Obesity and AF:
Is weight loss the simple solution?

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SOUTH AUSTRALIA

SAHMRI
South Australian Health & Medical Research Institute

HEART HEALTH
Centre for Heart Rhythm Disorders

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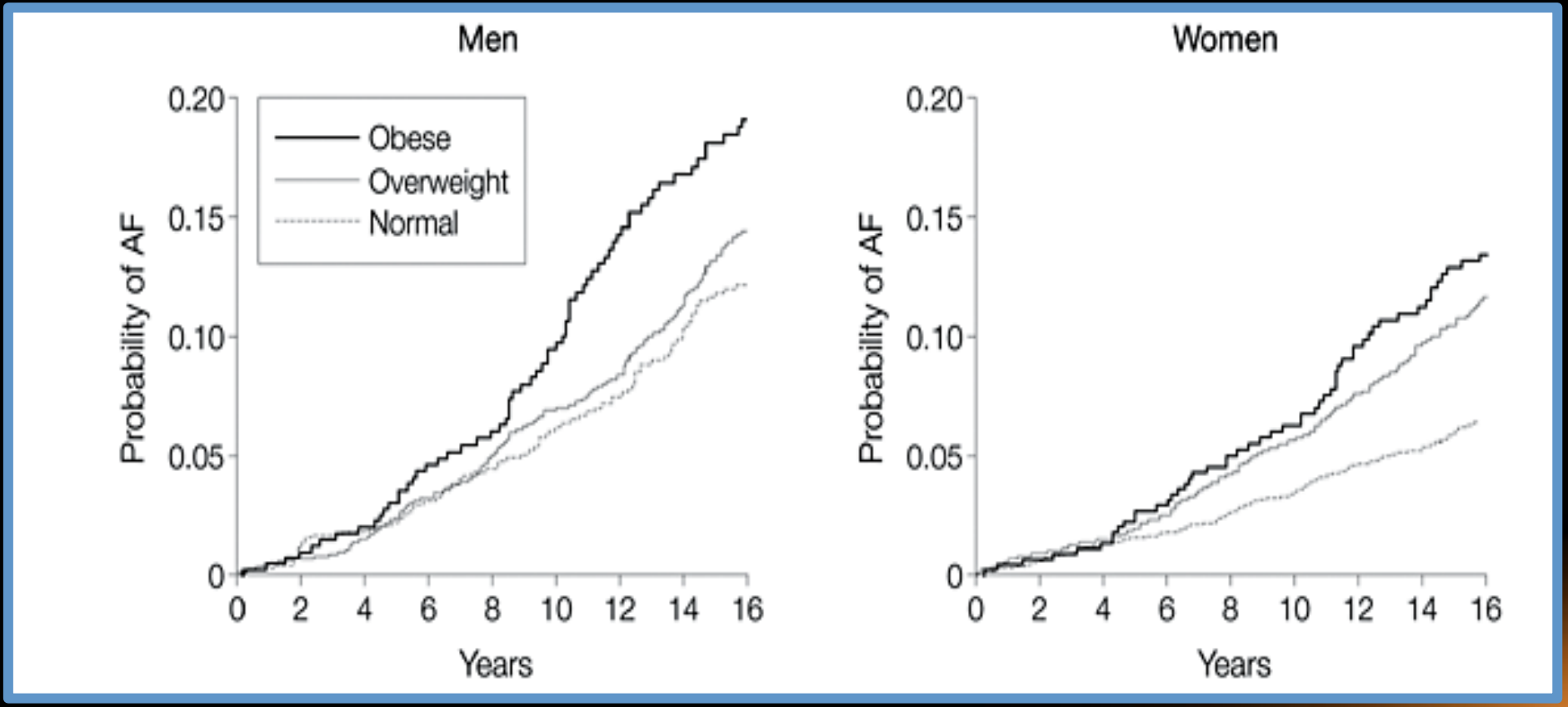
Disclosures 2015

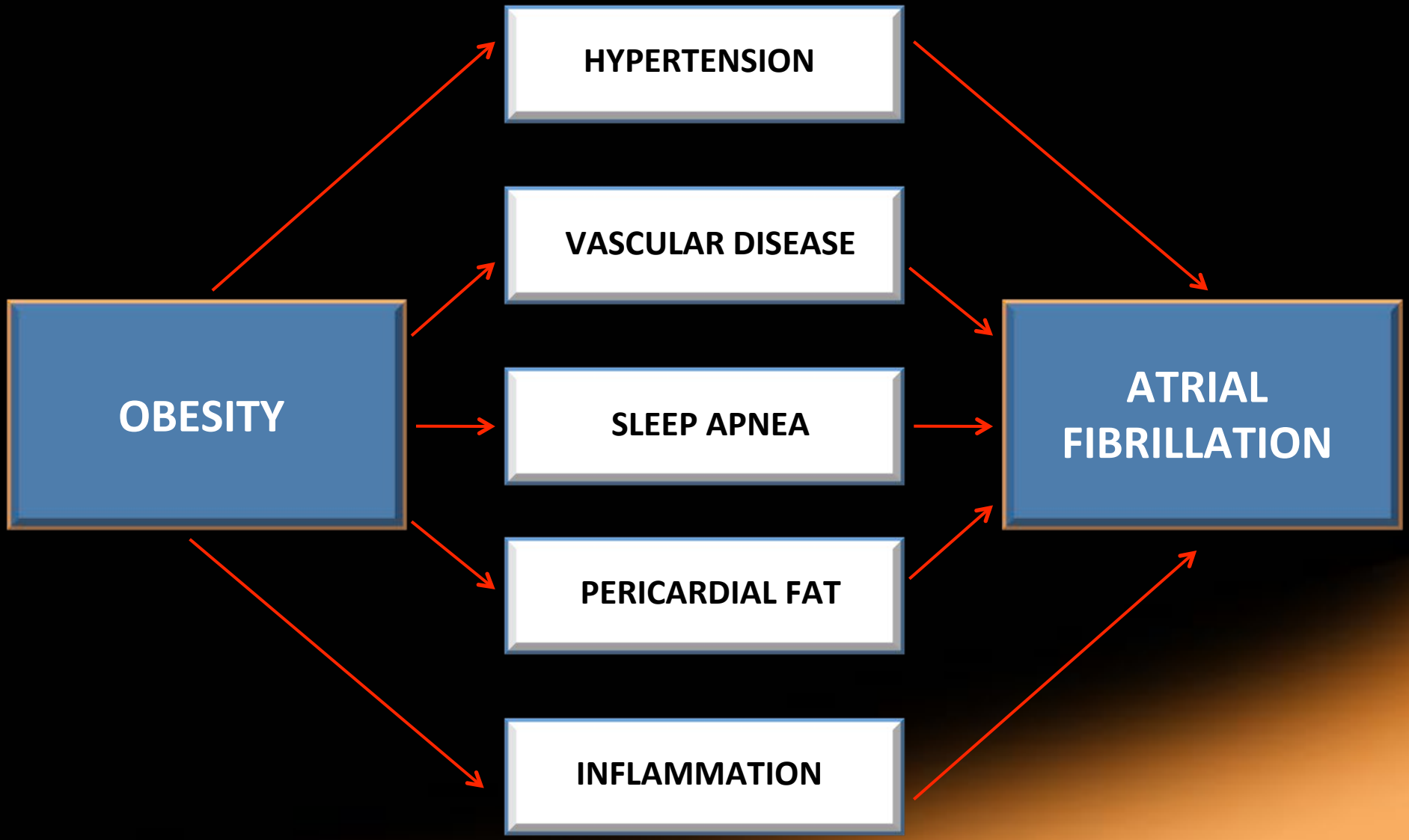
- **Advisory Board:** Biosense-Webster, Medtronic, St Jude Medical
- **Lecture Fees and Research Funding:** Biosense-Webster, Medtronic, Boston Scientific, Biotronik, Sorin and St Jude Medical

Dual epidemics of obesity and AF



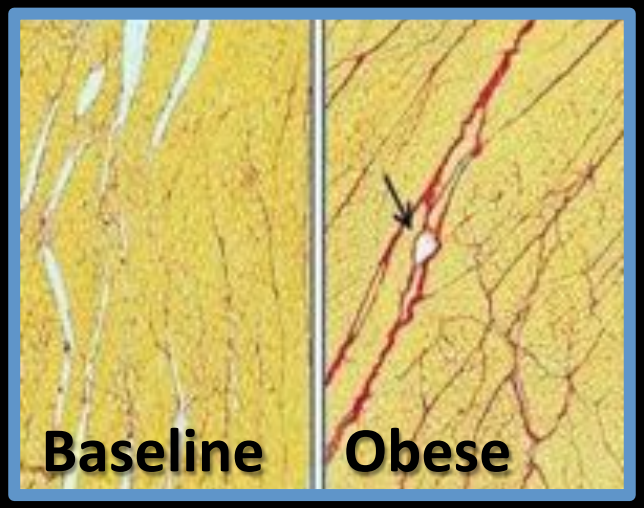
Wang TJ et al. JAMA 2004

Obesity and AF: associated conditions

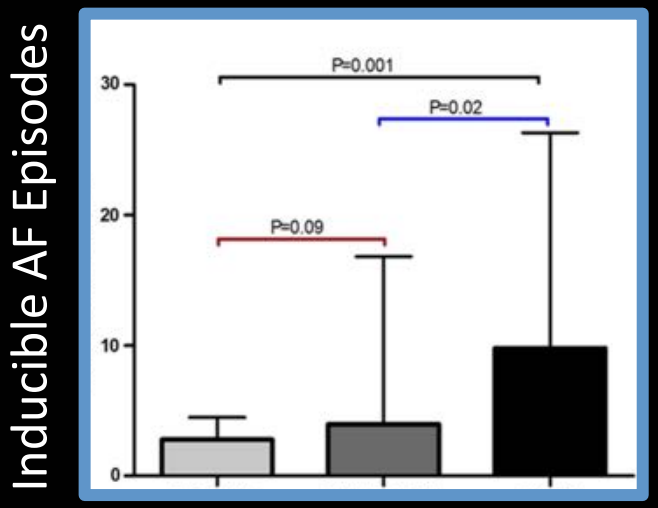


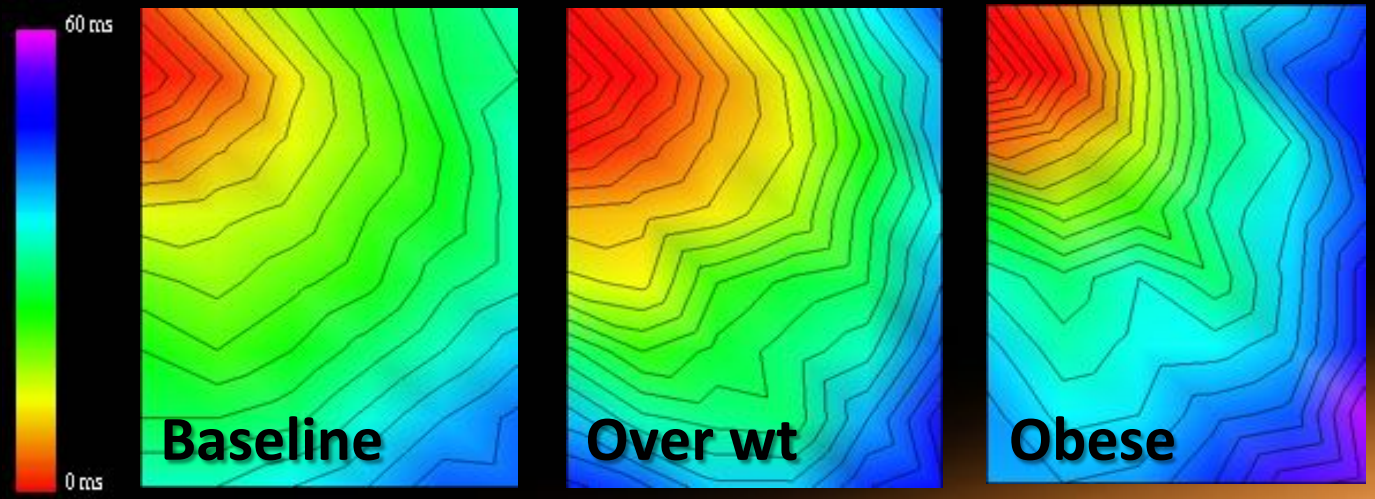
Atrial substrate due to weight gain

Atrial Fibrosis



AF Inducibility



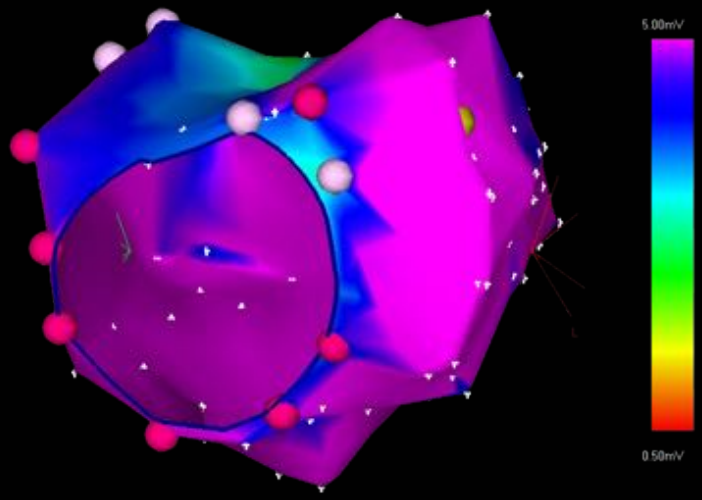


Abed H et al. Heart Rhythm 2013

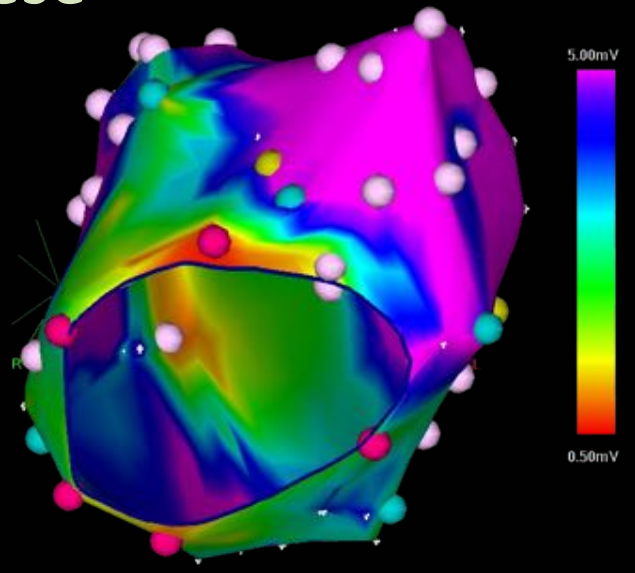
Fatty infiltration of posterior LA: a new substrate for AF

Mahajan R et al, JACC 2015

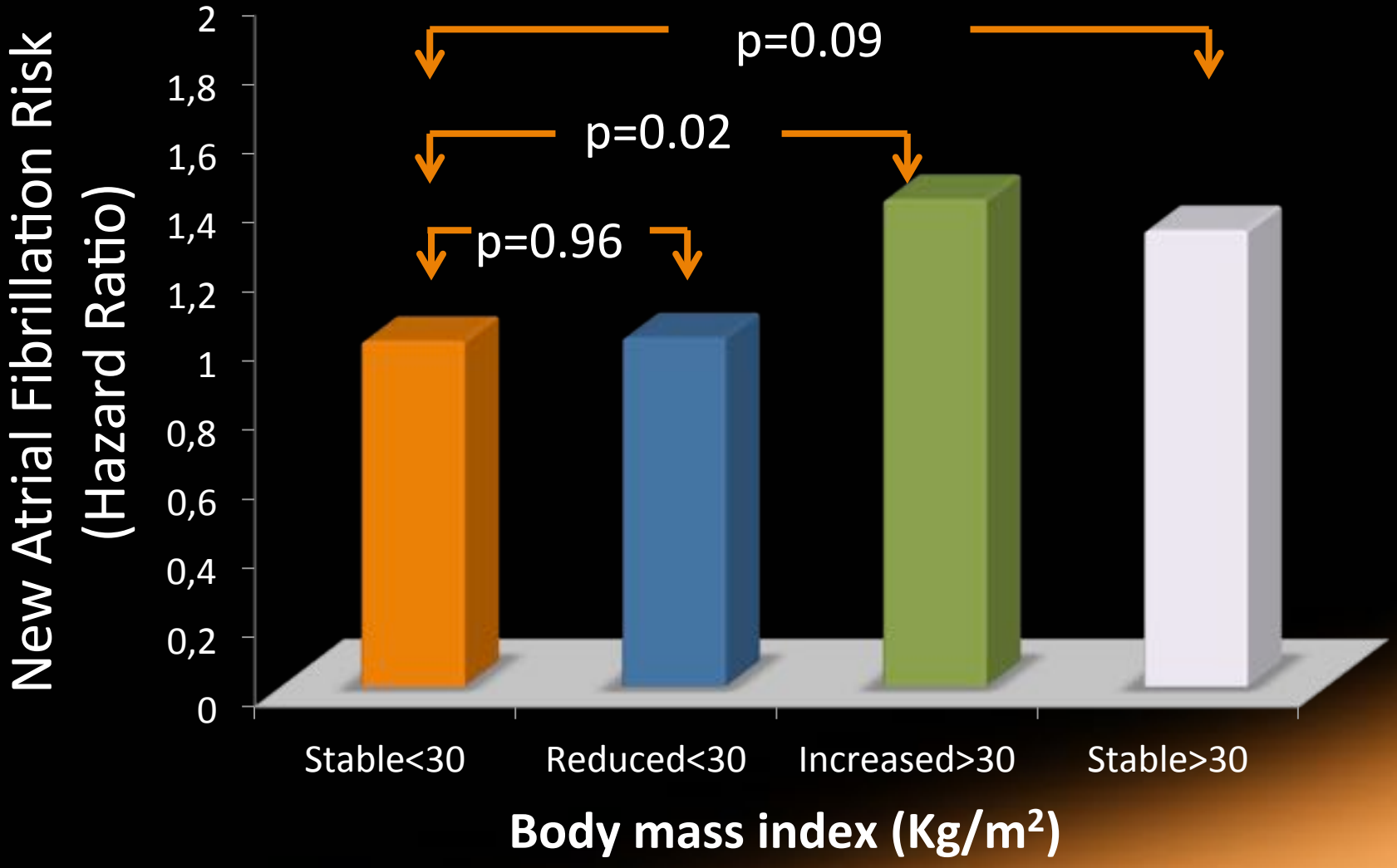
Control



Obese

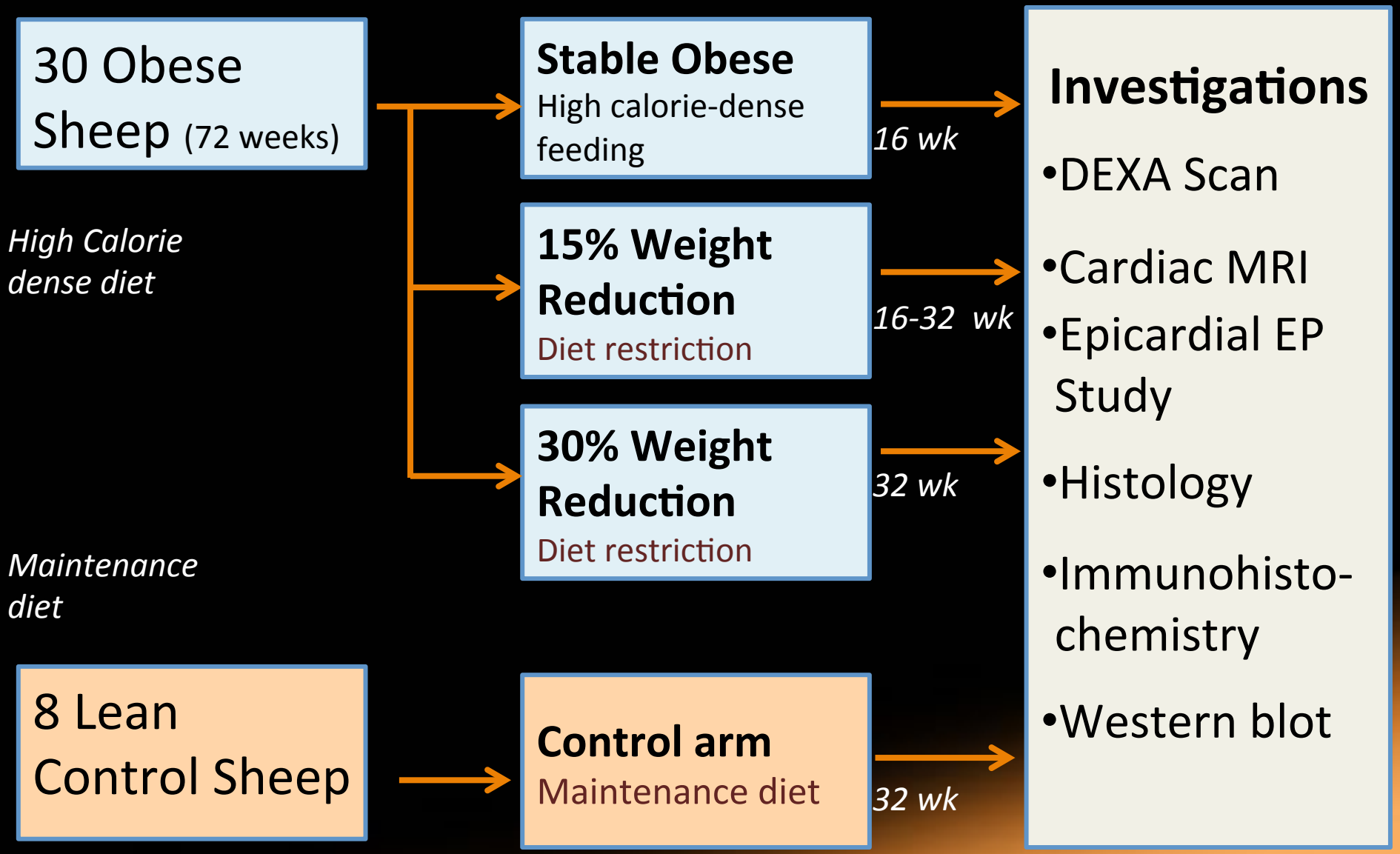


Weight Change and AF Risk



WHS JACC 2010

Impact of weight reduction



Mahajan R et al, HRS YIA 2013

Hemodynamic and MRI Characteristics

	Lean control group	Obese group	15% Weight loss group	30% Weight loss group	p value	
					Obese vs Control	Obese vs 30% Weight loss
Weight (kg)	58±6	111±12	94±9	77±8	<0.001	<0.001
Total Body fat (kg)	7±4	40±9	31±4	20±8	<0.001	<0.001
LA pressure (mmHg)	3.8±1.5	9.3±2.0	6.5±3.5	5.3±2.9	<0.001	0.007
PA pressure (mmHg)	9.5±2.3	15.1±2.5	13.5±2.5	10.9±2.0	<0.001	0.002
LA (EDV) (ml)	29±2	-*	46±7	31±3	0.001**	0.003
LVEF (%)	52.5±5.3	-*	52.4±4.7	51±0.7	NS**, #	NS#

* - CMR not performed as sheep did not fit in scanner

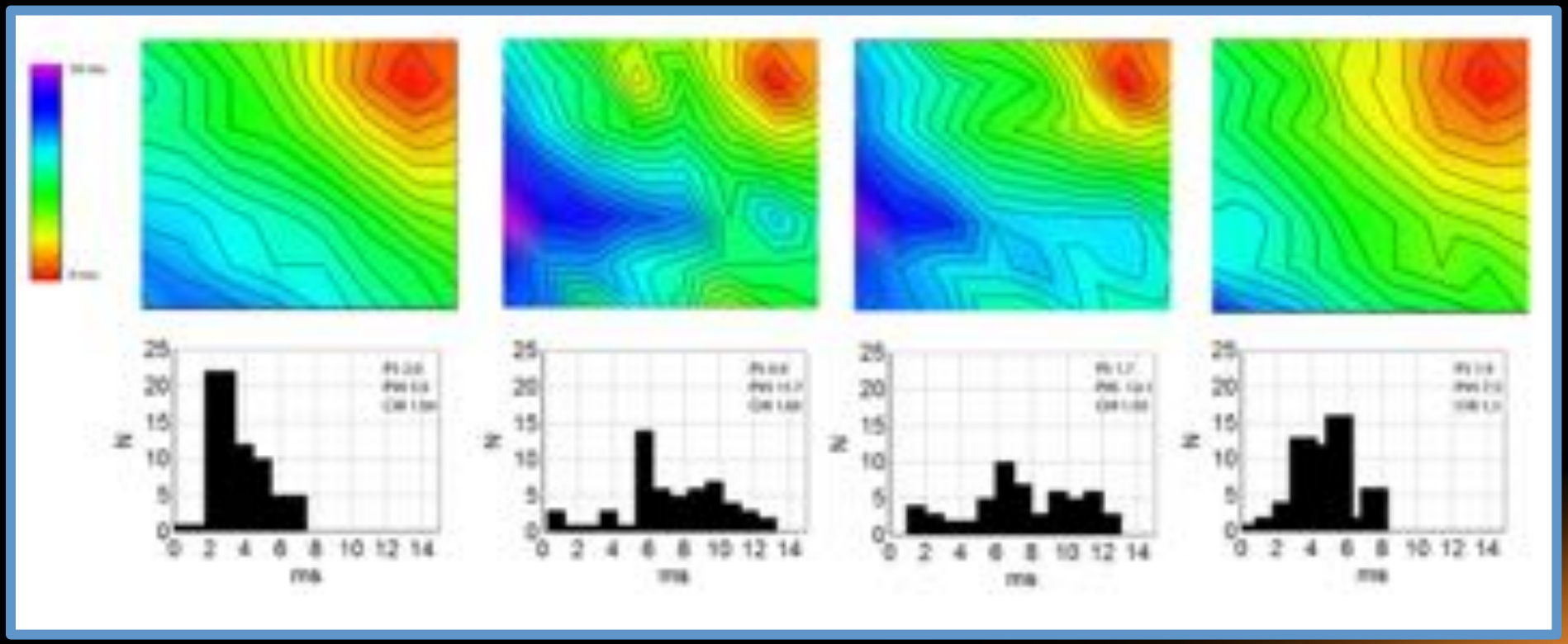
** -p Value-15% vs 30% Weight loss

\# -group effect not significant

Mahajan R et al, HRS YIA 2013

Conduction velocity and heterogeneity

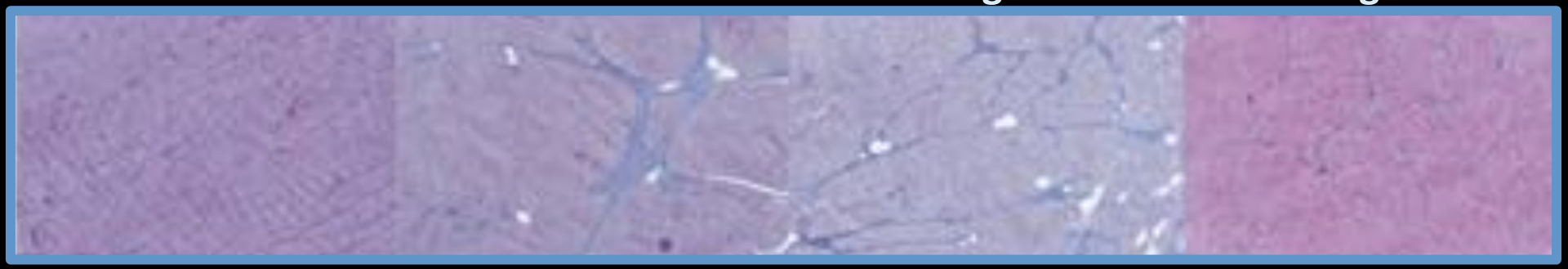
Lean Control | Obese | 15% Weight Loss | 30% Weight Loss

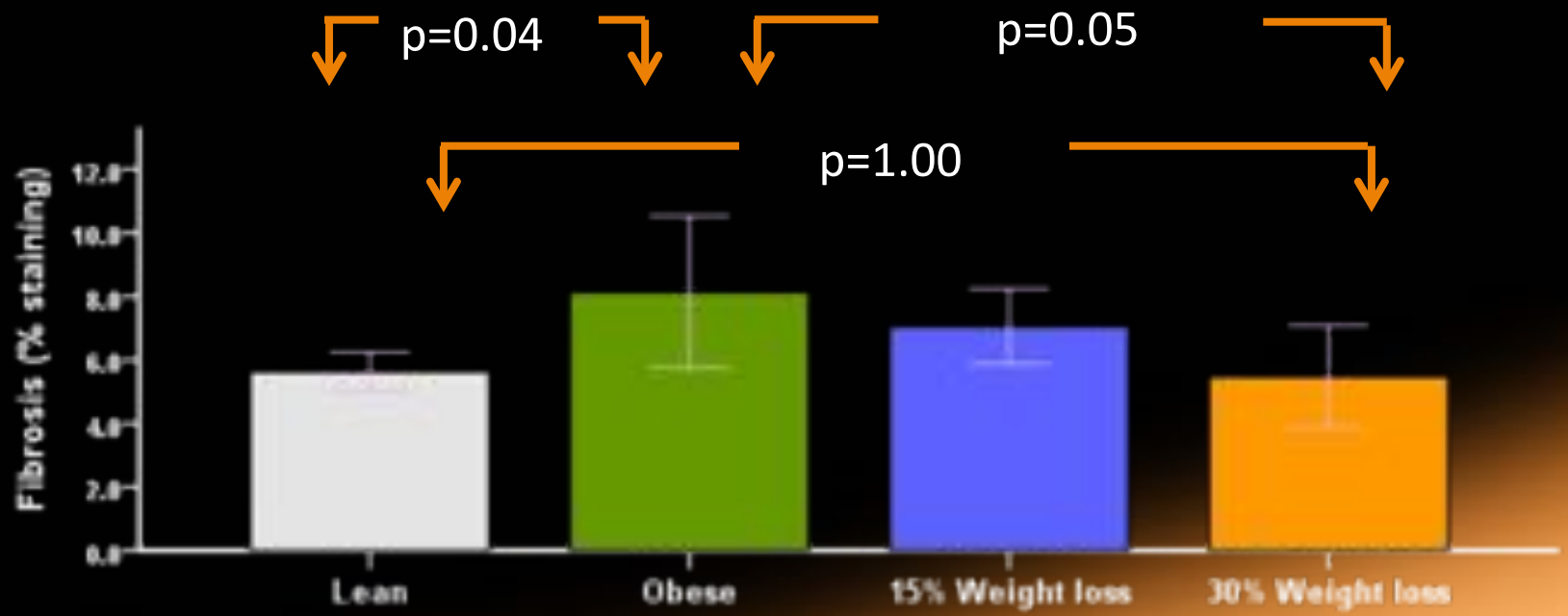


Mahajan R et al, HRS YIA 2013/CSANZ YIA 2013

Atrial Fibrosis: Morphometric Analysis

Masson's Trichrome





Mahajan R et al, HRS YIA 2013/CSANZ YIA 2013

Original Investigation

Effect of Weight Reduction and Cardiometabolic Risk Factor Management on Symptom Burden and Severity in Patients With Atrial Fibrillation

A Randomized Clinical Trial

Hany S. Abed, BPharm, MBBS; Gary A. Wittert, MBBch, MD; Darryl P. Leong, MBBS, MPH, PhD; Masoumeh G. Shirazi, MD; Bobak Bahrami, MBBS; Melissa E. Middeldorp; Michelle F. Lorimer, BSc; Dennis H. Lau, MBBS, PhD; Nicholas A. Antic, MBBS, PhD; Anthony G. Brooks, PhD; Walter P. Abhayaratna, MBBS, PhD; Jonathan M. Kalman, MBBS, PhD; Prashanthan Sanders, MBBS, PhD

JAMA 2013

248 highly symptomatic AF patients with BMI>27 & WC >100 (male) or >90 (female)

Exclusions: Serious medical/psychiatric disorder; Recent weight loss program; Malabsorption disorder; Unstable INR; LVEF≤35%; DM – on insulin; Valvular disease; Endocrinopthy

150 Randomised

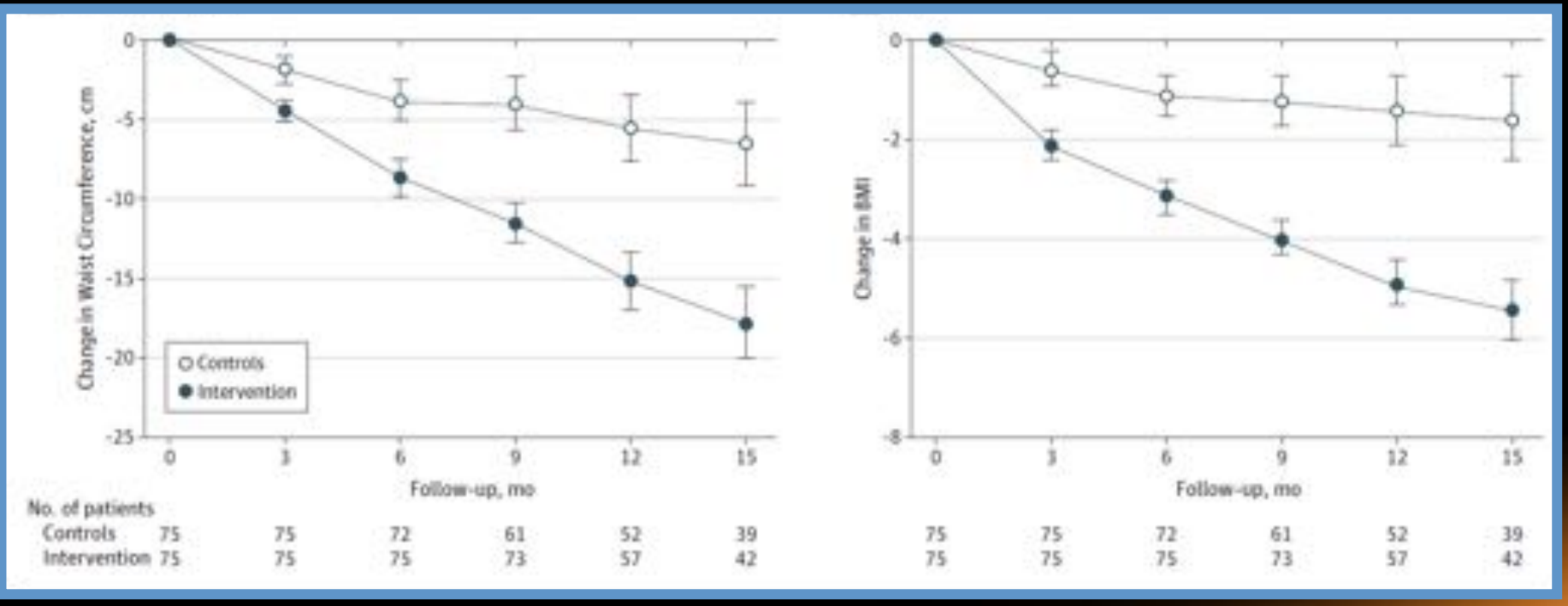
75 Control

75 Intervention

Changes in anthropometric measurements

Waist Circumference

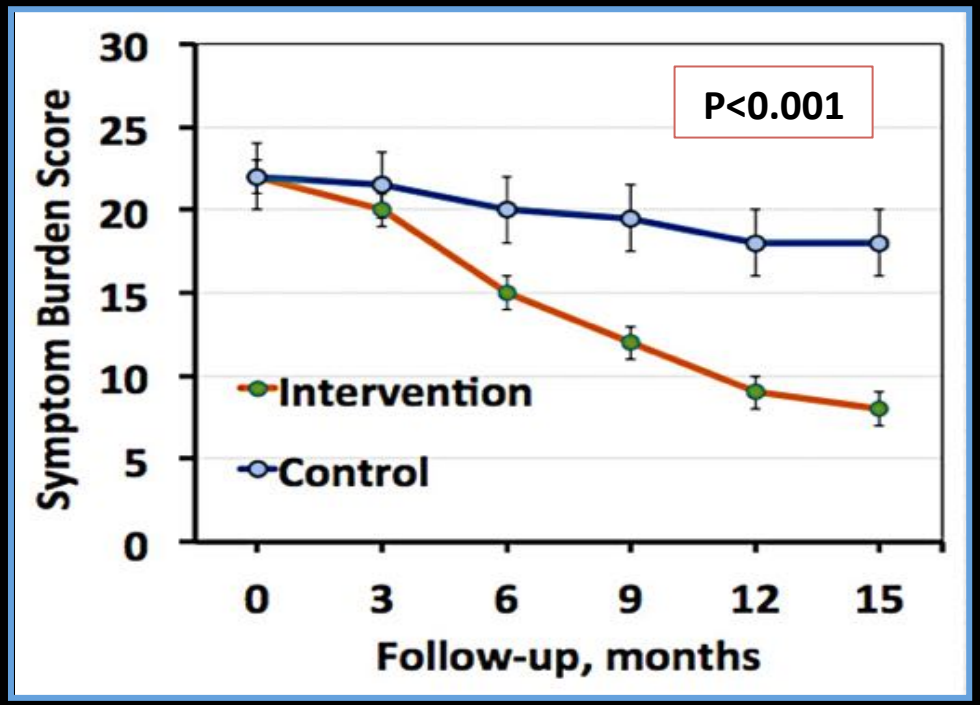
Body Mass Index



Abed H et al. JAMA 2013

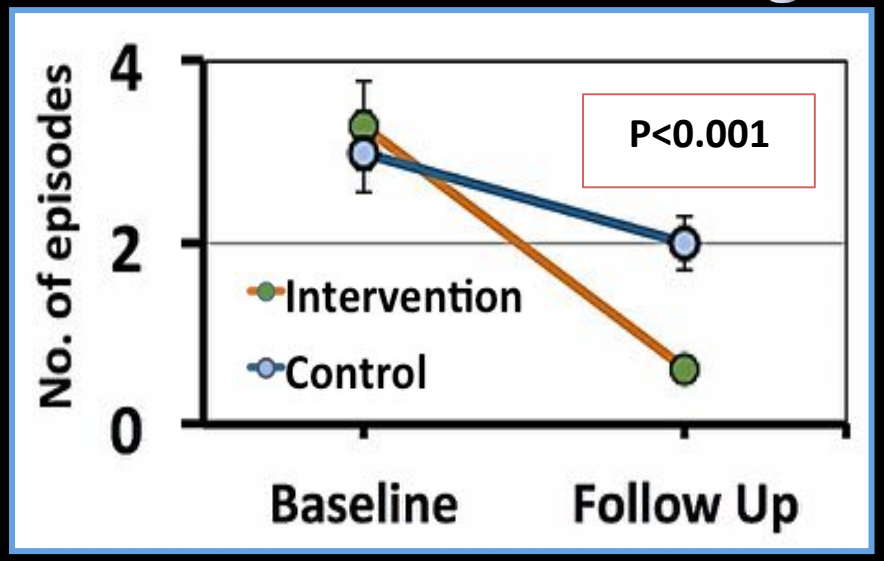
Effect of short-term weight loss

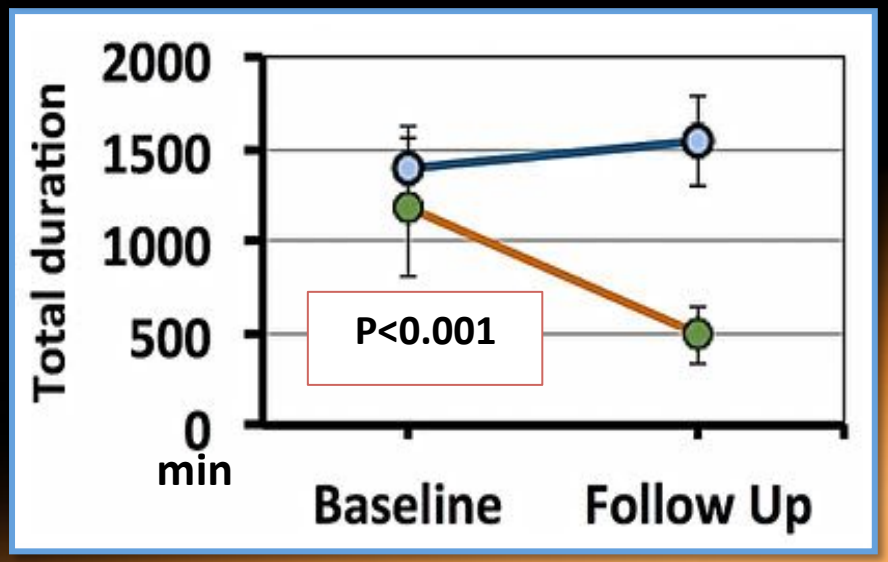
Symptom Burden Score



Abed et al. JAMA 2013

Continuous Monitoring





Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort

A Long-Term Follow-Up Study (LEGACY)

Rajeev K. Pathak, MBBS,* Melissa E. Middeldorp,* Megan Meredith,* Abhinav B. Mehta, MAcrSt,† Rajiv Mahajan, MD, PhD,* Christopher X. Wong, MBBS, PhD,*‡ Darragh Twomey, MBBS,* Adrian D. Elliott, PhD,*§ Jonathan M. Kalman, MBBS, PhD,¶ Walter P. Abhayaratna, MBBS, PhD,# Dennis H. Lau, MBBS, PhD,* Prashanthan Sanders, MBBS, PhD*

JACC 2015

Patients with BMI ≥ 27
N=825

↓

Weight Management

↓

Final Cohort
N=355

Met Exclusion Criteria (N=293)
Terminal Cancer (N=10)
Inflammatory Dx (N=20)
Permanent AF (N=84)
AV Node ablation (N=12)
AF ablation (N=90)
Severe Medical Illness (N=77)

Patients from other States (N=177)

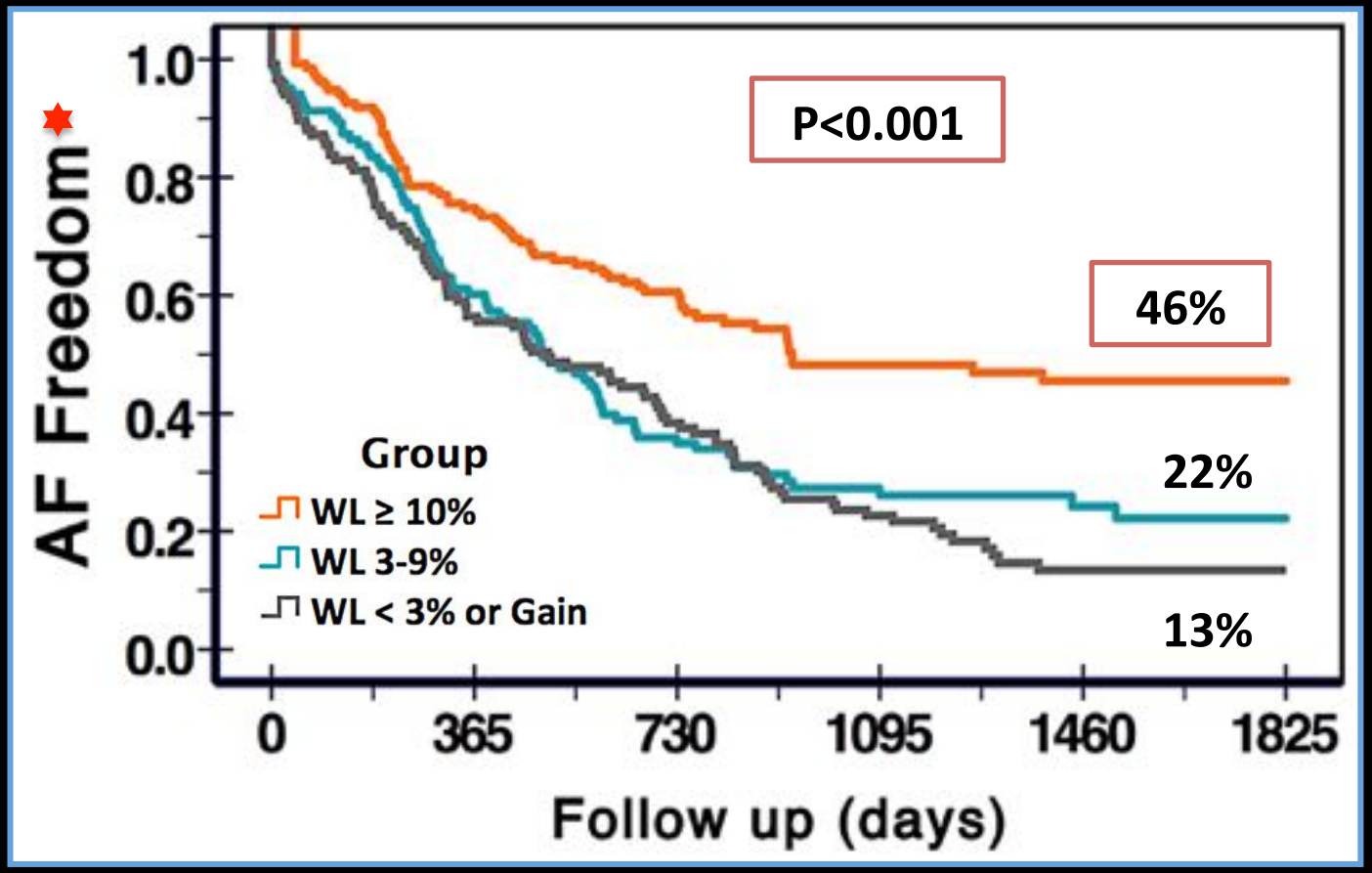
10%WL
N=135

3-9%WL
N=103

<3%WL or WG
N=117

AF Freedom: drug & ablation-free

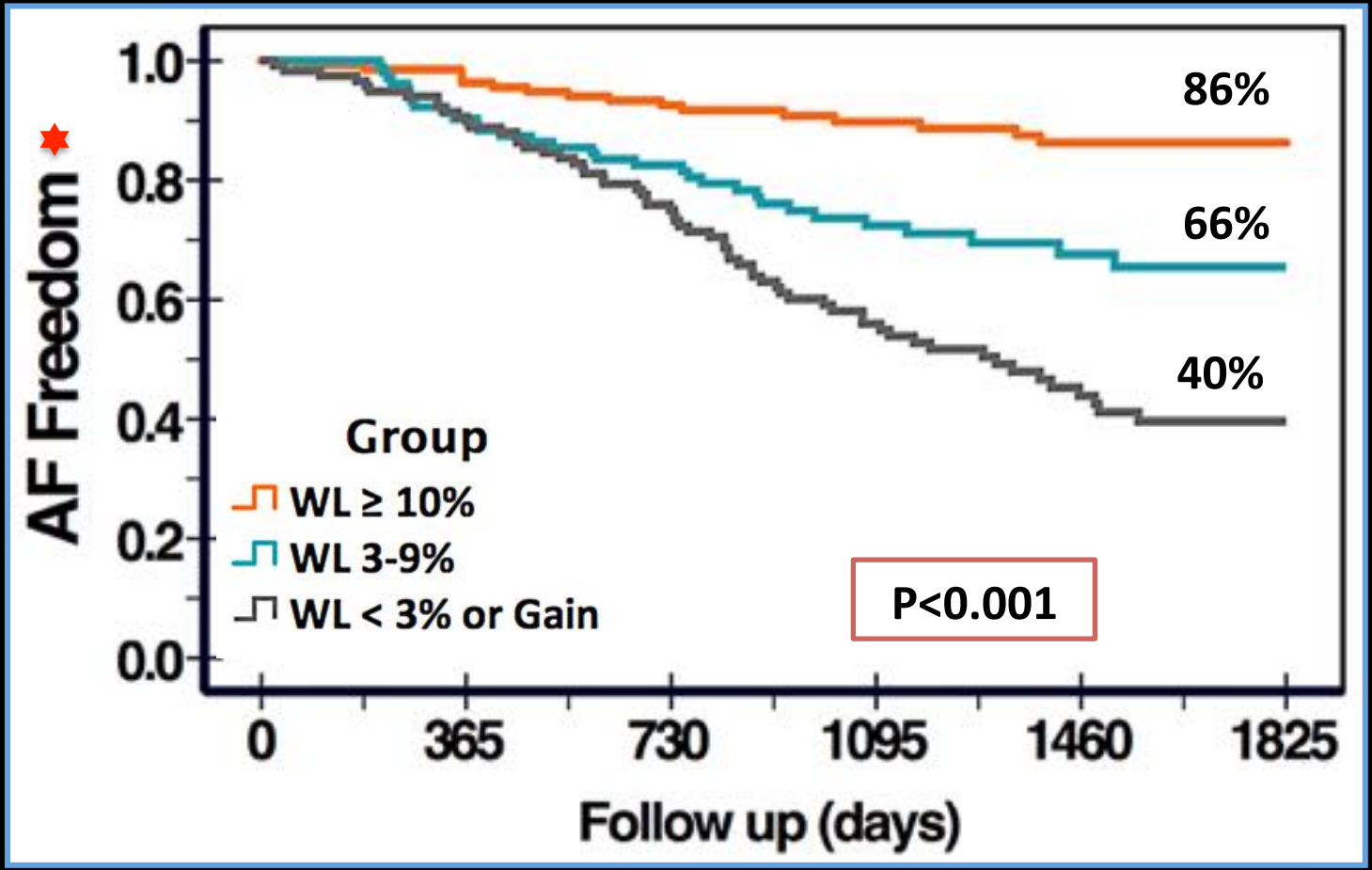
✸ Without AAD or ablation



Days	0	365	730	1095	1460	1825
≥10%WL	135	101	72	42	31	18
3-9% WL	103	62	36	22	13	7
<3% WL	117	66	44	22	11	9

Pathak RK, et al. JACC 2015

Total arrhythmia-free survival



★ With AAD +/- abln

Days	0	365	730	1095	1460	1825
≥10%WL	135	130	114	86	67	36
3-9% WL	103	93	83	57	35	22
<3% WL	117	105	85	53	32	22

Pathak RK, et al. JACC 2015

Yearly Weight Trend (N=355)

Linear Weight Loss (N=141)

Weight Fluctuation (N=179)

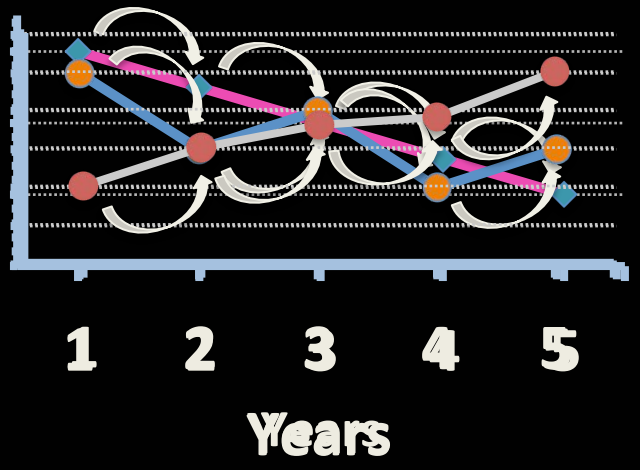
Linear Gain (N=24)

<2%WF N=54

2-5%WF N=68

>5%WF N=57

Effect of Weight Loss Trend

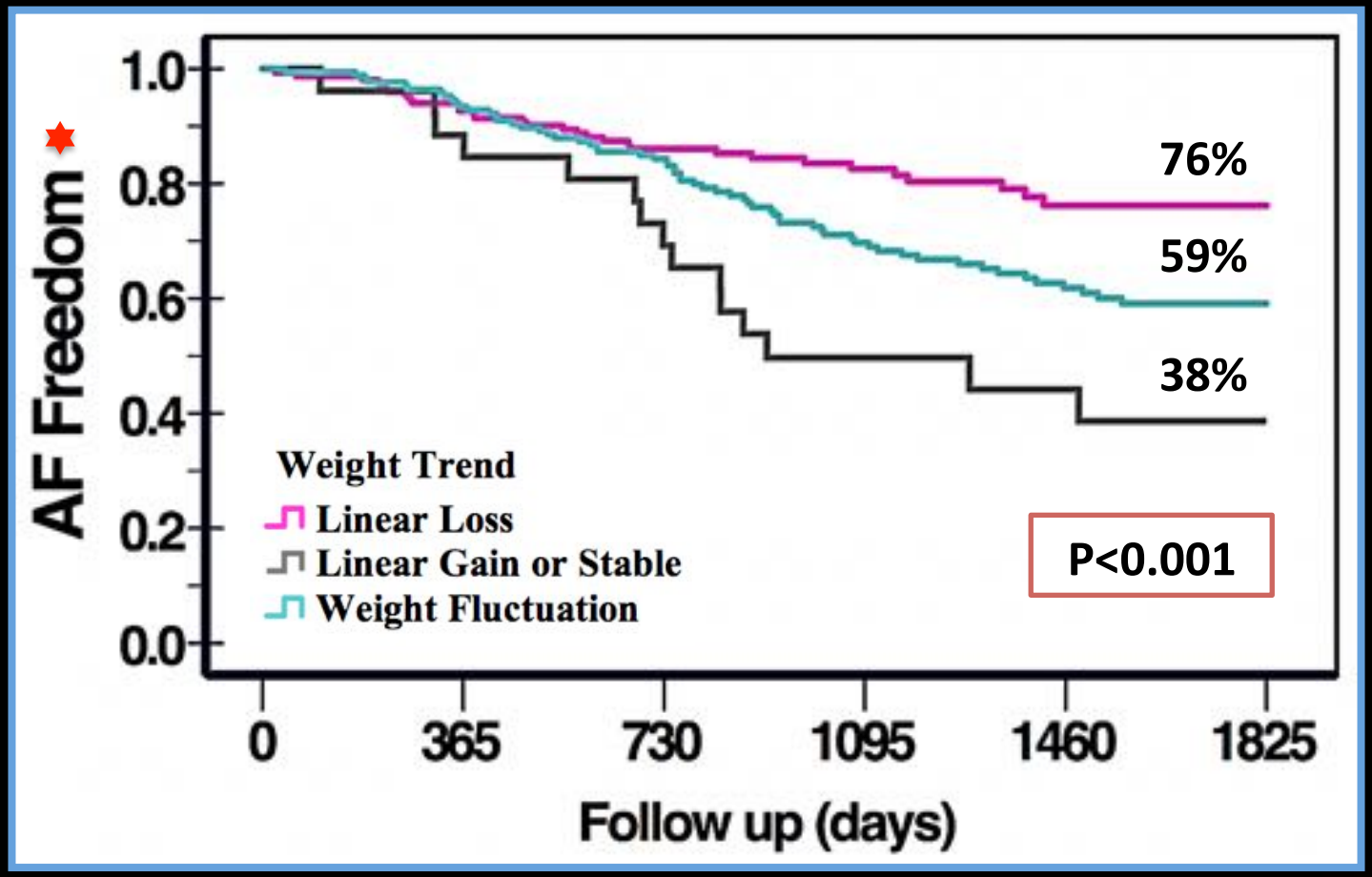


Effect of Degree of Weight fluctuation

Pathak RK, et al. JACC 2015

Weight loss trend

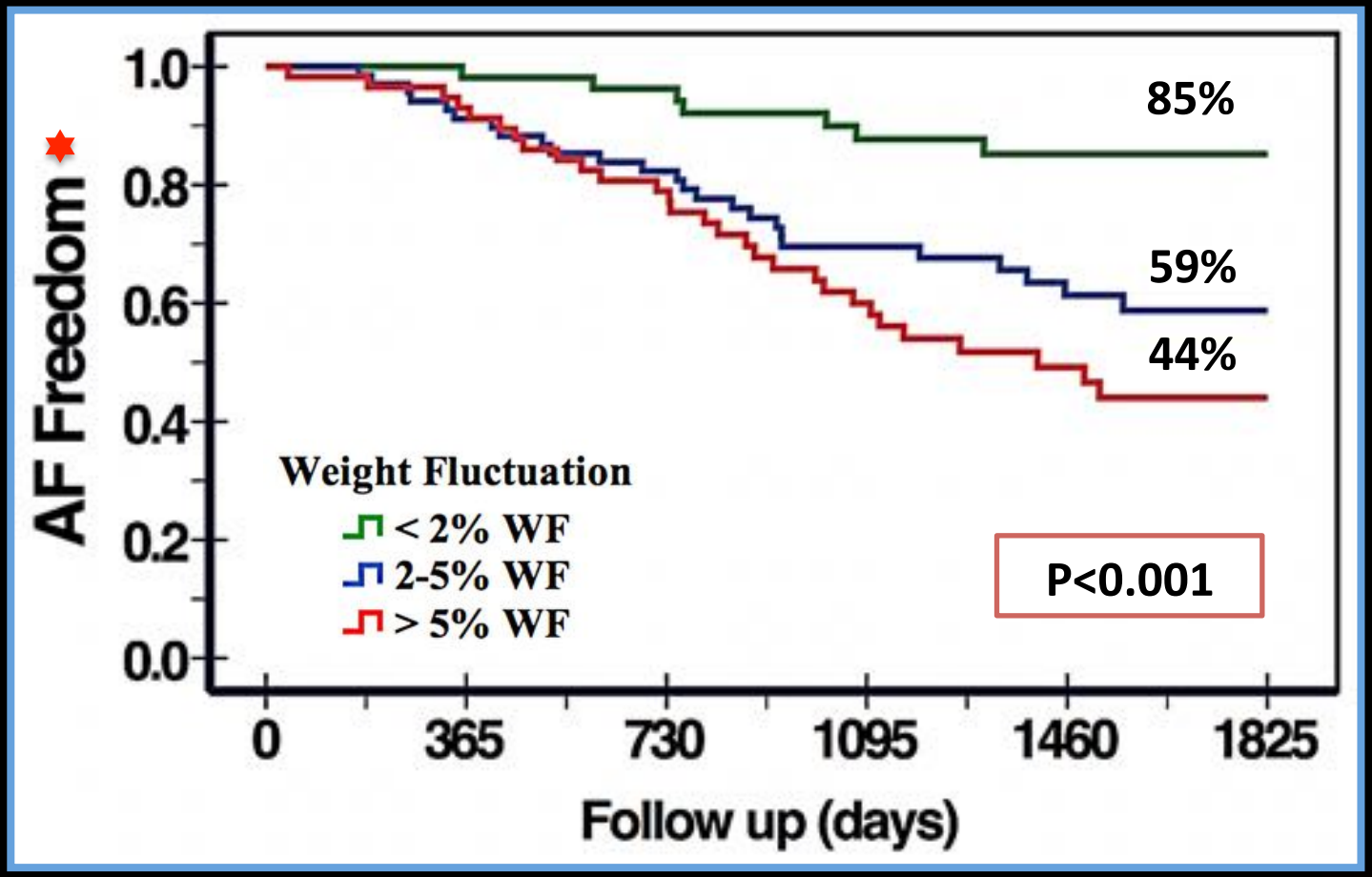
With AAD +/- abln



Days	0	365	730	1095	1460	1825
Linear Loss	141	130	122	80	52	29
Wt. Fluctuation	179	165	140	99	71	44
Linear Gain	24	20	18	12	8	5

Pathak RK, et al. JACC 2015

Effect of weight fluctuation



With AAD +/- abln

Days	0	365	730	1095	1460	1825
<2% WF	54	52	49	39	33	19
2-5% WF	68	62	54	39	27	15
>5% WF	57	53	45	31	19	14

Pathak RK, et al. JACC 2015

Impact of CARDIOrespiratory FITness on Arrhythmia Recurrence in Obese Individuals With Atrial Fibrillation

The CARDIO-FIT Study

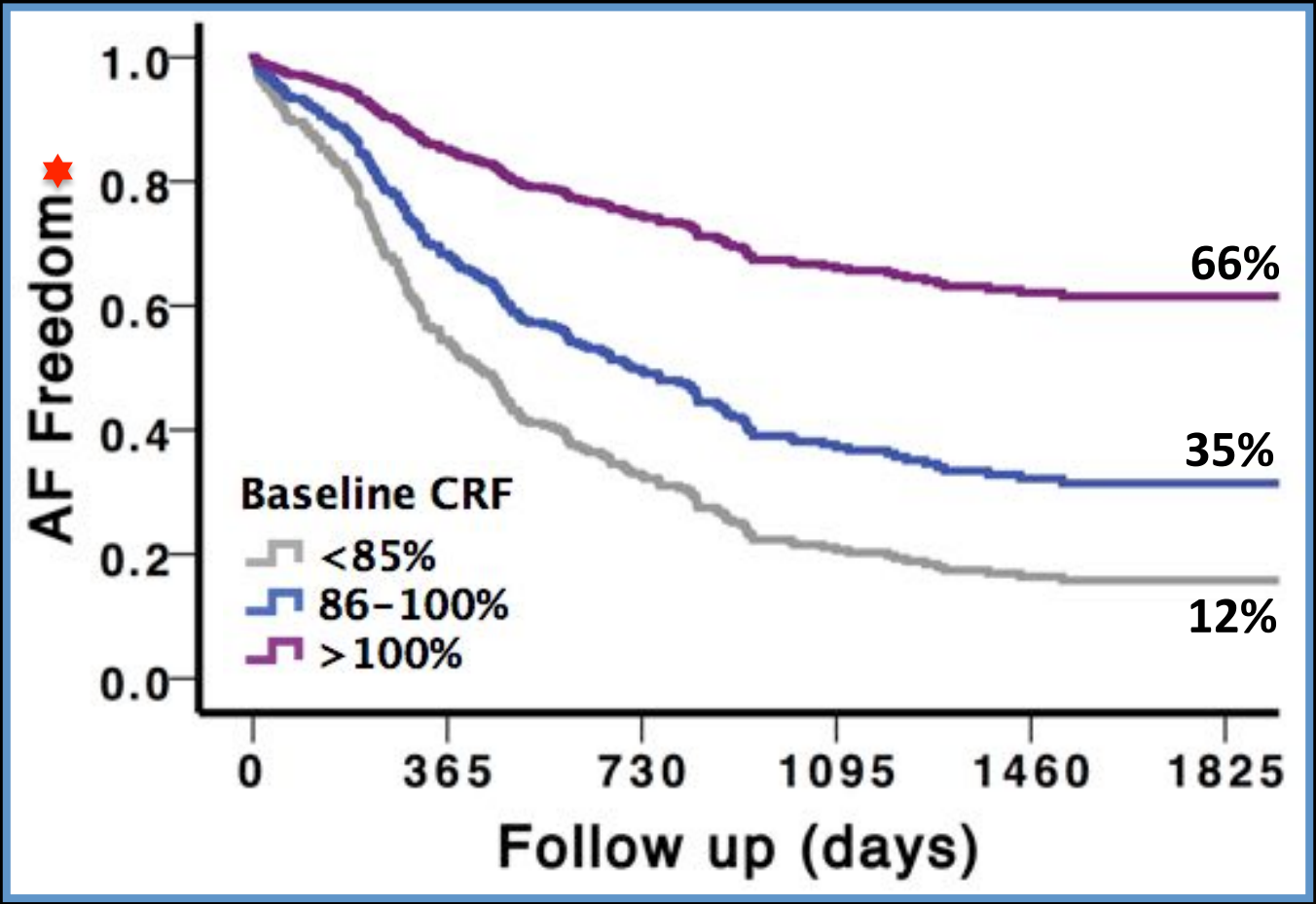
Rajeev K. Pathak, MBBS,* Adrian Elliott, PhD,* Melissa E. Middeldorp,* Megan Meredith,* Abhinav B. Mehta, M Acp St,† Rajiv Mahajan, MD, PhD,* Jeroen M.L. Hendriks, PhD,* Darragh Twomey, MBBS,* Jonathan M. Kalman, MBBS, PhD,‡ Walter P. Abhayaratna, MBBS, PhD,§ Dennis H. Lau, MBBS, PhD,* Prashanthan Sanders, MBBS, PhD*

JACC 2015

- Structured: age and ability matched
- Frequency: three days to five days
- Intensity: Low to Moderate
- Time: 60 to 200 Minutes /Week
- Type : Aerobic & strength training
- Heart Rate: Monitor, 85% of 220-age

AF Freedom: Drug & Ablation-Free

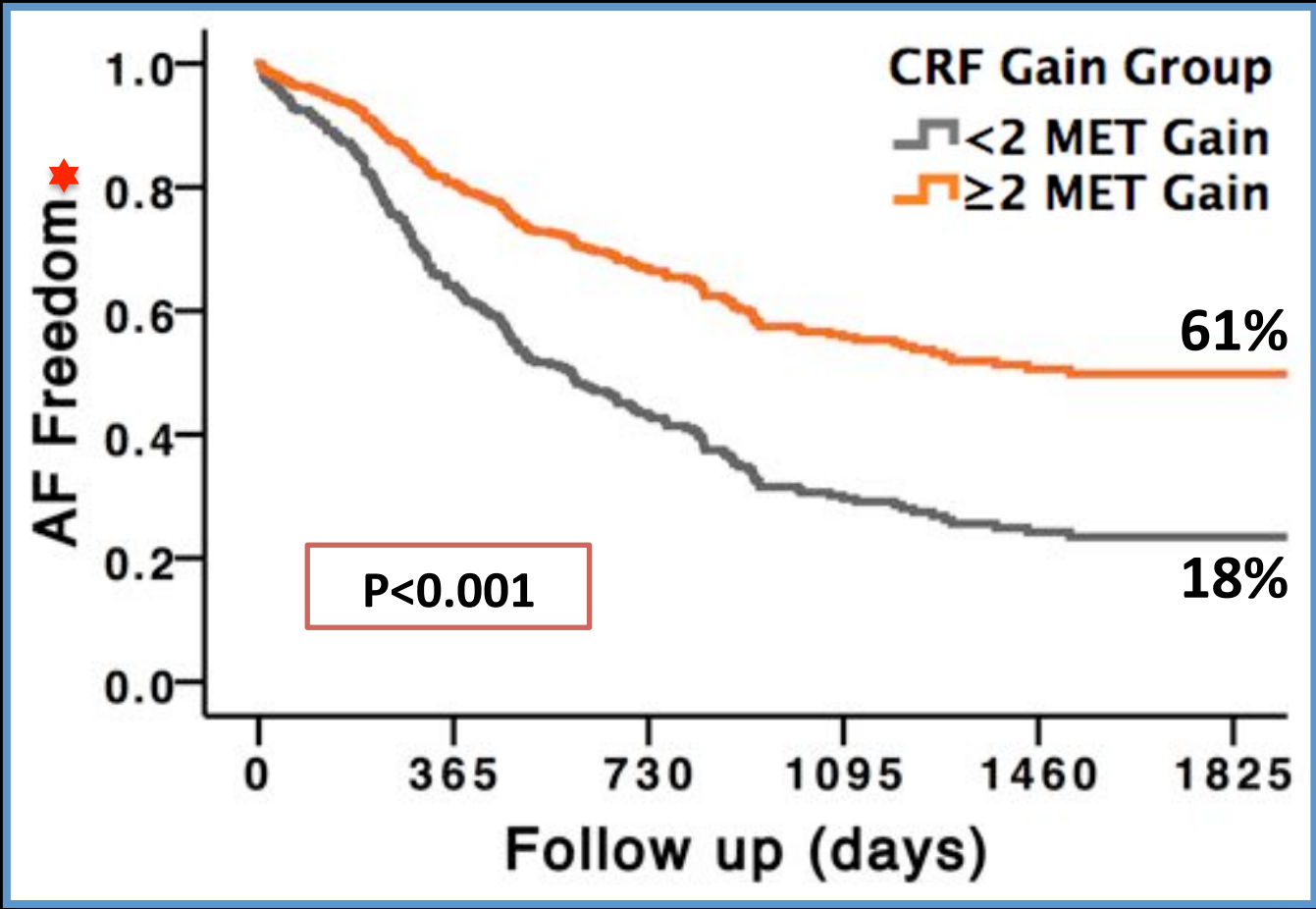
✸ Without AAD or ablation



Days	0	365	730	1095	1460	1825
<85%	95	54	36	16	12	6
86-100%	134	93	56	34	19	11
>100%	79	63	50	36	26	18

AF Freedom: Drug & Ablation-Free

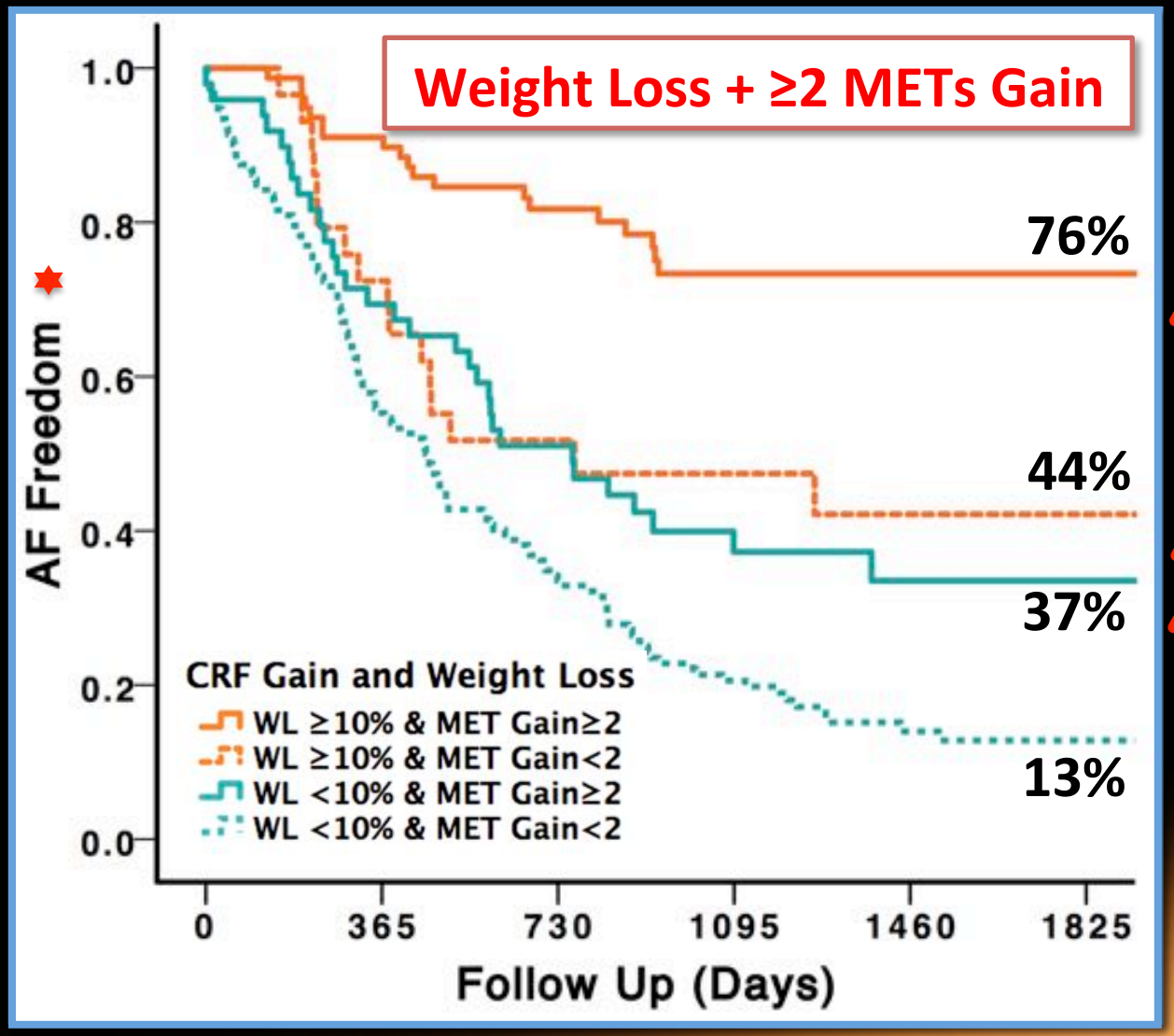
★ Without AAD or ablation



Days	0	365	730	1095	1460	1825
≥2 MET Gain	127	105	78	52	38	19
<2 MET Gain	181	104	63	36	20	16

Weight Loss and CRF
Drug & Ablation-Free AF freedom

Without AAD or ablation

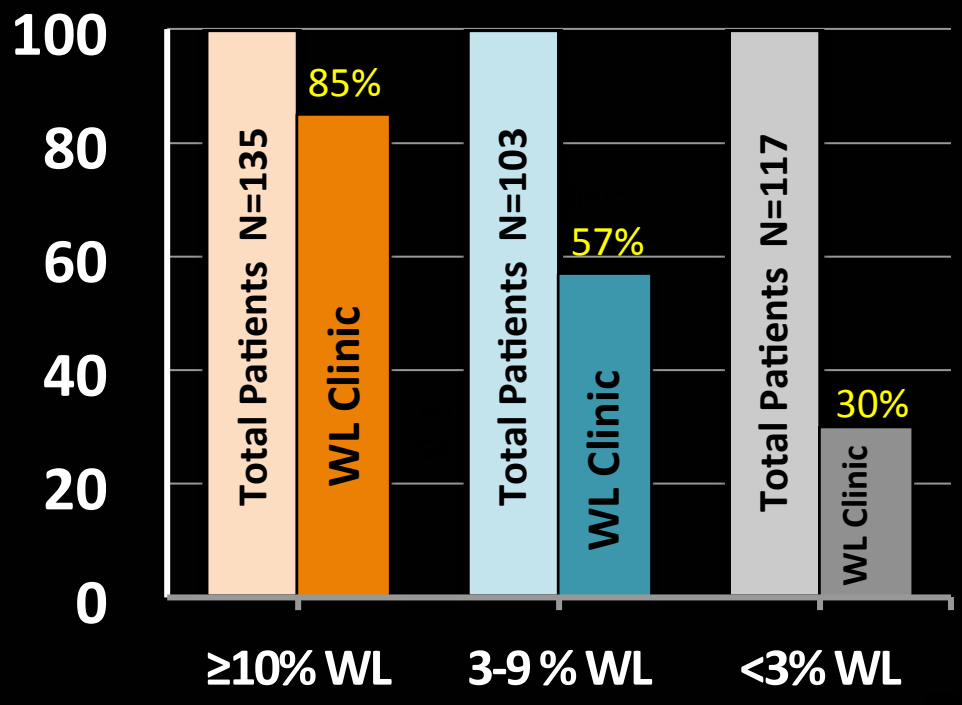


≥ 2MET
32%

≥1MET
24%

Implications of dedicated weight & risk factor management clinic

Successful Weight Loss



Weight Maintenance

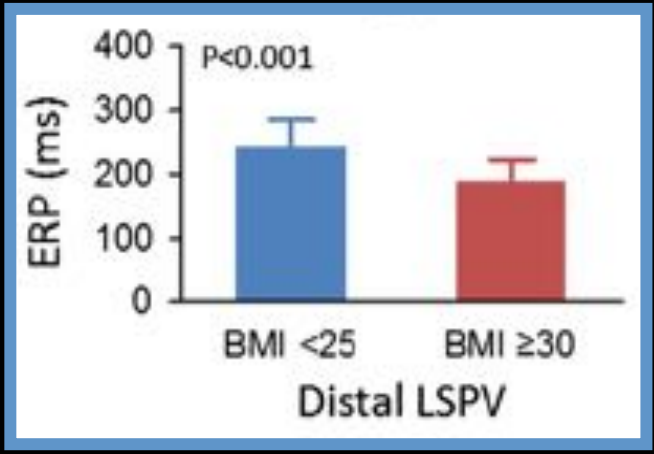
- 52 patients lost >10% weight in first year
- 34/52 (66%) maintained WL
- 30/34 (85%) attended WL clinic
- 18 regained weight, only 2 (11%) attended clinic

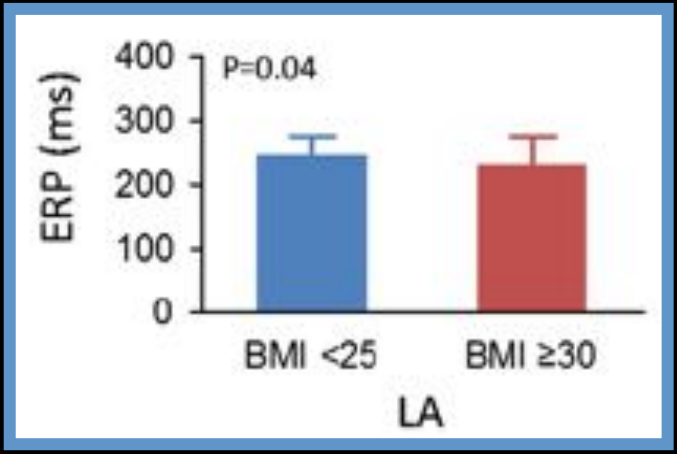
Pathak RK, et al. JACC 2015

Obesity & AF

- Sustained weight loss is associated with dose dependent reduction in AF burden and maintenance of sinus rhythm
- >5% Weight fluctuation dampens the benefit conferred by weight loss
- A dedicated clinic improves patient engagement, promoting treatment adherence, preventing weight regain and fluctuation

Electrical and hemodynamic changes associated with obesity





- ↓ERP
- ↑LA pressure
- ↑LA volume
- ↓LA strain

Munger TM et al, JACC 2012

Characteristic	BMI <25 kg/m² (n = 19)	BMI ≥30 kg/m² (n = 44)	Total (N = 63)	p Value
LVEDV index, ml/m²	42.5 (36.6, 47.5)	42.1 (36.8, 50.0)	42.2 (36.8, 48.5)	0.94*
LVESV index, ml/m²	15.0 (12.5, 7.5)	15.9 (12.8, 20.5)	15.3 (12.8, 20.4)	0.59*
LVEF, %	64.7 (62.1, 66.7)	62.5 (56.3, 68.3)	64.0 (57.7, 67.5)	0.67*
LAVI end-diastole, ml/m²	10.3 (6.8, 18.0)	20.3 (14.5, 29.5)	17.9 (11.1, 24.3)	0.002*
LAVI pre-A, ml/m²	16.8 (11.6, 27.7)	24.4 (19.3, 38.7)	24.1 (16.0, 31.4)	0.006*
LAEF, %	33.7 ± 12.3	22.2 ± 11.6	25.7 ± 12.9	0.001
E flow velocity, m/s	76.8 ± 21.8	76.7 ± 16.6	76.7 ± 18.1	0.99
A flow velocity, m/s	48.6 ± 18.2	44.3 ± 16.2	45.6 ± 16.8	0.37
E/A ratio	1.6 (1.3, 1.8)	1.6 (1.3, 2.4)	1.6 (1.3, 2.2)	0.40*
Deceleration time, ms	191.3 ± 40.0	200.6 ± 40.1	197.9 ± 40.0	0.41
LA septal E velocity, m/s	9.1 ± 4.1	8.5 ± 2.7	8.7 ± 3.2	0.51
E/E′ ratio	8.2 (6.3, 11.8)	8.7 (6.6, 12.3)	8.7 (6.6, 12.3)	0.69*
LA strain pre-A, %	8.8 ± 2.8	5.5 ± 3.1	6.5 ± 3.4	<0.001

Risk factor management

Weight Management and Exercise

- Education for permanent lifestyle change
- Life style journal
- High protein, low GI, calorie-controlled meal plan
- 30 minutes 3-4 times weekly
- Type of activity and duration

Hyperlipidemia

- Life style measures
- At 3 months LDL > 100 mg/dl - start statin
- Add Fibrate if TG > 200mg/dl
- Start Fibrate if TG > 500mg/dl

Glucose Tolerance

- Glucose tolerance test
- Lifestyle measures
- HbA1c> 6.5 at 3 months – start Metformin
- Referred to a diabetes clinic

Hypertension

- Measure BP 2-3 times daily, No added salt diet
- Aim of <130/80mmHg at rest and < 200/100 at peak exercise

Sleep Apnea

- Formal overnight sleep study
- AHI≥30/hour – CPAP
- Use Log in diary

Tobacco and alcohol use

- Smoking cessation
- Alcohol abstinence or reduction to ≤30g/week