JNI 18es Journées Nationales d'Infectiologie
du mercredi 21 au vendredi 23 juin 2017
Palais du Grand Large, Saint-Malo

Saint-Malo
et la région Bretagne

Endocardites infectieuses
Des recommandations à la pratique

Quelles explorations en 2017 ?

Pr Xavier Duval

Conflict of interest to declare

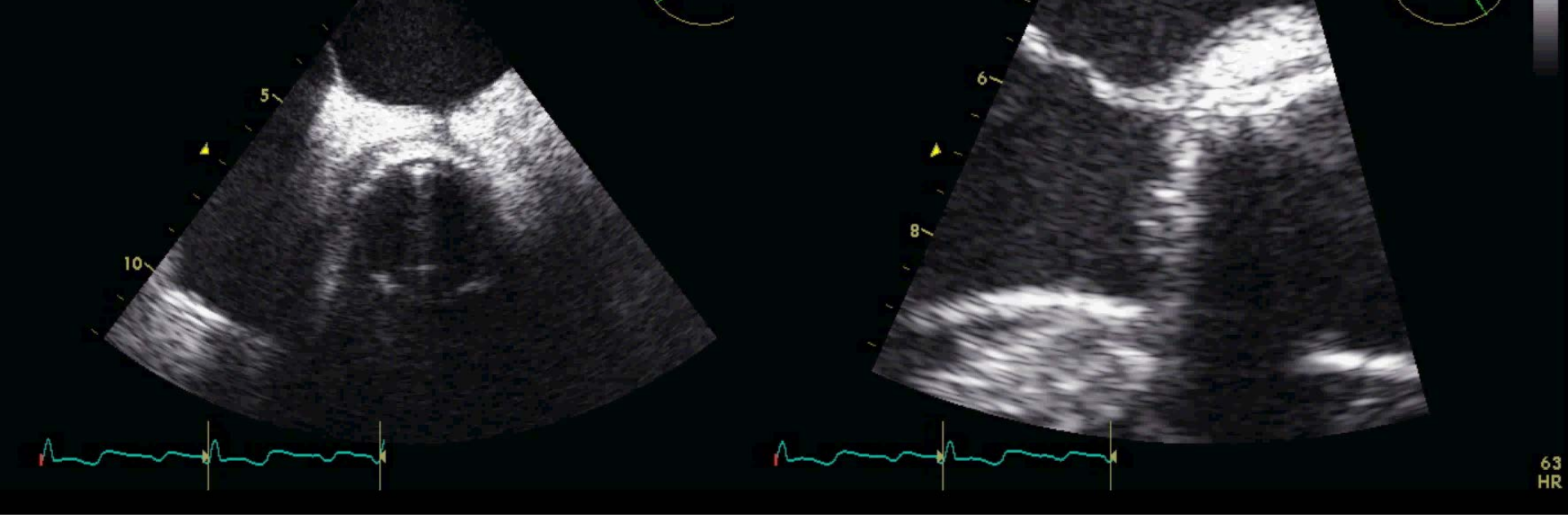
None

Case History

62-year old man

- Bentall intervention in 2005 for severe AR on a bicuspid aortic valve + aortic aneurysm
- Hospitalized
  - persisting fever for 3 weeks
  - amoxicillin treatment for one week
  - normal clinical examination
  - INR = 2

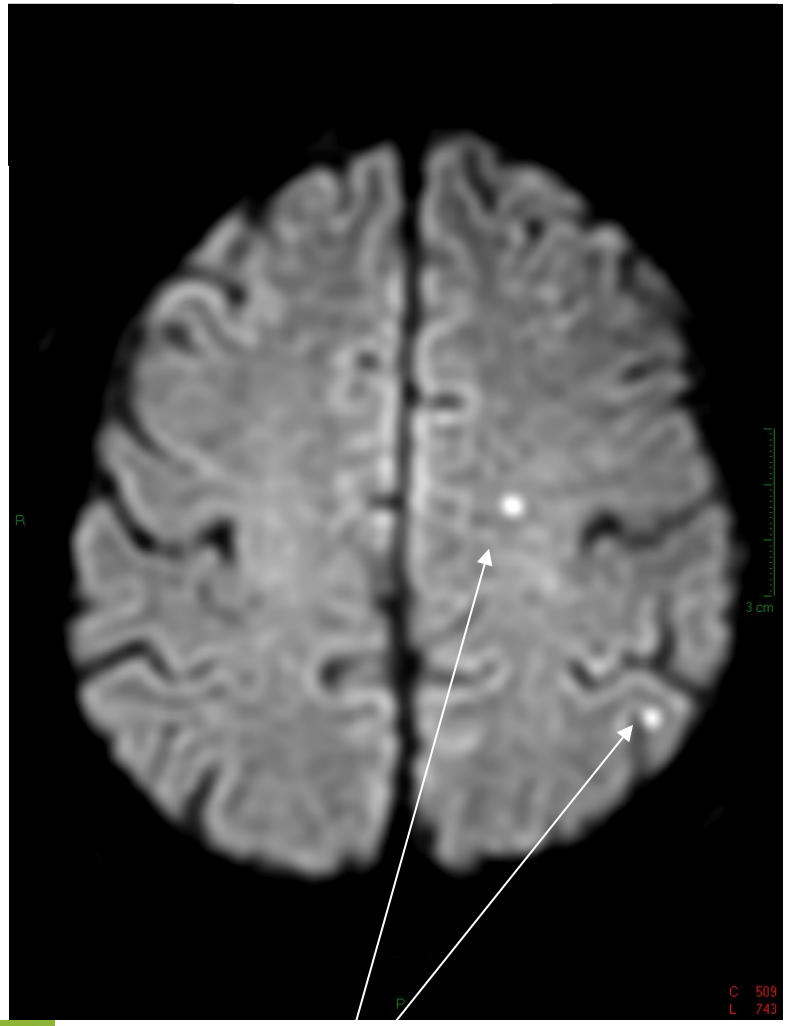
- WBC 13 500 leuco / ml, CRP 185 mg/l
- Negative blood cultures

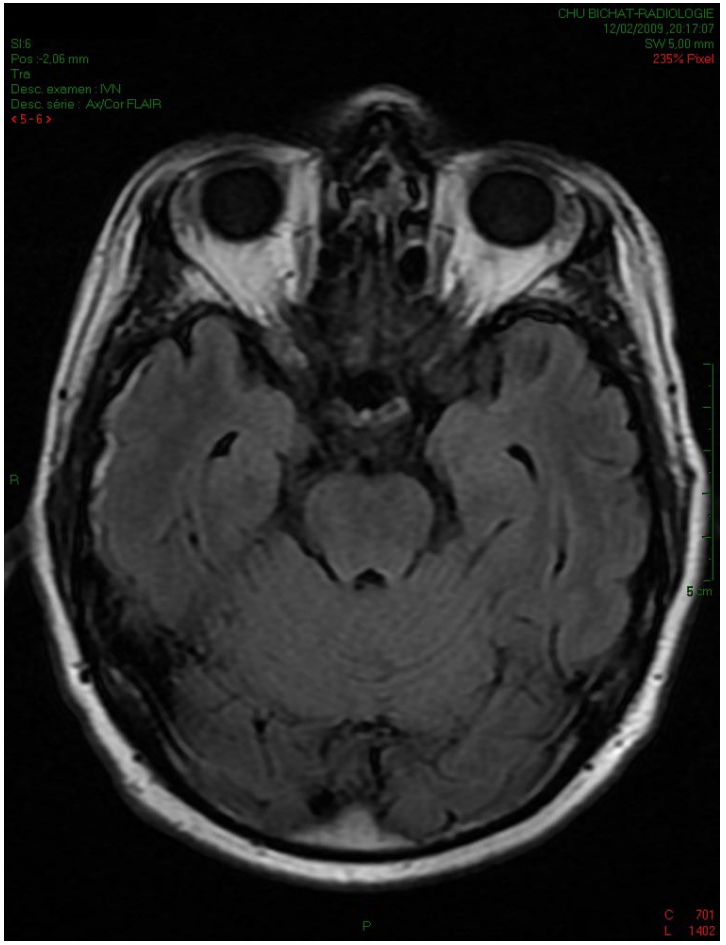


TTE / TEE

- no evidence of abscess
- no regurgitation
- mobile mass 8 mm (thrombus ?, vegetation ?)
- no prosthesis dysfunction

Cerebral MRI





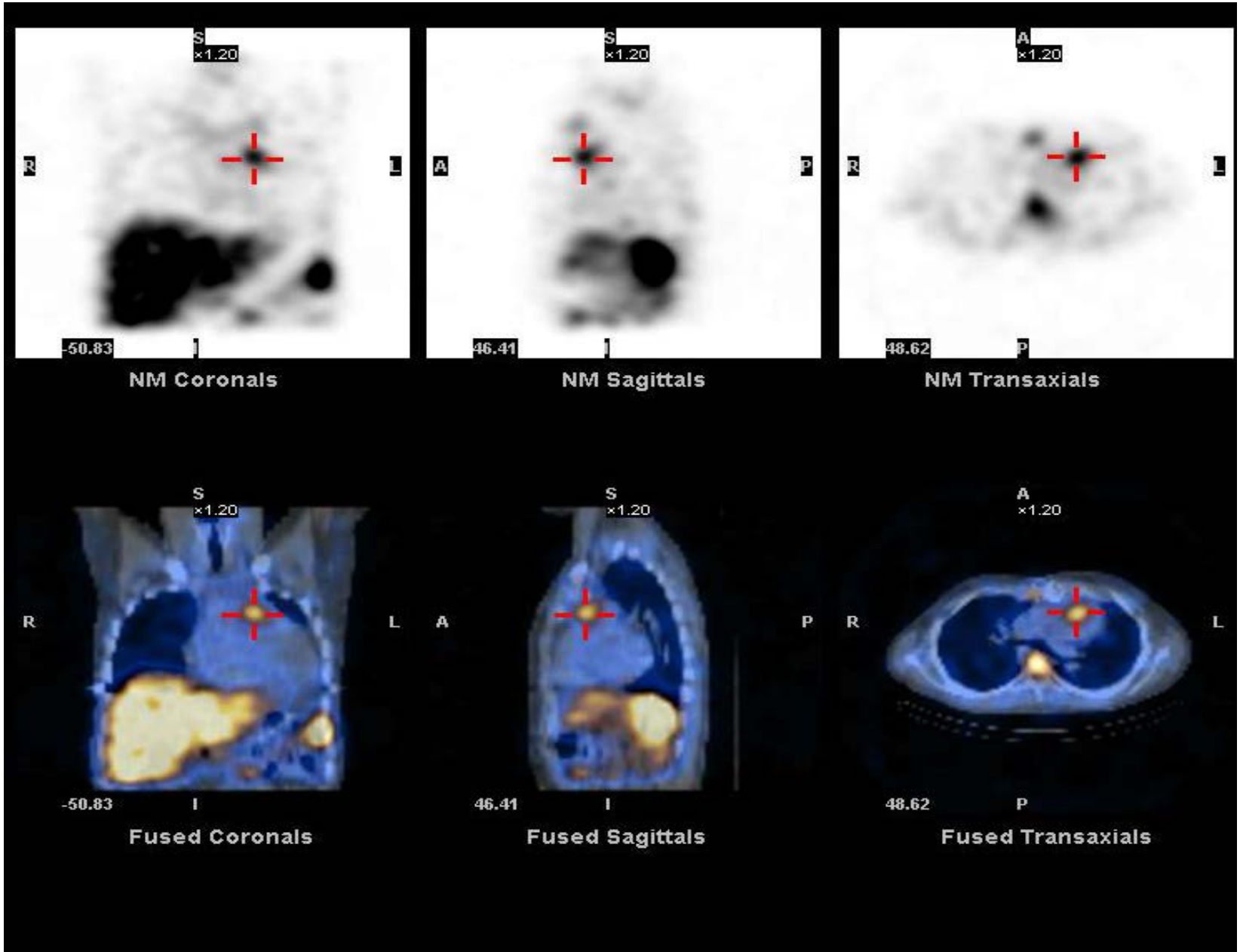
Summary

- Major Duke criteria : vegetation ?
- Minor Duke criteria
  - Valve prosthesis
  - Fever
  - + 2 small asymptomatic strokes

- After cerebral MRI

  possible IE → definite IE ?

Radionuclide Labelled Leucocytes



Imagings in IE patients

To establish IE diagnosis

- Cardiac involvement
- Peripheral localizations

EI workup / indications for cardiac surgery

- Cardiac (abscess)
- Extra cardiac localizations

Prognostic assessment

Follow-up

European Heart Journal
doi:10.1093/eurheartj/ehv319

ESC GUIDELINES

2015 ESC Guidelines for the management of infective endocarditis

The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC)

Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM)

Authors/Task Force Members: Gilbert Habib* (Chairperson) (France), Patrizio Lancellotti* (co-Chairperson) (Belgium), Manuel J. Antunes (Portugal), Maria Grazia Bongiorni (Italy), Jean-Paul Casalta (France), Francesco Del Zotti (Italy), Raluca Dulgheru (Belgium), Gebrine El Khoury (Belgium), Paola Anna Erba[a] (Italy), Bernard Iung (France), Jose M. Miro[b] (Spain), Barbara J. Mulder (The Netherlands), Edyta Plonska-Gosciniak (Poland), Susanna Price (UK), Jolien Roos-Hesselink (The Netherlands), Ulrika Snygg-Martin (Sweden), Franck Thuny (France), Pilar Tornos Mas (Spain), Isidre Vilacosta (Spain), and Jose Luis Zamorano (Spain)

To establish IE diagnosis

Cardiac involvement

- Cardiac echo

Endocardial Involvement

- Major Duke criteria
  - New regurgitation murmur
  - Echocardiography
    - Vegetation (presence, size, mobility)
    - Abscess (frequency PVE>>NVE; Aortic position >> Mitral)
    - New dehiscence on a prosthetic valve
- Improved sensitivity of TEE vs. TTE
  - Native valve 70% → >90%
  - Prosthetic valve 50% → >90%
- The diagnostic value of TEE should be interpreted according to patient characteristics and the probability of endocarditis

Anatomic and echo definitions

	Surgery / Necropsy	Echocardiography
Vegetation	Infected mass attached to an endocardial structure or an implanted intracardiac material	Oscillating or non oscillating intracardiac mass or other endocardial structures or non implanted intracardiac material
Abscess	Perivalvular cavity with necrosis and purulent material not communicating with the cardiovascular lumen	Thickened non-hogeneous perivalvular area with echodense or echolucent appearance
Pseudoaneurysm	Perivalvular cavity communicating with the cardiovascular lumen	Pulsatile perivalvular echo-free space with colour-Doppler flow detected
Perforation	Interruption of endocardial tissue continuity	Interruption of endocardial tissue continuity traversed by colour Doppler flow
Fistula	Communication between 2 neighbouring cavities through a perforation	Colour-Doppler communication between 2 neighbouring cavities through a perforation
Valve aneurysm	Saccular outpouching of valvular tissue	Saccular bulging of valvular tissue
Dehiscence of a prosthetic valve	Dehiscence of the prosthesis	Paravalvular regurgitation identified by TTE/TTE with or without rocking motion of the prosthesis

Eur Heart J 2015

An isolated periprosthetic regurgitation has a low positive predictive value for the diagnosis of IE

Prosthetic Endocarditis

Limitations of Echocardiography

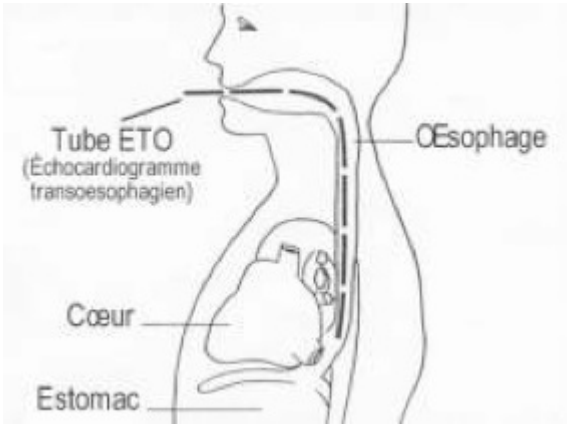
- Shadowing : attenuation of ultrasound by prosthetic material

  → *false -*

- Image artifacts → *false -*, *false* +

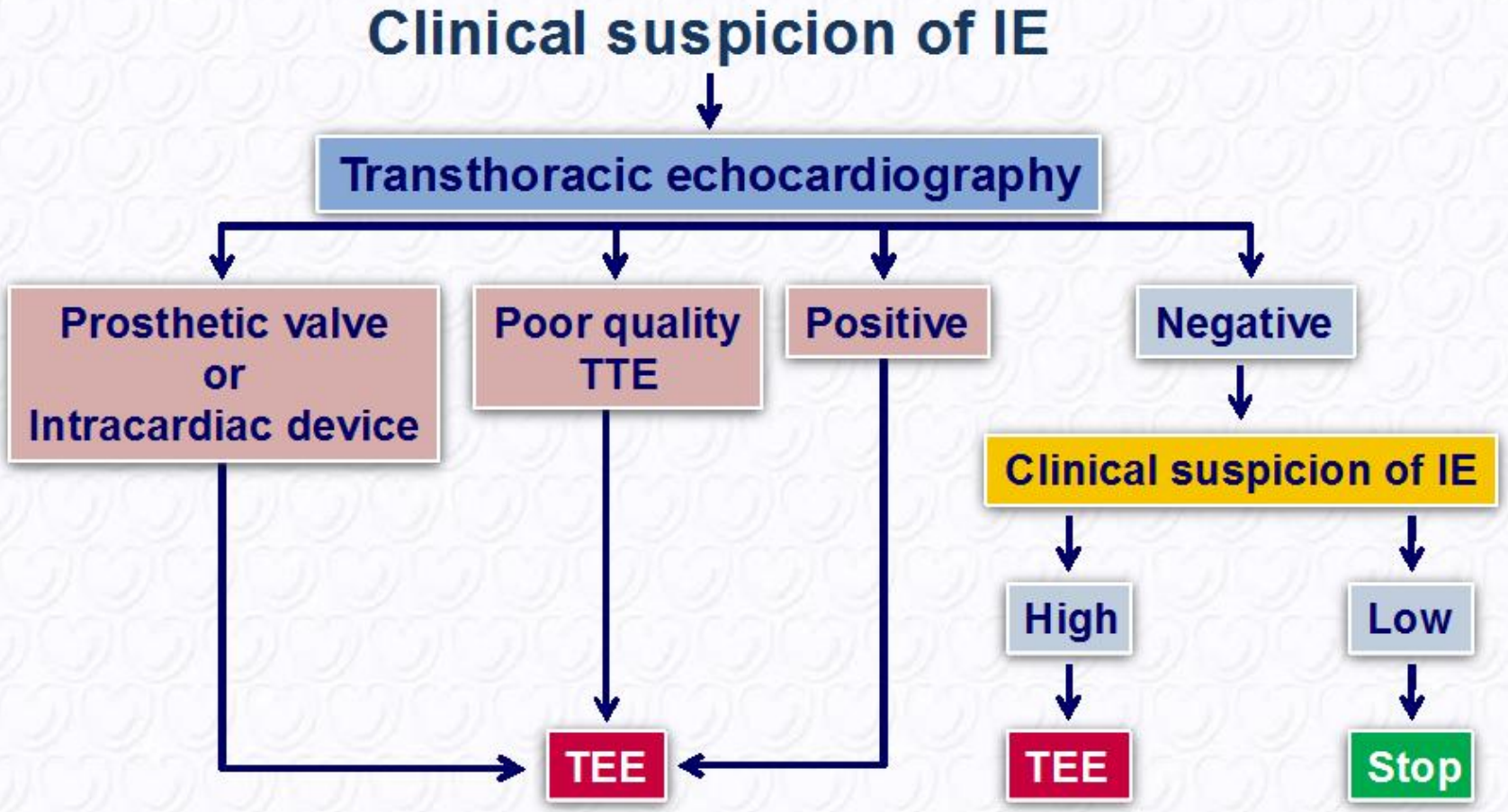
- Aortic prostheses
  - Posterior part poorly visualised in TTE
  - Anterior part poorly visualised in TEE

- Other artifacts (sutures ..)



➢ Importance of high resolution (TEE)

Indications for echocardiography



If initial TEE is negative but persistent suspicion of IE: repeat TEE within 7-10 days

Eur Heart J 2015

To establish IE diagnosis

Cardiac involvement

- Cardiac echo
- Cardiac multislice computed tomography (MSCT)

Cardiac multislice computed tomography (MSCT)

- Mainly used to analyze perivalvular lesions
  - abscesses, fistulae and pseudoaneurysms
- May complete TEE to assess
  - the topography and extension of abscesses, fistulae and pseudoaneurysms.
- Sensitivity and specificity of MSCT:

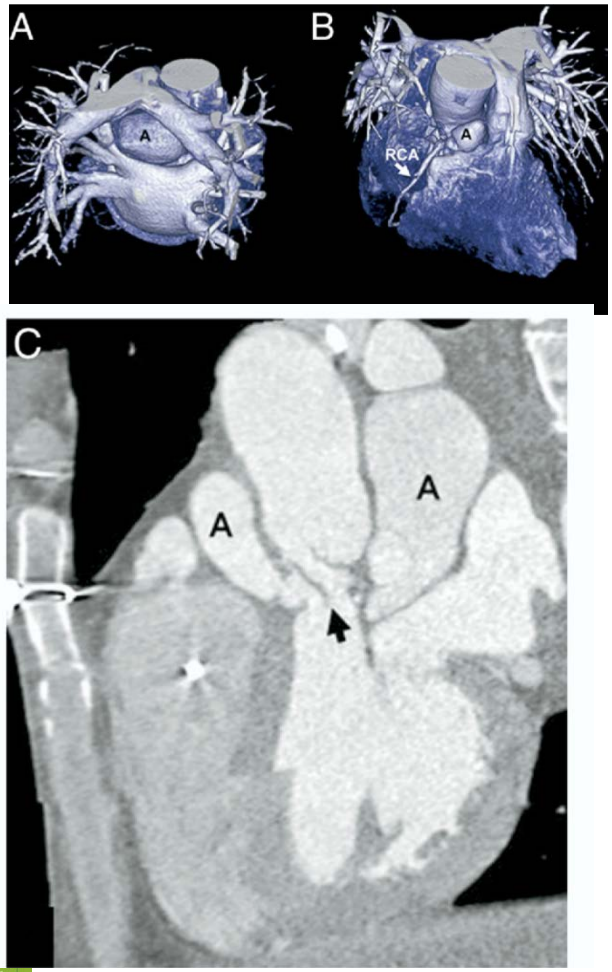
  > 95% as compared with surgical findings

Cardiac multislice computed tomography (MSCT)

- Aortic prosthetic tubes:
  - Superior to TTE and TEE to diagnose abscesses and/or pseudoaneurysms around.
- Coronary MSCT
  - To assess coronary anatomy
  - Mainly considered in pts at low risk of coronary artery disease, due to its high negative predictive value.

Multislice Computed Tomography in Infective Endocarditis

Comparison With Transesophageal Echocardiography and Intraoperative Findings



To establish IE diagnosis

Cardiac involvement

- Cardiac echo
- Cardiac multislice computed tomography (MSCT)
- Nuclear Imaging [18F]FDG PET/CT

Nuclear Imaging [18F]FDG PET/CT

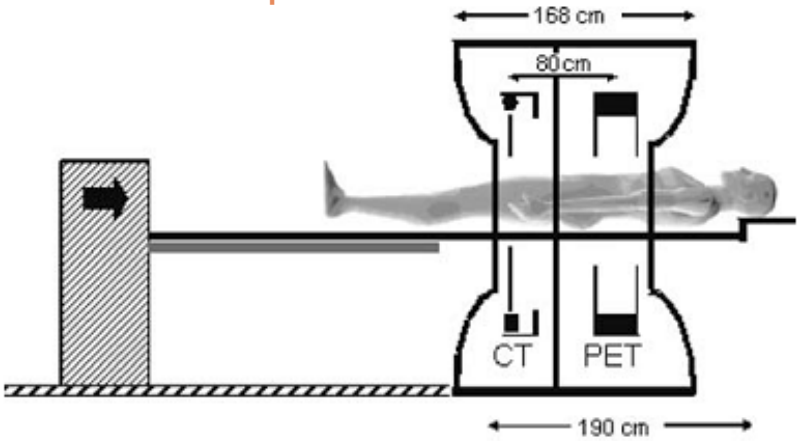
- ^{18}F-FDG PET/CT:
  - Reveal glucose consuming cells : tumoral, inflammation..
  - widely used in oncology for staging and evaluation of treatment response
- Introduced more recently for imaging of infection
- Gram positive bacteremia: cost-effective method for detection of metastatic infection
- High physiological cardiac and cerebral ^{18}F-FDG uptake: unsuitable for detecting cardiac and cerebral infectious lesions ?

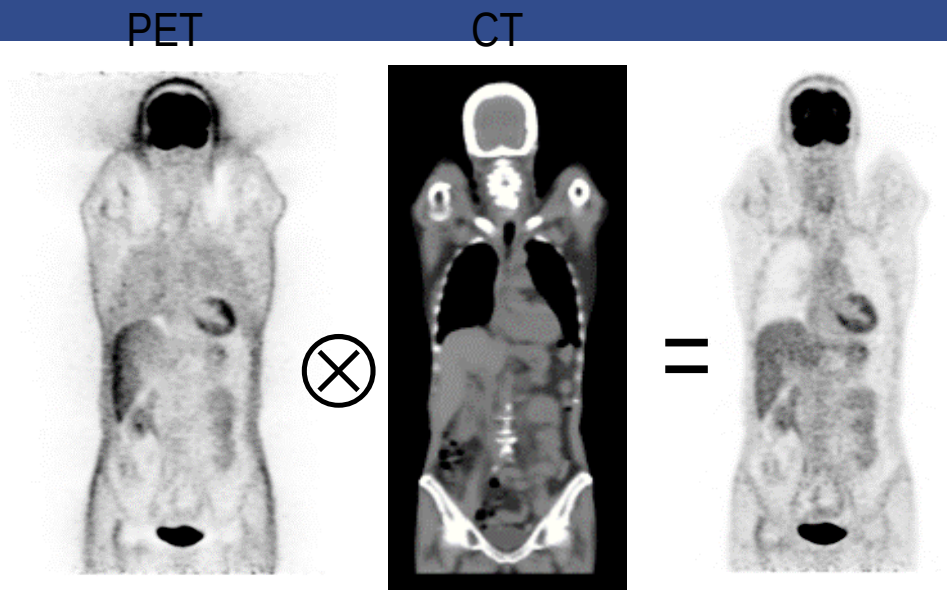
Nuclear Imaging [18F]FDG PET/CT

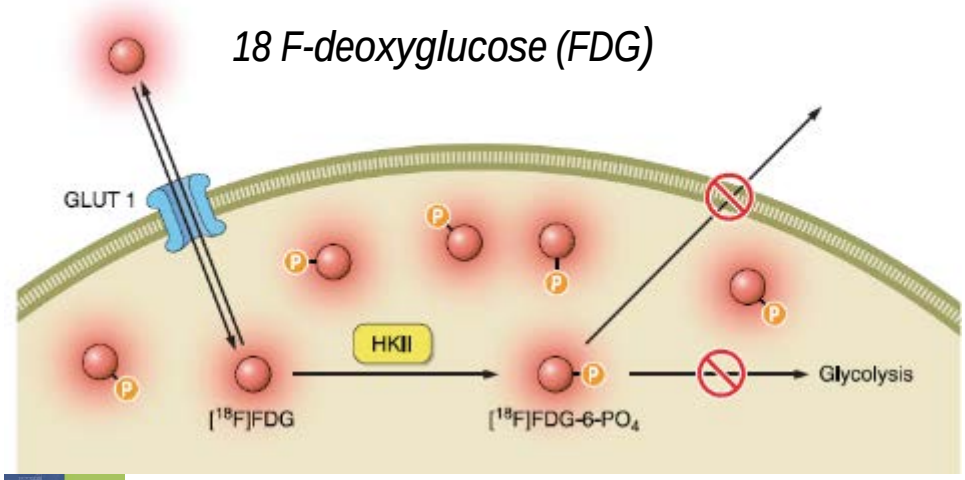
- Suppression of Cardiac ^{18}F-FDG uptake
  - Carbohydrate-restricted diet
  - Patient fasts for at least 12 hours
- Improvement of images using correction for attenuation
- Semi-quantitative analysis of the intensity of FDG uptake
  - maximal standardized uptake value (SUV_{max})
  - valve-to-background ratio: valve SUV_{max} /atrial blood SUV_{max}

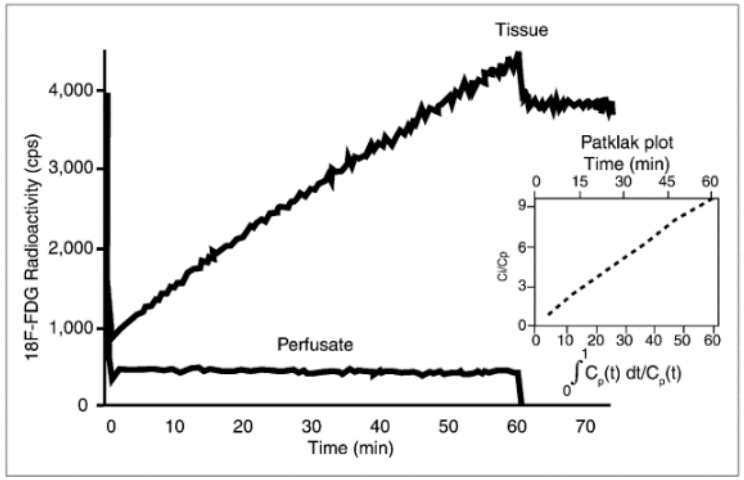
Nuclear Imaging [18F]FDG PET/CT

1. High sensitivity
2. Absolute quantification





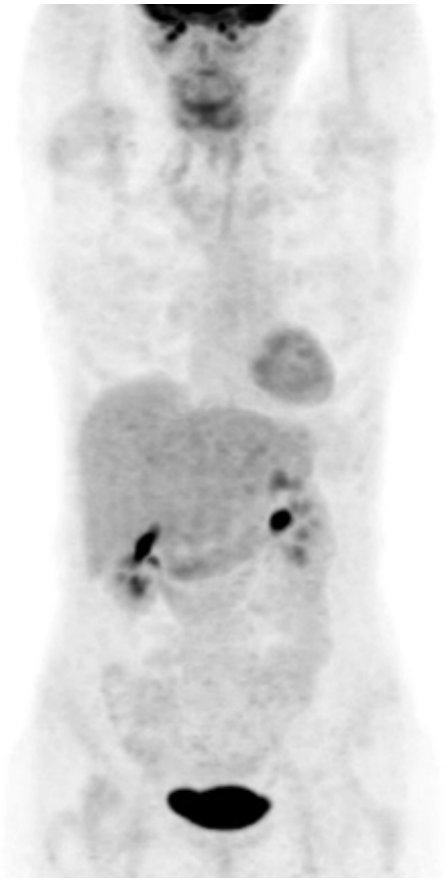




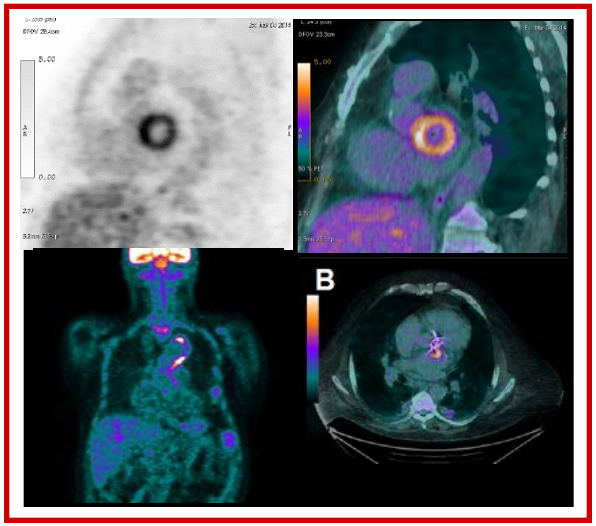
Nguyen et al., Am J Physiol 1990

[18F]FDG PET/CT “True” whole-body acquisition

Oncology-derived field of acquisition: skull base to upper thighs



[18F]FDG PET/CT Diagnostic of valvular involvement



Diagnostic of valvular involvement

Patients with definite IE

	Clinical situations	Total Nb pts Prosthetic V/ PM/native V	Definite EI / total	sensitivity	specificity	PPV False +	NPV False -
Van Riet 2010 *	Definite IE	25 pts 10/0/15	all	12% (3/25)	NA	NA	NA
Kestler M 2014	Definite IE	47pts 15/11/24	all	9.5% (4/47) 4/15 PVE (27%)	NA	NA	NA

0/24 (0%) native valve

* NO carbohydrate-restricted diet

Diagnostic of valvular involvement

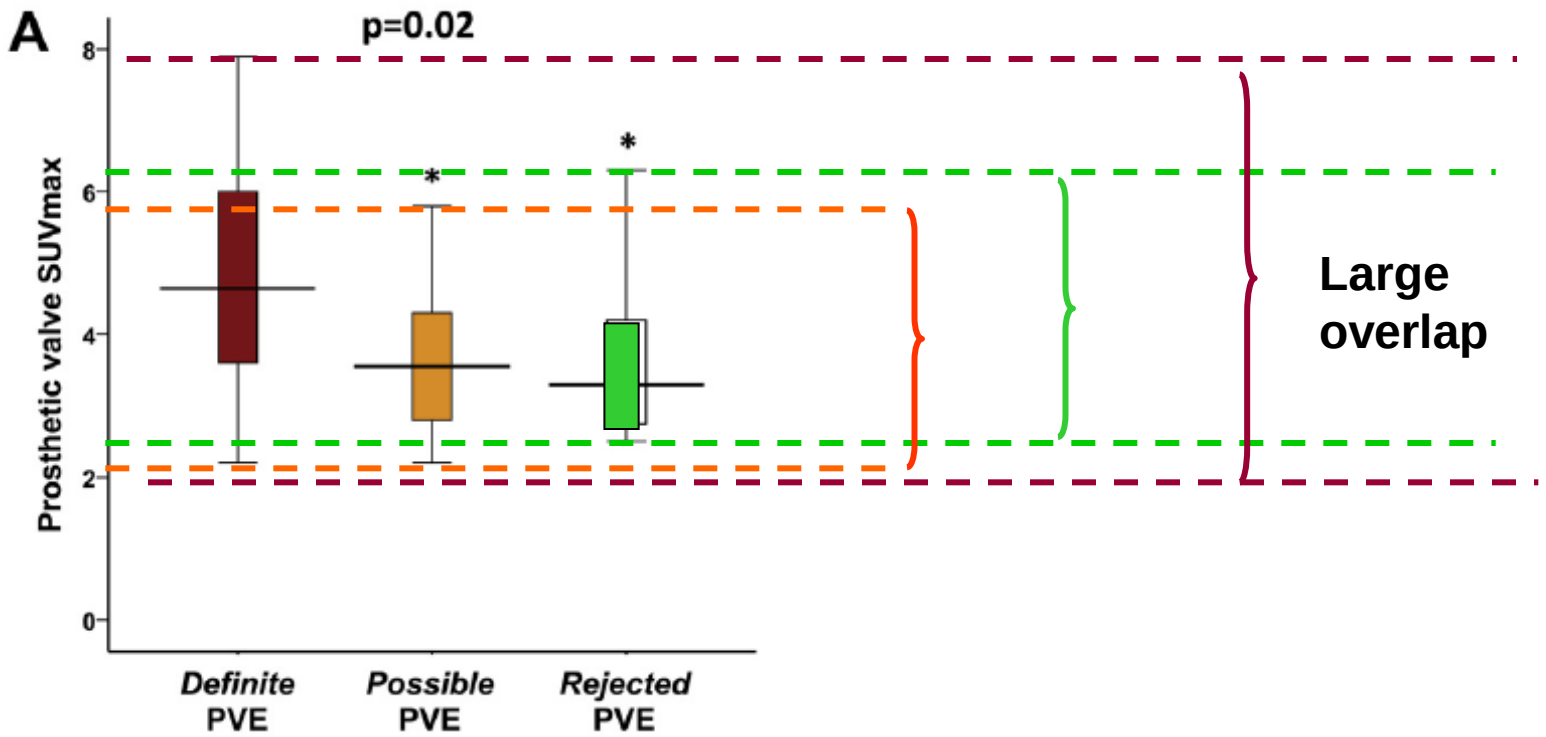
Patients with suspected IE

	Clinical situations	Total Nb pts Prosthetic V/ PM/native V	Definite EI / total	sensitivity	specificity	PPV False +	NPV False -
Kouijzer 2013 *	Gram + bacteremia	72 pts 6/5/61	18/72	39% (7/18)	93%	64% 36%	82% 18%
Saby 2013	Prosthetic valve AND Fever or crp > 10 mg, or bacteremia or + serology or echo pos	72pts 72/0/0	30/72	73% (22/30)	80%	85% 15%	67% 33%

* NO carbohydrate-restricted diet

SUVmax value to improve PET diagnosis performance ?

Results of the Prosthetic Valve SUV_{max} and Prosthetic Valve-to-Background SUV_{max} Ratio According to the Final Diagnosis



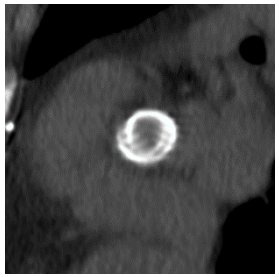
The SUV_{max} was significantly higher in patients with *definite* PVE in comparison with the 2 other groups **(A)**, whereas the prosthetic valve-to-background SUV_{max} ratio was not significantly higher **(B)**. *$p < 0.05$. Abbreviations as in Figures 1 and 2.

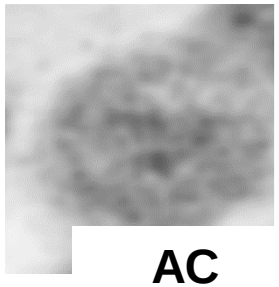
L. Saby JACC 2013

False positive results in patients with valvular prosthesis

Subject of concern ?

Absence of uptake on the PV





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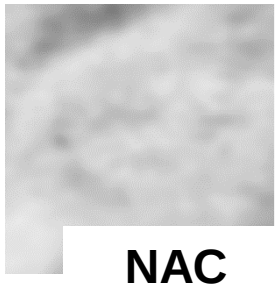
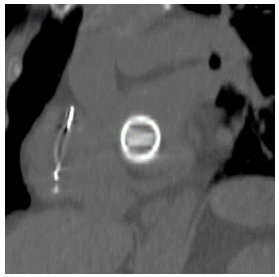
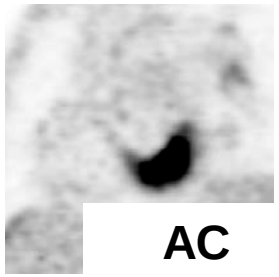


NAC

Myocardial uptake / Absence of uptake on the PV





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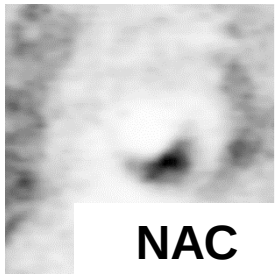
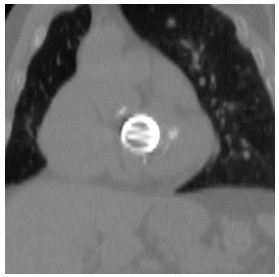
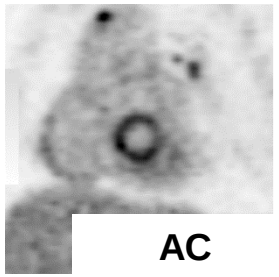


NAC

Intense / Homogeneous uptake on the PV





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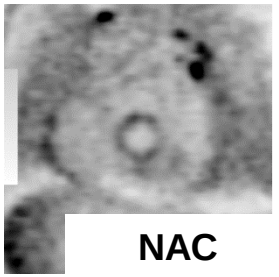
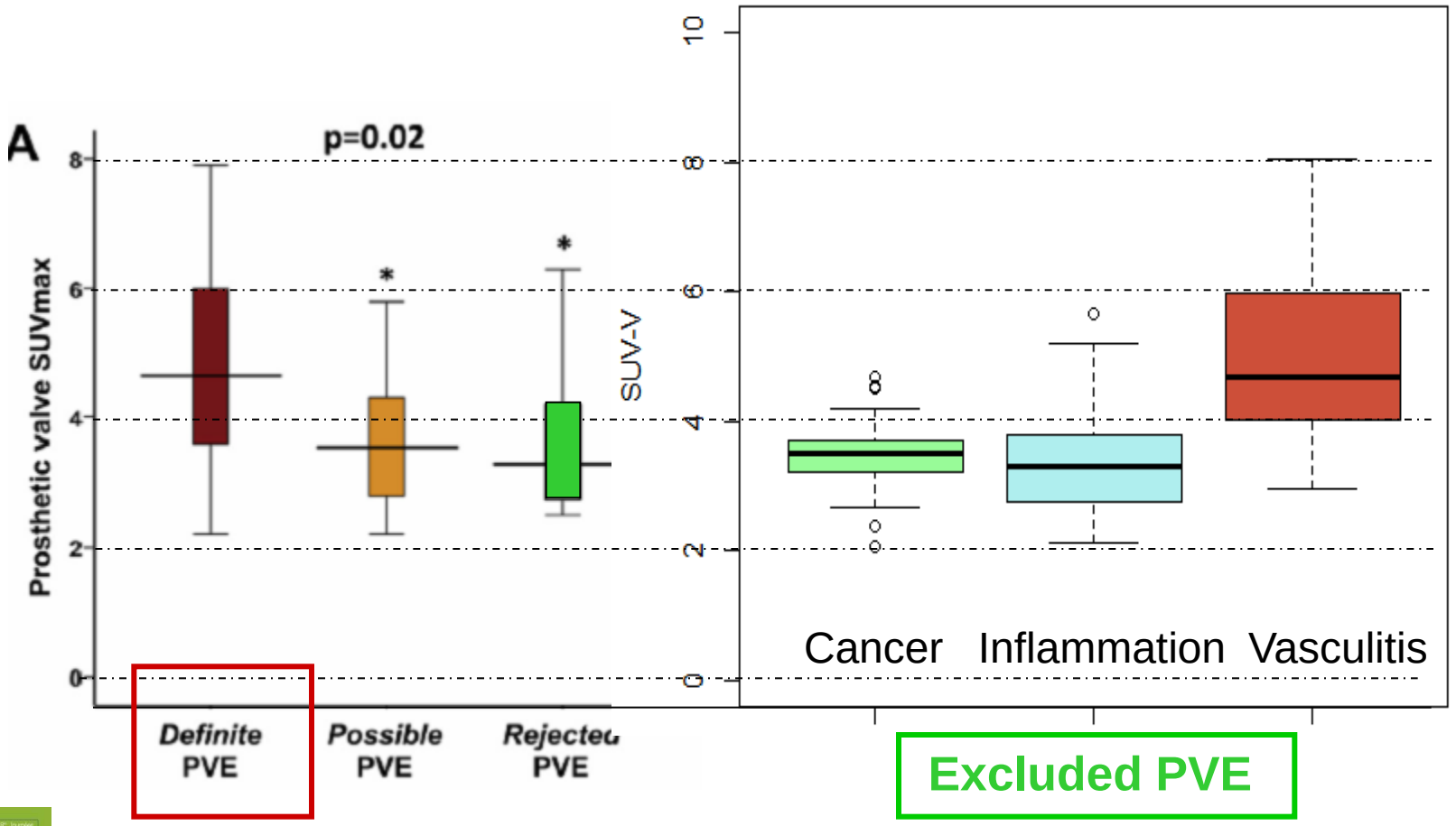


NAC

Non infected prosthesis

Perivalvular uptake in pts with valvular prosthesis

IE versus NON-IE

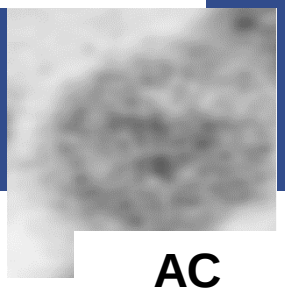


51 patients with 54 non infected prosthetic valves

Uptake: (AC) n=50 /54 (93%),

L. Saby JACC 2013

Absence of uptake on the PV



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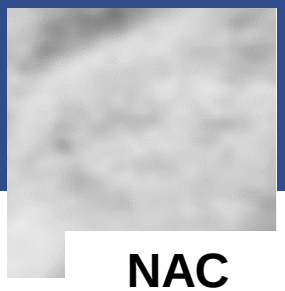
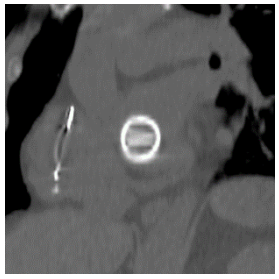
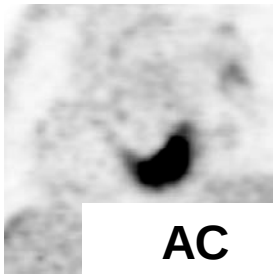


NAC

Myocardial uptake / Absence of uptake on the PV





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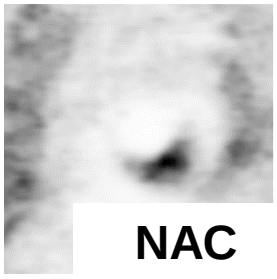
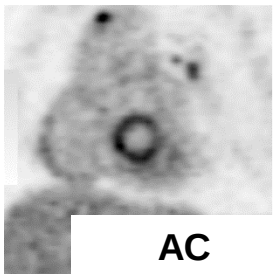


NAC

Intense / Homogeneous uptake on the PV



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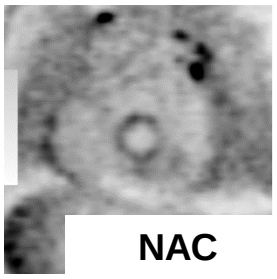
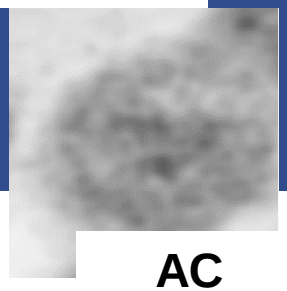


NAC

Non infected prosthesis

Absence of uptake on the PV



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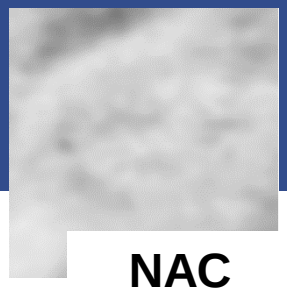

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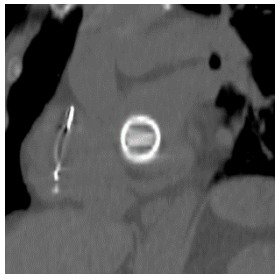
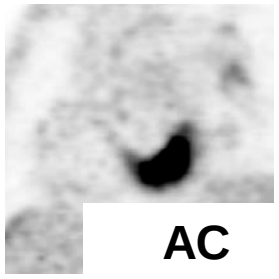
Myocardial uptake / Absence of uptake on the PV





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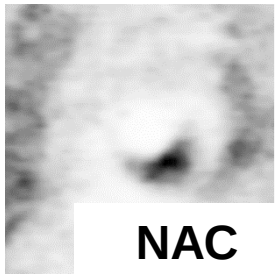
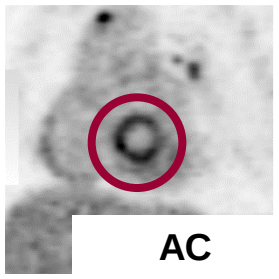


NAC

Intense / Homogeneous uptake on the PV



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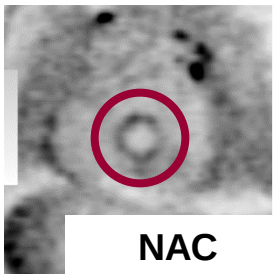
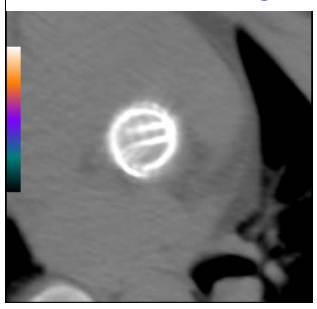


NAC

Non infected prosthesis

Intense / Heterogeneous uptake on the PV in IE pts



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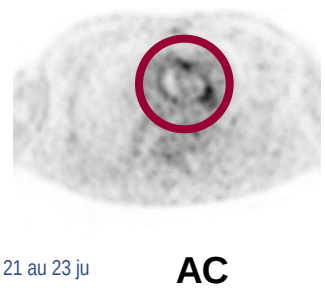

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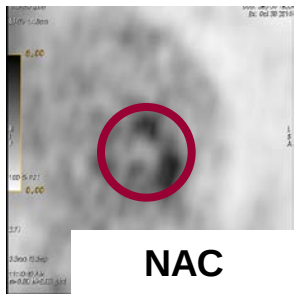

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Heterogeneity rather than intensity of the uptake to distinguish infected from non-infected prosthesis

Infected prosthesis

CIED infection diagnosis

- 42 pts suspected of CIED infection

	Group A Suspected CIED inf^{ion} N=42	Group B Controls 6 W post implantation N=12	Group C Controls > 6 M^{ths} post implantation N=12	
Confirmed infection	**35 (83%)**	**0**	**0**	**<0.001**
18F-FDG PET/CT uptake	**32/42** **1 false pos** **3 false neg**	**No or mild uptake**	**0**	
SUVmax	**4.4 ± 1.6**	**1.2 ± 1.4**	**0**	**<0.001**
ETOveg^{tion}	**12/42**	**0**	**0**	

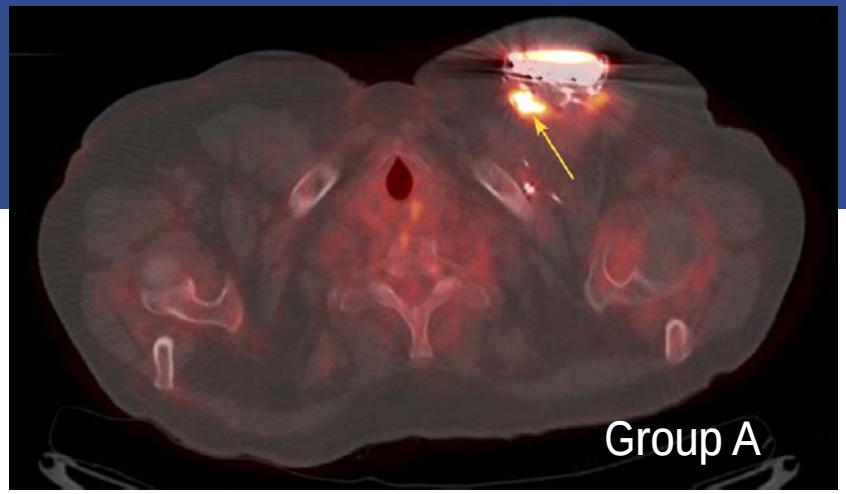
CIED: cardiovascular intra cardiac electronic device

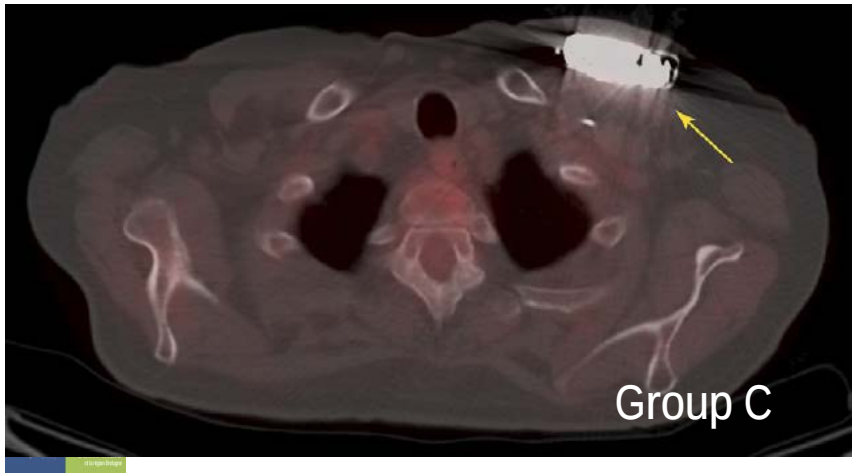
Sarrazin JF et al. JACC 2012

sensitivity	specificity
88 %	86 %

PET - AC

PET - NAC





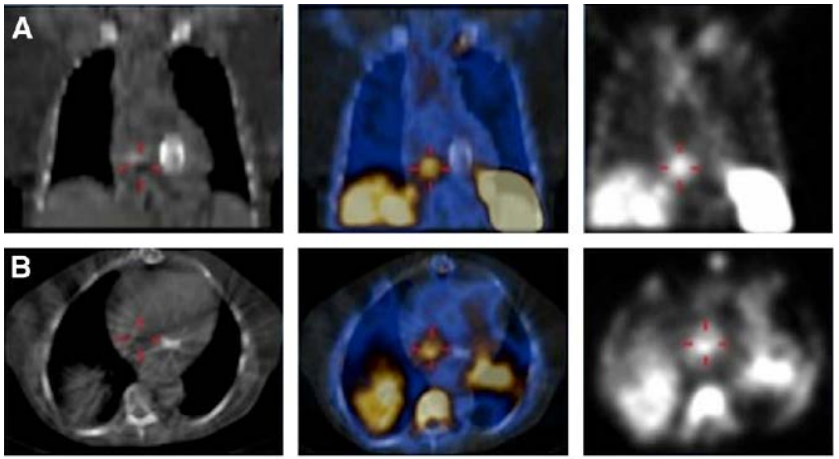
To establish IE diagnosis

Cardiac involvement

- Cardiac echo
- Cardiac multislice computed tomography (MSCT)
- Nuclear Imaging [18F]FDG PET/CT
- Nuclear Imaging Labelled leukocytes

Added Value of ^{99m}Tc-HMPAO–Labeled Leukocyte SPECT/CT in the Characterization and Management of Patients with Infectious Endocarditis

Erba PA et al, J Nucl Med 2012



- 51 pts with suspected IE (prosthetic IE)
- Final Diagnosis of EI 51/131 (39%) patients

Sensitivity : 90%
Specificity : 100%

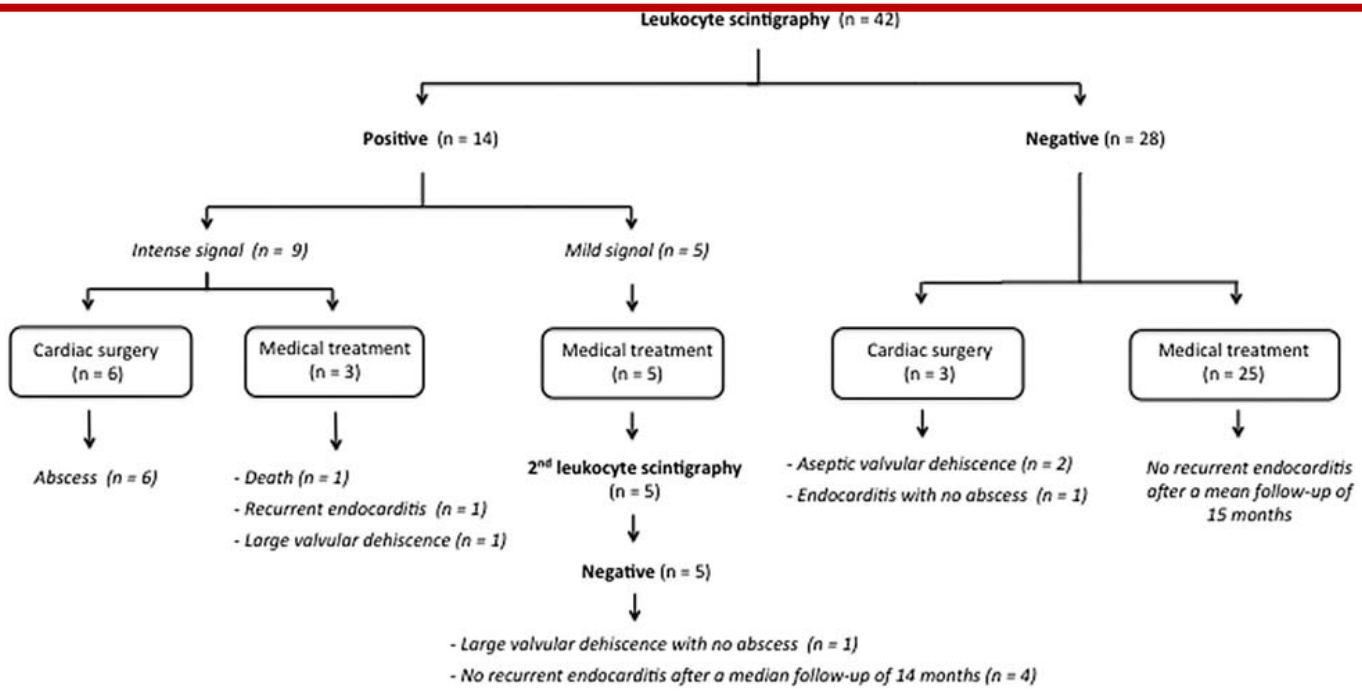
Results of ^{99m}Tc-HMPAO-WBC Scintigraphy in the 51 Patients with Final Diagnosis of IE, Stratified According to Duke Criteria

Duke criterion	Positive results			Negative results
	Cardiac only	Cardiac and extracardiac	Extracardiac only	
Definite IE (n = 24)	9	11*	0	4
Possible IE (n = 25)	13	11†	1*	0
Rejected IE (n = 2)	1	1*	0	0

*Septic embolism consequent to IE.
†Eight patients with septic embolism, 1 with vasculitis, and 2 false-positive scans due to vertebral crush and metastasis from prostate cancer.

Labelled leukocytes and infective endocarditis

- **42 pts** with suspected prosthetic IE (valve prosthesis / aortic tube / patch)
- Non-conclusive TTE/TEE in all cases
- 14 (33%) positive uptake (intense in 9, mild in 5)



(Hyafil et al. Eur Heart J Cardiovasc Imaging 2013;34:1597-606)

FDG PET *vs.* WBC SPECT

- Single-centre prospective study (Bichat Hospital, Paris)
- 39 patients (males: 22), aged 62±17 years
- Suspected of prosthetic valve endocarditis (PVE)
- Delay between FDG PET and WBC SPECT: 7±7 days
- Diagnosis after ≥3-months follow-up (Duke-Li):
  - Definite, n=14 (36%)
  - Possible, n=3
  - Rejected, n=21

Rouzet F et al, J Nucl Med 2014

FDG PET *vs.* WBC SPECT

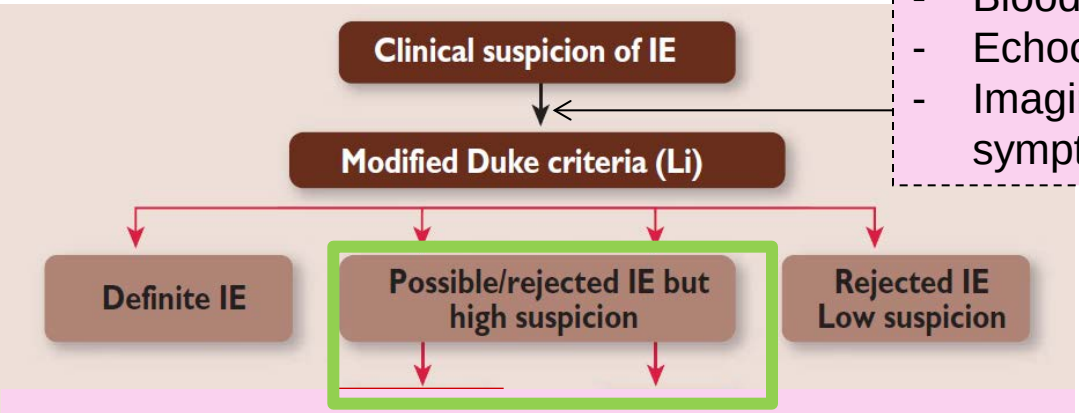
	Final diagnosis after ≥3 mo follow-up		
	Definite (n=14)	Possible (n=4)	Rejected (n=21)
FDG PET +	13 (93)	1	6
FDG PET -	1	2	15 (71)
WBC SPECT +	9 (64)	0	0
WBC SPECT -	5	3	22 (100)

- FDG PET false positive <2 months after valve implantation (n=6)
- WBC SPECT false negative (n=5): Coxiella (n=2), Candida (n=1), no abscess (n=2)

FDG PET: Higher sensitivity
WBC SPECT: Higher specificity

Diagnosis

Imaging techniques



- Blood cultures
- Echocardiography
- Imaging techniques for symptomatic emboli

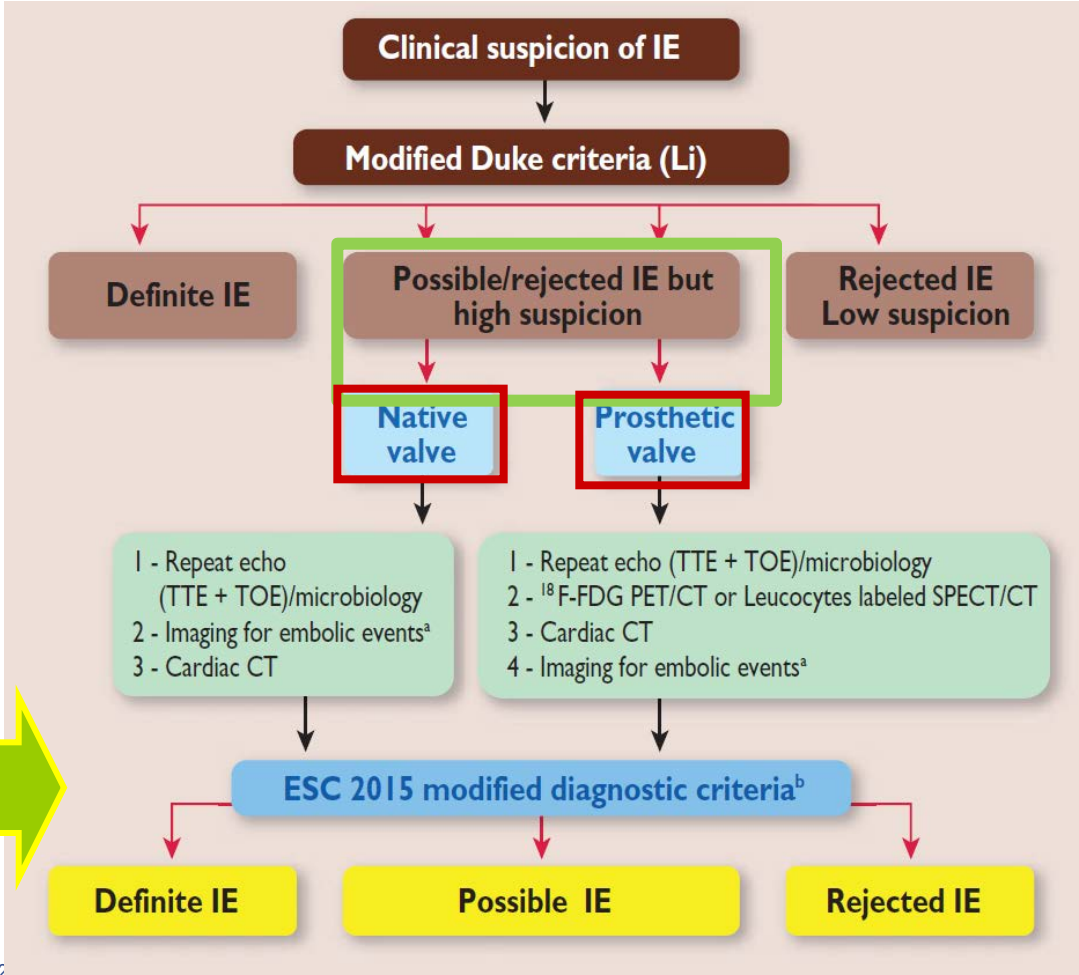
To perform second line imaging techniques:
Cerebral CT scan or MRI
Total body scan

Cardiac CT scan
In prosthetic valve pts:
18 FDG TEP/CT
Leucocytes labeled SPECT/CT

→ To establish valvular involvement

Diagnosis

Imaging techniques



To apply

ESC modified diagnostic criteria

Major criteria	
1. Blood cultures positive for IE a. Typical microorganisms consistent with IE from 2 separate blood cultures: • *Viridans streptococci, Streptococcus gallolyticus (Streptococcus bovis), HACEK group, Staphylococcus aureus;* or • Community-acquired enterococci, in the absence of a primary focus; or b. Microorganisms consistent with IE from persistently positive blood cultures: • ≥2 positive blood cultures of blood samples drawn >12 h apart; or • All of 3 or a majority of ≥4 separate cultures of blood (with first and last samples drawn ≥1 h apart); or c. Single positive blood culture for Coxiella burnetii or phase I IgG antibody titre >1:800	**2. Imaging positive for IE** a. Echocardiogram positive for IE: • Vegetation; • Abscess, pseudoaneurysm, intracardiac fistula; • Valvular perforation or aneurysm; • New partial dehiscence of prosthetic valve. b. Abnormal activity around the site of prosthetic valve implantation detected by ^{18}F-FDG PET/CT (only if the prosthesis was implanted for >3 months) or radiolabelled leukocytes SPECT/CT. c. Definite paravalvular lesions by cardiac CT.

More study is needed to define the utility of ^{18}F-fluoro-deoxyglucose positron emission tomography/CT in the diagnosis and management of IE.

American Heart Association®

ACC/AHA 2015

To establish IE diagnosis

Cardiac involvement

- Echo → **False negative**
- multislice computed tomography → **For Abscess**
- [18F]FDG PET/CT → **High sensitivity False positiv**
- Labelled leukocytes → High specificity

Imagings

To establish IE diagnosis

- Cardiac involvement
- Peripheral localizations

EI work up (indications for cardiac surgery)

- Cardiac (abscess)
- Extra cardiac localizations

Prognostic assessment

Follow-up

Annals of Internal Medicine | ARTICLE

Effects of Early Cerebral Magnetic Resonance Imaging on Clinical Decisions in Infective Endocarditis, the IMAGE study

Xavier Duval , Bernard Iung , Isabelle Klein , Eric Brochet , Gabriel Thabut , Florence Arnoult , Laurent Lepage , Jean Pierre Laissy , Michel Wolff and Catherine Leport and the IMAGE study group.

130 patients admitted to Bichat Claude Bernard Hospital, Paris

(June 2005-Sept 2008)

with systematic cerebral MRI with MRangiography

Neurological Complications n=106

82%

Symptomatic lesions 12%

Large Ischemic lesions n=33 (24 silent)	Small Ischemic lesions n=60 (45 silent)	Large Intracerebral Hemorrhage n=10 (8 silent)	Microbleed n=74 (66 silent)	Sub. Arachnoidal Hemorrhage n=11 (11 silent)	Aneurysms n=10 (10 silent)	Abscess n=8 (7 silent)
25%	46%	8%	58%	8%	8%	6%

Annals of Internal Medicine ARTICLE

Effects of Early Cerebral Magnetic Resonance Imaging on Clinical Decisions in Infective Endocarditis, the IMAGE study

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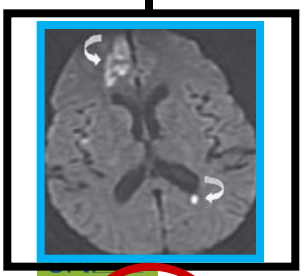
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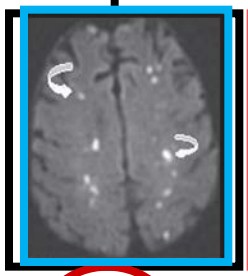
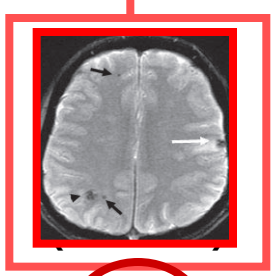
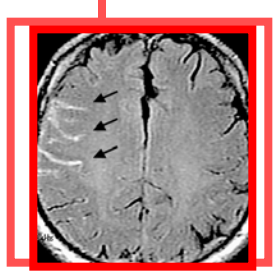

46%


8%


58%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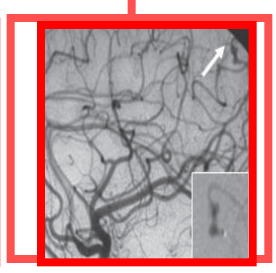
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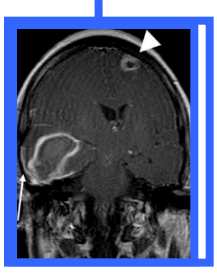

6%

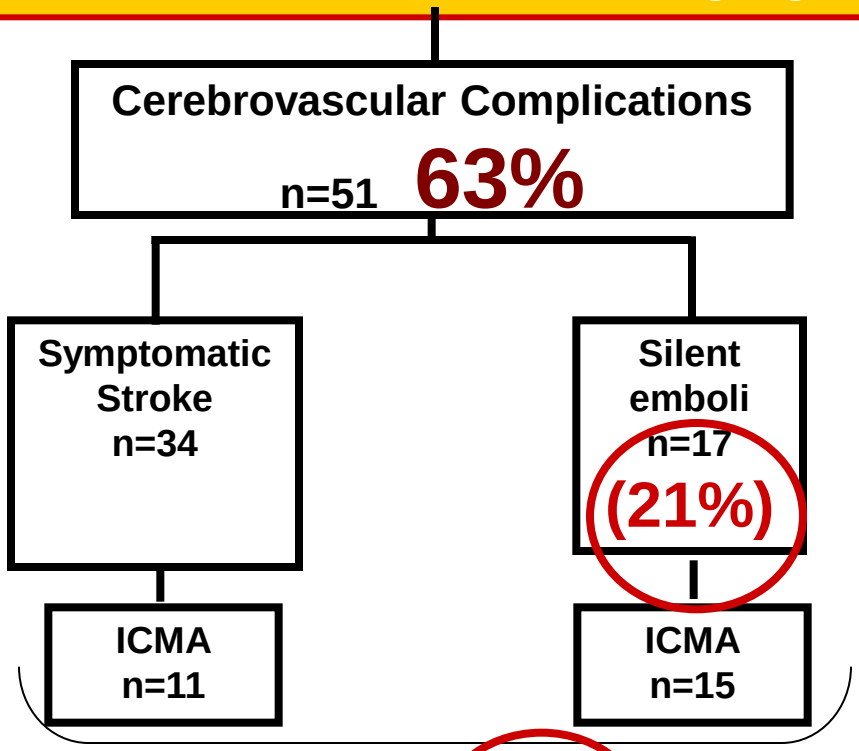
PLOS ONE

Marwa Sayed Meshaal[1]*, Hussein Heshmat Kassem[1], Ahmad Samir[1], Ayman Zakaria[2], Yasser Baghdady[1], Hussein Hassan Rizk[1] April 2015

Systematic cerebral CT with angiography

81 consecutive definite IE patients;

Systematic Cerebral CT with angiography



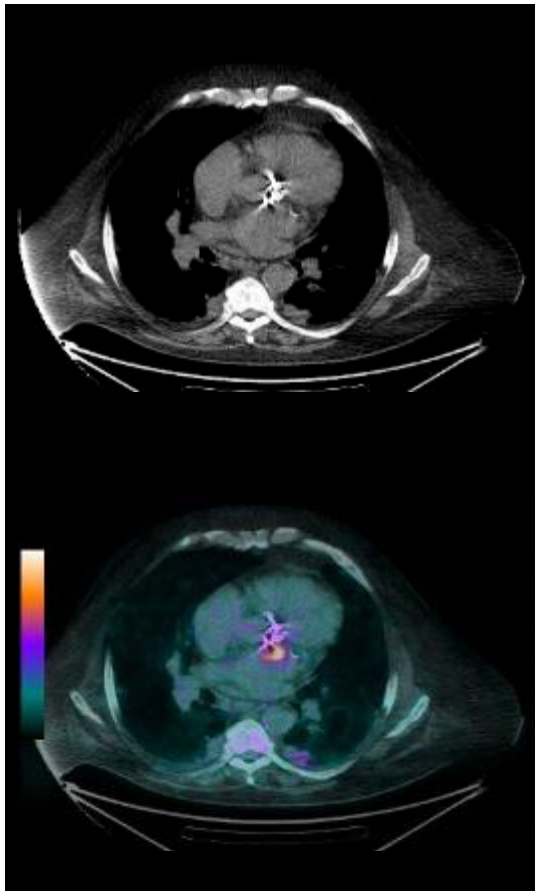
21% out of 81

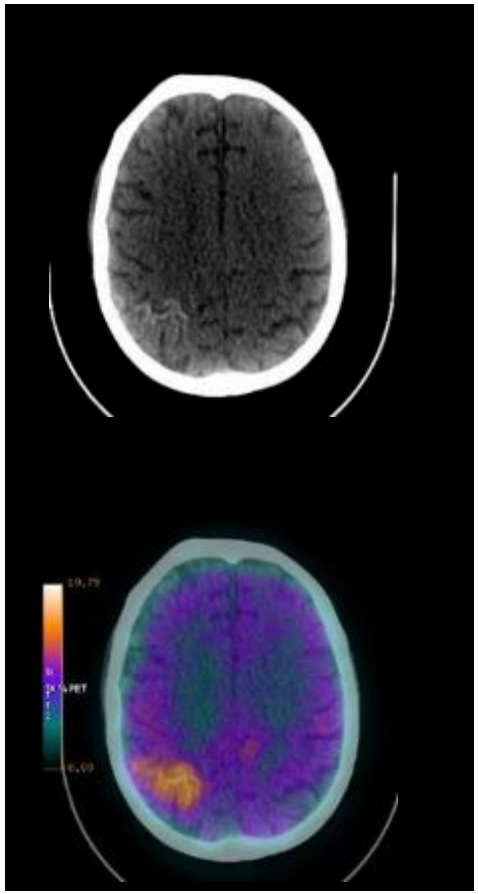
36% of 47 asymptomatic pts

ICMA: intracerebral mycotic aneurysm

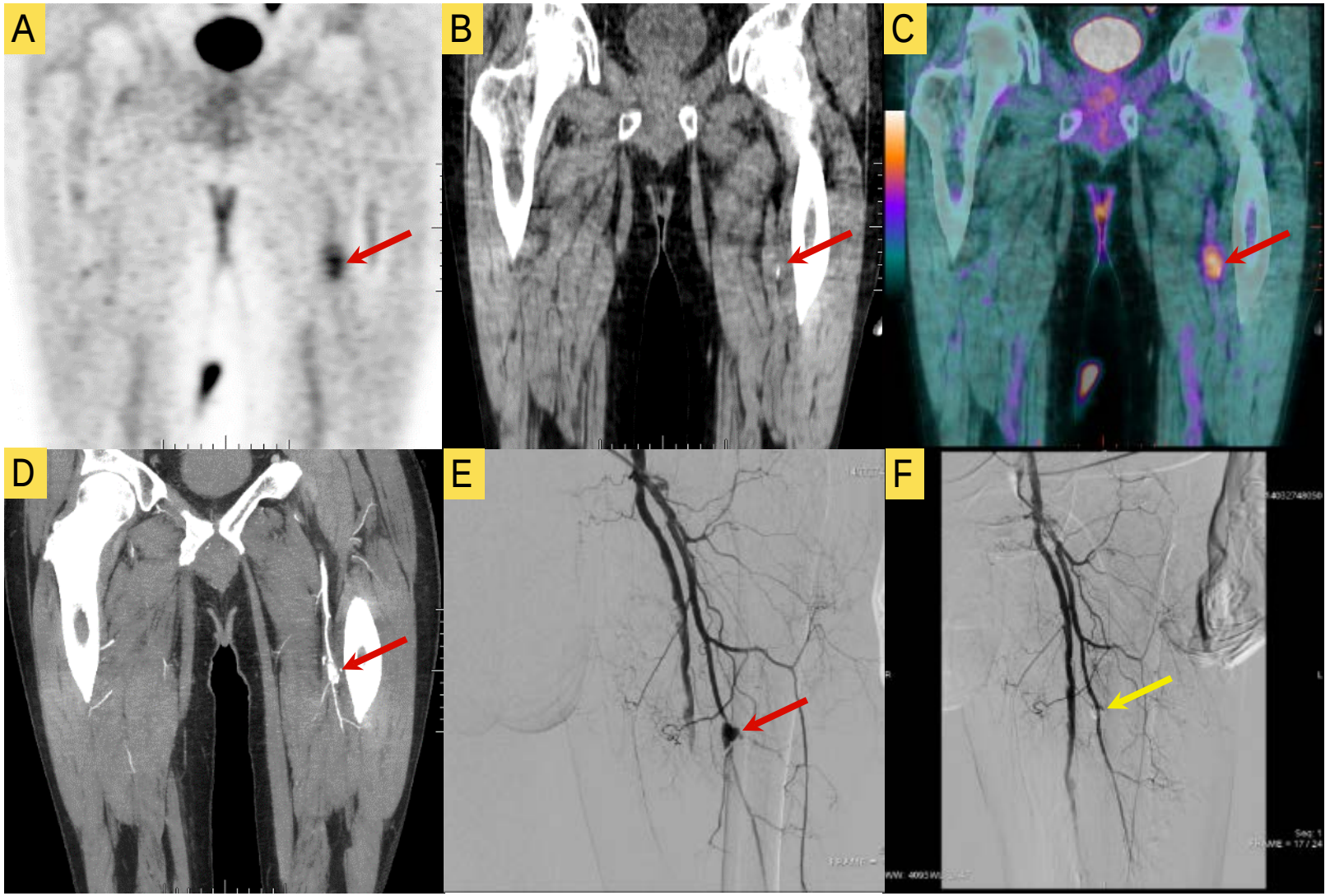
[18F]FDG PET/CT Brain imaging

Trans Arterial Valve Implantation



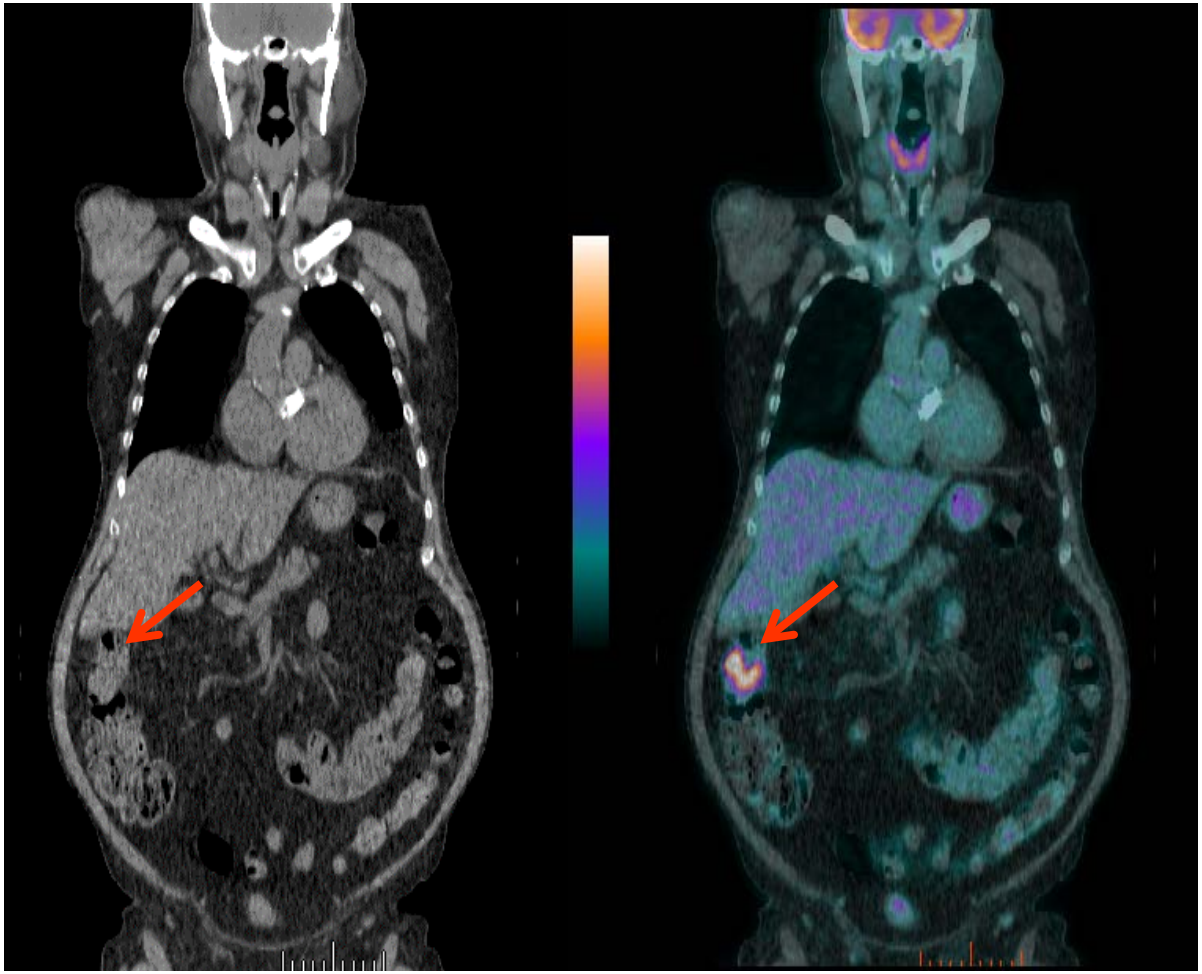


[18F]FDG PET/CT Mycotic aneurysms

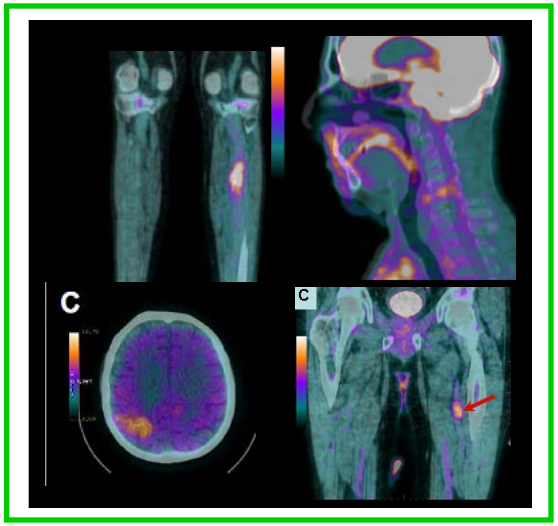


[18F]FDG PET/CT Portal of entry

- Recurrent chills, fever, and positive blood cultures (*E. faecalis*)
- Suspicion of aortic prosthetic valve infection



Diagnosis of peripheral complications



Diagnosis of peripheral complications

Patients with definite IE

	Clinical situations	Total Nb pts ProstheticV/ PM/native V	Definite EI / total	Peripheral localisations	sensitivity	specificity	PPV False +	NPV False -
Van Riet 2010 **	Definite IE	25 pts 10/0/15	25/25	11/25 (44%) 58% silent	100%	91%	91% 9%	
Kestler M 2014	Definite IE	47pts 15/11/24	47/47	31/47 (66%)	100%	80%	90% 10%	100% 0%

Cf Article Asmar 2014
Pizi Circulation 2015 detection of 14 cases (15%) of peripheral emboli, 10 of which asymptomatic

Kestler M: Cases/controls study; peripheral localisations detected in **57.4%** of cases (TEP) vs **18%** in control (without TEP) p=0.0001

Diagnosis of peripheral complications

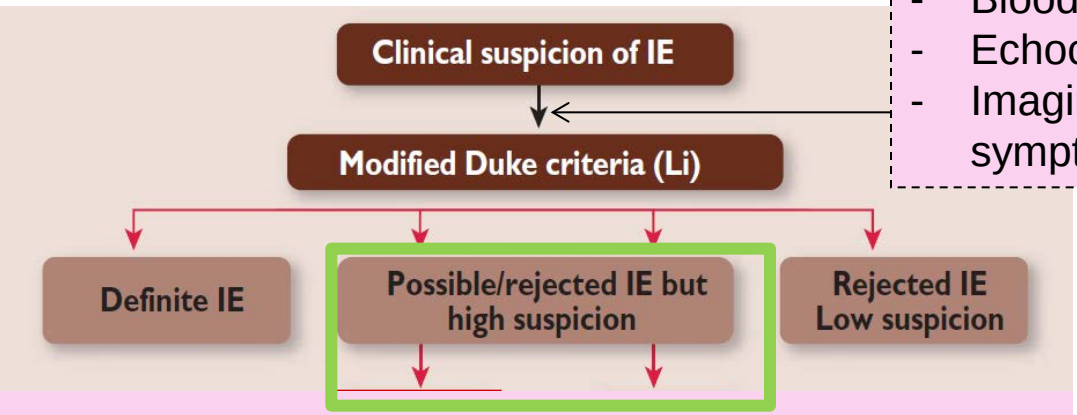
Patients with suspected IE

	Clinical situations	Total Nb pts ProstheticV/ PM/native V	Definite EI / total	Peripheral localisations	sensitivity	specificity	PPV False +	NPV False -
Vos 2010 **	Gram pos bacteremia *	115 pts	21/115	11/21 (50%) 50% silent	?	?	?	?
Saby 2013	Prosthetic valve AND Fever or crp > 10 mg, or bacteremia or positive serology or echo pos	72 pts 72/0/0	30/72	8/30 (25%)	?			
Bonfiglioli 2013	Clinical suspicion	71 pts 38/0/33	29/71	17/29 (?) 74%		94%		

*Pts with at least one risk factor for complicated bacteremia (community acquisition, signs of infection more than 48 h before initiation of appropriate treatment, fever more than 72 h after initiation of appropriate treatment, and positive blood cultures more than 48 h after initiation of appropriate treatment

Diagnosis

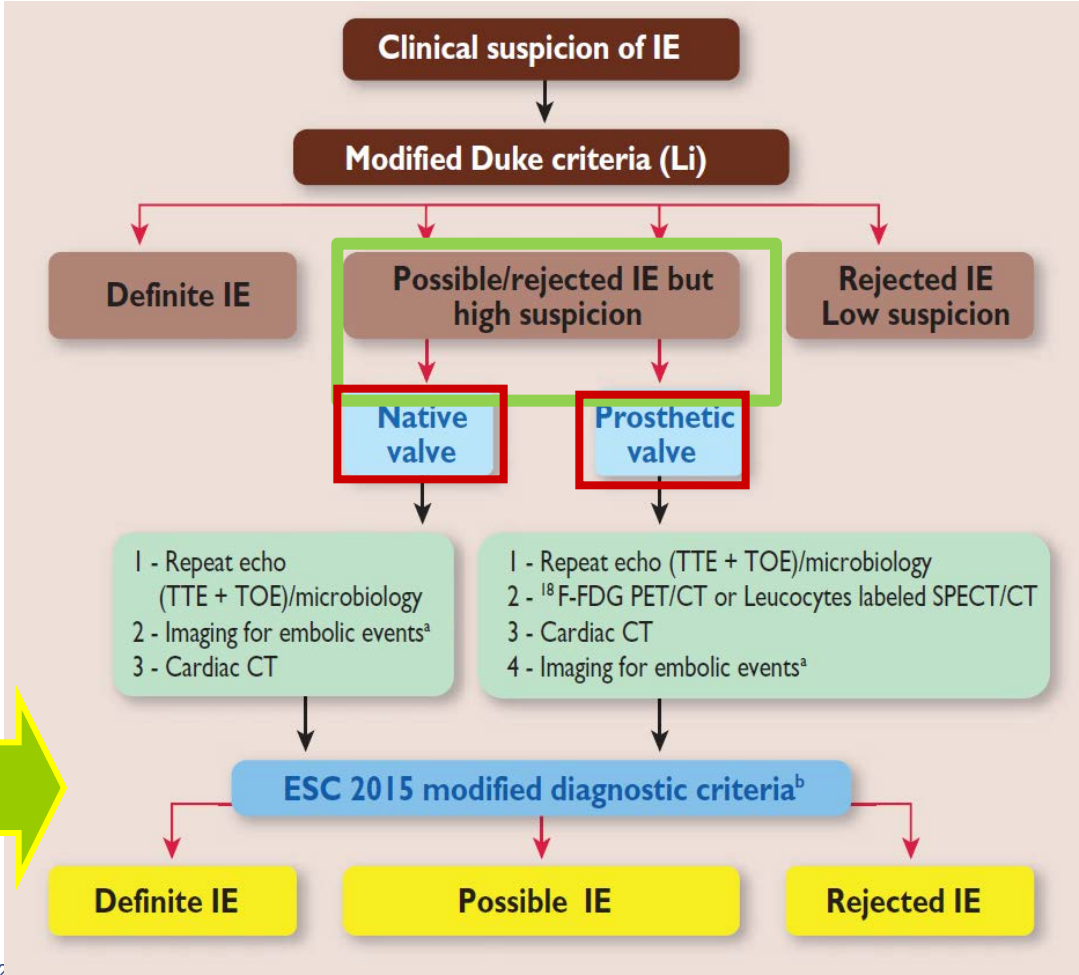
- Blood cultures
- Echocardiography
- Imaging techniques for symptomatic emboli



To perform second line imaging techniques:
Cerebral CT scan or MRI
Total body scan

To look for asymptomatic peripheral IE manifestations

Diagnosis



To apply

ESC modified diagnostic criteria

Major criteria

1. Blood cultures positive for IE

a. Typical microorganisms consistent with IE from 2 separate blood cultures:
- *Viridans streptococci, Streptococcus gallolyticus (Streptococcus bovis), HACEK group, Staphylococcus aureus;* or
- Community-acquired enterococci, in the absence of a primary focus; or

b. Microorganisms consistent with IE from persistently positive blood cultures:
- ≥2 positive blood cultures of blood samples drawn >12 h apart; or
- All of 3 or a majority of ≥4 separate cultures of blood (with first and last samples drawn ≥1 h apart); or

c. Single positive blood culture for Coxiella burnetii or phase I IgG antibody titre >1:800

2. Imaging positive for IE

a. Echocardiogram positive for IE:
- Vegetation;
- Abscess, pseudoaneurysm, intracardiac fistula;
- Valvular perforation or aneurysm;
- New partial dehiscence of prosthetic valve.

b. Abnormal activity around the site of prosthetic valve implantation detected by ^{18}F-FDG PET/CT (only if the prosthesis was implanted for >3 months) or radiolabelled leukocytes SPECT/CT.

c. Definite paravalvular lesions by cardiac CT.

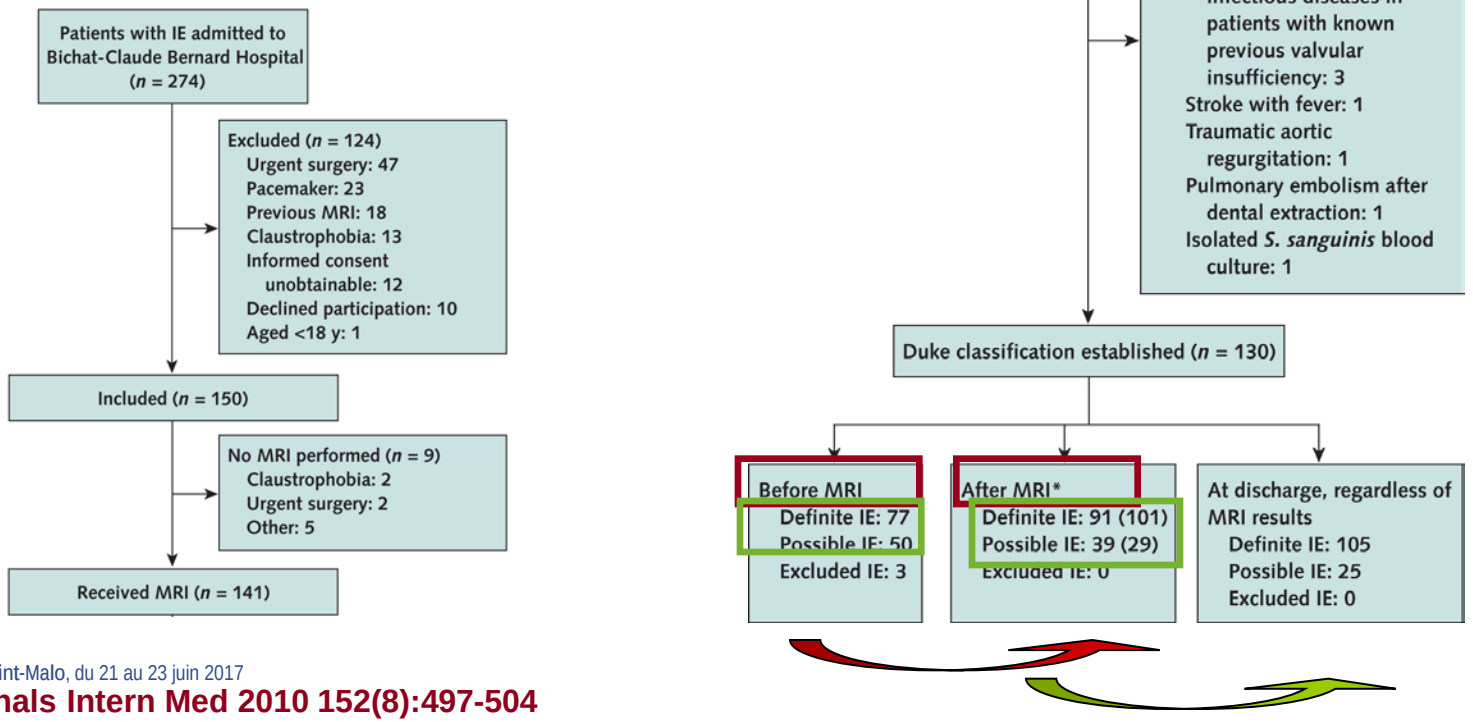
Minor criteria

1. Predisposition such as predisposing heart condition, or injection drug use.
2. Fever defined as temperature >38°C.
3. Vascular phenomena (including those detected by imaging only) major arterial emboli, septic pulmonary infarcts, infectious (mycotic) aneurysm, intracranial haemorrhage, conjunctival haemorrhages, and Janeway's lesions.
4. Immunological phenomena: glomerulonephritis, Osler's nodes, Roth's spots, and rheumatoid factor.
5. Microbiological evidence: positive blood culture but does not meet a major criterion as noted above or serological evidence of active infection with organism consistent with IE.

Effects of Early Cerebral Magnetic Resonance Imaging on Clinical Decisions in Infective Endocarditis, the IMAGE study

- Impact of cerebral lesion detection on IE diagnosis
  - Modified-Duke classification upgraded in 32%

Figure 1. Study flow diagram.



Duval X, Annals Intern Med 2010 152(8):497-504

Positron Emission Tomography/Computed Tomography for Diagnosis of Prosthetic Valve Endocarditis

Increased Valvular ^{18}F-Fluorodeoxyglucose Uptake as a Novel Major Criterion

Ludivine Saby, MD,* Olivia Laas, MD,† Gilbert Habib, MD,* Serge Cammilleri, MD, PhD,† Julien Mancini, MD, PhD,‡ Laetitia Tessonnier, MD,† Jean-Paul Casalta, MD,§ Frederique Gouriet, MD, PhD,§ Alberto Riberi, MD,|| Jean-Francois Avierinos, MD,* Frederic Collart, MD,|| Olivier Mundler, MD, PhD,† Didier Raoult, MD, PhD,§ Franck Thuny, MD, PhD*§¶

Duke classification upgraded due to

- **cardiac uptake in 7/8**
- **peripheric uptake in 1/8**

Table 5 Diagnostic Value of the Modified Duke Criteria at Admission With (Duke-PET/CT) and Without the Implementation of the PET/CT Results

	Final Diagnosis		
	Definite PVE	*Possible* PVE	*Rejected* PVE
Duke			
Definite PVE	21 (70)	0 (0)	0 (0)
Possible PVE	8 (27)	22 (100)	10 (50)
Rejected PVE	1 (3)	0 (0)	10 (50)
Duke-PET/CT			
Definite PVE	29 (97)	10 (45)	2 (10)
Possible PVE	1 (3)	12 (55)	10 (50)
Rejected PVE	0	0	8 (40)

Values are n (% of each final diagnosis).
Abbreviations as in Tables 1 and 2.

30 definite IE

Journal of the American College of Cardiology Vol. 61, No. 23, 2013

Imagings

To establish IE diagnosis

- Cardiac involvement
- Peripheral localizations

EI workup (indications for cardiac surgery)

- Cardiac (abscess)
- Extra cardiac localizations

Prognostic assessment

Follow-up

Valvular surgery_ 2015 ESC Indications

Table 22 Indications and timing of surgery in left-sided valve infective endocarditis (native valve endocarditis and prosthetic valve endocarditis)

Indications for surgery	Timing[a]	Class[b]	Level[c]	Ref.[d]
1. Heart failure				
Aortic or mitral NVE or PVE with severe acute regurgitation, obstruction or fistula causing refractory pulmonary oedema or cardiogenic shock	Emergency	I	B	111,115, 213,216
Aortic or mitral NVE or PVE with severe regurgitation or obstruction causing symptoms of HF or echocardiographic signs of poor haemodynamic tolerance	Urgent	I	B	37,115, 209,216, 220,221
3. Prevention of embolism				
Aortic or mitral NVE or PVE with persistent vegetations >10 mm after one or more embolic episode despite appropriate antibiotic therapy	Urgent	I	B	9,58,72, 113,222
Aortic or mitral NVE with vegetations >10 mm associated with severe valve stenosis or regurgitation, and low operative risk	Urgent	IIa	B	9
Aortic or mitral NVE or PVE with isolated very large vegetations (>30 mm)	Urgent	IIa	B	113
Aortic or mitral NVE or PVE with isolated large vegetations (>15 mm) and no other indication for surgery[e]	Urgent	IIb	C	

Quelles explorations en 2017 ?

Quelles explorations en 2017 ?

- Major place of new imaging techniques in doubtful situations
- Modification of Duke classification taking into account asymptomatic lesions
- From the most simple to the most complex imaging
- Choice based on each particular situation
  - To prioritize Sensitivity or Specificity

Quelles explorations en 2017 ?

- Major place of new imaging techniques in doubtful situations
- Modification of Duke classification taking into account asymptomatic lesions
- From the most simple to the most complex
- Choice based on each particular situation
  - To prioritize Sensitivity or Specificity
- Place to systematic whole body imaging in all pts ?

The 'Endocarditis Team'

When to refer a patient with IE to an 'Endocarditis Team' in a reference centre

1. Patients with complicated IE (i.e. endocarditis with HF, abscess, or embolic or neurological complication or CHD), should be referred early and managed in a reference centre with immediate surgical facilities.
2. Patients with non-complicated IE can be initially managed in a non-reference centre, but with regular communication with the reference centre, consultations with the multidisciplinary 'Endocarditis Team', and, when needed, with external visit to the reference centre.

1/ L'imagerie extra cardiaque peut contribuer à affirmer le diagnostic d'endocardite infectieuse.

2/ La fixation de la TEP-18 FDG au niveau valvulaire cardiaque chez un patient présentant une bactériémie persistante à *Staphylococcus aureus* permet d'affirmer l'existence d'une endocardite, même en cas de normalité de l'échocardiographie.

3/ L'imagerie cérébrale systématique est recommandée chez un patient présentant une végétation mitrale de 20 mm de plus grand axe.

4/ Sous traitement antibiotique, la diminution de la taille de la végétation à l'échocardiographie cardiaque est un signe de réponse thérapeutique favorable.

5/ Le TEP FDG est un examen sensible pour faire le diagnostic d'atteinte valvulaire dans l'endocardite infectieuse et la scintigraphie aux leucocytes marqués un examen spécifique.

1/ L'imagerie extra cardiaque peut contribuer à affirmer le diagnostic d'endocardite infectieuse.
VRAI

2/ La fixation de la TEP-18 FDG au niveau valvulaire cardiaque chez un patient présentant une bactériémie persistante à *Staphylococcus aureus* permet d'affirmer l'existence d'une endocardite, même en cas de normalité de l'échocardiographie.
FAUX

3/ L'imagerie cérébrale systématique est recommandée chez un patient présentant une végétation mitrale de 20 mm de plus grand axe.
FAUX

4/ Sous traitement antibiotique, la diminution de la taille de la végétation à l'échocardiographie cardiaque est un signe de réponse thérapeutique favorable.
FAUX

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VRAI