Autotransplantation of Bone-Marrow Derived Mesenchymal Stromal Cells in Patients with Severe Ischemic Heart Failure

The MSC-HF Trial

Anders Bruun Mathiasen M.D.
Rigshospitalet, Copenhagen University Hospital
Copenhagen, Denmark

The MSC-HF trial

- Randomized Double Blind Placebo controlled
- Phase 2
- 59 patients (2:1)
- Severe Ischemic Heart Failure
- Mesenchymal Stromal Cells
- Intramyocardial injection (NOGA-XP™)

Inclusion Criteria

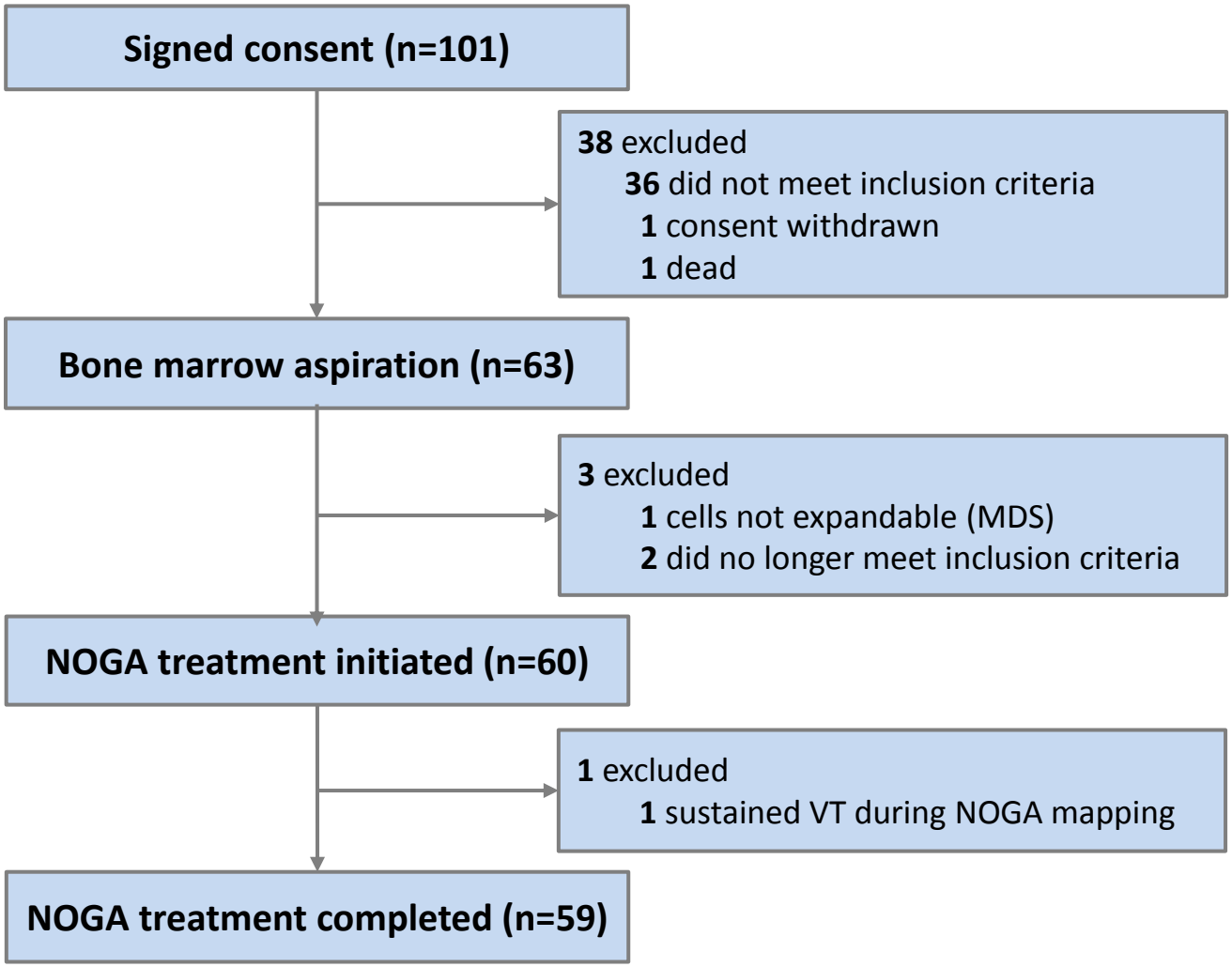
- 30-80 years
- Chronic ischemic heart failure
- LVEF < 45%
- NYHA 2-3
- No option for PCI or CABG
- Maximum tolerable medication

Primary Endpoint

End systolic volume

- MRI or CT
- 60 patients (2:1)
- 10 mL difference (SD = 11.1)
- Power = 90%

Patient Recruitment

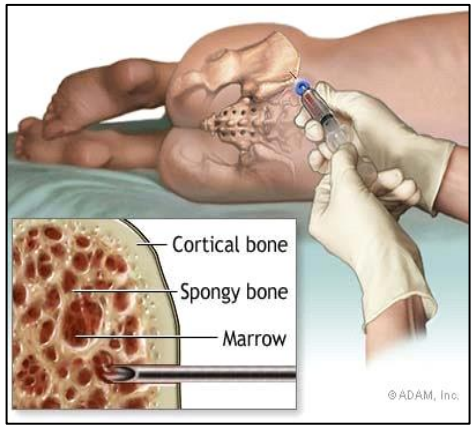


Baseline Characteristics

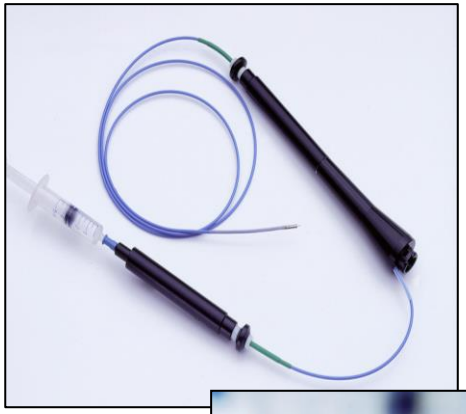
	MSC (n=39)	Placebo (n=20)	p
Age (years)	66.2 ± 7.7	64.2 ± 10.6	0.41
Male	35 (89.7)	14 (70.0)	0.07
Years with IHD	12.9 ± 7.9	13.1 ± 8.5	0.93
LVEF (%)	28.9 ± 9.1	26.3 ± 8.1	0.32
NYHA Class II	10 (25.4)	5 (25.0)	0.96
NYHA Class III	29 (74.6)	15 (75.0)	0.96
Previous MI	34 (87.2)	19 (95.0)	0.65
Previous PCI	27 (69.2)	15 (75.0)	0.64
Previous CABG	26 (66.7)	10 (50.0)	0.21
ICD implant	19 (48.7)	13 (65.0)	0.24
CRT implant	11 (28.2)	5 (25.0)	0.80
Smoking current / former	6 (15.4) / 26 (66.7)	1 (5.0) / 15 (75.0)	0.40 / 0.51
IDDM / NIDDM	9 (23.1) / 6 (15.4)	2 (10.0) / 1 (5.0)	0.30 / 0.40
Antithrombotic agent	39 (100.0)	20 (100.00)	1.00
ACE or ARB	34 (87.2)	18 (90.0)	1.00
β-blocker	34 (87.2)	15 (75.0)	0.28
Calcium antagonist	11 (28.2)	3 (15.0)	0.34
Diuretic agent	31 (79.5)	16 (80.0)	1.00
Statins	35 (89.7)	18 (90.0)	1.00
Nitrate	23 (59.0)	9 (45.0)	0.31

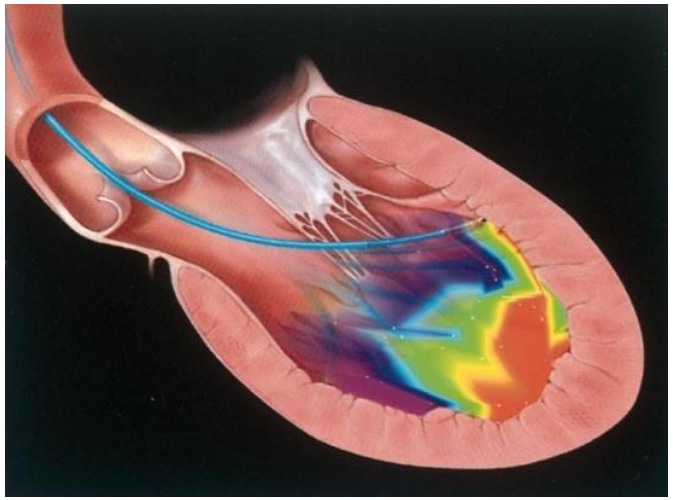
(%)

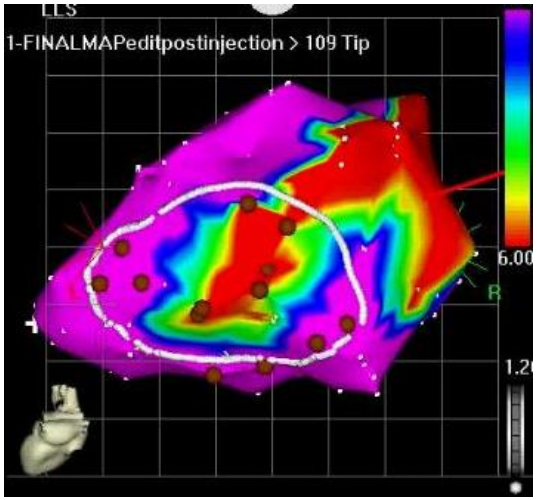
Treatment



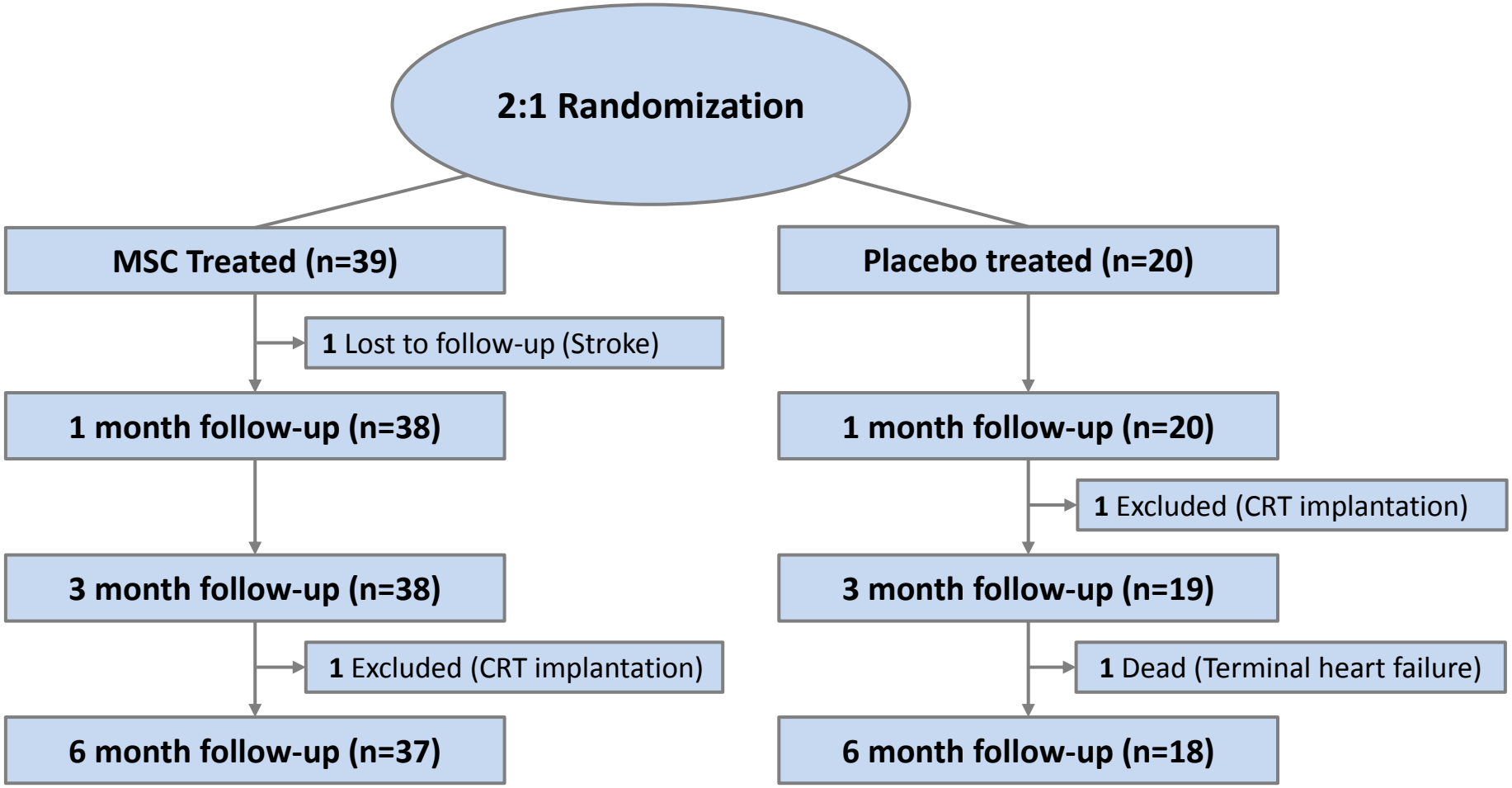
- Bone marrow MSCs
- Expansion for 6 - 8 weeks
- 77.5 million
- Injected using NOGA-XP™







Follow-up overview



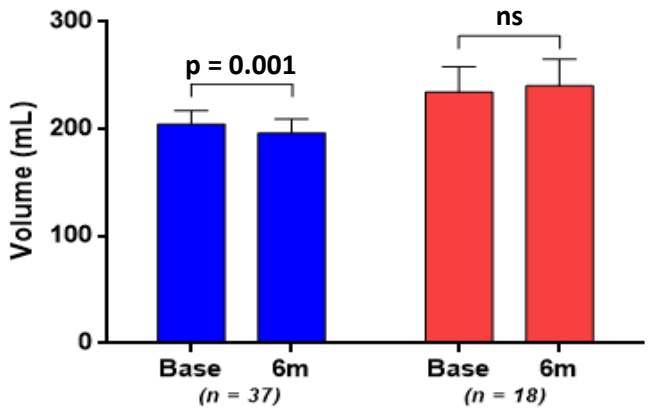
Safety

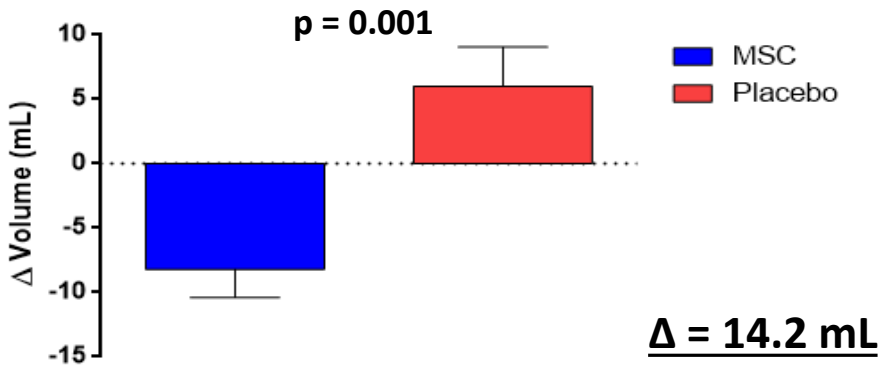
Serious Adverse Event	MSC (n=39)	Placebo (n=20)	p
MI	0 (0.0)	0 (0.0)	-
PCI or CABG	0 (0.0)	0 (0.0)	-
Stroke or TCI	2 (5.1)	1 (5.0)	1.00
Heart failure worsening	5 (12.8)	1 (5.0)	0.65
Angina	0 (0.0)	3 (15.0)	0.03
Orthostatic syncope	0 (0.0)	1 (5.0)	0.33
Atrial fibrillation	1 (2.6)	0 (0)	1.00
VT/VF	1 (2.6)	1 (5.0)	1.00
ICD implantation	1 (2.6)	0 (0)	1.00
CRT implantation	1 (2.6)	1 (5.0)	1.00
Device related	0 (0.0)	2 (10.0)	0.11
Cancer	0 (0.0)	0 (0.0)	-
Pneumonia	0 (0.0)	3 (15.0)	0.04
Gallbladder infection	0 (0.0)	1 (5.0)	0.34
Observation for headache	0 (0.0)	1 (5.0)	0.34

(%)

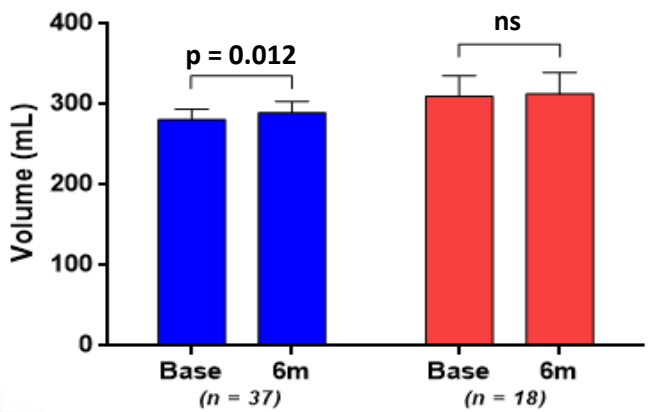
Results I

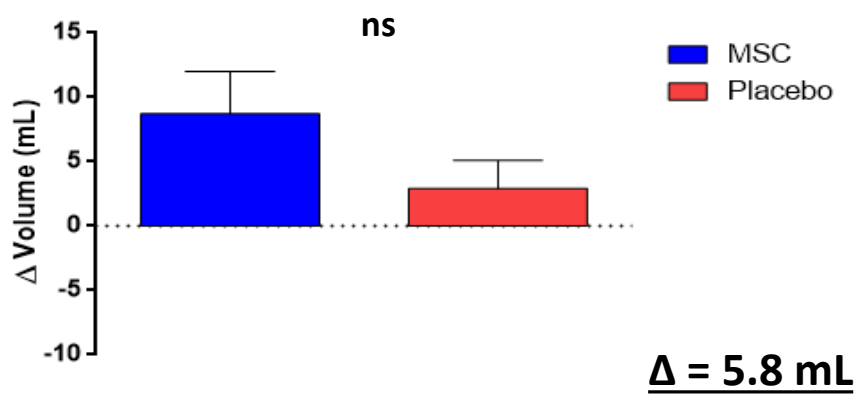
End systolic volume





End diastolic volume

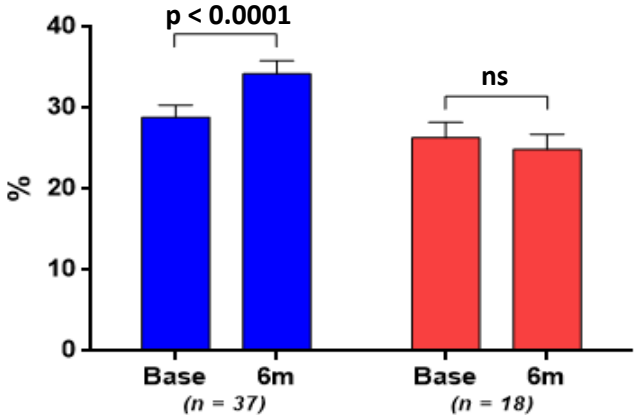


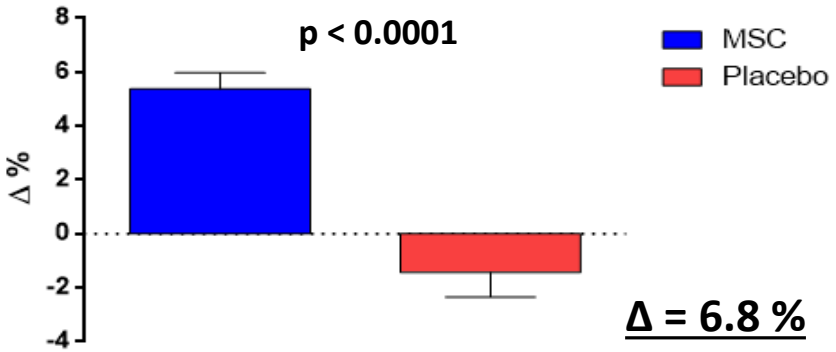


(Mean + SEM)

Results II

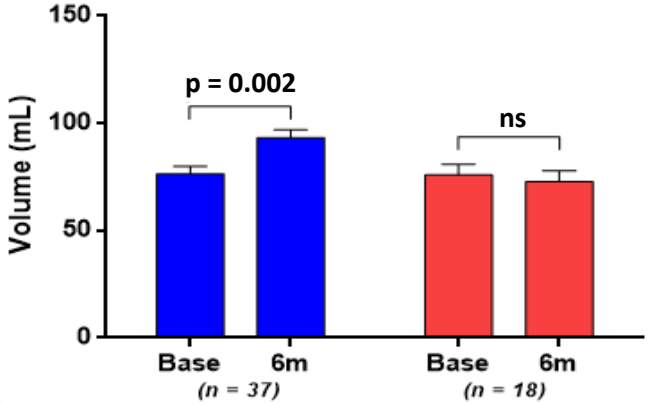
Ejection fraction

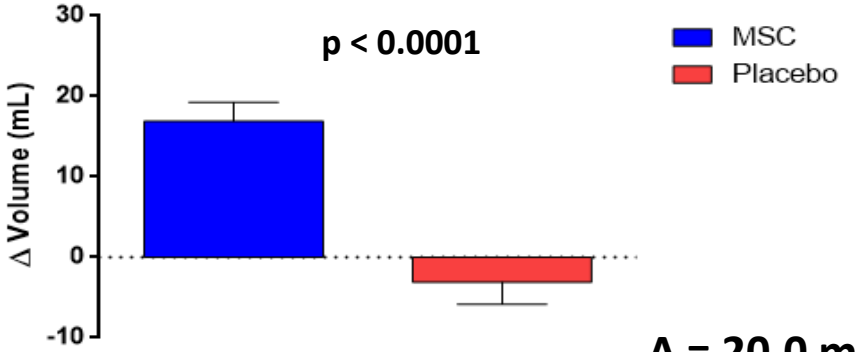




Δ = 6.8 %

Stroke volume



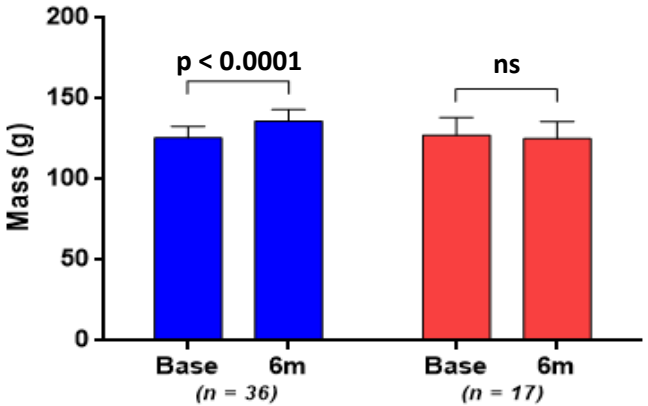


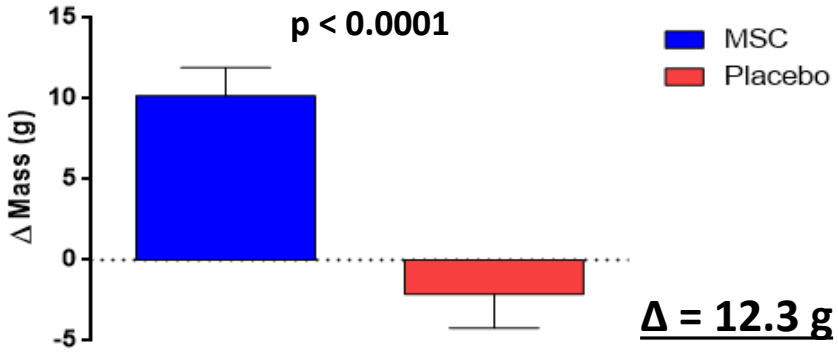
Δ = 20.0 mL

(Mean + SEM)

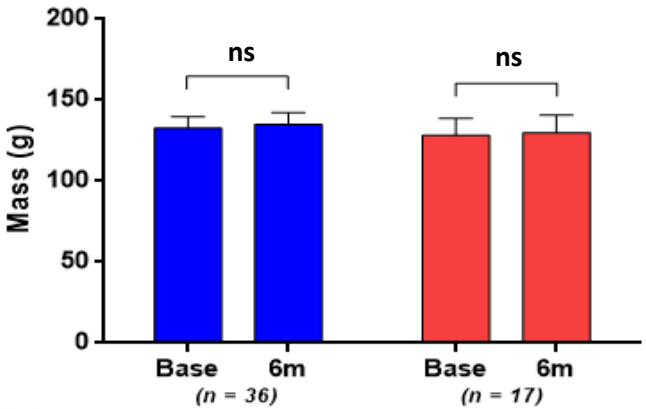
Results III

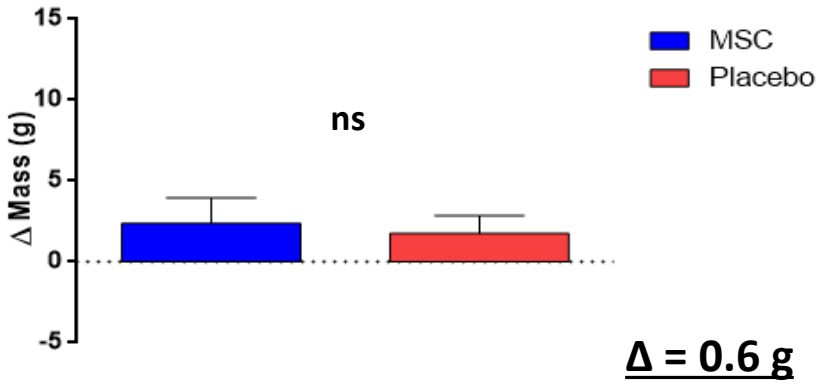
End systolic myocardial mass





End diastolic myocardial mass

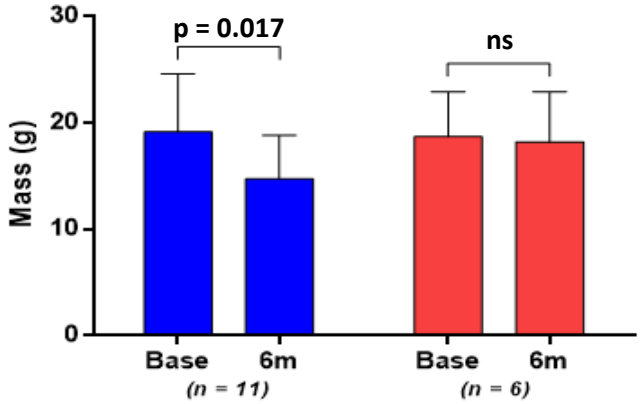


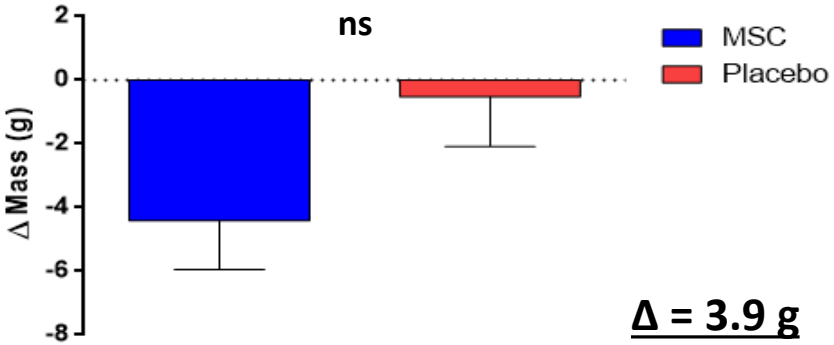


(Mean + SEM)

Results IV

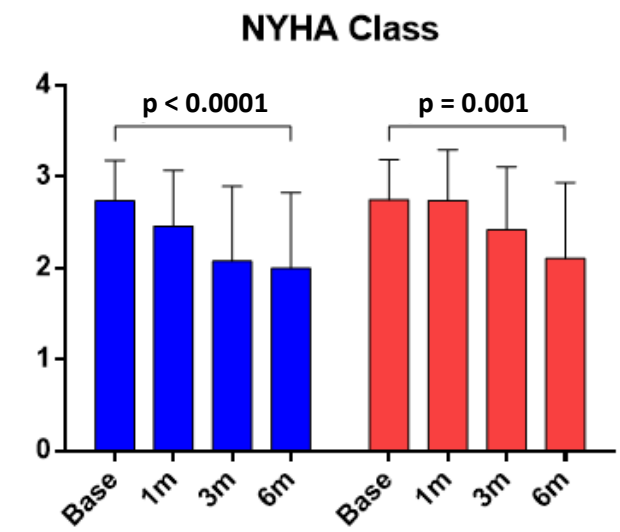
Scar tissue mass

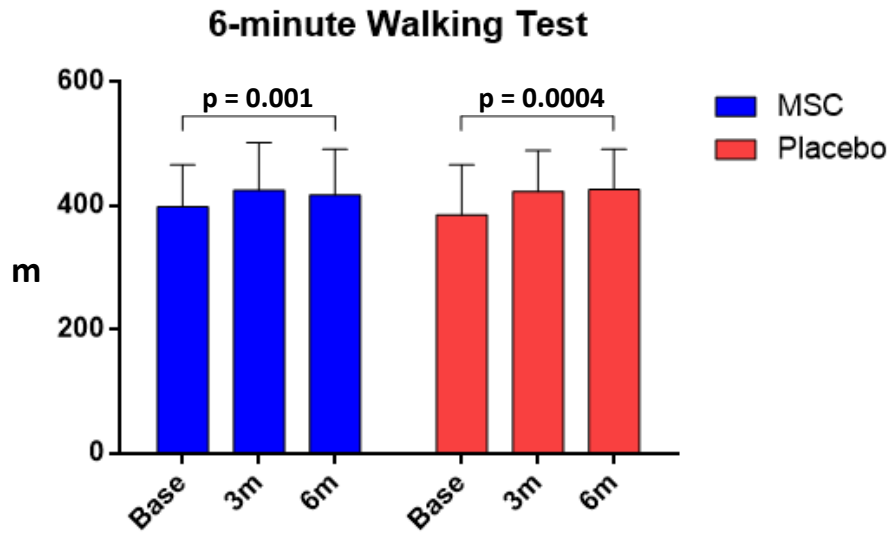


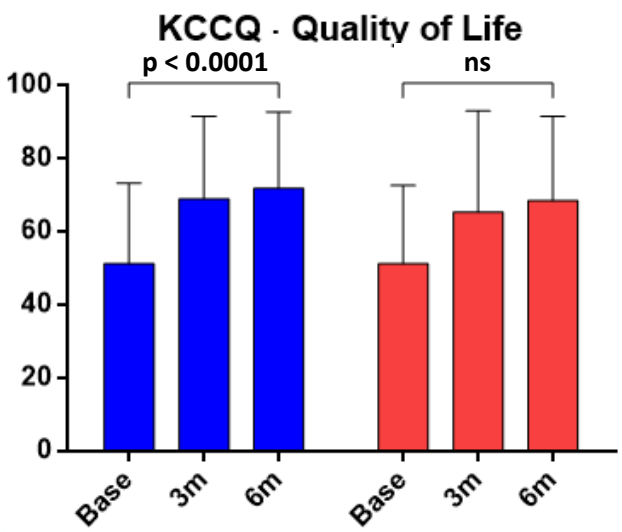


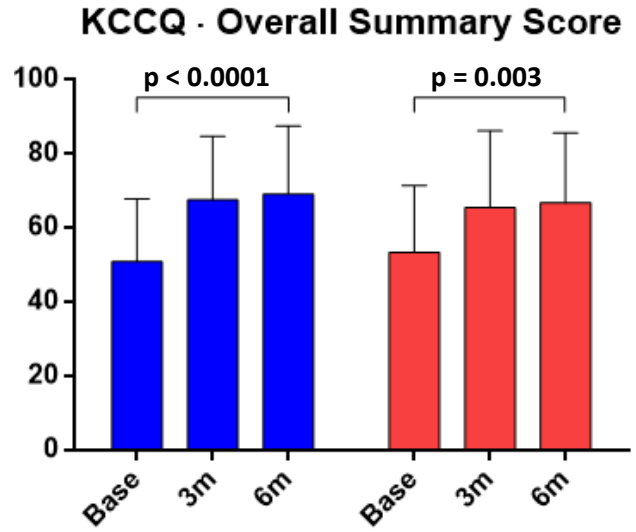
(Mean + SEM)

Results V









(Mean + SEM)

Post-hoc Power

55 patients (37 MSC : 18 placebo)

End systolic volume

- 14.2 mL difference (SD = 13.3 mL)
- Power = 95.4%

Ejection fraction

- 6.8 % difference (SD = 3.7 %)
- Power > 99.9%

Summary

MSC treatment in severe Heart Failure

- Treatment safe
- End systolic volume improved
- Ejection fraction and stroke volume improved
- Myocardial mass increased
- Trend towards reduced scar tissue
- Fewer symptoms, better quality of life in both groups