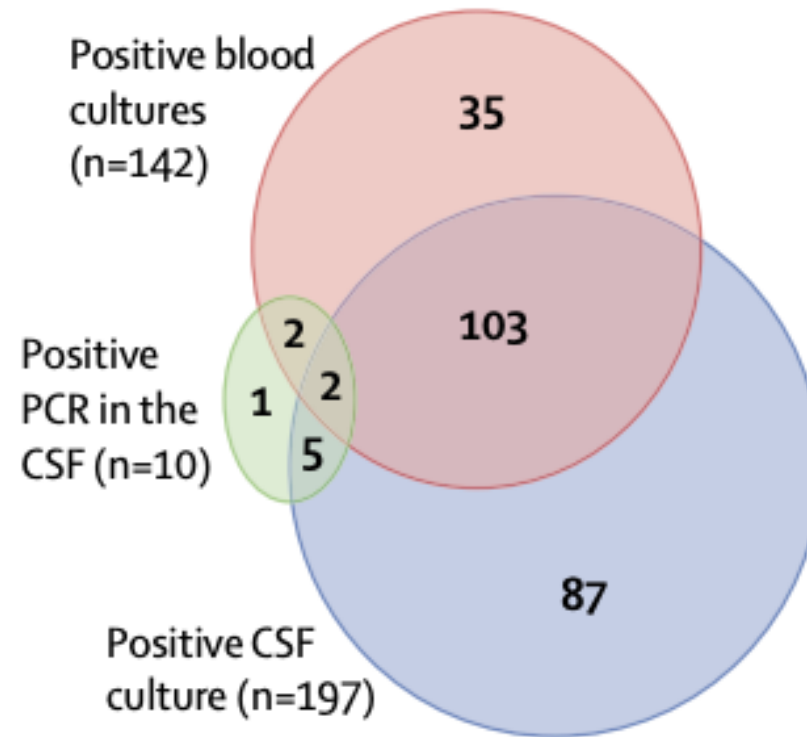
# Paraclinique – Orientation étiologique ?

CSF Profile	CSF pleocytosis group (WBC > 5cells/mm <sup>3</sup> )	Normocellular CSF group (WBC ≤ 5cells/mm <sup>3</sup> )
Days of CSF examination after neurological onset	Day 0—1: 5 (29.4 %) Day 2—10: 12 (70.6 %)	Day 0—1: 1 (16.7 %) Day 2—10: 5 (83.3 %)
CSF protein	0–60 mg/dl: 1 (6.3 %) 61–100 mg/dl: 7 (43.8 %) >100 mg/dl: 8 (50 %) Not available: 1	0–60 mg/dl: 2 (33.3 %) 61–100 mg/dl: 4 (66.7 %) >100 mg/dl: 0
CSF glucose	<30 mg/dl: 1 (6.3 %) 31–60 mg/dl: 7 (43.8 %) >60 mg/dl: 8 (50 %) Not available: 1	<30 mg/dl: 0 31–60 mg/dl: 1 (16.7 %) >60 mg/dl: 5 (83.3 %)
Average CSF viral load	12,200 copies/ml (39–11,755,813 copies/ml) (11 cases available: 6 had qualitative test)	3027 copies/ml (59–5970 copies/ml) (4 cases available: 3 had qualitative test)

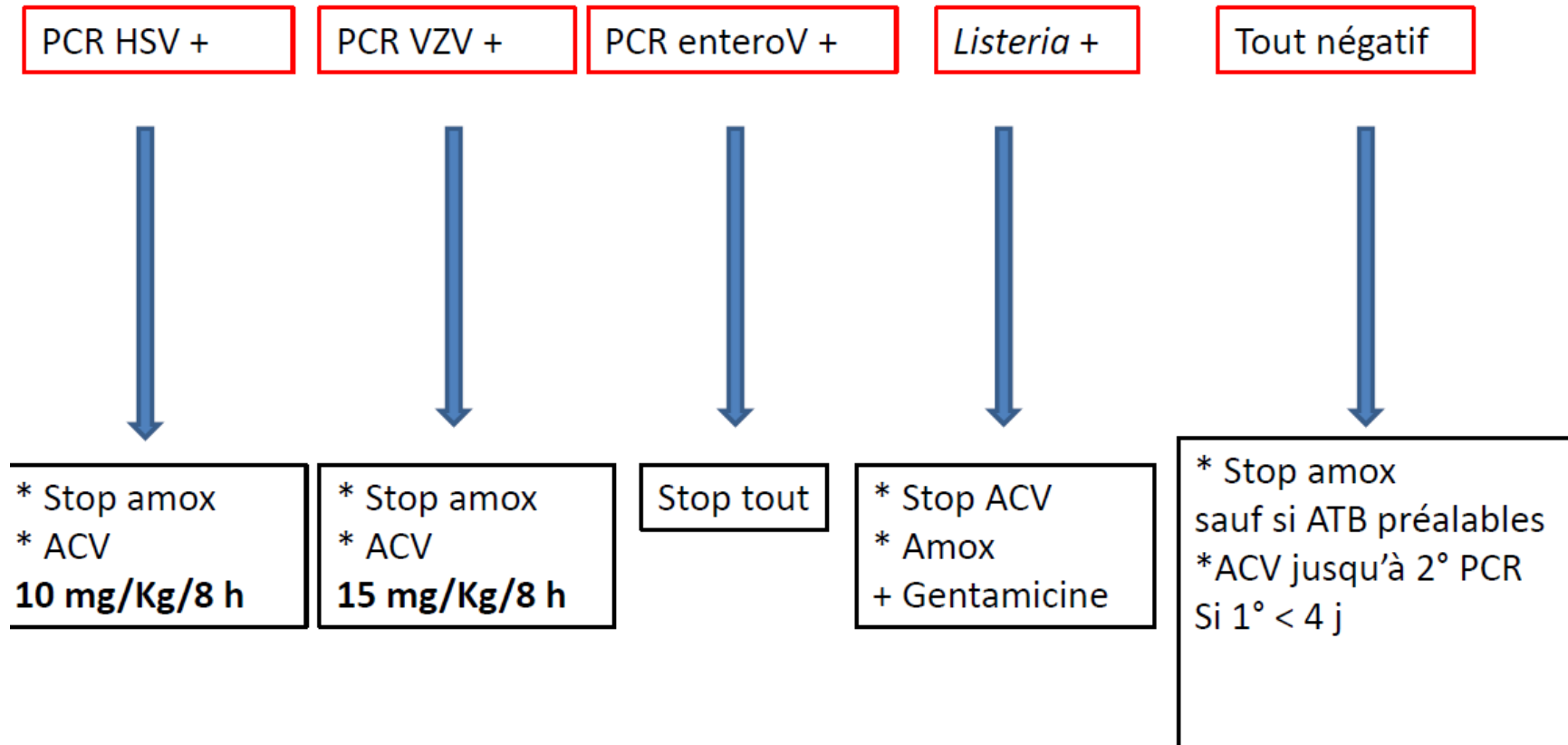
# Paraclinique – Orientation étiologique ?



# Paraclinique – Orientation étiologique ?



# Réévaluation à 48h



## Q3 : Diagnostic déjà fait à 48h, quelle CAT ?

- HSV

**Grade A** La dose d'aciclovir dans le traitement de l'encéphalite à HSV de l'adulte est de **10 mg/kg pendant 1 heure toutes les 8 heures**.

**Grade B** En cas d'encéphalite herpétique prouvée par la positivité de la PCR initiale, le contrôle systématique de la PCR HSV dans le LCS à la fin du traitement n'est pas recommandé si l'évolution est favorable

**Grade C** La durée recommandée de traitement est de **14 jours chez l'adulte immunocompétent**.

**Grade C** Pour les patients **immunodéprimés**, une durée de **21 jours** est recommandée.

**Grade C** En cas d'évolution clinique **non favorable** à la fin du traitement, une ponction lombaire avec PCR HSV et recherche d'auto-anticorps sur le LCS doit être réalisée. La positivité de la PCR HSV peut conduire à prolonger le traitement par aciclovir à 21 jours.

## Q3 : Diagnostic déjà fait à 48h, quelle CAT ?

- *Listeria*

### Recommandations

#### Grade A

Le traitement recommandé de l'encéphalite listérienne documentée est l'**amoxicilline** à la dose de **200 mg/kg/jour** en 4 perfusions au moins ou en administration continue par 24 heures pendant **21 jours** + **gentamicine 5 mg/kg/j** en dose unique quotidienne pendant au **maximum 5 jours (grade C, recos AFSSAPS aminosides)**

#### Grade A

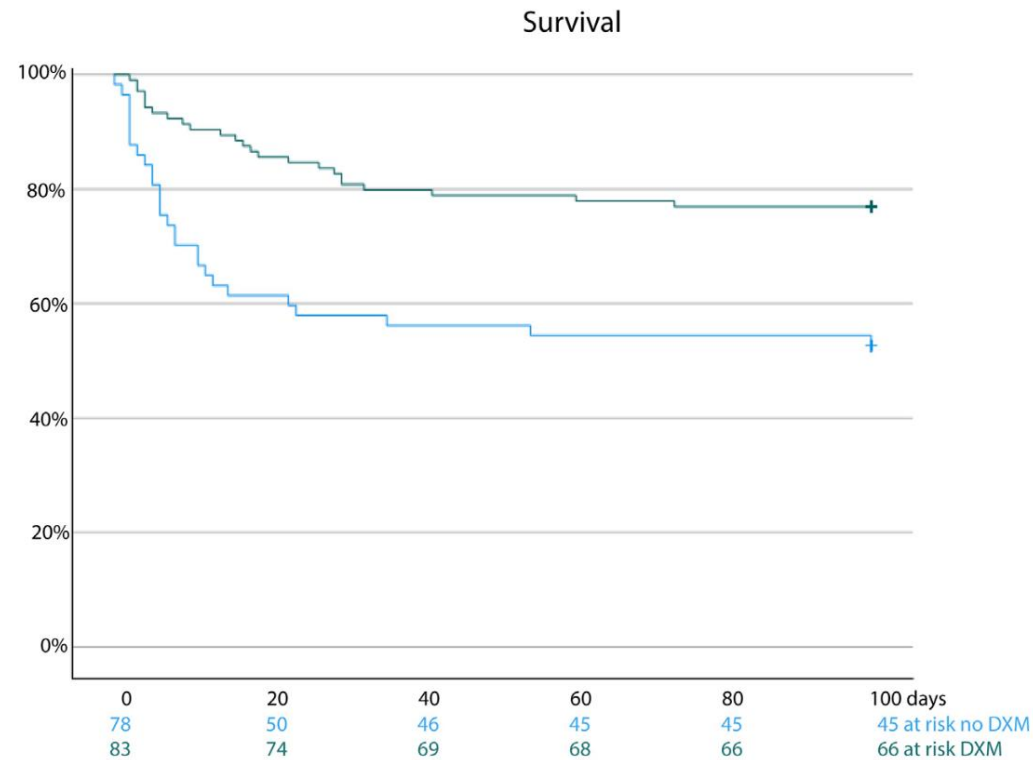
En cas de contre-indication à l'amoxicilline (allergie grave **prouvée**), l'association triméthoprime-sulfaméthoxazole à forte dose (6 à 9 ampoules par jour en 3 injections iv) doit être administrée pendant 21 jours.

# Quid de la corticothérapie ?

## 3-month mortality for neurolisteriosis (n=252)

Female sex	2.68 (1.24–5.83)	0.013
Age (years)	1.35 (0.99–1.85)	0.058
Ongoing organ neoplasia	4.58 (1.53–13.73)	0.007
Recent major weight loss	2.65 (1.08–6.55)	0.034
Multi-organ failure	3.08 (1.25–7.58)	0.014
Aggravation of any pre-existing organ dysfunction	2.75 (1.23–6.16)	0.014
Influenza-like symptoms	0.47 (0.20–1.12)	0.087
Mechanical ventilation	2.89 (1.31–6.37)	0.009
Monocytopenia <200 cells per $\mu$ L	3.57 (1.24–10.23)	0.018
Positive blood cultures	3.67 (1.60–8.40)	0.002
Protein concentration in the CSF	1.18 (0.99–1.41)	0.062
Adjunctive dexamethasone for meningitis	4.58 (1.50–13.98)	0.008

# Quid de la corticothérapie ?



# Quid de la corticothérapie ?



*La dexaméthasone en traitement  
complémentaire des encéphalites à Herpes  
Simplex Virus*  
DexENCEPH

PHRC:

Investigateur principal: J.P. Stahl (Grenoble)

Co-investigateurs: X. Argemi (Strasbourg), D. Bouteille(Nantes), T. De Broucker (Saint Denis), I. Gueit (Rouen), V. le Moing (Montpellier), C. Pulcini (Nancy), R. Sonnevile (Paris), P. Tattevin (Rennes).

**\*\*Primary Outcome: Auditory Memory Index for dexamethasone patients versus controls at 6 months**

	Dexamethasone (n=42)	Control (n=39)	Adjusted Mean Difference (95% CI)	P-Value
<b>Primary outcome</b> WMS-IV Auditory Memory Index Mean (SD)	71 (26)	69 (25)	1.7 (-10, 13)	.756

(Normal WMS-IV is 100; possible scores range 40 – 160)

Table 1 Clinical and neuropsychological profiles of cases of herpes simplex encephalitis

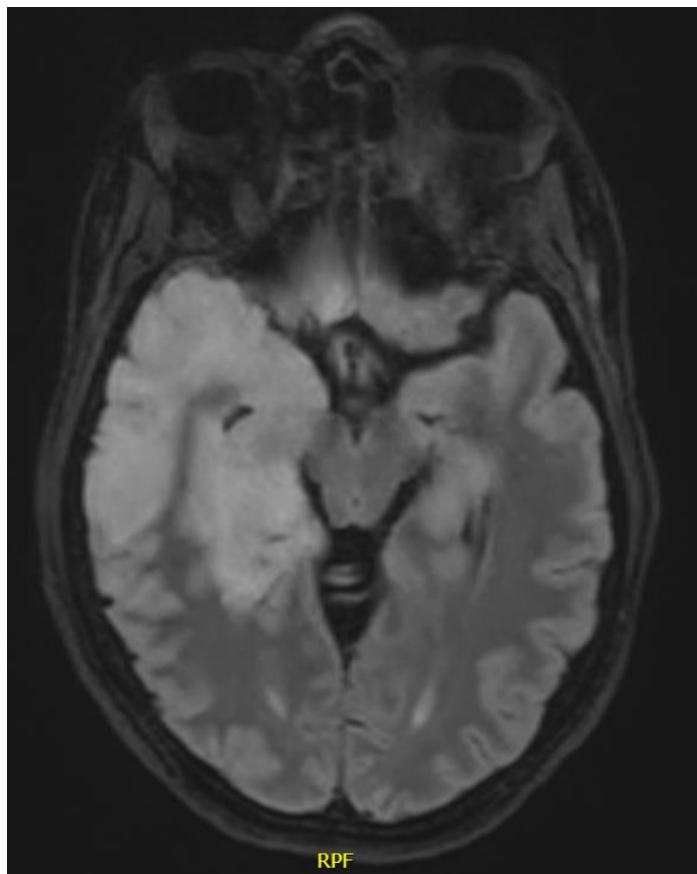
Case	Age and sex	Duration of memory disorder (y)	Amnesia severity* score (/24)	NART estimated IQ score	Verbal IQ subtest scores	Performance IQ subtest scores	Picture naming	Card sorting
1	53 Male	7	0	106	Infor = 8 Arith = 12 Simil = 6†	Pict ar = 8 B des = 15 D sy = 11	Impaired 2/30	Normal
2	39 Female	15	1	117	Infor = 6† Arith = 8 Simil = 7	Pict ar = 8 B des = 8 D sy = 8	Normal 11/30	Pronounced impairment
3	42 Female	10	2	113	Infor = 7 Arith = 12 Simil = 11	Pict ar = 8 B des = 10 D sy = 14	Normal 15/30	Normal
4	45 Female	3	3	110	Infor = 5† Arith = 10 Simil = 7	Pict ar = 8 B des = 9 D sy = 10	Impaired 2/30	Mild impairment
5	59 Male	7	4	122	Infor = 10 Arith = 12 Simil = 13	Pict ar = 14 B des = 12 D sy = 14	Normal 21/30	Normal
6	39 Male	4	7	(Long-standing dyslexia) 98	Infor = 5† Arith = 6† Simil = 8	Pict ar = 13 B des = 12 D sy = 6†	Impaired 5/30	Normal
7	70 Male	3	9		Infor = 12 Arith = 12 Simil = 11	Pict ar = 7 B des = 11 D sy = 8	Normal 13/30	Mild impairment
8	57 Female	2	12	(Dysphasia affected test score) 89	Infor = 5† Arith = 7 Simil = 7	Pict ar = 12 B des = 12 D sy = 11	Impaired 0/30	Normal
9	65 Male	7	13		Infor = 7 Arith = 9 Simil = 7	Pict ar = 7 B des = 8 D sy = 9	Normal 11/30	Pronounced impairment
10	24 Female	1	23	107	Infor = 9 Arith = 11 Simil = 10	Pict ar = 9 B des = 10 D sy = 7	Normal 22/30	Normal

\* Severity of amnesia was based on a composite score reflecting performance on the Wechsler memory scale-revised, the recognition memory test, and the current awareness test. † Impairment. Infor = Information; Arith = Arithmetic; Simil = Similarities; Pict ar = Picture arrangement; B des = Block design; D sy = Digit symbol.

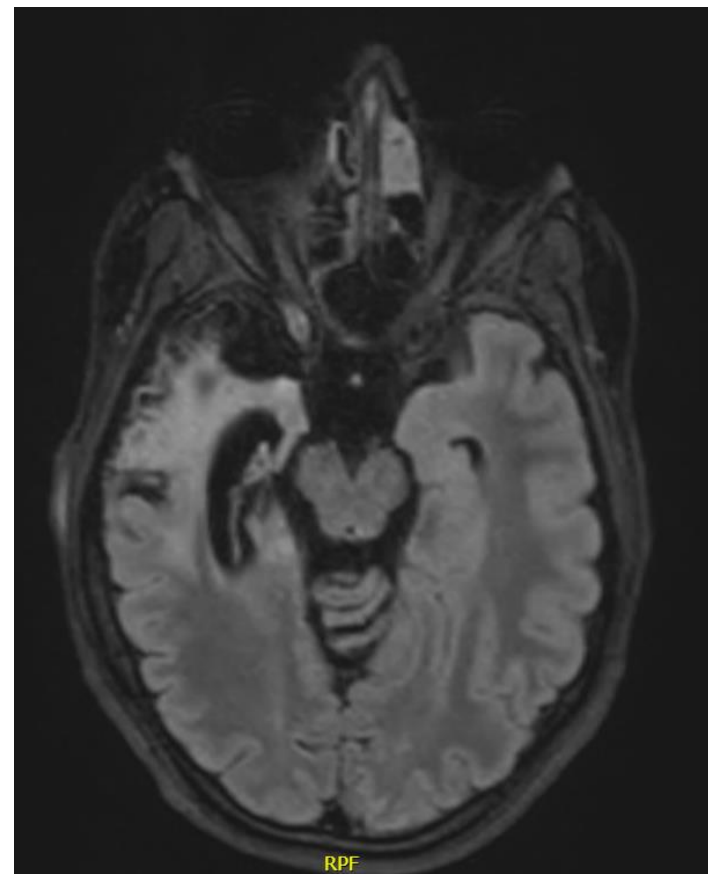
**Table 1** Participant characteristics and interview details of participants with HSV encephalitis

Person with HSV encephalitis	Age at interview	Gender M/F	Timing of interview post-discharge	Interview details	Duration of stay in hospital (days)	Destination on discharge	Employment status at time of interview
Retrospective Cohort							
1	45	M	6 years	Interviewed with partner	22	Home	No longer working: receiving Disability Living Allowance
2	47	F	7 Years	Interviewed with mother	211	Home	No longer working: receives income from previous employer's insurance
3	43	M	6 years	Interviewed with partner	20	Home	No longer working: receiving Disability Living Allowance
4	58	M	5 years 10 months	Interviewed with wife	30	Home	Employed: took a role with fewer responsibilities after being made redundant.
5	15	M	1 year 11 months	Interview conducted with the parents	63	Home	N/A – in school
6	62	F	5 years 9 months	Interviewed alone	48	Home	No longer working: sold her business
7	68	F	7 years 1 month	Interviewed alone	16	Home	Took early retirement
8	55	F	5 years	Interviewed with friend	15	Home	Took early retirement
9	36	M	1 year	Interviewed with wife	10 (continued acyclovir at home)	Home	Employed: took a role with fewer responsibilities post-encephalitis
10	5	M	5 years 7 months	Interview conducted with the child's mother	37	Home	N/A – in school
11	56	F	3 years 6 months	Interview conducted with husband	126	Neuro-rehabilitation	No longer able to work
12	20	F	5 years 10 months	Interviewed alone	39	Home	Student (university)
13	34	F	4 years 4 months	Interviewed with partner	21	Home	No longer working: receiving Disability Living Allowance
14	55	F	7 years 7 months	Interviewed alone	12	Home	Took early retirement
15	6	M	3 years	Interview conducted with the child's father	42	Home	N/A – in school
16	33	M	1 year 2 months	Interviewed with Mother	25	Home	Employed: returned to work
17	61	F	6 years 5 months	Interviewed alone	58	Home (offered rehabilitation but declined)	Took early retirement

# Sur le long terme



Octobre 2022



Juin 2023

## 5. Particularités de l'immunodéprimé

# Les différents types d'immunodépression

## **VIH**

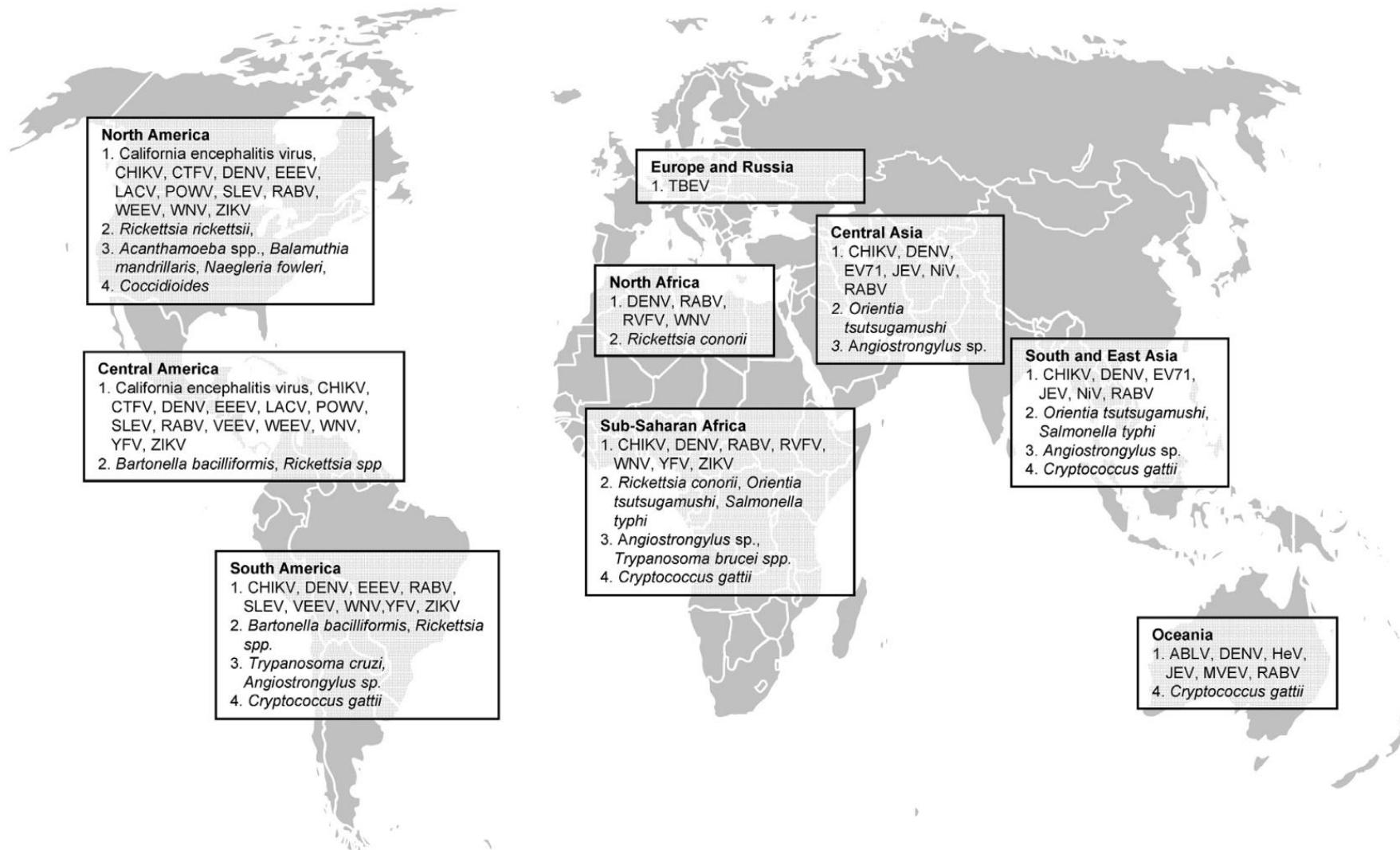
- Toxoplasmose cérébrale
- Cryptococcose neuroméningée
- LEMP
- Tuberculose neuroméningée
- Neurosyphilis
- Encéphalite à CMV
- Encéphalite à VIH
- Lymphome cérébral

## **Hors VIH**

- Encéphalite infectieuse
- Encéphalite auto-immune
- Encéphalite paranéoplasique
- Localisation neurologique de la maladie
- Lymphome cérébral
- Toxicité du traitement

## 6. Particularités du voyageur

# Les encéphalites du voyageur



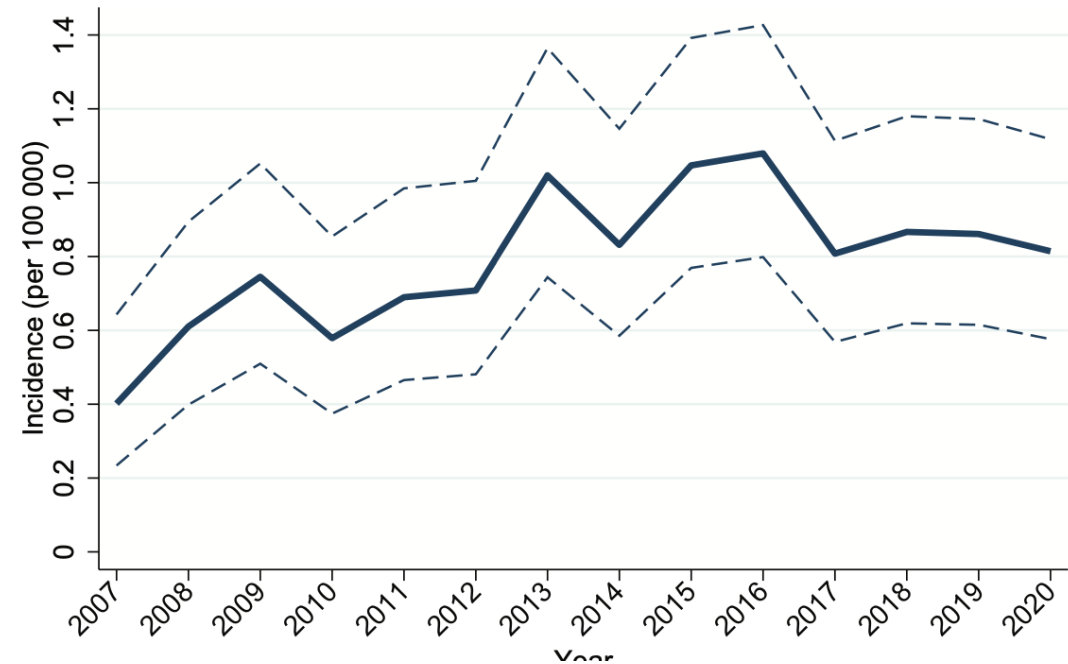
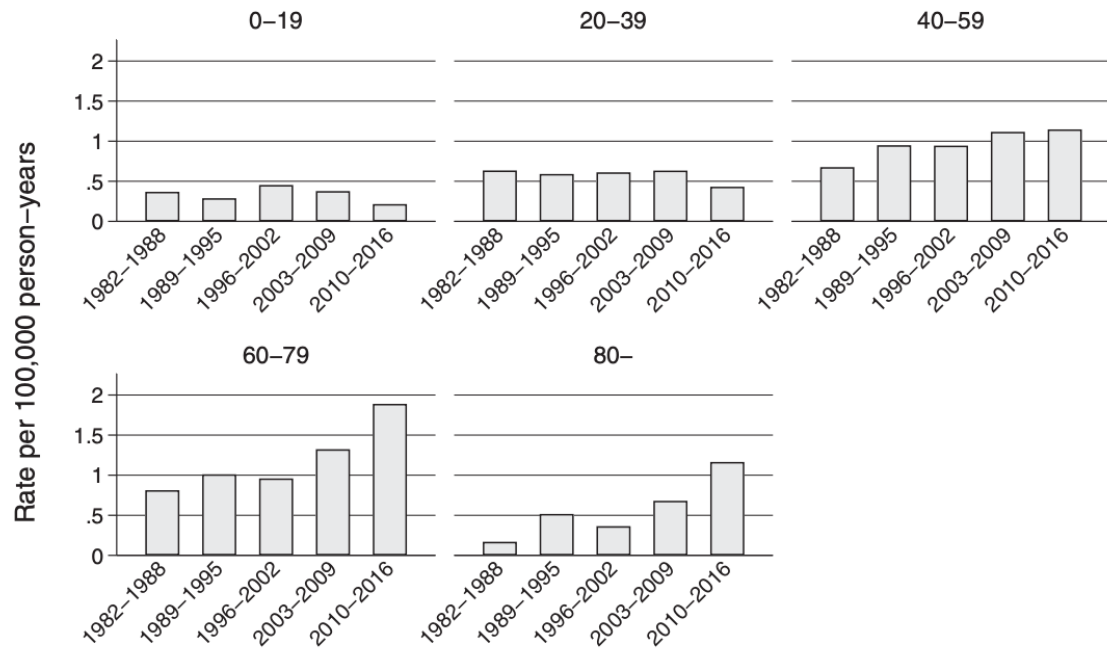
# PARTIE 2 : ABCÈS CÉRÉBRAUX

A. Abscès à pyogènes

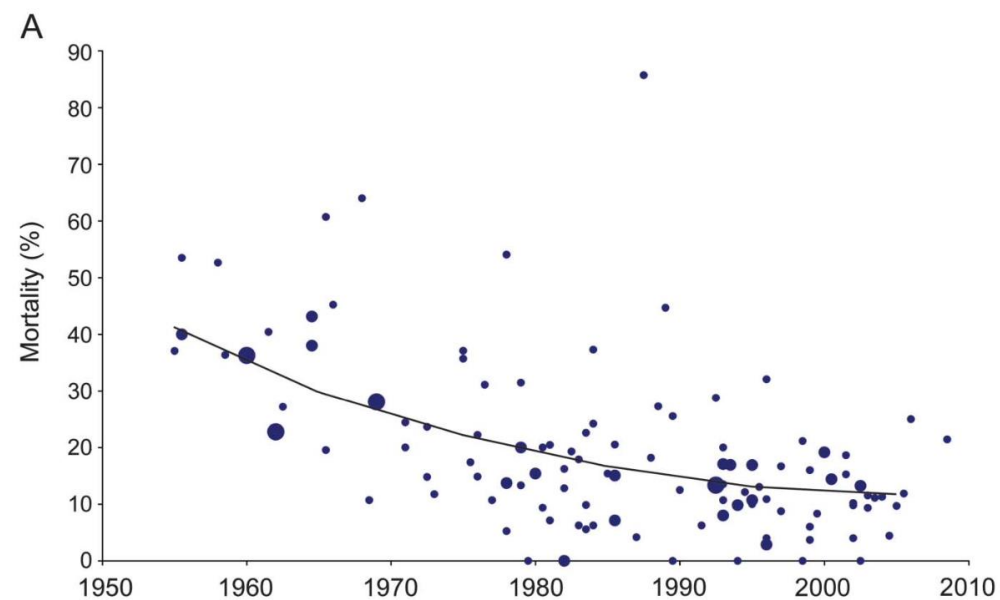
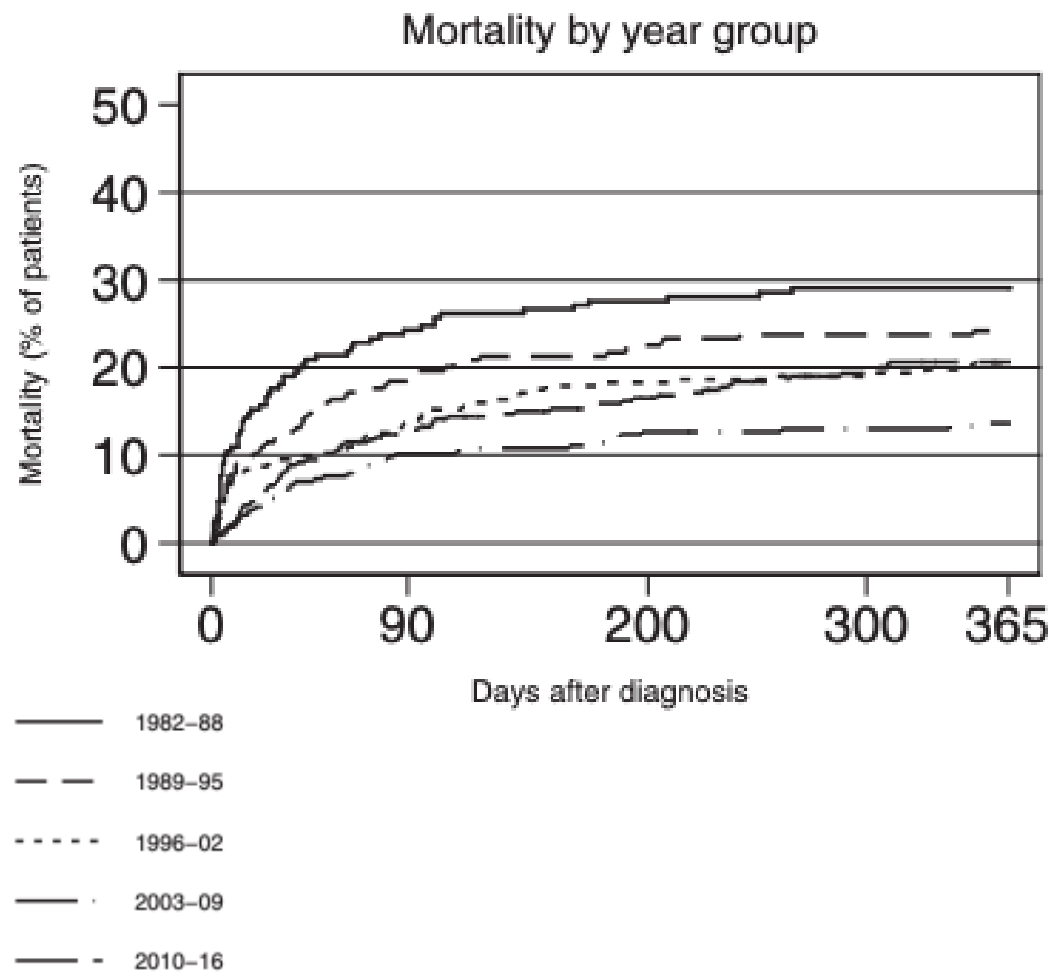
# 1. Épidémiologie

# Incidence des abcès cérébraux

Brain abscess in Denmark by age groups, 1982–2016



# Mortalité des abcès cérébraux



## 2. Physiopathologie

# Physiopathologie

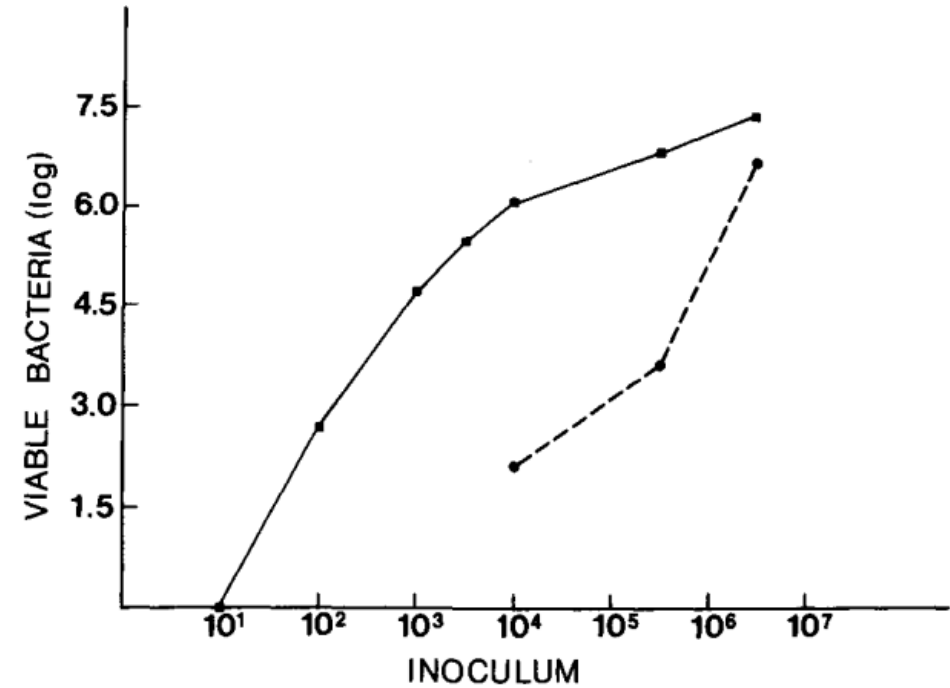
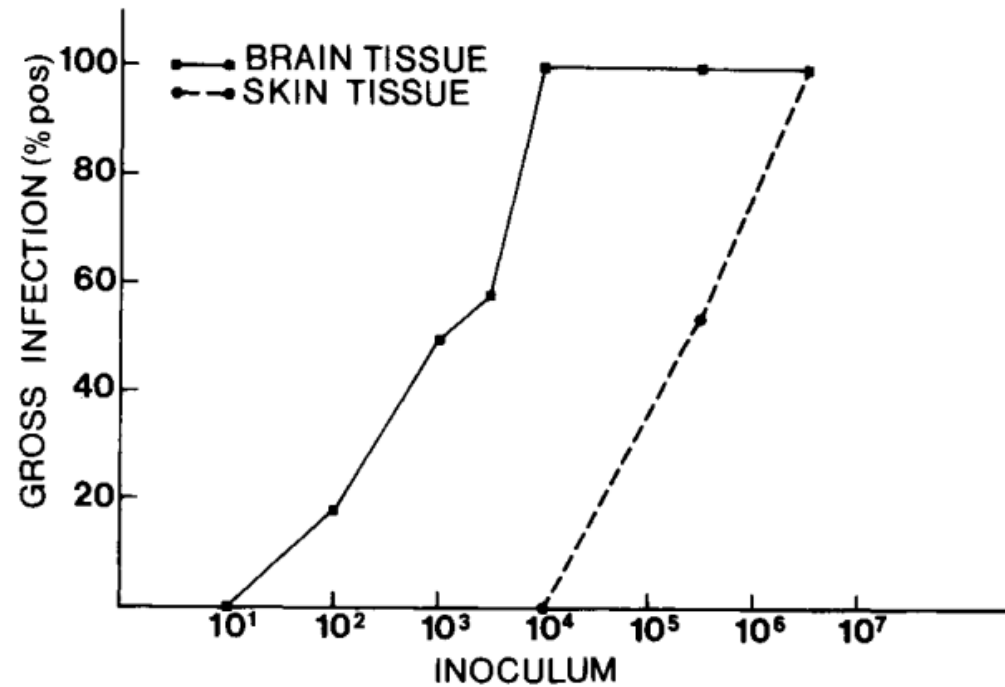
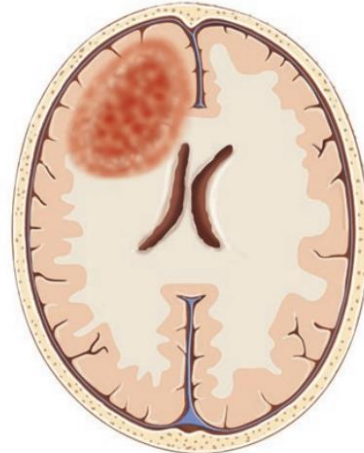


FIG. 1. Graphs showing the tissue response of brain and skin 4 days after challenge with different inocula of *S. aureus*.

# Physiopathologie

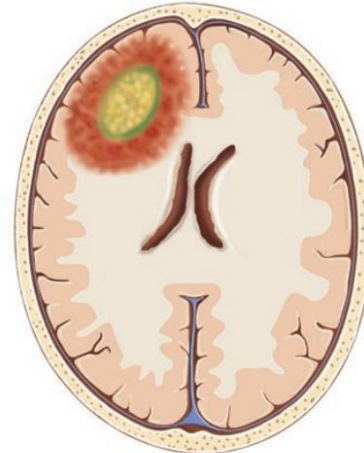
**Fig. 8.1** Different stages in the development of a brain abscess

0-3 jours



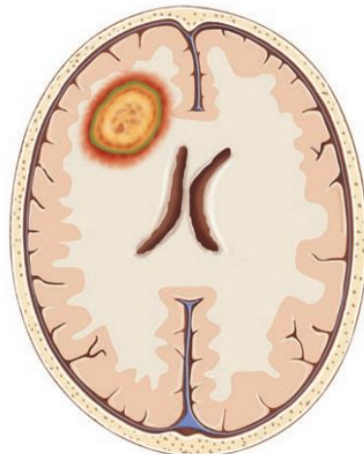
**Stage 1**  
Early cerebritis

4-9 jours



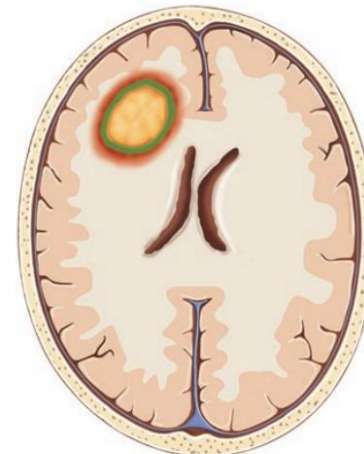
**Stage 2**  
Late cerebritis

9-14 jours



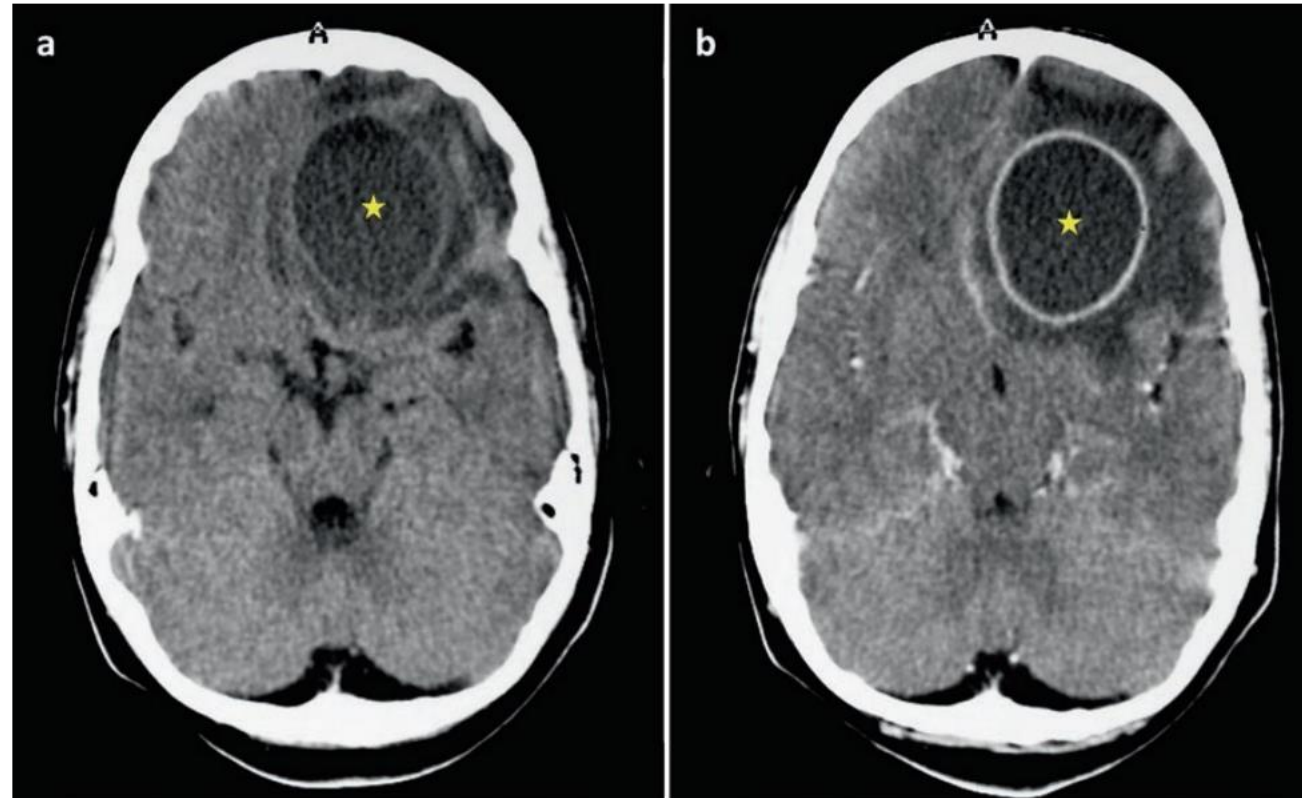
**Stage 3**  
Early capsule formation

≥ 15 jours



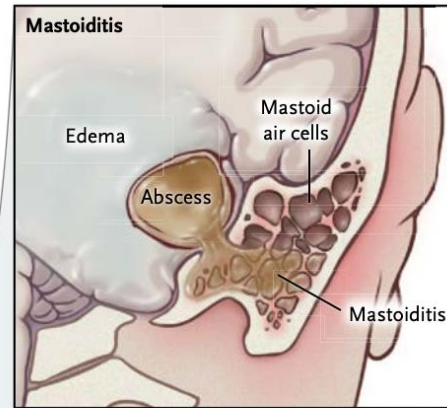
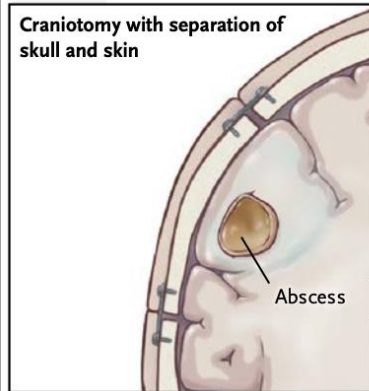
**Stage 4**  
Late capsule formation

# Physiopathologie

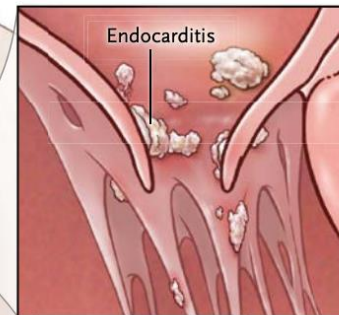
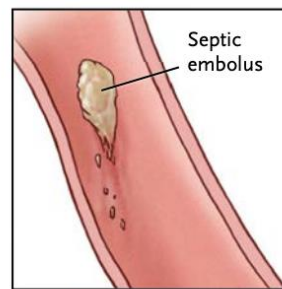


### 3. Facteurs prédisposants

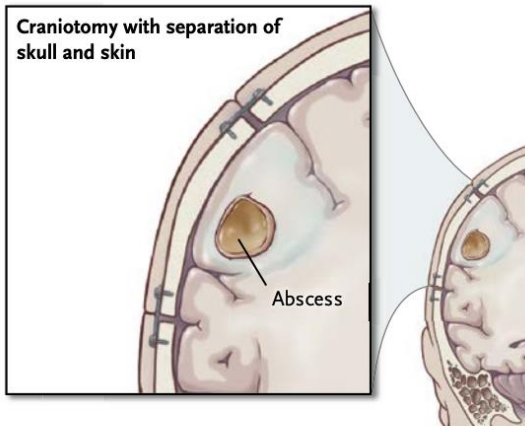
**A Sources of abscess formation**



**Hematogenous spread**



**A Sources of abscess formation**



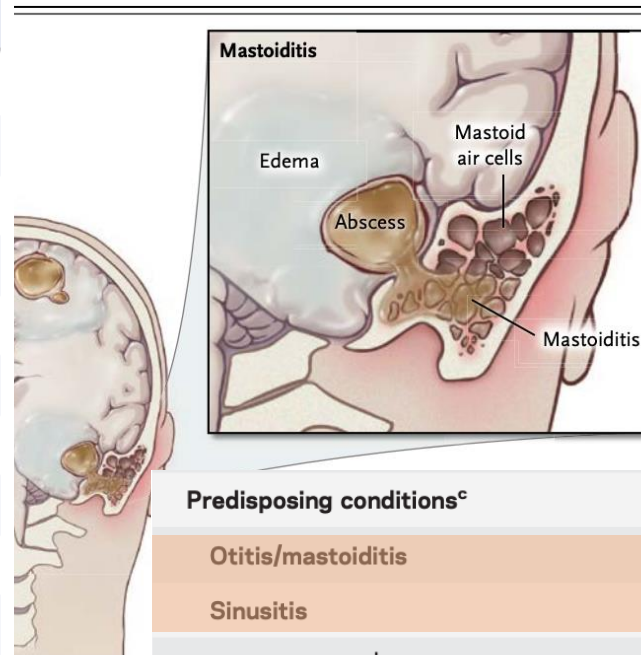
Mastoiditis

In the immunocompetent population	aOR	95% CI
Neurosurgery <sup>a</sup>	19.3	(14.3–26.0)
Congenital heart disease	15.6	(9.57–25.4)
Lung abscess or bronchiectasis	8.15	(3.59–18.5)
Dental infections <sup>a</sup>	4.61	(3.39–6.26)
Ear, nose, and throat infection <sup>a</sup>	3.81	(3.11–4.67)
Ear, nose, and throat surgery <sup>a</sup>	2.85	(2.21–3.70)
Liver disease	2.37	(1.53–3.68)
Alcohol abuse	2.22	(1.58–3.11)
Head trauma <sup>a</sup>	2.15	(1.72–2.70)
Kidney disease	2.04	(1.30–3.20)
Diabetes mellitus	1.74	(1.33–2.29)

**Predisposing conditions<sup>c</sup>**

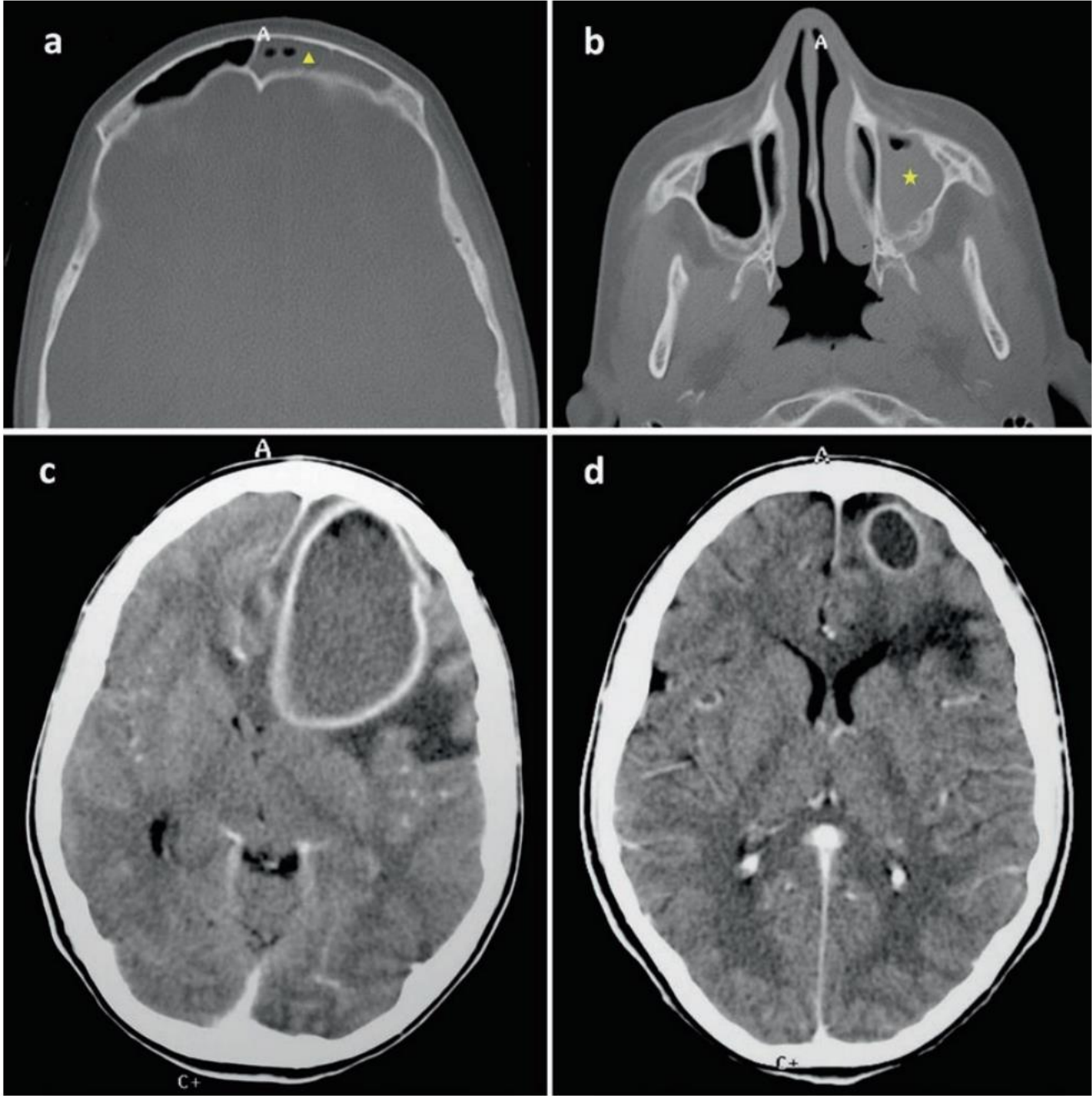
Otitis/mastoiditis	2,754/8,727 (32)
Sinusitis	660/6,499 (10)
Heart disease <sup>d</sup>	911/6,841 (13)
Posttraumatic	950/6,858 (14)
Hematogenous <sup>e</sup>	384/3,025 (13)
Pulmonary disease	403/4,909 (8)
Postoperative	469/5,421 (9)
Odontogenic	178/3,721 (5)
Immunocompromise	172/1,957 (9)
Meningitis	216/3,883 (6)
Unknown	1,350/7,198 (19)
Other	230/4,361 (5)

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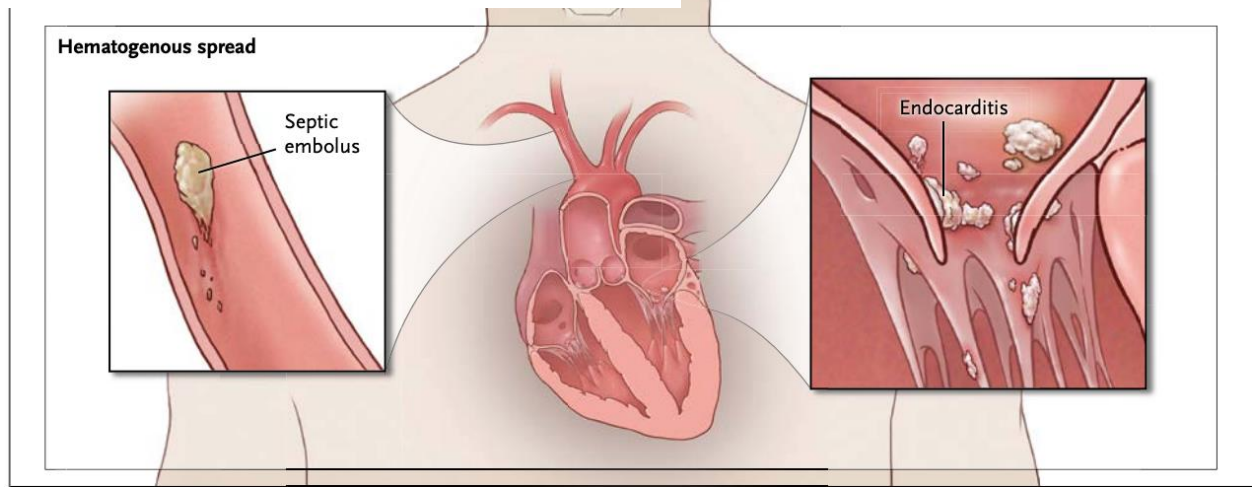
#### Predisposing conditions<sup>c</sup>

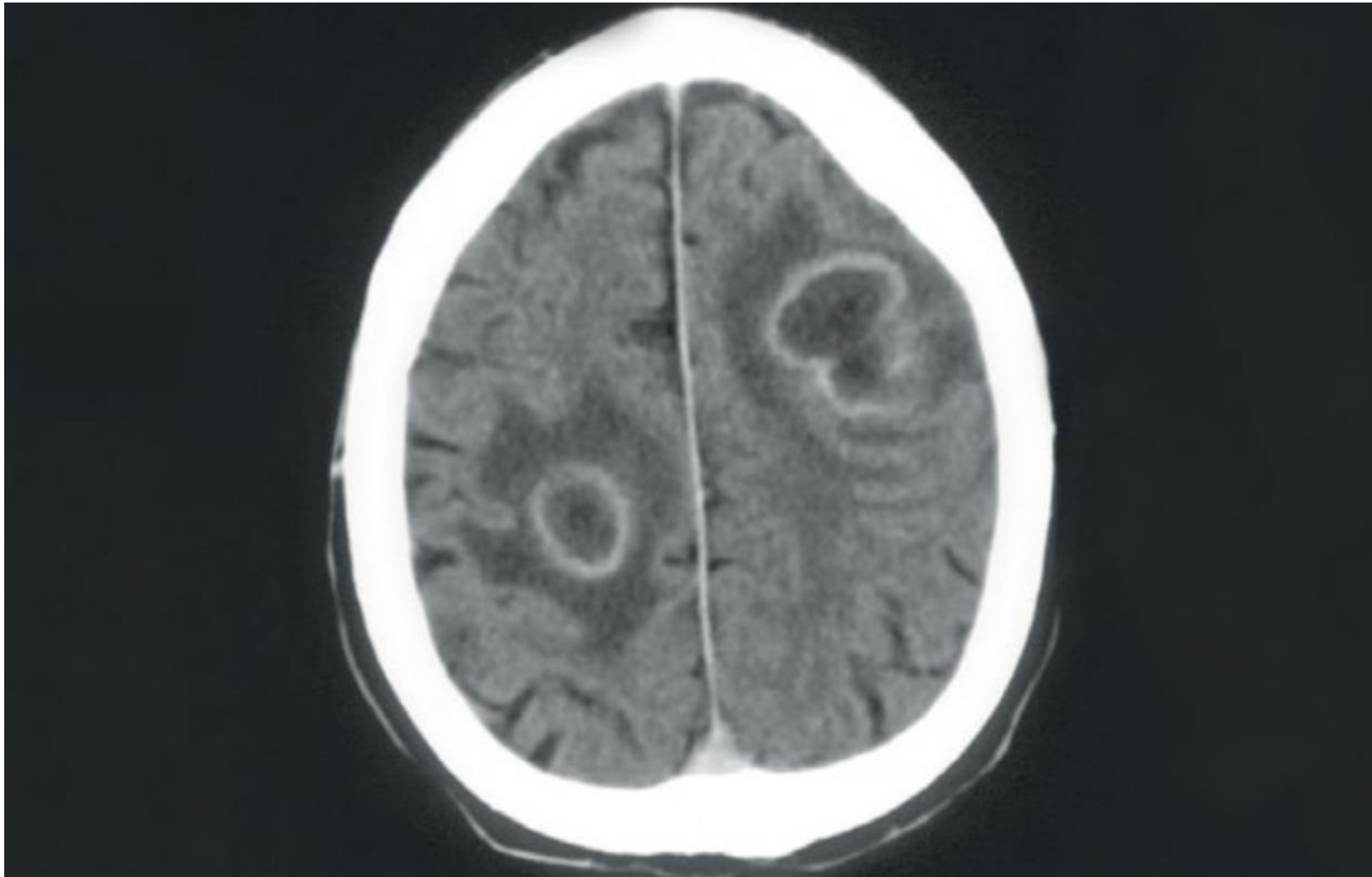
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Other	230/4,361 (5)





## 4. Clinique

# Clinique

Characteristic	n/N (%) <sup>a</sup>
Age, y, mean <sup>b</sup>	33.6
Sex, male	5,333/7,585 (70)
<b>Symptoms and signs</b>	
Headache	4,526/6,575 (69)
Nausea/vomiting	1,993/4,286 (47)
Fever	3,718/6,970 (53)
Altered consciousness	3,207/7,479 (43)
Neurologic deficits	2,996/6,241 (48)
Seizures	1,647/6,581 (25)
Nuchal rigidity	1,465/4,629 (32)
Papilloedema	845/2,428 (35)
Mean duration of symptoms <sup>f</sup>	8.3 d
Triad of fever, headache, focal neurologic deficits	131/668 (20)

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Triad of fever, headache, focal neurologic deficits	131/668 (20)

# Clinique

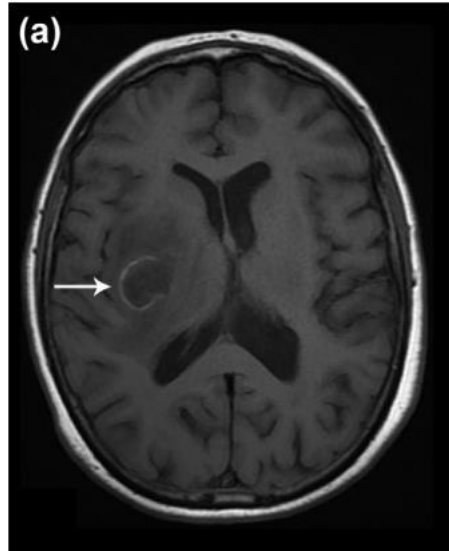
Characteristic	n/N (%) <sup>a</sup>
Age, y, mean <sup>b</sup>	33.6
Sex, male	5,333/7,585 (70)
<b>Symptoms and signs</b>	
Headache	4,526/6,575 (69)
Nausea/vomiting	1,993/4,286 (47)
Fever	3,718/6,970 (53)
Altered consciousness	3,207/7,479 (43)
Neurologic deficits	2,996/6,241 (48)
Seizures	1,647/6,581 (25)
Nuchal rigidity	1,465/4,629 (32)
Papilloedema	845/2,428 (35)
Mean duration of symptoms <sup>f</sup>	8.3 d
Triad of fever, headache, focal neurologic deficits	131/668 (20)

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## 5. Imagerie

# Imagerie



T1



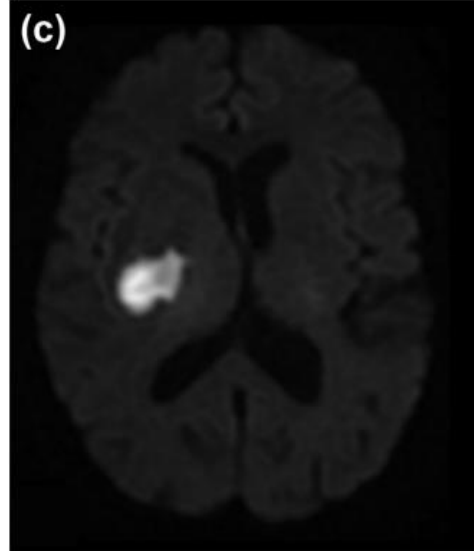
*Hypointense*



T2



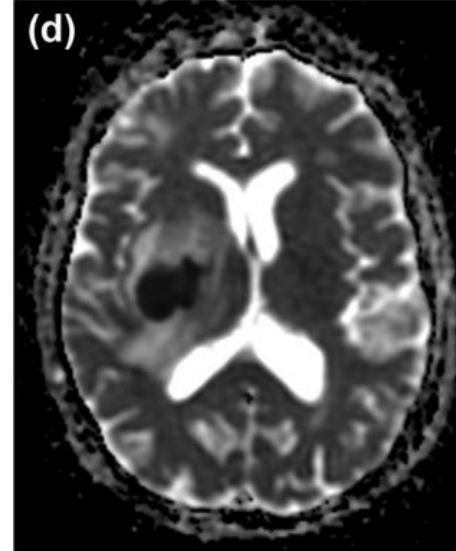
*Hyperintense*  
*Capsule hypointense*



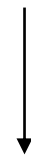
Diffusion



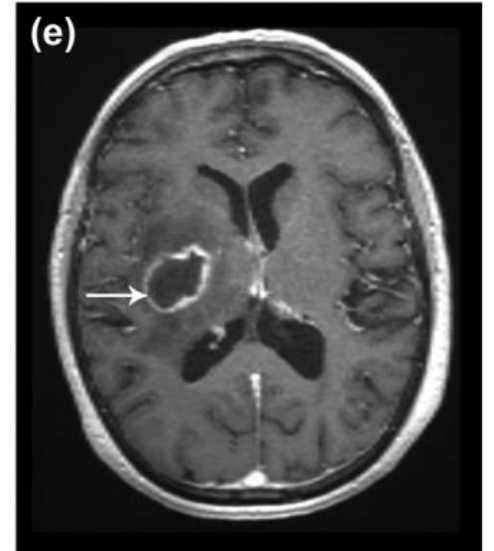
*Hyperintense*



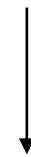
ADC



*Hypointense*

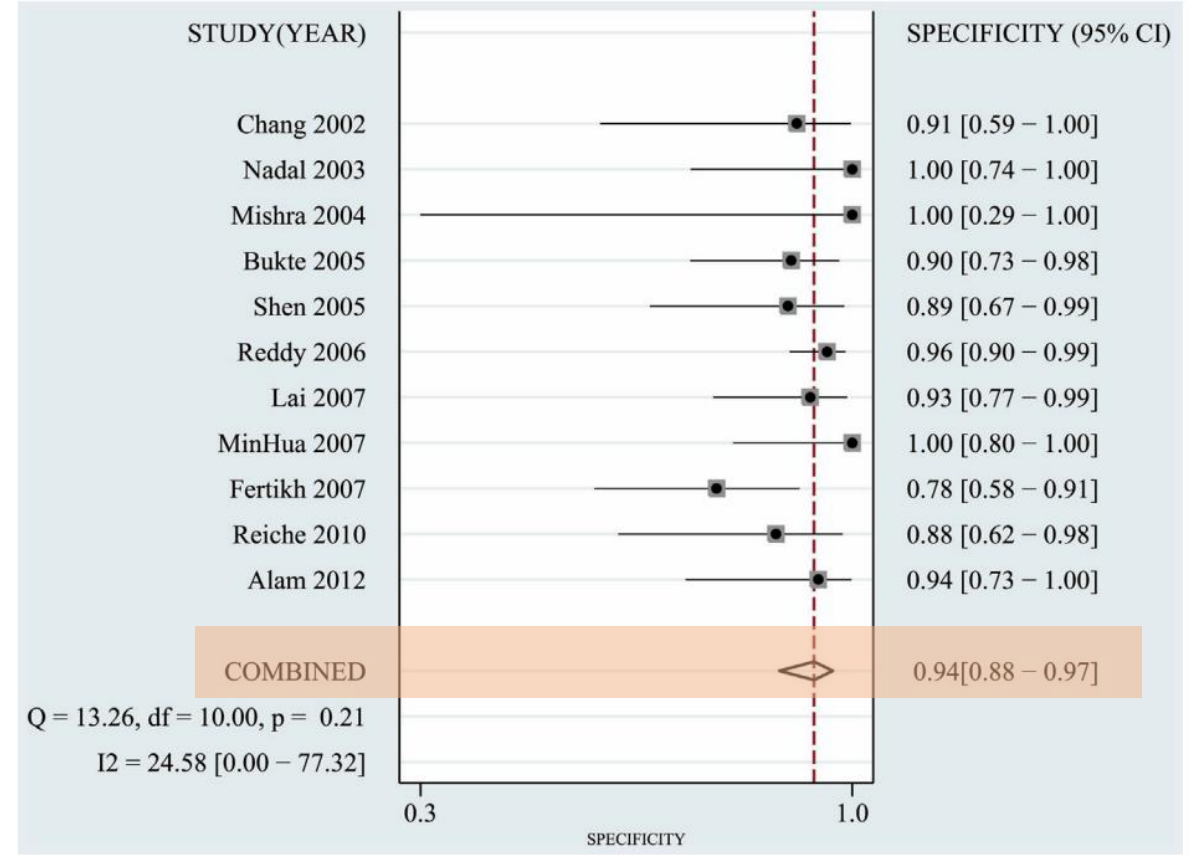
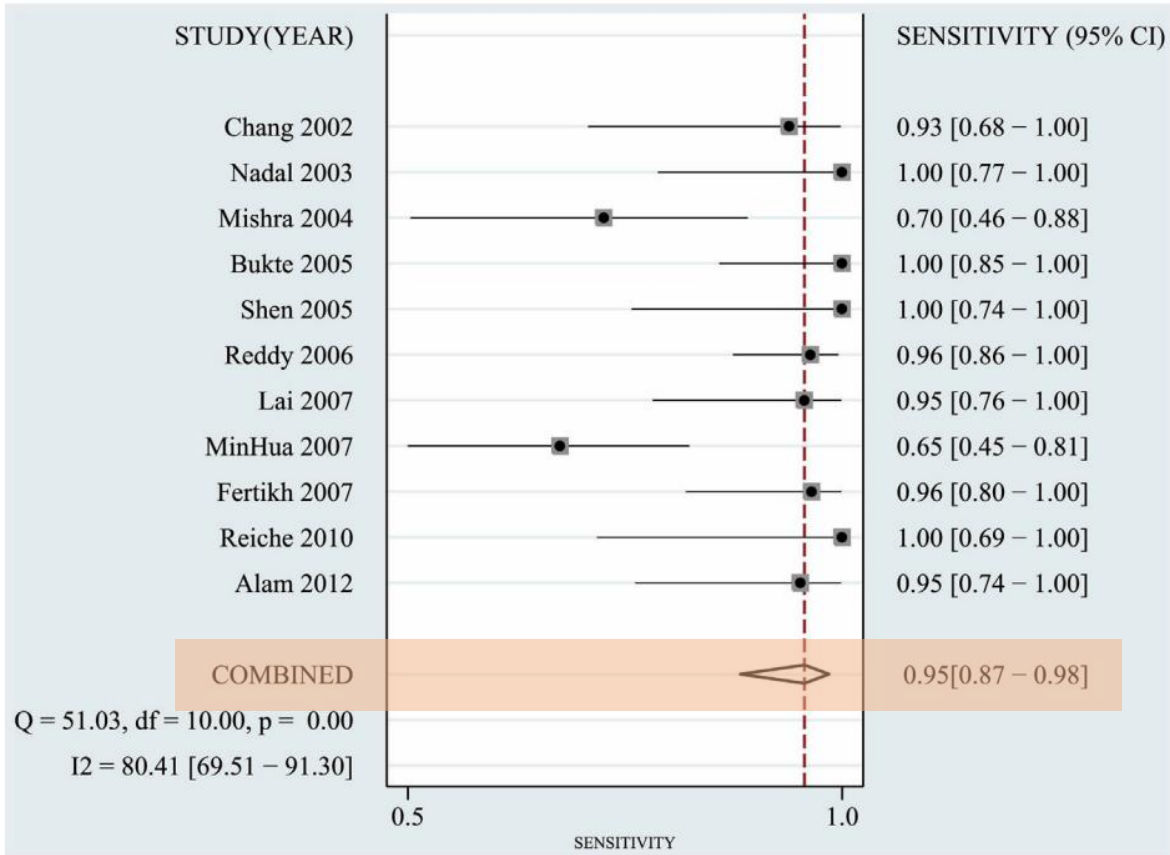


T1 gado

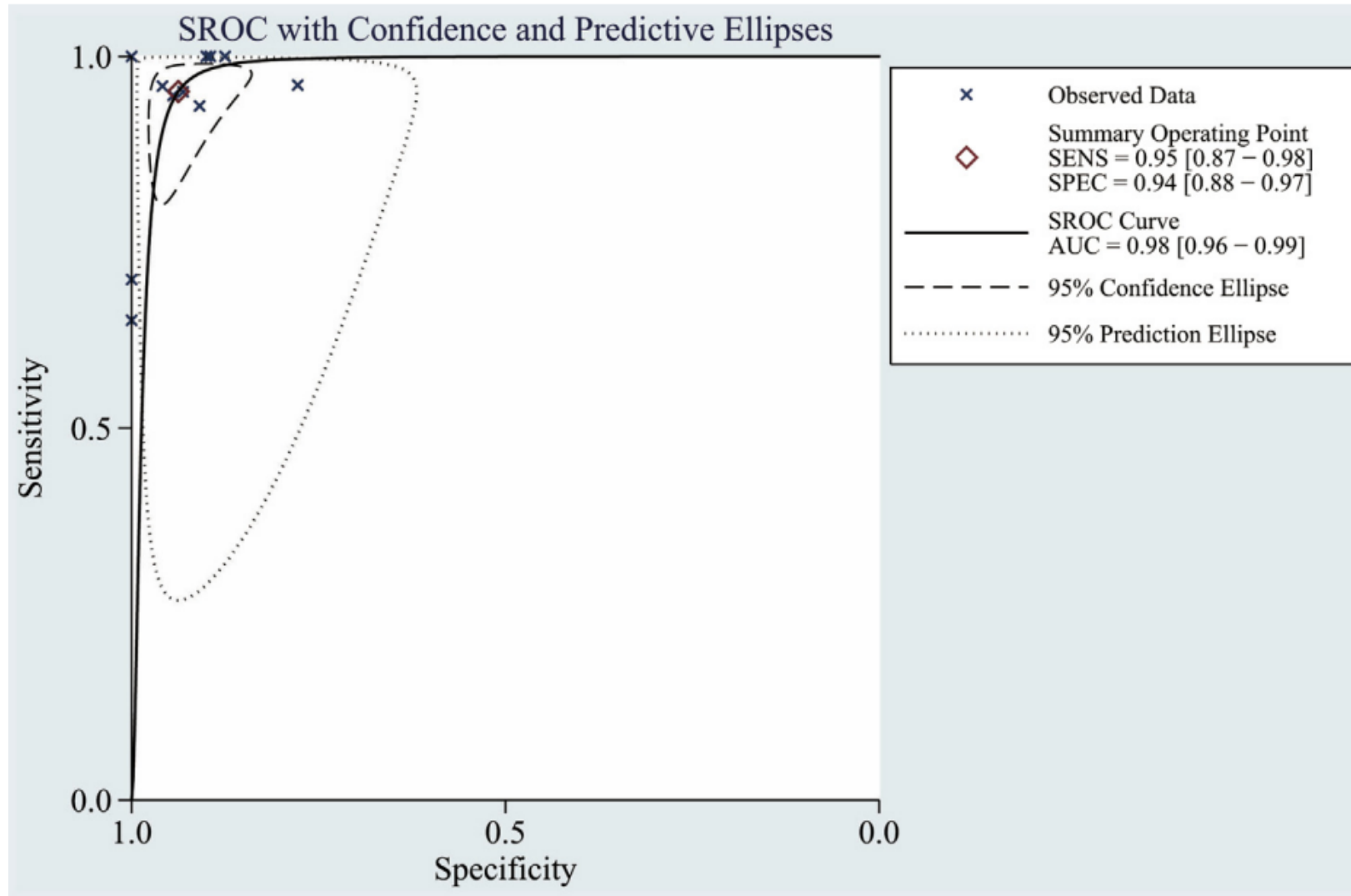


*Capsule hyperintense*

# Imagerie



# Imagerie



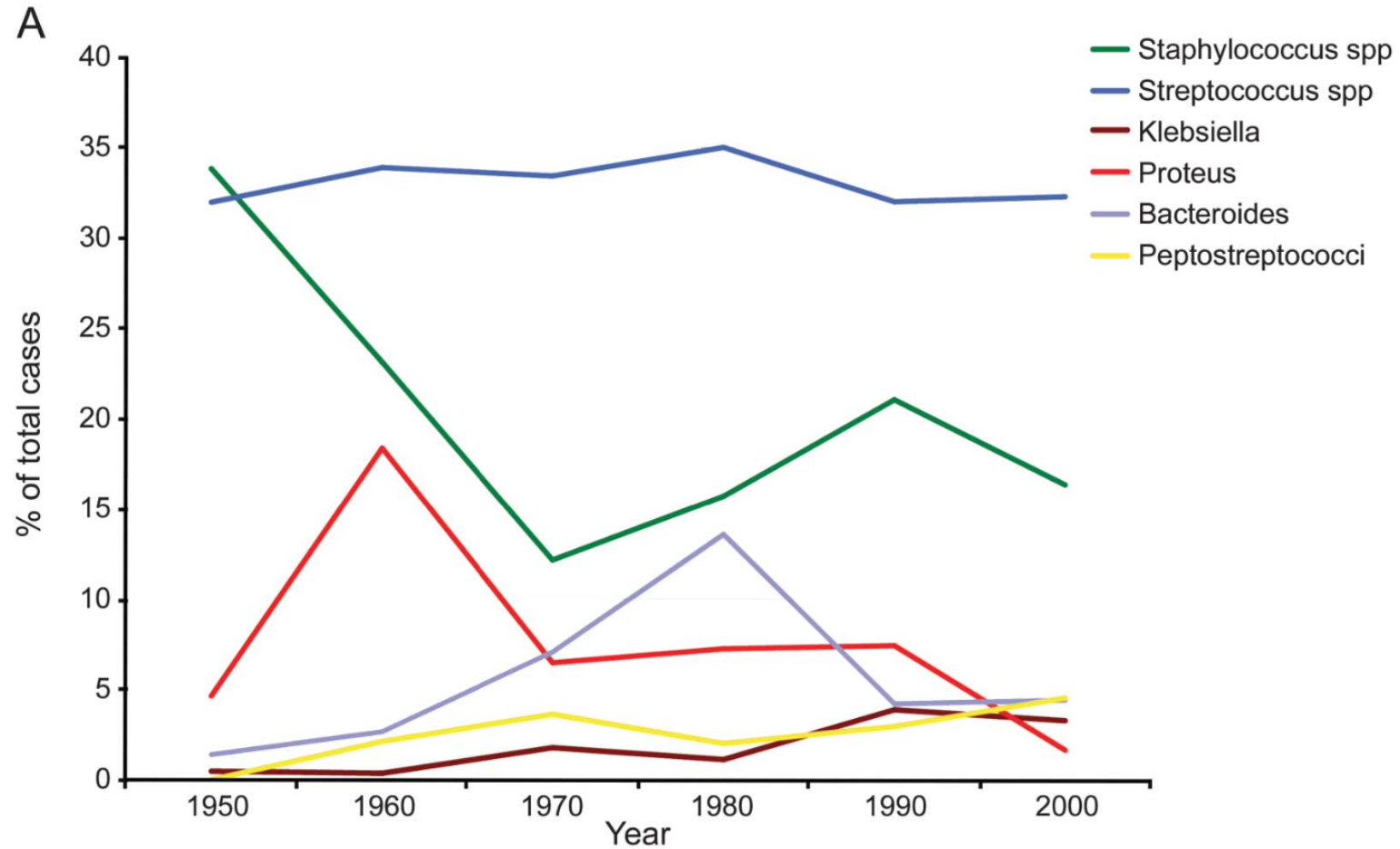
# Quelle imagerie réaliser ?



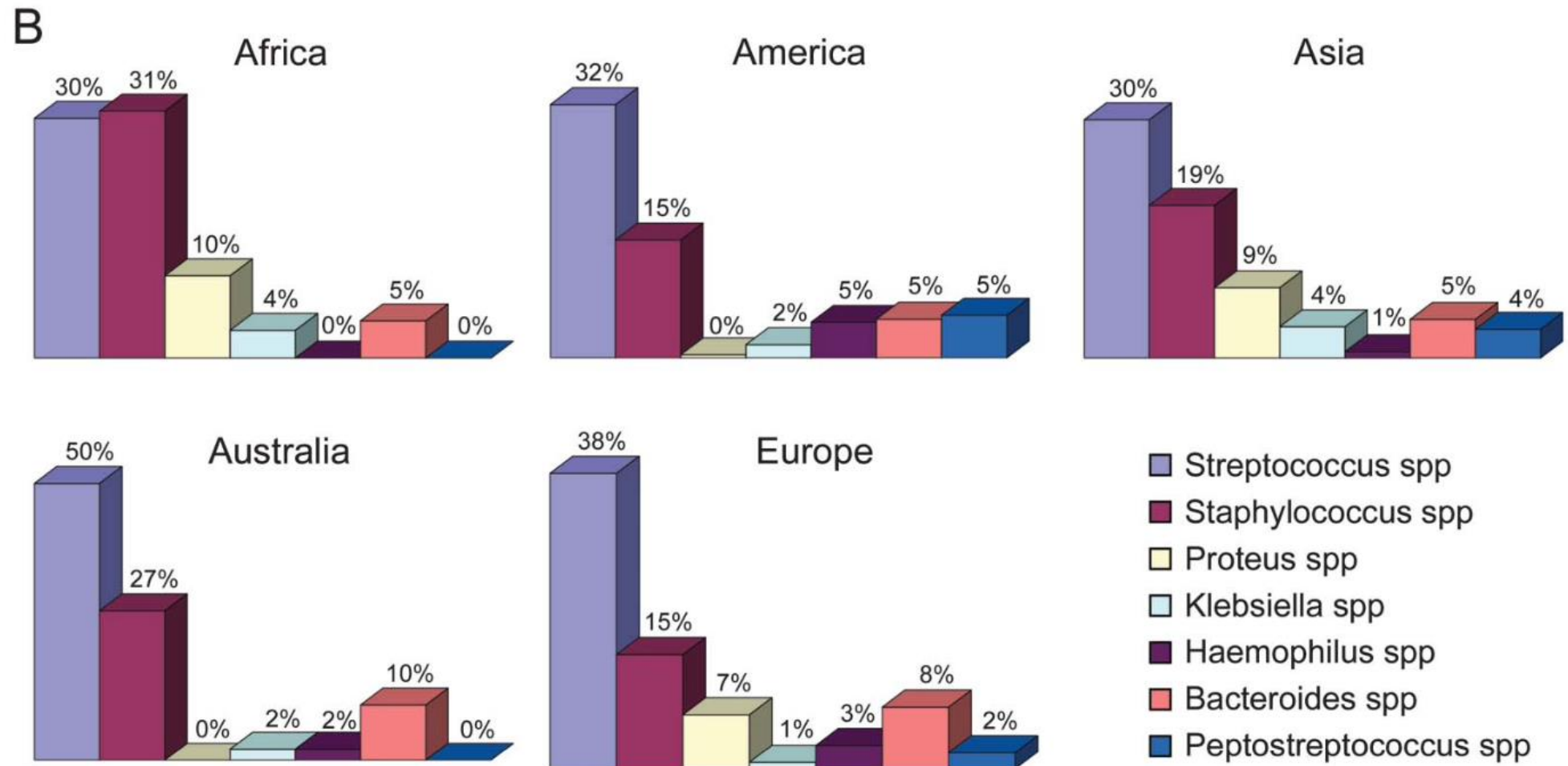
Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#1 What is the preferred brain imaging modality in patients with suspected brain abscess?</b>	We strongly recommend brain MRI including DWI and ADC sequences along with contrast enhancement for patients with suspected brain abscess.  If MRI is not available, CT with contrast enhancement is recommended.	Strong	High

## 6. Microbiologie

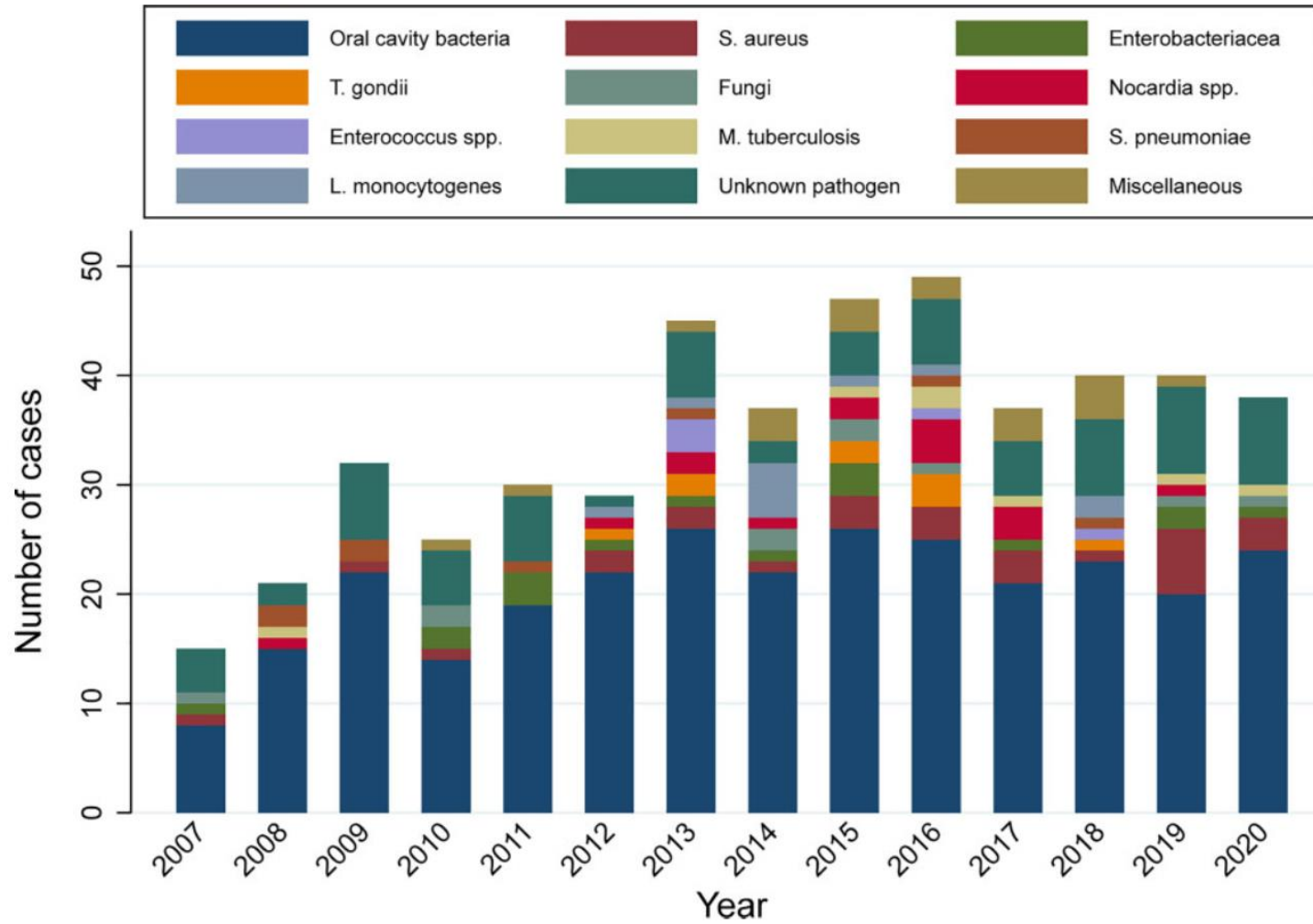
# Microbiologie



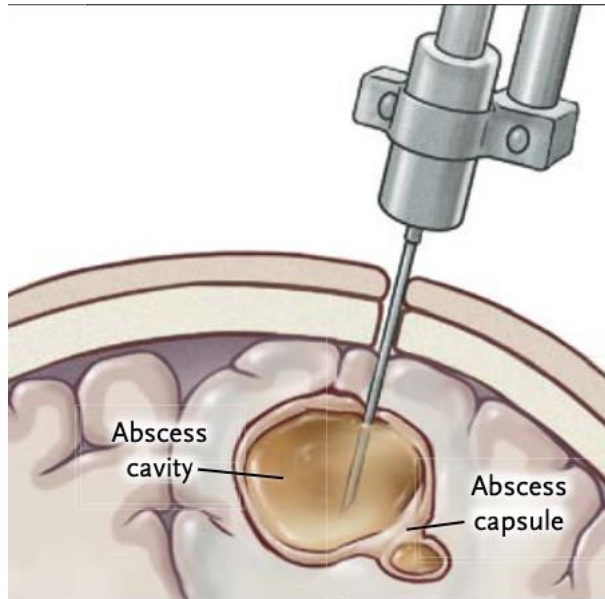
# Microbiologie



# Microbiologie



# Comment faire le diagnostic microbiologique d'abcès cérébral ?



Characteristic	All patients
Positive culture	4,543/6,663 (68)
Monomicrobial	3,067 (77)
Polymicrobial	902 (23)

- In Bodilsen's cohort : 61% polymicrobial

# Comment faire le diagnostic microbiologique d'abcès cérébral ?

Diagnosis based on brain imaging combined with	485	
Positive culture of brain abscess material		292 (60)
Aspiration of pus		44 (9)
Molecular diagnostics of brain abscess material		26 (5)
Positive blood cultures		37 (8)
Other relevant microbiological findings		39 (8)
Clinical presentation <sup>e</sup>		47 (10)

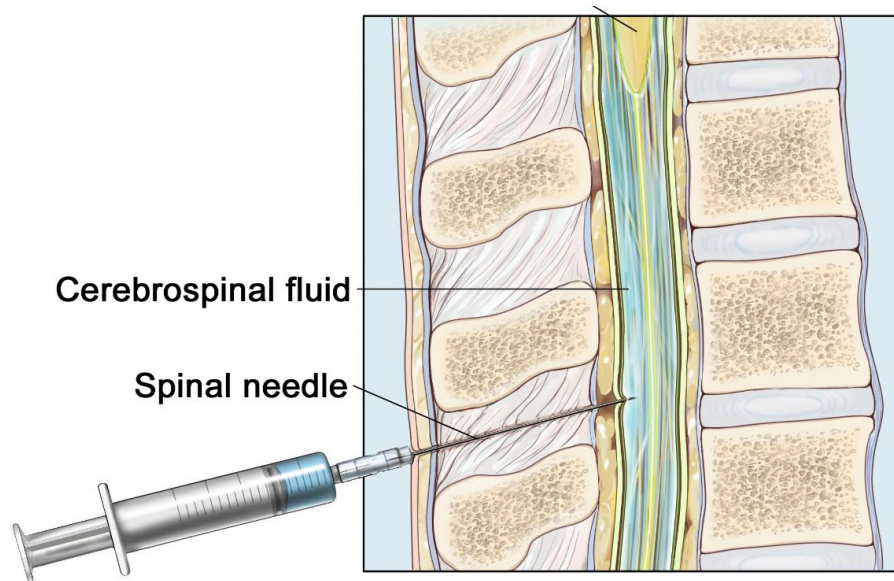
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# Quelle place de la biologie moléculaire ?



Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#3 Should molecular-based diagnostics be used in patients with brain abscess</b>	We conditionally recommend the use of molecular-based diagnostics, if available, in case cultures are negative or if antibiotic treatment is initiated before samples from the suspected brain abscess are obtained.	Conditional	Moderate

# Comment faire le diagnostic microbiologique d'abcès cérébral ?



Characteristic	n/N (%) <sup>a</sup>
<b>CSF investigation</b>	1,392/3,955 (35)
LP	1,286/1,298 (99)
Normal CSF	96/588 (16)
Pleocytosis	758/1,063 (71)
Elevated CSF protein	222/381 (58)
Culture positive	263/1,108 (24)

# Comment faire le diagnostic microbiologique d'abcès cérébral ?

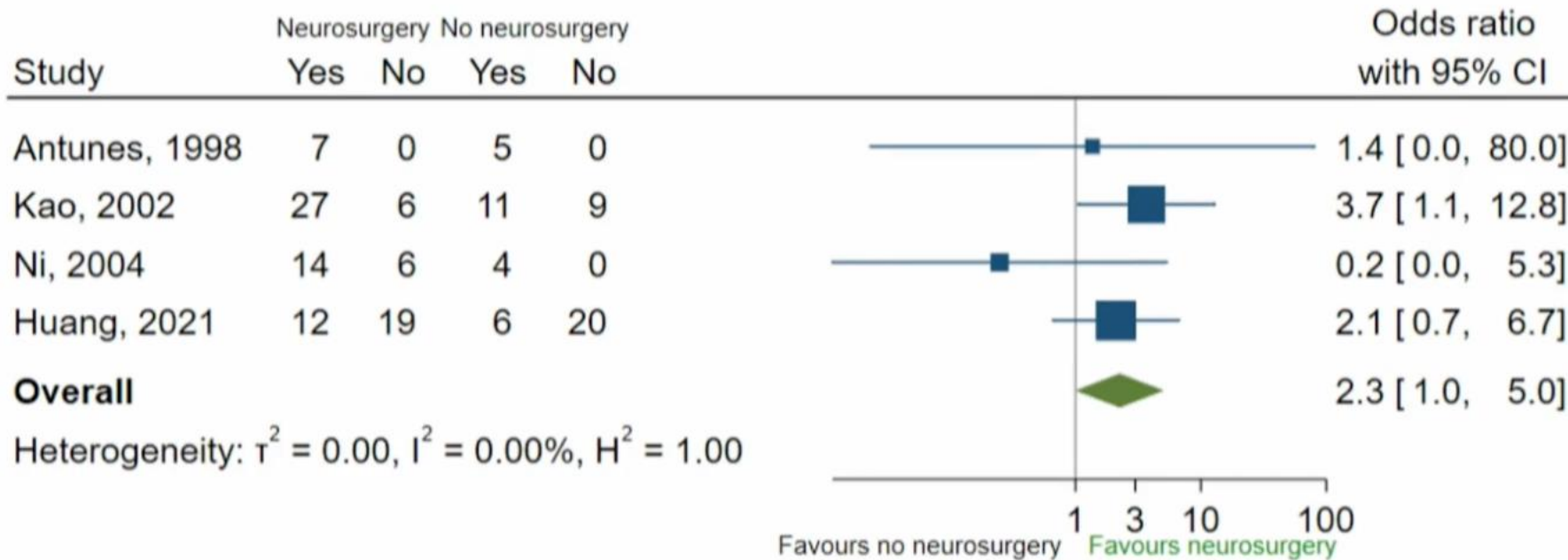


Characteristic	n/N (%) <sup>a</sup>
<b>Blood investigation</b>	
Leukocytosis	1,366/2,273 (60)
Elevated CRP	196/316 (60)
Elevated ESR	311/434 (72)
Positive blood culture	135/484 (28)

## 6. Prise en charge chirurgicale

# Quelle place de la neurochirurgie ?

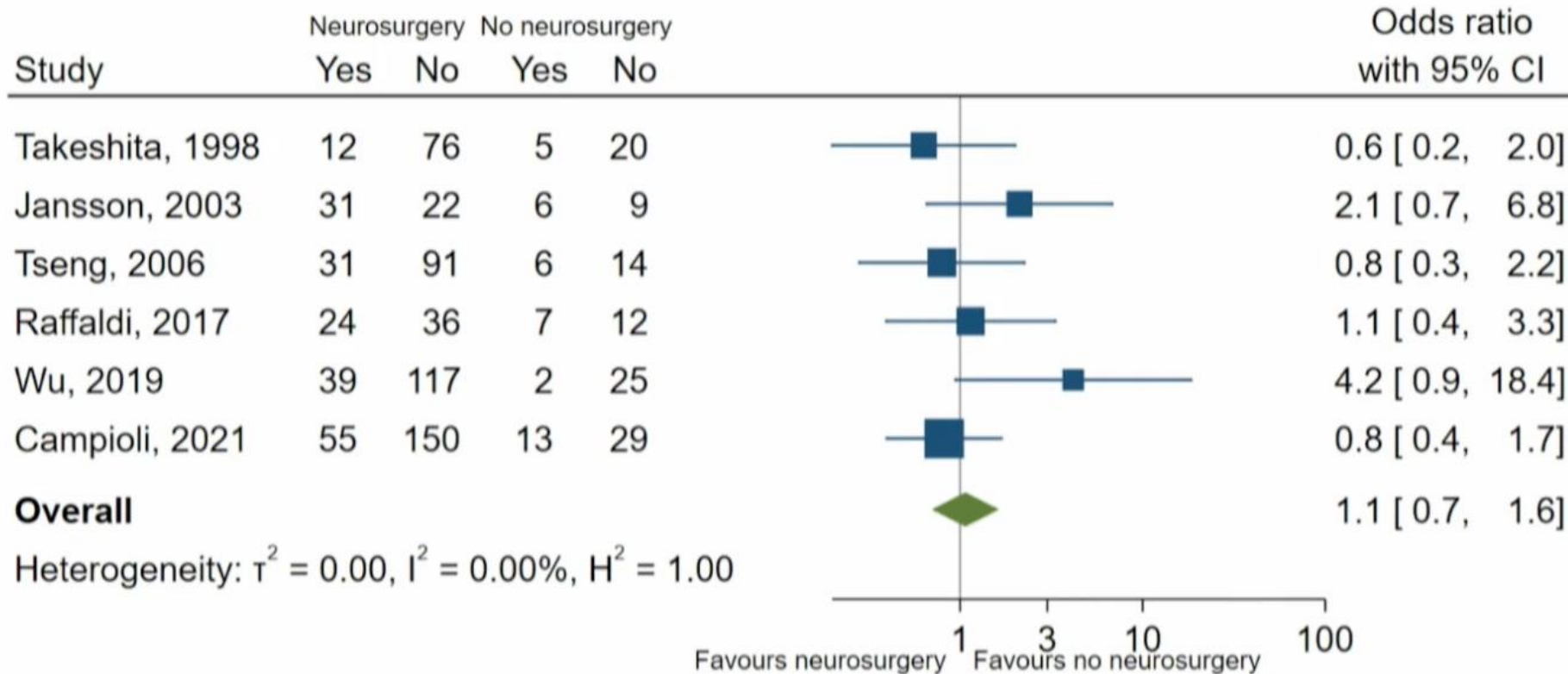
## Microbiological diagnosis



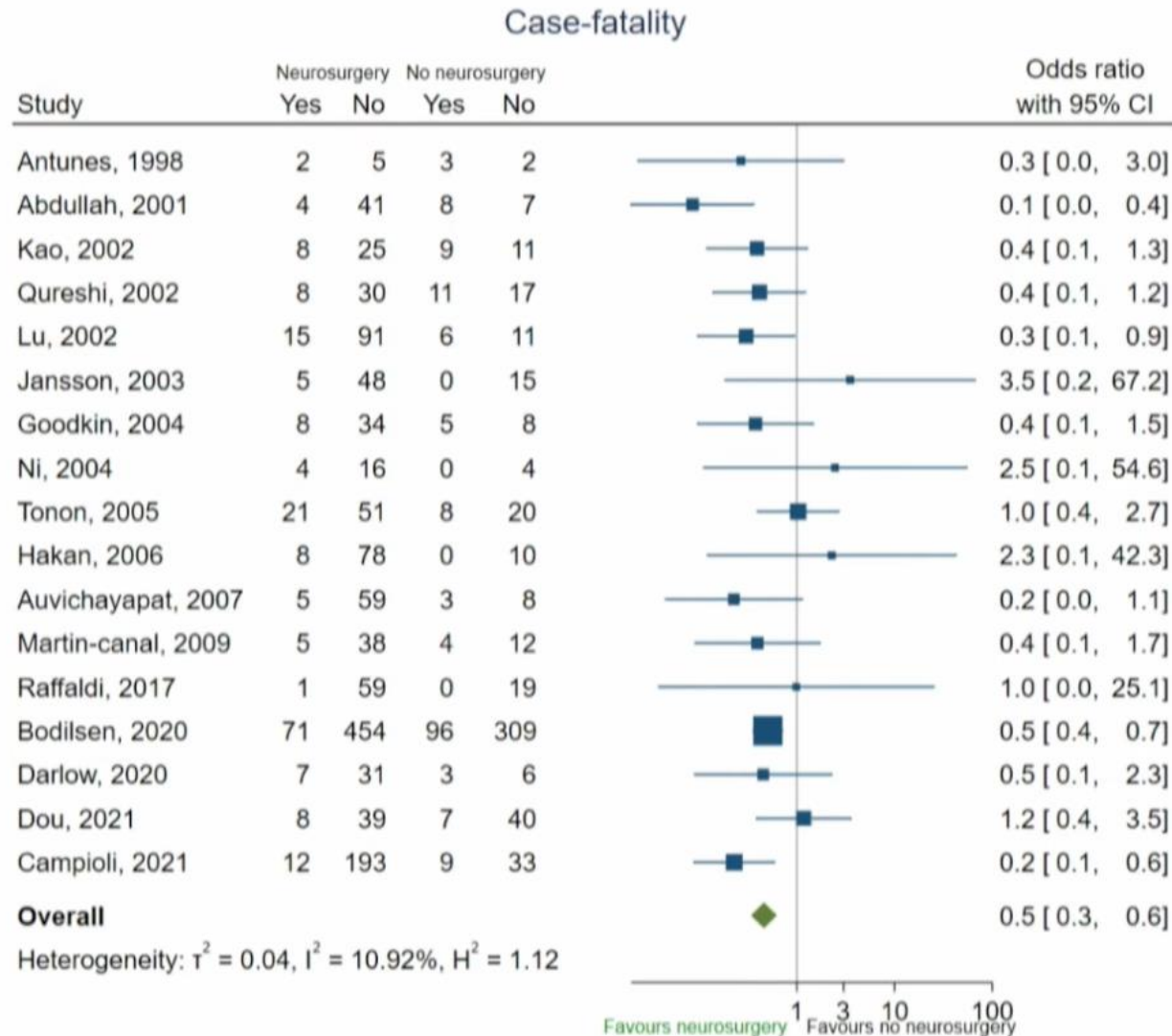
# Quelle place de la neurochirurgie ?



## Neurological sequelae



# Quelle place de la neurochirurgie ?



# Quelle place de la neurochirurgie ?

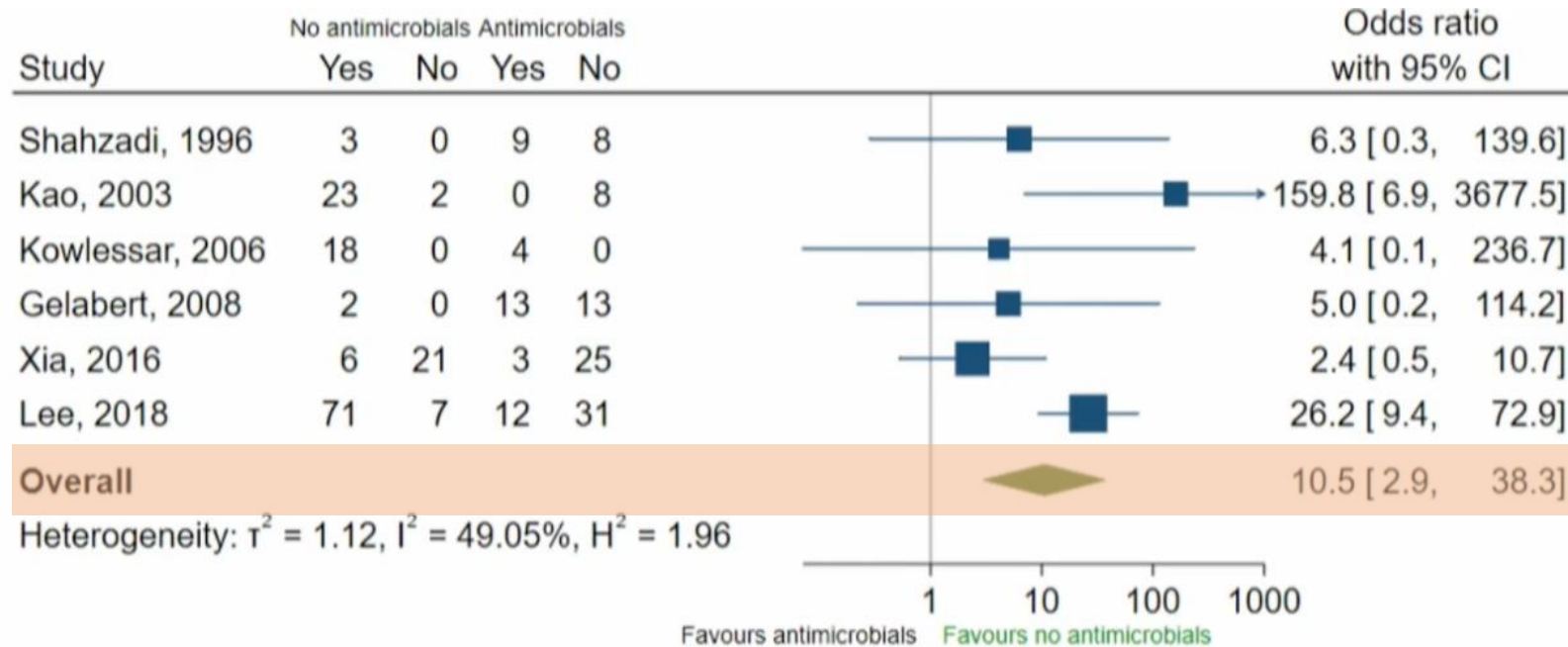


Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#4 Should neurosurgical aspiration or excision be used in patients with brain abscess?</b>	We strongly recommend neurosurgical aspiration or excision of brain abscess in all patients whenever feasible (excl. toxoplasmosis).	Strong	Low

## 7. Traitement anti-infectieux probabiliste

# Quand débiter le traitement anti-infectieux ?

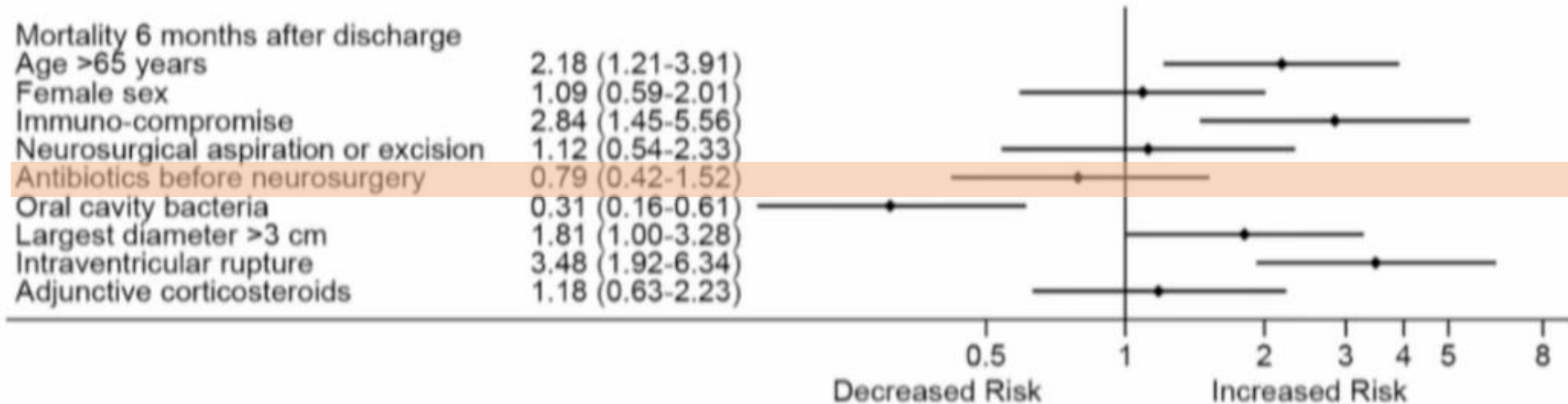
## Diagnostic microbiologique



# Quand débuter le traitement anti-infectieux ?



Pronostic du patient



Bodilsen et al, Brain, 2022

# Quand débiter le traitement anti-infectieux ?



Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#2 Should antimicrobials be withheld until aspiration or excision in patients with suspected brain abscess?</b>	We conditionally recommend that antimicrobials are withheld until aspiration or excision of brain abscess in patients without severe disease if neurosurgery can be carried out within reasonable time, preferably within 24 hours of diagnosis.	Conditional	Low

# Quelles molécules privilégier ?

**Tableau.** Facteurs susceptibles d'augmenter la diffusion des médicaments à travers la BHE.

Propriétés de la BHE	Facteurs favorisant la diffusion
Intégrité physique	Inflammation ou effraction
Propriétés physicochimiques des molécules	
Poids moléculaire	Faible poids moléculaire
État d'ionisation	Absence d'ionisation
Lipophilie	Lipophile
Propriétés pharmacocinétiques des molécules	
Fixation aux protéines plasmatiques	Faible fixation
Substrat des transporteurs	Substrat des SLC (influx) et non des ABC (efflux)

# Quelles molécules privilégier ?

Compound (reference[s] for CSF penetration)	$AUC_{CSF}/AUC_S^b$		Relationship of CSF concn to MIC with usual doses
	Uninflamed or mildly inflamed meninges	Strong meningeal inflammation	
Penicillins	<b>0.02</b>	<b>0.2</b>	CSF concn with uninflamed meninges close to the
$\beta$ -Lactamase inhibitors	<b>0.07</b>	<b>0.1</b>	CSF concn with inflamed and uninflamed meninges below the concn used <i>in vitro</i> for susceptibility testing (1–4 mg/liter)
Clavulanate (18)	0.037	0.084	
Sulbactam (72)			
Tazobactam (168)	0.106		

# Quelles molécules privilégier ?

Compound (reference[s] for CSF penetration)	$AUC_{CSF}/AUC_S^b$		Relationship of CSF concn to MIC with usual doses
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Clavulanate (18)	0.037	0.084	
Sulbactam (72)			
Tazobactam (168)	0.106		
Cefotaxime (96, 175, 194, 195, 230)	0.12	0.04, 0.17	magnitude lower than that of cefotaxime
Ceftriaxone (47, 118, 141, 162, 175, 195, 236)	0.007		
Metronidazole (93, 101, 258)	Not available	0.87	CSF concn above the MIC for susceptible pathogens with both inflamed and uninflamed meninges

# Quel traitement antibiotique probabiliste proposer chez l'IC ?



Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#5 What is the optimal empirical antimicrobial therapy for brain abscess?</b>	We strongly recommend a 3 <sup>rd</sup> generation cephalosporin combined with metronidazole for empirical treatment of community-acquired brain abscess.	Strong	Moderate

# Quelles molécules privilégier ?

Compound (reference[s] for CSF penetration)	$AUC_{CSF}/AUC_S^b$		Relationship of CSF concn to MIC with usual doses
	Uninflamed or mildly inflamed meninges	Strong meningeal inflammation	
Carbapenems	<b>0.2</b>	<b>0.3</b>	CSF concn with uninflamed meninges close to the MICs for moderately susceptible bacteria
Imipenem (15, 155, 263)		0.14	
Meropenem (34, 41, 142, 170)	0.047, 0.21, 0.25	0.39	
Linezolid (20, 252)	0.9 (0.8–1)	Not available	CSF concn above the MIC for susceptible pathogens with both inflamed and uninflamed meninges

# Quel traitement antibiotique probabiliste proposer en situation nosocomiale ?



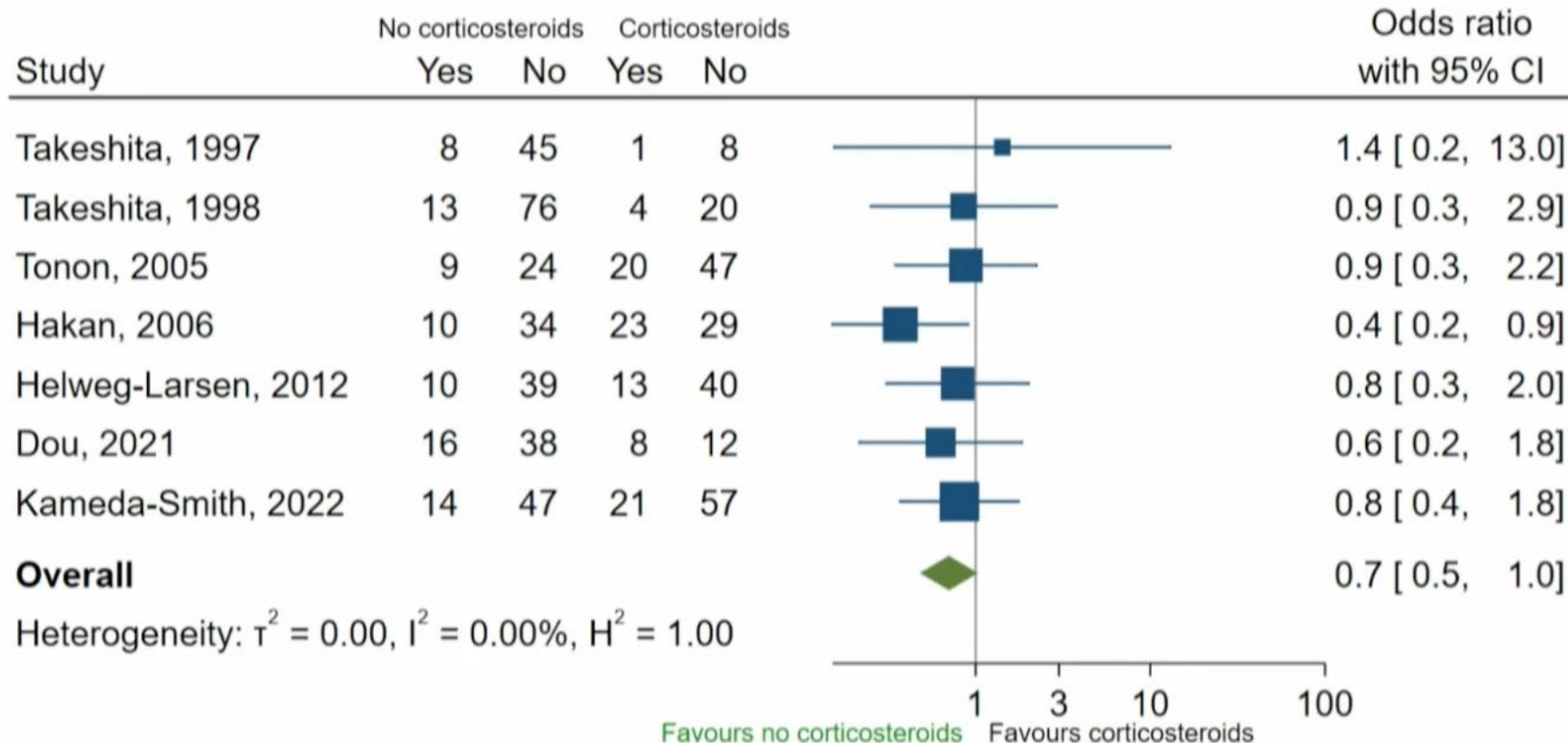
Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#5 What is the optimal empirical antimicrobial therapy for brain abscess?</b>	We conditionally recommend meropenem combined with vancomycin for empirical treatment of nosocomial brain abscess.	Conditional	Low

## 8. Corticothérapie

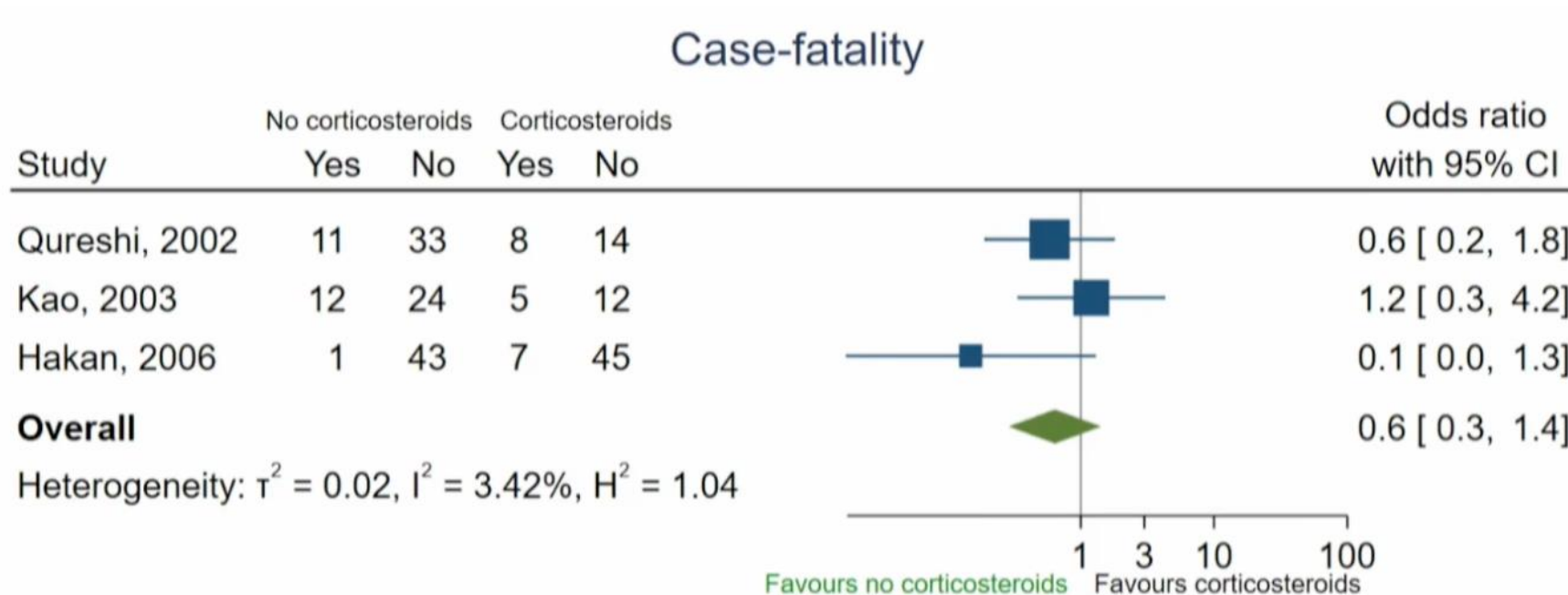
# Quelle place pour la corticothérapie ?



## Neurological deficits

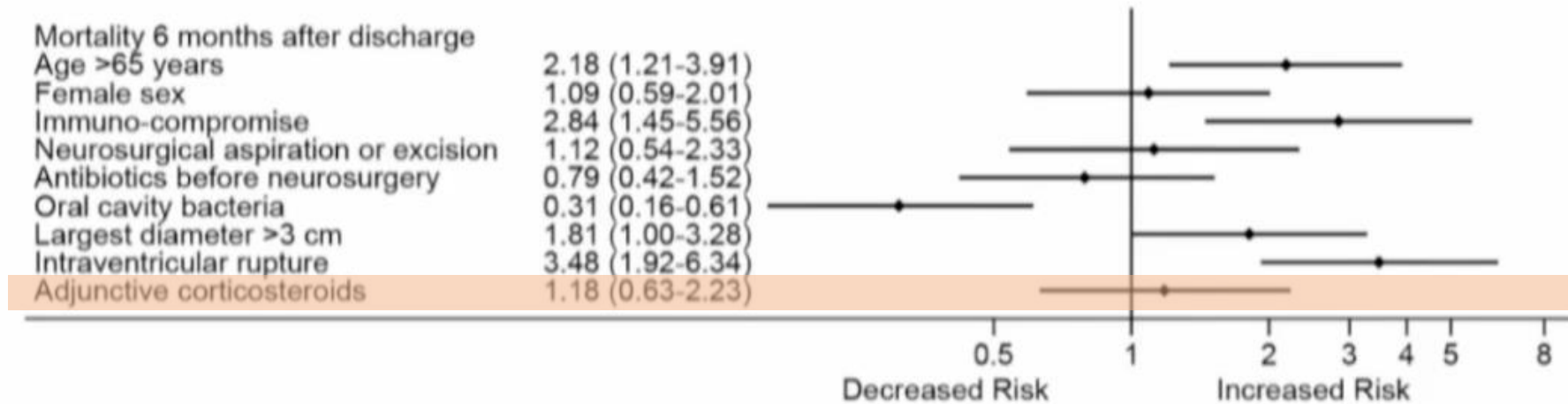


# Quelle place pour la corticothérapie ?



# Quelle place pour la corticothérapie ?

Denmark 2007-2020, N=485 adults



# Quelle place pour la corticothérapie ?



Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#9 Should dexamethasone be used to treat severe symptoms due to perifocal oedema in patients with brain abscess?</b>	In the absence of convincing clinical data of harm related to adjunctive corticosteroid treatment, we strongly recommend use of corticosteroids for relief of severe symptoms due to perifocal oedema or impending herniation in patients with brain abscess.	Strong	Low/very low

## 9. Traitement antiépileptique

# Quelle place pour le traitement antiépileptique en prophylaxie primaire ?



- 1 single-centre retrospective cohort study
- Supratentorial brain abscess treated with aspiration or excision
- Median follow-up: 15 months (range 0.5-122) from diagnosis

	Primary prophylaxis antiepileptics*		P-value
	n/N (%)		
	Yes	No	
Subsequent epilepsy	10/103 (9)	0/6 (0)	0.03

\*Mean duration of 15 days (standard deviation 26)

# Quelle place pour le traitement antiépileptique en prophylaxie primaire ?



Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#10 Should primary prophylaxis with antiepileptic treatment be used to reduce risks of seizures during admission and subsequent epilepsy?</b>	Based on expert opinion, we conditionally recommend against primary prophylaxis with antiepileptics in patients with brain abscess.	Conditional	Very low

## 10. Durée de traitement

# Quelle durée de traitement... IV ?

**Table 2.** Factors associated with unfavourable 3 month GOS

Total population (n = 108 patients)			Univariate analysis		Multivariate analysis	
	Favourable GOS (n = 78)	Unfavourable GOS (n = 30)	OR (95% CI)	P value	ORa (95% CI)	P value
Male sex	58 (74.4)	22 (73.3)	1.1 (0.4–2.7)	0.913	1.6 (0.5–5.0)	0.430
Charlson scale $\geq 2$	49 (62.8)	25 (83.3)	3 (1.1–9.5)	0.046	4.8 (1.4–19.4)	0.020
GCS $\leq 14$	32 (41)	22 (73.3)	4 (1.6–10.5)	0.004	4.4 (1.6–14.0)	0.010
Number of abscesses $\geq 2$	29 (37.2)	11 (36.7)	1 (0.4–2.3)	0.961	0.9 (0.3–2.9)	0.850
Total duration of antibiotics >8 weeks	48 (61.5)	16 (53.3)	0.7 (0.3–1.7)	0.438	1 (0.3–2.9)	0.940
Duration of IV antibiotics >3 weeks	51 (65.4)	21 (70.0)	1.2 (0.5–3.2)	0.649	0.4 (0.1–1.7)	0.210
Antibiotic oral switch	41 (52.6)	7 (23.3)	0.3 (0.1–0.7)	0.008	0.2 (0.0–0.6)	0.010
time before oral switch >2 weeks	24/41 (58.5)	3/7 (42.9)	0.5 (0.1–2.7)	0.444	—	—
Surgery	64 (82.1)	21 (70)	0.5 (0.2–1.4)	0.175	0.3 (0.1–1.2)	0.100
number of surgical procedures $\geq 2$	17/64 (26.6)	11/21 (52.4)	2.8 (1–7.7)	0.047	—	—
time before surgery >3 days	35/64 (54.7)	16/21 (76.2)	2.2 (0.8–6.8)	0.142	—	—
ICU stay	56 (71.8)	23 (76.7)	1.3 (0.5–3.6)	0.609	2.3 (0.6–10.6)	0.240

# Quelle durée de traitement... IV ?

Subpopulation with GCS >14 and 3 month GOS >1 (n = 71 patients)

			Univariate analysis		Multivariate analysis	
	Favourable GOS (n = 65)	Unfavourable GOS (n = 6)	OR (95% CI)	P value	ORa (95% CI)	P value
Male sex	47 (72.3)	3 (50.0)	2.6 (0.4–15.3)	0.266	3.00 (0.4–28.5)	0.300
Charlson scale $\geq 2$	44 (67.7)	4 (66.7)	1.0 (0.2–7.3)	0.959	0.50 (0.0–6.6)	0.600
GCS $\leq 14$	19 (29.2)	3 (50.0)	2.4 (0.4–14.1)	0.304	3.00 (0.4–25.7)	0.270
Number of abscesses $\geq 2$	24 (36.9)	1 (16.7)	0.3 (0.0–2.3)	0.340	0.1 (0.0–1.1)	0.110
Total duration of antibiotics >8 weeks	41 (63.1)	4 (66.7)	1.2 (0.2–8.9)	0.861	3.6 (0.4–47.0)	0.270
Duration of IV antibiotics >3 weeks	40 (61.5)	3 (50.0)	0.6 (0.1–3.6)	0.583	0.10 (0.0–2.0)	0.180
Antibiotic oral switch	36 (55.4)	3 (50.0)	0.8 (0.1–4.6)	0.800	0.10 (0.0–2.8)	0.250
time before oral switch >2 weeks	20/36 (55.6)	0 (0.0)	—	—	—	—
Surgery	52 (80.0)	4 (66.7)	0.5 (0.1–3.9)	0.451	0.10 (0.0–1.3)	0.090
number of surgical procedures $\geq 2$	13/52 (25.0)	2/4 (50.0)	2.0 (0.2–13.4)	0.474	—	—
time before surgery >3 days	29/52 (55.8)	3/4 (75.0)	1.2 (0.2–9.6)	0.856	—	—
ICU stay	43 (66.2)	5 (83.3)	2.6 (0.4–50.6)	0.404	4.00 (0.3–169.9)	0.360

# Quelle durée de traitement... IV ?

**Table 1** (continued)

	TOTAL ( <i>n</i> = 101) (unless specified)	PO group ( <i>n</i> = 24)	IV group ( <i>n</i> = 77)	<i>p</i> value
Median time to revision surgery, days	12.5 (8–24)	10.0 (5–16)	12.5 (9–27)	0.30
3-month outcome				
Recurrence	5 (5)	1 (4)	4 (5)	0.84
Median time to recurrence, days	44 (43–49)	44	46 (39–56)	1
All-cause mortality	13 (13)	1 (4)	12 (16)	0.18
Attributable mortality	11 (11)	0	11 (14)	0.15
Median time between diagnosis and death, days	24 (17–50)	71	24 (14–35)	0.14
Neurologic sequelae	39 (39) ( <i>n</i> = 99)	7 (29)	32 (43) ( <i>n</i> = 75)	0.39
Primary endpoint criteria fulfilled (no death, no recurrence, no sequelae)	46 (46) ( <i>n</i> = 99)	16 (67)	30 (40) ( <i>n</i> = 75)	0.02

# Quelle durée de traitement... IV ?



Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#7 Should early transition to oral antimicrobials be used in treatment of patients with bacterial brain abscess?</b>	No recommendation. For early transition to oral antimicrobials in patients with brain abscess, there is insufficient evidence at the time of writing to provide a recommendation.	-	-

# Quelle durée de traitement ?

Subpopulation with GCS >14 and 3 month GOS >1 (n = 71 patients)

			Univariate analysis		Multivariate analysis	
	Favourable GOS (n = 65)	Unfavourable GOS (n = 6)	OR (95% CI)	P value	ORa (95% CI)	P value
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GCS $\leq 14$	19 (29.2)	3 (50.0)	2.4 (0.4–14.1)	0.304	3.00 (0.4–25.7)	0.270
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Total duration of antibiotics >8 weeks	41 (63.1)	4 (66.7)	1.2 (0.2–8.9)	0.861	3.6 (0.4–47.0)	0.270
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Antibiotic oral switch	36 (55.4)	3 (50.0)	0.8 (0.1–4.6)	0.800	0.10 (0.0–2.8)	0.250
time before oral switch >2 weeks	20/36 (55.6)	0 (0.0)	—	—	—	—
Surgery	52 (80.0)	4 (66.7)	0.5 (0.1–3.9)	0.451	0.10 (0.0–1.3)	0.090
number of surgical procedures $\geq 2$	13/52 (25.0)	2/4 (50.0)	2.0 (0.2–13.4)	0.474	—	—
time before surgery >3 days	29/52 (55.8)	3/4 (75.0)	1.2 (0.2–9.6)	0.856	—	—
ICU stay	43 (66.2)	5 (83.3)	2.6 (0.4–50.6)	0.404	4.00 (0.3–169.9)	0.360

# Quelle durée de traitement ?



Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#6 What is the appropriate duration of antimicrobial therapy for bacterial brain abscess?</b>	<p>We conditionally recommend a total duration of 6-8 weeks of intravenous antimicrobials for aspirated or conservatively treated brain abscesses.</p> <p>A shorter duration (<u>e.g.</u> 4 weeks) may be considered in patients treated with excision of brain abscess (expert opinion).</p>	Conditional	Low/very low

11. Suivi

# Quel suivi proposer ?



Brain imaging should be performed in all patients with clinical deterioration. Otherwise, imaging needs only to be done at two weeks after aspiration or excision and at end of treatment in uncomplicated cases caused by a known pathogen with favourable antimicrobial susceptibility (good clinical practice statement). For conservatively managed patients, imaging should be done every two weeks until end of treatment (good clinical practice statement). Although the radiological evolution of brain abscess varies considerably, abscess volume is often stationary or slightly diminished on brain imaging by two weeks after aspiration, whereas lack of regression by four weeks is unusual. On the other hand, it may take 3-6 months before residual contrast enhancement disappears on brain imaging. Hence, it is often inappropriate to prolong antimicrobial treatment based solely on radiological findings due to the lag in improvement compared with regression of neurological symptoms and signs of inflammation.

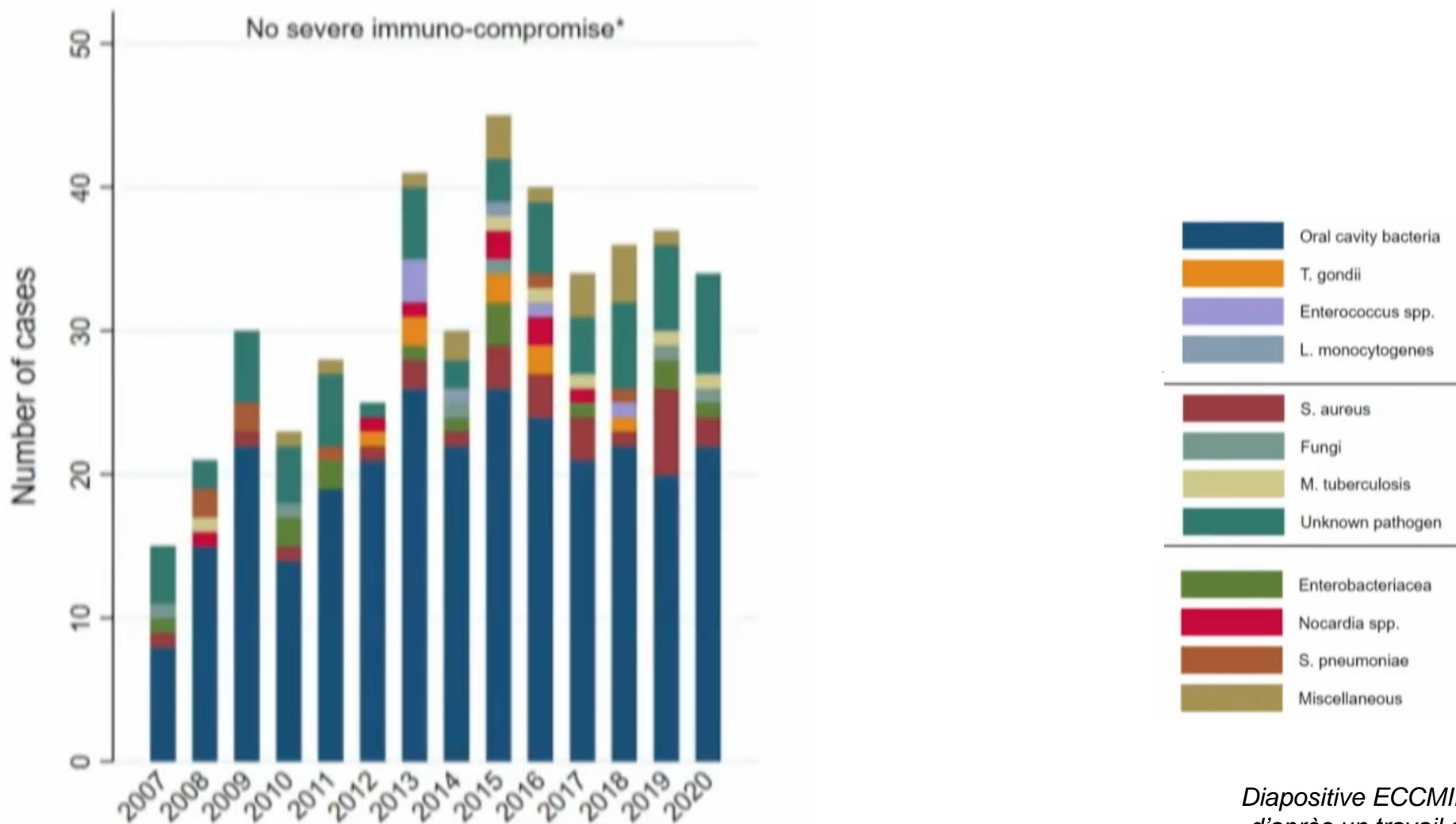
**B. Spécificités du patients immunodéprimé**

# Personne vivant avec le VIH

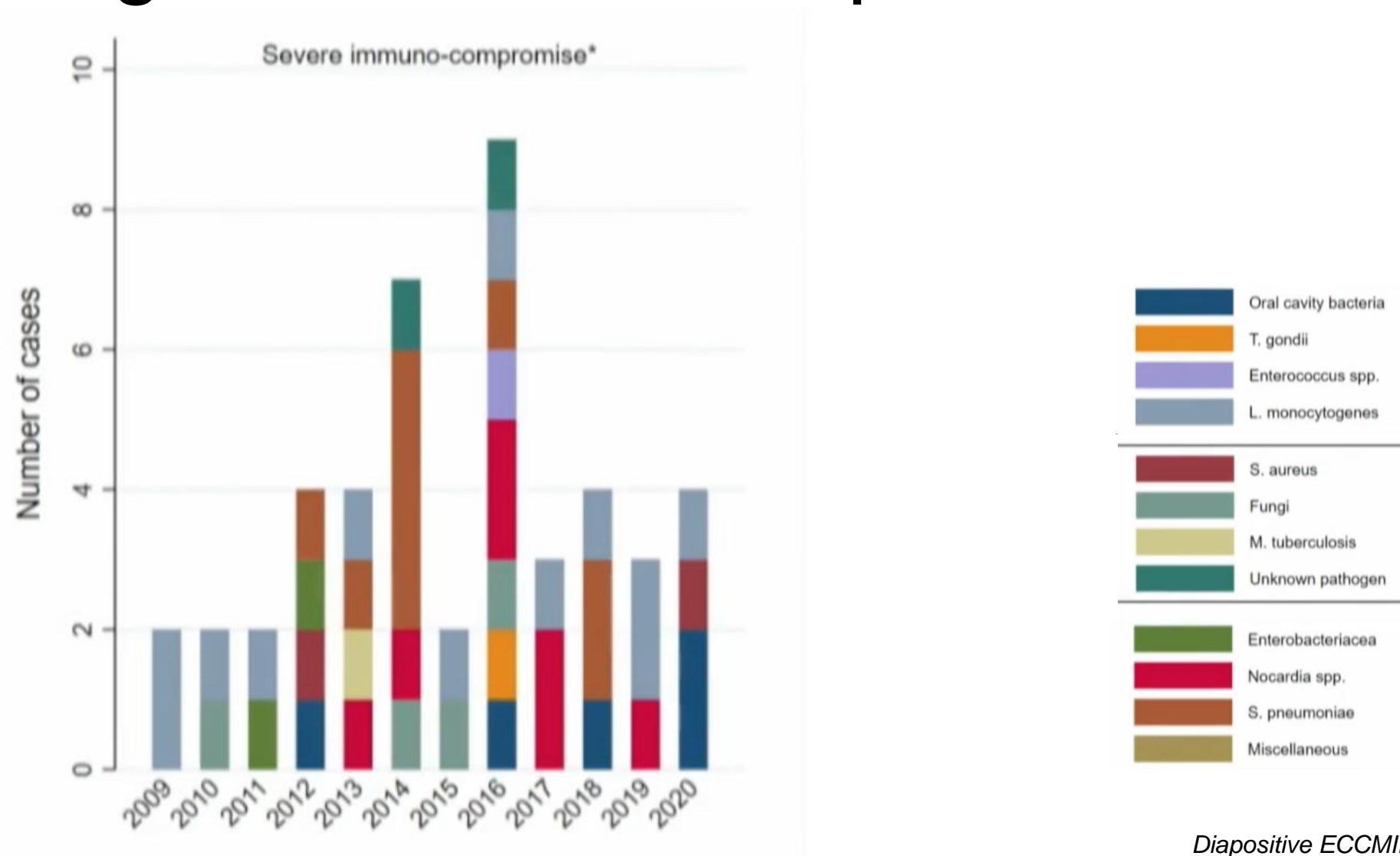
TOXOPLASMOSE jusqu'à preuve du contraire

Donc débuter le traitement et réévaluation à 15 jours

# Microbiologie chez ID autre que PVVIH



# Microbiologie chez ID autre que PVVIH

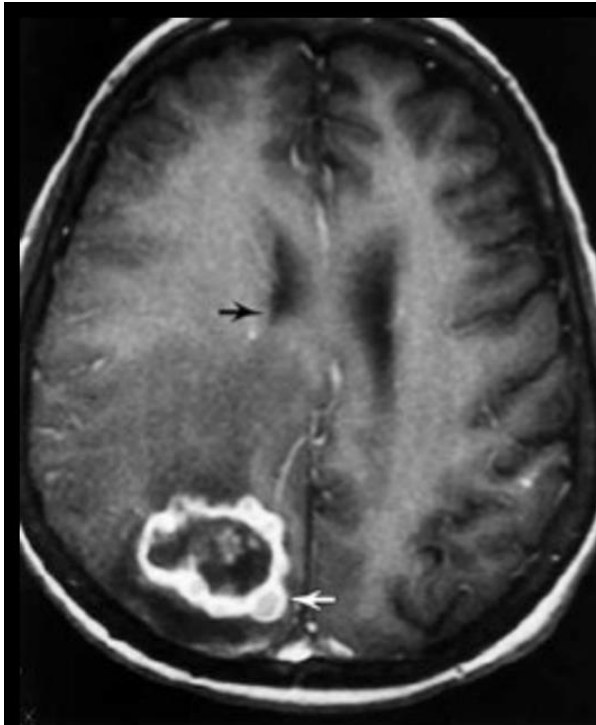


# En fonction du type de déficit immunitaire

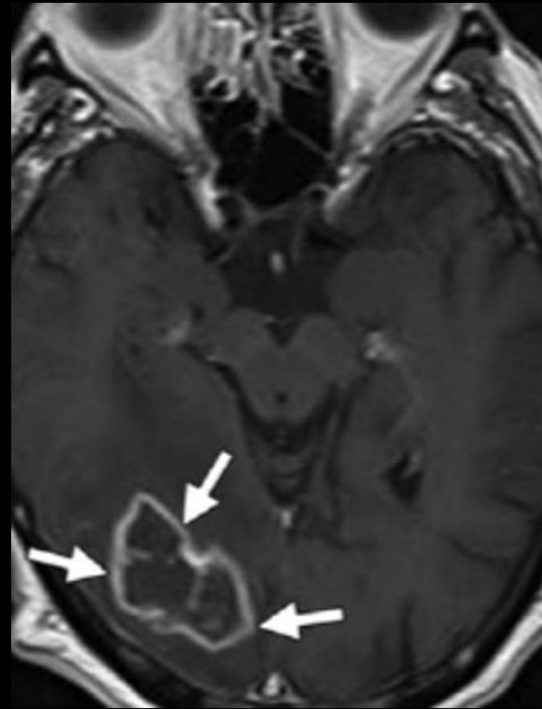
- Transplantés d'organe
  - > 80% = fongique (*Aspergillus* +++ précoce post-Tx < M3)
  - *Nocardia* +++ = plus tardif > M3-M6
  - Toxoplasmose = plus tardif > M3
  - Autres bactéries = rare
- Allogreffe :
  - > 90% = fongique (*Aspergillus* >> *Candida* > Mucorales)
  - Toxoplasmose et *Nocardia*
- Granulomatose septique familiale : fongique (*A. fumigatus*) > bactérien
- Dans tous les cas, *M. tuberculosis* = rare (abcès = 1% des TB maladies)

Singh, N. and Husain, S. TID 2000  
Haagensee, M.E et al Clin Infect Dis 1992  
Merlijn van den Berg, J et al PloS One 2009

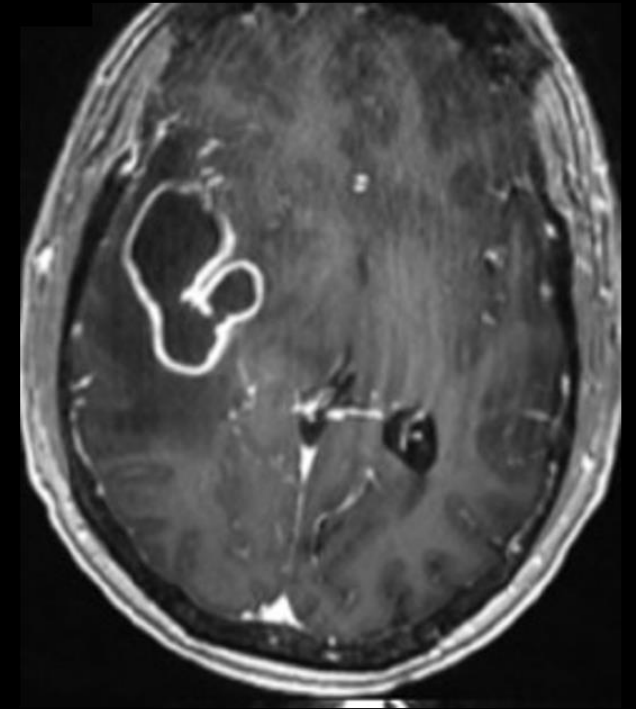
# Imagerie



*A. fumigatus*



*T. gondii*



*N. farcinica*

# Quel traitement antibiotique probabiliste proposer chez l'ID hors PVVIH ?



Key question	Recommendation	Strength of recommendation	Level of evidence
<b>#5 What is the optimal empirical antimicrobial therapy for brain abscess?</b>	<p>For severely immuno-compromised patients equivalent to organ transplant recipients, active chemotherapy or biological treatment, or haematological malignancies, we conditionally recommend:</p> <p>A 3<sup>rd</sup> generation cephalosporin and metronidazole combined with voriconazole and TMP-SMX.</p>	Conditional	Low



Merci de votre  
attention

