Sesión de casos clínicos/ Imágenes

Ernesto V. Garcia, PhD*
Emory University School of Medicine

Curso Regional de Tecnicas Avanzadas, Cardiologia Nuclear
OEIA y Fundacion CardioInfantil
Bogota, Colombia
Noviembre 5 a 9 de 2012

- *receives royalties from the sale of the following software programs: Emory Cardiac Toolbox, PERFEX, Heartfusion, Synctool and ExSPECT II.
- * Consultant for Lantheus
- *receives research funding from GE, and has an equity position with Syntermed inc.

Ejemplo Normal #1

9122358

1. Como interpretaria este estudio?

A. Cannot interpret due to technical artifacts
B. Normal
C. One vessel disease
D. Two vessel disease
E. Three vessel disease

Newda

- Demographic:
  - 45 years old, male,
  - Weight: 150 lb, Height: 68”, Chest: 32”
- Clinical Data:
  - Clinical history of chest pain
- Protocol:
  - Rest Thallium-201– Stress Sestamibi-99mTc
  - Maximal stress test on treadmill

1. Como interpretaria este estudio?

A. Cannot interpret due to technical artifacts
B. Normal
C. One vessel disease
D. Two vessel disease
E. Three vessel disease

2. Como interpreto ECTb este estudio?

A. Cannot interpret due to technical artifacts
B. Normal
C. One vessel disease
D. Two vessel disease
E. Three vessel disease

Purja (Extent, Prognosis – STSS & SSS)

- Demographic:
  - 70 years old, male, white
  - Weight: 168 lb, Height: 63”, Chest: 42”
- Clinical Data:
  - Smoke for 30 years
  - Clinical history of arterial hypertension, and hypercholesterolemia
  - Previous myocardial infarction (1968)
- Protocol:
  - Rest Thallium-201 – Stress Sestamibi-99mTc
  - Pharmacologic stress with dipyridamole

2. Como interpreto ECTb este estudio?

A. Cannot interpret due to technical artifacts
B. Normal
C. One vessel disease
D. Two vessel disease
E. Three vessel disease

Fleli

What is Wrong With This Study?

A. Patient motion or cardiac creep

B. Incorrect oblique axis selection

C. Incorrect base selection

D. Gating error

E. Incorrect ejection fraction

Fleli

What is Wrong With This Study?

A. Patient motion or cardiac creep

B. Incorrect oblique axis selection

C. Incorrect base selection

D. Gating error

E. Incorrect ejection fraction

Fleli

What is Wrong With This Study?

A. Patient motion or cardiac creep

B. Incorrect oblique axis selection

C. Incorrect base selection

D. Gating error

E. Incorrect ejection fraction

Ejemplo Normal #2

9123343

Allan

What is Wrong With This Study?

A. Patient motion or cardiac creep

B. Incorrect oblique axis selection

C. Incorrect base selection

D. Gating error

E. Incorrect ejection fraction

Allan

What is Wrong With This Study?

A. Patient motion or cardiac creep

B. Incorrect oblique axis selection

C. Incorrect base selection

D. Gating error

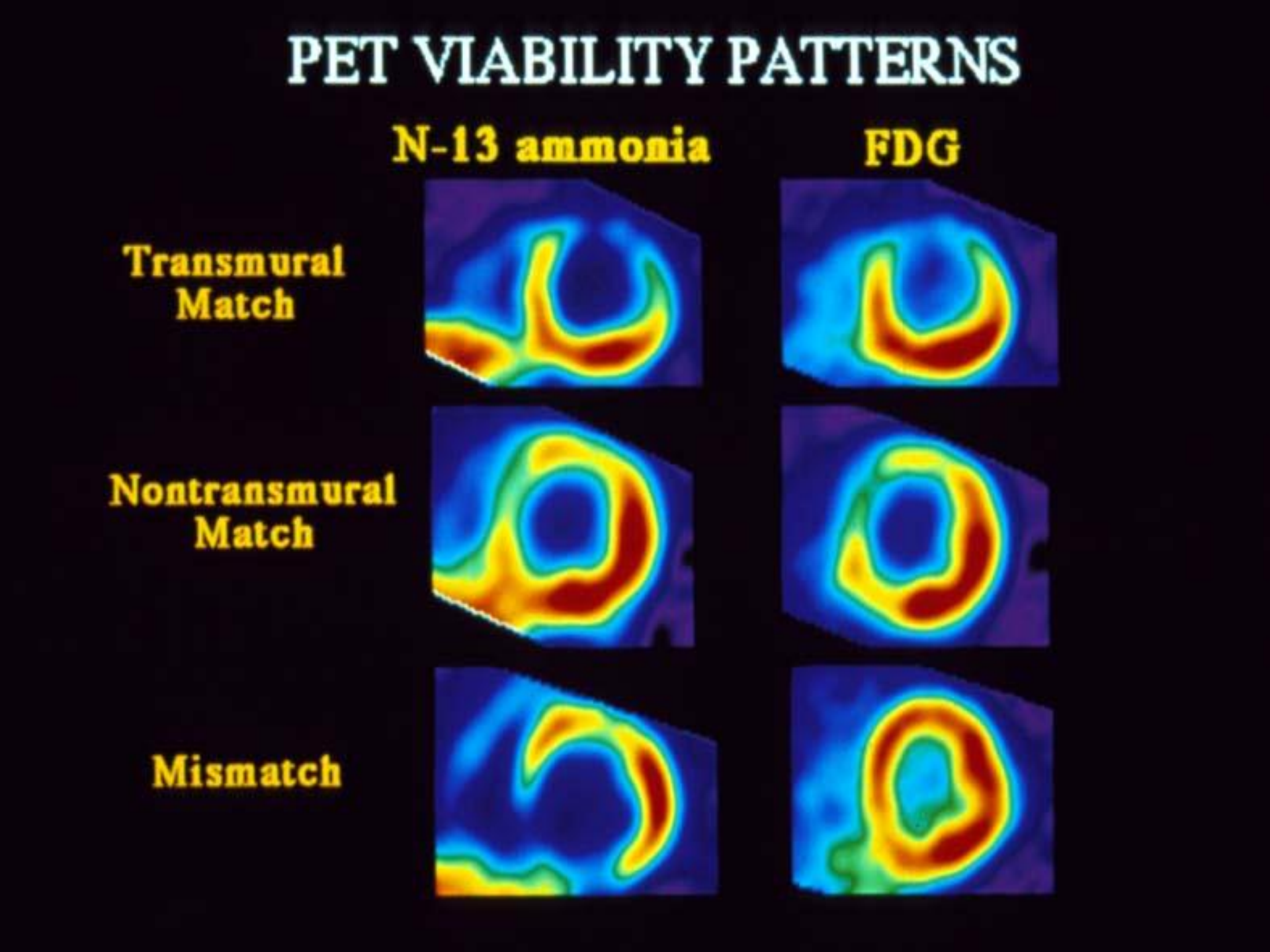
E. Incorrect ejection fraction

Post

CAD Progress over 3 yrs: Cooja

- 2000
- 2001
- 2002

PET VIABILITY PATTERNS



Grida

(CD Case # 6)

History:

- 63-year-old, white male with past medical history of 2 prior MI, 2 prior angioplasties and CHF who was admitted in the hospital because of inferior acute myocardial infarction. He also has a history of diabetes and hypertension.

- Cardiac catheterization (8 days prior) demonstrating multiple 90% lesions in the proximal and mid LAD, 90% proximal LCX, 100% RCA. Severe global hypokinesis with EF of 10 to 15%.

Reason for referral for PET Rb/FDG:

- Assessment of viable myocardium after MI in patients with heart failure previous cardiac surgery.

Grida

Outcome:

- The patient was treated medically. Three months after PET images the patient died. The primary cause of death was cardiac (MI plus CHF).

Teaching point:

- Worse outcome in patients with mismatch pattern that are treated medically.
- High mortality rate in patients with low ejection fraction plus high left ventricular volume.
- Compare to TopCr

Haljo

History:

- 55 years old, male, with clinical history of CHF class 3, and arterial hypertension. He was admitted to the hospital because acute myocardial infarction. Coronary angiography showed a 90% lesion in the LAD, and a 90% lesion in the RCA/PDA. Contrast Ventriculography showed wall motion abnormality, and LVEF = 16%.

Reason for referral for PET Rb/FDG study:

- Assessment of myocardial viability prior myocardial revascularization.

Haljo

Outcome:

- The patients was treated medically while waiting for cardiac transplant.
- Eight months after PET studies the patient underwent successful heart transplantation. Six years later the patient is doing well.

Teaching point:

- Incremental prognostic value of the left ventricular function over myocardial viability. PET images show a predominant match pattern but with low EF and high LV volumes.

Johne

History:

- 72-year-old female with prior history of hypertension. She was admitted to the hospital because myocardial infarction and heart failure. The patient underwent cardiac catheterization on the day of admission and was found to have moderate CAD with an 80% mid left anterior descending lesion and a 60 % distal right coronary artery lesion. Her ejection fraction was estimated to be approximately 35 to 40%.

Reason for referral for PET Rb/FDG study:

- Assessment of viable myocardium after MI.

Johne

Outcome:

- The patients was treated medically.
- During the last 6 years the patient did not develop any cardiac complication and continues medical treatment.

Teaching point:

- PET imaging example of match pattern and mild reduced LV function.

Gracias

Taller de Resincronización

Ernesto V. Garcia, PhD*
Emory University School of Medicine

Curso Regional de Tecnicas Avanzadas, Cardiologia Nuclear
OEIA y Fundacion CardioInfantil
Bogota, Colombia
Noviembre 5 a 9 de 2012

- *receives royalties from the sale of the following software programs: Emory Cardiac Toolbox, PERFEX, Heartfusion, Synctool and ExSPECT II.
- * Consultant for Lantheus
- *receives research funding from GE, and has an equity position with Syntermed inc.

Ejemplo Normal #3

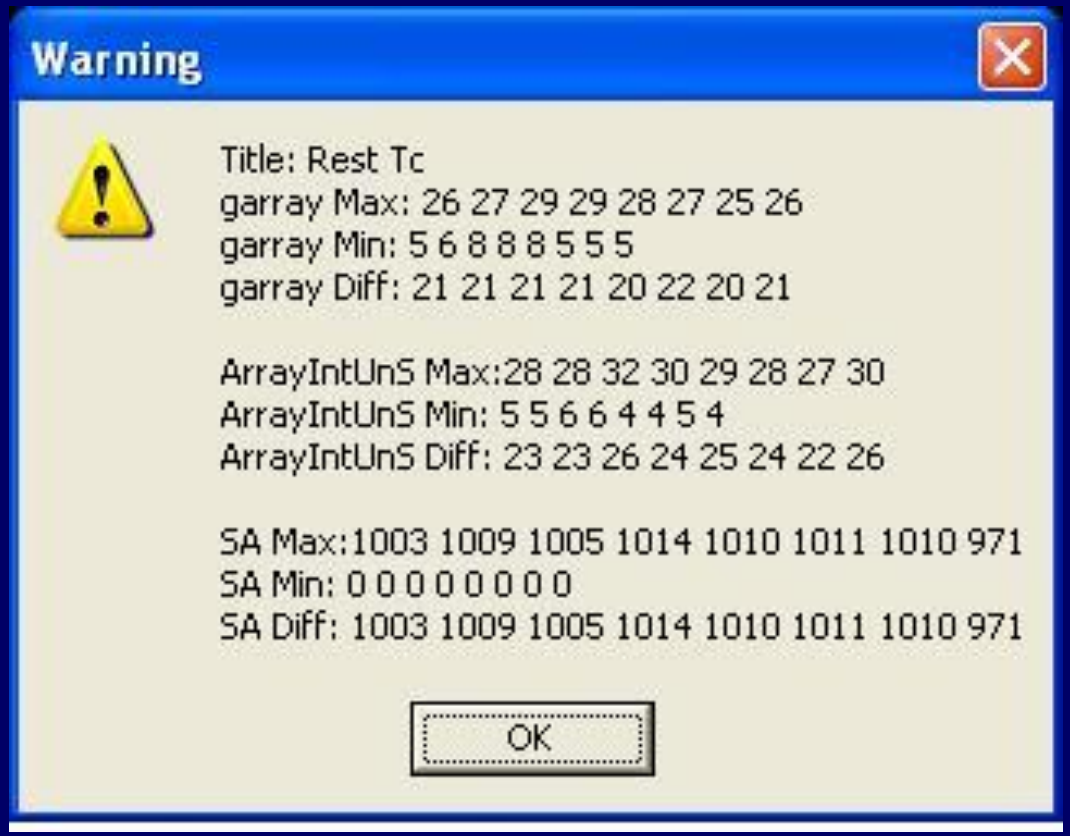
20274370

Criterio de Cuentas

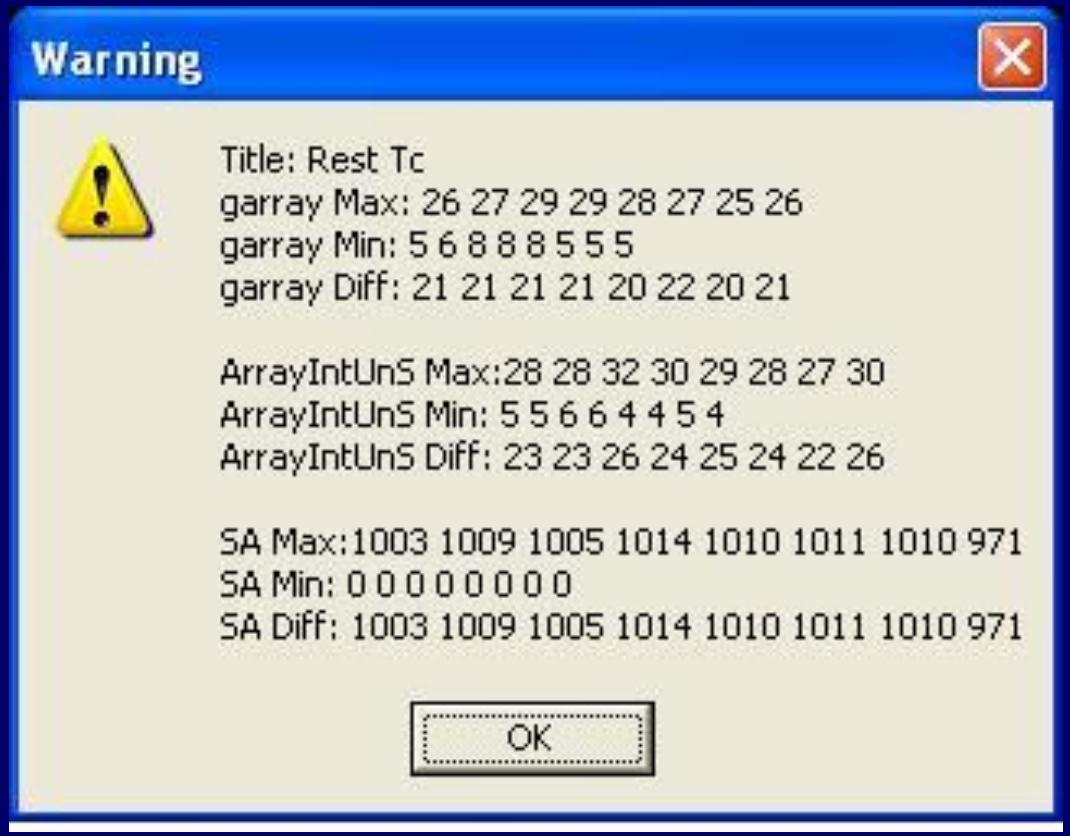
Technical Quality	**Max Counts in Gated LV**
Adequate	>80 (300 typical)
Marginal	20-80
Inadequate	<20

Estudio sin suficiente cuenta

Retroproyeccion Filtrada

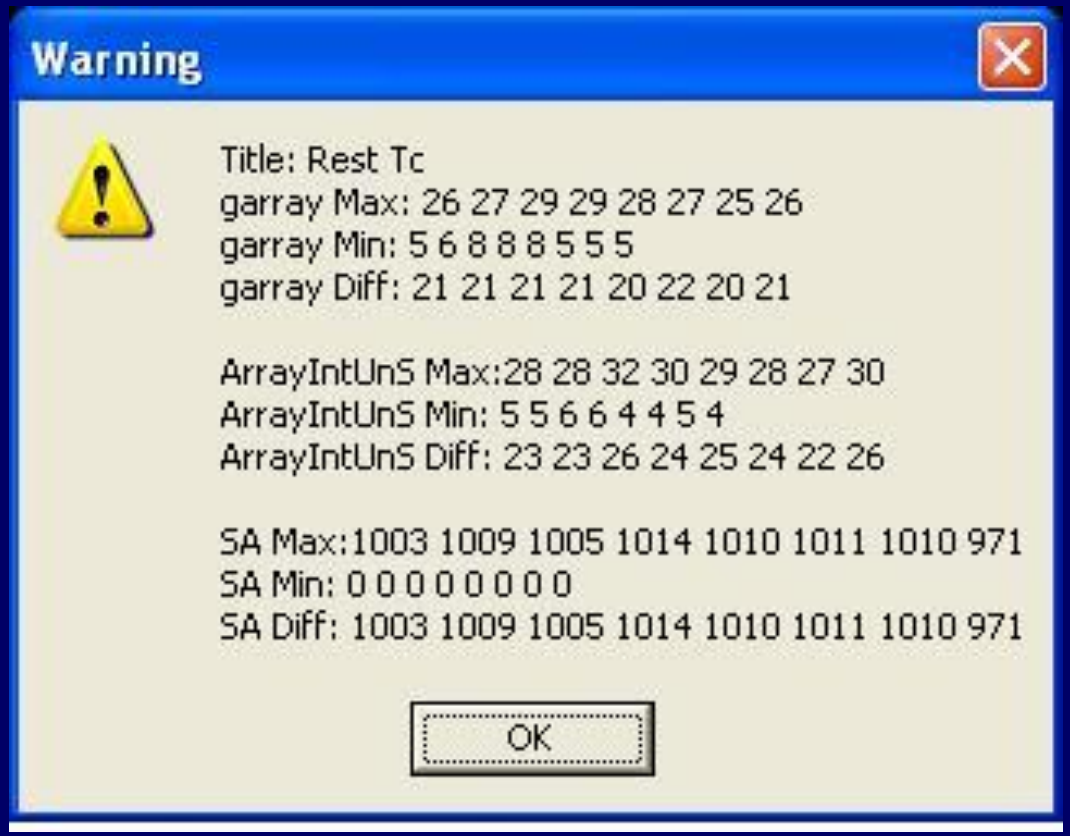


Estudio sin suficiente cuenta Retroproyeccion Filtrada + Pre Filter



Estudio sin suficiente cuentas

Reconstruccion Iterativa



Control de Calidad de la Base del Ventriculo Izquierdo

Ejemplo: infarcto no transmural?

Ejemplo: infarcto transmural?

WesRo

- 63 y/o male, 71’’, 204 lbs. with known hypercholesterolemia and without other cardiac risk factors was diagnosed to have LBBB in 2001. Stress echo showed a normal study.
- In 2002 reported atypical chest pain not related to exercise.
- He was referred for a dual-isotope rest-Tl-201/ ECG-gated Exercise stress Tc-99m sestamibi MPI study to rule out myocardial ischemia.
- The patient exercised for 7.5 minutes and reached 140 bpm > 85% of the predicted max heart rate with no symptoms. The EKG was non diagnostic due to LBBB.

WesRo

What is Wrong With This Study?

A. Patient motion or cardiac creep

B. Incorrect oblique axis selection

C. Incorrect base selection

D. Gating error

E. Incorrect form of stress

WesRo

What is Wrong With This Study?

A. Patient motion or cardiac creep

B. Incorrect oblique axis selection

C. Incorrect base selection

D. Gating error

E. Incorrect form of stress

Adenosine

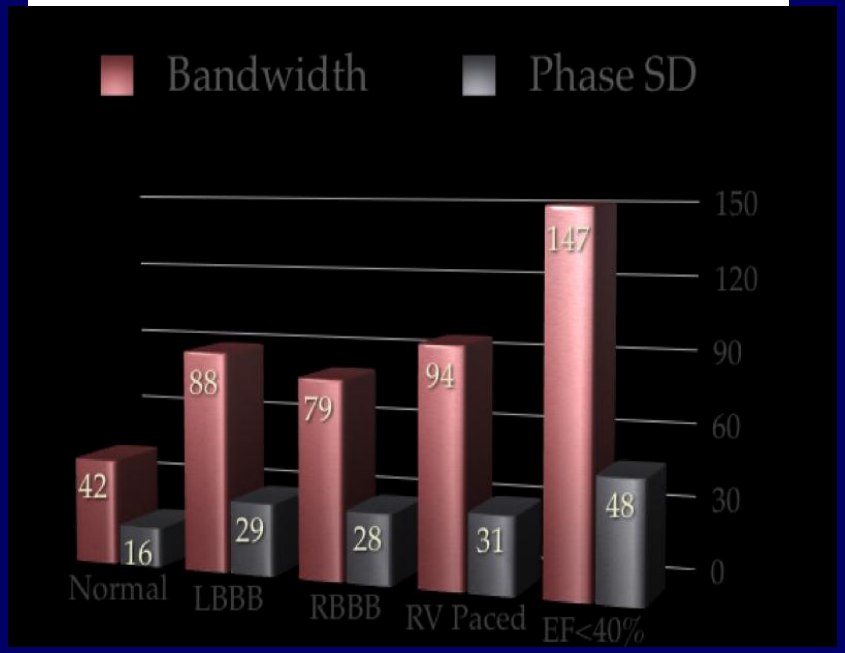
Evaluacion clinica: Comparasion entre pacientes con diferente cardiopatias

- LV dyssynchrony measured by phase analysis was compared between LBBB (n=33), RBBB (n=19), RV paced (n=23), and LVEF<40% (n=120) and normal controls (n=157)
- Phase standard deviation and histogram bandwidth differentiated these cohorts, who were expected to have different degrees of LV dyssynchrony
- Trimble MA, Borges-Neto S et al, JNC 2007; 12:298-307

ORIGINAL ARTICLES

Evaluation of left ventricular mechanical dyssynchrony as determined by phase analysis of ECG-gated SPECT myocardial perfusion imaging in patients with left ventricular dysfunction and conduction disturbances

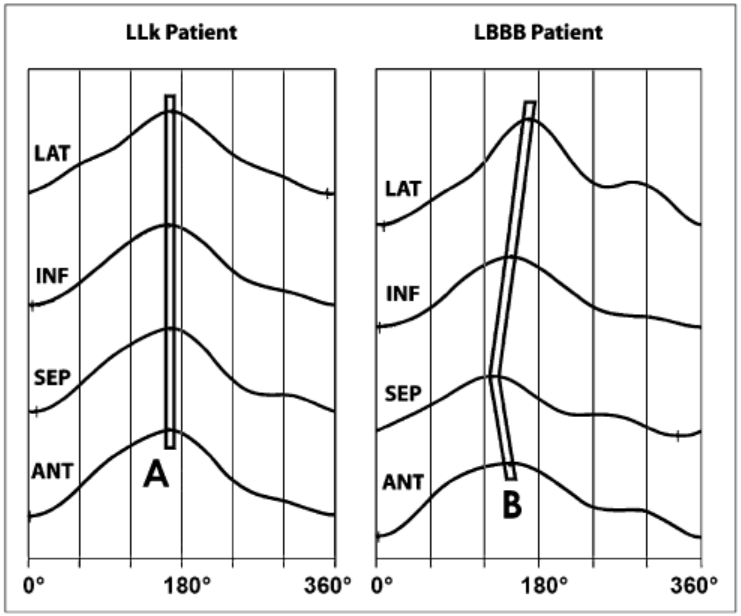
Mark A. Trimble, MD,[a,c] Salvador Borges-Neto, MD,[a,b,c] Stuart Smallheiser, MD,[e] Ji Chen, PhD,[f] Emily F. Honeycutt,[c] Linda K. Shaw,[c] Jaekyeong Heo, MD,[d] Robert A. Pagnanelli, CNMT, NCT,[b] E. Lindsey Tauxe, MEd,[d] Ernest V. Garcia, PhD,[f] Fabio Esteves, MD,[f] Frank Seghatol-Eslami, MD,[d] G. Neal Kay, MD,[e] and Ami E. Iskandrian, MD[e]



Automatic Global and Regional Phase Analysis from Gated Myocardial Perfusion SPECT Imaging: Application to the Characterization of Ventricular Contraction in Patients with Left Bundle Branch Block

Serge D. Van Kriekinge[1,2], Hidetaka Nishina[3], Muneo Ohba[4], Daniel S. Berman[1,2], and Guido Germano[1,2]

[1]Department of Imaging and Medicine, Cedars-Sinai Medical Center, Los Angeles, California; [2]David Geffen School of Medicine, University of California at Los Angeles, Los Angeles, California; [3]Division of Cardiology, Tsukuba Medical Center Hospital, Tsukuba, Japan; and [4]Heart Center, Tazuke Kofukai Medical Research Institute, Kitano Hospital, Osaka, Japan



ΔM_S: AUC = 0.95, Ss = 88%, Sp = 90%, and Th = 10.5°) than for global parameters (σ: AUC = 0.75/0.67, Ss = 81%/66%, Sp = 63%/64%, and Th = 16.5°/22.2° for women/men; β: AUC = 0.80/0.72, Ss = 71%/71%, Sp = 79%/64%, and Th = 69°/81° for women/men). **Conclusion:** The computed parameters all discriminate effectively between LLk and LBBB populations. Measurements that are less dependent on the shape of the phase-angle distribution histogram provided higher sensitivity and specificity for this purpose. Further study is needed to evaluate these parameters for the purpose of predicting response to CRT.

Key Words: left ventricular dyssynchrony; left bundle branch block; cardiac resynchronization therapy; myocardial perfusion gated SPECT

J Nucl Med 2008; 49:1790–1797
DOI: 10.2967/jnumed.108.055160

Predicting response to CRT: Clinical considerations

- Patient in HF NYHA Class III or IV?
- LVEF < 35%?
- LV dyssynchronous?
  - QRS > 130 ms (electrically)
  - Mechanically (accurately and reproducibly)
- Is wall for lead placement viable?
  - Bleeker et al, Circulation 2006; 113:969-976
- Is LV lead placed at the latest viable mechanical activation site?
  - Boogers, Chen et al, Eur J Nucl Med Mol Im 2011, 38:230-238

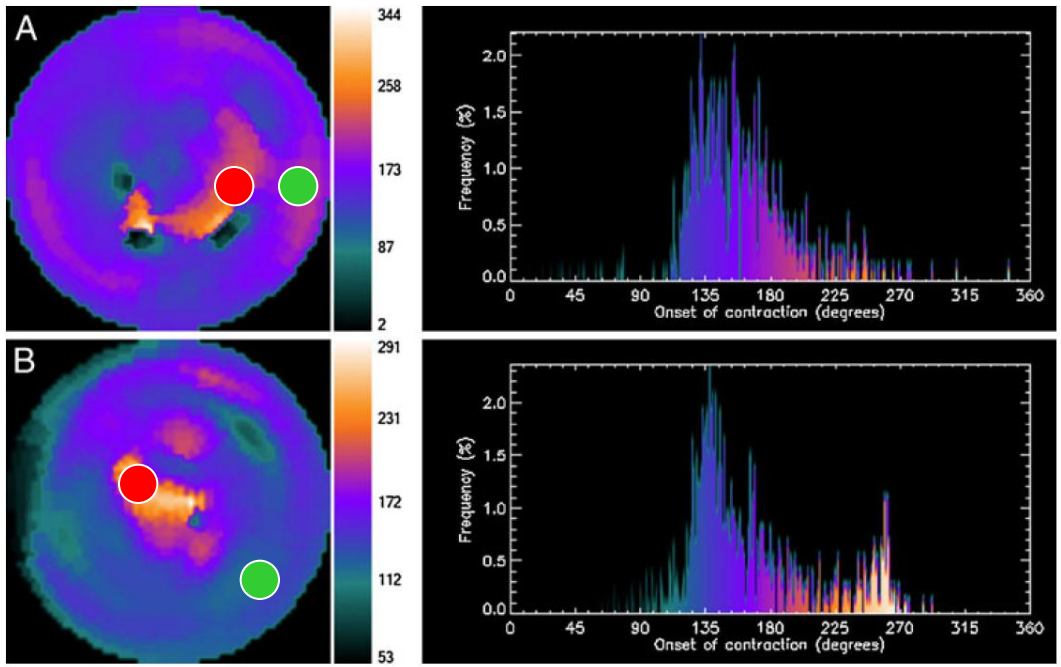
Ejemplo de un paciente con Chagas y con defecto de perfusion

Courtesy
Paola Smanio, MD

Ejemplo de un paciente con Chagas y sin defecto de perfusion

Courtesy
Paola Smanio, MD

Colocacion optima del electrodo VI de TRC en la region de engrosamiento ultimo

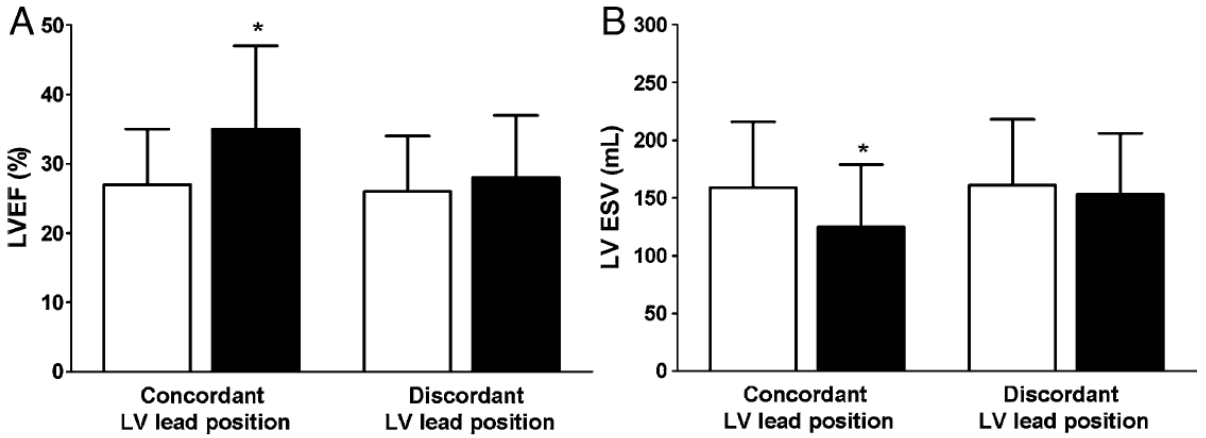


Concordant lead: 6 mo
ΔESV 139 ml → 86 ml
Δ EF 32% → 44%

Disoncordant lead: 6 mo
ΔESV 124 ml → 153 ml
Δ EF 27% → 22%

52 concordant /38 discordant

Baseline
6 months later



Boogers, Chen et al,
Eur J Nucl Med Mol Im
2011, 38:230-238

Cuales Pacientes Responderan al Tratamiento de Resincronización Biventricular?

Ejemplo #1

Antes y despues de Resincronización

Ejemplo #2

Antes y despues de Resincronización

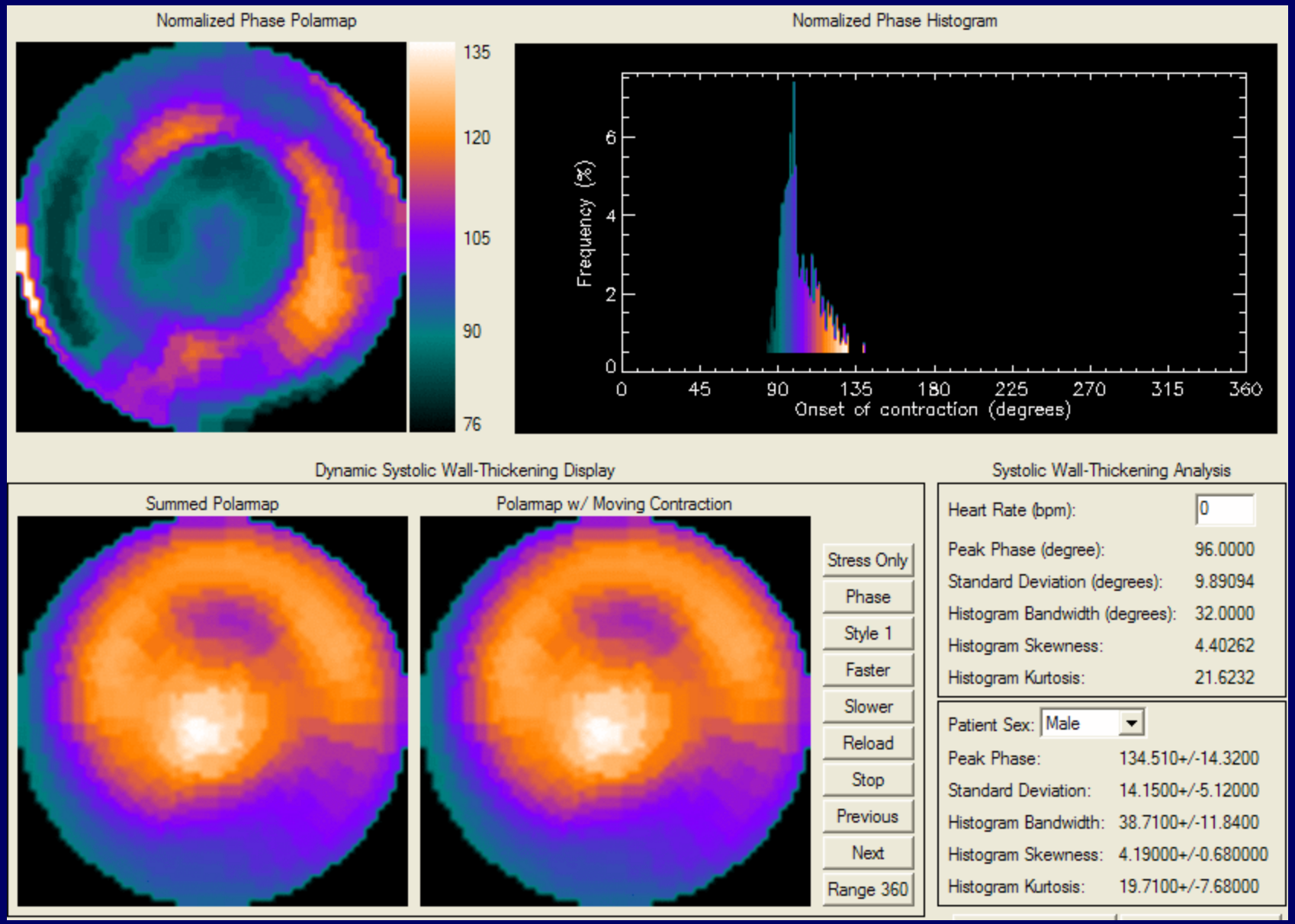
Donde colocar el electrodo?

Ejemplo #1

Ejemplo #2

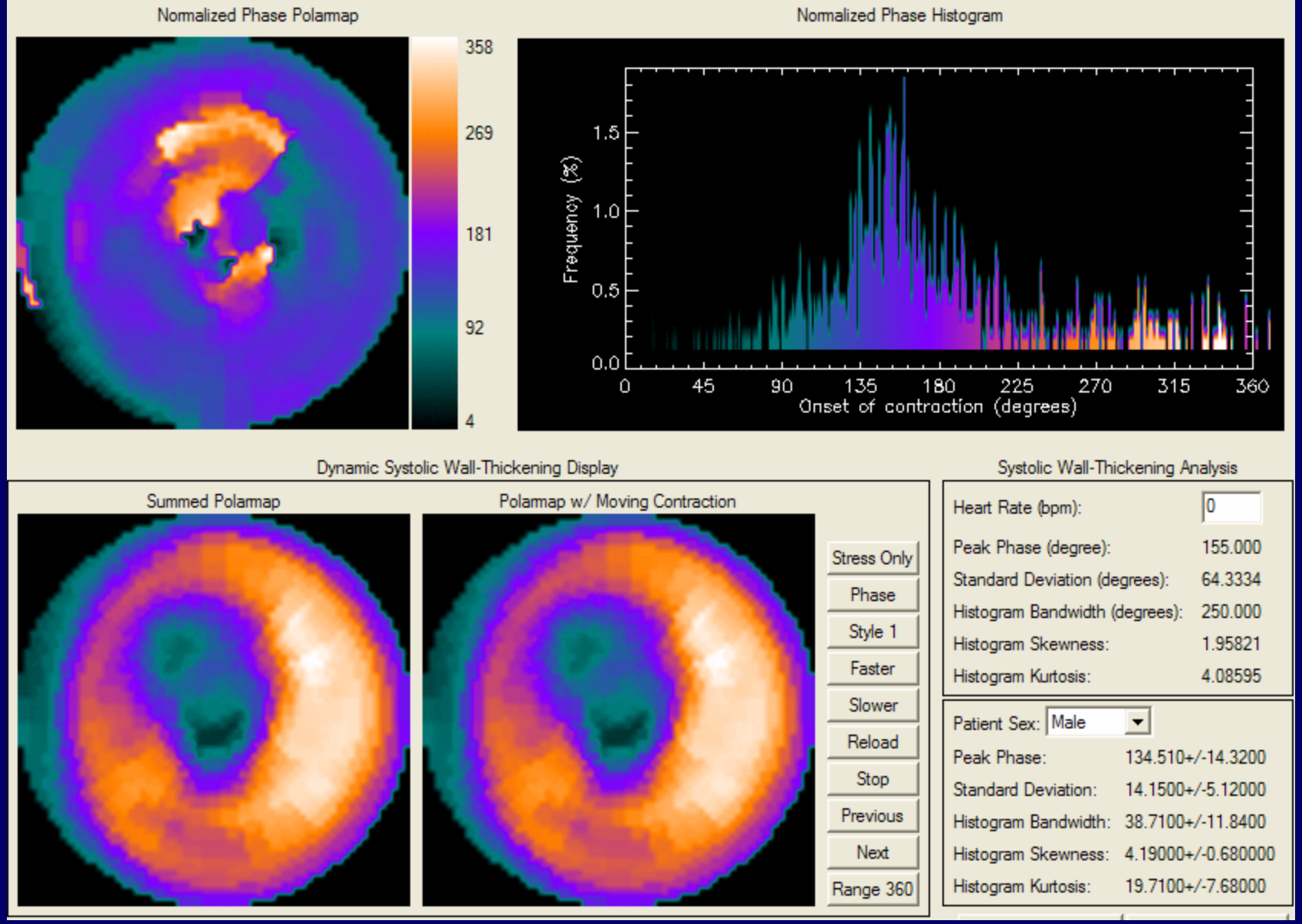
Ejemplo #3

Gracias



Class III Heart Failure
LVEF (Echo) = 32%

Patient with LVEF < 35% but retaining LV synchrony = NO CRT



Class III Heart Failure
LVEF (Echo) = 27%