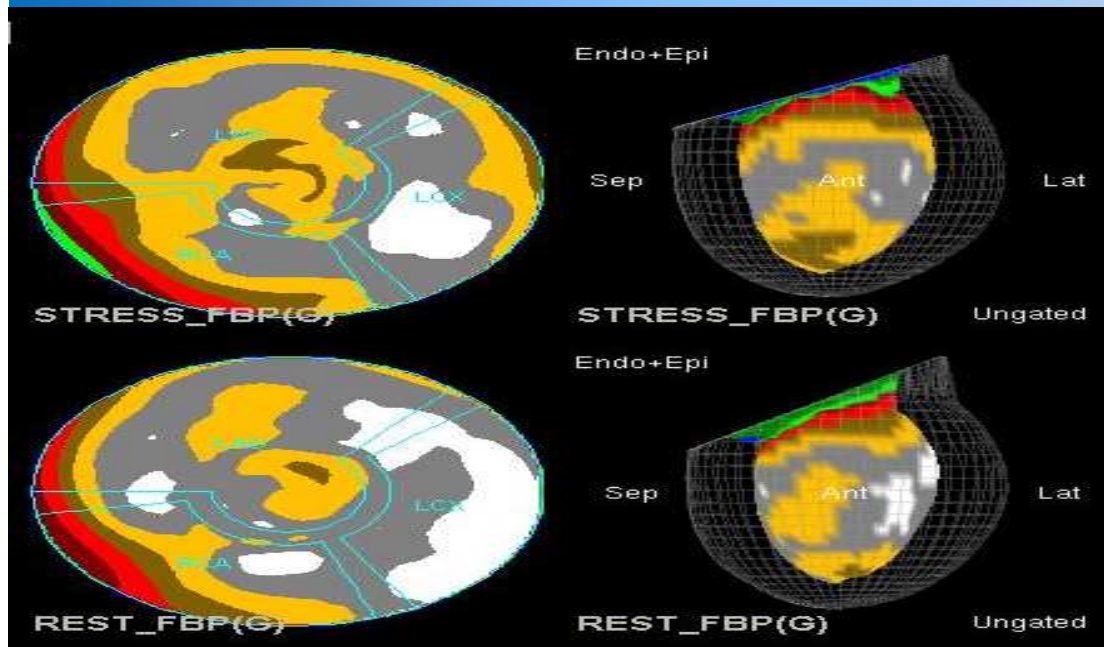


CAN NON-VARIABILITY OF SPECT-OBTAINED LVEF AND ITS RELATIONSHIP WITH SUM STRESS SCORE DIFFERENTIATE NORMAL FROM ABNORMAL SCANS?



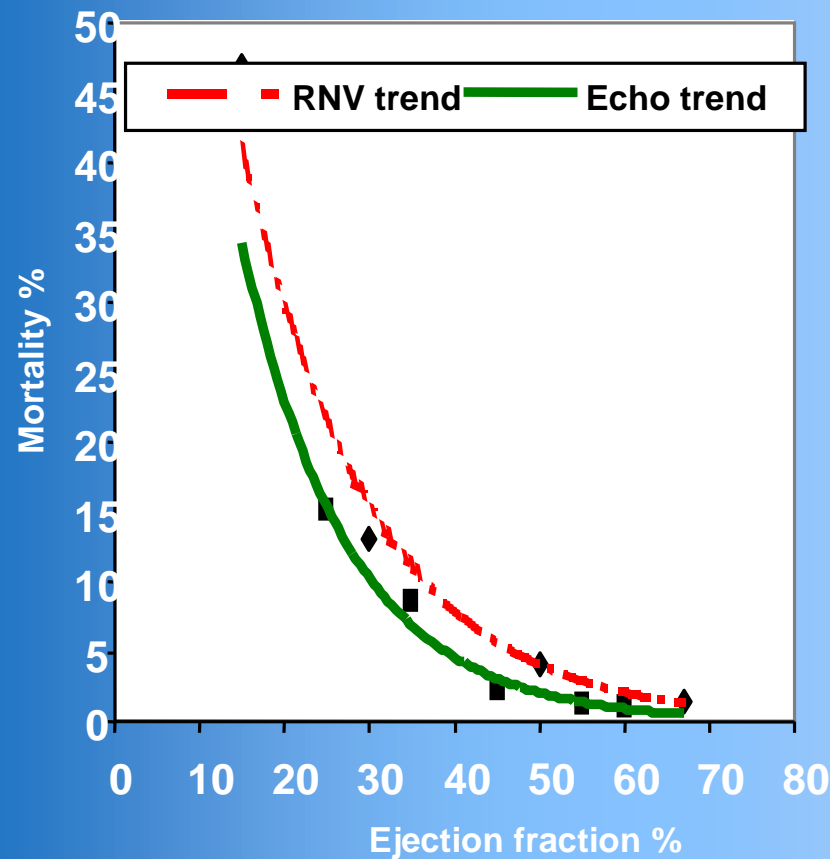
Samir Saha, MD, PhD, FASE,
Anna Beckman, MD.
Sundsvalls Hospital, Sweden



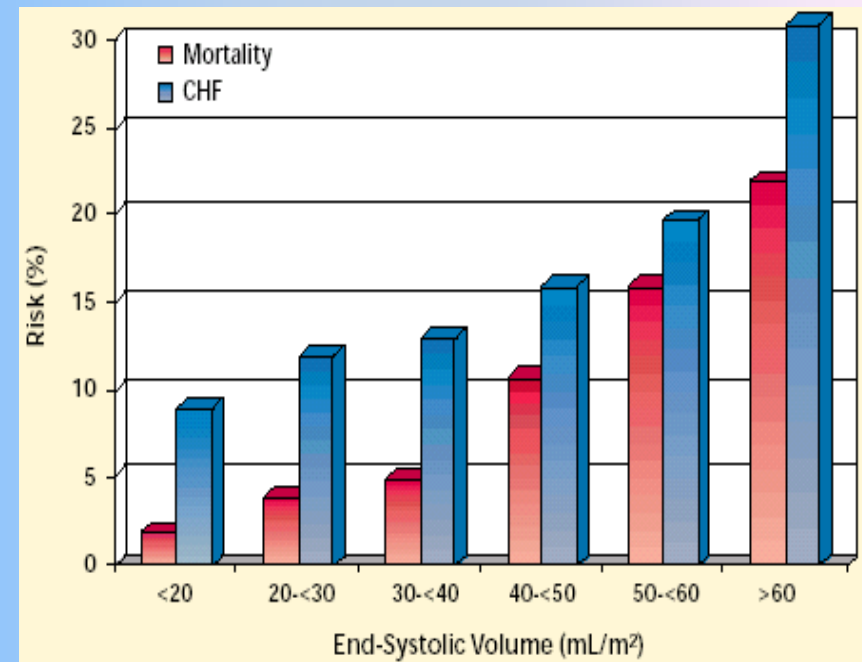
Purpose: Left ventricular ejection fraction (LVEF) is a universally used parameter for clinical management and prognostication in cardiology practice. Gated SPECT-obtained LVEF adds incremental prognostic value on survival when combined with sum stress score (SSS) data. However, it is necessary that different software provide uniform data. Here we report variation of LVEF values using three different types of software.

PURPOSE OF THE STUDY

EF and ESV – powerful prognostic tools



Gottdiener JS, JACC. 1996

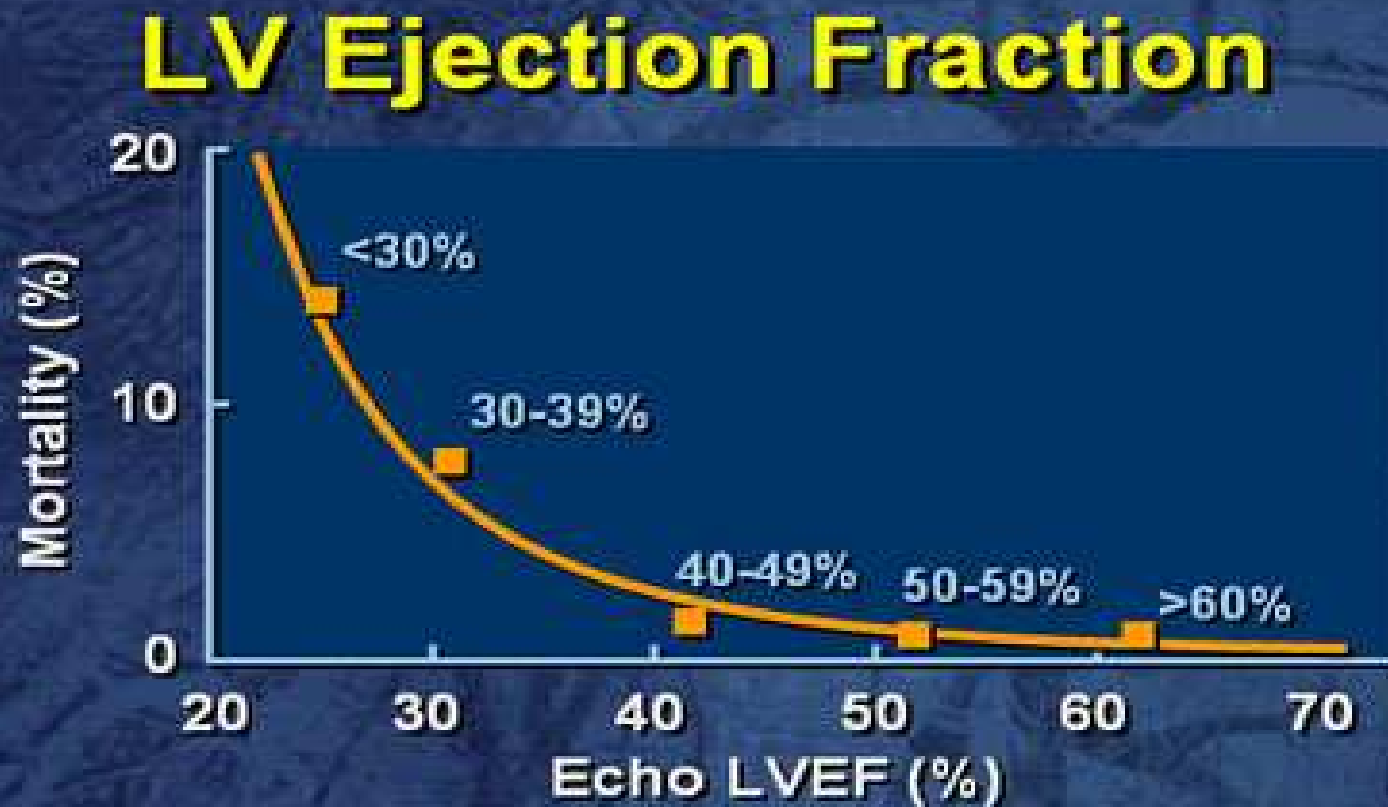


1300 LV grams in GUSTO-1 study

Migrino R, Circulation 1997

Cross-sectional studies don't reflect longitudinal performance

LVEF and mortality



Volpi A et al. Circulation 1993;88:416

METHODS

Subjects

- 37 human subjects without evidence of reversible myocardial ischemia (Controls) and 13 patients with evidence of reversible myocardial ischemia (Patients) were included.

AGE

- Ages of the two groups respectively were 59 ± 10 and 62 ± 9 yrs with 22 females in the former group and 3 females in the latter group.

Spect

- SPECT images, acquired on multi-head detectors with either Technetium-99m based MIBI ($n=24$) or Tetrofosmin ($n=26$), were post processed using ECToolbox (ECTb), Myovision (GE Health Care), and QGS/QPS soft wares embedded in Xeleris 2 (GE).



Table: LVEF% using 3 different soft wares

Comparisons (LVEF%)	Rest(mean±SD)	P value	Stress(mean±SD)	P value
ECTb vs. Myovision	70±8 vs. 66±8	0.02	68± 13 vs. 64±8	0.12
ECTb vs. QGS/QPS	70±8 vs. 63± 7	0.0004	70±8 vs. 59±12	0.002
Myovsion vs. QGS/QPS	66± 8 vs. 64± 8	0.11	64± 8 vs. 59±12	0.03

LVEF obtained by gated SPECT using 3 different software programs at rest and during stress in Controls

RESULTS

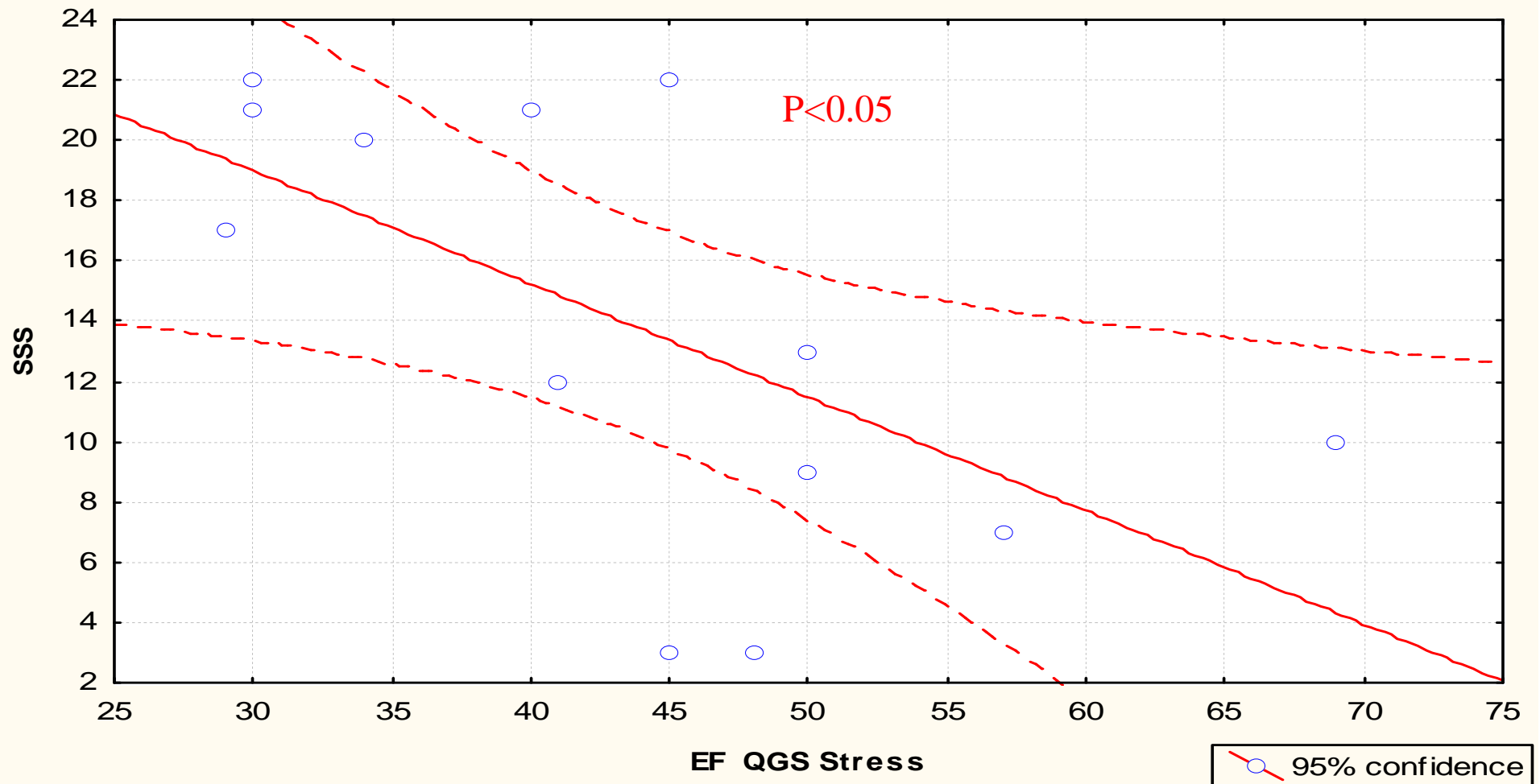
Data obtained by independent sample t test: $P < 0.05$ is considered significant

Results Contd: Correlation between SSS and LVEF in subjects with reversible myocardial ischemia

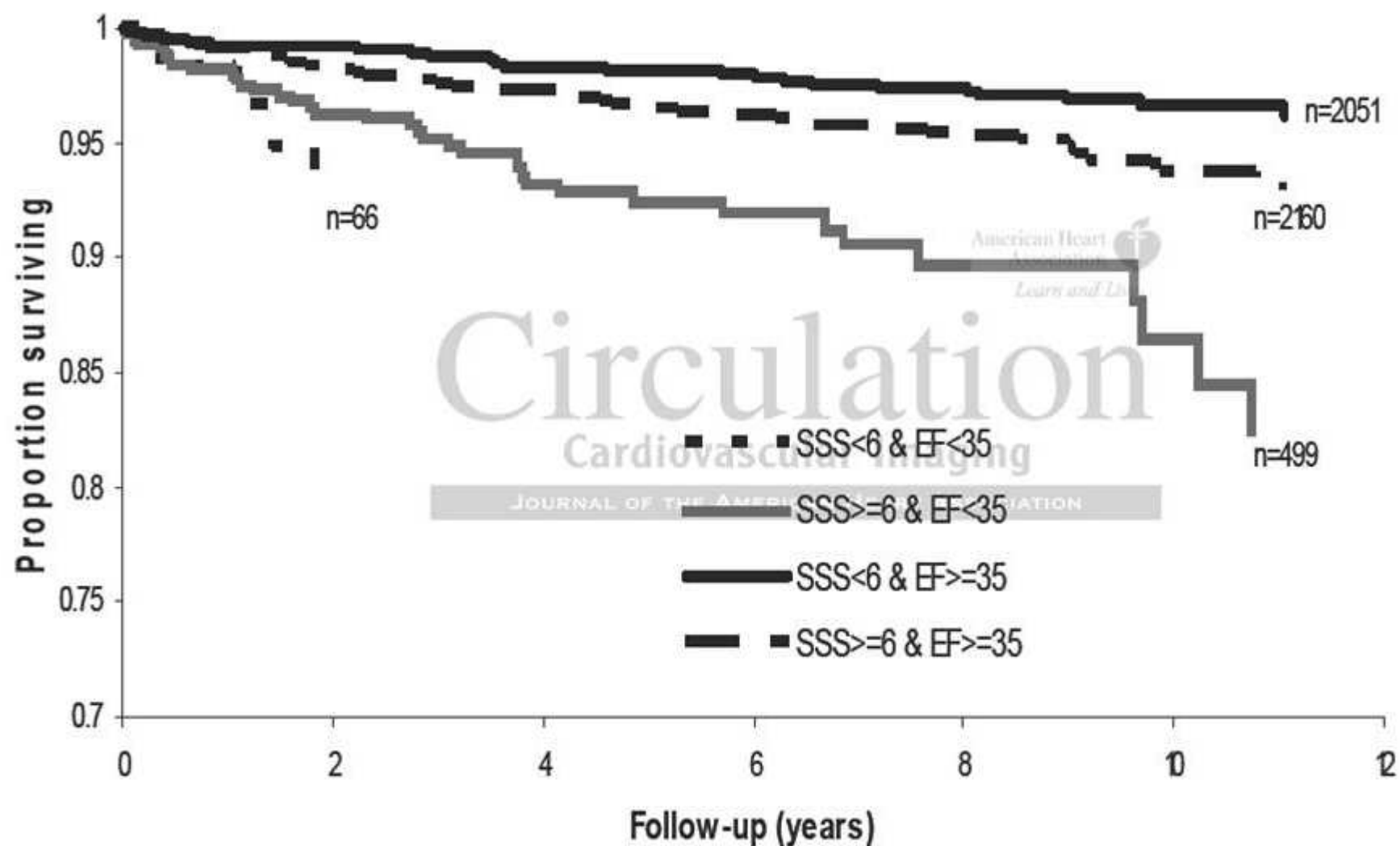
Scatterplot: **EF QGS Stress** vs. **SSS** (Casewise MD deletion)

$$\text{SSS} = 30.293 - .3764 * \text{EF QGS Stress}$$

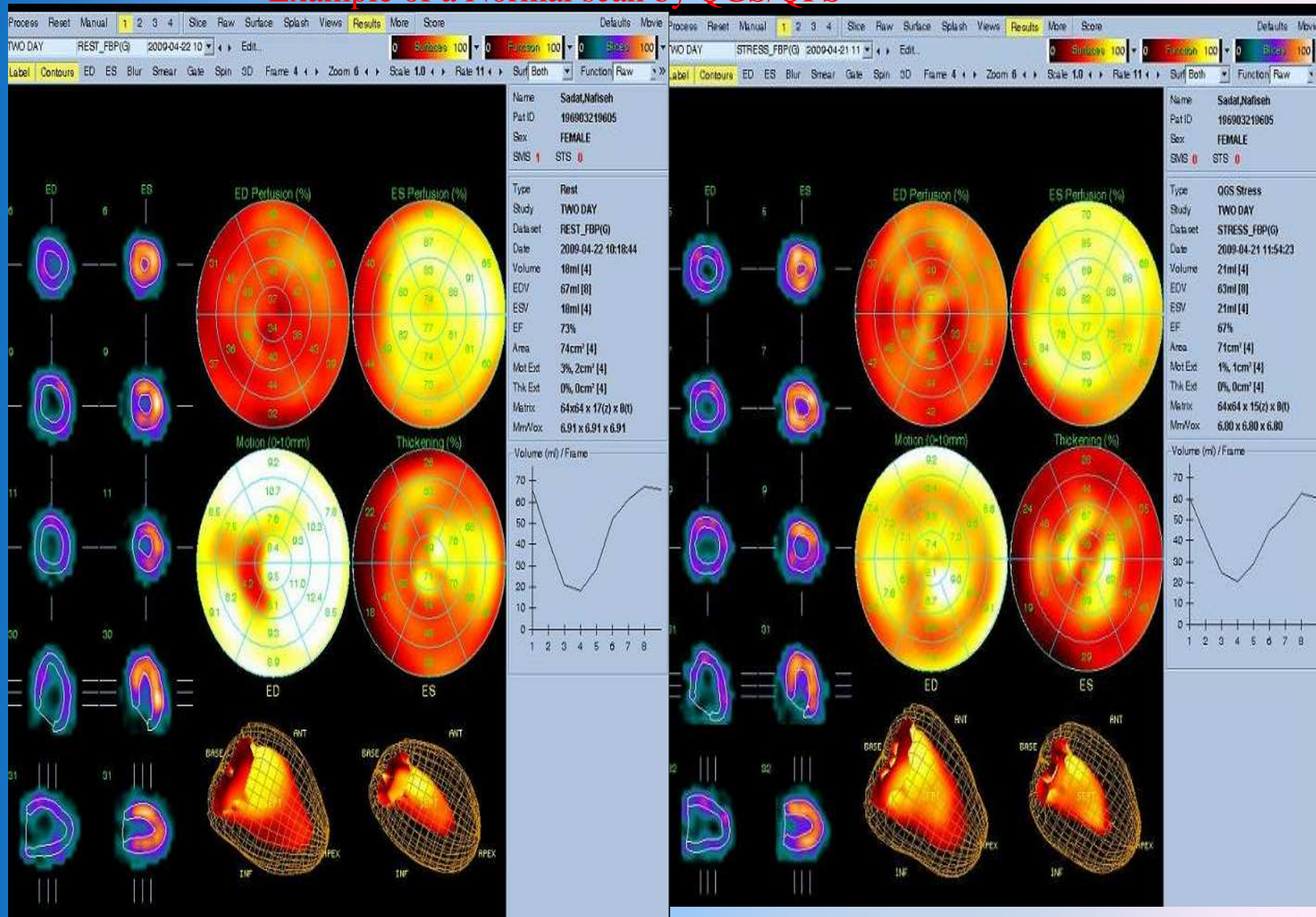
Correlation: $r = -.6155$



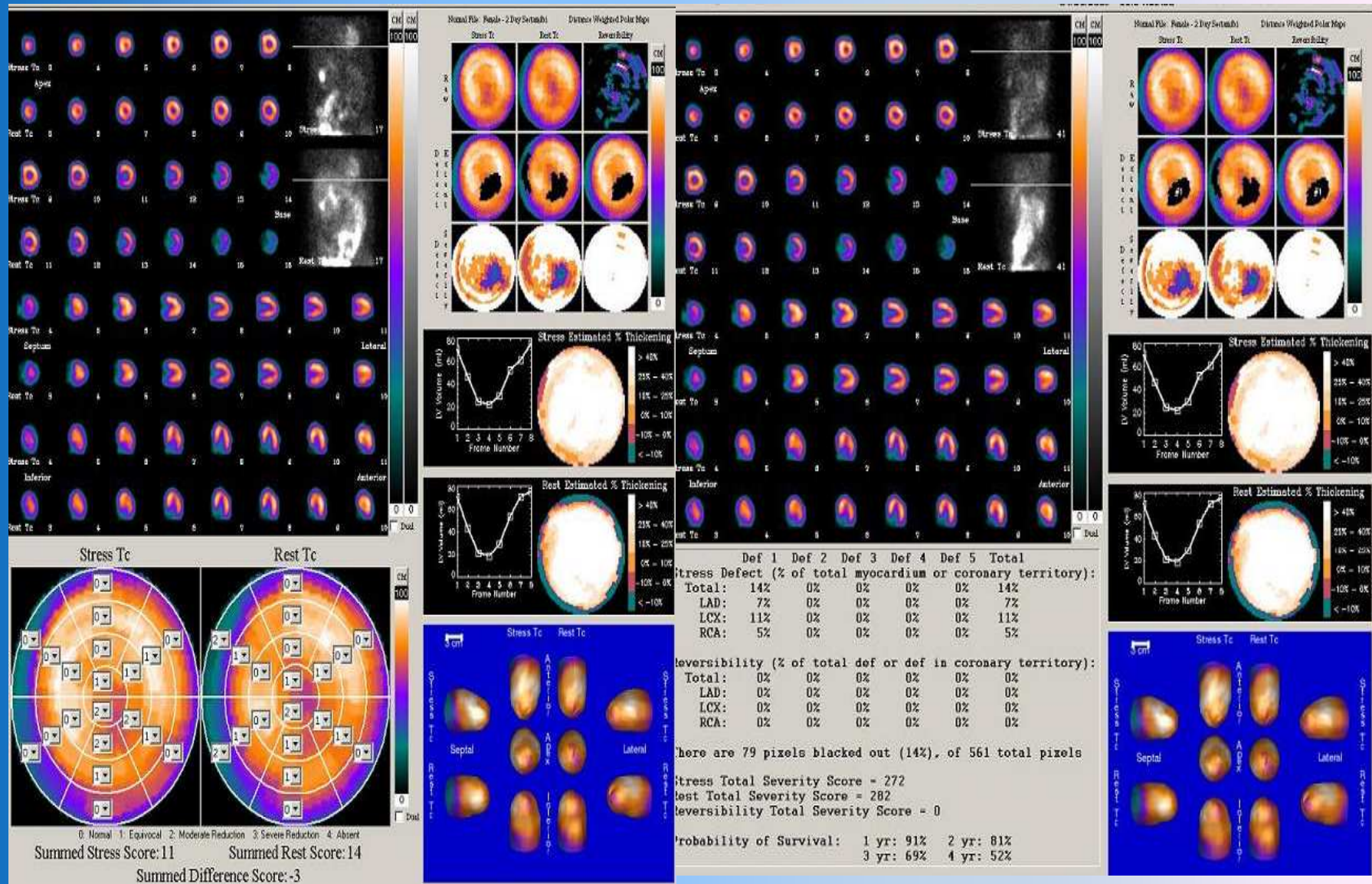
Jonathan P Piccini, et al, ahead of print, Sept 17, 2008



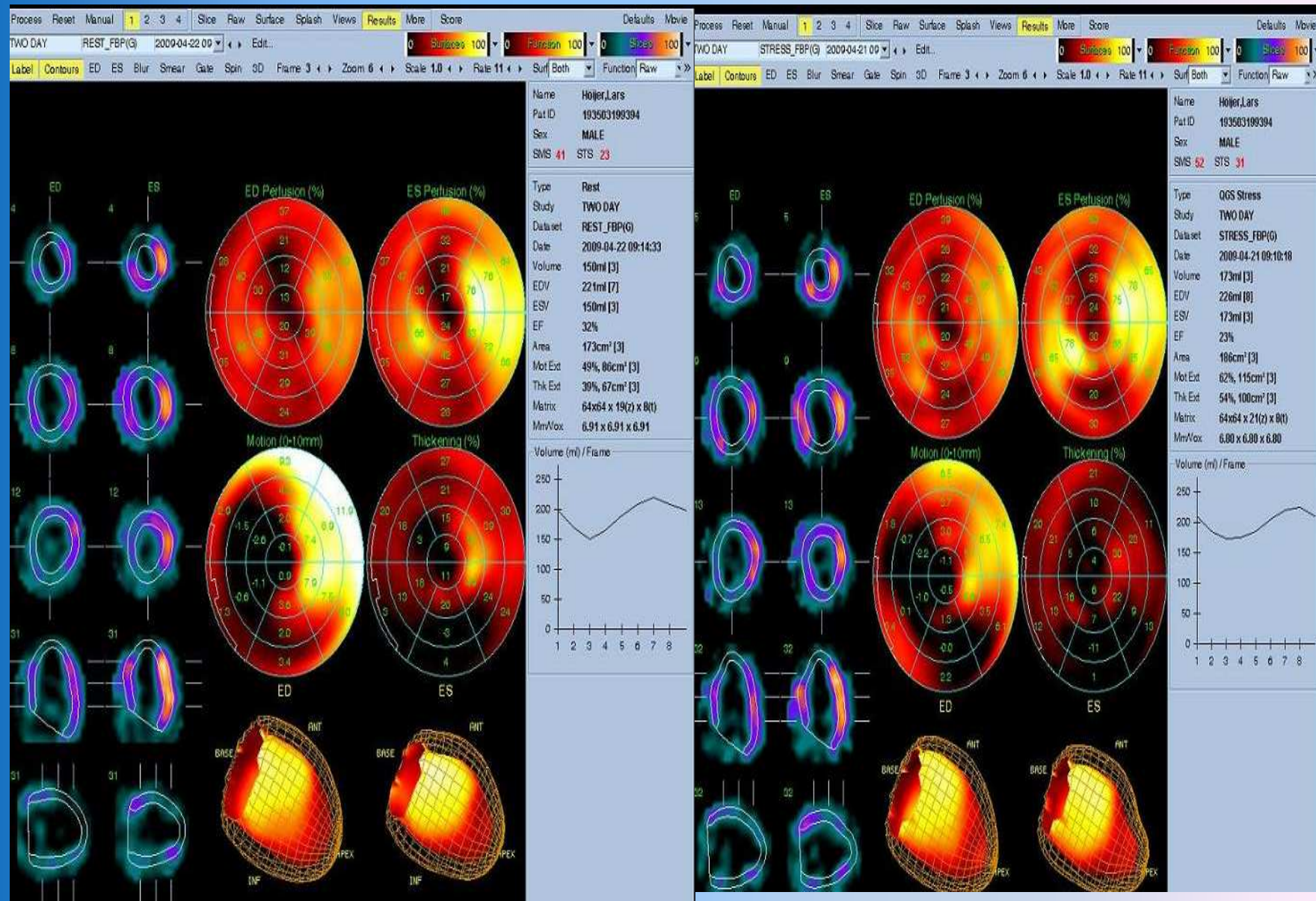
Example of a Normal scan by QGS/QPS



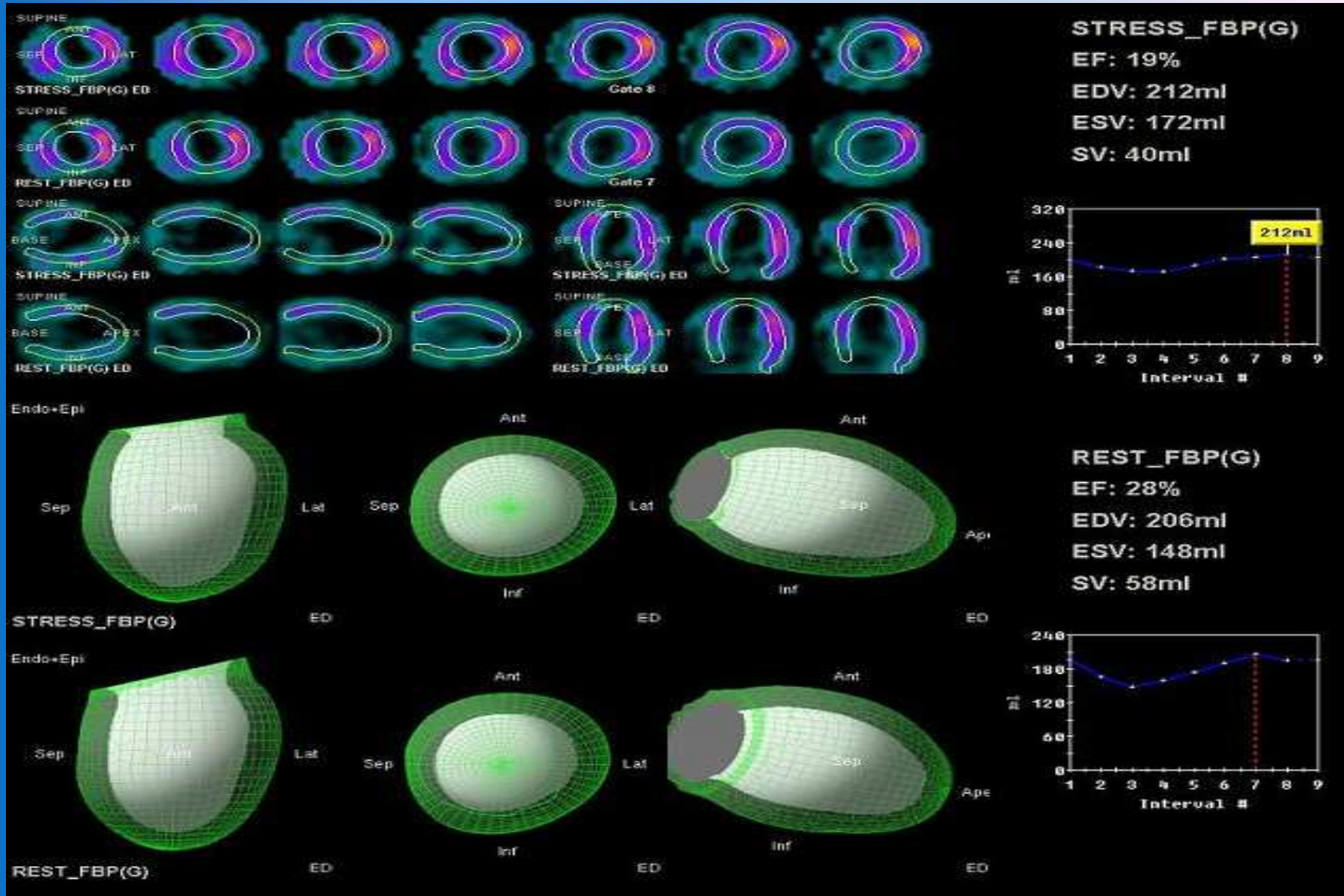
Low 4 -year"survival" according to ECTBox in a normal scan

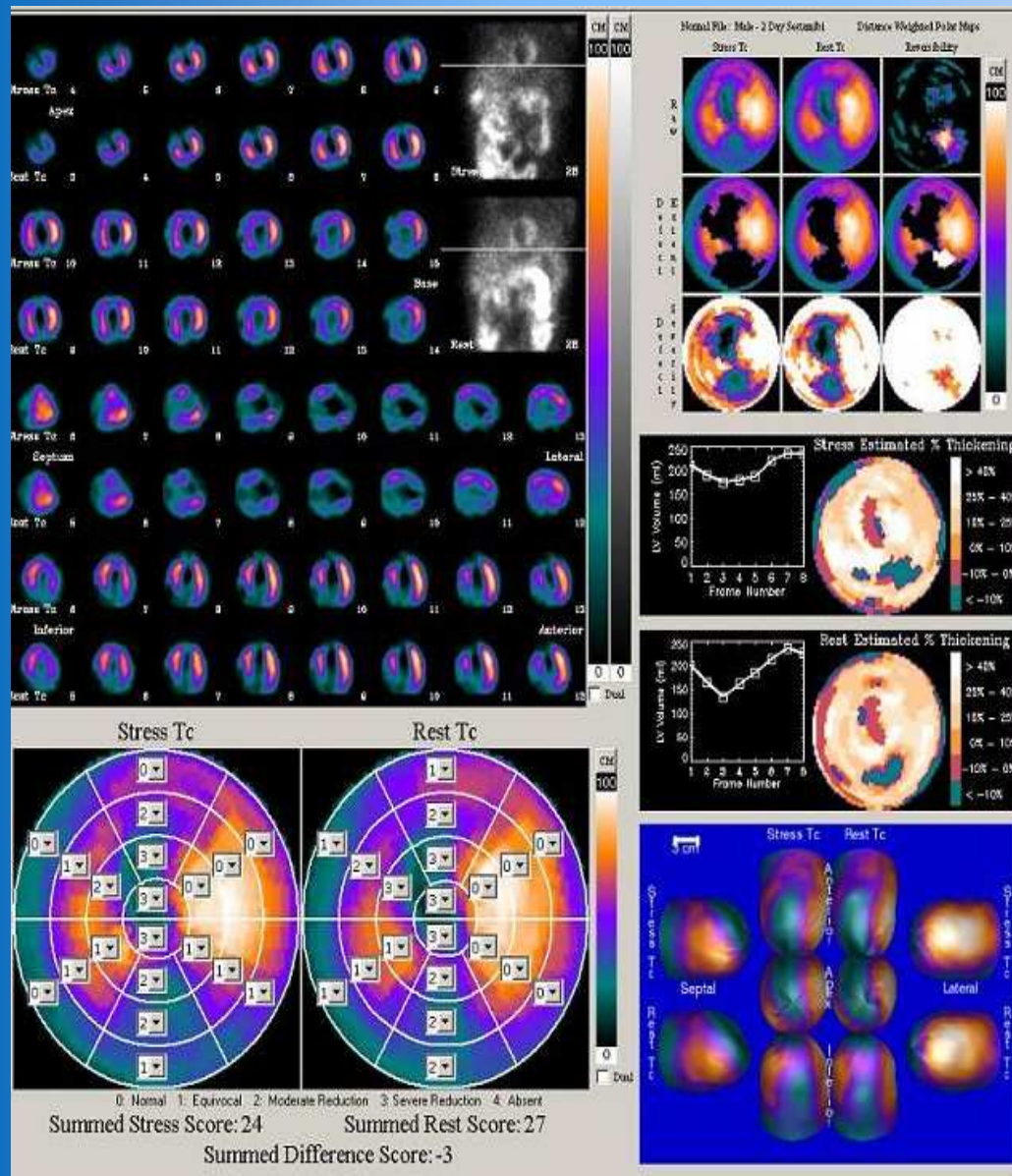


Abnormal scan as registered in a patient (CABG) using QGS/QPS



Myovision data in the same "abnormal" scan (Post CABG)





	Def 1	Def 2	Def 3	Def 4	Def 5	Total
Stress Defect (% of total myocardium or coronary territory):						
Total:	39%	0%	0%	0%	0%	39%
LAD:	50%	0%	0%	0%	0%	50%
LCX:	10%	0%	0%	0%	0%	10%
RCA:	53%	0%	0%	0%	0%	53%

	Def 1	Def 2	Def 3	Def 4	Def 5	Total
Reversibility (% of total def or def in coronary territory):						
Total:	11%	0%	0%	0%	0%	11%
LAD:	0%	0%	0%	0%	0%	0%
LCX:	38%	0%	0%	0%	0%	38%
RCA:	10%	0%	0%	0%	0%	10%

There are 217 pixels blacked out (39%), of 561 total pixels

Stress Total Severity Score = 1023

Rest Total Severity Score = 970

Reversibility Total Severity Score = 46

Probability of Survival: 1 yr: 81% 2 yr: 77%
3 yr: 63% 4 yr: 42%

We conclude that a combination of LVEF and SSS could be useful to differentiate between normal and abnormal scan.



The variation of LVEF values in the Controls may not have any clinical significance because of the large (55%-90%) "normal" range of this functional variable.

However, such variations in subjects with reversible myocardial ischemia may affect the clinical decision making process.

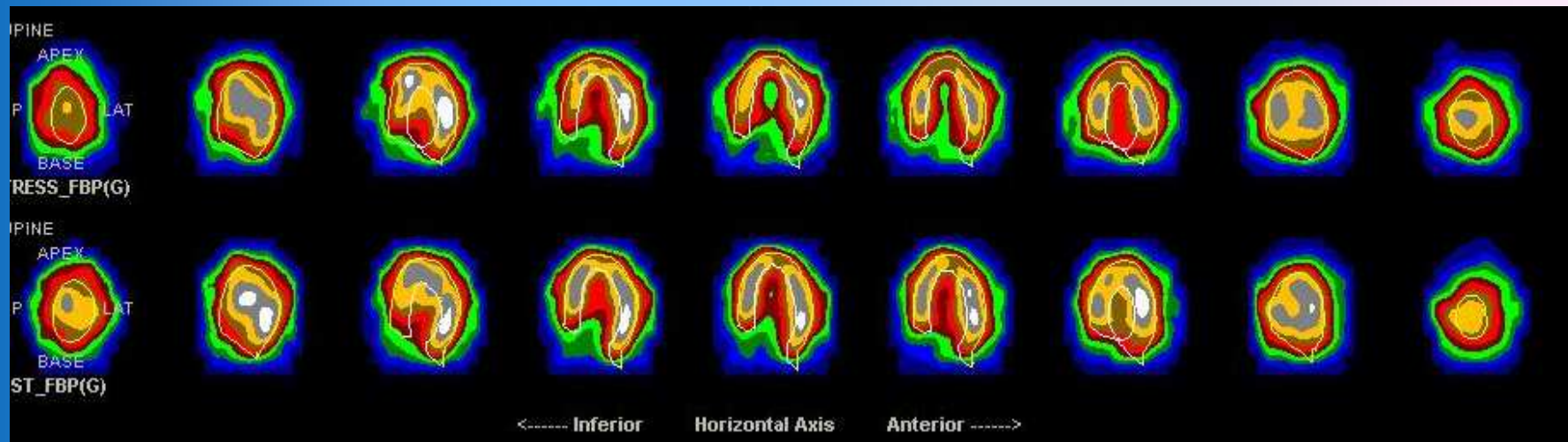
Though relatively small number of Patients precludes us to comment further on this issue, it is probably desirable to have uniform cross talk among the soft wares.

CONCLUSIONS

In the Patient group no variation was observed (lowest LVEF was $44\pm 12\%$ vs. 59 ± 12 in Controls by stress QGS/QPS; $p<0.0001$).

SSS in the former group was 3 ± 3 and in the other group 13 ± 7 ($p<0.01$). Significant negative correlation was found between SSS and QGS/QPS-obtained stress LVEF in the Patient group ($r=-0.6$; $p<0.05$).

No such correlations were found in either group in any of the other software based data either at rest or during stress.



FINAL CONCLUSIONS

- ❖ **Mortality data base in the ECtBox SW is misleading**
- ❖ **Since LVEF data along with SSS is a better marker of survival.....**
- ❖ **Other SWs also should provide SSS, SDS data**
- ❖ **Motion defect and the thickening defect in the QGS/QPS SW is also misleading**
- ❖ **Myovision SW has multiple options thereby making it probably more robust among the 3 SW**