


# Cas clinique

Le 06/09/2024



Dr B.Mahdi  
Dr K.Mefteh

# Cas clinique

- ▶ Mme Mbarka âgée de 66 ans
- ▶ Originaire de Regueb



# Cas clinique

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- ▶ Mme Mbarka âgée de 66 ans
- ▶ Originaire de Regueb
- ▶ HTA sous ARAll
- ▶ G8P8
- ▶ Pas de tabac
- ▶ Altération fébrile de l'état général depuis 02 mois
- ▶ Anti inflammatoire, antalgique : Pas d'amélioration



# Examen physique

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- ▶ Apyrétique
- ▶ Pas d'ADP périphérique
- ▶ Bon état bucco-dentaire
- ▶ TA:12/7; FC:89
- ▶ Souffle minime au foyer mitral
- ▶ Eupnéique; SaO<sub>2</sub>: 100%
- ▶ Auscultation pulmonaire: normale
- ▶ Abdomen souple
- ▶ Pas d'HSMG
- ▶ Force motrice et sensibilité conservées



# Cas clinique

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- ▶ NFS :
  - ▶ GB:8620/mm<sup>3</sup>
  - ▶ Hb: 9,9g/dl
  - ▶ Pq : 309 000/mm<sup>3</sup>
- ▶ CRP: 22,4 g/dl
- ▶ Créatinine: 106 umol/l
- ▶ Protides : 82 g/l
- ▶ Radio du thorax: Normale



# ETT

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- ▶ FEVG conservée
- ▶ IM modérée
- ▶ RM moyennement serré
- ▶ **Doute sur une végétation**
  - ▶ bord libre de la petite VM sur le versant auriculaire
  - ▶ 7mm de grand axe

Diagnostic à  
évoquer ?



# Endocardite infectieuse a été suspectée

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- ▶ Tableau très variable
  - ▶ Lésions cardiaques pré-existantes
  - ▶ Micro-organismes en causes
  - ▶ Valve native/ Prothèse
- ▶ Fièvre –AEG            90%
- ▶ Souffle                    85%
- ▶ Signes emboliques 25%
- ▶ Biologie non spécifique

**Hémocultures**



# Les principales bactéries responsables d'EI

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- A. *Staphylococcus aureus*
- B. *Staphylococcus epidermidis*
- C. *Streptococcus gallolyticus*
- D. *Brucella sp.*
- E. *Klebsiella pneumoniae*





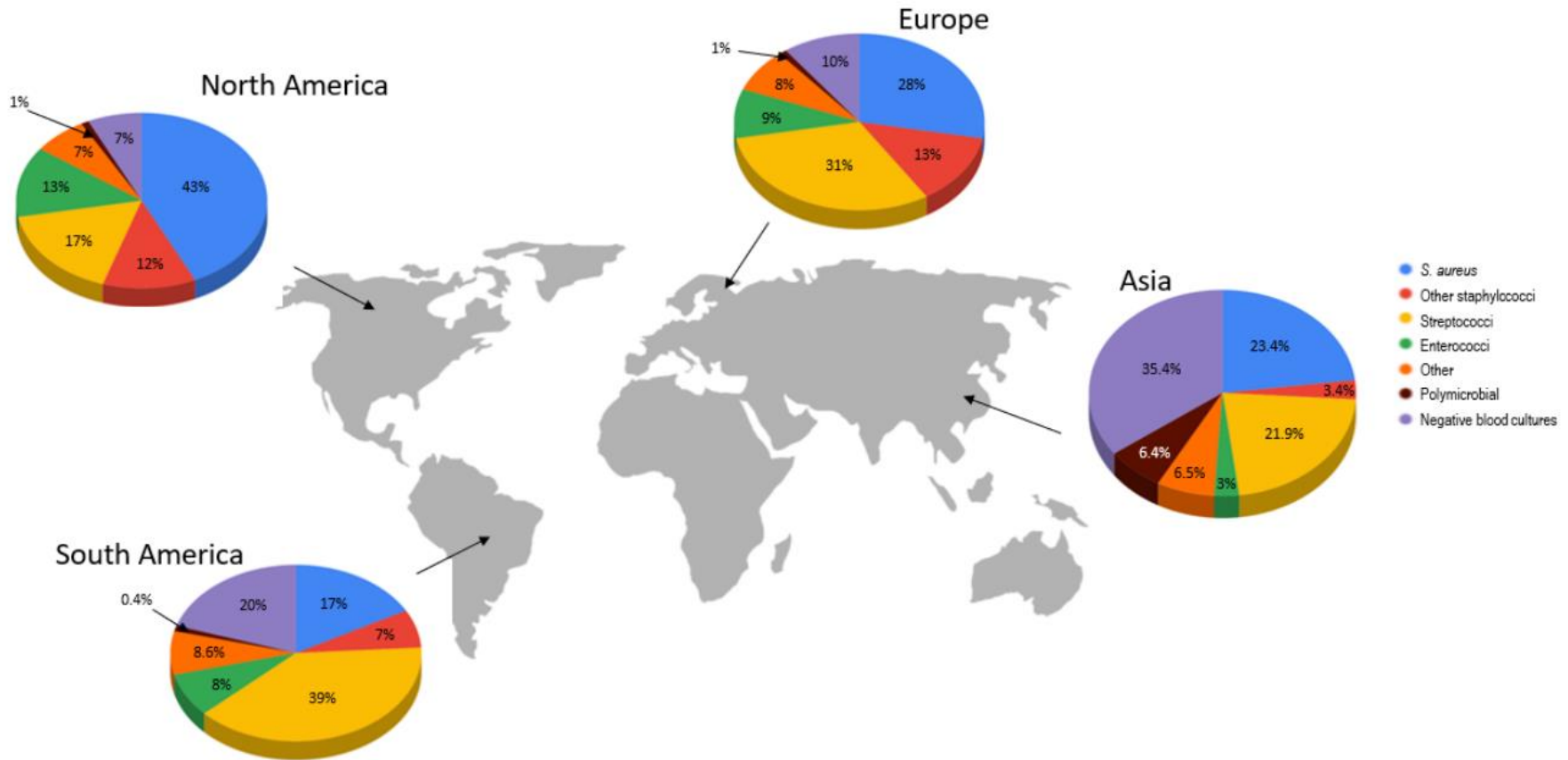
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# Endocardite infectieuse: Principales étiologies bactériennes



# Endocardite infectieuse: Principales étiologies bactériennes



## ▶ Etude prospective multicentrique internationale

Clinical presentation, aetiology and outcome of infective endocarditis. Results of the ESC-EORP EURO-ENDO (European infective endocarditis) registry: a prospective cohort study

Villares Jimenez, **Tunisia:** Sfax: L. Abid, R. Hammami, S. Kammoun, Tunis: M.S. Mourali, F. Mghaieth Zghal, M. Ben Hlima, S. Boudiche, S. Ouali, *La Marsa:* L. Zakhama, S. Antit, I. Slama, **Turkey:** Samsun:

Gilbert Habib<sup>1,2\*</sup>, Paola Anna Erba<sup>3,4</sup>, Bernard Jung<sup>5</sup>, Erwan Donat<sup>6</sup>, Bernard Cosyns<sup>7</sup>, Cécile Laroche<sup>8</sup>, Bogdan A. Popescu<sup>9</sup>, Bernard Prendergast<sup>10</sup>, Pilar Tornos<sup>11</sup>, Anita Sadeghpour<sup>12</sup>, Leopold Oliver<sup>13</sup>, Jolanta-Justina Vaskelyte<sup>14</sup>, Rouguiatou Sow<sup>15</sup>, Olivier Axler<sup>16</sup>, Aldo P. Maggioni<sup>17</sup>, and Patrizio Lancellotti<sup>18,19,20</sup>; on behalf of the EURO-ENDO Investigators<sup>†</sup>

	Total (n = 3116)	Prosthesis+Repair (n = 939)	Native (n = 1764)	PM/ICD (n = 308)	P-value
<b>Number of positive BC</b>					
N	2461/3116 (79.0%)	747/939 (79.6%)	1383/1764 (78.4%)	233/308 (75.6%)	0.3482
Methi-S Staphylococcus aureus	595 / 2461 (24.2%)	134 / 747 (17.9%)	336 / 1383 (24.3%)	92 / 233 (39.5%)	<0.0001
Methi-R Staphylococcus aureus	177 / 2461 (7.2%)	35 / 747 (4.7%)	116 / 1383 (8.4%)	16 / 233 (6.9%)	0.0060
Methi-S Staph coagulase negative	163 / 2461 (6.6%)	61 / 747 (8.2%)	68 / 1383 (4.9%)	28 / 233 (12.0%)	0.0001
Methi-R Staph coagulase negative	150 / 2461 (6.1%)	76 / 747 (10.2%)	56 / 1383 (4.0%)	16 / 233 (6.9%)	<0.0001
Streptococcus viridans	304 / 2461 (12.4%)	76 / 747 (10.2%)	209 / 1383 (15.1%)	6 / 233 (2.6%)	<0.0001
Enterococcus	390 / 2461 (15.8%)	162 / 747 (21.7%)	185 / 1383 (13.4%)	31 / 233 (13.3%)	<0.0001
Streptococcus gallolyticus	162 / 2461 (6.6%)	45 / 747 (6.0%)	105 / 1383 (7.6%)	9 / 233 (3.9%)	0.0709
Gram negative bacillus	86 / 2461 (3.5%)	18 / 747 (2.4%)	50 / 1383 (3.6%)	13 / 233 (5.6%)	0.0618
Coxiella burnetii IgG anti	formerly <i>S. bovis</i>	10 / 939 (1.1%)	15 / 1764 (0.9%)	0 / 308 (0.0%)	0.1854

BC= Blood Cultures. ECG= Electrocardiogram. WBC= White Blood Cells.

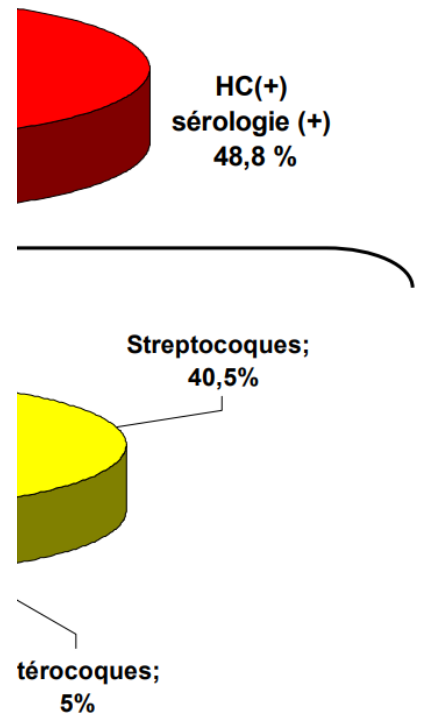
For qualitative variables, the Monte Carlo estimates of the exact p-values are used. Kruskal-Wallis test is used for quantitative data

# Endocardite infectieuse: Principales étiologies bactériennes



Table 4  
Microbiological profile of native valve infective endocarditis

Microorganism	Native Valve IE (n = 134)
<i>Staphylococcus aureus</i>	24 (18%)
Coagulase-negative <i>Staphylococci</i>	6 (4%)
<i>Streptococci viridans</i>	32 (24%)
<i>Bartonella</i>	11 (8%)
Pneumococcus	1 (1%)
<i>Enterococci</i>	1 (1%)
<i>Granulicatella adjacens</i>	1 (1%)
<i>Nisseria</i>	1 (1%)
<i>Corynebacterium</i>	2 (1.5%)
<i>Escherichia coli</i>	1 (1%)
<i>Klebsiella pneumoniae</i>	1 (1%)
<i>Acinetobacter baumannii</i>	1 (1%)
<i>Chlamydomphila pneumoniae</i>	1 (1%)
<i>Coxiella burnetii</i>	1 (1%)
<i>Candida albicans</i>	2 (1.5%)
<i>Aspergillus</i>	1 (1%)



# Endocardite infectieuse: Principales étiologies bactériennes



## Epidemiological, Bacteriological, and Evolutive Features of Children Hospitalized for Infective Endocarditis in a Tertiary Tunisian Pediatric Department

*Table 1. Aetiologic agents of infective endocarditis (n = 36).*

Isolated organism	Number of cases (%)
<i>Staphylococcus aureus</i>	10 (27.7 %)
<i>Coagulase-negative staphylococci</i>	1 (2.8 %)
<i>Streptococcus spp.</i>	1 (2.8 %)
<i>Streptococcus sanguinis</i>	1 (2.8 %)
<i>Escherichia coli</i>	1 (2.8 %)
<i>Klebsiella pneumoniae</i>	1 (2.8 %)
<i>Acinetobacter baumannii</i>	1 (2.8 %)
<i>Pseudomonas aeruginosa</i>	1 (2.8 %)
<i>Gram-positive cocci (non identified)</i>	2 (5.5 %)
<i>Gram-negative bacilli (non identified)</i>	1 (2.8 %)
Negative Culture	16 (44.4 %)

Au cours des endocardites, les hémocultures sont prélevées:

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- A. préférentiellement sur un cathéter veineux central
- B. avant toute antibiothérapie
- C. au moment des pics fébriles
- D. 6 flacons en un prélèvement unique
- E. préférentiellement sur des flacons aérobies



# Au cours des endocardites, les hémocultures sont prélevées

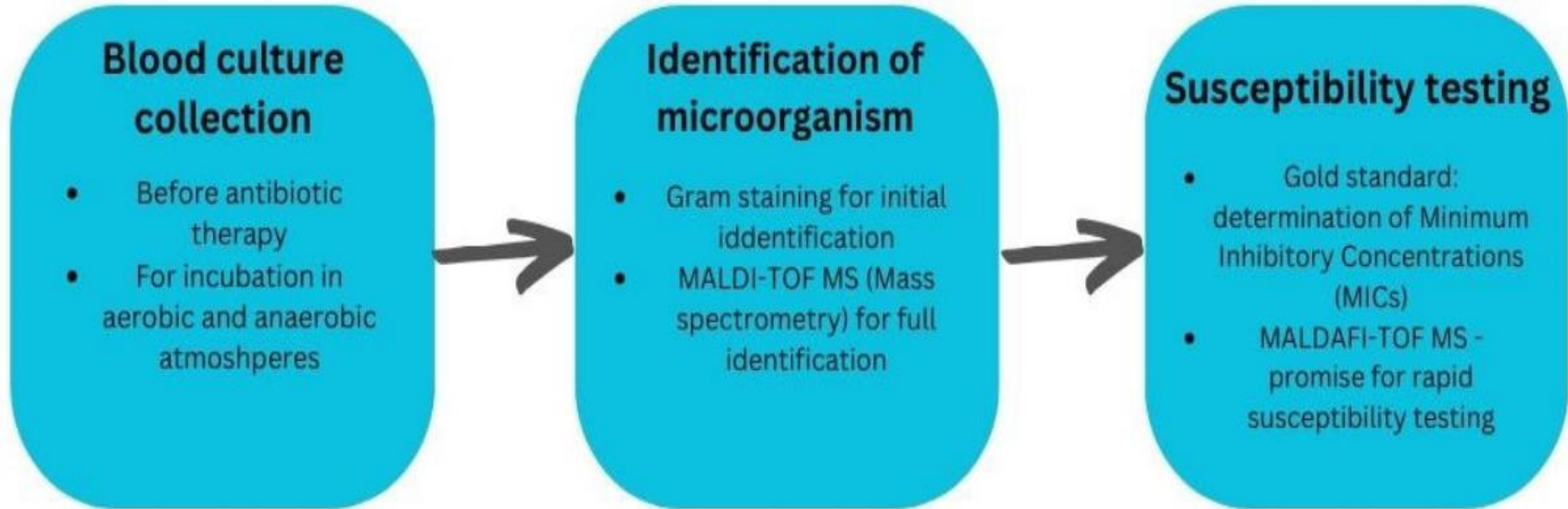
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# Les hémocultures au cours des EI

- ▶ Hémocultures : **Pierre angulaire** pour le diagnostic EI



**Figure 2.** A summary of the procedure associated with the collection and examination of blood cultures.

→ Voie veineuse périphérique



# Les hémocultures au cours des endocardites infectieuses

- ▶ Hémocultures : **Pierre angulaire** pour le diagnostic EI

Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis

## Major criteria

### (i) Blood cultures positive for IE

(a) Typical microorganisms consistent with IE from two separate blood cultures:

*Oral streptococci, Streptococcus gallolyticus (formerly S. bovis), HACEK group, S. aureus, E. faecalis*

## Minor criteria

### (v) Microbiological evidence:

- Positive blood culture but does not meet a major criterion as noted above.
- Serological evidence of active infection with organism consistent with IE.

(c) Single positive blood culture for *C. burnetii* or phase I IgG antibody titre >1:800.



ESC

European Society  
of Cardiology

European Heart Journal (2023) 00, 1–95  
<https://doi.org/10.1093/eurheartj/ehad193>

ESC GUIDELINES

2023 ESC Guidelines for the management  
of endocarditis



# Les hémocultures au cours des EI

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- ▶ Au cours des EI, bactériémie est constante:

→ Pas besoin d'attendre les pics fébriles

- ▶ **Précautions pour la réalisation des HC**

- ▶ Pas de prélèvements uniques préconisés:

- ▶ 3 paires
- ▶ sur les premières 24 h/ ou espacés de 30 mn (si urgences thérapeutiques)



# Les hémocultures au cours des endocardites infectieuses

## ► Critères Majeurs

**Table 10** Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis

### Major criteria

#### (i) Blood cultures positive for IE

(a) Typical microorganisms consistent with IE from two separate blood cultures:

Oral streptococci, *Streptococcus gallolyticus* (formerly *S. bovis*), HACEK group, *S. aureus*, *E. faecalis*

(b) Microorganisms consistent with IE from continuously positive blood cultures:

- $\geq 2$  positive blood cultures of blood samples drawn  $>12$  h apart.
- All of 3 or a majority of  $\geq 4$  separate cultures of blood (with first and last)

(c) Single positive blood culture for *C. burnetii* or phase I IgG antibody titre  $>1:100$



ESC

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of Cardiology

European Heart Journal (2023) **44**, 3948–4042

<https://doi.org/10.1093/eurheartj/ehad193>

The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

<sup>a</sup>*Staphylococcus aureus*; *Staphylococcus lugdunensis*; *Enterococcus faecalis*; all streptococcal species (except for *Streptococcus pneumoniae* and *Streptococcus pyogenes*), *Granulicatella* and *Abiotrophia* spp., *Gemella* spp., HACEK group microorganisms (*Haemophilus* species, *Aggregatibacter actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella corrodens*, and *Kingella kingae*). In the setting of intracardiac prosthetic material, the following additional bacteria should be included as “typical” pathogens: coagulase negative staphylococci, *Corynebacterium striatum* and *Corynebacterium jeikeium*, *Serratia marcescens*, *Pseudomonas aeruginosa*, *Cutibacterium acnes*, nontuberculous mycobacteria (especially *M. chimaerae*), and *Candida* spp.

# Les hémocultures au cours des endocardites infectieuses

## ► Critères Majeurs

**Table 10** Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis

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(c) Single positive blood culture for *C. burnetii* or phase I IgG antibody titre  $>1:800$ .



ESC

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Parmi ces examens lesquels demandez vous?

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- A. IRM cérébrale
- B. ETO
- C. Scintigraphie
- D. TDM cardiaque
- E. PET scan



Parmi ces examens lesquels demandez-vous?

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A. **IRM cérébrale**

B. **ETO**

C. **Scintigraphie**

D. **TDM cardiaque**

E. **PET scan**

**Echocardiographie et les  
hémocultures restent fondamentaux**

**L'imagerie multimodale  
place croissante**



# ETO

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## 2023 ESC Guidelines for the management of endocarditis

- ▶ Bilan lésionnel : Dg + Pc + Evolution
    - ▶ les végétations
    - ▶ les lésions valvulaires + périvalvulaires
    - ▶ Les abcès
    - ▶ Les pseudo-anévrysmes
  
  - ▶ Importantes pour le diagnostic
  - ▶ La stratification du risque
  - ▶ La prise en charge de l'endocardite
- 



# ETT/ETO

## 2023 ESC Guidelines for the management of endocarditis

Végétations	Sensibilité	Spécificité
ETT	70%	50%
ETO	90%	92%

Abcès	Sensibilité	Spécificité
ETT	50%	90%
ETO	90%	96%





ETT : Examen de 1<sup>er</sup> choix

ETO: Recommandée pour tous les patients avec suspicion clinique d'EI + ETT Nle ou non contributive

I-B

Refaire ETT-ETO dans 5-7jours si Nles ou non concluantes / suspicion clinique élevée

I-C

ETO recommandée même qd l'ETT est positive pour mieux détailler les lésions

I-C

**Section 5. Recommendation Table 5 — Recommendations for the role of echocardiography in infective endocarditis**

TOE should be considered in patients with suspected IE, even in cases with positive TTE, except in isolated right-sided native valve IE with good quality TTE examination and unequivocal echocardiographic finding.

IIa

C

TOE is recommended in patients with suspected IE, even in cases with positive TTE, except in isolated right-sided native valve IE with good quality TTE examination and unequivocal echocardiographic findings.

I

C

ETO : survenue de complications,  
persistance de la fièvre  
embols, abcès, AVB

I-B

ETO : patients stables avant le passage  
à la voie orale

I-B

ETO : intra-opérative

I-C

ETT/ETO: fin de traitement  
évaluation de la morphologie et la  
fonction cd+valvulaire

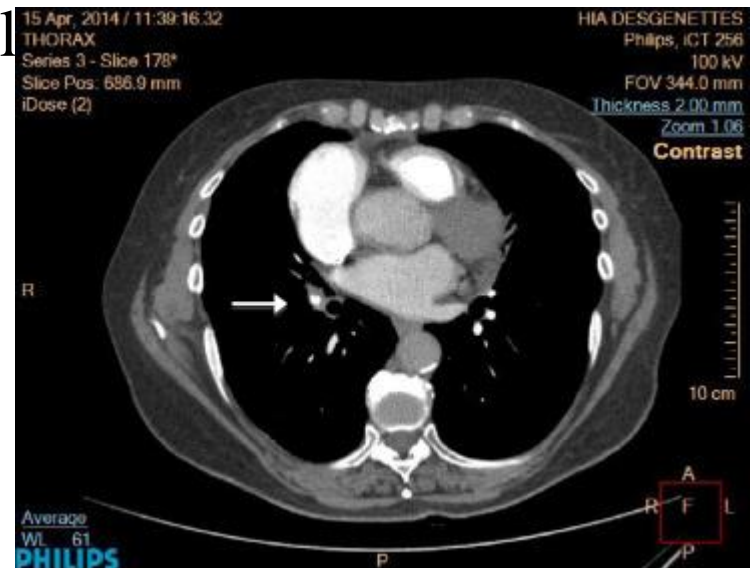
I-C



# Scanner cardiaque

## 2023 ESC Guidelines for the management of endocarditis

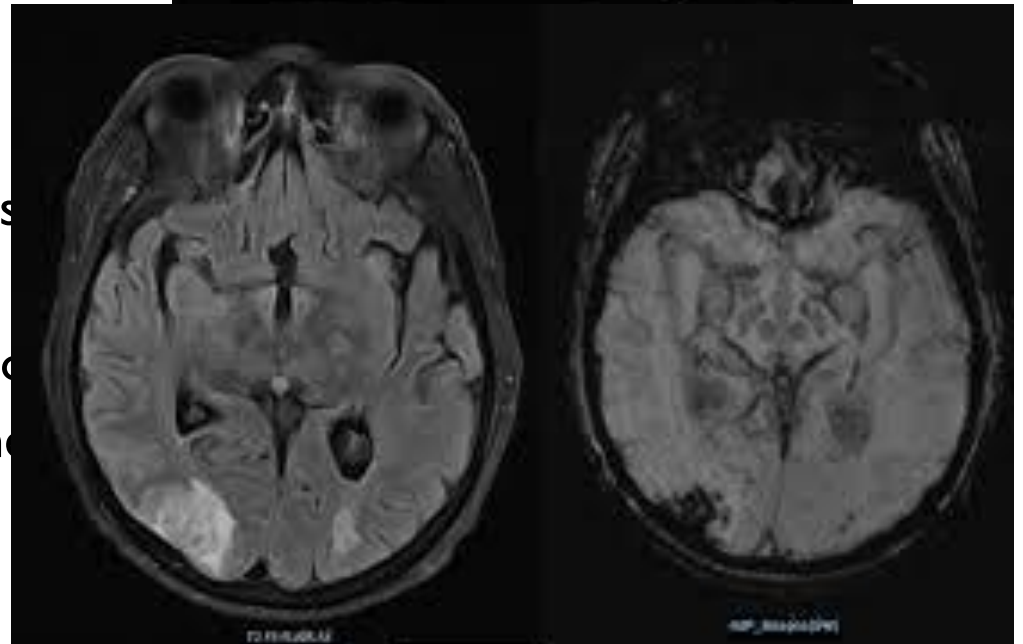
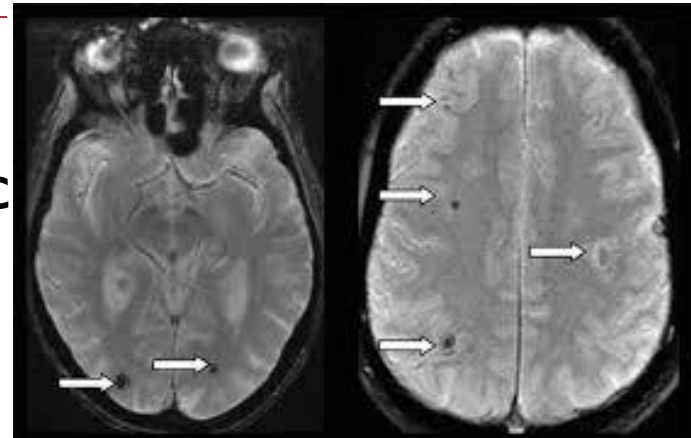
- ▶ Bilan lésionnel
  - ▶ Abscès
  - ▶ Anévrismes
  - ▶ Fistules
- ▶ Meilleur que l'ETO
  - ▶ Extension des lésions périvalvulaires
  - ▶ Déhiscence des prothèses
  - ▶ Valves Ao; Ao ascendante
  - ▶ Tronc supra Ao
- ▶ Localisations pulmonaires
  - ▶ Infarctus, abcès



# IRM cérébrale

## 2023 ESC Guidelines for the management of endocarditis

- ▶ Systématique
- ▶ Impact Dg: 25% EI douteuse/c
- ▶ Anomalies
  - ▶ Lésions ischémiques
  - ▶ Autres lésions
    - ▶ Lésions parenchymateuses
    - ▶ Anévrismes mycotiques
    - ▶ Hémorragies sous arachnoïdiennes
    - ▶ Séquence T2 : Hgic minimale

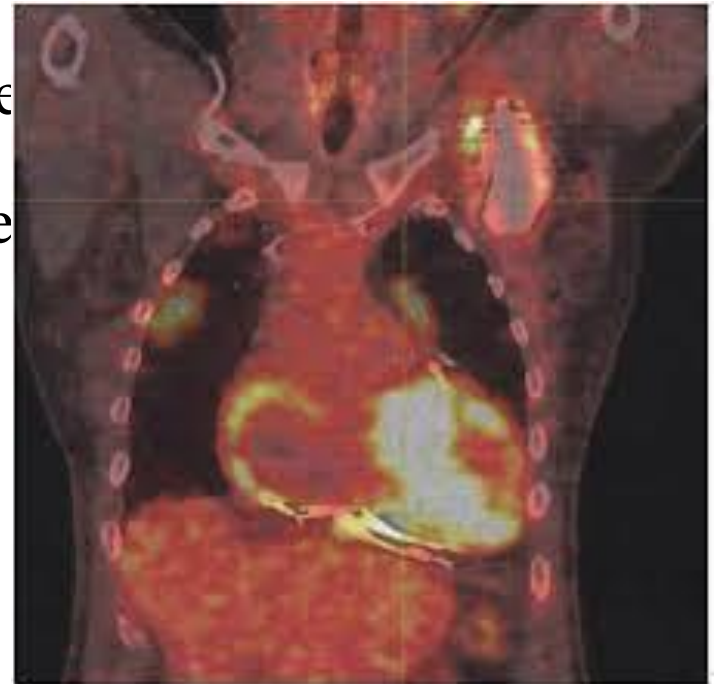


# PET-Scanner

## 2023 ESC Guidelines for the management of endocarditis

### ▶ Intérêt accru

- ▶ Echographie non contributive chez les porteurs de prothèse
- ▶ Les valvulopathies natives : les localisations extracardiaques
- ▶ Sensibilité et la spécificité : excellente
- ▶ Lésions cérébrales : IRM cérébrale



TDM cardiaque: confirmer EI valve native

I-B

TDM Cd+PET Scan: EI possible  
Lésions valvulaires : confirme Dg

I-B

TDM Cd: Dg EVN+EVP  
Lésions paravalvulaires + Cmp  
périprothétiques(écho non concluante)

I-B

Body scan+PET scan+ IRM cérébrale  
Lésions périphériques-critères mineurs  
Patients symptomatiques VN-VP  
Patients asymptomatiques

I-B  
IIb-B

## 2023 ESC Guidelines for the management of endocarditis

# Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis

### Major criteria

#### (i) Blood cultures positive for IE

- (a) Typical microorganisms consistent with IE from two separate blood cultures:  
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- $\geq 2$  positive blood cultures of blood samples drawn  $>12$  h apart.
  - All of 3 or a majority of  $\geq 4$  separate cultures of blood (with first and last samples drawn  $\geq 1$  h apart).
- (c) Single positive blood culture for *C. burnetii* or phase I IgG antibody titre  $>1:800$ .

#### (ii) Imaging positive for IE:

Valvular, perivalvular/periprosthetic and foreign material anatomic and metabolic lesions characteristic of IE detected by any of the following imaging techniques:

- Echocardiography (TTE and TOE).
- Cardiac CT.
- [18F]-FDG-PET/CT(A).
- WBC SPECT/CT.



## 2023 ESC Guidelines for the management of endocarditis

# Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis

### Minor criteria

**(i) Predisposing conditions (i.e. predisposing heart condition at high or intermediate risk of IE or PWIDs)<sup>a</sup>**

**(ii) Fever defined as temperature >38°C**

**(iii) Embolic vascular dissemination (including those asymptomatic detected by imaging only):**

- Major systemic and pulmonary emboli/infarcts and abscesses.
- Haematogenous osteoarticular septic complications (i.e. spondylodiscitis).
- Mycotic aneurysms.
- Intracranial ischaemic/haemorrhagic lesions.
- Conjunctival haemorrhages.
- Janeway's lesions.

**(IV) Immunological phenomena:**

- Glomerulonephritis.
- Osler nodes and Roth spots.
- Rheumatoid factor.

**(V) Microbiological evidence:**

- Positive blood culture but does not meet a major criterion as noted above.
- Serological evidence of active infection with organism consistent with IE.





## 2023 ESC Guidelines for the management of endocarditis

# Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis

### IE Classification (at admission and during follow-up)

#### **Definite:**

- 2 major criteria.
- 1 major criterion and at least 3 minor criteria.
- 5 minor criteria.

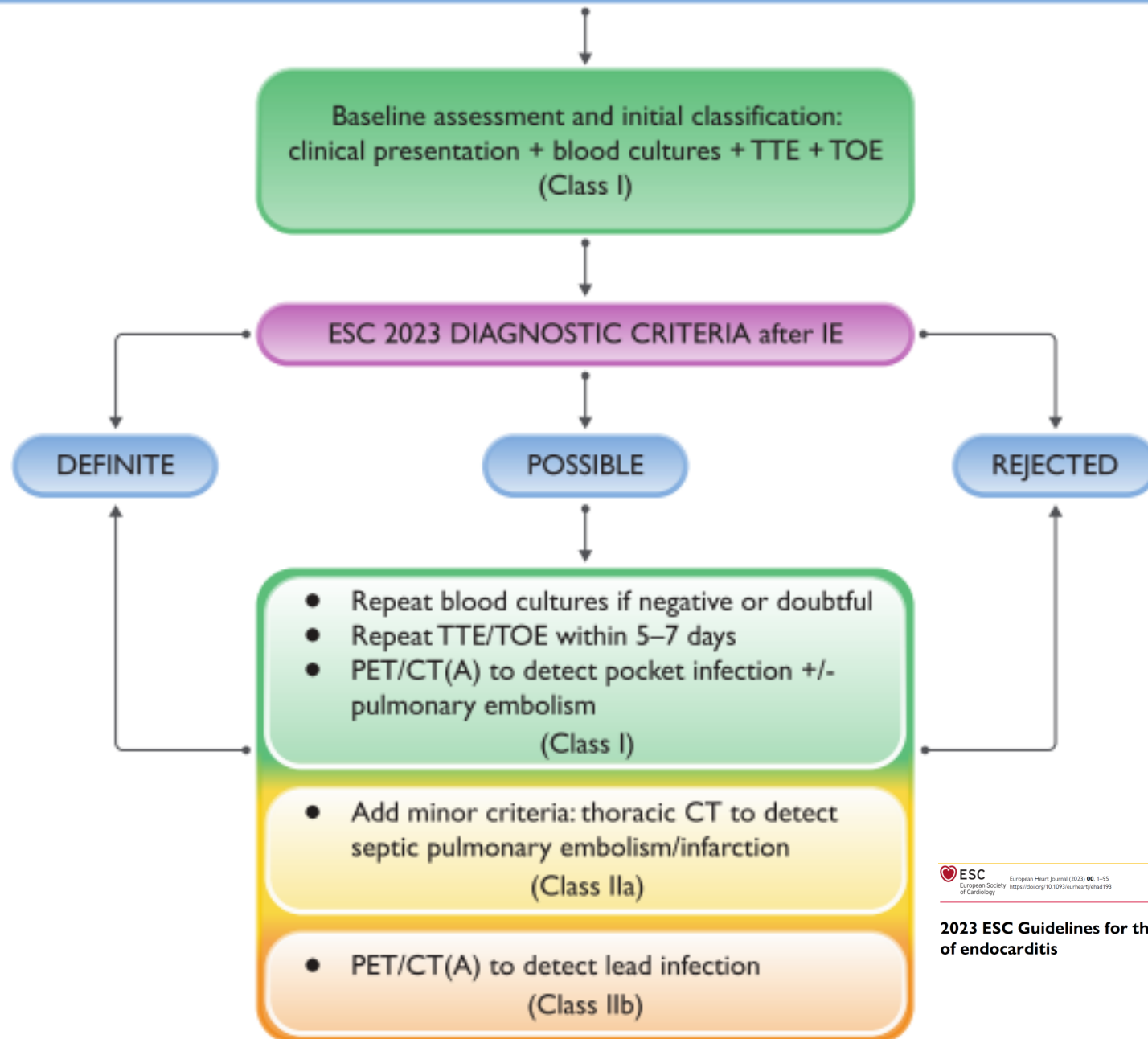
#### **Possible:**

- 1 major criterion and 1 or 2 minor criteria.
- 3–4 minor criteria.

#### **Rejected:**

- Does not meet criteria for definite or possible at admission with or without a firm alternative diagnosis.

## Suspected CIED-associated IE



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*Clinical Infectious Diseases*

VIEWPOINTS



The logo for Oxford University Press, featuring the word 'OXFORD' in a white, uppercase, serif font on a dark grey rectangular background.

# The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

Vance G. Fowler, Jr.,<sup>1,2,6</sup> David T. Durack,<sup>1</sup> Christine Selton-Suty,<sup>3</sup> Eugene Athan,<sup>4</sup> Arnold S. Bayer,<sup>5,6</sup> Anna Lisa Chamis,<sup>1</sup> Anders Dahl,<sup>7</sup> Louis DiBernardo,<sup>1</sup> Emanuele Durante-Mangoni,<sup>8</sup> Xavier Duval,<sup>9</sup> Claudio Querido Fortes,<sup>10</sup> Emil Fosbol,<sup>11</sup> Margaret M. Hannan,<sup>12</sup> Barbara Hasse,<sup>13</sup> Bruno Hoen,<sup>14</sup> Adolf W. Karchmer,<sup>15</sup> Carlos A. Mestres,<sup>16</sup> Cathy A. Petti,<sup>1,17</sup> Maria Nazarena Pizzi,<sup>18</sup> Stephen D. Preston,<sup>19</sup> Albert Roque,<sup>20</sup> Francois Vandenesch,<sup>21,22</sup> Jan T. M. van der Meer,<sup>23</sup> Thomas W. van der Vaart,<sup>23</sup> and Jose M. Miro<sup>24,25</sup>



# Critères de Duke 2023

## I. MAJOR CRITERIA

### A. Microbiologic Major Criteria

(1) Positive blood cultures

**i. Microorganisms that commonly cause IE<sup>a</sup> isolated from 2 or more separate blood culture sets (Typical)<sup>b</sup>**

or

**ii. Microorganisms that occasionally or rarely cause IE isolated from 3 or more separate blood culture sets (Nontypical)<sup>b</sup>**

(2) Positive laboratory tests

**i. Positive polymerase chain reaction (PCR) or other nucleic acid-based technique<sup>c</sup> for *Coxiella burnetii*, *Bartonella* species, or *Tropheryma whippelii* from blood**

or

**ii. *Coxiella burnetii* antiphase I immunoglobulin G (IgG) antibody titer >1:800 [24]<sup>d</sup>, or isolated from a single blood culture**

or

**iii. Indirect immunofluorescence assays (IFA) for detection of IgM and IgG antibodies to *Bartonella henselae* or *Bartonella quintana* with immunoglobulin G (IgG) titer  $\geq$ 1:800 [24, 25]<sup>d</sup>**

### B. Imaging Major Criteria

(1) Echocardiography and **cardiac computed tomography (CT)** imaging

**i. Echocardiography and/or **cardiac CT** showing vegetation,<sup>a</sup> valvular/leaflet perforation,<sup>f</sup> valvular/leaflet aneurysm,<sup>g</sup> abscess,<sup>h</sup> pseudoaneurysm,<sup>i</sup> or intracardiac fistula<sup>j</sup>**

or

**ii. Significant new valvular regurgitation on echocardiography as compared with previous imaging. Worsening or changing of preexisting regurgitation is not sufficient.**

or

**iii. New partial dehiscence of prosthetic valve as compared with previous imaging [52]**

**(2) Positron emission computed tomography with 18F-fluorodeoxyglucose ([18F]FDG PET/CT imaging)**

**Abnormal metabolic activity<sup>k</sup> involving a native or prosthetic valve, ascending aortic graft (with concomitant evidence of valve involvement), intracardiac device leads or other prosthetic material<sup>l,m</sup>**

### C. Surgical Major Criteria

**Evidence of IE documented by direct inspection during heart surgery neither Major Imaging Criteria nor subsequent histologic or microbiologic confirmation<sup>n</sup>**

# Critères de Duke 2023

## II. MINOR CRITERIA

### A. Predisposition

#### – **Previous history of IE**

- Prosthetic valve<sup>o</sup>
- Previous valve repair<sup>o</sup>
- Congenital heart disease<sup>p</sup>
- More than mild regurgitation or stenosis of any etiology
- **Endovascular intracardiac implantable electronic device (CIED)**
- Hypertrophic obstructive cardiomyopathy
- Injection drug use

### B. Fever *Documented temperature greater than 38.0 °C (100.4 °F)*

### C. Vascular Phenomena *Clinical or radiological evidence of arterial emboli, septic pulmonary infarcts, **cerebral or splenic abscess**, mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhages, Janeway lesions, purulent purpura*

### D. Immunologic Phenomena *Positive rheumatoid factor, Osler nodes, Roth spots, or immune complex-mediated glomerulonephritis<sup>q</sup>*

### E. Microbiologic Evidence, Falling Short of a Major Criterion

1) Positive blood cultures for a microorganism consistent with IE but not meeting the requirements for Major Criterion<sup>f</sup>

*or*

2) **Positive culture, PCR, or other nucleic acid based test (amplicon or shotgun sequencing, *in situ* hybridization) for an organism consistent with IE<sup>e</sup> from a sterile body site other than cardiac tissue, cardiac prosthesis, or arterial embolus; or a single finding of a skin bacterium by PCR on a valve or wire without additional clinical or microbiological supporting evidence [51]**

### F. Imaging Criteria

***Abnormal metabolic activity as detected by [18F]FDG PET/CT within 3 mo of implantation of prosthetic valve, ascending aortic graft (with concomitant evidence of valve involvement), intracardiac device leads or other prosthetic material***

### G. Physical Examination Criteria<sup>a</sup>

New valvular regurgitation identified on auscultation if echocardiography is not available. Worsening or changing of preexisting murmur not sufficient

# Critères de Duke 2023

---

## I. DEFINITE ENDOCARDITIS

### A. Pathologic Criteria

**(1) Microorganisms identified<sup>a</sup> in the context of clinical signs of active endocarditis in a vegetation; from cardiac tissue; from an explanted prosthetic valve or sewing ring; from an ascending aortic graft (with concomitant evidence of valve involvement); from an endovascular intracardiac implantable electronic device (CIED); or from an arterial embolus**

or

**(2) Active endocarditis<sup>b</sup> (may be acute<sup>c</sup> or subacute/chronic<sup>d</sup>) identified in or on a vegetation; from cardiac tissue; from an explanted prosthetic valve or sewing ring; from an ascending aortic graft (with concomitant evidence of valve involvement); from a CIED; or from an arterial embolus**

### B. Clinical Criteria

(1) 2 Major Criteria

or

(2) 1 Major Criterion and 3 Minor Criteria

or

(3) 5 Minor Criteria

## II. POSSIBLE ENDOCARDITIS

A. 1 Major Criterion And 1 Minor Criterion

or

B. 3 Minor Criteria

## III. REJECTED ENDOCARDITIS

A. Firm alternate diagnosis explaining signs/symptoms<sup>e</sup>

or

**B. Lack of recurrence despite antibiotic therapy for less than 4 d.**

or

C. No pathologic or macroscopic evidence of IE at surgery or autopsy, with antibiotic therapy for less than 4 d

or

D. Does not meet criteria for possible IE, as above

---



# ESC2015/ESC2023/Duke 2023

---

<b>Etude Suisse 1344 P EI à Staph</b>	<b>Sensibilité</b>	<b>Spécificité</b>
Duke 2023	81%	96%
ESC 2015	75%	92%
ESC 2023	82%	96%

40% des suspicions d'EI classées certaines ou possibles alors qu'elles ne sont pas



# Cas clinique : ETO

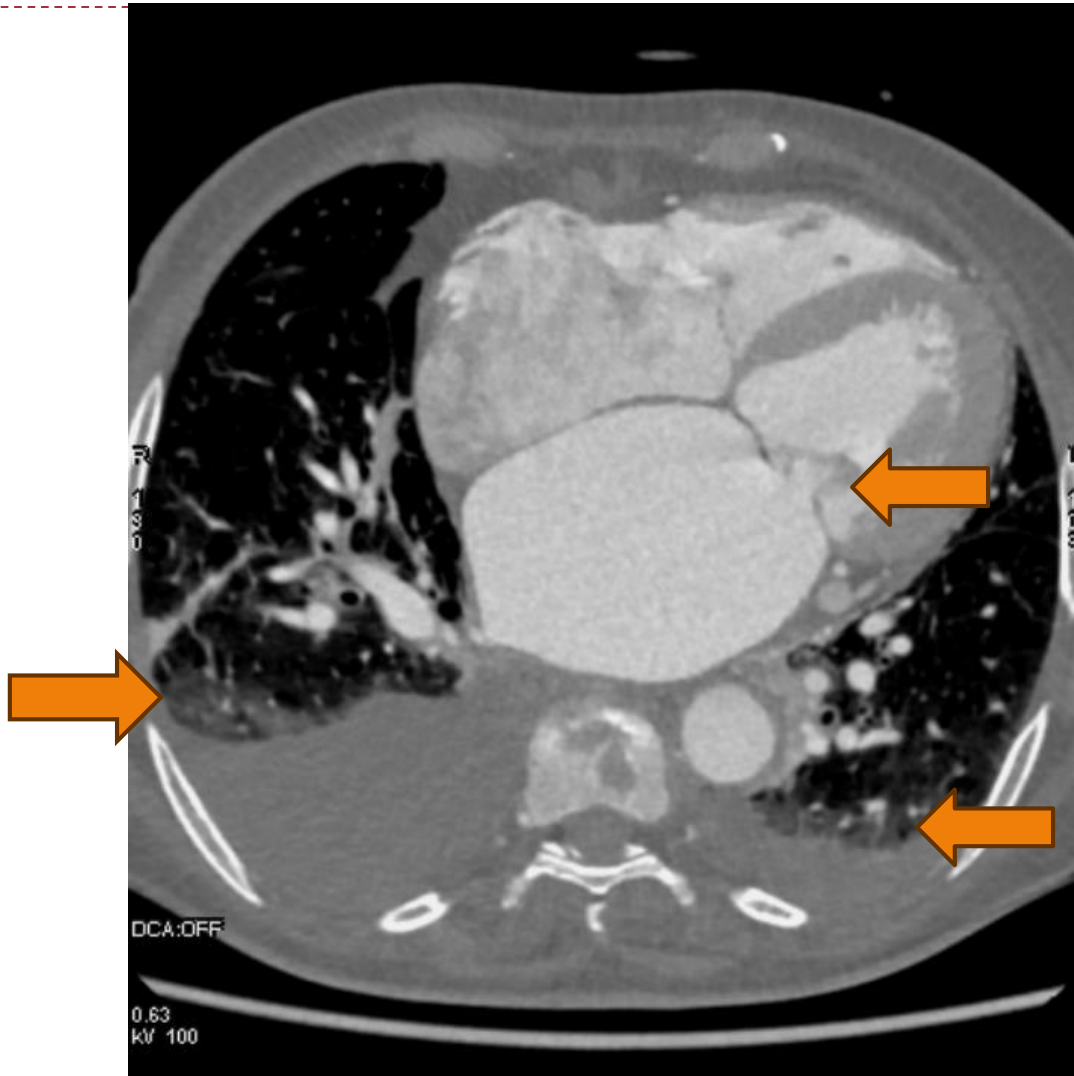
---

- ▶ FEVG conservée
- ▶ IM modérée
- ▶ RM moyennement serré
- ▶ Végétation au dépend du bord libre de la petite VM sur le versant auriculaire faisant 9mm de grand axe **mobile vibratile**
- ▶ **Pas d'abcès ni perforation**
- ▶ IT modérée
- ▶ PAPS=35mmHg





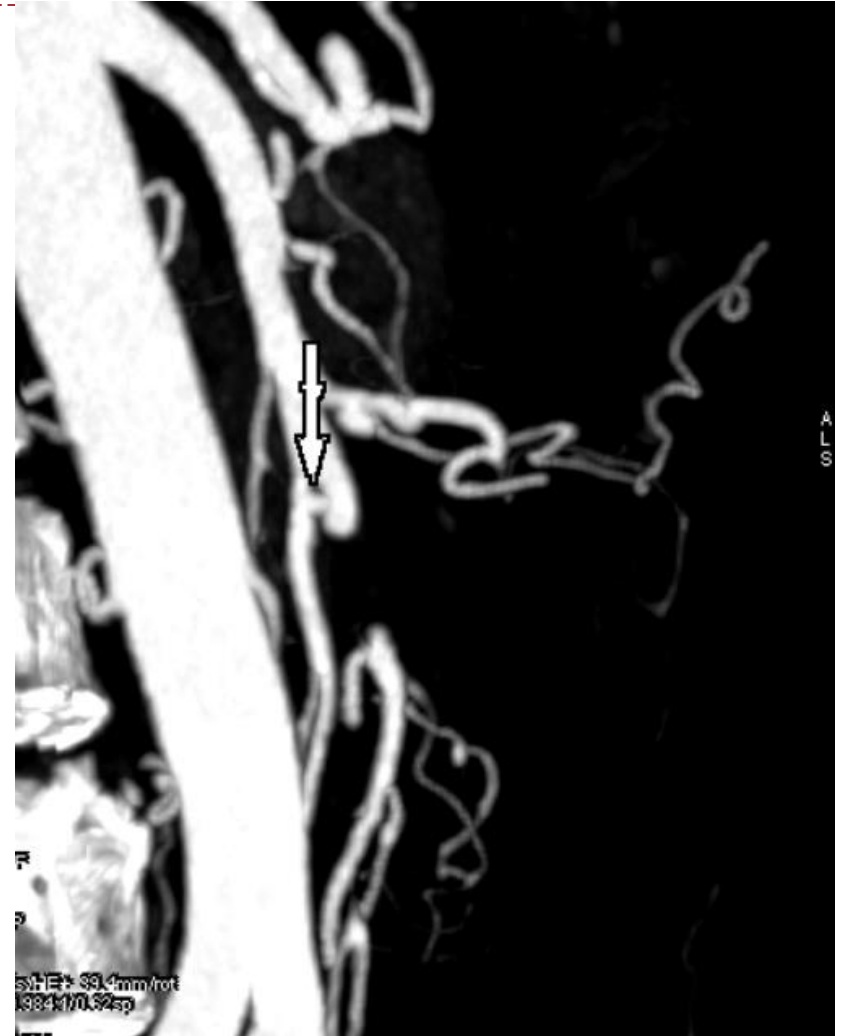
# Cas clinique : Scanner C-TAP



# Cas clinique : Scanner C-TAP



# Cas clinique : Scanner C-TAP



# Cas clinique : TDM C-TAP

---

- ▶ **Epaississement nodulaire de la valve mitrale**
- ▶ Absence d'abcès péri-valvulaire ni de pseudo-anévrisme
  
- ▶ **Nodules solides sous pleuraux**
  
- ▶ **Anévrisme mycotique**
  - ▶ branche colique droite de l'AMS
  - ▶ 3,6 mm
- ▶ **Occlusion** de l'artère mésentérique supérieure
  - ▶ 2cm
- ▶ **3 faux anévrismes mycotiques**



# Cas clinique : TDM C-TAP

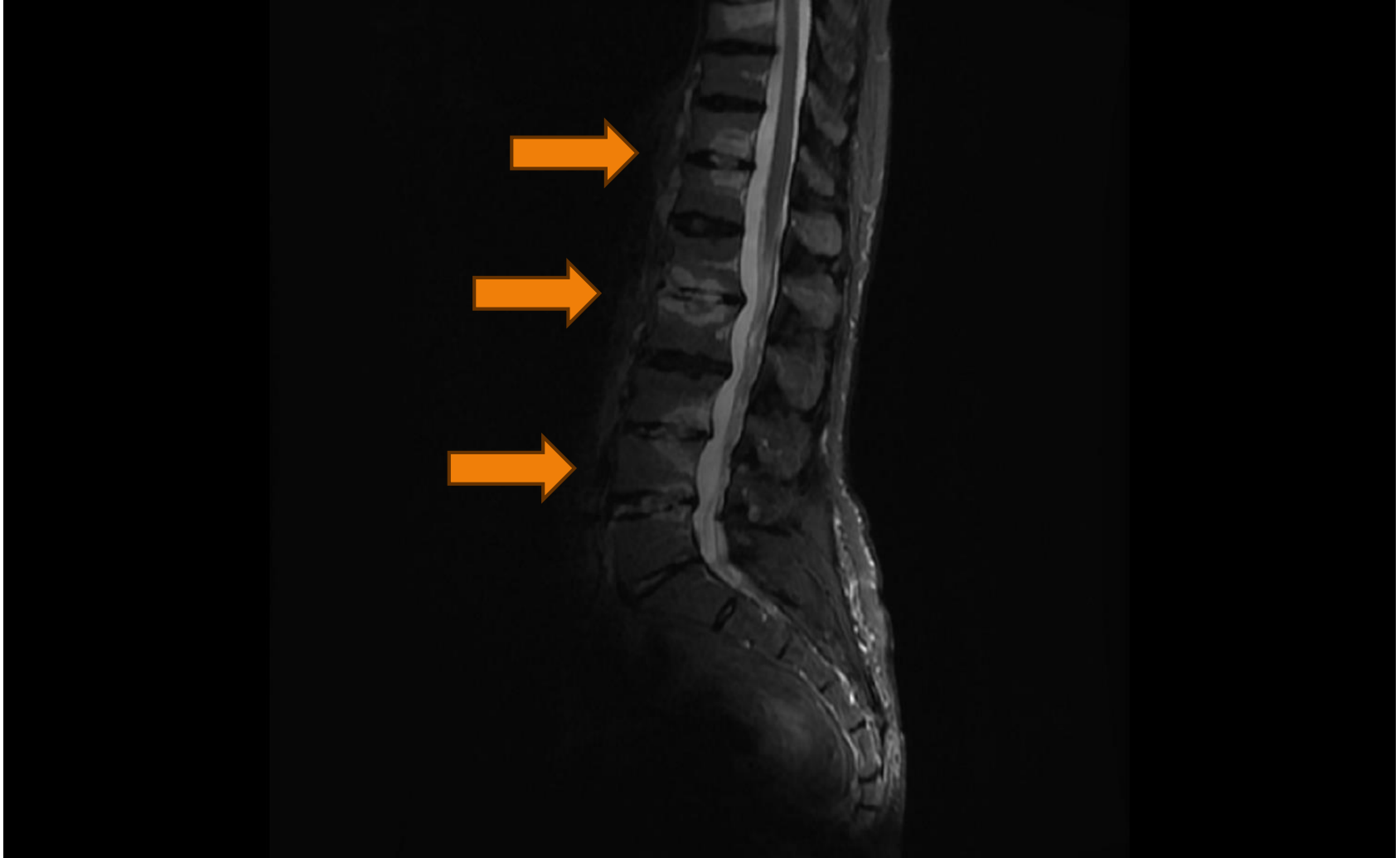
---

- ▶ Lésions lytiques gommant les plateaux contigus L3 et L4 avec réhaussement discal après injection du PDC
- ▶ Pas de collection intra-canaulaire ou des parties molles péri vertébrales
- ▶ Aspect de spondylodiscite infectieuse L3-L4



# Cas clinique : IRM médullaire

---



# Cas clinique : IRM médullaire

---

- ▶ Anomalie de signal de type œdémateux et érosions osseuses des plateaux vertébraux de D9, D11-12, L1-5
- ▶ Epaississement et prise de contraste épidurale antérieure
  - ▶ Epidurite sans collection
- ▶ Infiltration des parties molles péri-vertébrales antérieure et antéro-latérale
- ▶ Pas de collection



# Cas clinique :IRM articulaire

---

- ▶ Epanchement articulaire de moyenne abondance
  - ▶ Cul de sac sous-quadricipital
  - ▶ 18mm d'épaisseur
  - ▶ cloisonné
- ▶ Epaissement synovial hypoéchogène
- ▶ Hyperhémie au Doppler couleur
- ▶ **Arthrite septique**

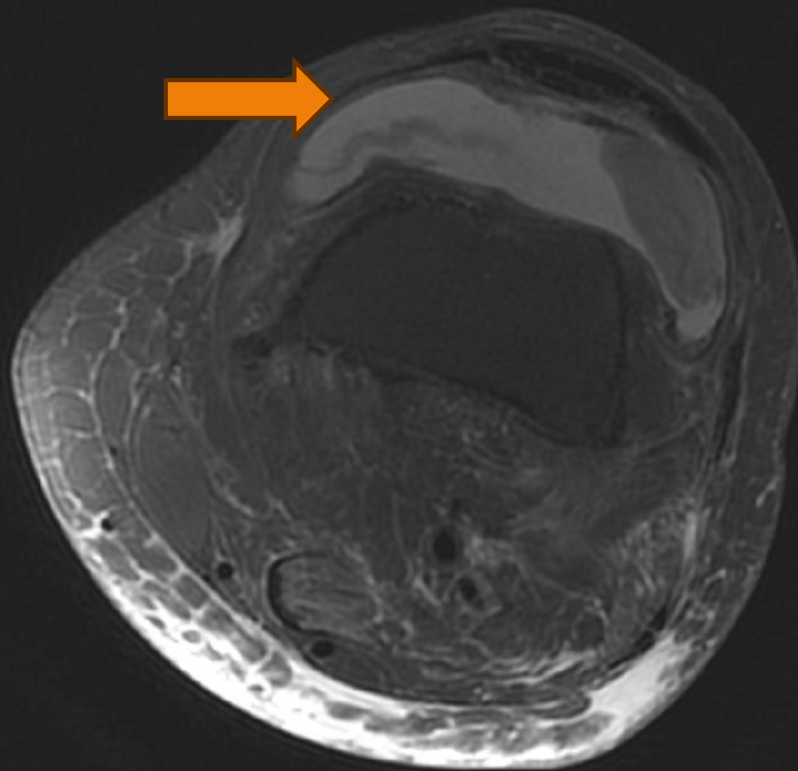




IRM DU GENOU  
AX T2 FSE FS PROPELLER

A

SIGNA Artist  
29-April-2024 11:41:10



R  
L  
ST: 3.30 mm SL: 12.55 mm  
RT: 7559 ET: 82.2  
FS: 1.5  
MR  
LittleEndianImplicit  
Images: 13/37  
Series: 3

P

WL: 864 WW: 2322



# Cas clinique: EI?

## ▶ Hémocultures toujours négatives

## Definitions of the 2023 European Society of Cardiology modified diagnostic criteria of infective endocarditis

### IE Classification (at admission and during follow-up)

#### **Definite:**

- 2 major criteria.
- 1 major criterion and at least 3 minor criteria.
- 5 minor criteria.

#### **Possible:**

- 1 major criterion and 1 or 2 minor criteria.
- 3–4 minor criteria.

#### **Rejected:**

- Does not meet criteria for definite or possible at admission with or without a firm alternative diagnosis.



# Quelle antibiothérapie à prescrire en 1ère intention ?

---

- A. Céfotaxime-Fosfomycine
- B. Ampicilline-Oxacilline-Gentamicine
- C. Ampicilline-Gentamicine
- D. Oxacilline-Gentamicine
- E. Céfazoline-Gentamicine



# Quelle antibiothérapie à prescrire en 1ère intention ?

---

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- B. Amicilline-Oxacilline-Gentamicine
- C. Ampicilline-Gentamicine
- D. Oxacilline-Gentamicine
- E. Céfazoline-Gentamicine



Recommendations		Class <sup>b</sup>	Level <sup>c</sup>
In patients with community-acquired NVE or late PVE ( $\geq 12$ months post-surgery), ampicillin in combination with ceftriaxone or with (flu)cloxacillin and gentamicin should be considered using the following doses: <sup>255</sup>		IIa	C
<i>Adult antibiotic dosage and route</i>			
Ampicillin	12 g/day i.v. in 4–6 doses		
Ceftriaxone	4 g/day i.v. or i.m. in 2 doses		
(Flu)cloxacillin	12 g/day i.v. in 4–6 doses		
Gentamicin <sup>d</sup>	3 mg/kg/day i.v. or i.m. in 1 dose		
<i>Paediatric antibiotic dosage and route</i>			
Ampicillin	300 mg/kg/day i.v. in 4–6 equally divided doses		
Ceftriaxone	100 mg/kg i.v. or i.m. in 1 dose		
(Flu)cloxacillin	200–300 mg/kg/day i.v. in 4–6 equally divided doses		
Gentamicin <sup>d</sup>	3 mg/kg/day i.v. or i.m. in 3 equally divided doses		

On est à J 4 et .....

---



**Hémocultures toujours négatives !!!**



Au cours des EI, avec des hémocultures négatives, il faut:

---

- A. Prolonger l'incubation des flacons à 30 jours
- B. Répéter les hémocultures
- C. Réaliser des PCR sur un tube de sang EDTA
- D. Réaliser la sérologie *Coxiella burnetti*
- E. Penser à une étiologie non infectieuse probable



Au cours des EI, avec des hémocultures négatives, il faut:

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- D. Réaliser la sérologie *Coxiella burnetti*
- E. Penser à une étiologie non infectieuse probable





# Au cours des EI, avec des hémocultures négatives

---

- ▶ **Durée d'incubation:**

- ▶ 5 jours : OK
- ▶ mais on peut prolonger jusqu'à 15 jours

- ▶ **Informez le laboratoire :**

suspicion d'endocardite ++++

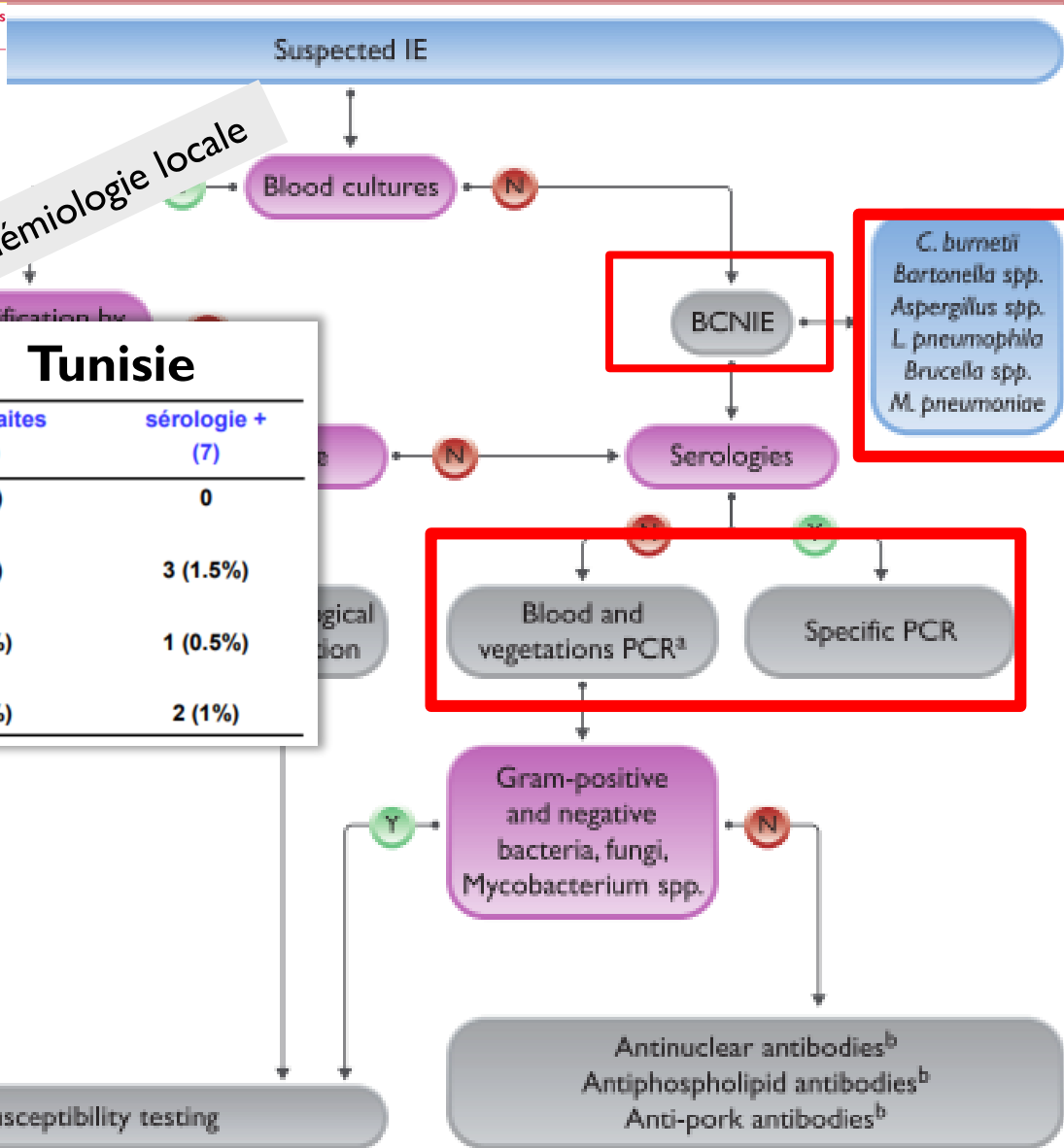
- ▶ Si les HC négatives au cours des premières 48 à 72H  
→ **Refaire les HC +++**



Selon l'épidémiologie locale

### La sérologie Tunisie

	sérologies faites	sérologie +
	81(40%)	(7)
<i>Chlamydia</i>	69 (34%)	0
<i>Brucella</i>	79 (39%)	3 (1.5%)
<i>Coxiella burnetii</i>	70 (34.5%)	1 (0.5%)
<i>Bartonella</i>	38 (18.5%)	2 (1%)



- C. burnetii*
- Bartonella* spp.
- Aspergillus* spp.
- L. pneumophila*
- Brucella* spp.
- M. pneumoniae*

Antimicrobial susceptibility testing

Antinuclear antibodies<sup>b</sup>  
Antiphospholipid antibodies<sup>b</sup>  
Anti-pork antibodies<sup>b</sup>

# Endocardite infectieuse: la biologie moléculaire

The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria

**Table 2. Definitions of Terms Used in the 2023 Duke-International Society for Cardiovascular Infectious Diseases Infective Endocarditis (IE) Criteria for the Diagnosis of IE, With Proposed Changes in Bold Type**

## I. MAJOR CRITERIA

### A. Microbiologic Major Criteria

#### (1) Positive blood cultures

**i. Microorganisms that commonly cause IE<sup>a</sup> isolated from 2 or more separate blood culture sets (Typical)<sup>b</sup>**

or

**ii. Microorganisms that occasionally or rarely cause IE isolated from 3 or more separate blood culture sets (Nontypical)<sup>b</sup>**

#### (2) Positive laboratory tests

**i. Positive polymerase chain reaction (PCR) or other nucleic acid-based technique<sup>c</sup> for *Coxiella burnetii*, *Bartonella* species, or *Tropheryma whippelii* from blood**

or

ii. *Coxiella burnetii* antiphase I immunoglobulin G (IgG) antibody titer >1:800 [24]<sup>d</sup>, or isolated from a single blood culture

or

**iii. Indirect immunofluorescence assays (IFA) for detection of IgM and IgG antibodies to *Bartonella henselae* or *Bartonella quintana* with immunoglobulin G (IgG) titer  $\geq$ 1:800 [24, 25]<sup>d</sup>**

### E. Microbiologic Evidence, Falling Short of a Major Criterion

1) Positive blood cultures for a microorganism consistent with IE but not meeting the requirements for Major Criterion<sup>f</sup>

or

**2) Positive culture, PCR, or other nucleic acid based test (amplicon or shotgun sequencing, *in situ* hybridization) for an organism consistent with IE<sup>f</sup> from a sterile body site other than cardiac tissue, cardiac prosthesis, or arterial embolus; or a single finding of a skin bacterium by PCR on a valve or wire without additional clinical or microbiological supporting evidence [51]**

# Endocardite infectieuse: la biologie moléculaire

Review

## Novel Diagnostic Methods for Infective Endocarditis

Anna Burban<sup>1,2</sup>, Dorota Stupik<sup>1</sup>, Aleksandra Reda<sup>1</sup>, Ewa Szczerba<sup>1</sup>, Marcin Grabowski<sup>1</sup>  
and Agnieszka Kołodzińska<sup>1,\*</sup>

**Table 1.** The characteristics and benefits of molecular methods used in the diagnosis of IE [72].

Molecular Method	Short Characteristic/Benefit
Organism-Specific PCR Assays	antibiotic. Baddour et al. showed that 17% of patients (who had skin commensals identified in previous blood cultures) tested via the 16S rDNA PCR method were found to have species such as <i>T.whipplei</i> and <i>C.burnetti</i> that do not respond to treatment with empirical antibiotic regimens for IE treatment from the guidelines [49].
Broad-Range PCR with 16S rRNA Gene	Detects bacterial DNA in blood (41% des BC-Neg) and specificity for explanted tissue sensitivity and specificity for explanted tissue and plasma
Targeted Metagenomic Sequencing (tMGS)	It is less cost-consuming comparing to the sMGS and the overall generation sequencing. The combination of sMGS and tMGS for traditional culture allowed for the identification of pathogens in 97% of patients. The summary of the molecular
Shotgun Metagenomic Sequencing (sMGS)	Detects and identifies all bacterial species and resistant microorganisms, contrarily to tMGS [72].



2023 ESC Guidelines for the management  
of endocarditis

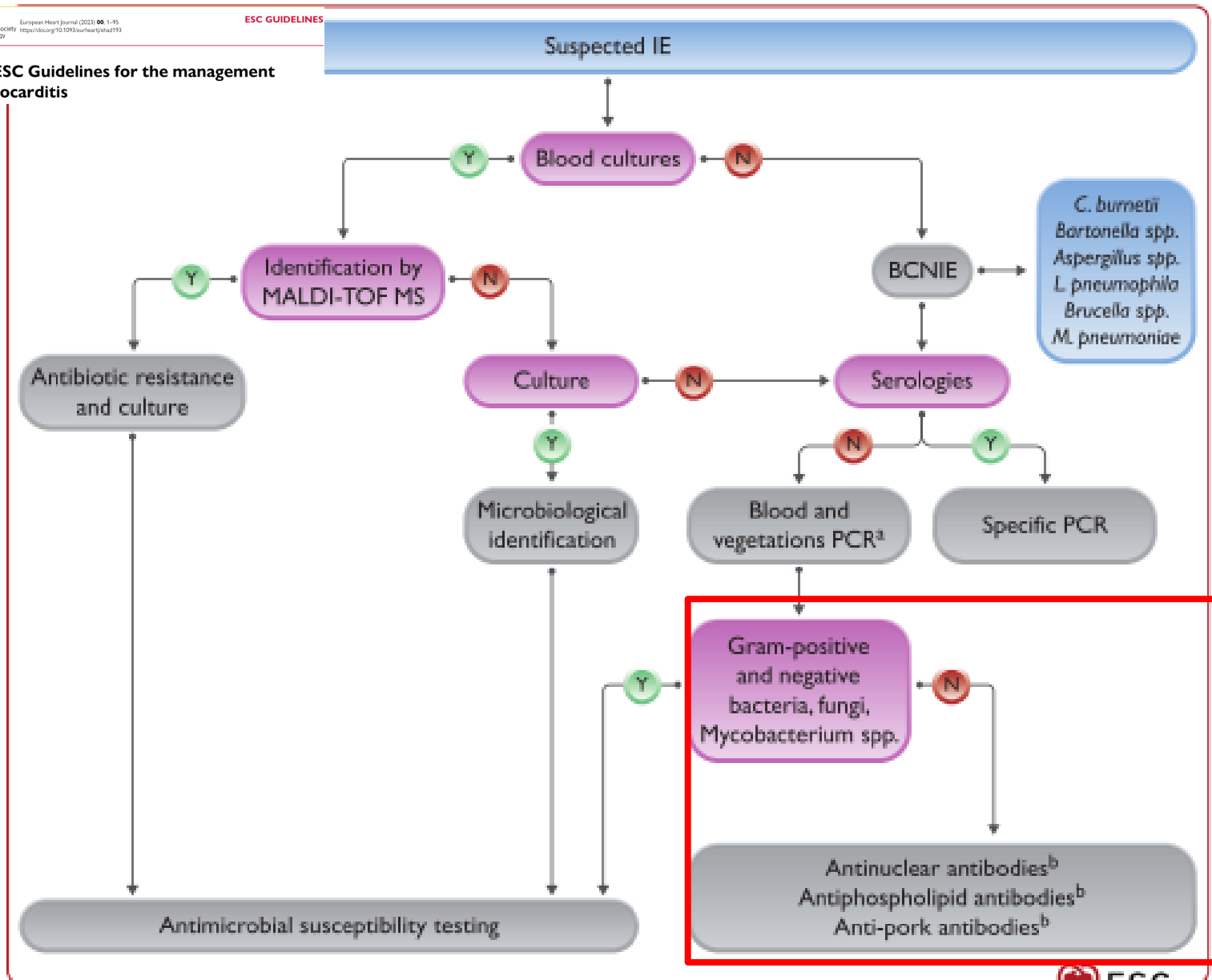
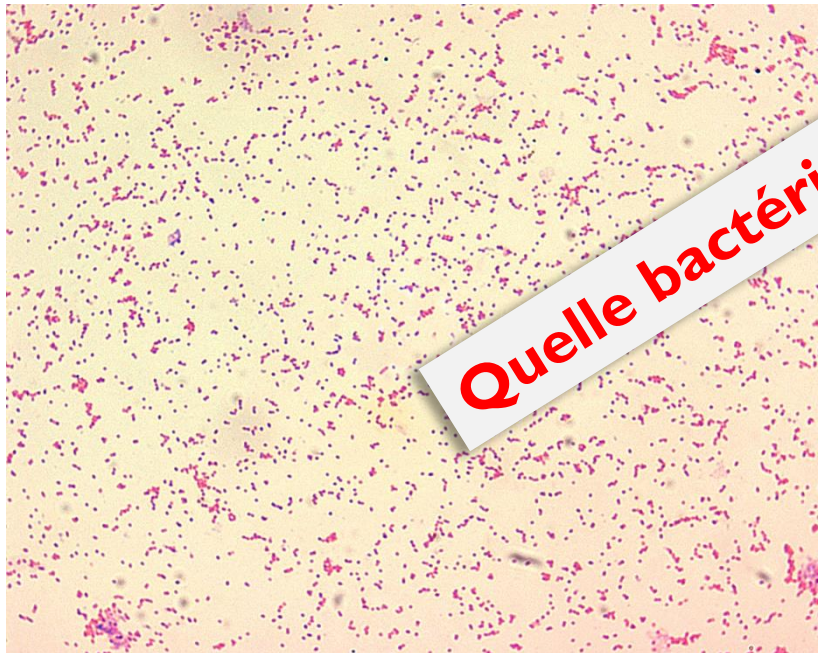


Figure 4 Microbiological diagnostic algorithm in culture-positive and culture-negative infective endocarditis. BCNIE, blood cultures negative endocarditis;

# À J5, un flacon d'HC se positive ....

- ▶ Gram à partir du flacon:  
absence de germe
- ▶ Pousse fine sur gélose au sang cuit
- ▶ Cocco-bacille à Gram négatif



**Quelle bactérie suspectez vous?**



# Pour *Brucella*

---

- A. L'identification d'espèce se fait les méthodes biochimiques classiques (galeries Api)
- B. La confirmation du genre peut se faire par PCR en temps réel
- C. La confirmation du genre peut se faire par séquençage de l'ARN 16S
- D. L'identification de l'espèce a un intérêt pour le traitement
- E. L'antibiogramme est réalisé par la méthode de diffusion en milieu gélosé



# Pour *Brucella*

---

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- E. L'antibiogramme est réalisé par la méthode de diffusion en milieu gélosé





# *Brucella sp*

---



- ▶ **A manipuler dans un PSM II**
- ▶ Toute suspicion clinique de brucellose doit être signalée au laboratoire
- ▶ **Risque accru de contamination:** exposition le personnel de laboratoire à des aérosols



# EI à Brucella: diagnostic **direct**

---



## ▶ Hémocultures +++

Prélèvement de choix pour l'isolement des *Brucella* les 15 premiers jours +++  
(bactériémie quasi-continue)

## ▶ **HC + dans 17 à 85 % des cas**

## ▶ **Autres prélèvements**

▶ Végétation d'endocardite: pour la culture ou PCR

▶ Sang sur tube EDTA → PCR sur sang

▶ ARN 16S puis séquençage / PCR spécifique:

- Antibiothérapie empirique négativant la culture
- Identification de l'espèce



# EI à *Brucella*: Etude de la sensibilité aux antibiotiques

---



- ▶ Non recommandée
- ▶ ATB les (+) actifs :
  - ▶ Tropisme intracellulaire
  - ▶ **aminosides, tétracyclines, rifampicine, cotrimoxazole** (bactéricides)
  - ▶ fluoroquinolones : bactériostatique

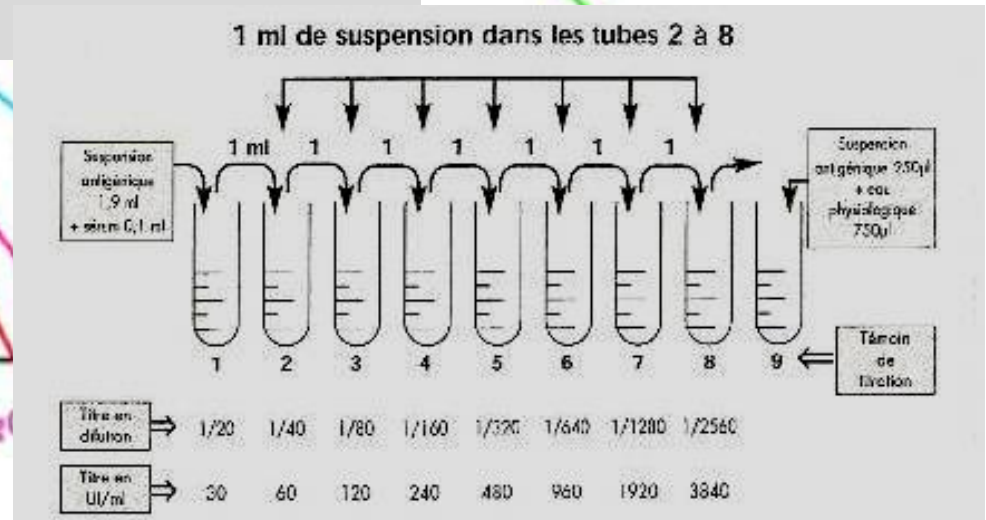
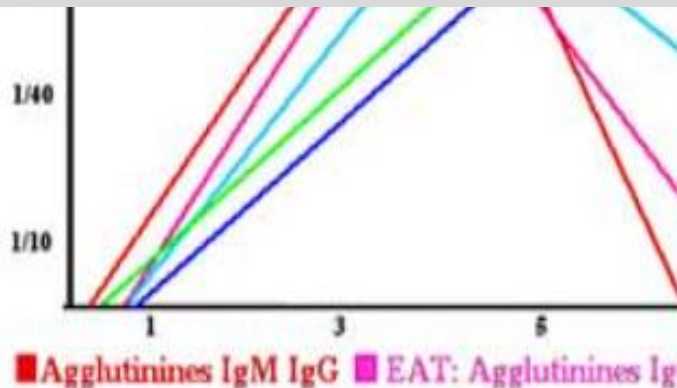
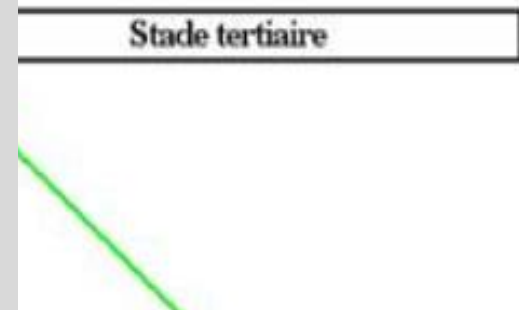


# EI à *Brucella*: Diagnostic indirect

- ▶ Intérêt si HC négatives ++++

## Séro-agglutination de Wright (SAW)

- Méthode de référence +++
- Réaction d'agglutination sur tubes : Test quantitatif
- Détection des IgG et IgM
- Titre  $\geq 1/80 \rightarrow$  brucellose active



# Le diagnostic d'EI à *Brucella* a été retenu ...

- ▶ Hémoculture positive à *Brucella*
- ▶ Test au Rose Bengal : positif
- ▶ Sérologie de Wright : positif à la dilution 1/2560

**Table 9** Investigation of rare causes of blood culture-negative infective endocarditis

Pathogen	Diagnostic procedures
<i>Brucella</i> spp.	Serology, blood cultures, tissue culture, immunohistology, and 16S rRNA sequencing of tissue
<i>C. burnetii</i>	Serology (IgG phase I >1:800), tissue culture, immunohistology, and 16S rRNA sequencing of tissue
<i>Bartonella</i> spp.	Serology (IgG phase I >1:800), blood cultures, tissue culture, immunohistology, and 16S rRNA sequencing of tissue
<i>T. whipplei</i>	Histology and 16S rRNA sequencing of tissue
<i>Mycoplasma</i> spp.	Serology, tissue culture, immunohistology, and 16S rRNA sequencing of tissue
<i>Legionella</i> spp.	Serology, blood cultures, tissue culture, immunohistology, and 16S rRNA sequencing of tissue
Fungi	Serology, blood cultures, 18S rRNA sequencing of tissue
Mycobacteria (including <i>Mycobacterium chimaera</i> )	Specific blood cultures, 16S rRNA sequencing of tissue

Ig, immunoglobulin; rRNA, ribosomal ribonucleic acid.

# Cas clinique

---

- ▶ **Brucellose polyviscérale**
  - ▶ endocarditique
  - ▶ spondylodiscite
  - ▶ Articulaire périphérique



# EI à *Brucella* : rare .....

Médecine et Maladies Infectieuses — 1982 — 12 — N° 5 — 266-274.

## La Brucellose polyviscérale subaiguë maligne. A propos d'une observation\*

par G. ROCHE\*\*, Ph. CAM  
F. SCHOONI

*International Journal of Cardiology*, 33 (1991) 328–329

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*Annales de Cardiologie et d'Angéiologie* 55 (2006) 157–160

**Annales de  
cardiologie  
et d'angéiologie**

<http://france.elsevier.com/direct/ANCAAN/>

Article original

Endocardite brucellienne :  
particularités cliniques et modalités thérapeutiques

*Brucella* endocarditis:  
clinical particularities and therapeutic modalities

A. Ben Khalfallah \*, M. Ousji, N. Annabi, F. Ajili, R. Tlili

*Service de cardiologie, hôpital de Menzel-Bourguiba, 7050 Tunisie*

Reçu le 14 août 2004 ; accepté le 5 avril 2005

Disponible sur internet le 23 mai 2005

00-1

)...

# Quelle sera votre prescription?

---

- A. Doxycycline + Rifampicine
- B. Doxycycline + Cotrimoxazole
- C. Cotrimoxazole + Rifampicine
- D. Doxycycline + Rifampicine + Cotrimoxazole
- E. Doxycycline + Rifampicine + Céftriaxone





# Quelle sera votre prescription?

---

- A. Doxycycline + Rifampicine
- B. Doxycycline + Cotrimoxazole
- C. Cotrimoxazole + Rifampicine
- D. Doxycycline + Rifampicine + Cotrimoxazole
- E. Doxycycline + Rifampicine + Céftriaxone



## 2023 ESC Guidelines for the management of endocarditis

Pathogens	Proposed therapy <sup>a</sup>	Treatment outcome
<i>Brucella</i> spp.	Doxycycline (200 mg/24 h) plus cotrimoxazole (960 mg/12 h) plus rifampin (300–600 mg/24 h) for $\geq 3$ –6 months <sup>b</sup> orally	Treatment success defined as an antibody titre <1:60. Some authors recommend adding gentamicin for the first 3 weeks



# Cas clinique

---

- ▶ **Notre patiente a reçu**
  - ▶ Rifampicine 900mg/j IV
  - ▶ Cotrimoxazole 400/80 : 2Ampoulesx3/j IV
  - ▶ Doxycycline 200mg/j
  
- ▶ **Insuffisance rénale**
  - ▶ Ceftriaxone 2gx2/j IV



# Clinical implementation of partial oral treatment in infective endocarditis: the Danish POETry study

Mia Marie Pries-Heje <sup>1\*</sup>, Julie Glud Hjulmand<sup>1</sup>, Ingrid Try Lenz<sup>1</sup>, Rasmus Bo Hasselbalch <sup>2,3</sup>, Jonas Agerlund Povlsen<sup>4</sup>, Nikolaj Ihlemann<sup>5,6</sup>, Nana Køber<sup>6</sup>, Marlene Lyngborg Tofterup<sup>5</sup>, Lauge Østergaard <sup>1</sup>, Morten Dalsgaard<sup>3</sup>, Daniel Faurholt-Jepsen<sup>7</sup>, Malene Wienberg<sup>8</sup>, Ulrik Christiansen<sup>9</sup>, Niels Eske Bruun <sup>10,11,12</sup>, Emil Fosbøl<sup>1</sup>, Claus Moser<sup>13,14</sup>, Kasper Karmark Iversen <sup>2,3,12†</sup>, and Henning Bundgaard <sup>1,12†</sup>

<sup>1</sup>Department of Cardiology, The Heart Centre, Copenhagen University Hospital—Rigshospitalet, Copenhagen, Denmark; <sup>2</sup>Department of Emergency Medicine, Copenhagen University Hospital—Herlev and Gentofte Hospital, Herlev, Denmark; <sup>3</sup>Department of Cardiology, Copenhagen University Hospital—Herlev and Gentofte Hospital, Herlev, Denmark; <sup>4</sup>Department of Cardiology, Aarhus University Hospital, Aarhus, Denmark; <sup>5</sup>Department of Cardiology, Odense University Hospital, Odense, Denmark; <sup>6</sup>Department of Cardiology, Copenhagen University Hospital—Bispebjerg and Frederiksberg, Copenhagen, Denmark; <sup>7</sup>Department of Infectious Diseases, The Heart Centre, Copenhagen University Hospital—Rigshospitalet, Copenhagen, Denmark; <sup>8</sup>Department of Cardiology, Copenhagen University Hospital—North Zealand, Hilleroed, Denmark; <sup>9</sup>Department of Cardiology, Aalborg University Hospital, Aalborg, Denmark; <sup>10</sup>Department of Cardiology, Zealand University Hospital, Roskilde, Denmark; <sup>11</sup>Department of Clinical Medicine, University of Aalborg, Aalborg, Denmark; <sup>12</sup>Department of Clinical Medicine, University of Copenhagen, Copenhagen, Denmark; <sup>13</sup>Department of Clinical Microbiology, Copenhagen University Hospital—Rigshospitalet, Copenhagen, Denmark; and <sup>14</sup>Department of Immunology and Microbiology, University of Copenhagen, Copenhagen, Denmark

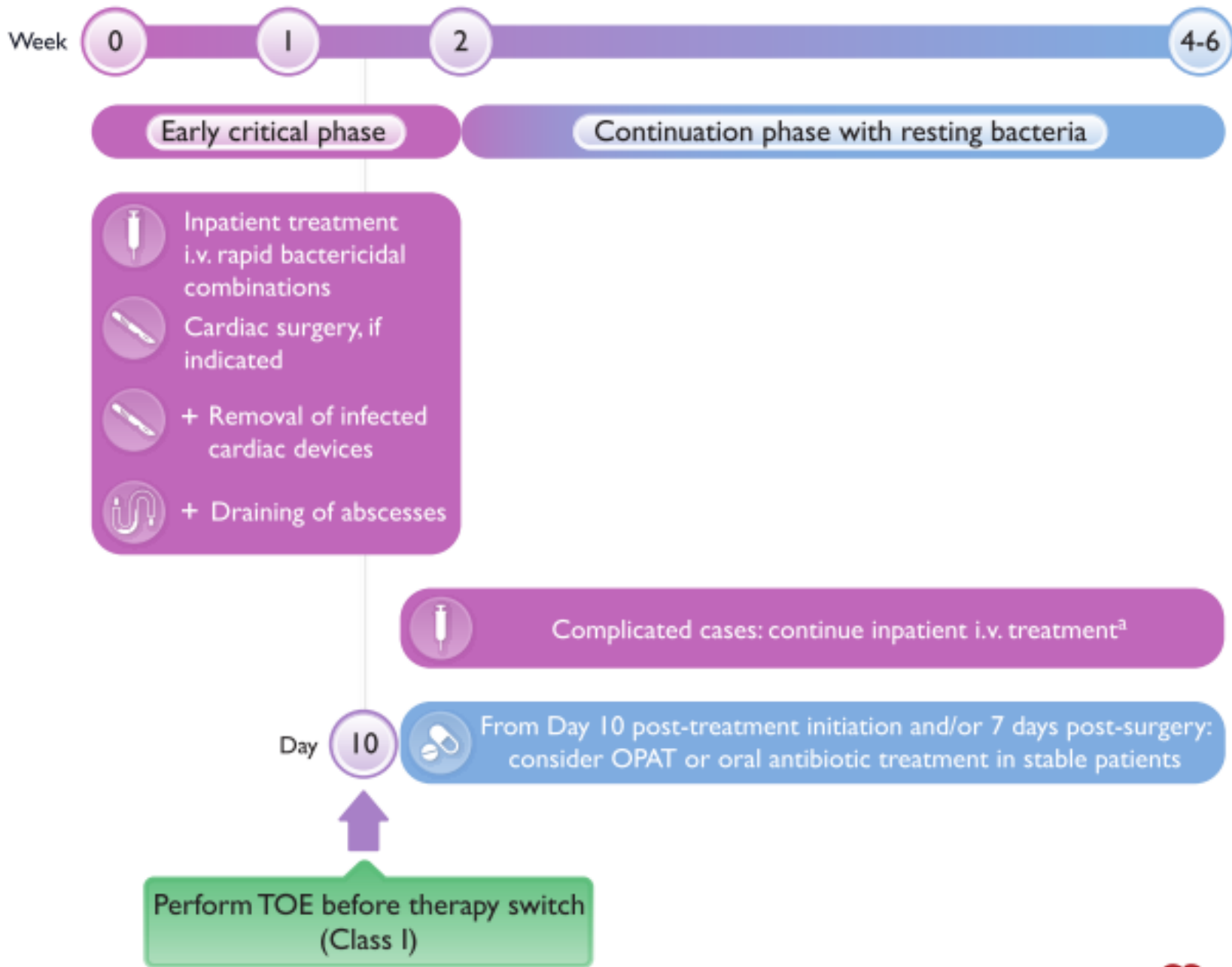
Received 21 February 2023; revised 3 August 2023; accepted 10 October 2023; online publish-ahead-of-print 25 October 2023

# Etude randomisée POET

---

- ▶ Evaluer le passage aux antibiotiques oraux
- ▶ Après 2 S d'ATB IV : bactéricidie rapide
  - ▶ Chirurgie: 1<sup>ère</sup> phase
  - ▶ Patients hospitalisés stables
  - ▶ Cocci à Gram positif
  - ▶ Suivi rigoureux
- ▶ Après un suivi médian de 5,4 ans: **supériorité**
  - ▶ 2 semaines d'hospitalisation en moins






---

Possibilité de passer à une ATB orale  
Après min 10 j sous ATB IV  
ou 7j après une chir cardiaque  
Etat est stabilisé + l'absence de complications  
à l'ETO

**IIa**

Etude randomisée **RODEO**  
**Relais Oral dans le traitement des EI**  
à staphylocoques ou streptocoques  
multisensibles

---



# Traitement chirurgical

---

- ▶ 50% pendant la phase aiguë de l'infection
- ▶ Elimine le tissu pathologique + restaurer la ft valvulaire
  
- ▶ Recommandée
  - ▶ Insuffisance cardiaque
  - ▶ végétation volumineuse (= 10 mm)
  - ▶ antécédent d'embolie pour prévenir l'embolisation
  - ▶ infection non contrôlée locale (abcès périvalvulaire) ou systémique
    - ▶ (hémoculture positive après une semaine de traitement par antibiotique)





# Traitement chirurgical

---

## Section 8. Recommendation Table 12 — Recommendations for the main indications of surgery in infective endocarditis (native valve endocarditis and prosthetic valve endocarditis)

Aortic or mitral NVE with vegetations >10 mm, associated with severe valve stenosis or regurgitation, and low operative risk (urgent surgery should be considered).

**IIa**

**B**

Urgent surgery is recommended in IE with vegetation  $\geq 10$  mm and other indications for surgery.

**I**

**C**

Aortic or mitral NVE or PVE with isolated large vegetations (>15 mm) and no other indication for surgery (urgent surgery may be considered).

**IIb**

**C**

Urgent surgery may be considered in aortic or mitral IE with vegetation  $\geq 10$  mm and without severe valve dysfunction or without clinical evidence of embolism and low surgical risk.

**IIb**

**B**



# Traitement chirurgical

---

- ▶ Si indiquée : doit se faire précocement S I de ttt
- ▶ En prévention du risque TE élevé (S I)
  
- ▶ Nouvelle définition de l'intervention d'urgence
  - ▶ Doit être pratiquée dans les 3-5 jours
  - ▶ A envisager en urgence en cas de végétation = 10 mm
  - ▶ Même sans dysft valvulaire ou embolie préalable (**Classe IIb**)
  - ▶ Discutée en tenant compte du risque associé à la chirurgie (**Classe I**)



# Cas clinique

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- ▶ Opérée à 3 semaines de traitement antibiotique
- ▶ Bonne évolution post opératoire
- ▶ 12 mois de traitement
- ▶ Recul de 1 an



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Merci pour votre attention

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