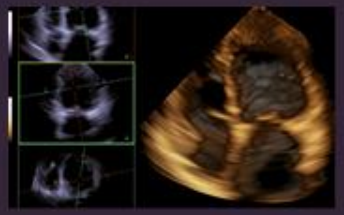
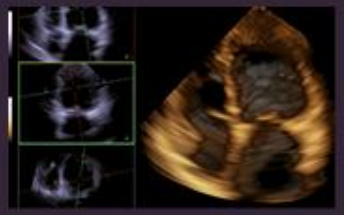


EuroValve
March 10-11, 2016

Diagnostic strategy

Dr Pilar Tornos
Hospital Vall d'Hebron
Barcelona



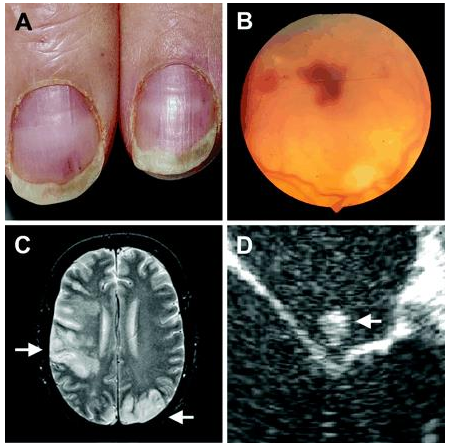
EuroValve
March 10-11, 2016

Faculty disclosure

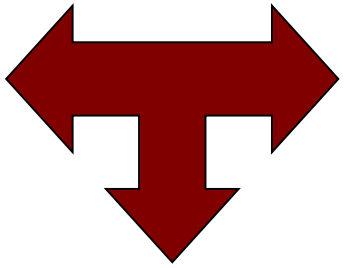
Pilar Tornos

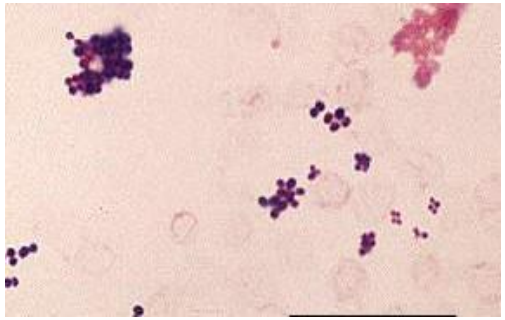
I disclose the following financial relationships:

Paid speaker for Recordati, Edwards.

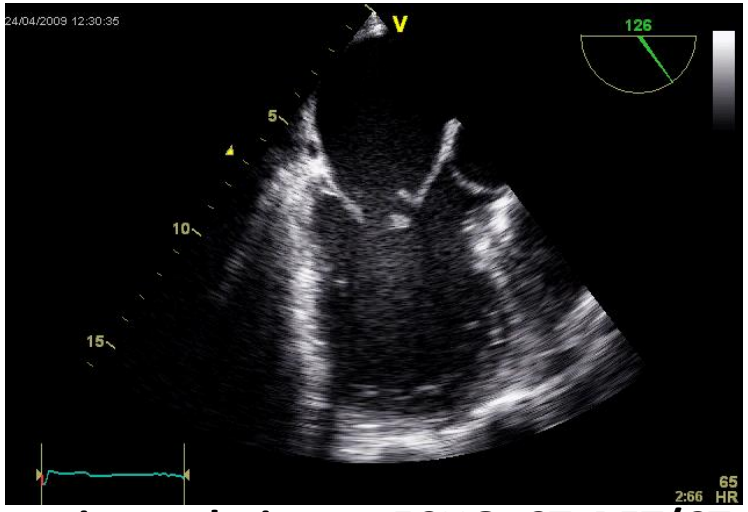


Clinical picture





Microbiology

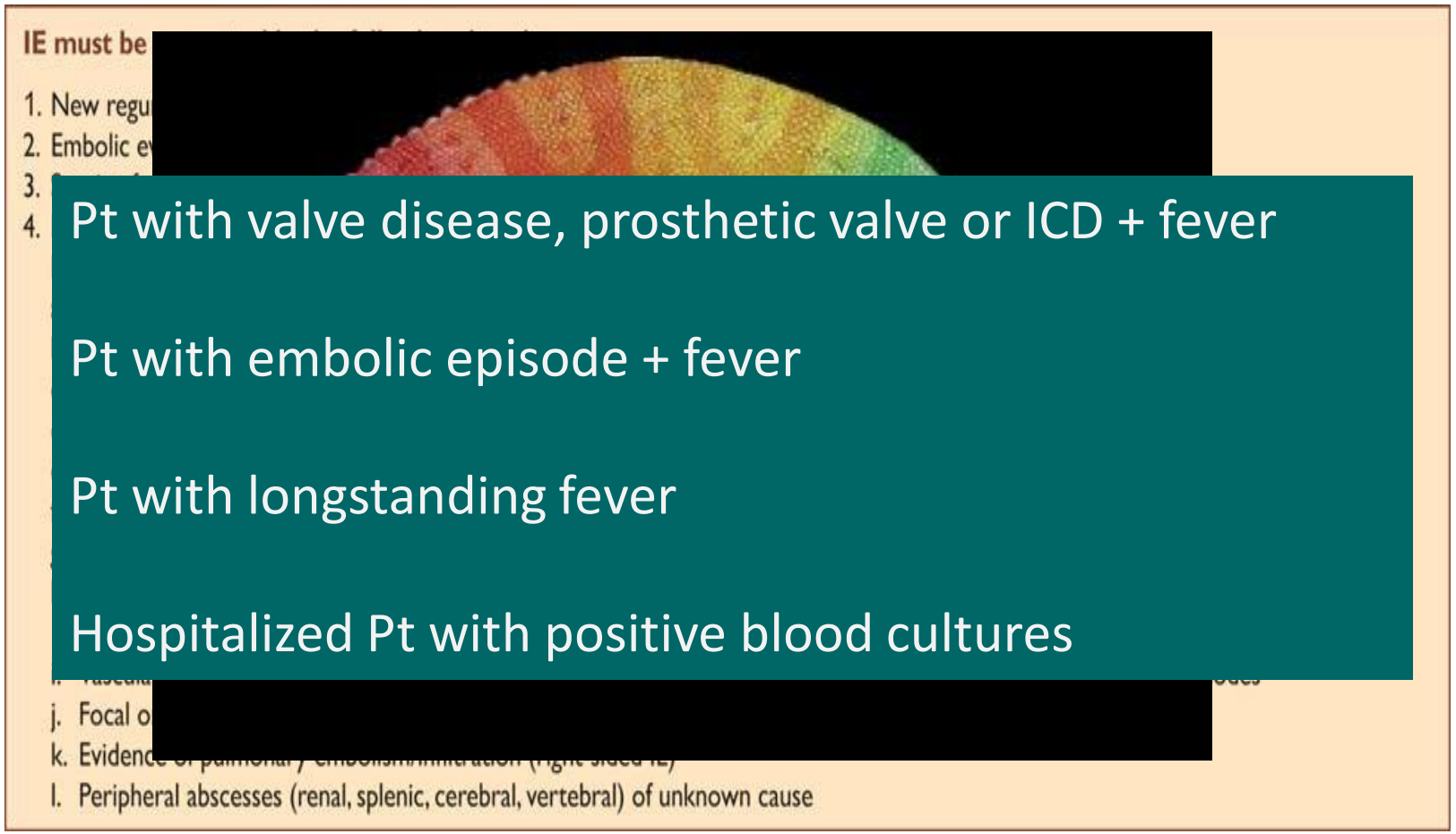


Imaging techniques: ECHO, CT, PET/CT

Diagnosis of IE: clinical picture

- ***No longer classic clinical picture***
  - The classic disease affecting young people with rheumatic valve disease is decreasing
    - Hill et al Eur Heart J 2007
  - IE occurs in old people with comorbidities such as diabetes, renal dysfunction, cancer
    - Hoen et al JAMA 2002
    - Fernandez-Hidalgo et al Clin Infect Dis 2008
  - PVE and IE on devices are more common
    - Habib et al. Prog Cardiovasc Dis 2008
    - Greenspon et al JACC 2011
  - >50% are unaware of any valve disease before diagnosis
    - Tornos et al Heart 2005
  - Acute IE predominates
    - Murdoch et al Arch Intern Med 2009

IE:Clinical Suspicion



Pt with valve disease, prosthetic valve or ICD + fever

Pt with embolic episode + fever

Pt with longstanding fever

Hospitalized Pt with positive blood cultures

Courtesy from Dr Prendergast

ESC Guidelines, 2007

Diagnosis of IE: microbiology

Team work: Cardiologist and Microbiologist

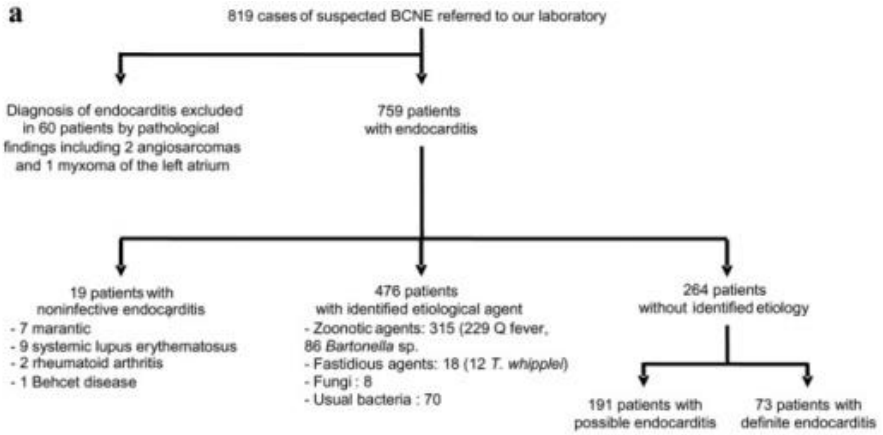
Google immage

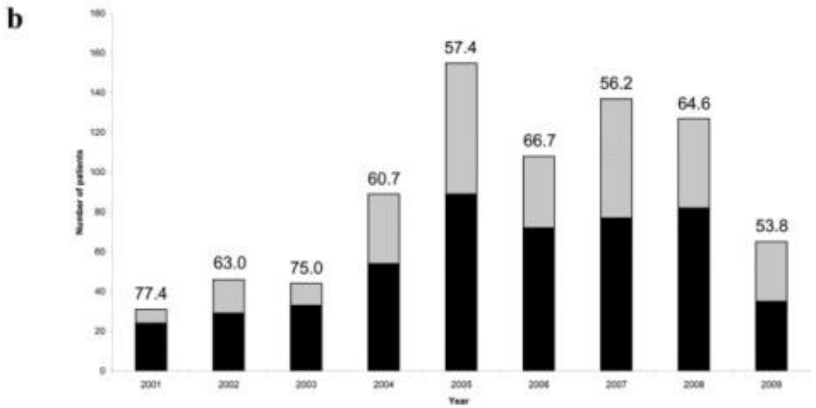
Diagnosis of IE: microbiology

- **Blood cultures**
  - *3 sets, 30 minutes interval*
- **Blood culture-negative cases**
  - ***Previous AB use:***
    - *Stop AB. Repeat cultures*
  - ***True negative:***
    - *Fungi, fastidious bacteria (specialized culture media)*
    - *Serological testing, blood PCR*
    - *Microbiology on surgical speciments amd emboli*
- **Consider alternative diagnosis**

Comprehensive Diagnostic Strategy for Blood Culture–Negative Endocarditis: A Prospective Study of 819 New Cases

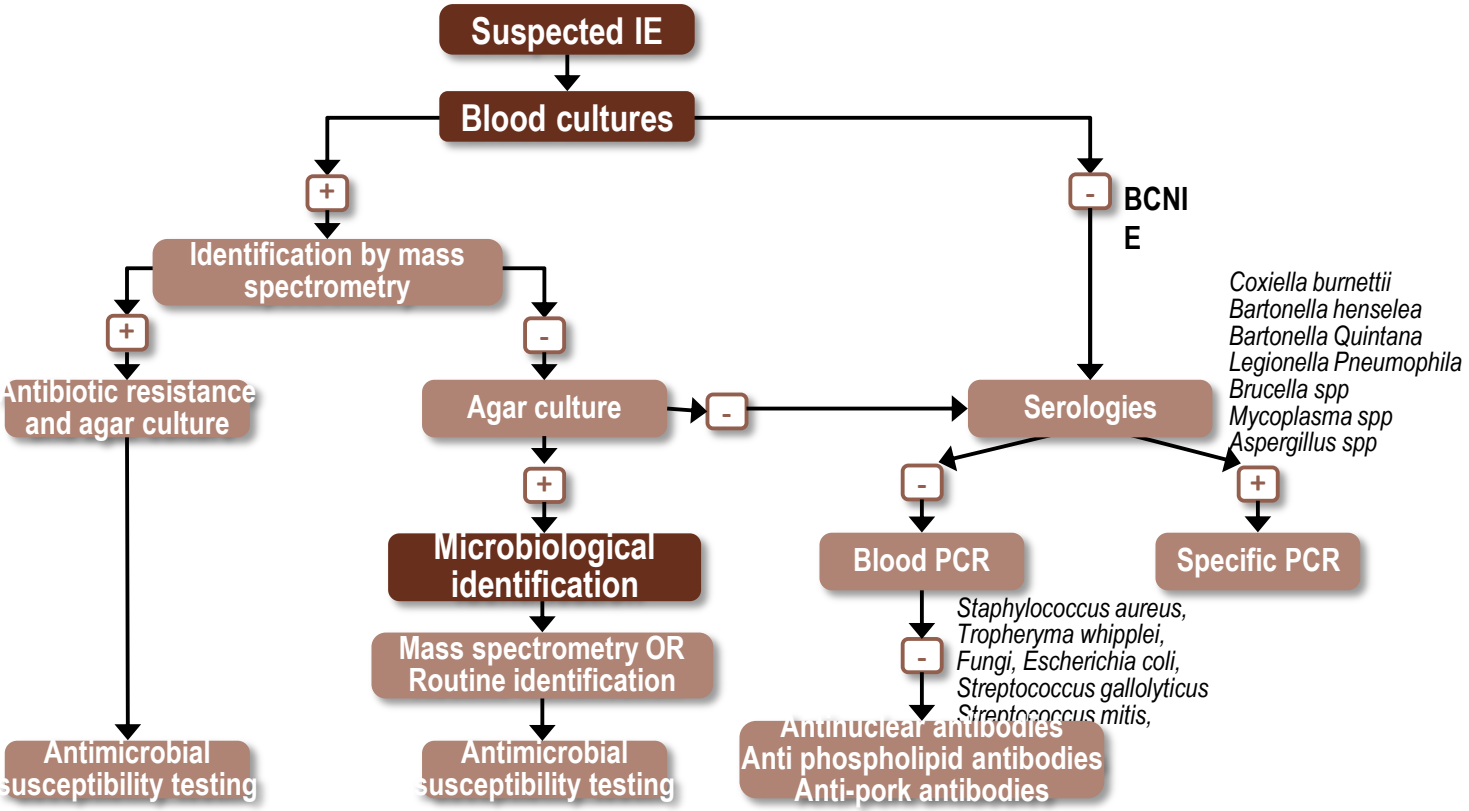
Pierre-Edouard Fournier,[1,2] Franck Thuny,[3] Hervé Richet,[1] Hubert Lepidi,[1] Jean-Paul Casalta,[2] Jean-Pierre Arzouni,[2] Max Maurin,[5] Marie Célard,[6] Jean-Luc Mainardi,[7] Thierry Caus,[3] Frédéric Collart,[3] Gilbert Habib,[4] and Didier Raoult[1,2]





Clin Infect Dis 2010

Microbiological diagnostic algorithm in culture-positive and culture-negative



European Heart Journal (2015) doi:10.1093/eurheartj/ehv319

Imaging techniques: ECHOCARDIOGRAPHY

TTE as soon as IE is supected

TOE when TTE is negative

when TTE is positive to rule out complications

in PVE and device-related IE

Echocardiography
Diagnosis

Recommendations	Class	Level
A. Diagnosis		
TTE is recommended as the first-line imaging modality in suspected IE.	I	B
TOE is recommended in all patients with clinical suspicion of IE and a negative or non diagnostic TTE.	I	B
TOE is recommended in patients with clinical suspicion of IE, in case of prosthetic valve or intracardiac device.	I	B
Repeat TTE/TOE within 5–7 days is recommended in case of initially negative examination when clinical suspicion of IE remains high.	I	C
Echocardiography should be considered in *Staphylococcus aureus* bacteraemia.	IIa	B
TOE should be considered in the majority of adult patients with suspected IE, even in cases with positive TTE.	IIa	C

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Diagnosis of IE:

- ***Echocardiography (TTE and TEE) is the technique of choice for the diagnosis of IE and plays a key role in the management and monitoring***

However:

- 15% of pts have negative TTE/TOE
- Difficuties with prosthetic valves, devices, complex congenital pts
- False positive cases (thrombi, lambs excrecences, fibroelastoma, strands, marantic vegetations)

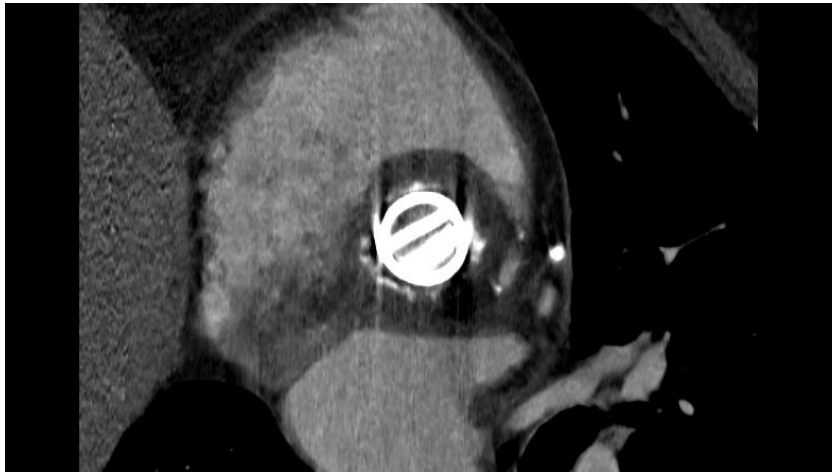
New imaging modalities in the diagnosis of IE
MSCT

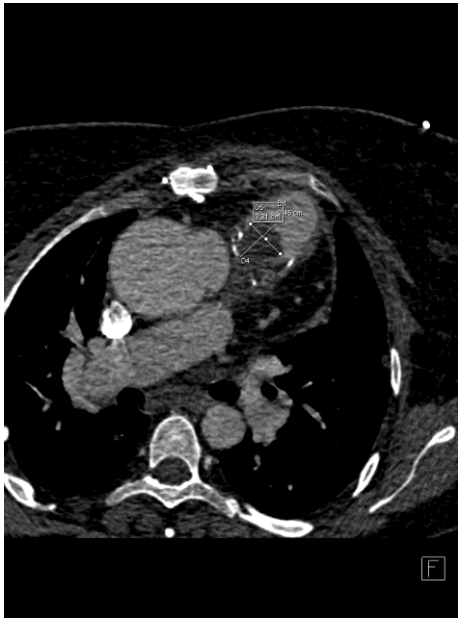
- MSCT is possibly superior to ECHO in information regarding paravalvular extension of IE (abscesses, pseudoaneurysms, fistulae, especially in prosthetic valve endocarditis)
  - *Feutchner JACC 2009, Fagman EuroRadiol 2012*

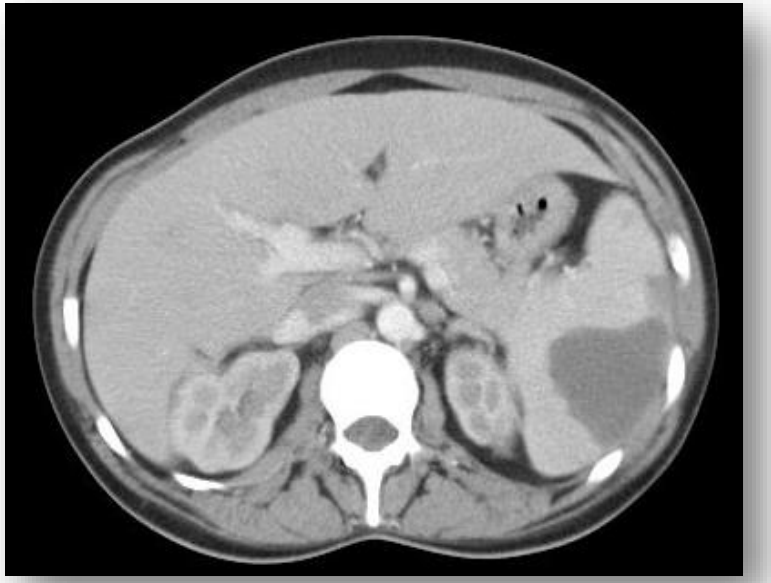
- MSCT has a high sensitivity for the diagnosis of non cardiac complications of IE

Major diagnostic criteria: Definite paravalvular lesions by MSCT

Minor diagnostic criteria: Vascular phenomena







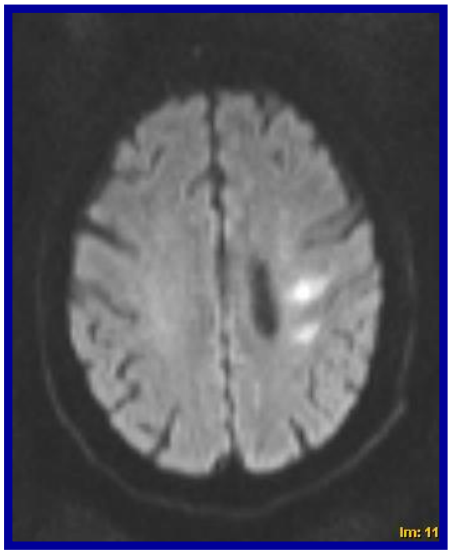
New imaging modalities in the diagnosis of IE
MRI

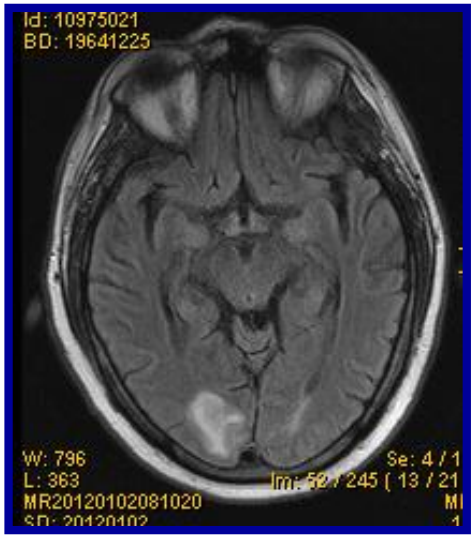
MRI increases the likelihood of detecting cerebral consequences of IE

- Systematic MRI
  - Cerebral MRI in IE reports lesions in 60-80% of patients
  - Ischemic lesions in 50-80%, hemorrhages (parenchymal or subaracnoidal), abscesses or micotic aneurysms, microbleeds
    - *Cooper et al Circulation 2009, Duval et al Ann Intern Med 2010*

Minor diagnostic criteria: vascular phenomena

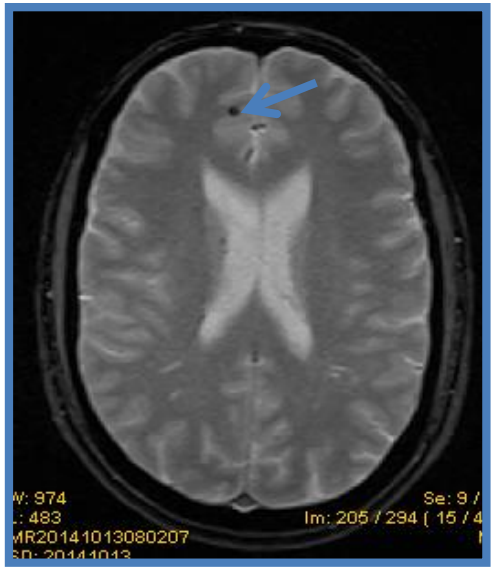
Ischemic emboli





Minor criteria

Microbleeds



NO Minor criteria

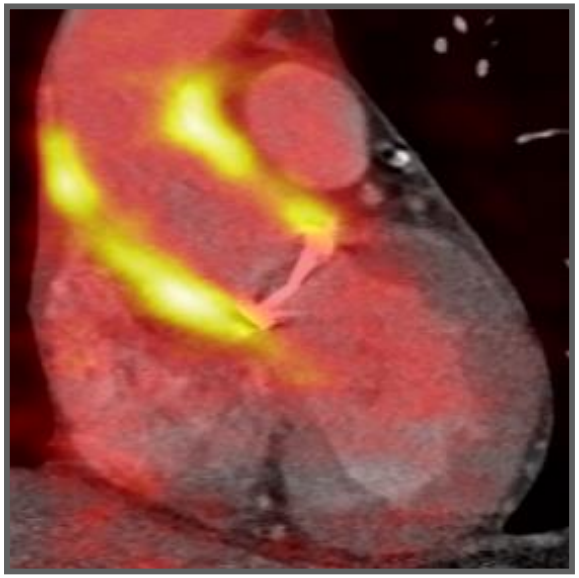
New imaging modalities in the diagnosis of IE
Nuclear medicine

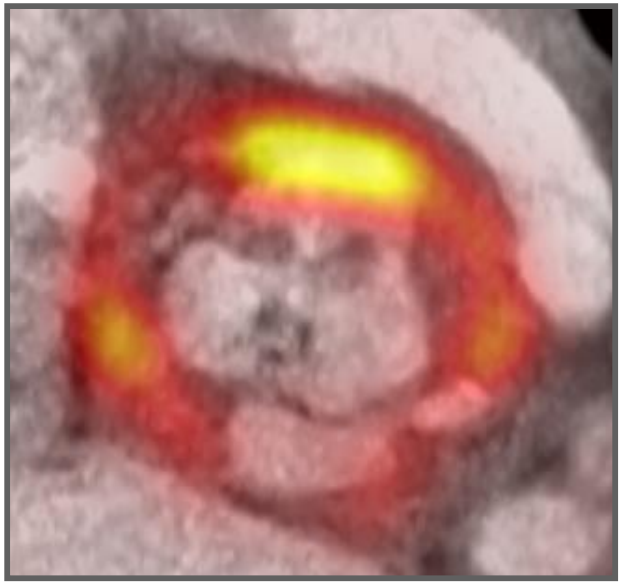
- 18FDG PET/CT is useful in cases with negative or doubtful echos. It also detects peripheral embolism

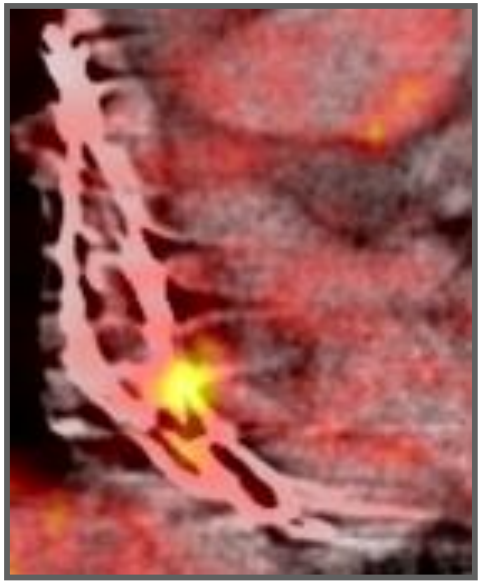
  18FDG PET/CT is also very useful to rule out the diagnosis of IE in difficult situations due to its high negative predictive value
  - *Saby JACC 2013, Pizzi ECC 2014*
  - *Pizzi Circulation 2015*

- Radiolabelled WBC SPECT/CT is more specific but the technique is more complex and time consuming
  - *Erba et al. J Nucl Med 2012*

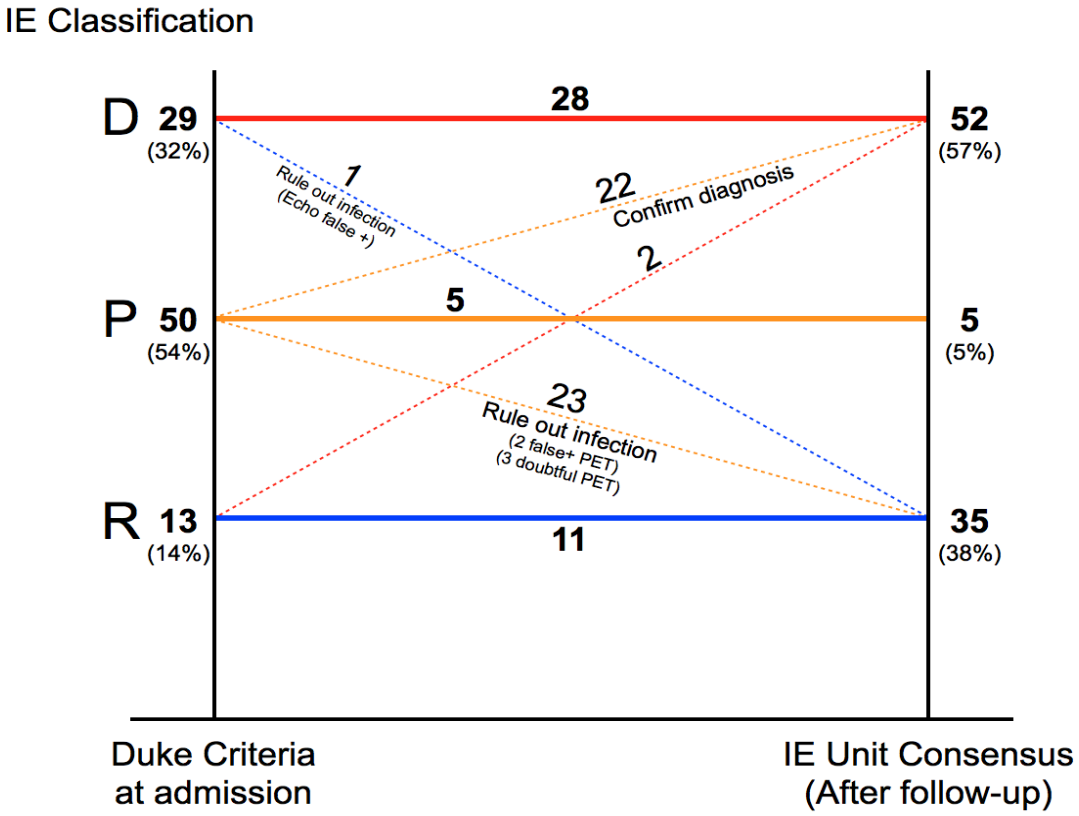
Major diagnostic criteria: Abnormal activity around PV detected by 18FDG PET/CT or radiolabelled SPECT/CT
Minor diagnostic criteria: vascular phenomena



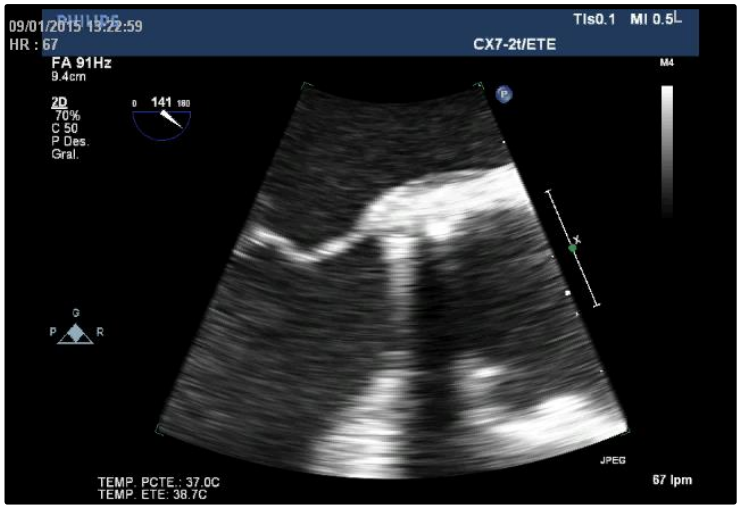


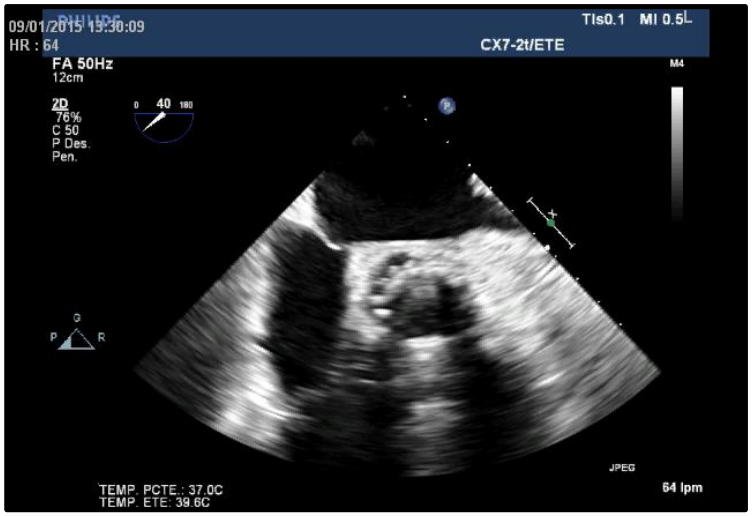


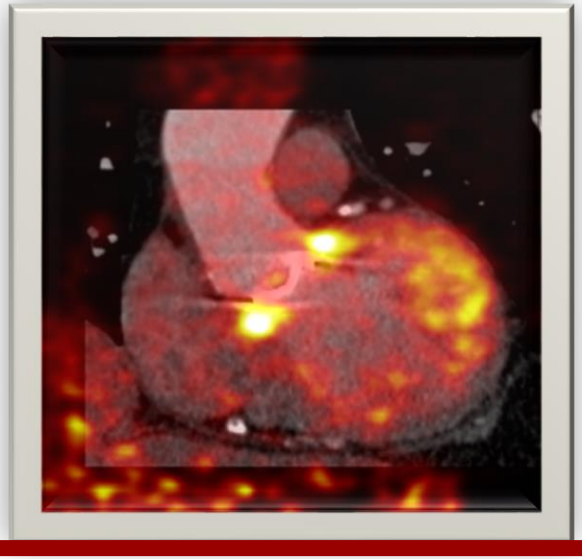
Improving the diagnosis of infective endocarditis in prosthetic valves and intracardiac devices with ^{18}F-FDG-PET/CT-Angiography: initial results at an infective endocarditis referral center.



Pizzi et al. Circulation 2015 in press



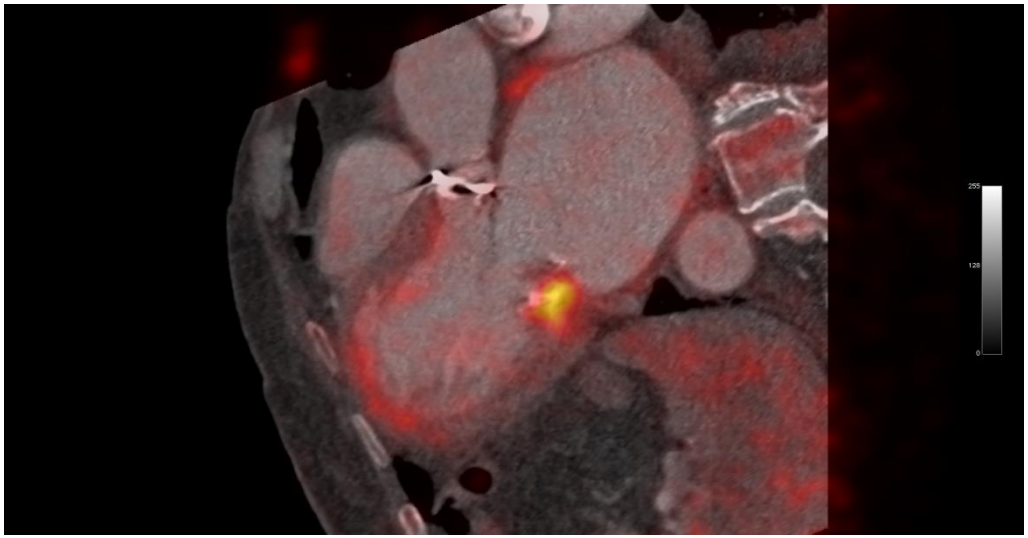




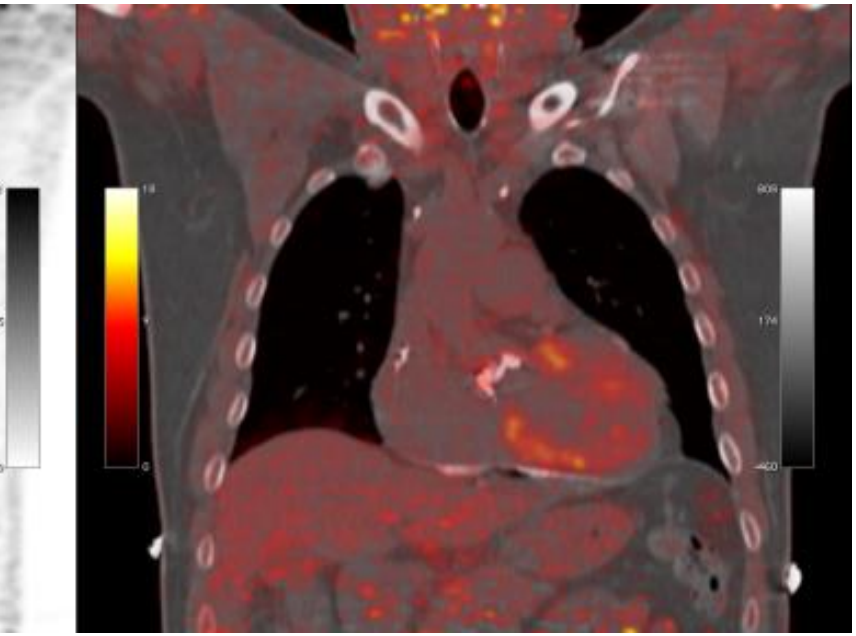
Pt with an aortic PV + aortic tube
Eco: perprosthetic abscess
PET/CTA + on the valve, negative on the tube

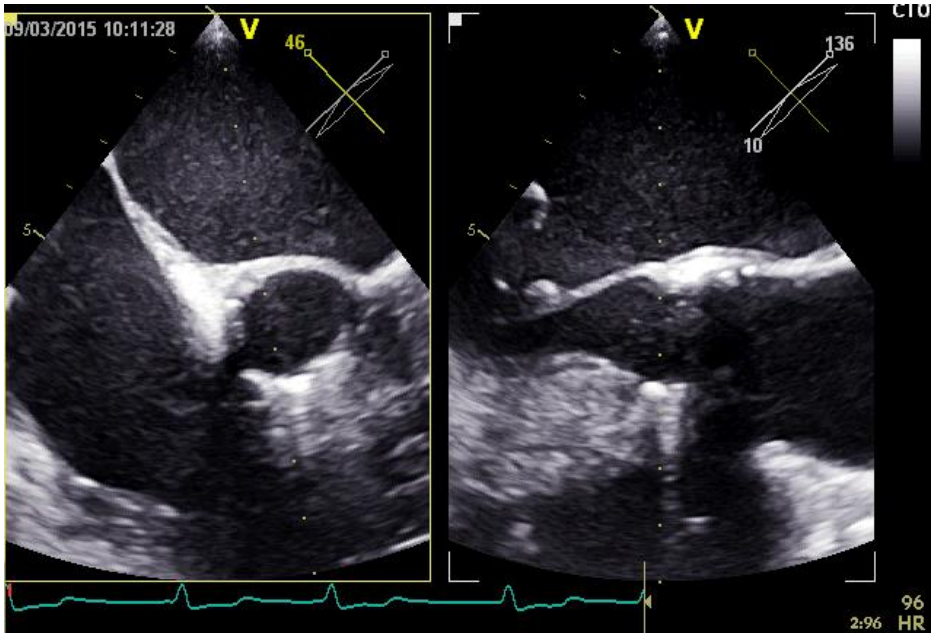
Surgery: AV surgery

Vall d'Hebron
Hospital



Patient with prosthetic AV and mitral valve IE diagnosed by ECHO.
PET /CTA positive mitral, negative on the prosthetic AV
Surgery: mitral valve replacement





Patient with a prosthetic AV, fever and 1 positive BC
Doubtful ECHO
PET/CTA negative
No AB. Follow up

Vall d'Hebron
Hospital

ESC 2015 modified criteria for diagnosis of IE: *Major 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.

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ESC 2015 modified criteria for diagnosis of IE: *Minor criteria*

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 only by imaging)**: 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.

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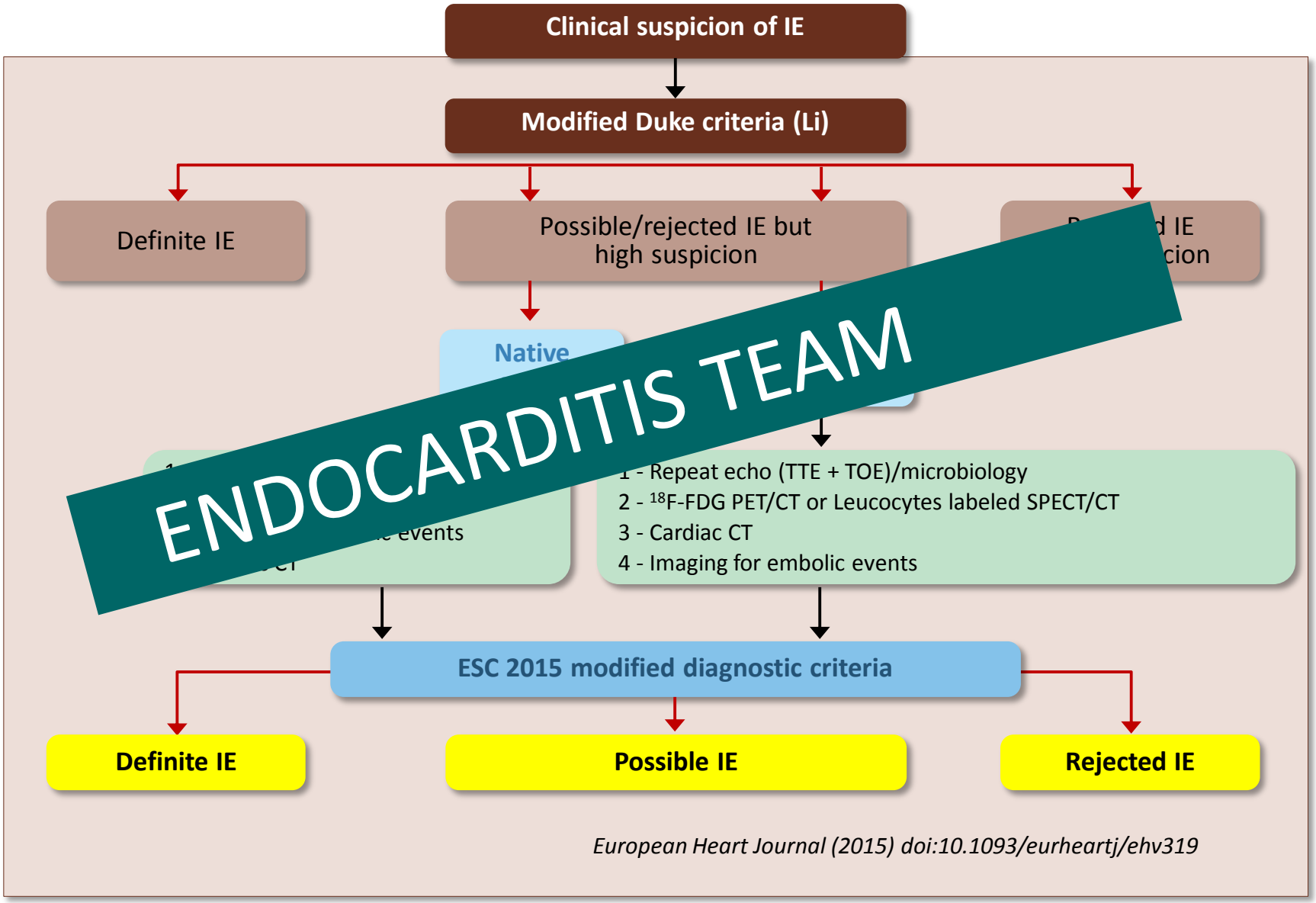

ENDOCARDITIS TEAM

European Heart Journal (2015) doi:10.1093/eurheartj/ehv319