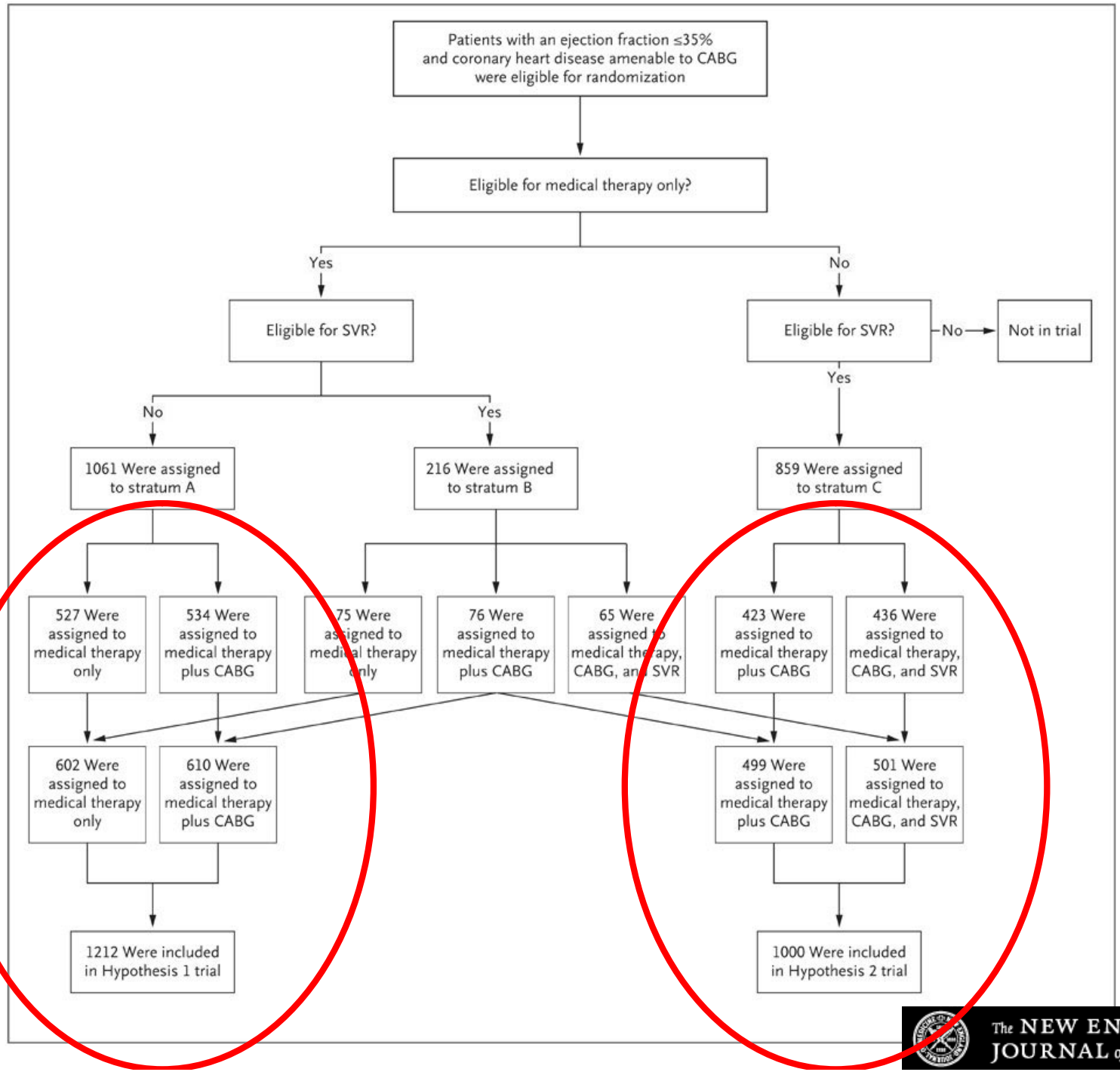
9° ΣΥΜΠΟΣΙΟ ΟΜΑΔΩΝ ΕΡΓΑΣΙΑΣ

Της Ελληνικής Εταιρείας Χειρουργών Θώρακος, Καρδιάς και Αγγείων

# Η χειρουργική θεραπεία στην καρδιακή ανεπάρκεια ισχαιμικής αιτιολογίας – Από τη STICH στη STICHES


Πολυχρόνης Αντωνίτσης

Επ. Καθηγητής Καρδιοχειρουργικής Α.Π.Θ.

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ESTABLISHED IN 1812 APRIL 23, 2009 VOL. 360 NO. 17

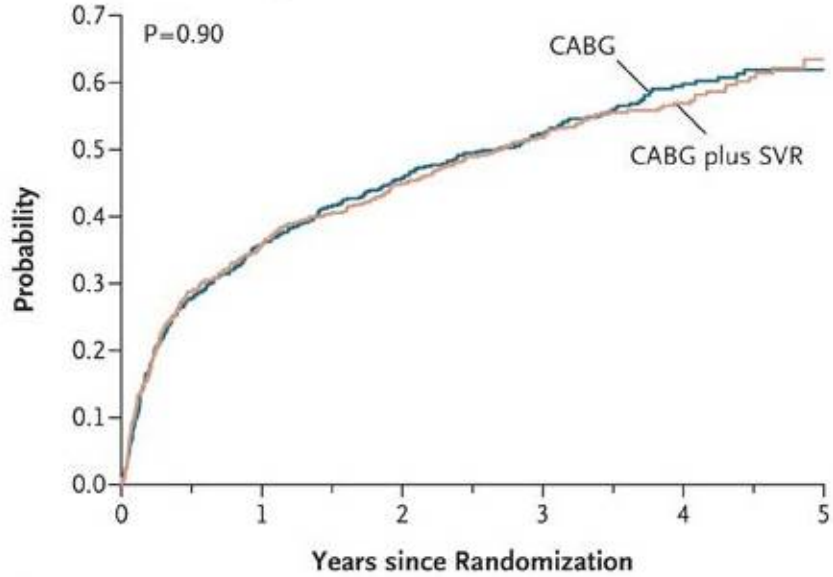
# Coronary Bypass Surgery with or without Surgical Ventricular Reconstruction

Robert H. Jones, M.D., Eric J. Velazquez, M.D., Robert E. Michler, M.D., George Sopko, M.D., Jae K. Oh, M.D., Christopher M. O'Connor, M.D., James A. Hill, M.D., Lorenzo Menicanti, M.D., Zygmunt Sadowski, M.D., Patrice Desvigne-Nickens, M.D., Jean-Lucien Rouleau, M.D., and Kerry L. Lee, Ph.D., for the STICH Hypothesis 2 Investigators*

# Υπόθεση 2

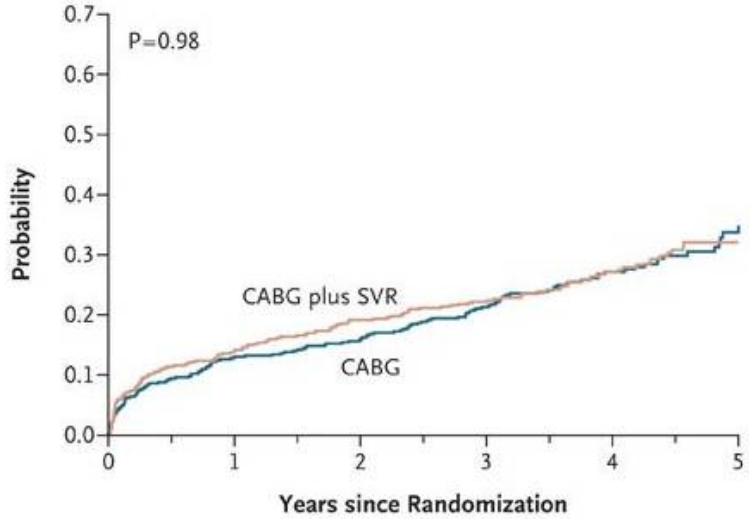
- 1000 ασθενείς
- 96 κέντρα
- 23 χώρες
- 1231 ημέρες

**A Death from Any Cause or Hospitalization for Cardiac Causes**




| No. at Risk | | | | | | |
|---|---|---|---|---|---|---|
| CABG | 499 | 319 | 270 | 220 | 99 | 23 |
| CABG plus SVR | 501 | 319 | 275 | 216 | 111 | 23 |

**B Death from Any Cause**




| No. at Risk | | | | | | |
|---|---|---|---|---|---|---|
| CABG | 499 | 434 | 417 | 363 | 201 | 59 |
| CABG plus SVR | 501 | 429 | 404 | 352 | 193 | 53 |

*Jones RH, et al. New Eng J Med 2009.*

**Table 2. Outcomes and Subsequent Procedures.***

| Variable | CABG Alone (N=499) | CABG with Surgical Ventricular Reconstruction (N=501) | Hazard Ratio (95% CI) | P Value |
|---|---|---|---|---|
| | *number (percent)* | | | |
| **Outcome** | | | | |
| Death from any cause or hospitalization for cardiac causes | 292 (59) | 289 (58) | 0.99 (0.84–1.17) | 0.90 |
| Death from any cause | 141 (28) | 138 (28) | 1.00 (0.79–1.26) | 0.98 |
| Death from any cause within 30 days after randomization (intention-to-treat analysis) | 22 (4) | 30 (6) | | 0.26 |
| Death from any cause within 30 days after surgery† | | | | |
| Intention-to-treat analysis | 25 (5) | 26 (5) | | 0.88 |
| As-treated analysis | 23 (5) | 28 (6) | | 0.40 |
| Hospitalization | | | | |
| For any cause | 272 (55) | 268 (53) | 0.98 (0.83–1.16) | 0.82 |
| For cardiac causes | 211 (42) | 204 (41) | 0.97 (0.80–1.18) | 0.73 |
| Acute myocardial infarction | 22 (4) | 20 (4) | 1.01 (0.54–1.87) | 0.96 |
| Stroke | 31 (6) | 23 (5) | 0.77 (0.45–1.32) | 0.35 |
| **Subsequent procedure‡** | | | | |
| CABG | 0 | 1 (<1) | | |
| Placement of left ventricular assist device | 2 (<1) | 2 (<1) | | |
| Heart transplantation | 2 (<1) | 7 (1) | | |
| Percutaneous coronary intervention | 32 (6) | 17 (3) | | |
| Placement of pacemaker | | | | |
| For resynchronization | 31 (6) | 30 (6) | | |
| For heart rate | 44 (9) | 47 (9) | | |
| Placement of implantable cardioverter–defibrillator | 100 (20) | 86 (17) | | |

*Jones RH, et al. New Eng J Med 2009.*

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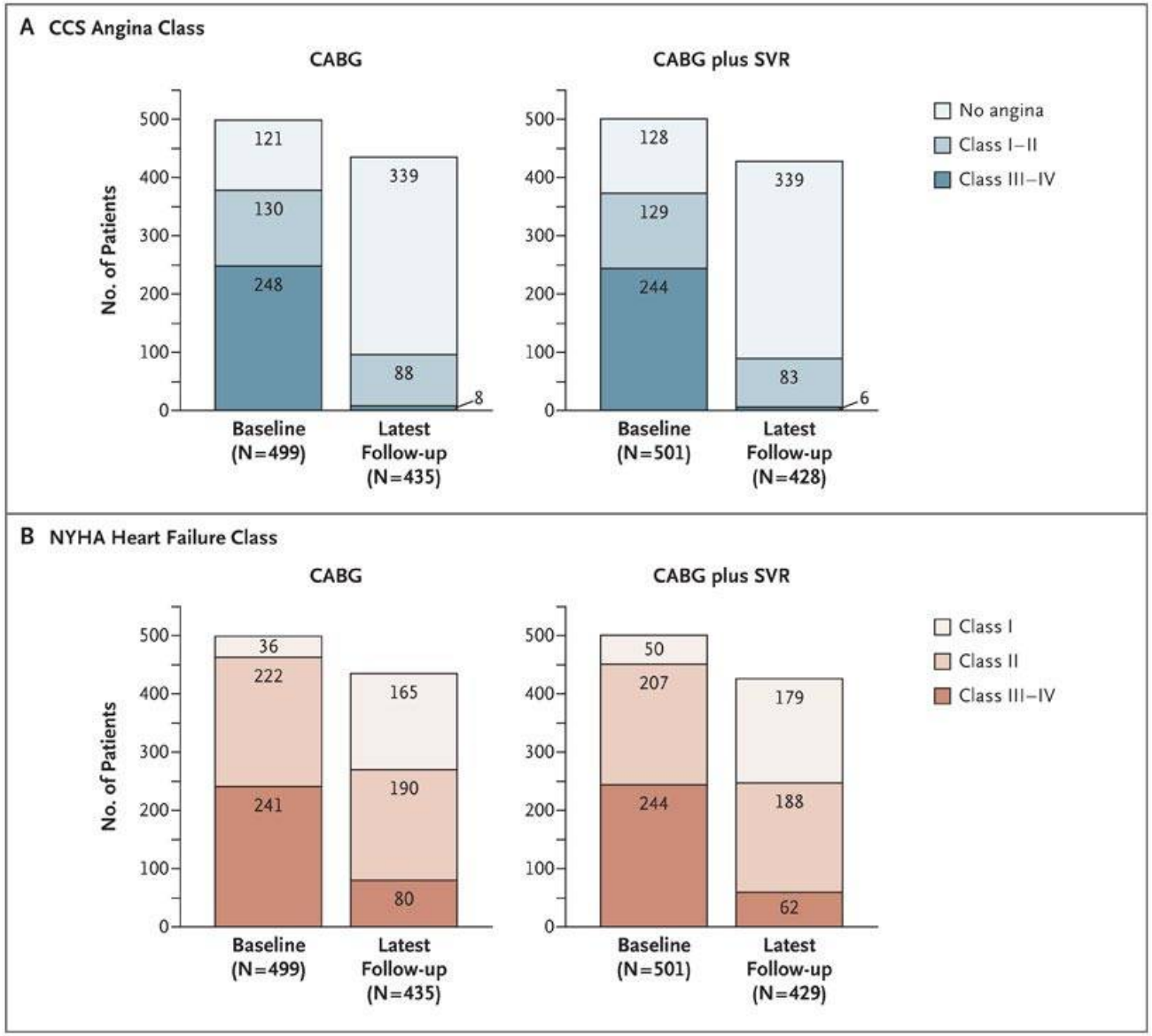


*Jones RH, et al. New Eng J Med 2009.*

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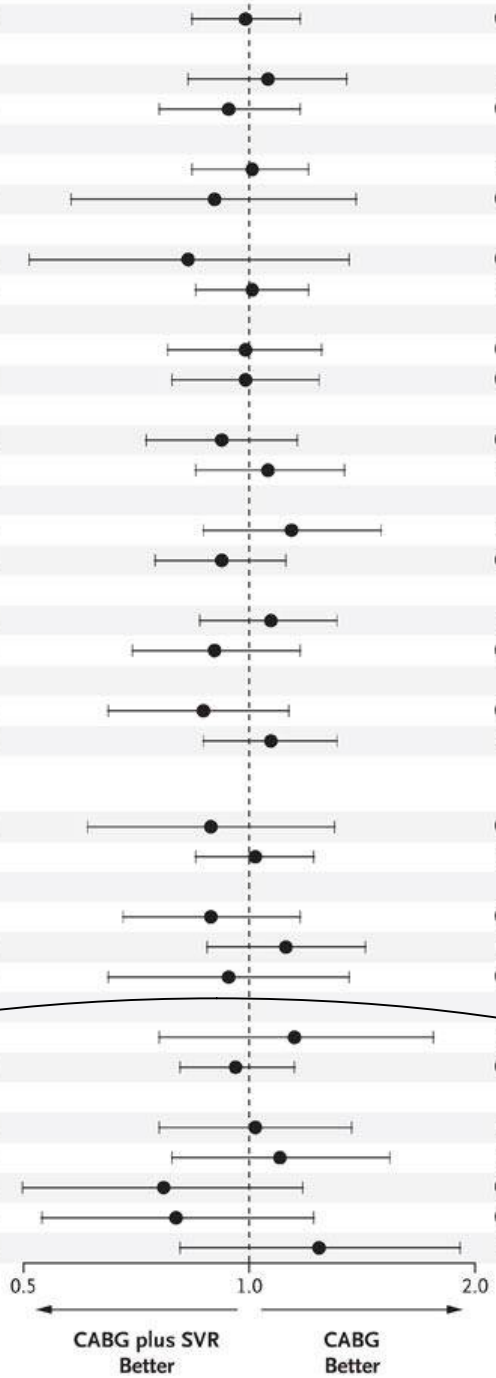
| Subgroup | No. of Patients | Hazard Ratio for Event (95% CI) | P Value for Interaction |
|---|---|---|---|
| All patients | 1000 | 0.99 (0.84–1.17) | |
| Age | | | 0.48 |
| ≥65 yr | 391 | 1.06 (0.83–1.35) | |
| <65 yr | 609 | 0.94 (0.76–1.17) | |
| Sex | | | 0.60 |
| Male | 853 | 1.01 (0.84–1.20) | |
| Female | 147 | 0.90 (0.58–1.39) | |
| Race | | | 0.44 |
| Black or other | 124 | 0.83 (0.51–1.36) | |
| White | 876 | 1.01 (0.85–1.20) | |
| NYHA heart failure class | | | 0.97 |
| I or II | 515 | 0.99 (0.78–1.25) | |
| III or IV | 485 | 0.99 (0.79–1.24) | |
| CCS angina class | | | 0.39 |
| No angina or ≤ class II | 508 | 0.92 (0.73–1.16) | |
| Class III or IV | 492 | 1.06 (0.85–1.34) | |
| Baseline diabetes | | | 0.20 |
| Yes | 344 | 1.14 (0.87–1.50) | |
| No | 656 | 0.92 (0.75–1.12) | |
| LVEF | | | 0.33 |
| ≤28% | 534 | 1.07 (0.86–1.31) | |
| >28% | 466 | 0.90 (0.70–1.17) | |
| No. of vessels with stenosis of ≥50% | | | 0.21 |
| 1 or 2 | 362 | 0.86 (0.65–1.13) | |
| 3 | 638 | 1.07 (0.87–1.31) | |
| LM stenosis of ≥50% or proximal LAD stenosis of ≥75% | | | 0.53 |
| No | 179 | 0.89 (0.61–1.30) | |
| Yes | 821 | 1.02 (0.85–1.22) | |
| Mitral regurgitation | | | 0.44 |
| None or trace | 363 | 0.89 (0.68–1.17) | |
| Mild (≤2+) | 449 | 1.12 (0.88–1.43) | |
| Moderate or severe (3+ or 4+) | 178 | 0.94 (0.65–1.36) | |
| Stratum | | | 0.44 |
| B | 141 | 1.15 (0.76–1.76) | |
| C | 859 | 0.96 (0.81–1.15) | |
| Region | | | 0.41 |
| Poland | 288 | 1.02 (0.76–1.37) | |
| United States | 200 | 1.10 (0.79–1.54) | |
| Canada | 154 | 0.77 (0.50–1.18) | |
| Western Europe | 164 | 0.80 (0.53–1.22) | |
| Other | 194 | 1.24 (0.81–1.91) | |

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Recommendations on revascularizations in patients with chronic heart failure and systolic LV dysfunction (ejection fraction ≤35%)

| Recommendations | Class[a] | Level[b] | Ref[c] |
|---|---|---|---|
| CABG is recommended for patients with significant LM stenosis and LM equivalent with proximal stenosis of both LAD and LCx arteries. | I | C | - |
| CABG is recommended for patients with significant LAD artery stenosis and multivessel disease to reduce death and hospitalization for cardiovascular causes. | I | B | 112,288 |
| LV aneurysmectomy during CABG should be considered in patients with a large LV aneurysm, if there is a risk of rupture, large thrombus formation or the aneurysm is the origin of arrhythmias. | IIa | C | |
| Myocardial revascularization should be considered in the presence of viable myocardium. | IIa | B | 55 |
| CABG with surgical ventricular restoration may be considered in patients with scarred LAD territory, especially if a post-operative LVESV index <70 ml/m² can be predictably achieved. | IIb | B | 291–295 |
| PCI may be considered if anatomy is suitable, in the presence of viable myocardium, and surgery is not indicated. | IIb | C | |

*2014 ESC/EACTS Guidelines on myocardial revascularization*

The NEW ENGLAND JOURNAL of MEDICINE

CORRESPONDENCE

Surgical Ventricular Reconstruction

# The STICH trial: Misguided conclusions

Gerald D. Buckberg, MD,[a] and Constantine L. Athanasuleas, MD[b]

EUROPEAN SOCIETY OF CARDIOLOGY®

European Journal of Heart Failure (2010) **12**, 1024–1027
doi:10.1093/eurjhf/hfq147

EDITORIAL

# The STICH trial unravelled

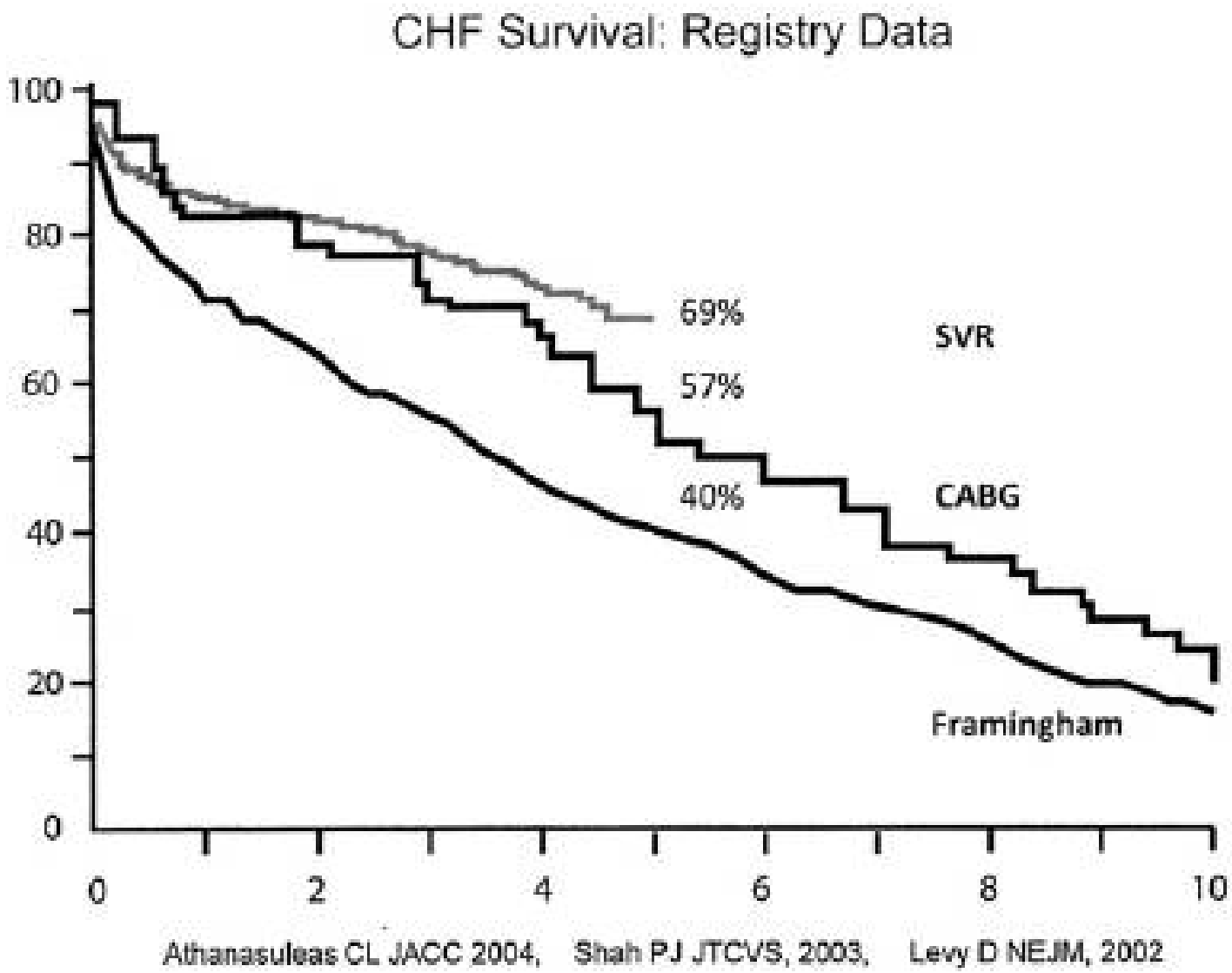
**Gerald D. Buckberg[1*], Constantine L. Athanasuleas[2], Andrew S. Wechsler[3], Friedhelm Beyersdorf[4], John V. Conte[5], and John E. Strobeck[6]**

# «Παραλειπόμενα» STICH

- Χαλάρωση κριτηρίων εισαγωγής κατά τη διάρκεια της μελέτης
- Ο τελο-συστολικός όγκος της ΑΚ (LVESI > 60 ml/m$^2$) έπαψε να αποτελεί κριτήριο εισόδου στη μελέτη
- EF≤ 35% παρέμεινε ως μοναδικό κριτήριο
- Μετατροπή από μελέτη ασθενών με καρδιακή ανεπάρκεια ισχαιμικής αιτιολογίας σε μελέτη ασθενών με στεφανιαία νόσο

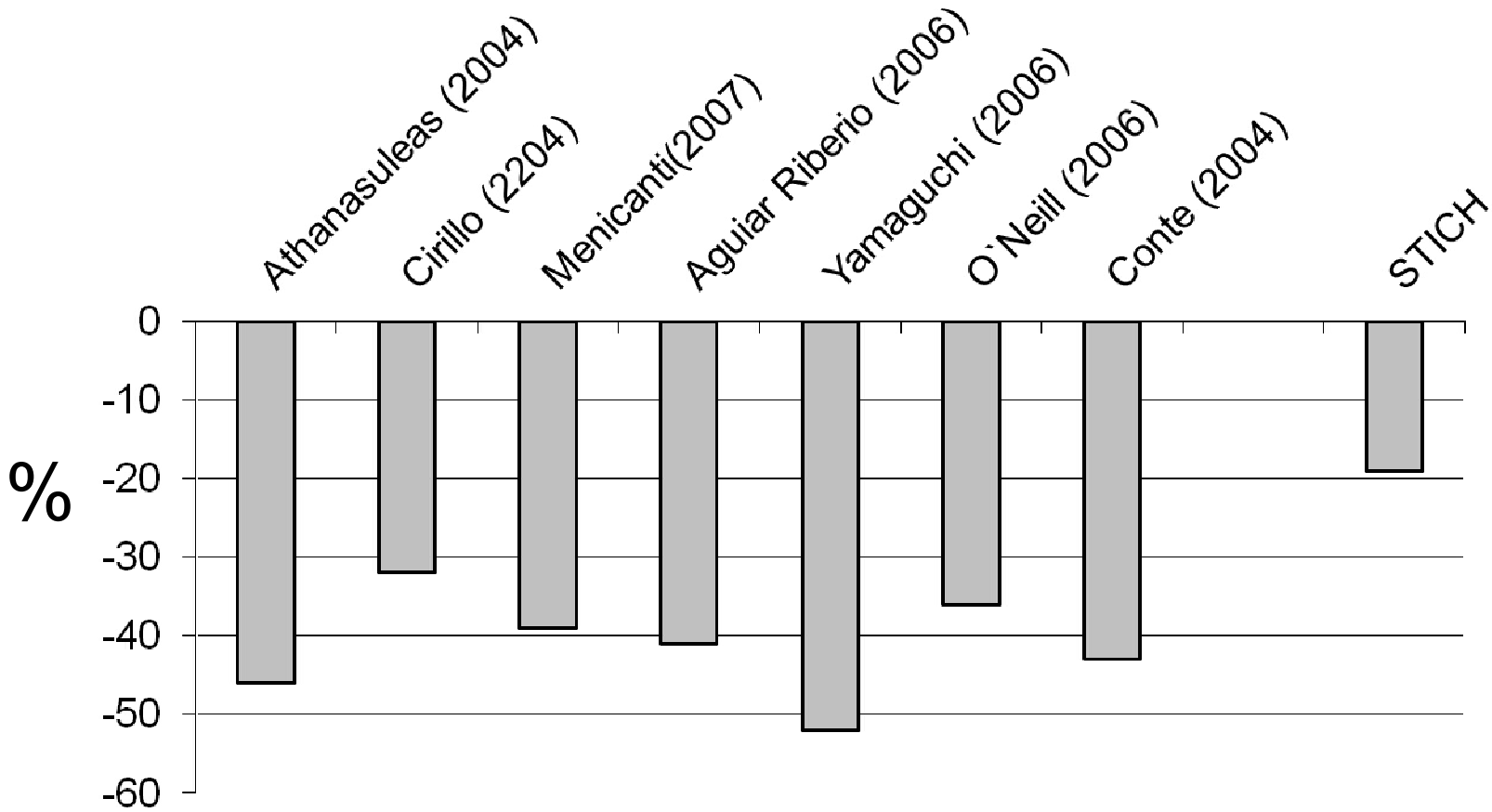
# «Παραλειπόμενα» STICH

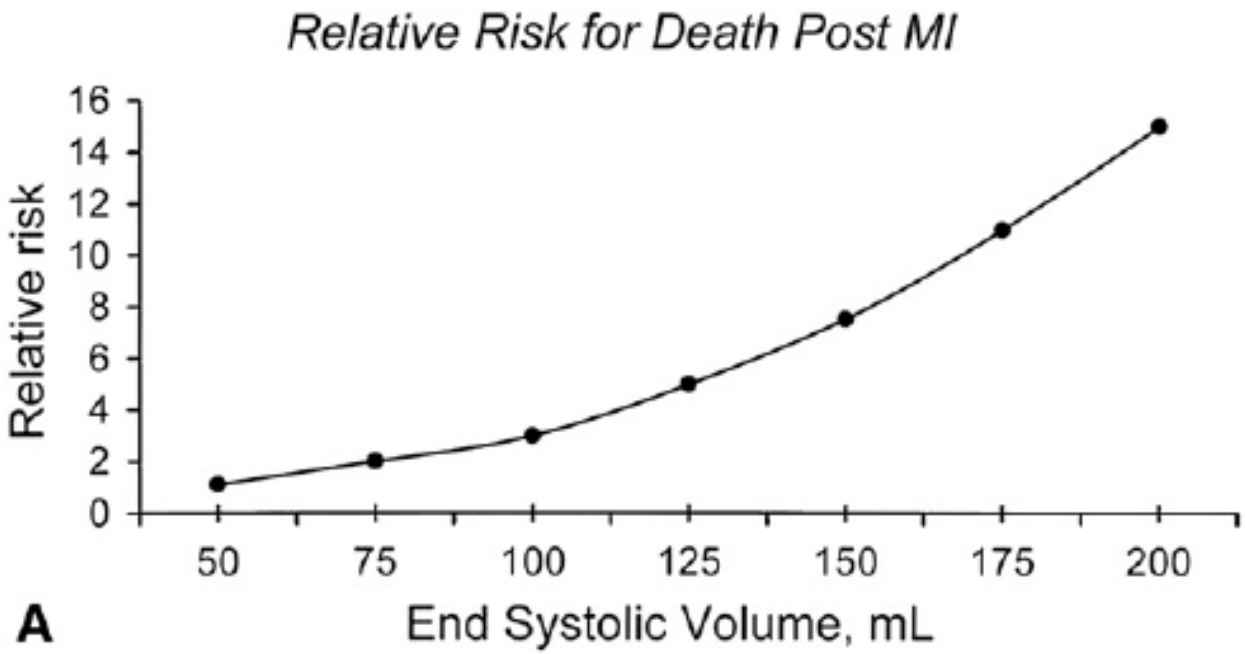
- Λιγότεροι από 50% των ασθενών ήταν κλάση NYHA III-IV
- 13% των ασθενών δεν είχαν προηγούμενο ΕΜ
- 26% των ασθενών δεν εμφάνιζαν στένωση στον LAD
- Δε χρησιμοποιήθηκε μελέτη βιωσιμότητας του μυοκαρδίου
- Μόνο 50% των ασθενών εμφάνιζε ακινητική ή δυσκινητική περιοχή στο μυοκάρδιο
- Σε 41% των ασθενών δεν τοποθετήθηκε patch



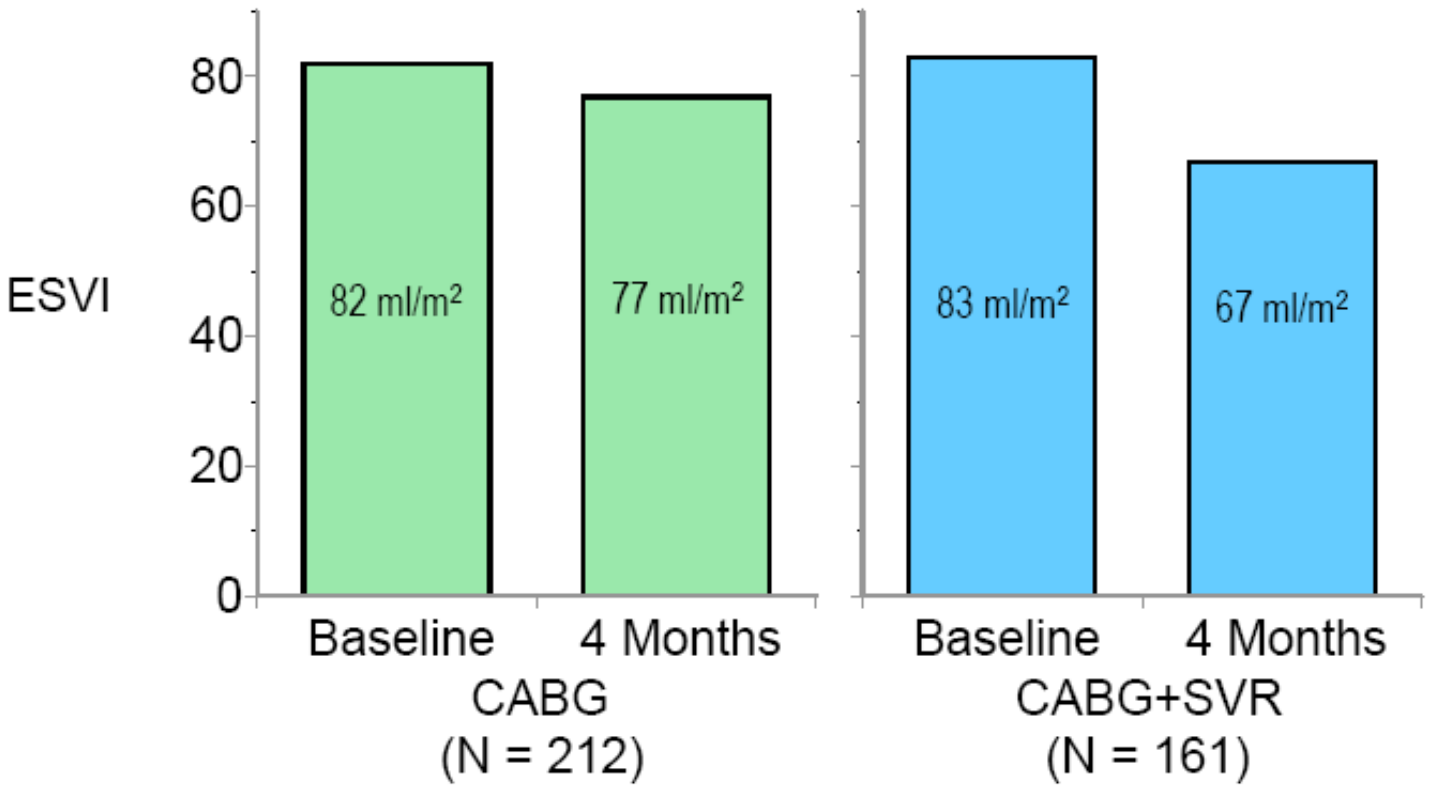

*Buckberg GD, J Thorac Cardiovasc Surg 2010*

# % ελάτωση του τελο-συστολικού όγκου της ΑΚ (LVESVI)






*White HD, et al. Circulation 1987;76:44-51.*




*Jones RH, et al. New Eng J Med 2009.*

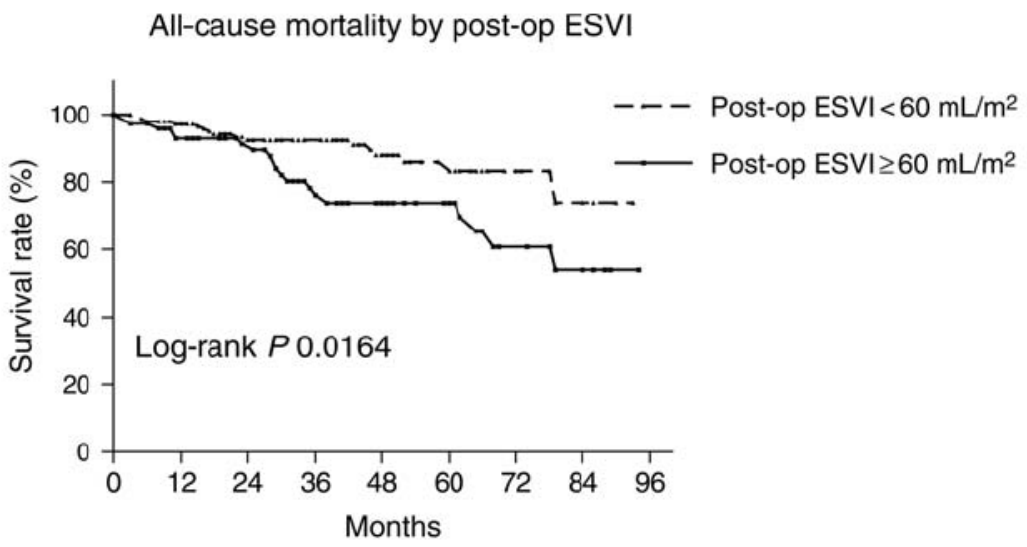
# Ρόλος του LVESVI στην SVR

European Journal of Heart Failure
doi:10.1093/eurjhf/hfq020

## End-systolic volume following surgical ventricular reconstruction impacts survival in patients with ischaemic dilated cardiomyopathy

Marisa Di Donato[1]*, Serenella Castelvecchio[2], and Lorenzo Menicanti[2]

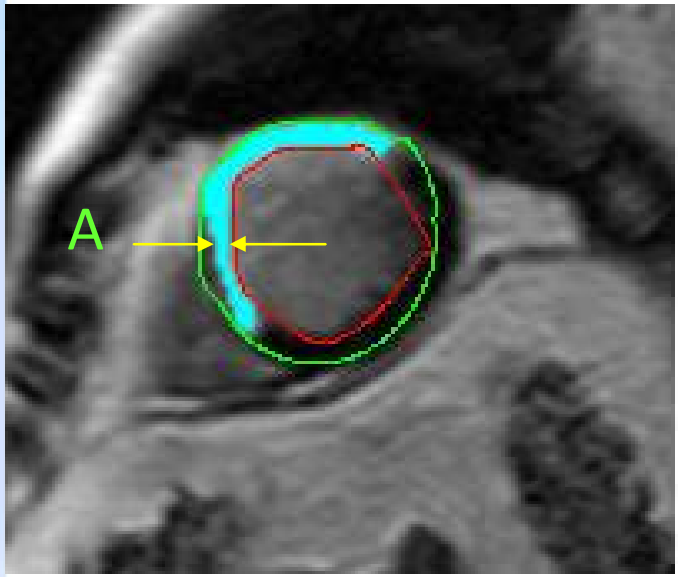
# Ρόλος του LVESVI στην SVR



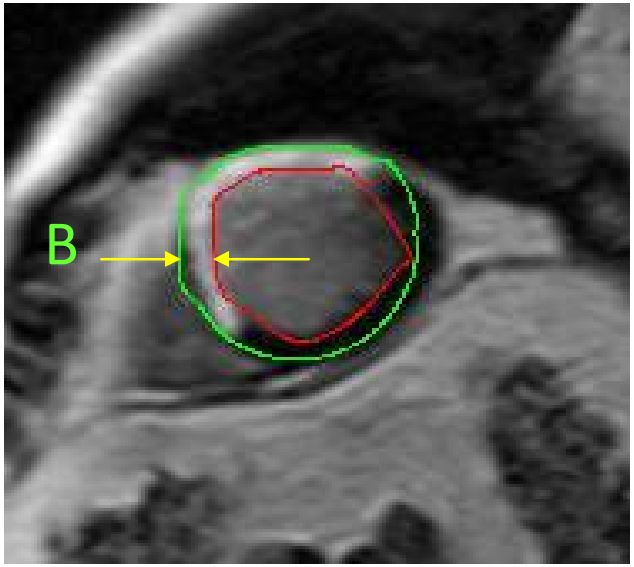

| | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 |
|---|---|---|---|---|---|---|---|---|
| ≥60 mL/m2 | 71 | 65 | 55 | 36 | 27 | 20 | 11 | 6 |
| <60 mL/m2 | 145 | 132 | 103 | 78 | 56 | 32 | 12 | 7 |

*Di Donato et al, Eur J Heart Fail, 2010*

# Διατοιχωματική ουλή




Scar $_{Thick}$

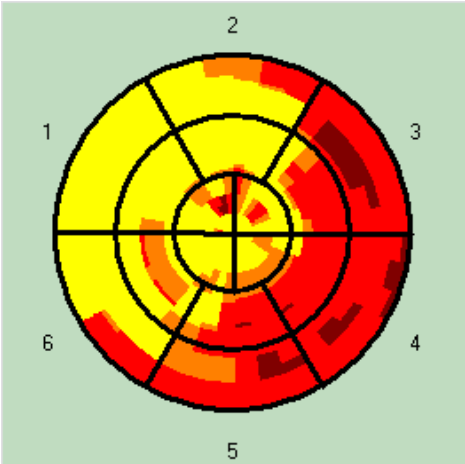



Wall $_{Thick}$

Transmurality (%): Scar $_{Thick}$ / Wall $_{Thick}$ x 100 or A/B x 100

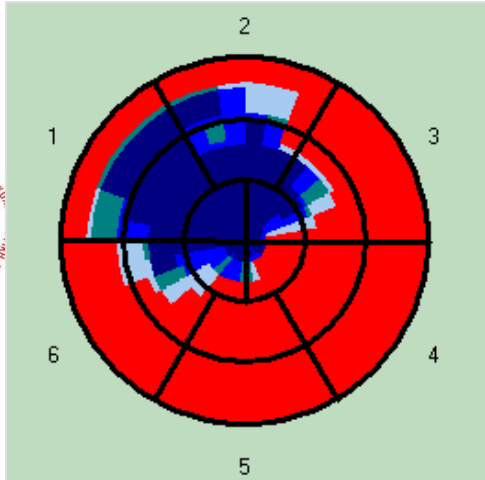
e.g. 9mm/11mm x 100 = 81.81%

# Διατοιχωματική ουλή και βιωσιμότητα



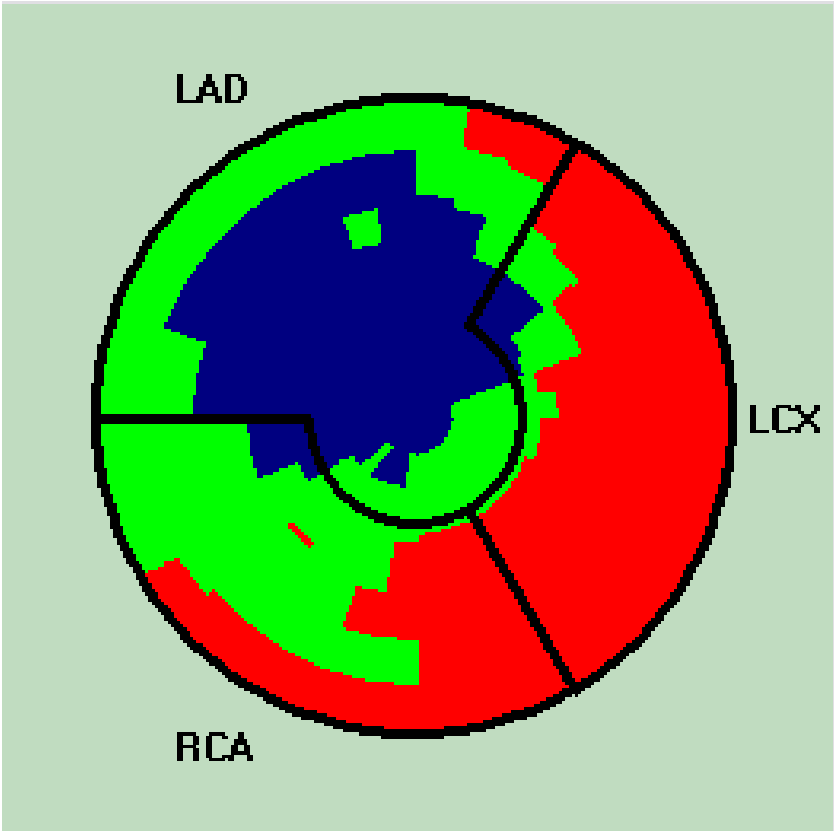

**Πάχος τοιχώματος**

**+**




**Βιωσιμότητα**

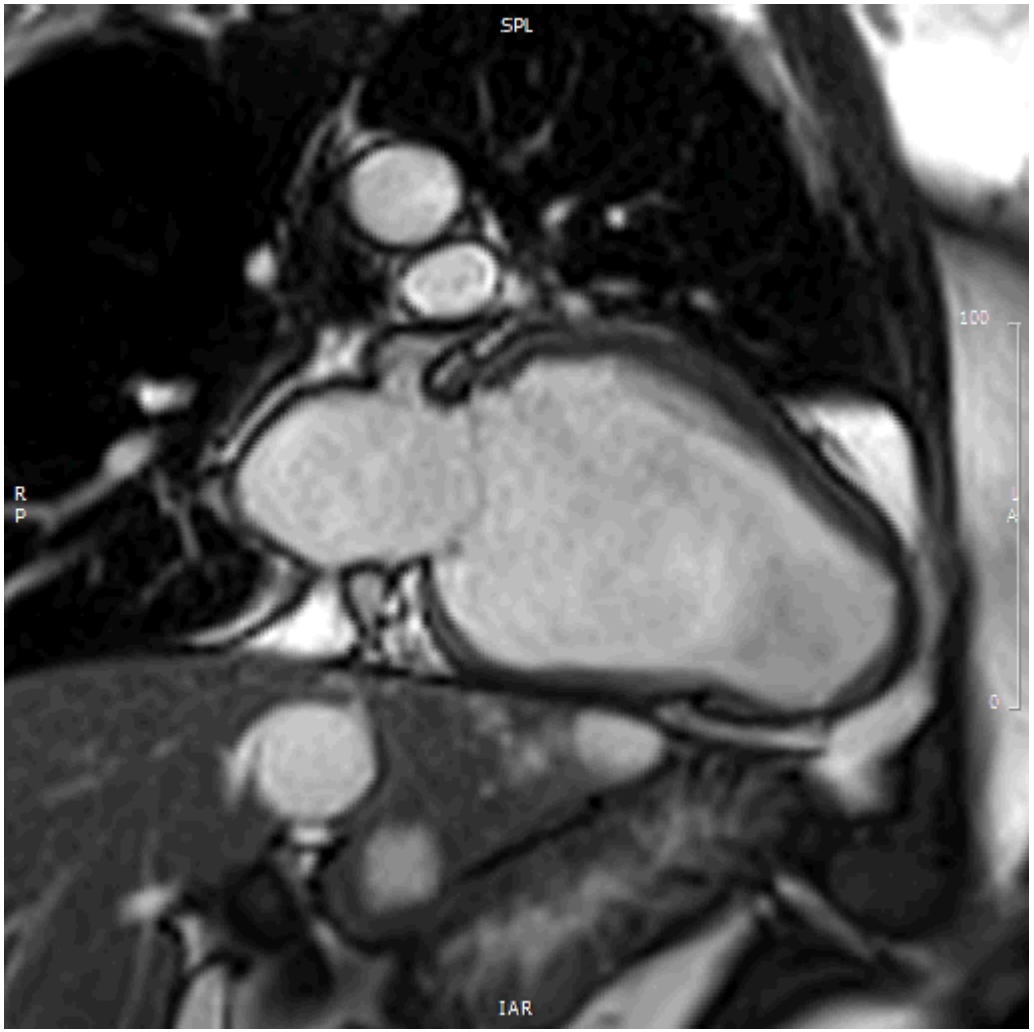
**=**




**Bull's-eye**

Recoverable
Contractile
Non-Recoverable

# Γεωμετρική αναδιαμόρφωση ΑΚ



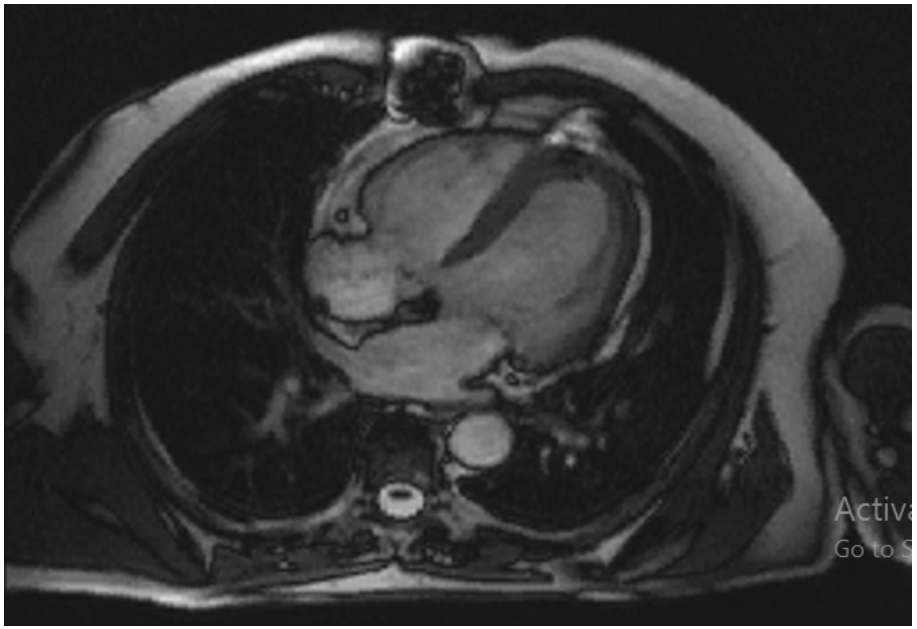

Πριν

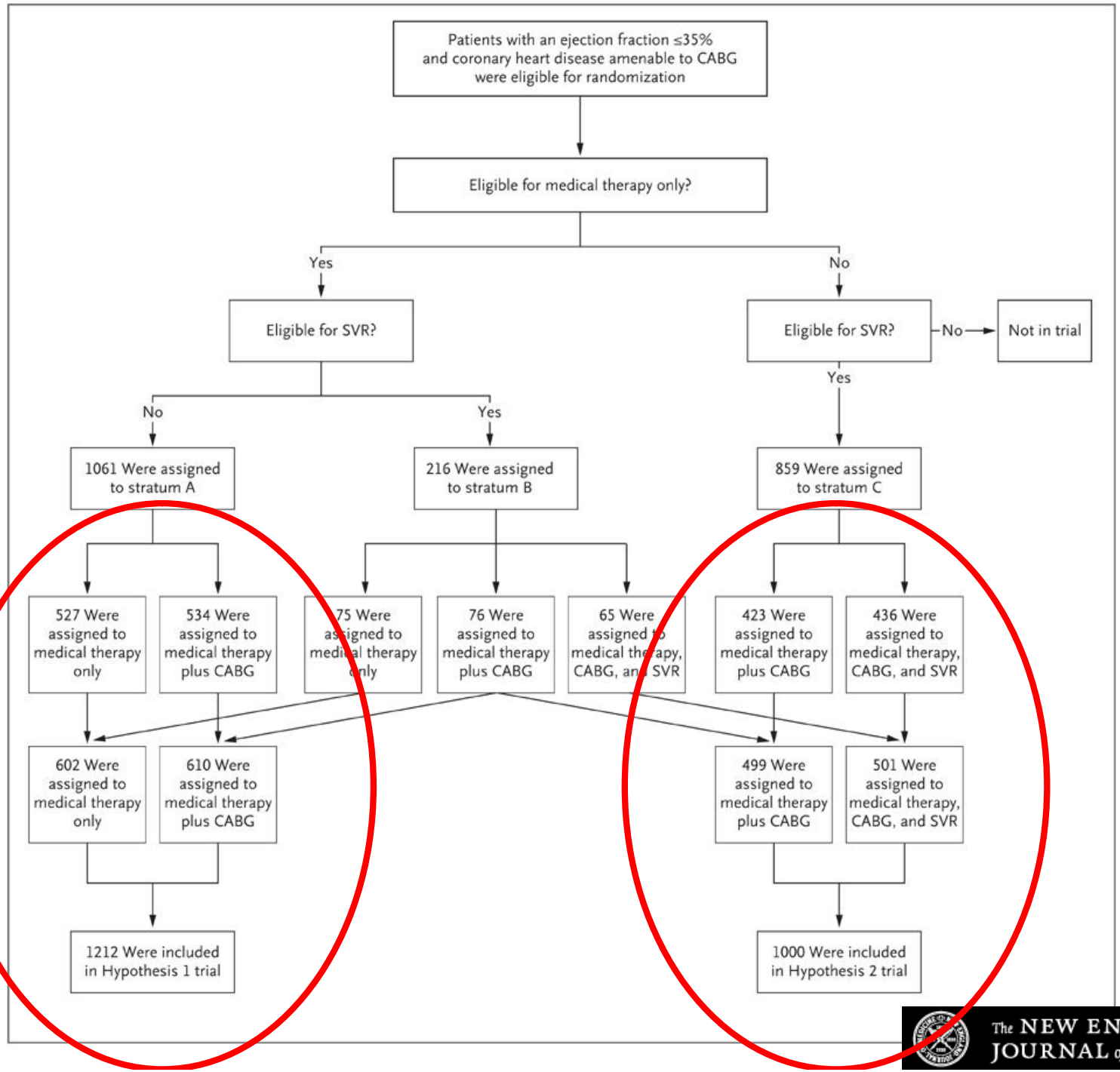
EDVI:361 ml
EDVI: 154 ml/m$^2$
ESV: 289 ml
ESVI: 123,5 ml/m$^2$
EF: 20%
SVI: 20ml/m$^2$

# Γεωμετρική αναδιαμόρφωση ΑΚ

Μετά SVR

EDVI: 60ml/m$^2$
ESVI: 40 ml/m$^2$
EF: 45%
SVI=31ml/m$^2$



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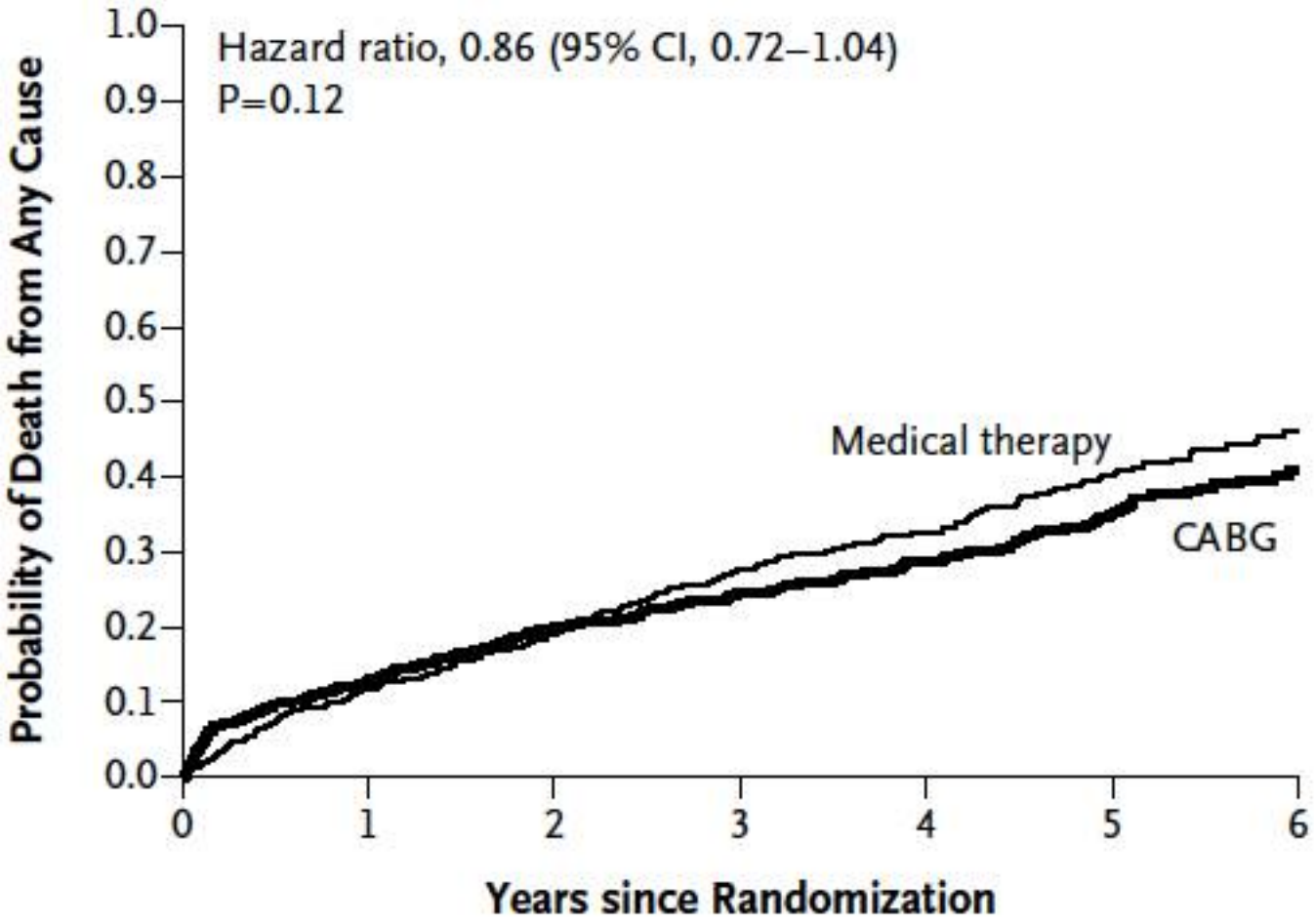
ORIGINAL ARTICLE

# Coronary-Artery Bypass Surgery in Patients with Left Ventricular Dysfunction

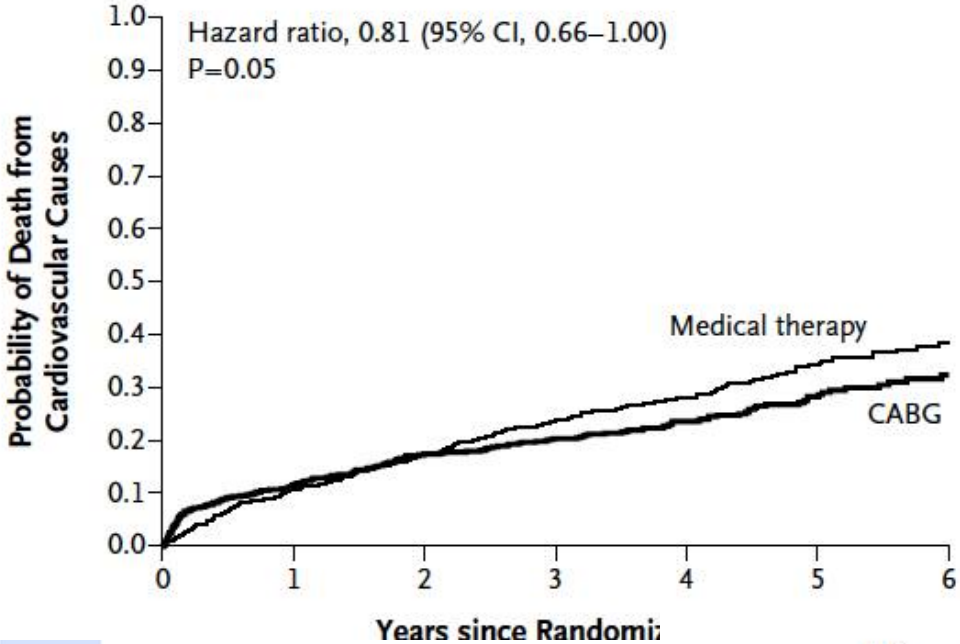
Eric J. Velazquez, M.D., Kerry L. Lee, Ph.D., Marek A. Deja, M.D., Ph.D., Anil Jain, M.D., George Sopko, M.D., M.P.H., Andrey Marchenko, M.D., Ph.D., Imtiaz S. Ali, M.D., Gerald Pohost, M.D., Sinisa Gradinac, M.D., Ph.D., William T. Abraham, M.D., Michael Yii, M.S., F.R.C.S., F.R.A.C.S., Dorairaj Prabhakaran, M.D., D.M., Hanna Szwed, M.D., Paolo Ferrazzi, M.D., Mark C. Petrie, M.D., Christopher M. O'Connor, M.D., Pradit Panchavinnin, M.D., Lilin She, Ph.D., Robert O. Bonow, M.D., Gena Roush Rankin, M.P.H., R.D., Robert H. Jones, M.D., and Jean-Lucien Rouleau, M.D., for the STICH Investigators*

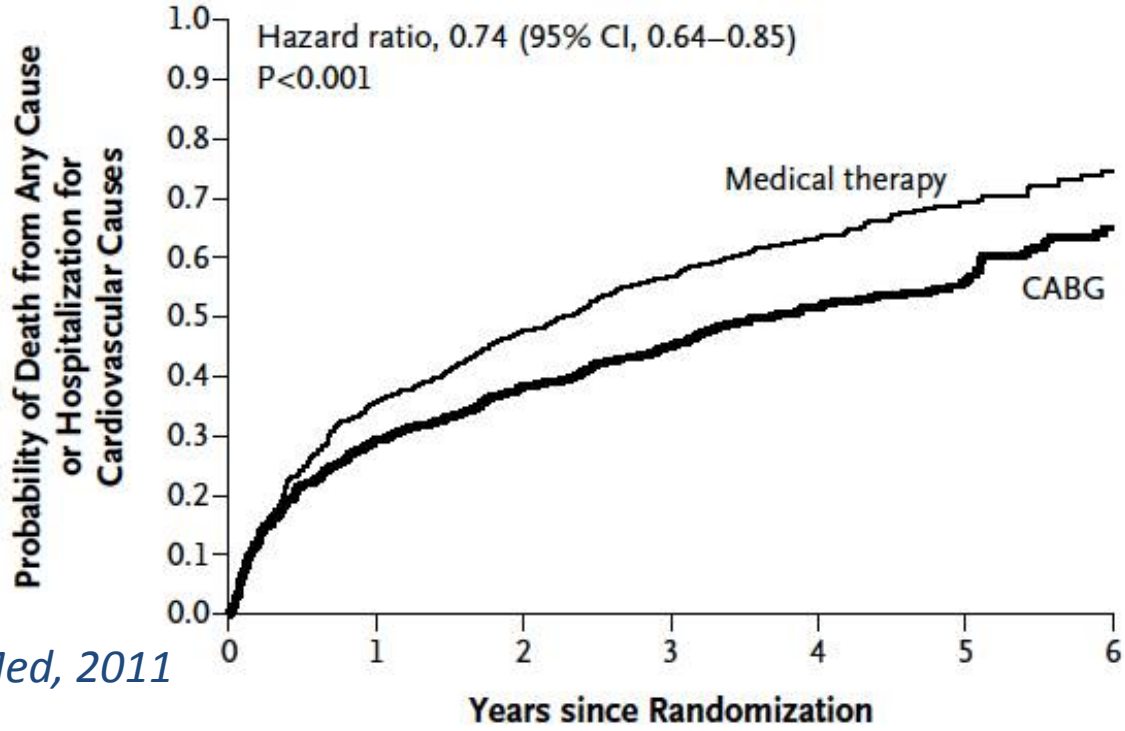



**No. at Risk**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Medical therapy | 602 | 532 | 487 | 435 | 312 | 154 | 80 |
| CABG | 610 | 532 | 486 | 459 | 340 | 174 | 91 |

*Velazquez et al., N Eng J Med, 2011*



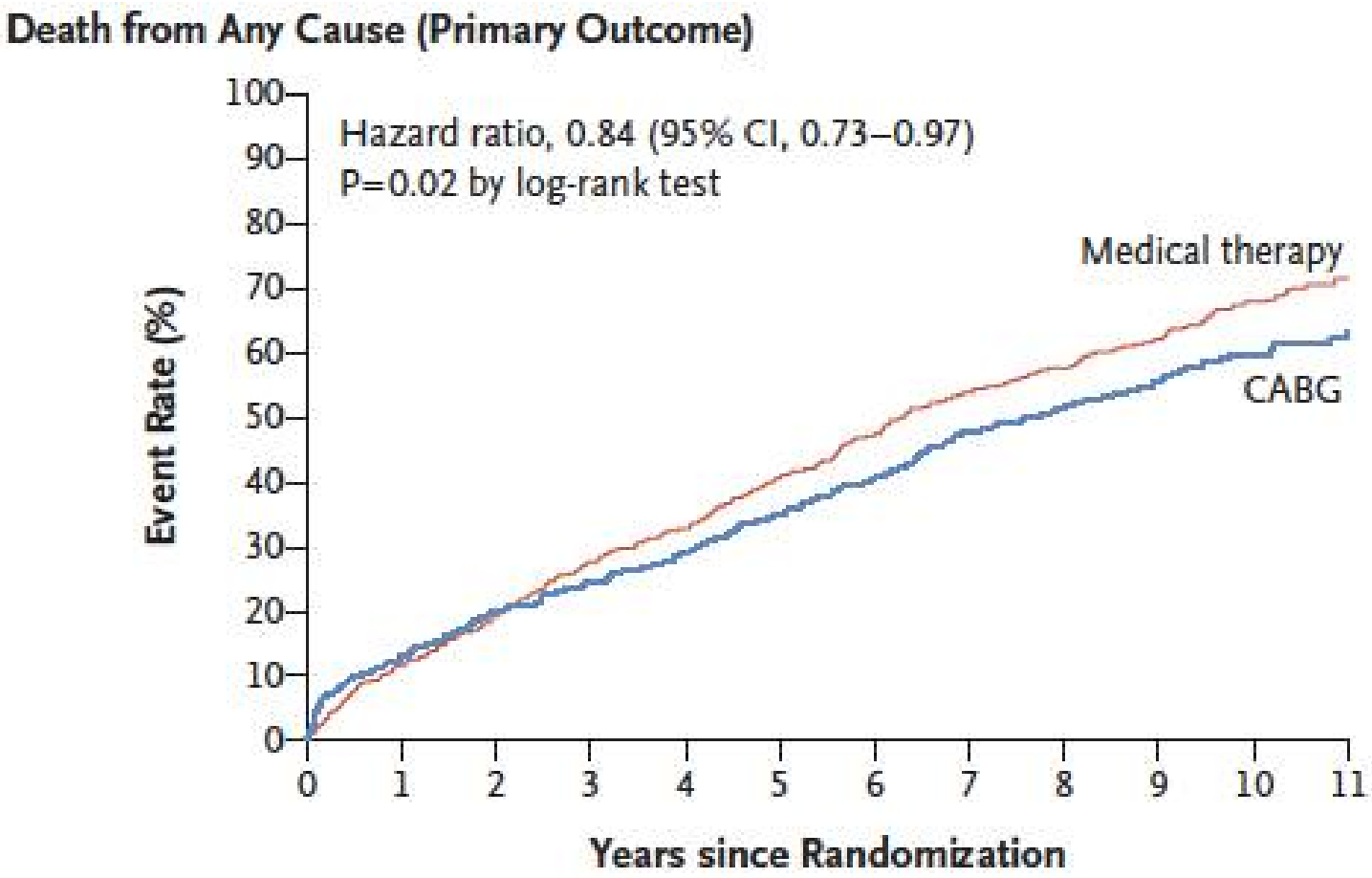

*Velazquez et al., N Eng J Med, 2011*

The NEW ENGLAND JOURNAL of MEDICINE

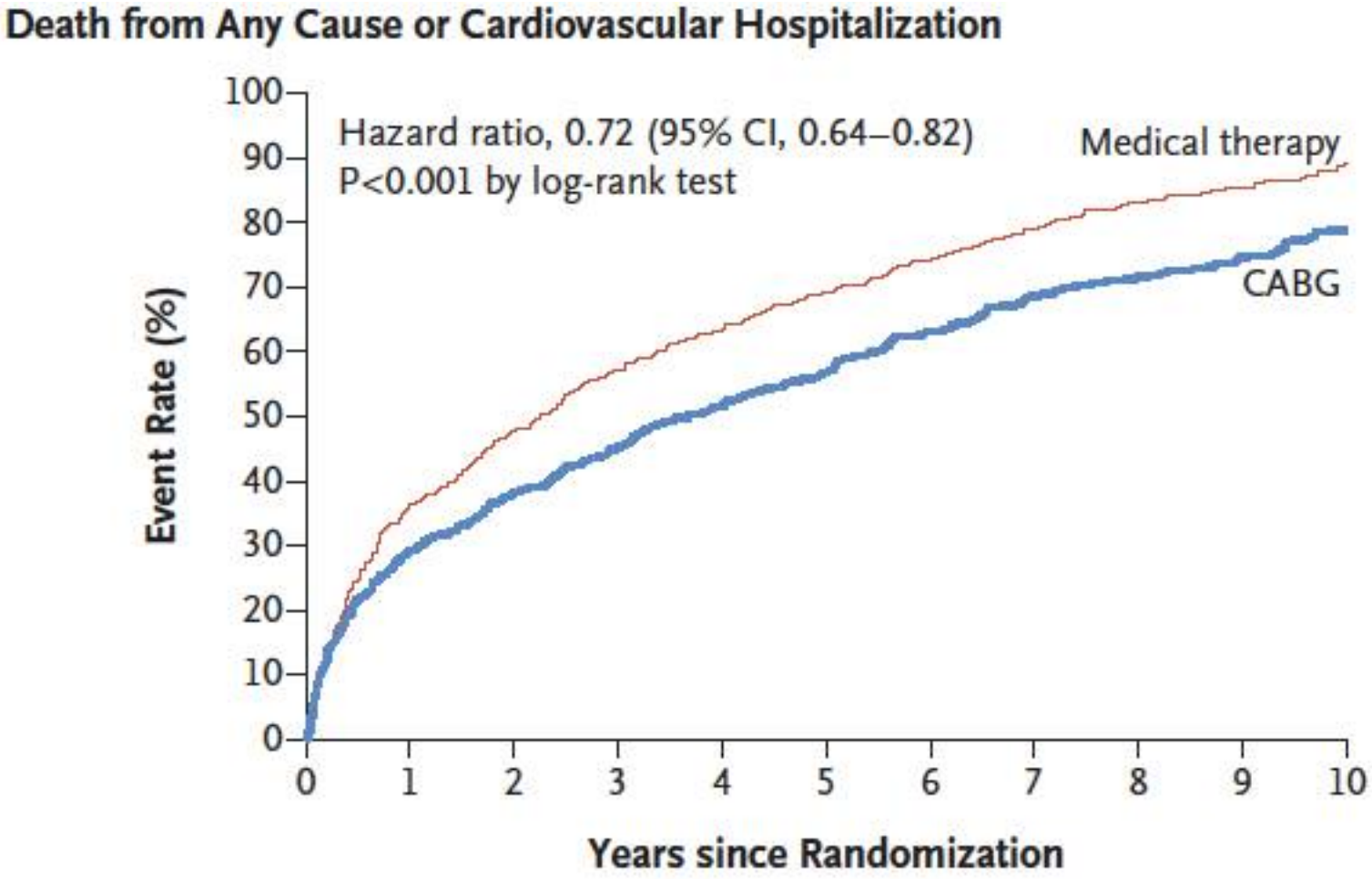
ESTABLISHED IN 1812 APRIL 21, 2016 VOL. 374 NO. 16

# Coronary-Artery Bypass Surgery in Patients with Ischemic Cardiomyopathy

Eric J. Velazquez, M.D., Kerry L. Lee, Ph.D., Robert H. Jones, M.D., Hussein R. Al-Khalidi, Ph.D., James A. Hill, M.D., Julio A. Panza, M.D., Robert E. Michler, M.D., Robert O. Bonow, M.D., Torsten Doenst, M.D., Mark C. Petrie, M.D., Jae K. Oh, M.D., Lilin She, Ph.D., Vanessa L. Moore, A.A.S., Patrice Desvigne-Nickens, M.D., George Sopko, M.D., M.P.H., and Jean L. Rouleau, M.D., for the STICHES Investigators*



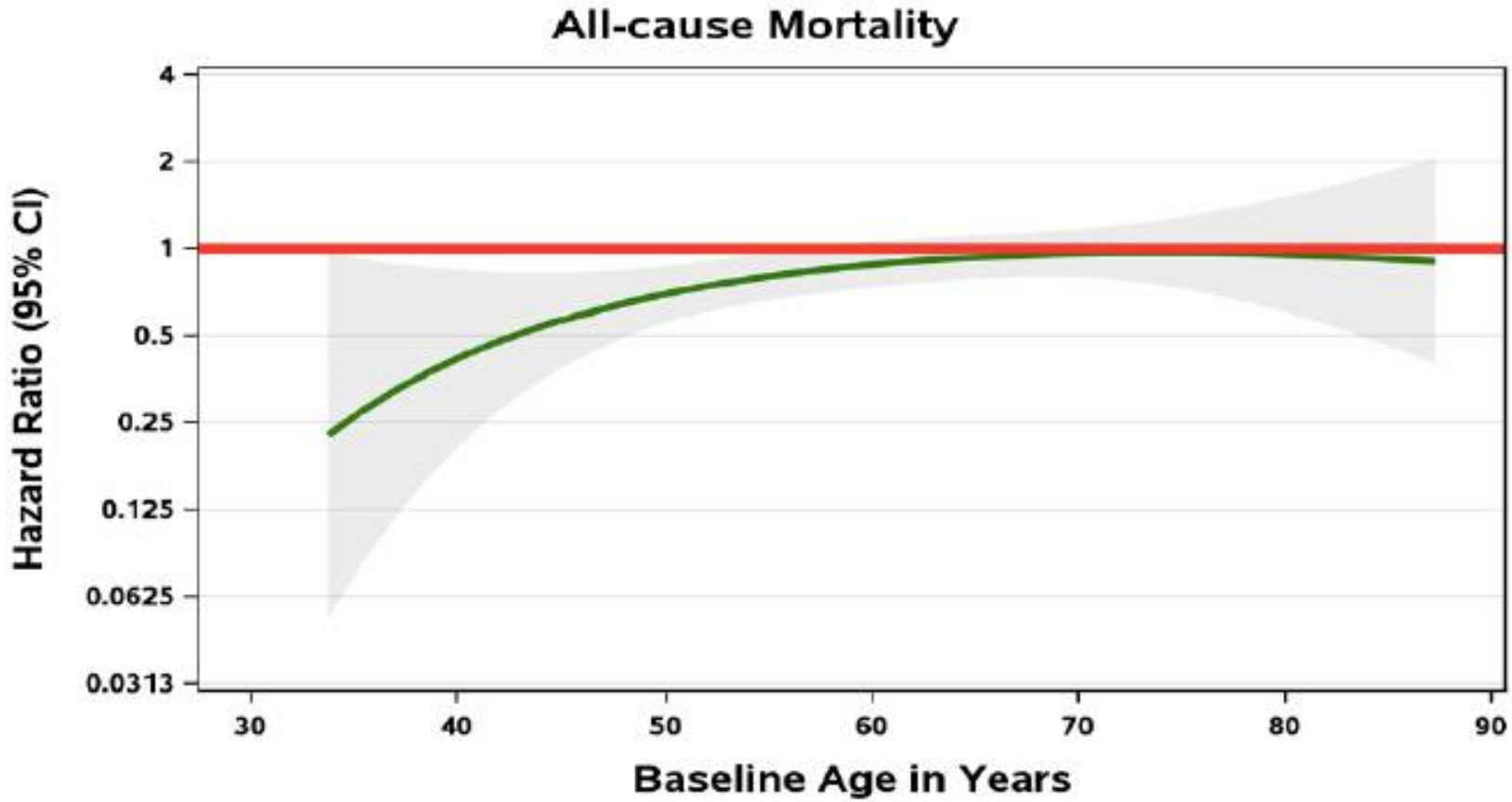

*Velazquez et al., N Eng J Med, 2016*




*Velazquez et al., N Eng J Med, 2016*

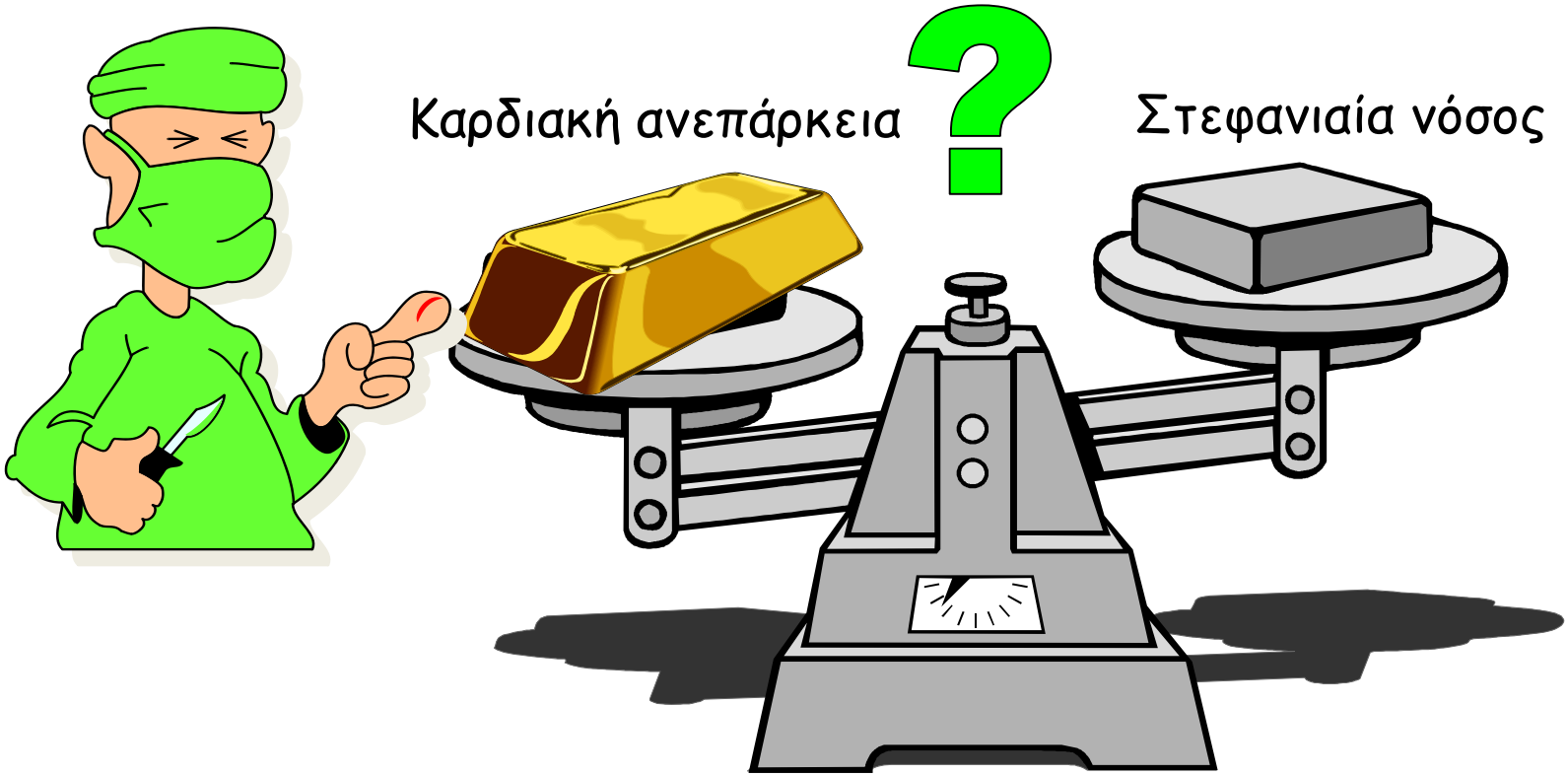
# Ten-Year Outcomes After Coronary Artery Bypass Grafting According to Age in Patients With Heart Failure and Left Ventricular Systolic Dysfunction

## An Analysis of the Extended Follow-Up of the STICH Trial (Surgical Treatment for Ischemic Heart Failure)

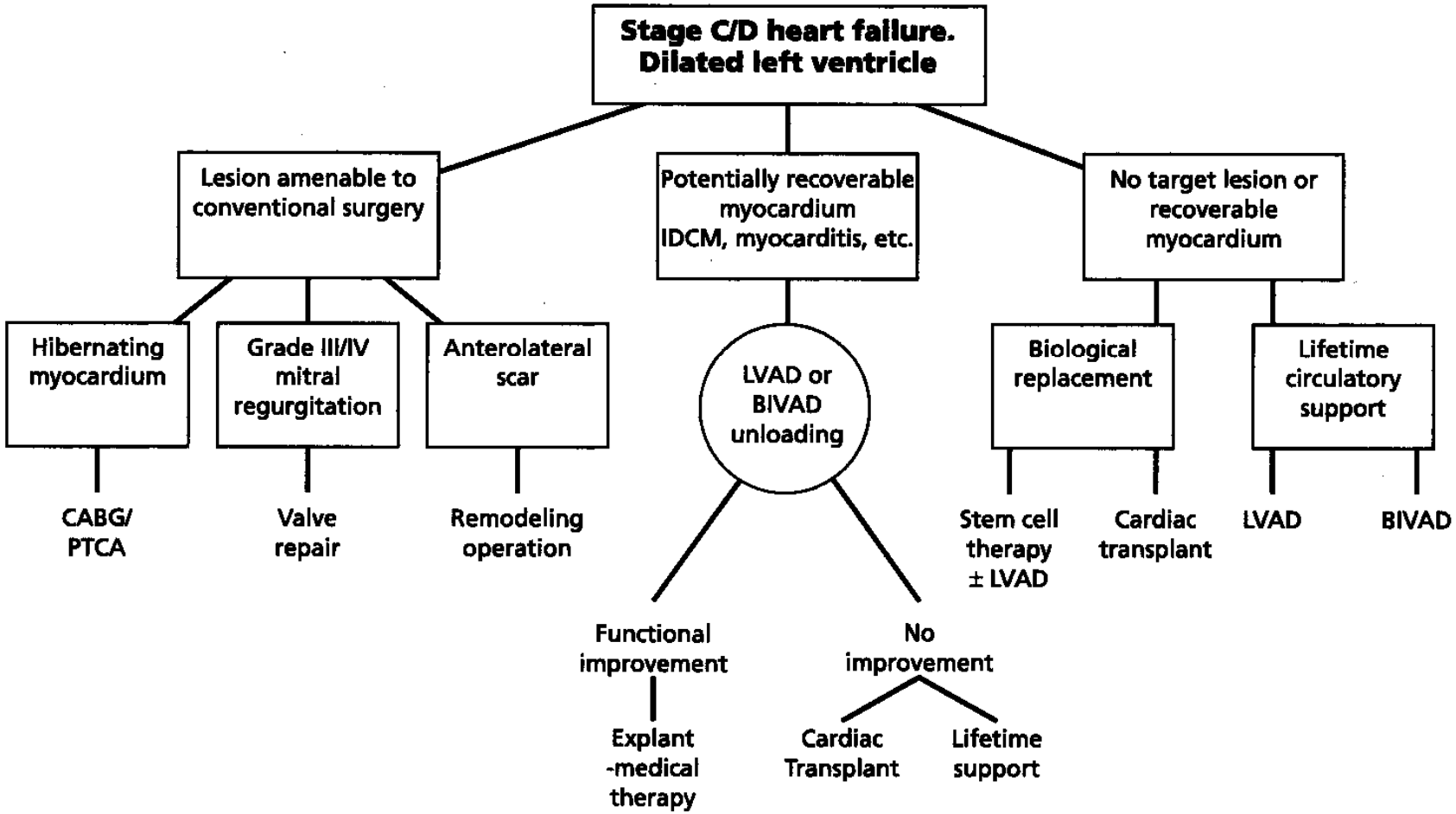


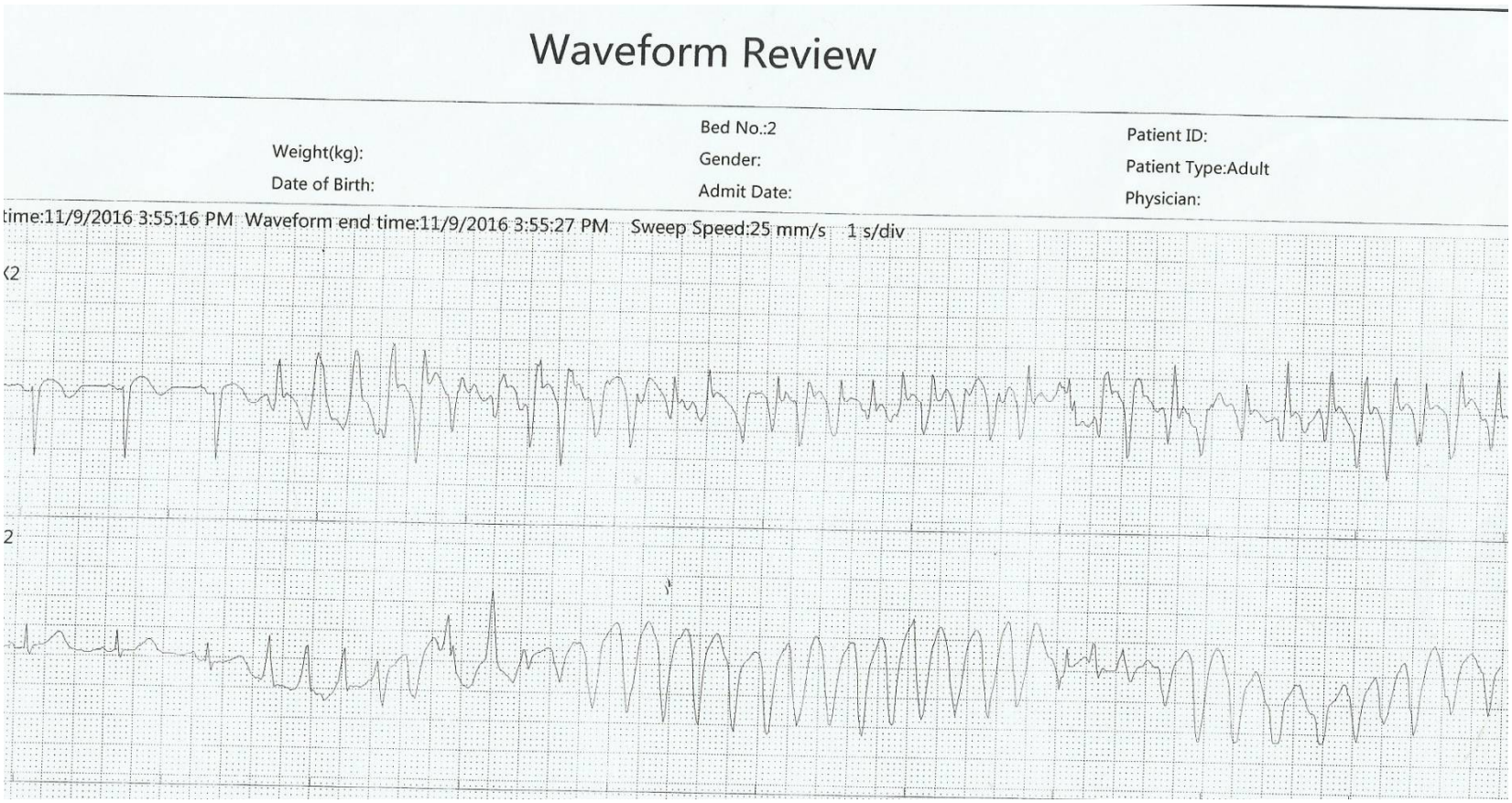

*Petrie et al., Circulation, 2016*

# Καρδιακή ανεπάρκεια ισχαιμικής αιτιολογίας

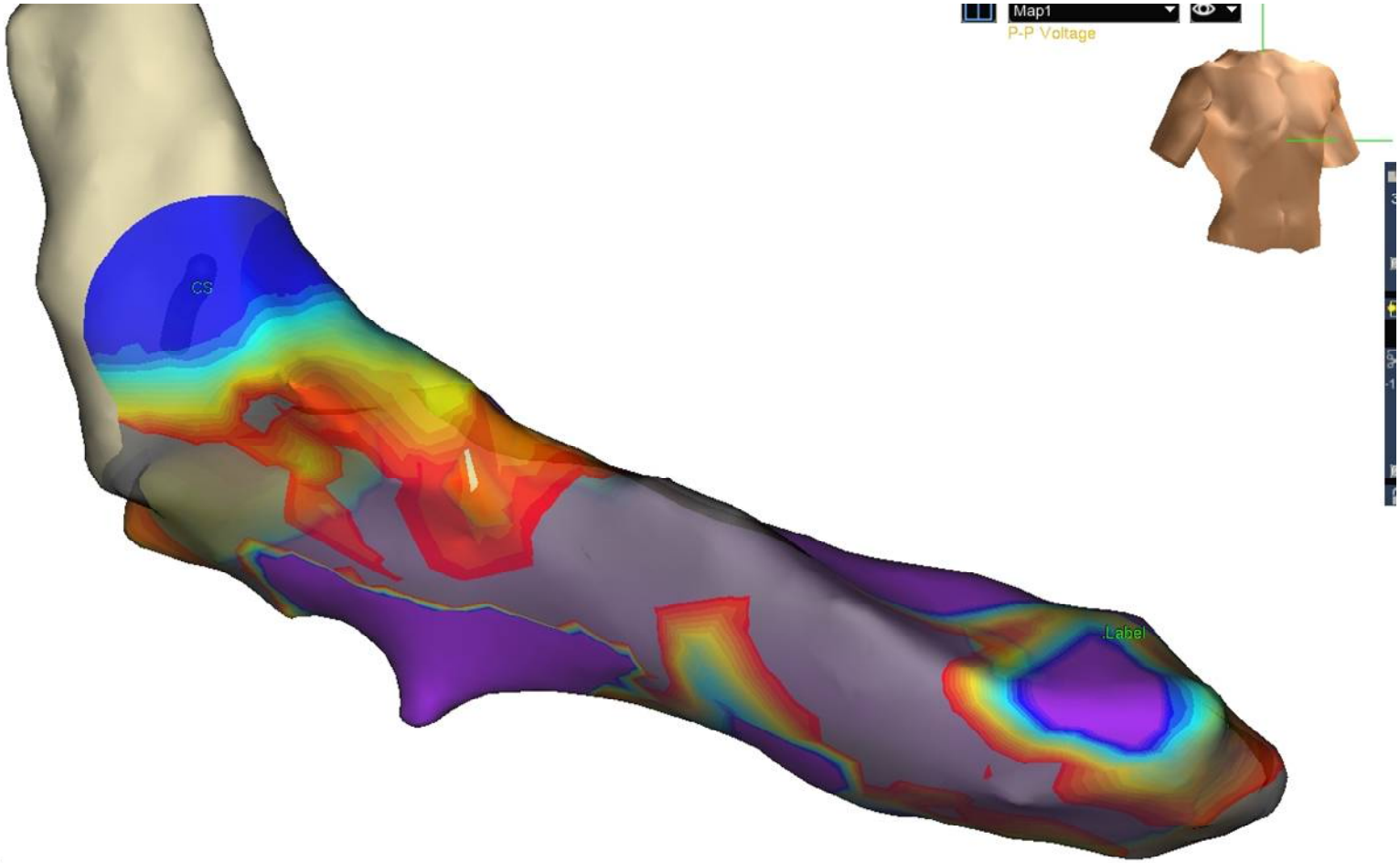


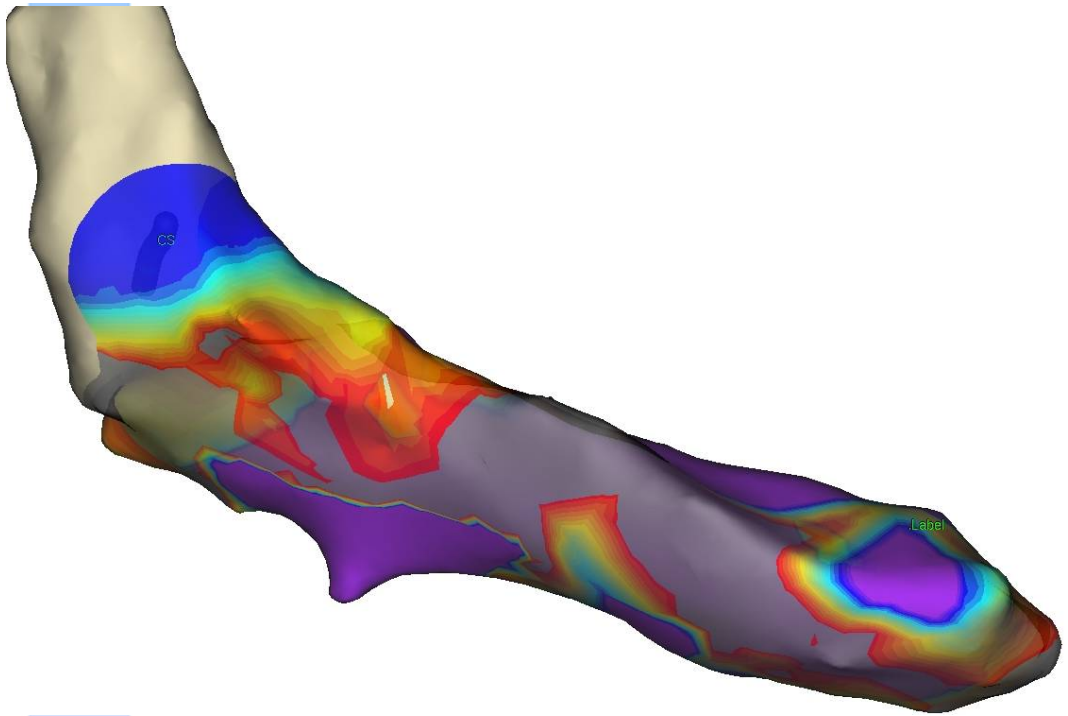
# Surgical Options in Advanced Heart Failure






CABGX3,
Ηλεκτρική θύελλα
2-3 MTX > 40 απινιδώσεις στη ΜΕΘ


Map1
P-P Voltage
CS
Label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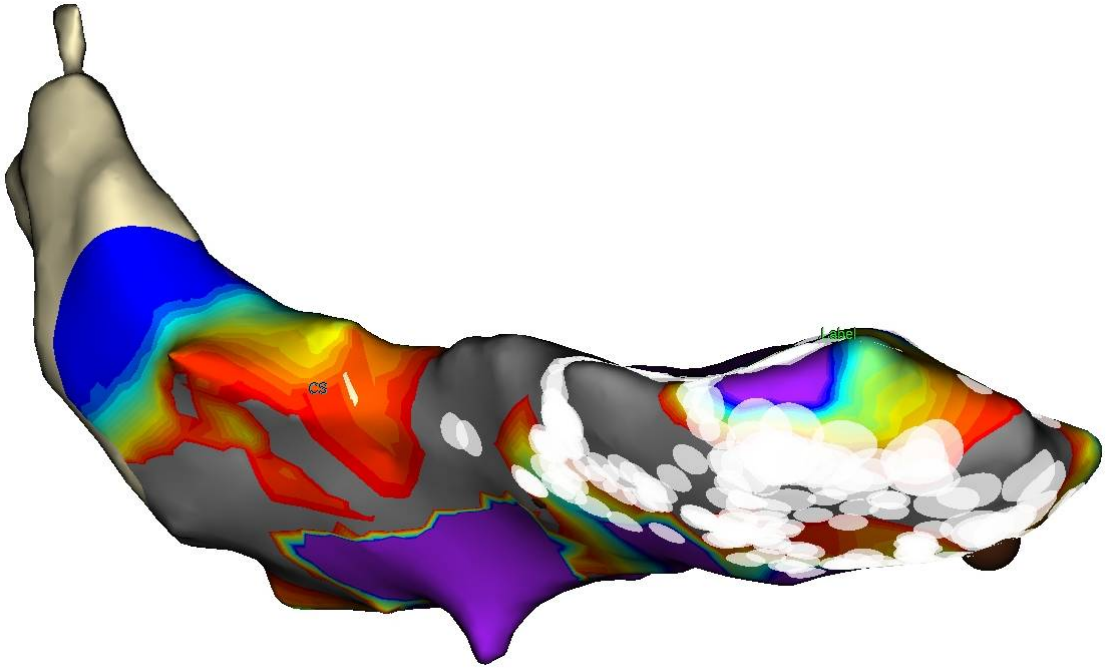
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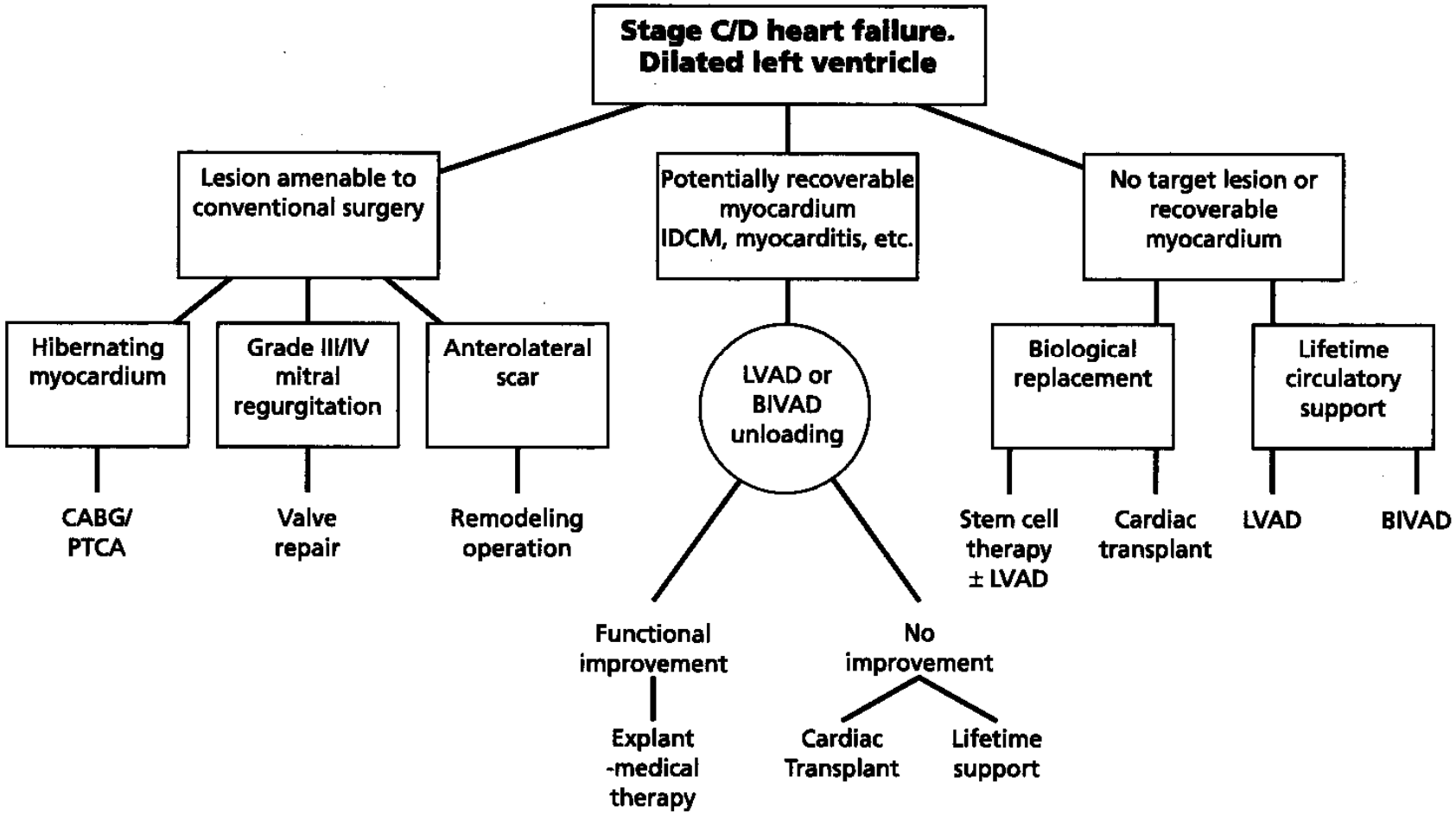
# Surgical Options in Advanced Heart Failure



# A Randomized Controlled Trial of Preoperative Intra-Aortic Balloon Pump in Coronary Patients With Poor Left Ventricular Function Undergoing Coronary Artery Bypass Surgery*

Marco Ranucci, MD, FESC[1]; Serenella Castelvecchio, MD, FESC[1]; Andrea Biondi, MD[2]; Carlo de Vincentiis, MD[2]; Andrea Ballotta, MD, FESC[1]; Alessandro Varrica, MD[2]; Alessandro Frigiola, MD[2]; Lorenzo Menicanti, MD[2]; for the Surgical and Clinical Outcome Research (SCORE) Group

**TABLE 2. Primary Outcome (With Its Components) and Operative Mortality in the Two Groups**

| Outcome | Intra-Aortic Balloon Pump Group (*n* =55) | Control Group (*n* = 55) | Odds Ratio (95% CI) | *p* |
|---|---|---|---|---|
| Surgical revision, *n* (%) | 6 (11) | 2 (3.6) | 3.24 (0.62–18.84) | 0.161 |
| Prolonged mechanical ventilation, *n* (%) | 17 (31) | 15 (27) | 1.19 (0.52–2.72) | 0.675 |
| Acute kidney injury, *n* (%) | 5 (12) | 2 (4.9) | 2.71 (0.49–14.84) | 0.251 |
| Stroke, *n* (%) | 1 (1.8) | 0 (0) | Not applicable | 0.315 |
| Mediastinitis, *n* (%) | 1 (1.8) | 3 (5.5) | 0.32 (0.03–3.19) | 0.332 |
| Major morbidity, *n* (%) | 22 (40) | 17 (31) | 1.49 (0.68–3.33) | 0.320 |
| Operative mortality, *n* (%) | 4 (7.3) | 8 (14) | 0.46 (0.13–1.43) | 0.230 |

*Ranucci et al., Crit Care Med, 2013*

# Effectiveness of prophylactic levosimendan in patients with impaired left ventricular function undergoing coronary artery bypass grafting: a randomized pilot study

Kyriakos Anastasiadis, Polychronis Antonitsis*, Konstantinos Vranis, Athanassios Kleontas, Christos Asteriou, Vassilios Grosomanidis, Paschalis Tossios and Helena Argiriadou

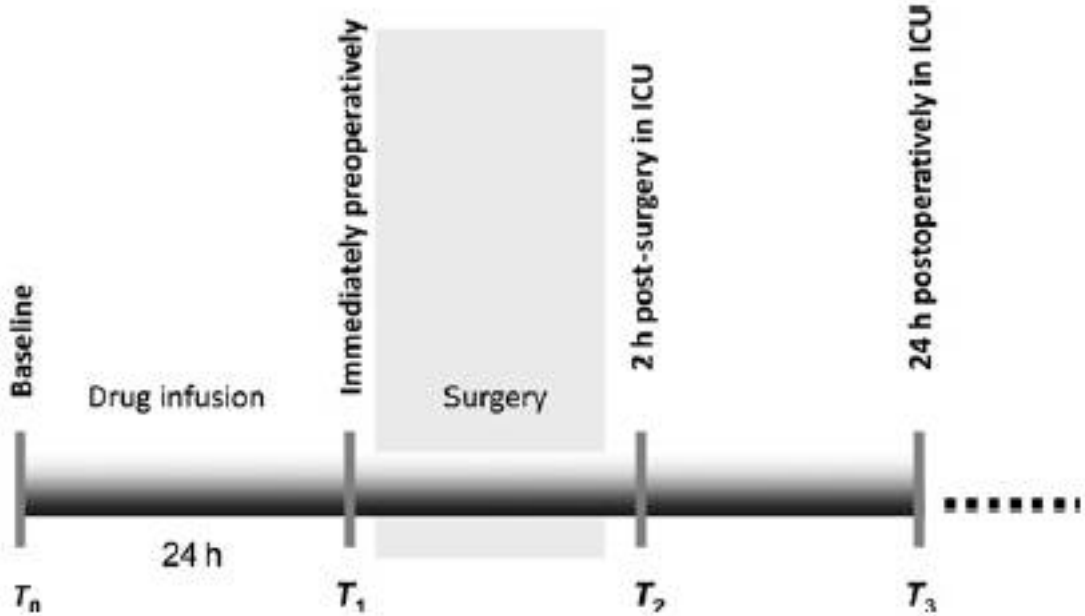
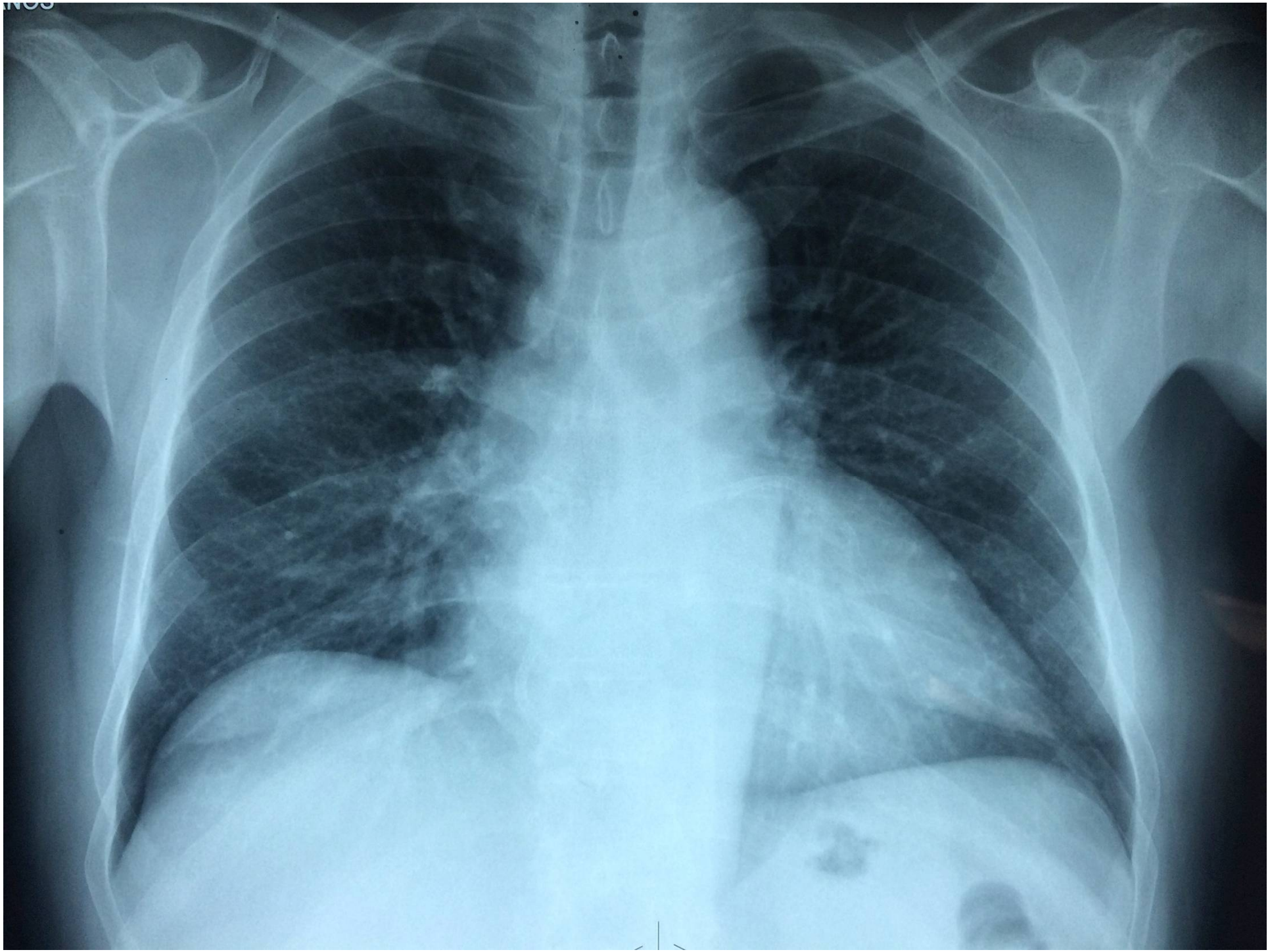
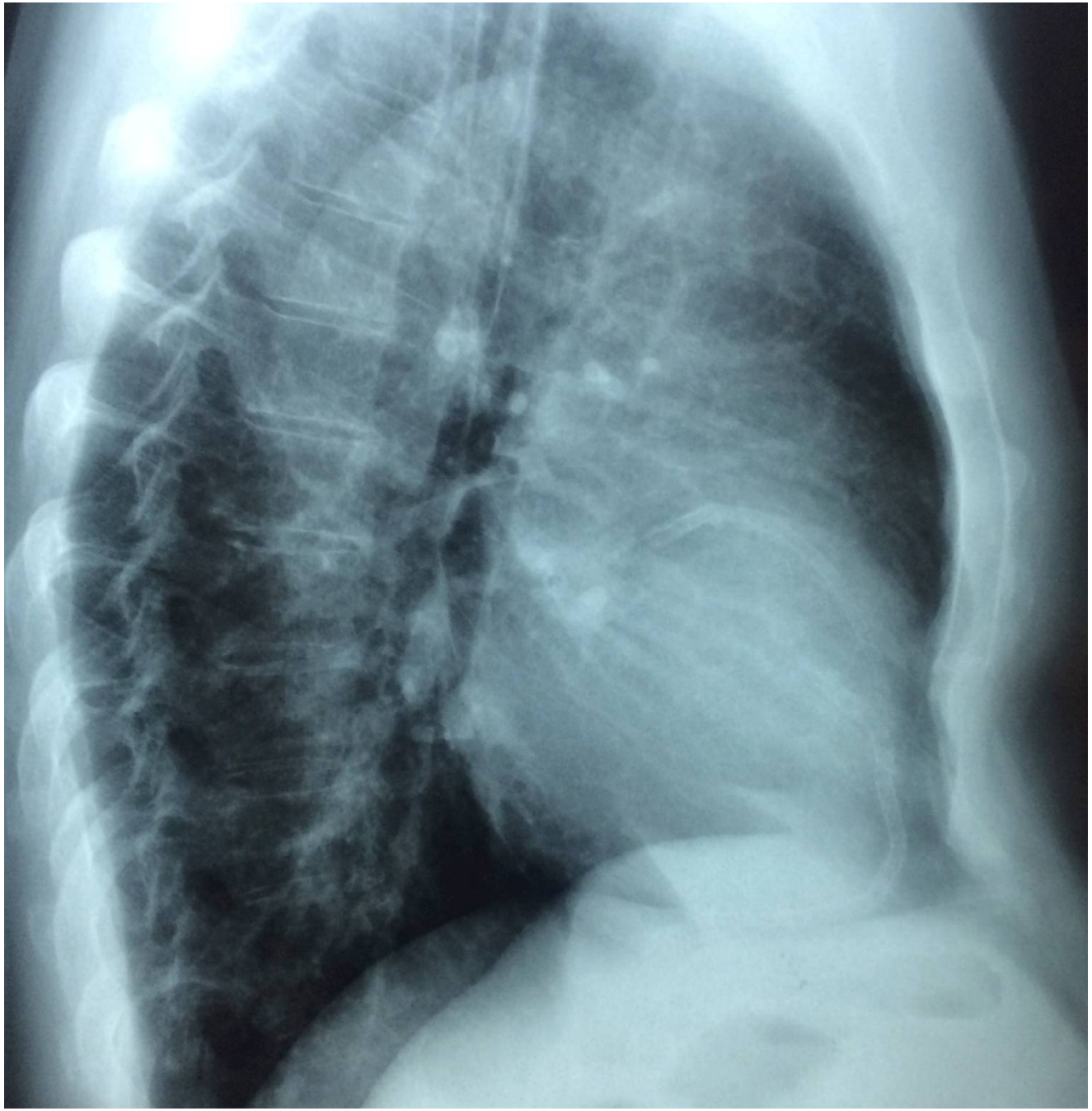
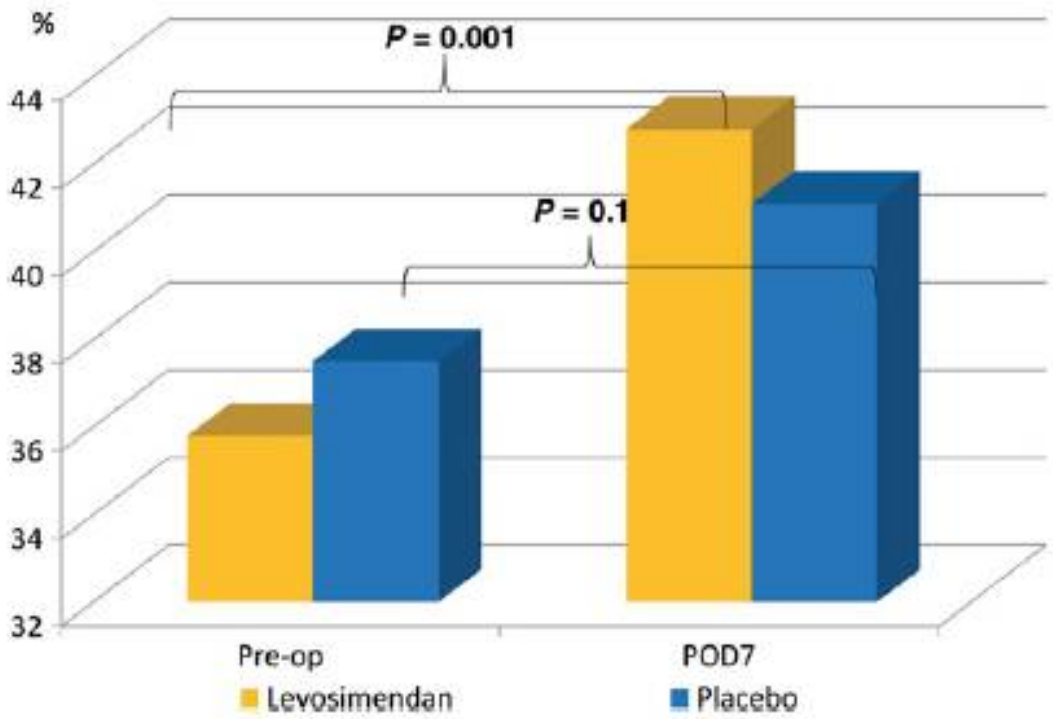


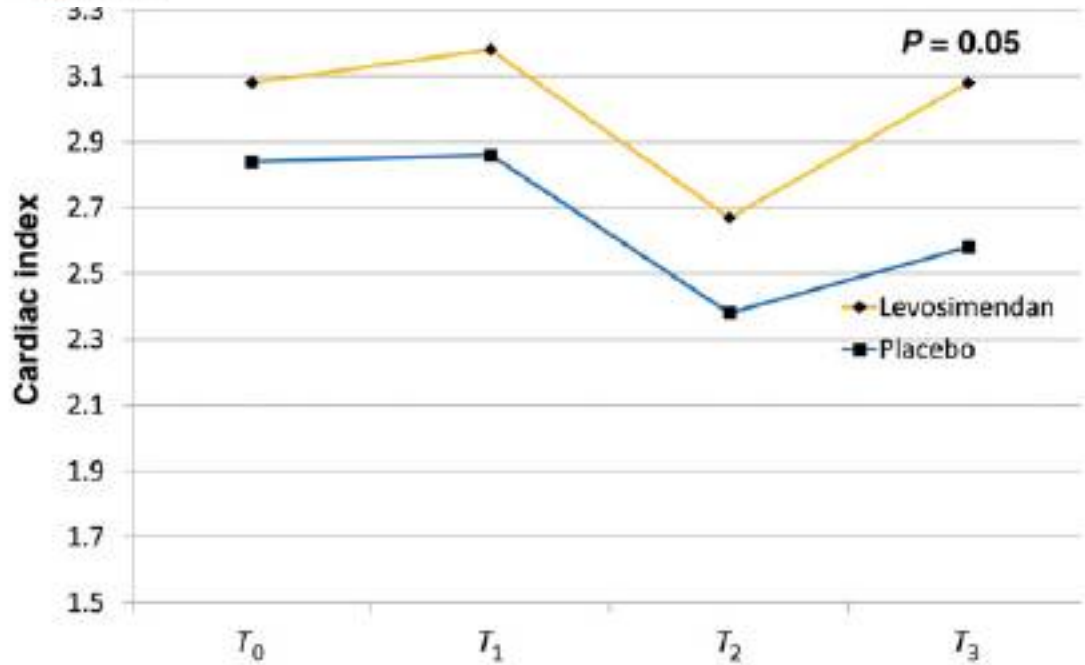

**Figure 2:** Time point recording of haemodynamic parameters.

*Anastasiadis et al., ICVTS, 2016*








*Anastasiadis et al., ICVTS, 2016*

# Ισχαιμική μυοκαρδιοπάθεια

**Στεφανιαία νόσος- Ισχαιμική μυοκαρδιοπάθεια (LVEF≤40%)**

**CABG + IM εμφύτευση stem cells**

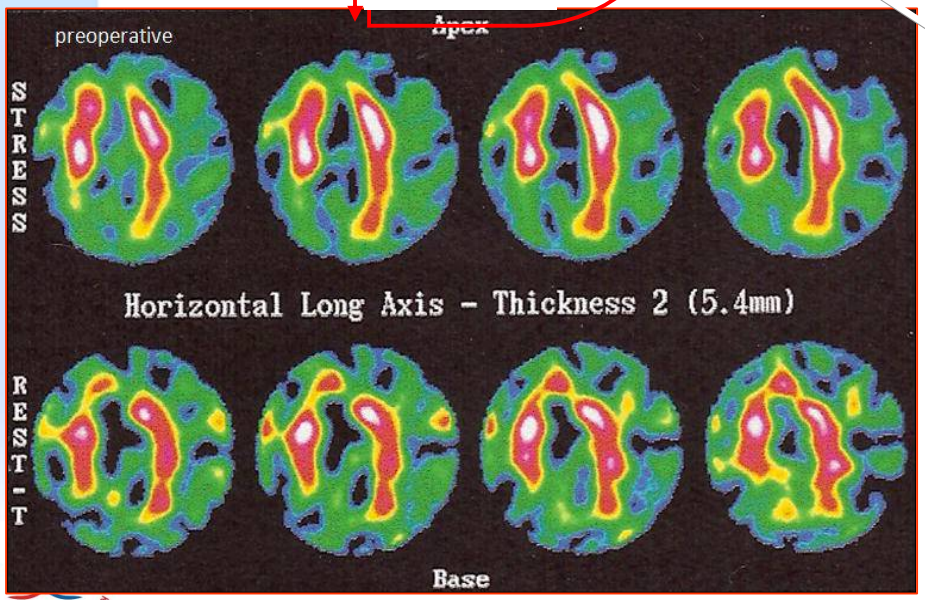
**Αυτόλογα**

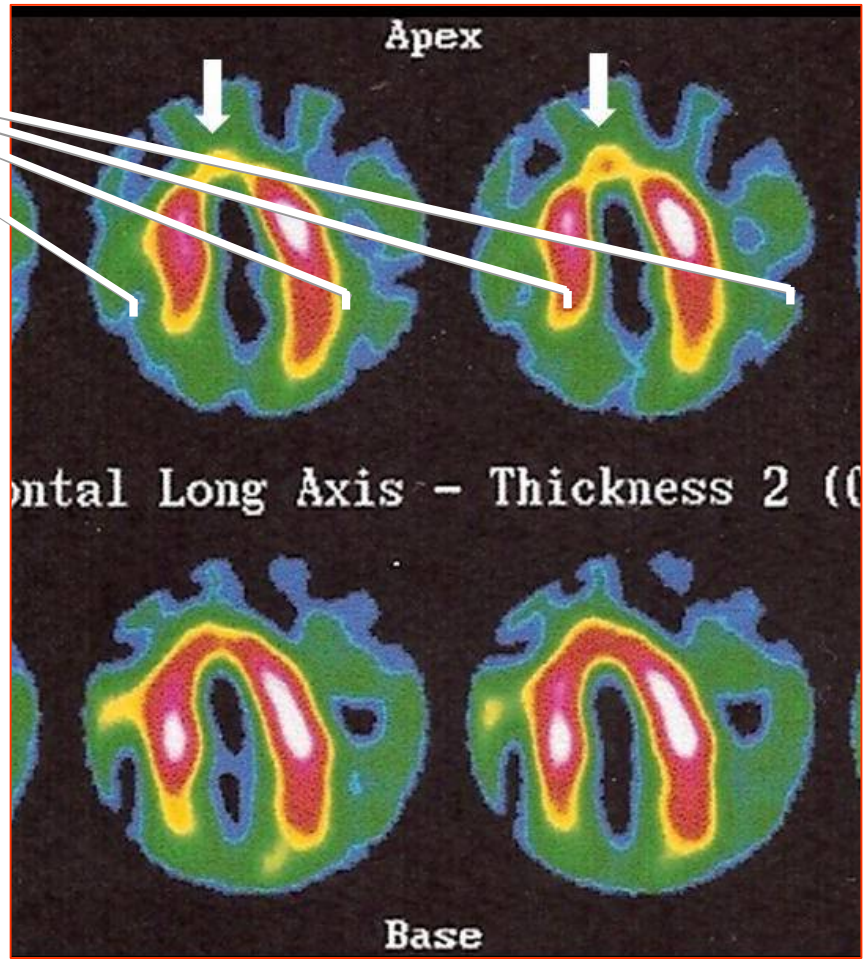
**Ετερόλογα**

## AUTOLOGOUS BONE MARROW INJECTATE (im)

## pluripotent population of stem cells ($10^6$)

- **CD34+**
- **CD133+**
- **CD105+**




**Myocardial reperfusion at the infarcted and peri-infarct milieu.**

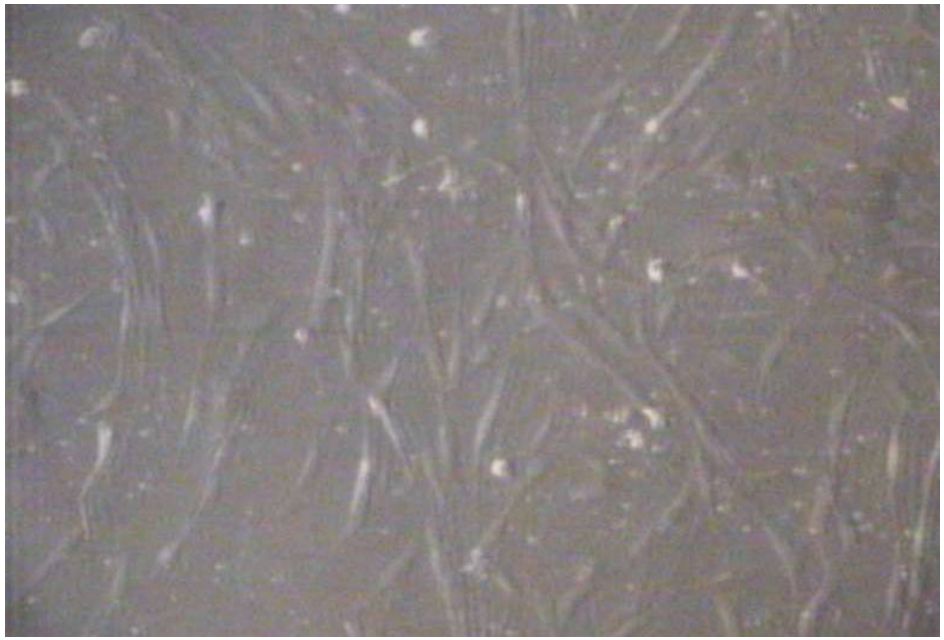
***Replacement of scared tissue and regeneration of viable myocardium remains a challenging target of cell transplantation therapy.***

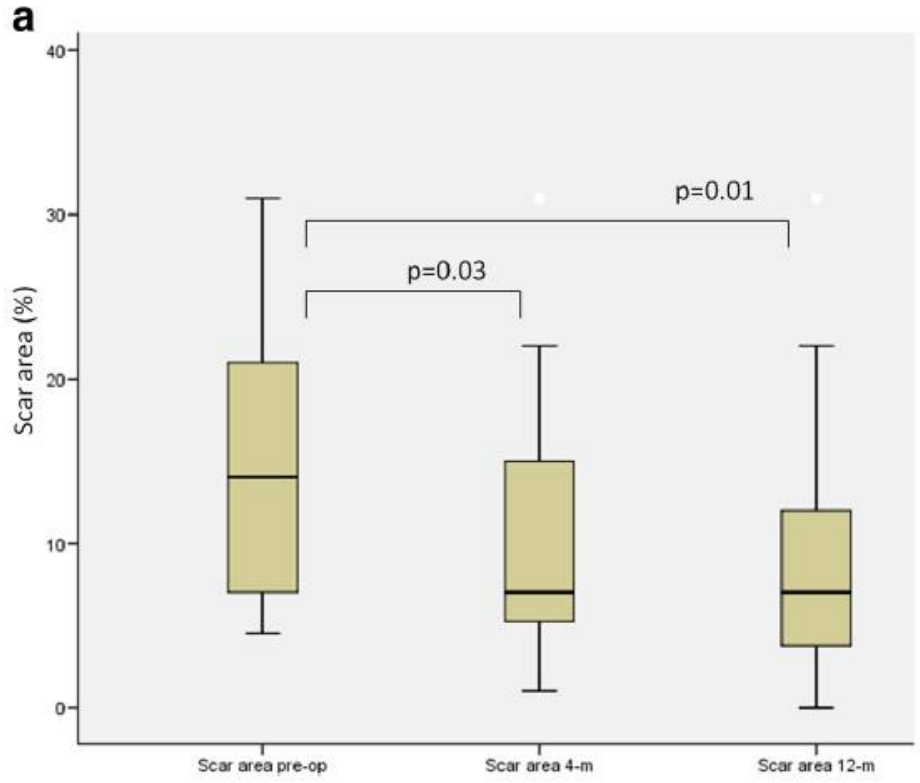
J. of Cardiovasc. Trans. Res. (2016) 9:202–213
DOI 10.1007/s12265-016-9686-0

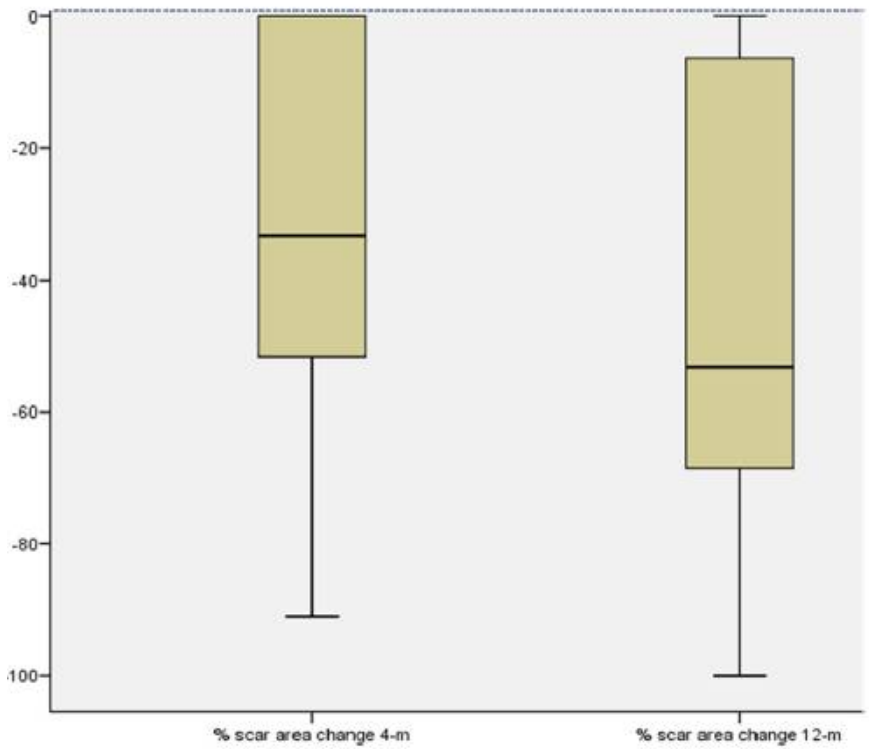
ORIGINAL ARTICLE

# Implantation of a Novel Allogeneic Mesenchymal Precursor Cell Type in Patients with Ischemic Cardiomyopathy Undergoing Coronary Artery Bypass Grafting: an Open Label Phase IIa Trial

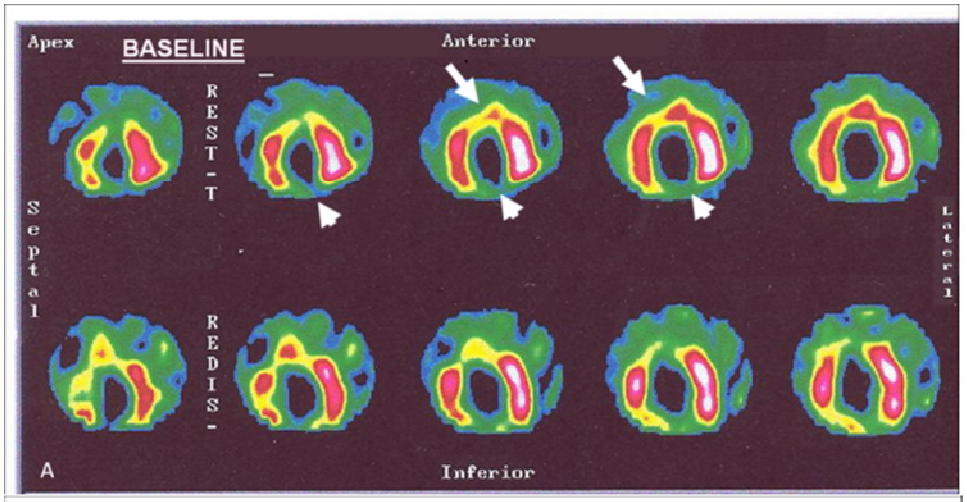
Kyriakos Anastasiadis[1] · Polychronis Antonitsis[1] · Stephen Westaby[2] · Ajan Reginald[3] · Sabena Sultan[2] · Argirios Doumas[4] · George Efthimiadis[5] · Martin John Evans[6]






*Anastasiadis et al., JCTR, 2016*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BASELINE
Anterior
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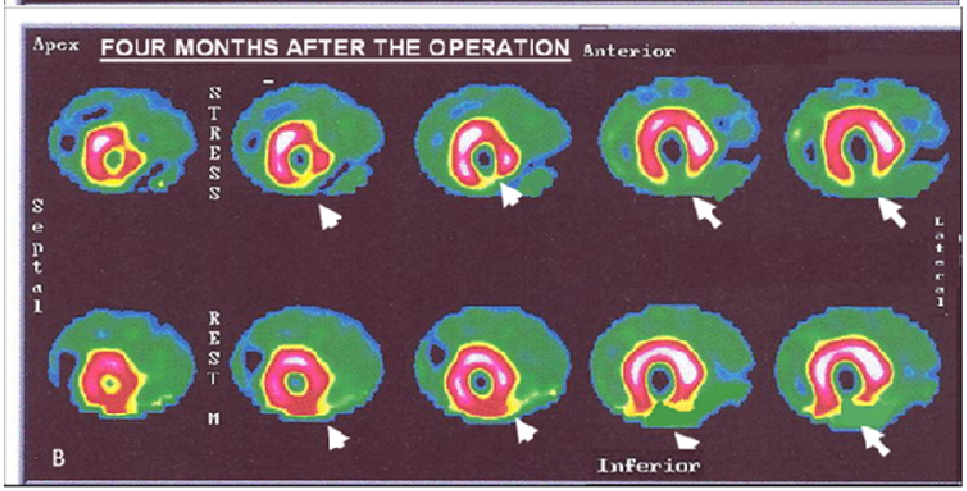
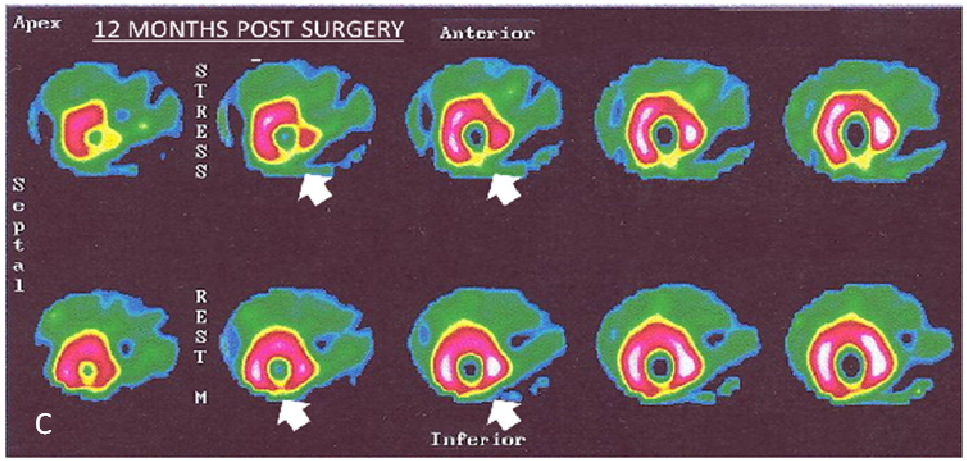
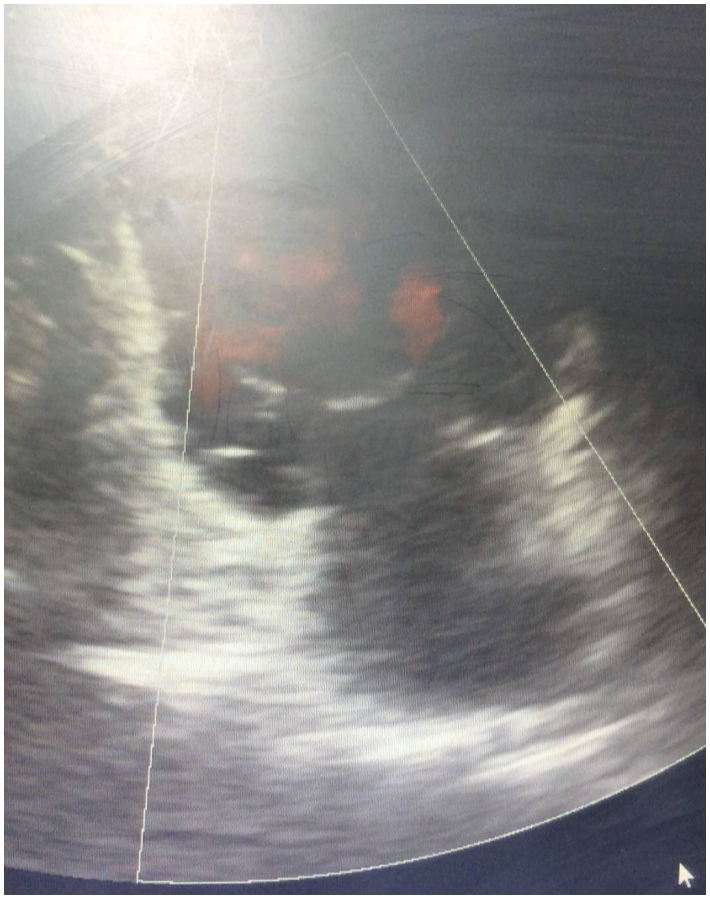
REDIS-
Septal
Lateral
A
Inferior

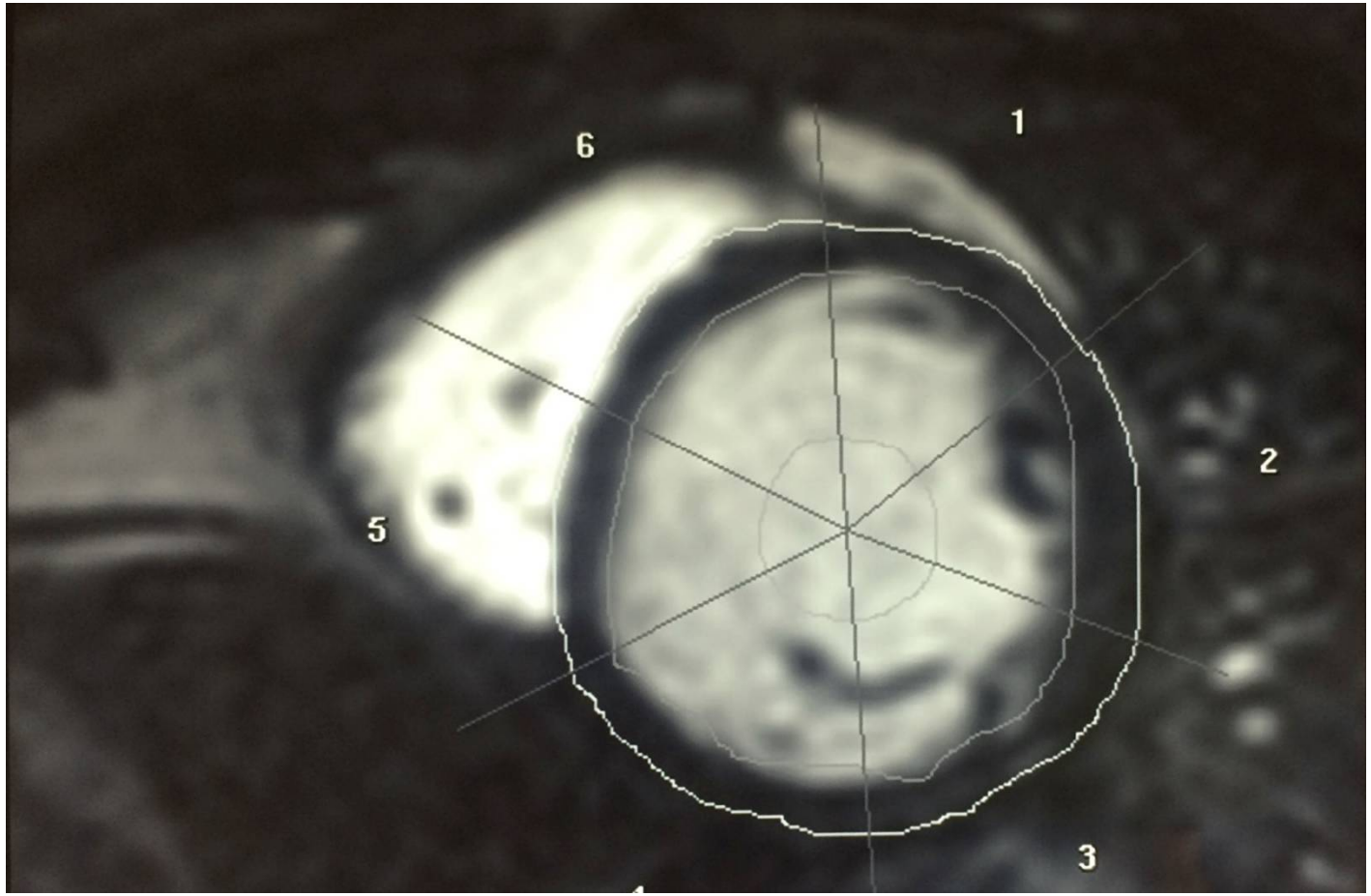

Apex
FOUR MONTHS AFTER THE OPERATION
Anterior
STRESS
REST M
Septal
Lateral
B
Inferior


Apex
12 MONTHS POST SURGERY
Anterior
STRESS
REST M
Septal
C
Inferior

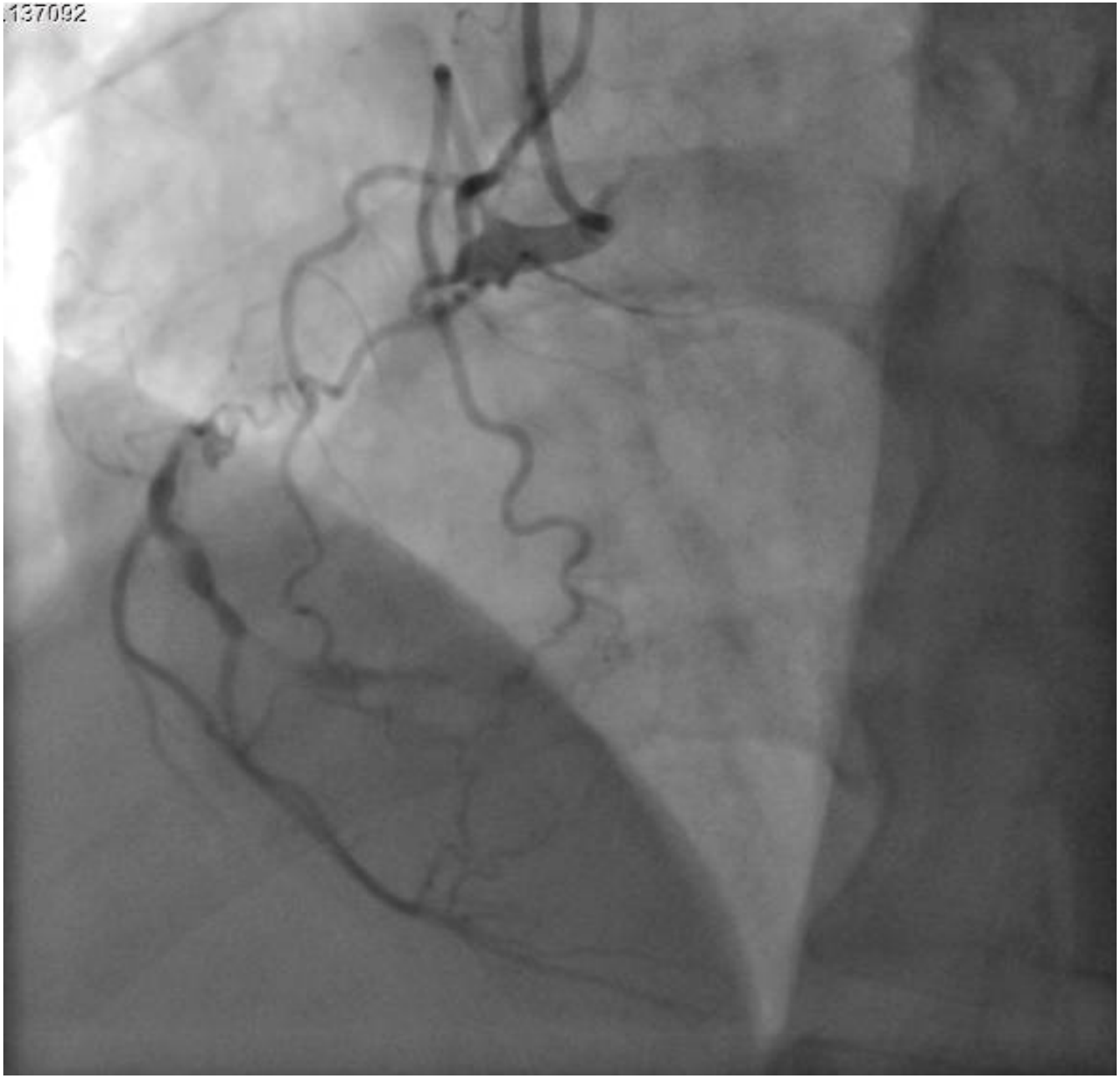

50 ετών

Πρωτοδιαγνωσθείσα καρδιακή ανεπάρκεια ισχαιμικής αιτιολογίας






| | | Endovolume | Blood volume | |
|---|---|---|---|---|
| ED volume | : | 389.8 | 324.5 | ml |
| ES volume | : | 328.3 | 259.0 | ml |
| Ejection fraction | : | 15.8 | 20.2 | % |
| Stroke volume | : | 61.5 | 65.6 | ml |
| Stroke index | : | 33.0 | 35.1 | ml/beat/m² |
| Cardiac output | : | 3.6 | 3.9 | l/min |
| Cardiac index | : | 1.9 | 2.1 | l/min/m² |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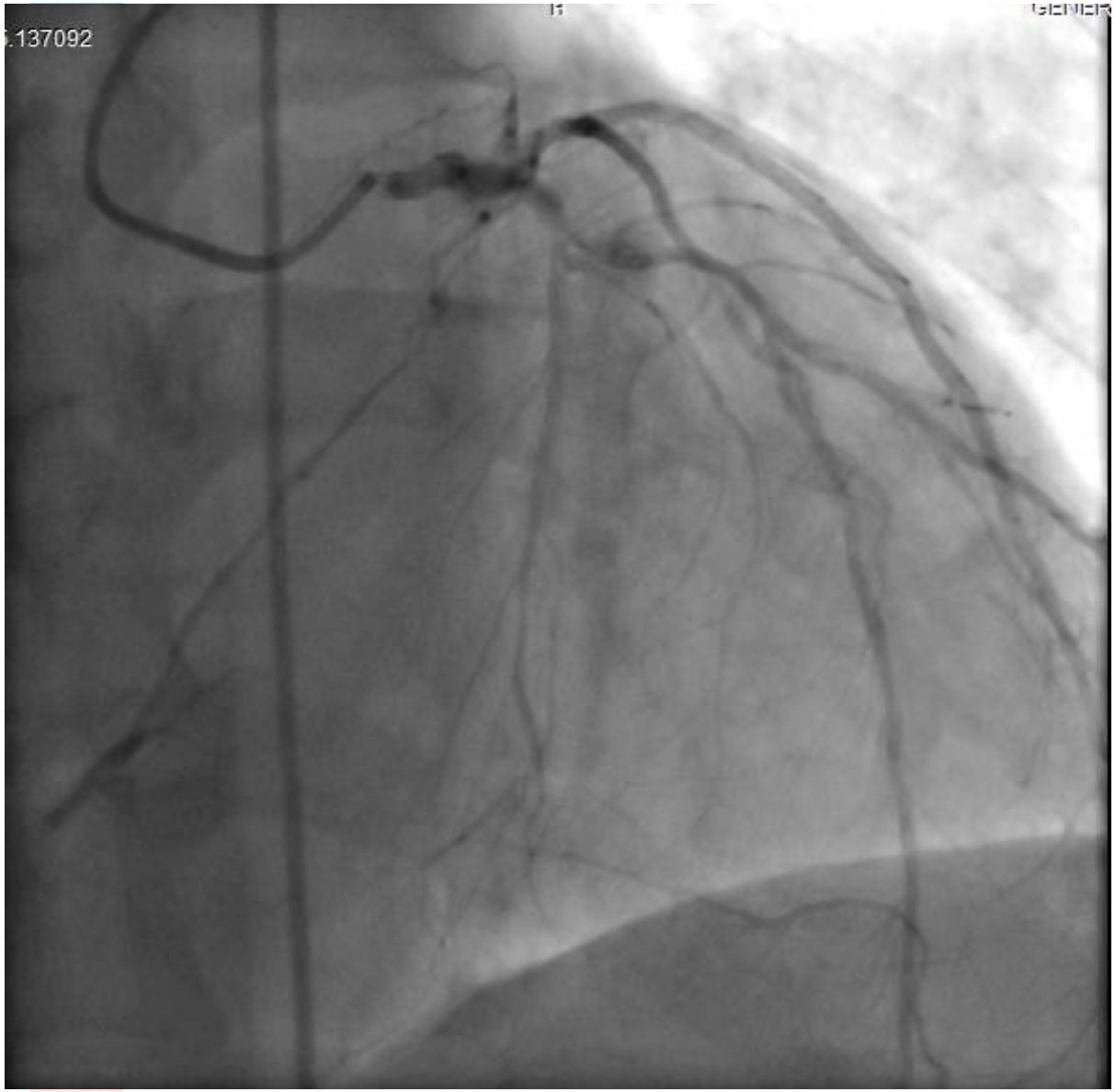


- Βέλτιστη φαρμακευτική αγωγή
- PCI
- Ενδεχόμενη μηχανική υποστήριξη ως θεραπεία προορισμού