Cardiovascular disease Prevention & Rehabilitation in Acute Coronary Syndrome & Heart Failure

สมเกียรติ แสงวัฒนาโรจน์ พบ.

ภาควิชาอายุรศาสตร์ คณะแพทยศาสตร์

จุฬาลงกรณ์มหาวิทยาลัย

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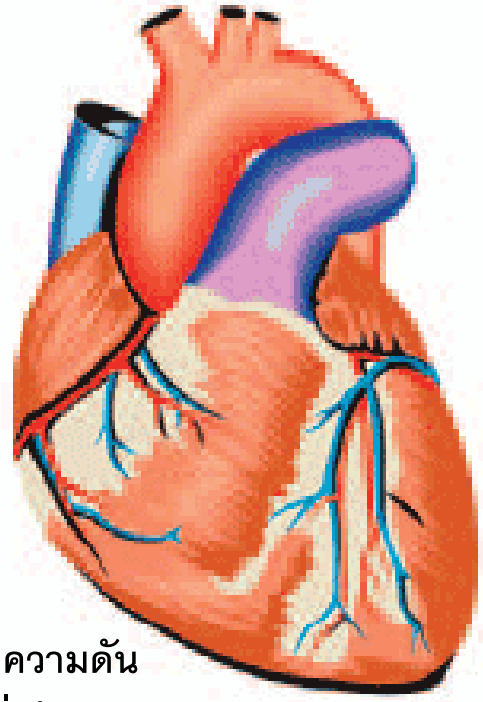
The Cardiovascular Continuum



Health Promotion & Prevention

Myocardial infarction

HP, Prevention & Rehabilitation

Persistent cardiac damage

LV dilatation and remodeling

Chronic heart failure

HP, Prevention & Rehabilitation

Cardiovasular risk factors

เบาหวาน ความดัน
ไขมัน บุหรี่ อ้วนพีมีพุง

Health Promotion & Prevention

Atherosclerosis

Coronary artery disease

Cardiac rehabilitation following a cardiac event

- Phase I or inpatient phase: introduced in 1960s & consists of early graded mobilization of stable cardiac pt to the activity to perform simple household tasks.
- Phase II consists of outpatient monitored exercise and risk factor reduction. This multidimensional approach gained popularity in 1970s & well structured in 1980s.
- Phase III or maintenance phase consists of home- or gymnasium-based exercise ĉ goal of continuing risk factor modification & phase II exercise program.

Cardiac rehabilitation: exercise-based, psychology-based for Coronary Heart Disease

Exercise-based CR. for CHD.

Heran BS. Cochrane Data System Rev 2011, Issue 7. Art. No.: CD001800.

Comparison 1. Exercise-based rehabilitation versus usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Total mortality	33		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 Follow-up of 6 to 12 months	19	6000	Risk Ratio (M-H, Fixed, 95% CI)	0.82 [0.67, 1.01]
1.2 Follow-up longer than 12 months	16	5790	Risk Ratio (M-H, Fixed, 95% CI)	0.87 [0.75, 0.99]
	Total events: 324 (Exercise), 354 (Usual Care)		Heterogeneity: Chi^2 = 14.42, df = 15 (P = 0.49); I^2 =0.0%	
2 Cardiovascular mortality	19		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 Follow-up of 6 to 12 months	9	4130	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.71, 1.21]
2.2 Follow-up longer than 12 months	12	4757	Risk Ratio (M-H, Fixed, 95% CI)	0.74 [0.63, 0.87]
	Total events: 235 (Exercise), 301 (Usual Care)		Heterogeneity: Chi^2 = 8.23, df = 10 (P = 0.61); I^2 =0.0%	

Exercise-based CR. for CHD.

Heran BS. Cochrane Data System Rev 2011, Issue 7. Art. No.: CD001800.

Comparison 1. Exercise-based rehabilitation versus usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4 CABG	21		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Follow-up of 6 to 12 months	14	2312	Risk Ratio (M-H, Fixed, 95% CI)	0.91 [0.67, 1.24]
4.2 Follow-up longer than 12 months	9	2189	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.68, 1.27]
5 PTCA	11		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 Follow-up of 6 to 12 months	7	1328	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.69, 1.50]
5.2 Follow-up longer than 12 months	6	1322	Risk Ratio (M-H, Fixed, 95% CI)	0.89 [0.66, 1.19]
6 Hospital Admissions	10		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
6.1 Follow-up of 6 to 12 months	4	463	Risk Ratio (M-H, Fixed, 95% CI)	0.69 [0.51, 0.93]
	Total events: 54 (Exercise), 73 (Usual Care)		Heterogeneity: $Chi^2 = 3.39$, $df = 3$ ($P = 0.33$); $I^2 = 12\%$	
6.2 Follow-up longer than 12 months	7	2009	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.87, 1.11]

CHD 2nd prevention: CR vs. Drugs

Interventions	Trials (pts)	All cause mortality reduction/1000/yr
Beta-blockers [1]	31(24,974)	12 (6-17)
ACE-inhibitors [2]	22(102,476)	4 (1-6)
Statins [3]	3(17,617)	4 (2-6)
Anti-platelets[4]	11(18,773)	7 ? (1-3)
Exercise-based CR[5]	44 (8,700)	9 ? (15-116)

1 Freemantle N. BMJ 1999;318:1730-7 2 Domanski MJ. J Am Coll Cardiol 1999;33:598-604
3 LaRosa JC. JAMA 1999;282:2340-6 4 Collins R. BMJ 1994;309:1215-7
5 Taylor RS. Am J Med 2004;116:682-692
From Perk J. Cardiovascular prevention and rehabilitation. Springer-Verlag London 2007: 16

Exercise vs. Drug on Death

Metaepidemiologic. Naci H. BMJ 2013;347:f5577 doi: 10.1136/bmj.f5577

- 16 (4 exercise & 12 drug) meta-analyses & additional 3 recent exercise trials, included 305 Randomised Controlled Trials with 339,274 participants. Four conditions with evidence on the effectiveness of exercise on mortality outcomes (2ry prevention of Coronary Heart Disease, rehabilitation of stroke, Rx of heart failure, prevention of diabetes), 14,716 participants were randomised to physical activity interventions in 57 trials.

Exercise vs. Drug on Death

Metaepidemiologic. Naci H. BMJ 2013;347:f5577 doi: 10.1136/bmj.f5577

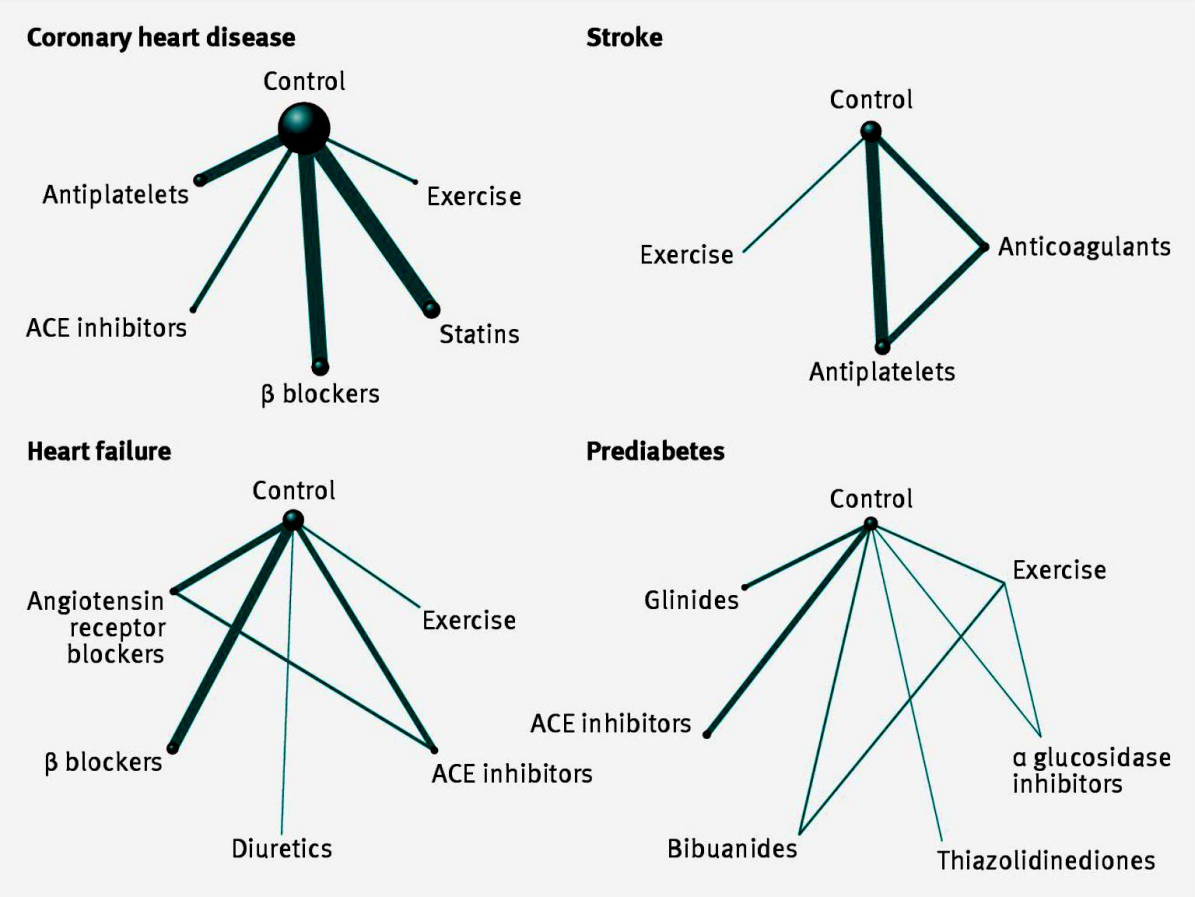
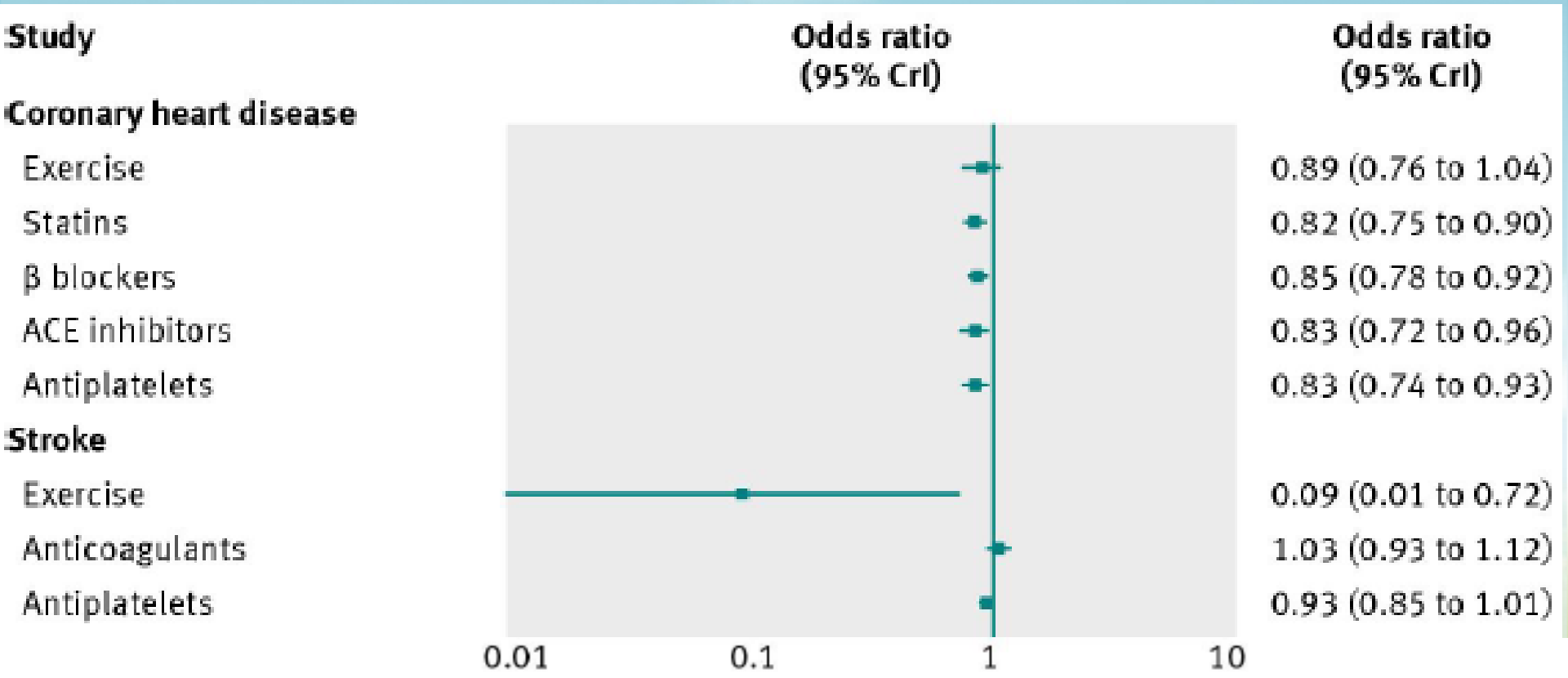


Fig 2 Network of available comparisons between exercise and individual drug interventions in coronary heart disease, stroke, heart failure, and prediabetes. Size of node is proportional to number of trial participants, and thickness of line connecting nodes is proportional to number of participants randomised in trials directly comparing the two treatments.

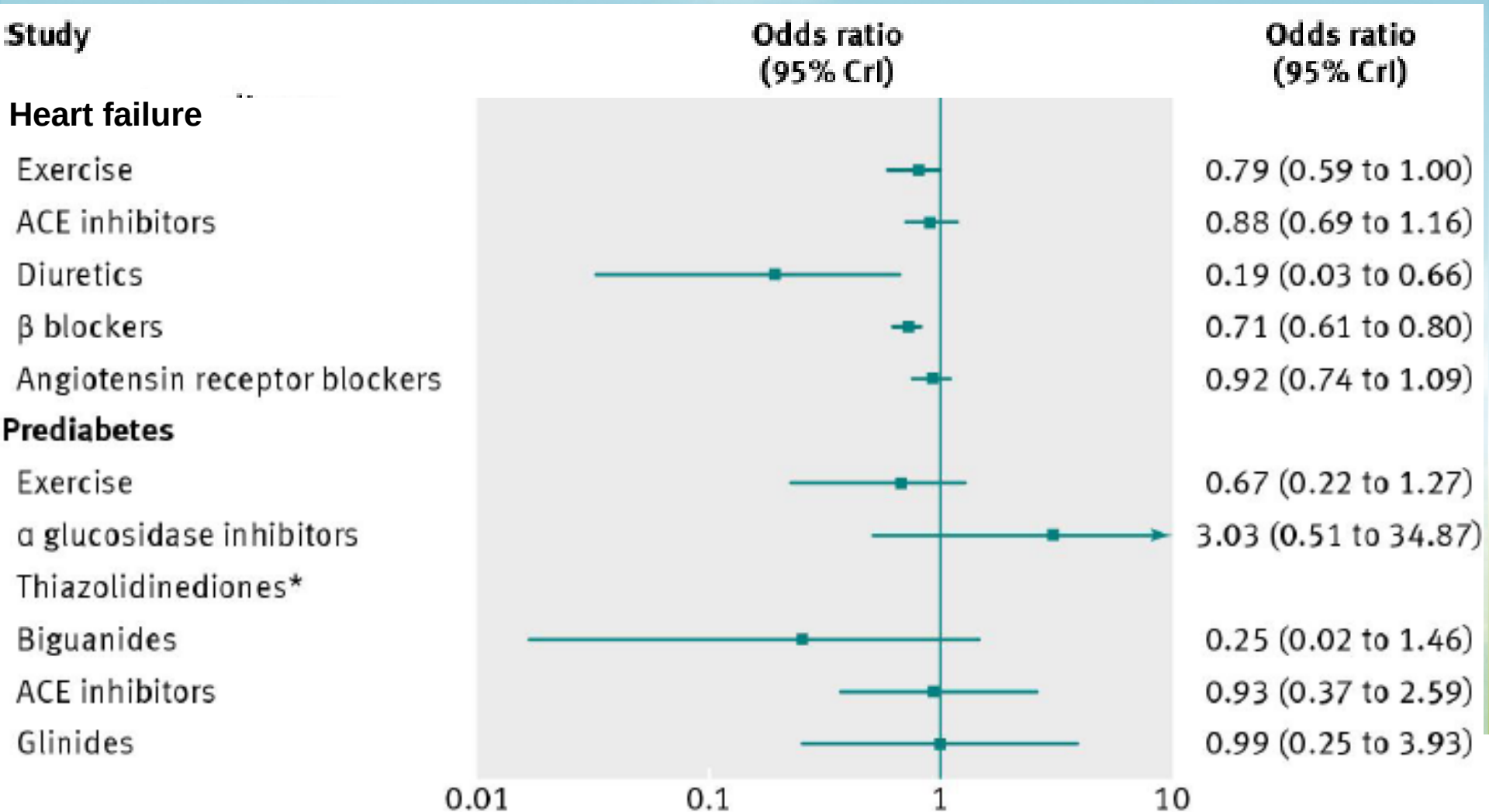
Exercise vs. Drug on Death

Metaepidemiologic. Naci H. BMJ 2013;347:f5577 doi: 10.1136/bmj.f5577



Exercise vs. Drug on Death

Metaepidemiologic. Naci H. BMJ 2013;347:f5577 doi: 10.1136/bmj.f5577



ออกกำลังกาย ลดการตายได้มากกว่ากินยาในอัมพาต

Exercise vs. Drug on Death

Metaepidemiologic. Naci H. BMJ 2013;347:f5577 doi: 10.1136/bmj.f5577

Intervention	Comparator drugs			
CHD	Statins	β blockers	ACE inhibitors	Antiplatelets
Exercise	1.08 (0.90 to 1.30)	1.05 (0.87 to 1.25)	1.08 (0.87 to 1.33)	1.07 (0.88 to 1.30)
Statins	—	0.97 (0.85 to 1.10)	0.99 (0.84 to 1.18)	0.99 (0.85 to 1.15)
β blockers	—	—	1.03 (0.87 to 1.21)	1.02 (0.89 to 1.17)
ACE inhibitors	—	—	—	0.99 (0.83 to 1.19)

Stroke	Comparator drugs	
Intervention	Anticoagulants	Antiplatelets
Exercise	0.09 (0.01 to 0.70)	0.10 (0.01 to 0.62)
Anticoagulants	—	1.11 (1.00 to 1.21)

Estimates lower than 1.00 favour row defining intervention.

ยาขับเกลือลดการตายได้มากกว่าออกกำลังกายในหัวใจล้มเหลว

Exercise vs. Drug on Death

Metaepidemiologic. Naci H. BMJ 2013;347:f5577 doi: 10.1136/bmj.f5577

HF

Intervention	Comparator drugs			
	ACE inhibitors	Diuretics	β blockers	ARBs
Exercise	0.89 (0.59 to 1.23)	4.11 (1.17 to 24.76)	1.11 (0.82 to 1.46)	0.86 (0.62 to 1.16)
ACE inhibitors	—	4.66 (1.32 to 28.21)	1.24 (0.96 to 1.71)	0.96 (0.78 to 1.27)
Diuretics	—	—	0.27 (0.04 to 0.93)	0.21 (0.03 to 0.73)
β blockers	—	—	—	0.77 (0.62 to 0.98)

Pre-DM

Intervention	Comparator drugs			
	AGIs	Biguanides	ACE inhibitors	Glinides
Exercise	0.22 (0.02 to 1.18)	2.67 (0.41 to 36.39)	0.73 (0.14 to 1.96)	0.69 (0.10 to 2.52)
AGIs	—	13.39 (0.99 to 519.75)	3.26 (0.42 to 43.94)	3.06 (0.33 to 48.01)
Biguanides	—	—	0.26 (0.01 to 1.85)	0.25 (0.01 to 2.08)
ACE inhibitors	—	—	—	0.93 (0.18 to 5.49)

AGIs=α glucosidase inhibitors; ACE=angiotensin converting enzyme.
Estimates lower than 1.00 favour row defining intervention.

2013 AHA/ACC Lifestyle Management Guideline

Eckel RH. Circulation. published online November 12, 2013.

Table 5. Summary of Recommendations for Lifestyle Management

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
PHYSICAL ACTIVITY				
Lipids 1. In general, advise adults to engage in aerobic physical activity to reduce LDL–C and non-HDL–C: 3 to 4 sessions a week, lasting on average 40 minutes per session, and involving moderate-to-vigorous intensity physical activity.	B (Moderate)	**CQ3:** ES1 (moderate), ES2 (moderate), ES5 (low)	IIa	A
BP 1. In general, advise adults to engage in aerobic physical activity to lower BP: 3 to 4 sessions a week, lasting on average 40 minutes per session, and involving moderate-to-vigorous intensity physical activity.	B (Moderate)	**CQ3:** ES1 (high)	IIa	A
Aerobic Exercise Training and Lipids				
ES1. • Among adults, aerobic physical activity, as compared to control interventions, reduces LDL–C 3.0 to 6.0 mg/dL on average.				
Strength of Evidence: Moderate				
ES2. • Among adults, aerobic physical activity alone, as compared to control interventions, reduces non-HDL–C 6 mg/dL on average.				
Strength of Evidence: Moderate				

Aerobic physical activity no consistent effect on TG & HDL-C

www.dms.moph.go.th/imrta/images/data/aw20130328.pdf

วันนี้ คุณหมอสั่ง "ออกกำลังกาย" หรือยัง ?

Rx การออกกำลังกาย วันที่___/____/_____
ชื่อ นามสกุล_____อายุ____ปี HN_____

1. รูปแบบการออกกำลังกาย	2. ระยะเวลา (นาที)	3. ความถี่ (__ครั้ง/สัปดาห์)	4. ระดับความแรง (เบา/ปานกลาง/หนัก)	5. ข้อแนะนำ
○ เดิน 				
○ วิ่ง 				
○ ขี่จักรยาน 				
○ ว่ายน้ำ 				
○ ชี่กง 				
○ โยคะ 				
○ เต้นแอโรบิค 				
○ ยกน้ำหนัก 				
○ อื่นๆ_____				

วันนัดครั้งต่อไป _____/_____/_____
ลายเซ็นต์แพทย์ _____

ชื่อ นามสกุล.....อายุ.....ปี
น้ำหนัก.....กิโลกรัม ส่วนสูง.....ซม. รอบเอว.....นิ้ว
สัปดาห์ที่.....เดือน.....พ.ศ.....

วัน	วันที่	กิจกรรม	ชีพจรก่อนออกกำลังกาย	ชีพจรสูงสุด	ชีพจรหลังออกกำลังกาย	บันทึกระยะทาง/ระยะเวลา	บันทึกเพิ่มเติม
จันทร์	11	เดิน	65	88	67	2 กม./ 30นาที	
อังคาร	12	เดิน	60	84	62	2 กม./ 35นาที	เหนื่อยต้องพักนาน
พุธ		ไม่ได้ออกกำลังกาย เพราะรู้สึกไม่สบายมีไข้					
พฤหัสบดี							
ศุกร์							

The American Journal of Chinese Medicine, Vol. 40, No. 2, 255–267

Institute for Advanced Research in Asian Science and Medicine
DOI: 10.1142/S0192415X12500206

A Systematic Review of the Effectiveness of Qigong Exercise in Cardiac Rehabilitation

Abstract: The objective of this study was to assess evidence for the efficacy and effectiveness of Chinese qigong exercise in rehabilitative programs among cardiac patients. Thirteen databases were searched through to November 2010, and all controlled clinical trials on Chinese qigong exercise among patients with chronic heart diseases were included. For each included study, data was extracted and validity was assessed. Study quality was evaluated and summarized using both the Jadad Scale and the criteria for levels of evidence. Seven randomized controlled trials (RCTs) and one non-randomized controlled clinical trial (CCT) published between 1988 and 2007 met the inclusion criteria. In total, these studies covered 540 patients with various chronic heart diseases including atrial fibrillation, coronary artery disease, myocardial infarct, valve replacement, and ischemic heart disease. Outcome measures emerged in these studies included subjective outcomes such as symptoms and quality of life; and objective outcomes such as blood pressure, ECG findings, and exercise capacity, physical activity, balance, co-ordination, heart rate, and oxygen uptake. Overall, these studies suggest that Chinese qigong exercise seems to be an optimal option for patients with chronic heart diseases who were unable to engage in other forms of physical activity; however, its efficacy and effectiveness in cardiac rehabilitation programs should be further tested.

RCTs Qigong in heart disease pts.

Systematic Review. Chan CLW. Am J Chin Med 2012;40:255

Studies/ Regions	Design	Subjects (Age)	*n*	Intervention (Frequency)	Control	Follow-Up Period	Outcome Measures	Intergroup Difference	Jadad Score
(Pippa *et al.*, 2007) Italy	RCT	Inpatient with atrial fibrillation (68 ± 8 yr.)	QG: 22 CG: 21	Qigong (static) exercise (90 min, 2 sessions per week)	Waiting list	16 weeks (32 sessions)	Exercise capacity (6-min walking test)	$p < 0.001$ at the end of training $p = 0.008$ 16 weeks after	3
(Stenlund *et al.*, 2005) Sweden	RCT	Inpatient with CAD (≥73 yr.)	QG:48 CG:47	Qigong (dynamic) plus usual care (1 h qigong plus 2 h group discussion)	Usual medical care	3 months (12 groups sessions)	(1) Physical activity (2) One-leg stance test (R) (3) Co-ordination (4) Box-climbing test (R)	(1) $p = 0.011$ (2) $p = 0.029$ (3) $p = 0.021$ (4) $p = 0.035$	2
(Liu *et al.*, 1998) China	RCT	Patients with CAD resulted from hypertension (n.r.)	QG:60 CG:60	Qigong (dynamic) plus drugs (n.r.)	Drugs only	1 year	(1) Symptoms (2) Blood pressure (3) ECG	(1) $p < 0.01$ (2) $p < 0.05$ (3) $p < 0.01$	1
(Qiu *et al.*, 1992) China	RCT	Community older adults with CAD (61.4 ± 7.6 yr.)	QG:22 CG:15	Qigong (dynamic) (3 times per week)	Placebo	12 weeks	(1) Symptoms (2) Blood pressure (3) CM5 ST/HR slope	(1) $p < 0.05$ (2) $p < 0.05$ (3) $p < 0.05$	2

RCTs Qigong in heart disease pts.

Systematic Review. Chan CLW. Am J Chin Med 2012;40:255

Studies/ Regions	Design	Subjects (Age)	*n*	Intervention (Frequency)	Control	Follow-Up Period	Outcome Measures	Intergroup Difference	Jadad Score
(Sun *et al.*, 1988) China	RCT	Outpatient with cardiovascular disease (64.1 ± 1.4 yr.)	QG:11 CG: 9	Qigong/Tai chi (30 min, 3 times per week)	Treadmill or cycle ergometer	8 weeks	(1) Symptoms (2) Blood pressure (3) Heart rate (4) ECG (5) Oxygen uptake (6) Serum cholesterol	$p > 0.05$ for all tests	1
(Wang *et al.*, 1988) China	RCT	Male with CAD resulted from hypertension (45–66 yr.)	QG:50 CG: 48	Qigong (dynamic) plus drug (30 min, 1–2 times per day)	Drug only	1 year	(1) Symptoms (2) Blood pressure (3) ECG (4) HDL-C	(1) 62.5% vs. 28.1% ($p < 0.01$) (2) 86.0% vs. 64.2% ($p < 0.05$) (3) 52.2% vs. 21.6% ($p < 0.01$) (4) $p < 0.001$	1
(Hu *et al.*, 1987) China	RCT	Outpatient with CAD (40–60 yr.)	QG:31 CG:31	Medical qigong (1 h each day)	Drugs	3 months	(1) Symptoms (2) Blood pressure (3) ECG	(1) $p < 0.01$ (2) $p < 0.01$ (3) $p < 0.01$	1
(Hui *et al.*, 2006) Hong Kong	CCT	Outpatients with different cardiac disease (42–76 yr.)	65 (total)	Qigong (dynamic) (20 min each session)	Progressive relaxation	8 sessions	(1) Blood pressure (2) Quality of life (SF-36, STAI, GHQ)	Progressive relaxation was more effective in reducing BP compared to qigong, whereas qigong group demonstrated greater improvement in psychological measures in addition to reduction in systolic BP	0

Psychological intervention for CHD

Whalley B. Cochrane Data System Rev 2011, Issue 8. Art. No.: CD002902.

Comparison 1. Psychological intervention +/- other rehabilitation vs control (usual care/other rehabilitation)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Total Mortality	17	6852	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.75, 1.05]
2 Cardiac Mortality	5 I^2 =0.0%	3893	Risk Ratio (M-H, Random, 95% CI)	0.80 [0.64, 1.00]
	Total events: 389 (Treatment), 403 (Control)			
3 Revascularisation (CABG and PTCA combined)	12	6670	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.80, 1.13]
4 Non-fatal MI	12	7534	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.67, 1.13]
5 Depression	12 I^2 =70%	5041	Std. Mean Difference (IV, Random, 95% CI)	-0.21 [-0.35, -0.08]
6 Anxiety	8 I^2 =72%	2771	Std. Mean Difference (IV, Random, 95% CI)	-0.25 [-0.48, -0.03]

Pt. education in CHD management:not enough

Brown JPR. Cochrane Data System Rev 2011, Issue 12. Art. No.: CD008895.

Comparison 1. Total Mortality

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Total mortality at the end of the follow up period	6	2330	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.55, 1.13]

Comparison 2. Cardiovascular Events

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Myocardial Infarction at the end of the follow up period	2	209	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.26, 1.48]

Comparison 4. Hospitalisations

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Cardiac Hospitalisations at end of follow up period	4	12905	Risk Ratio (M-H, Random, 95% CI)	0.83 [0.65, 1.07]

Cardiac rehabilitation in Heart Failure

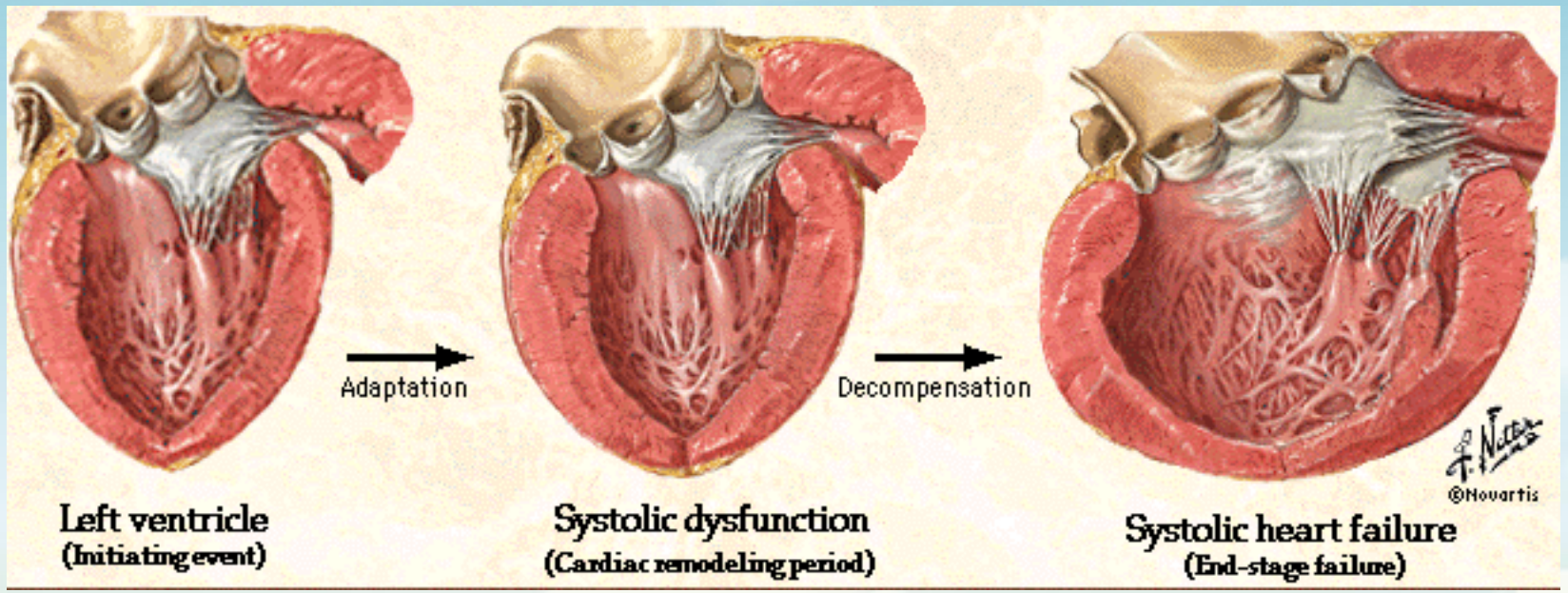
2013 ACCF/AHA Heart Failure Guideline.

Yancy CW. Circulation 2013;

- A complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood.
- Cardinal manifestations of HF: dyspnea and fatigue, which may limit exercise tolerance & fluid retention, which may lead to pulmonary ± splanchnic congestion ± peripheral edema.

HF with reduced EF

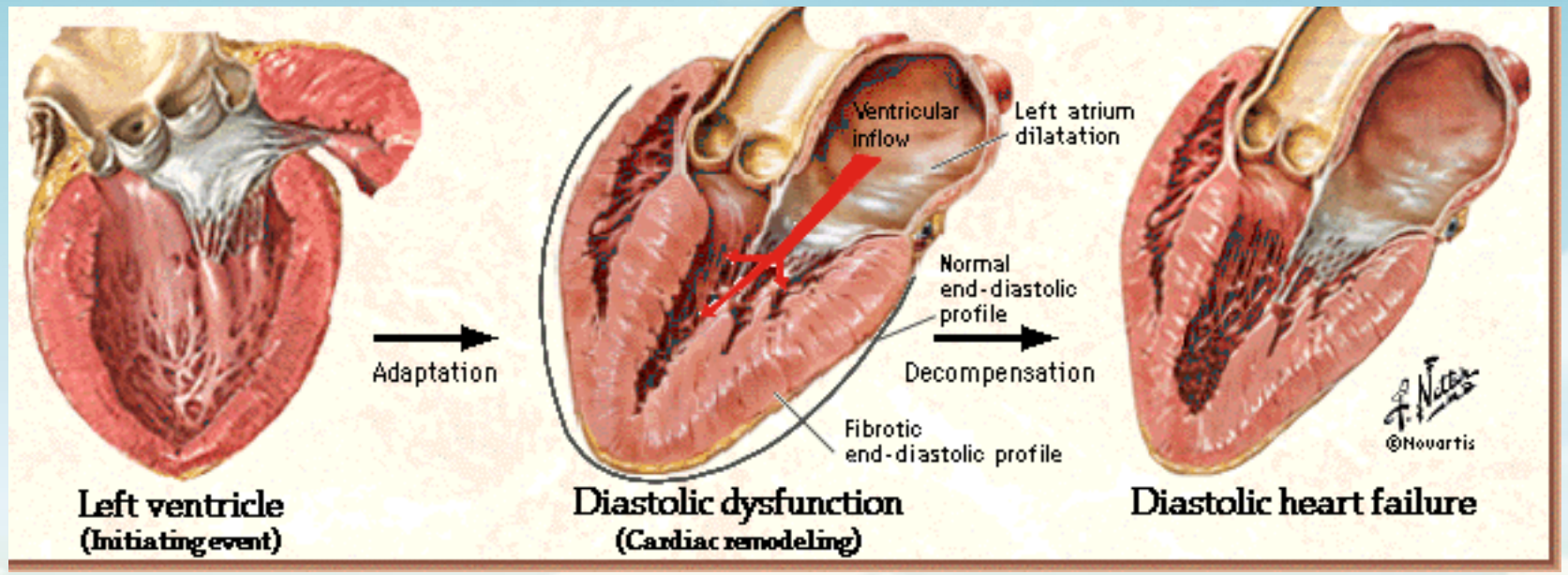
Or Systolic heart failure



Mechanism of S_3 gallop: rapid filling

HF with preserved EF

or Diastolic heart failure



Mechanism of S4 gallop: atrial contraction

2013 ACCF/AHA Heart Failure Guideline.

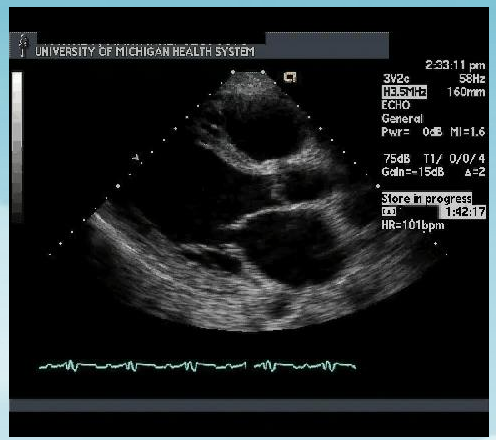
Yancy CW. Circulation 2013;

Table 3. Definitions of HF*r*EF and HF*p*EF

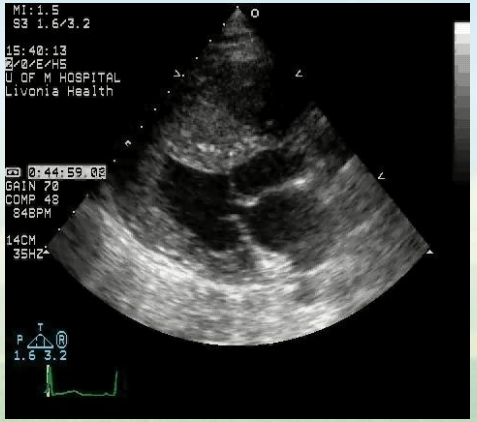
Classification	EF (%)	Description
I. Heart failure with reduced ejection fraction (HF*r*EF)	≤40	Also referred to as systolic HF. Randomized clinical trials have mainly enrolled patients with HF*r*EF, and it is only in these patients that efficacious therapies have been demonstrated to date.
II. Heart failure with preserved ejection fraction (HF*p*EF)	≥50	Also referred to as diastolic HF. Several different criteria have been used to further define HF*p*EF. The diagnosis of HF*p*EF is challenging because it is largely one of excluding other potential noncardiac causes of symptoms suggestive of HF. To date, efficacious therapies have not been identified.
a. HF*p*EF, borderline	41 to 49	These patients fall into a borderline or intermediate group. Their characteristics, treatment patterns, and outcomes appear similar to those of patients with HF*p*EF.
b. HF*p*EF, improved	>40	It has been recognized that a subset of patients with HF*p*EF previously had HF*r*EF. These patients with improvement or recovery in EF may be clinically distinct from those with persistently preserved or reduced EF. Further research is needed to better characterize these patients.

Echocardiography
normal
para-sternal long axis

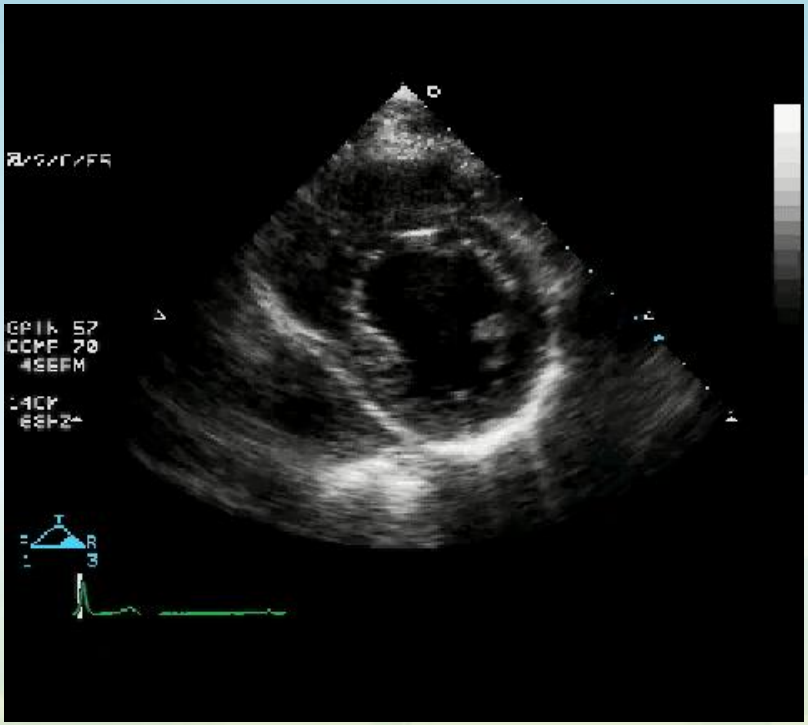
Reduced Ejection Fraction
Left ventricular dilatation



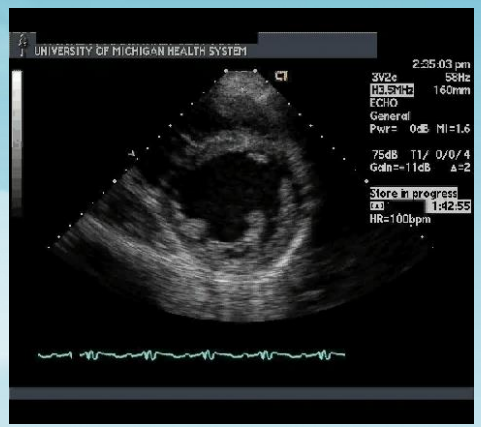
Preserved Ejection Fraction
Left ventricular hypertrophy



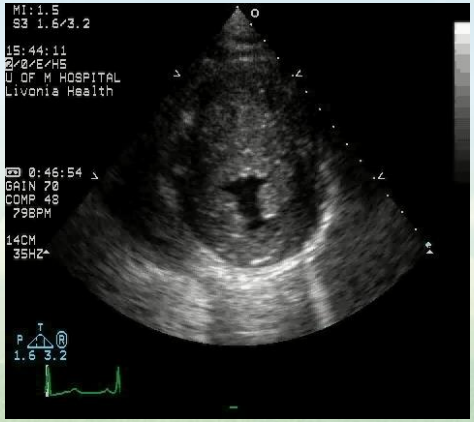
Echocardiography
normal
para-sternal short axis



Reduced Ejection Fraction
Left ventricular dilatation



Preserved Ejection Fraction
Left ventricular hypertrophy



No therapy has been proven to reduce morbidity and mortality in HFpEF.Borlaug BA. Nat Rev Cardiol 2013;10:244.

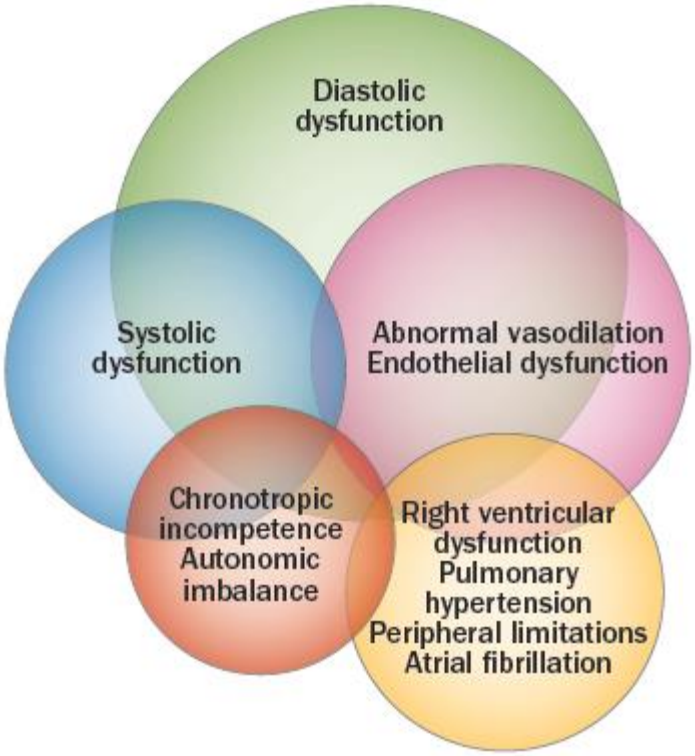


Figure 1 | Heart failure with preserved ejection fraction is a complex 'systems disease', in which symptoms of effort intolerance are caused by numerous abnormalities in myocardial diastolic, systolic, vascular, autonomic, and skeletal muscle function that coexist to varying degrees within the individual patient.

2013 ACCF/AHA Heart Failure Guideline.

Yancy CW. Circulation 2013;

ACCF/AHA Stages of HF (38)		NYHA Functional Classification (46)	
A	At high risk for HF but without structural heart disease or symptoms of HF	None	
B	Structural heart disease but without signs or symptoms of HF	I	No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
C	Structural heart disease with prior or current symptoms of HF	I	No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
		II	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in symptoms of HF.
		III	Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes symptoms of HF.
		IV	Unable to carry on any physical activity without symptoms of HF, or symptoms of HF at rest.
D	Refractory HF requiring specialized interventions		

ACCF indicates American College of Cardiology Foundation; AHA, American Heart Association; HF, heart failure; a
NYHA, New York Heart Association.

2013 ACCF/AHA Heart Failure Guideline.

Yancy CW. Circulation 2013;

7.3. Stage C

7.3.1. Nonpharmacological Interventions

7.3.1.1. Education: Recommendation

Class I

1. **Patients with HF should receive specific education to facilitate HF self-care (363-368).** ***(Level of Evidence: B)***

7.3.1.2. Social Support

Social support is thought to buffer stress and promote treatment adherence and a healthy lifestyle (371). Most studies examining the relationship between social support and hospitalization in adults with HF have found that a lack of social support is associated with higher hospitalization rates (372, 373) and mortality risk (374, 375).

7.3.1.3. Sodium Restriction: Recommendation

Class IIa

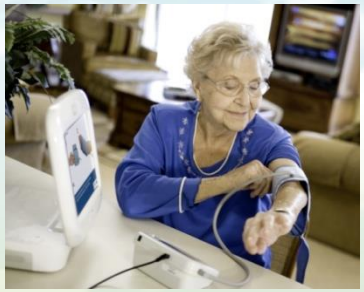
1. **Sodium restriction is reasonable for patients with symptomatic HF to reduce congestive symptoms.** (***Level of Evidence: C***)

เมื่อวัดความดันฯสูงกว่า 140/90 mmHg. ที่รพ.

คุยความรู้

ดูให้ทำ

ทำเองได้
ไม่ต้องดู



อยู่ยั่งยืน

ทำให้ดู

หรือ ๑ สัปดาห์ ก่อนพบแพทย์ตามนัด

2013 ACCF/AHA Heart Failure Guideline.

Yancy CW. Circulation 2013;

7.3. Stage C

7.3.1.4. Treatment of Sleep Disorders: Recommendation

Class IIa

1. **Continuous positive airway pressure (CPAP) can be beneficial to increase LVEF and improve functional status in patients with HF and sleep apnea (393-396).** ***(Level of Evidence: B)***

7.3.1.5. Weight Loss

Obesity is defined as a BMI ≥30 kg/m^2. Patients with HF who have a BMI between 30 and 35 kg/m^2 have lower mortality and hospitalization rates than those with a BMI in the normal range (99). Weight loss may reflect cachexia caused by the higher total energy expenditure associated with HF compared with that of healthy sedentary subjects (399). The diagnosis of cardiac cachexia independently predicts a worse prognosis (191). At

2013 ACCF/AHA Heart Failure Guideline.

Yancy CW. Circulation 2013;

7.3. Stage C

7.3.1.6. Activity, Exercise Prescription, and Cardiac Rehabilitation: Recommendations

Class I

1. Exercise training (or regular physical activity) is recommended as safe and effective for patients with HF who are able to participate to improve functional status (404-407). *(Level of Evidence: A)*

Class IIa

1. Cardiac rehabilitation can be useful in clinically stable patients with HF to improve functional capacity, exercise duration, HRQOL, and mortality (404, 406-411). *(Level of Evidence: B)*

Exercise based rehabilitation for HF

Davies EJ. Cochrane Database of Systematic Reviews 2010, Issue 4

- Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library 2007, Issue 4).* MEDLINE, EMBASE, CINAHL, and PsycINFO were searched (2001-Jan 2008). ISI Proceedings and bibliographies of identified reviews were checked.
- RCTs of exercise-based interventions $\geq$ 6 months follow up compared to usual medical care or placebo in adults of all ages (> 18 yrs) with evidence of chronic systolic heart failure.

Rehabilitation for systolic HF

Davies EJ. Cochrane Database of Systematic Reviews 2010, Issue 4

Comparison 1. All exercise interventions versus usual care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 All cause mortality up to12 month follow up	13	962	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.70, 1.51]
2 All cause mortality more than 12 months follow up	4	2658	Odds Ratio (M-H, Fixed, 95% CI)	0.88 [0.73, 1.07]
3 Hospital admission up to 12 month follow up	8	659	Risk Ratio (M-H, Fixed, 95% CI)	0.79 [0.58, 1.07]
4 Hospital admission more than 12 months follow up	4	2658	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.90, 1.02]
5 Hospital admission heart failure only	7	569	Risk Ratio (M-H, Fixed, 95% CI)	0.72 [0.52, 0.99]
6 Health related quality of life - MLWHF	6	700	Mean Difference (IV, Random, 95% CI)	-10.33 [-15.89, -4.77]
7 Health related quality of life - all scales	10	3109	Std. Mean Difference (IV, Random, 95% CI)	-0.56 [-0.82, -0.30]

Rehabilitation for HF: Conclusions

Davies EJ. Cochrane Database of Systematic Reviews 2010, Issue 4

- Exercise training improved short term exercise capacity in mild-moderate systolic HF cf. uc.
- Exercise does not increase risk of all-cause mortality and may reduce heart failure-related hospital admissions.
- Exercise training may offer improvements pts' health-related Quality of Life.

cf. = compared to, uc = usual care

Dietary pattern in heart failure

Dietary Approaches to Stop Hypertension diet &

Mediterranean diet

Women's Health Initiative

Levitan EB. DOI: 10.1161/CIRCHEARTFAILURE.2013/113.000495

- 1993-1998, postmenopausal women aged 50-79 were recruited at 40 US clinical centers.
  - WHI Clinical Trial (CT) component 68,132 participants enrolled hormone therapy (HT), dietary modification (DM), and calcium plus vitamin D (CaD) trials,
  - Observational Study (OS) component n = 93,676
- WHI CT & OS ended in 2004-2005; participants were invited to continue in WHI Extension Study (ES)-1: 2005-2010 & ES-2: 2010-2015; 4,043 WHI CT and OS participants had a HF hospitalization

Women's Health Initiative

Levitan EB. DOI: 10.1161/CIRCHEARTFAILURE.113.000495

Table 2. Mediterranean and DASH diet scores and mortality among women with heart failure

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
DASH diet score				
N	768	704	956	787
Median (Range)	19 (9-21)	23 (22-24)	26 (25-28)	31 (29-40)
Deaths	345	329	386	325
Person-years	3,440	3,120	4,477	3,698
Mortality rate per 100 person-years	10.0	10.5	8.6	8.8
Model 1 HR (95% CI)*	1	1.00 (0.85-1.16)	0.77 (0.66-0.90)	0.75 (0.64-0.89)
Model 2 HR (95% CI)†	1	1.05 (0.90-1.23)	0.86 (0.73-1.02)	0.89 (0.75-1.05)
Model 3 HR (95% CI)‡	1	1.04 (0.89-1.21)	0.83 (0.70-0.98)	0.84 (0.70-1.00)

* Adjusted for age at heart failure hospitalization and total energy intake

† Adjusted for variables in Model 1 and race/ethnicity, education, income, married, current smoking, total exercise, physical function, use of off-study postmenopausal hormone therapy, and WHI study arm

‡ Adjusted for variables in Model 2 and systolic blood pressure, diastolic blood pressure, use of diuretics, beta-blockers, and angiotensin converting enzyme inhibitors or angiotensin receptor blockers, body mass index, and history of high cholesterol, high blood pressure, diabetes, myocardial infarction, coronary revascularization, and atrial fibrillation.

Women's Health Initiative

Levitan EB. DOI: 10.1161/CIRCHEARTFAILURE.113.000495

Table 2. Mediterranean and DASH diet scores and mortality among women with heart failure

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Mediterranean diet score				
N	572	1,305	589	749
Median (Range)	2 (0-2)	4 (3-4)	5 (5-5)	6 (6-9)
Deaths	260	587	248	290
Person-years	2,582	5,772	2,741	3,639
Mortality rate per 100 person-years	10.1	10.2	9.0	8.0
Model 1 HR (95% CI)*	1	1.00 (0.86-1.17)	0.88 (0.74-1.04)	0.75 (0.63-0.89)
Model 2 HR (95% CI)†	1	1.09 (0.93-1.28)	1.02 (0.85-1.22)	0.91 (0.75-1.09)
Model 3 HR (95% CI)‡	1	1.05 (0.89-1.24)	0.97 (0.81-1.17)	0.85 (0.70-1.02)

* Adjusted for age at heart failure hospitalization and total energy intake

† Adjusted for variables in Model 1 and race/ethnicity, education, income, married, current smoking, total exercise, physical function, use of off-study postmenopausal hormone therapy, and WHI study arm

‡ Adjusted for variables in Model 2 and systolic blood pressure, diastolic blood pressure, use of diuretics, beta-blockers, and angiotensin converting enzyme inhibitors or angiotensin receptor blockers, body mass index, and history of high cholesterol, high blood pressure, diabetes, myocardial infarction, coronary revascularization, and atrial fibrillation.

ผัก ข้าวกล้อง ถั่ว ลดโอกาสการตายในหญิงหัวใจล้มเหลว

Vegetables, Nuts, Whole grain ↓ Death in HF

Levitan EB. DOI: 10.1161/CIRCHEARTFAILURE.113.000495

Table 3. Components of the Mediterranean and DASH diet scores and mortality among women with heart failure*

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	p-trend
Mediterranean diet score					
Fruits	1	1.06 (0.89-1.25)	1.06 (0.90-1.26)	1.05 (0.89-1.25)	0.67
Vegetables	1	0.95 (0.81-1.12)	0.97 (0.82-1.14)	0.81 (0.68-0.96)	0.01
Nuts	1	0.97 (0.83-1.14)	0.92 (0.81-1.06)	0.86 (0.74-0.96)	0.049
Legumes	1	1.01 (0.87-1.17)	0.98 (0.85-1.13)	0.95 (0.81-1.12)	0.49
Whole grains	1	0.91 (0.78-1.05)	0.82 (0.70-0.96)	0.79 (0.67-0.94)	0.005
Fish	1	1.00 (0.86-1.17)	1.01 (0.86-1.18)	1.00 (0.85-1.18)	0.98
Ratio of monounsaturated to saturated fat	1	0.91 (0.78-1.06)	1.06 (0.91-1.23)	0.91 (0.78-1.07)	0.51
Red and processed meat	1	0.97 (0.83-1.13)	0.95 (0.81-1.11)	1.13 (0.93-1.36)	0.16
Alcohol	1	1.02 (0.87-1.20)	0.99 (0.85-1.16)	0.94 (0.80-1.10)	0.32
DASH diet score					
Fruits	1	1.06 (0.89-1.25)	1.06 (0.90-1.26)	1.05 (0.89-1.25)	0.67
Vegetables	1	0.95 (0.81-1.12)	0.97 (0.82-1.14)	0.81 (0.68-0.96)	0.01
Nuts and legumes	1	0.87 (0.75-1.01)	0.90 (0.77-1.05)	0.81 (0.69-0.95)	0.03
Low-fat dairy	1	0.81(0.70-0.95)	0.84 (0.73-0.98)	0.83 (0.71-0.98)	0.11
Whole grains	1	0.91 (0.78-1.05)	0.82 (0.70-0.96)	0.79 (0.67-0.94)	0.005
Sodium	1	0.96 (0.82-1.12)	0.98 (0.84-1.14)	1.09 (0.94-1.28)	0.23
Sweetened beverages†	1	1.00 (0.85-1.18)	0.98 (0.85-1.13)		0.80
Red and processed meat	1	0.97 (0.83-1.13)	0.95 (0.81-1.11)	1.13 (0.93-1.36)	0.16

2013 AHA/ACC Lifestyle Management Guideline

Eckel RH. Circulation. published online November 12, 2013.

Table 5. Summary of Recommendations for Lifestyle Management

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
LDL–C - Advise adults who would benefit from LDL–C lowering* to:				
1. Consume a dietary pattern that emphasizes intake of vegetables, fruits, and whole grains; includes low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils and nuts; and limits intake of sweets, sugar-sweetened beverages and red meats. a. Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes mellitus). b. Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.	A (Strong)	**CQ1:** ES4 (high), ES6 (low), ES8 (moderate), ES9 (moderate)	I	A
BP - Advise adults who would benefit from BP lowering to:				
1. Consume a dietary pattern that emphasizes intake of vegetables, fruits, and whole grains; includes low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils and nuts; and limits intake of sweets, sugar-sweetened beverages and red meats. a. Adapt this dietary pattern to appropriate calorie requirements, personal and cultural food preferences, and nutrition therapy for other medical conditions (including diabetes mellitus). b. Achieve this pattern by following plans such as the DASH dietary pattern, the USDA Food Pattern, or the AHA Diet.	A (Strong)	**CQ1:** ES1 (low) ES3 (high), ES5 (high), ES6 (low), ES7 (low), ES8 (moderate)	I	A
2. Lower sodium intake.	A (Strong)	**CQ2:** ES1	I	A

ลดความดันฯ, ไขมันด้วย

*จำกัด หวาน มัน เกลือ เนื้อแดง

American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention

Reducing the Risk of Cancer With Healthy Food Choices and Physical Activity

- Limit consumption of processed meats and red meats.
  - Minimize consumption of processed meats such as bacon, sausage, luncheon meats, and hot dogs.
  - Choose fish, poultry, or beans as an alternative to red meat (beef, pork, and lamb).
  - If you eat red meat, select lean cuts and eat smaller portions.
  - Prepare meat, poultry, and fish by baking, broiling, or poaching rather than by frying or charbroiling.

Cancer J Clin 2012;62:30–67.

Red (processed) meat ↑ mortality

Cohort of ½ million Americans.Sinha R. Arch Intern Med 2009;169:562-71

Total and cause-specific mortality in relation to red (or processed) meat intake: NIH Diet and Health Study

เพศ	ตายทุกสาเหตุ	ตายจากมะเร็ง	ตายจากโรคหัวใจและหลอดเลือด
ชาย	1.31(1.16) เท่า	1.22(1.12) เท่า	1.27(1.09) เท่า
หญิง	1.36(1.25) เท่า	1.20(1.11) เท่า	1.50(1.38) เท่า

Hazard ratios (HR) were adjusted for confounding factors and are for comparison between the highest and lowest quintiles of red or processed meat intake.
$p < 0.0001$ for all HR comparisons.

47 976 male deaths and 23 276 female deaths during 10 years of follow-up

Meat intake & CHD, DM risks

Systematic review. Circulation 2010;121:2271-83.

- Cohort, case-control, or randomized trial in generally healthy adults.1598 identified abstracts, 20 studies:17 prospective cohorts & 3 case-control. Random-effects generalized least squares models for trend estimation to derive pooled dose-response estimates. The 20 studies included 1,218, 380 individuals and 23,889 CHD, 2,280 stroke, and 10,797 DM cases.

กินเบคอน ๒ แผ่น/ฮอดดอก ๑ ชิ้นต่อวัน เพิ่มโอกาสโรคเบาหวาน ~ ๒ เท่า

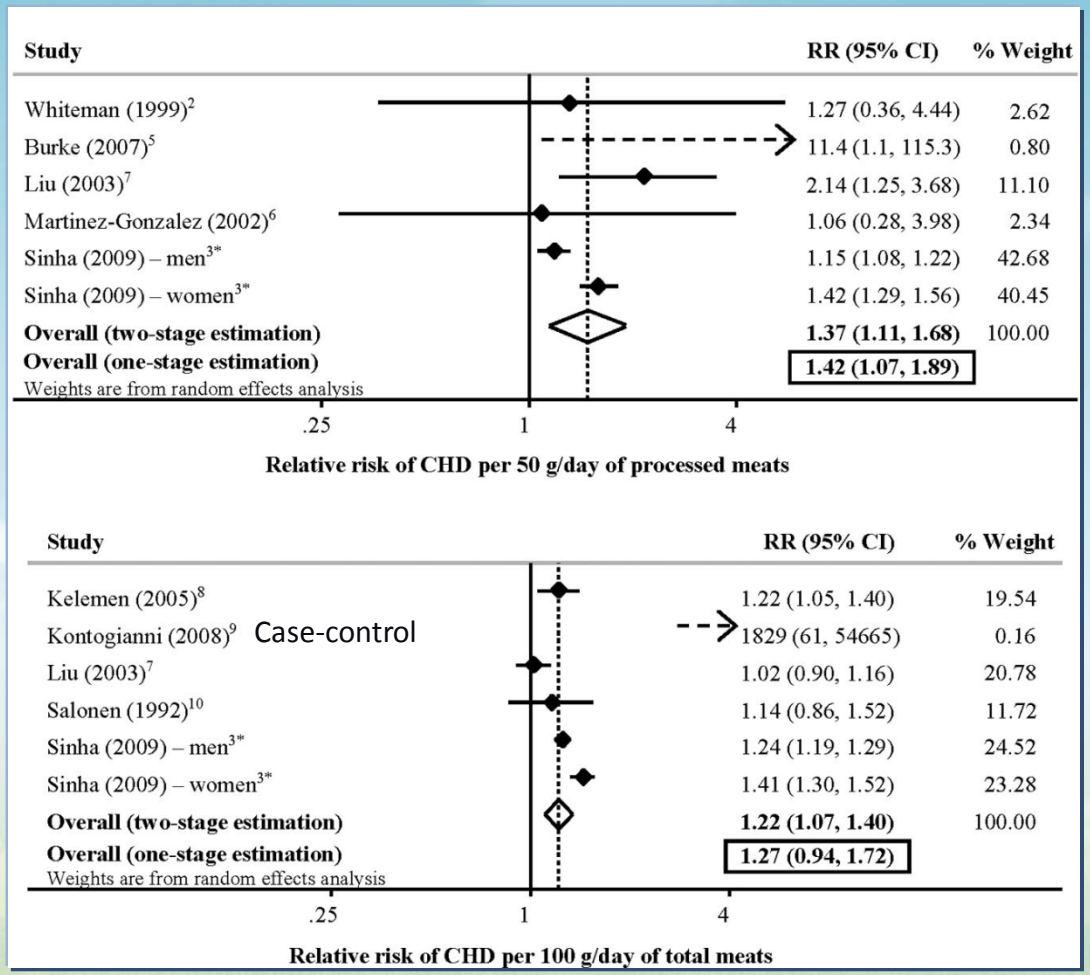
Systematic review. Circulation 2010;121:2271-83.

- Each serving (2 slices) per day of bacon was associated with a 2-fold higher incidence of diabetes mellitus (RR = 2.07; 95% CI, 1.40 to 3.04);
- Each serving of hot dogs (each 1 per day), with nearly a 2-fold higher incidence (RR = 1.92; 95% CI, 1.33 to 2.78),

RR of CHD per 50 g/d processed meat

Systematic review. Circulation 2010;121:2271-83.

Case-control

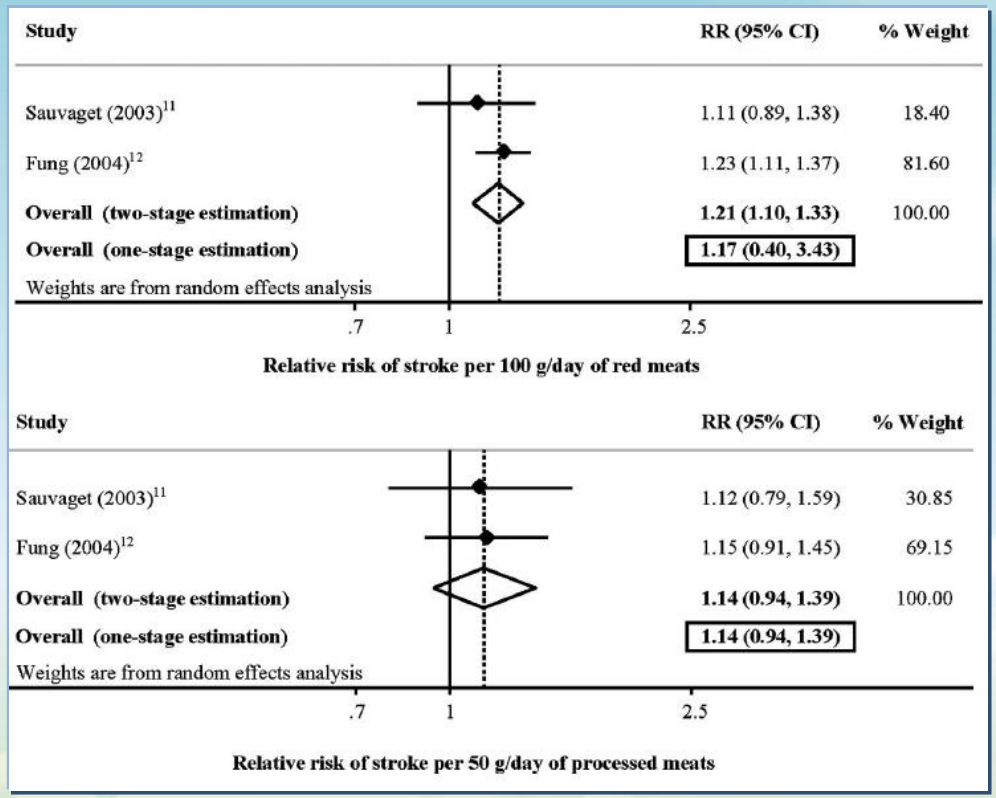


RR of CHD per 100 g/d total meat

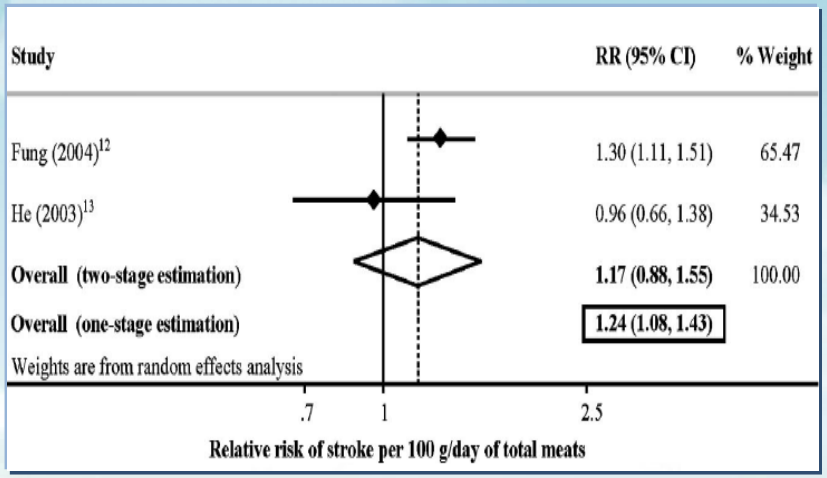
RR of stroke & meat intake: cohorts

Systematic review. Circulation 2010;121:2271-83.

RR of stroke/100 g/d red meat



RR of stroke/50 g/d processed meat



RR of stroke/100 g/d total meat

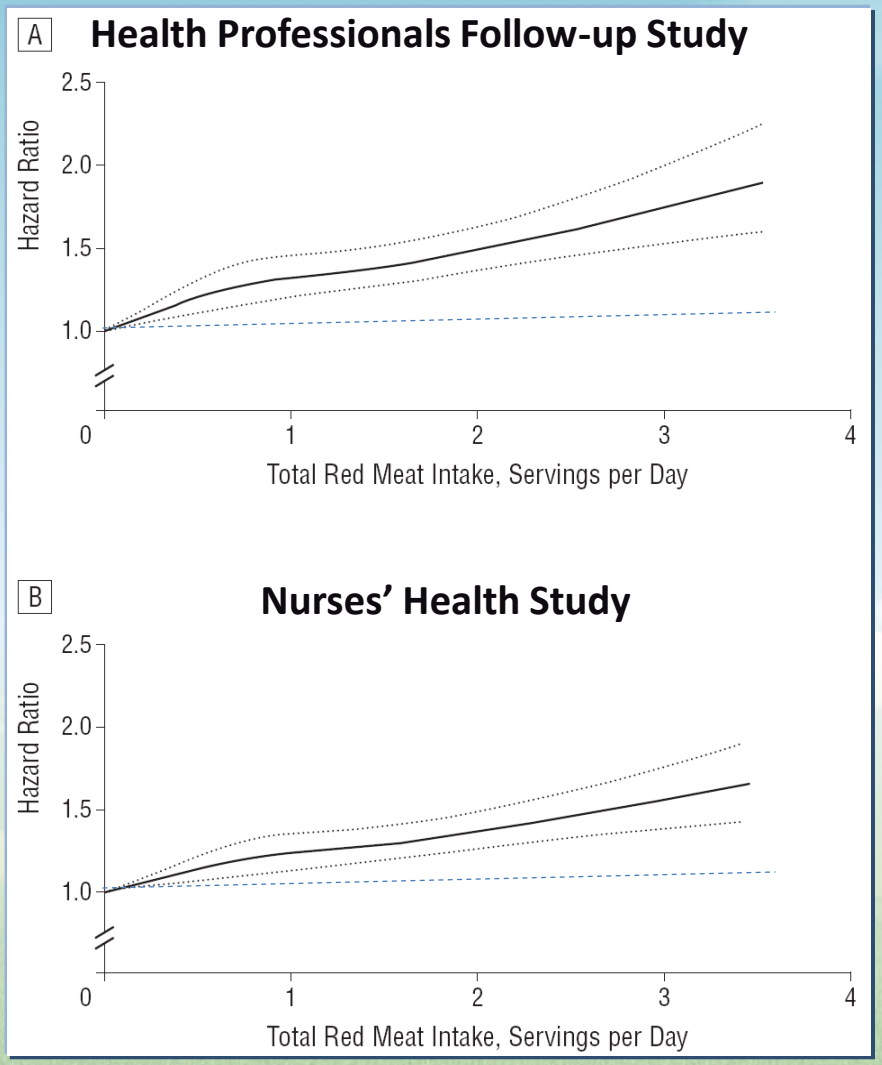
Red meat intake ↑all-cause death

Pan A. Arch Intern Med 2012; doi:10.1001/archinternmed.2011.2287

- Prospectively observed 37,698 men from Health Professionals Follow-up Study (1986-2008) & 83 644 women from Nurses' Health Study (1980-2008), free of CVD & cancer at baseline. Diet assessed by validated Food Frequency Questionnaires & updated every 4 yrs.
- 23,926 deaths (5910 CVD & 9464 cancer deaths) 2.96 million person-year follow-up

Red meat intake ↑all-cause death

Pan A. Arch Intern Med 2012; doi:10.1001/archinternmed.2011.2287



- Pooled hazard ratio (95% CI) of total mortality for a 1-serving/day increase was 1.13 (1.07-1.20) for unprocessed red meat and 1.20 (1.15-1.24) for processed red meat.

Red meat intake ↑all-cause death

Pan A. Arch Intern Med 2012; doi:10.1001/archinternmed.2011.2287

- 9.3% of deaths in men and 7.6% in women in these cohorts could be prevented at the end of follow-up if all the individuals consumed fewer than 0.5 servings per day (approximately **42 g/d**) of red meat.
- กินเนื้อแดง (ทั้งปรุงแต่งและไม่ปรุงแต่ง) น้อยกว่า ๔๒ กรัมต่อวัน ลดโอกาสตาย ๙.๓% ในบุคลากรฯชาย, ๗.๖% ในพยาบาลหญิง

2013 AHA/ACC Lifestyle Management Guideline

Eckel RH. Circulation. published online November 12, 2013.

Heart Healthy Nutrition

The adult population should be encouraged to practice heart healthy lifestyle behaviors :

- ✓ Consume a dietary pattern that emphasizes intake of vegetables, fruits & whole grains; includes low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils and nuts;
- ✘ Limits intake of sodium, sweets, sugarsweetened beverages and red meats.(หวาน มัน เกลือ เนื้อแดง)

พืชสด ลดเกลือ เนื้อน้อย ด้อยมัน น้ำตาลต่ำ

ธรรมชาติ ปราศจากภัย

2013 ACCF/AHA Heart Failure Guideline.

Yancy CW. Circulation 2013;

Recommendations for Pharmacological Therapy for Management of Stage C HF*r*EF

Recommendation	COR	LOE
Diuretics		
Diuretics are recommended in patients with HF*r*EF with fluid retention	I	C
ACE inhibitors		
ACE inhibitors are recommended for all patients with HF*r*EF	I	A
ARBs		
ARBs are recommended in patients with HF*r*EF who are ACE inhibitor intolerant	I	A
Routine *combined* use of an ACE inhibitor, ARB, and aldosterone antagonist is potentially harmful	III: Harm	C
Beta blockers		
Use of 1 of the 3 beta blockers proven to reduce mortality is recommended for all stable patients	I	A
Aldosterone receptor antagonists		
Aldosterone receptor antagonists are recommended in patients with NYHA class II-IV who have LVEF ≤35%	I	A
Aldosterone receptor antagonists are recommended following an acute MI who have LVEF ≤40% with symptoms of HF or DM	I	B
Inappropriate use of aldosterone receptor antagonists may be harmful	III: Harm	B

2013 ACCF/AHA Heart Failure Guideline.

Yancy CW. Circulation 2013;

Recommendations for Pharmacological Therapy for Management of Stage C HF*r*EF

Recommendation	COR	LOE
Hydralazine and isosorbide dinitrate		
The combination of hydralazine and isosorbide dinitrate is recommended for African Americans with NYHA class III–IV HF*r*EF on GDMT	I	A
Digoxin		
Digoxin can be beneficial in patients with HF*r*EF	IIa	B
Anticoagulation		
Patients with chronic HF with permanent/persistent/paroxysmal AF and an additional risk factor for cardioembolic stroke should receive chronic anticoagulant therapy*	I	A
The selection of an anticoagulant agent should be individualized	I	C
Anticoagulation is not recommended in patients with chronic HF*r*EF without AF, a prior thromboembolic event, or a cardioembolic source	III: No Benefit	B
Statins		
Statins are not beneficial as adjunctive therapy when prescribed solely for HF	III: No Benefit	A

*In the absence of contraindications to anticoagulation.

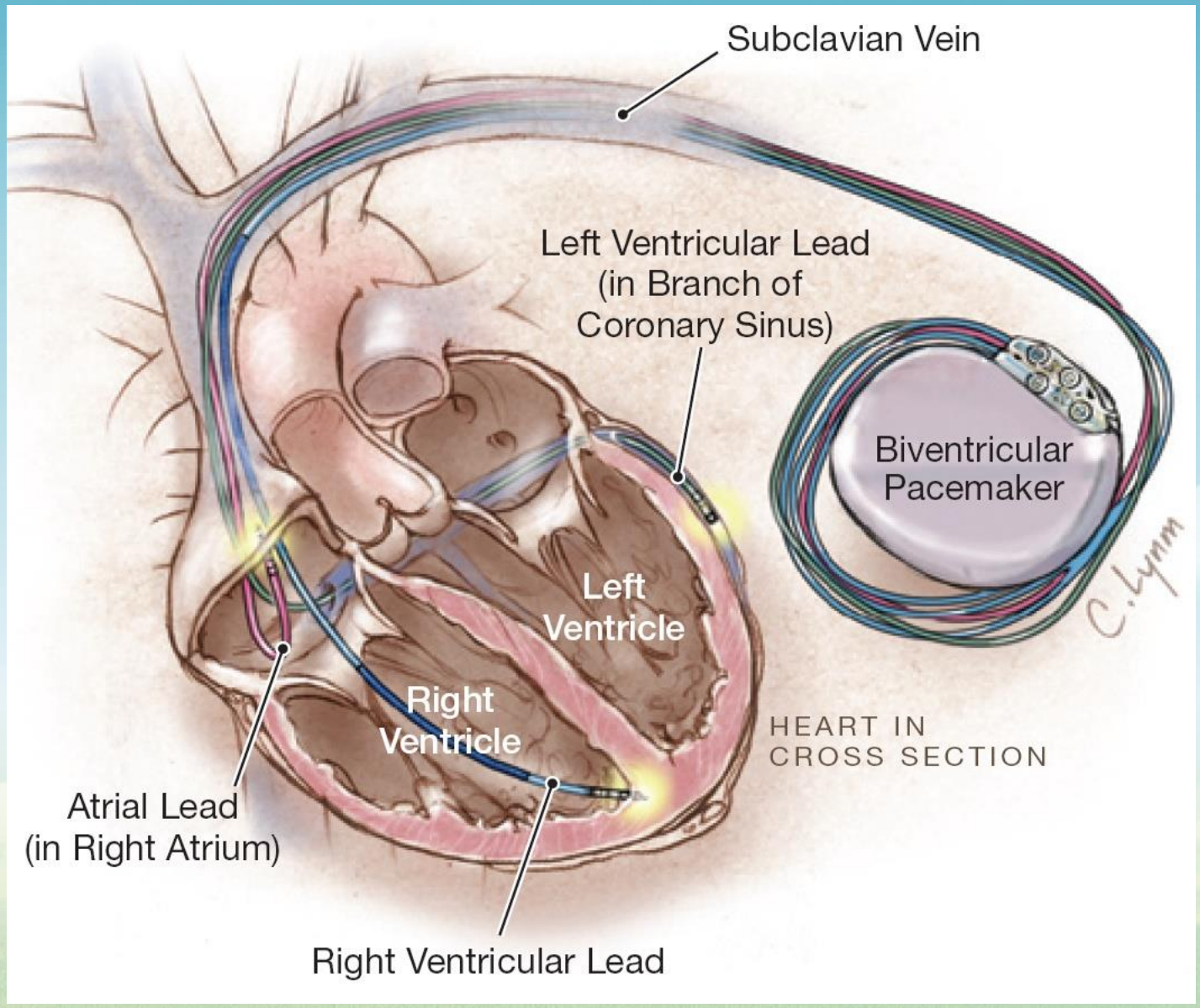
2013 ACCF/AHA Heart Failure Guideline.

Yancy CW. Circulation 2013;

Recommendations for Pharmacological Therapy for Management of Stage C HF*r*EF

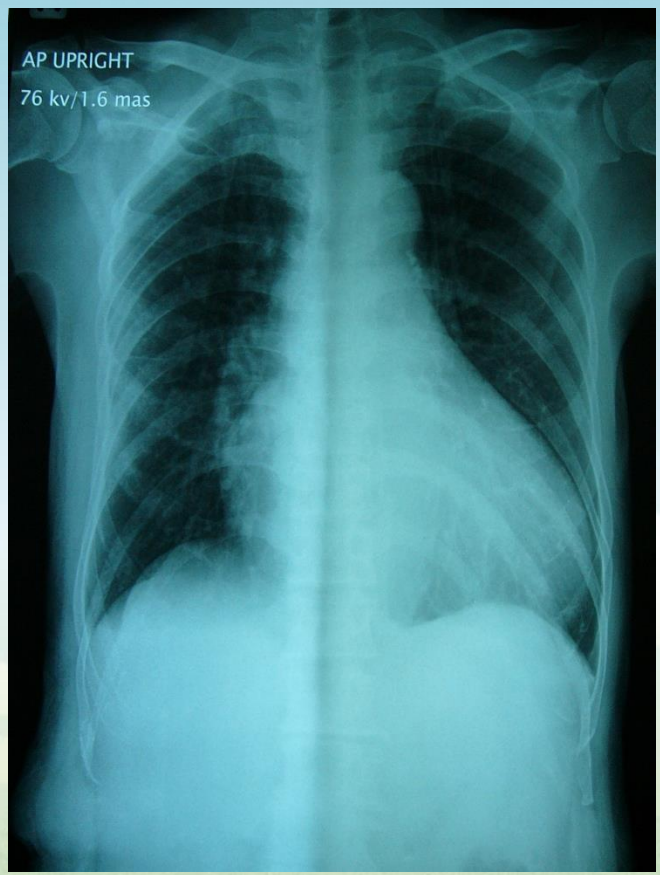
Recommendation	COR	LOE
Omega-3 fatty acids		
Omega-3 PUFA supplementation is reasonable to use as adjunctive therapy in HF*r*EF or HF*p*EF patients	IIa	B
Other drugs		
Nutritional supplements as treatment for HF are not recommended in HF*r*EF	III: No Benefit	B
Hormonal therapies other than to correct deficiencies are not recommended in HF*r*EF	III: No Benefit	C
Drugs known to adversely affect the clinical status of patients with HF*r*EF are potentially harmful and should be avoided or withdrawn	III: Harm	B
Long-term use of an infusion of a positive inotropic drug is not recommended and may be harmful except as palliation	III: Harm	C
Calcium channel blockers		
Calcium channel blocking drugs are not recommended as routine treatment in HF*r*EF	III: No Benefit	A

*In the absence of contraindications to anticoagulation.

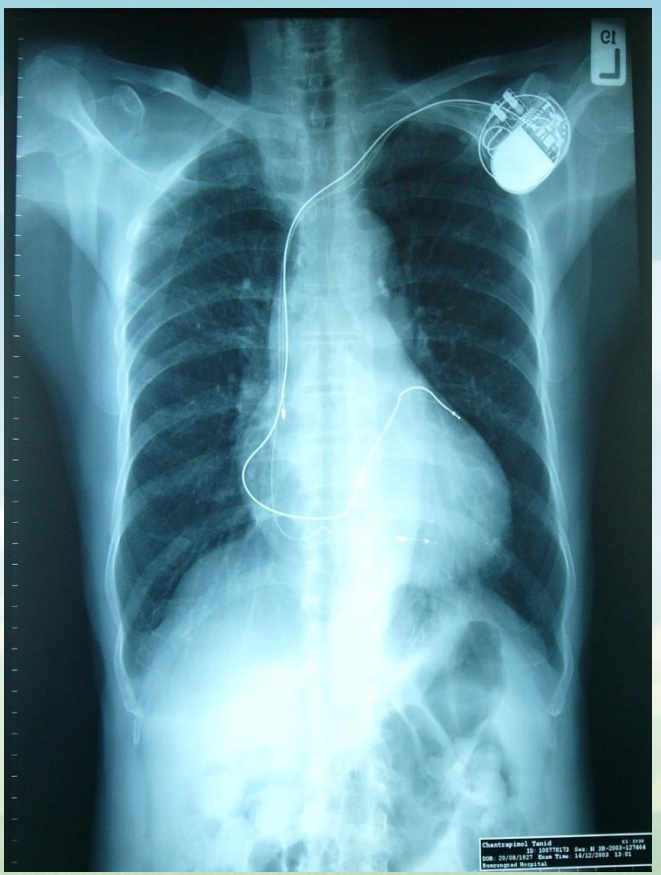

Subclavian Vein
Left Ventricular Lead
(in Branch of
Coronary Sinus)
Biventricular
Pacemaker
Left
Ventricle
Right
Ventricle
HEART IN
CROSS SECTION
Atrial Lead
(in Right Atrium)
Right Ventricular Lead

Cardiac Resynchronized Therapy

หญิงไทยคู่อายุ ๗๔ ปี DCM, FC 4, EF 26, QRS 127 ms.



Before

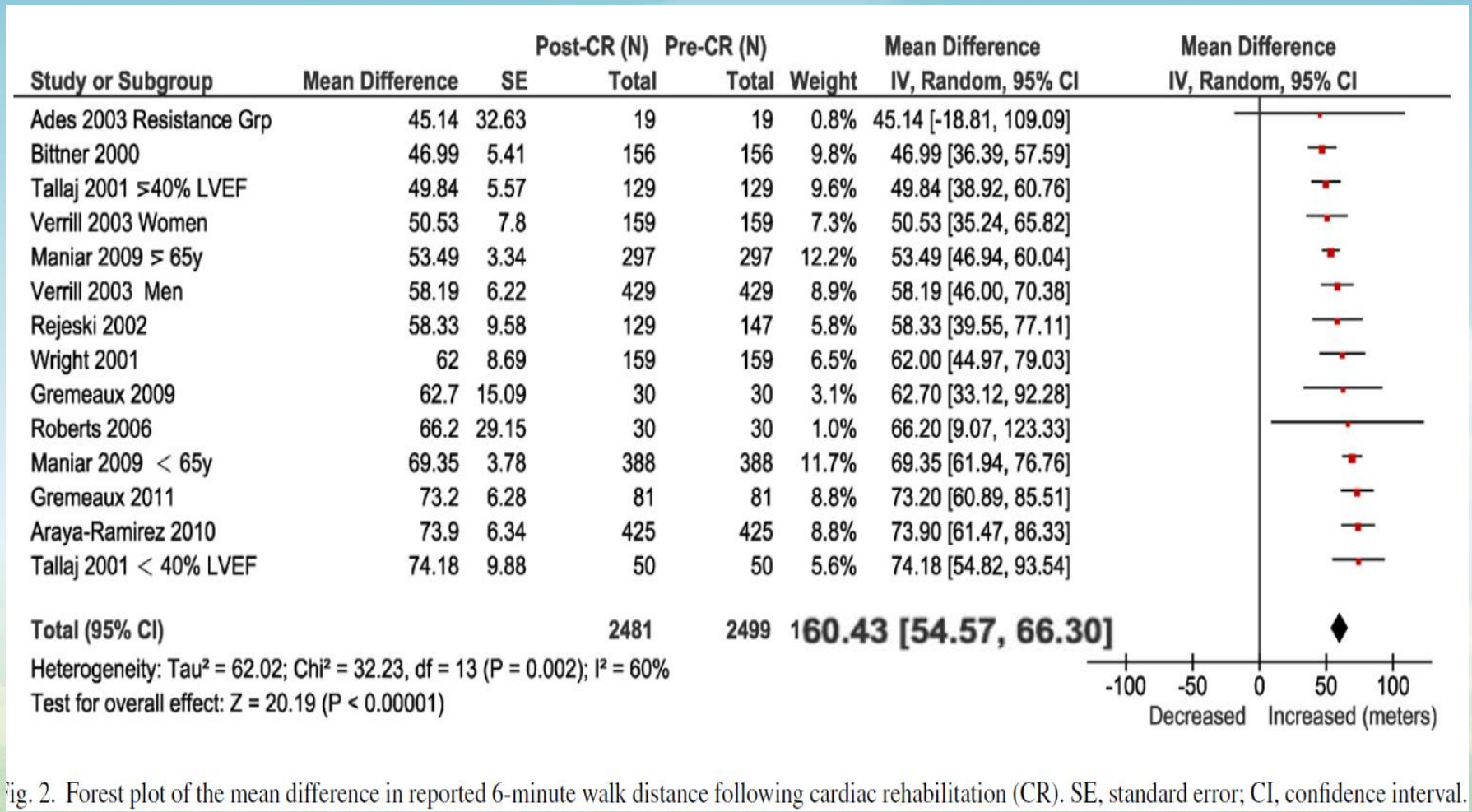


3 months after CRT

Timed Up & Go test
Six-minute walk test

6-minute walk distance after CR

Systematic review. Bellet RN. Physiotherapy 2012l;98:277.



Study or Subgroup	Mean Difference	SE	Post-CR (N) Total	Pre-CR (N) Total	Weight	Mean Difference IV, Random, 95% CI
Ades 2003 Resistance Grp	45.14	32.63	19	19	0.8%	45.14 [-18.81, 109.09]
Bittner 2000	46.99	5.41	156	156	9.8%	46.99 [36.39, 57.59]
Tallaj 2001 ≤40% LVEF	49.84	5.57	129	129	9.6%	49.84 [38.92, 60.76]
Verrill 2003 Women	50.53	7.8	159	159	7.3%	50.53 [35.24, 65.82]
Maniar 2009 ≥ 65y	53.49	3.34	297	297	12.2%	53.49 [46.94, 60.04]
Verrill 2003 Men	58.19	6.22	429	429	8.9%	58.19 [46.00, 70.38]
Rejeski 2002	58.33	9.58	129	147	5.8%	58.33 [39.55, 77.11]
Wright 2001	62	8.69	159	159	6.5%	62.00 [44.97, 79.03]
Gremeaux 2009	62.7	15.09	30	30	3.1%	62.70 [33.12, 92.28]
Roberts 2006	66.2	29.15	30	30	1.0%	66.20 [9.07, 123.33]
Maniar 2009 < 65y	69.35	3.78	388	388	11.7%	69.35 [61.94, 76.76]
Gremeaux 2011	73.2	6.28	81	81	8.8%	73.20 [60.89, 85.51]
Araya-Ramirez 2010	73.9	6.34	425	425	8.8%	73.90 [61.47, 86.33]
Tallaj 2001 < 40% LVEF	74.18	9.88	50	50	5.6%	74.18 [54.82, 93.54]
Total (95% CI)			2481	2499	100%	**60.43 [54.57, 66.30]**

Heterogeneity: $Tau^2 = 62.02$; $Chi^2 = 32.23$, df = 13 (P = 0.002); $I^2 = 60\%$

Test for overall effect: Z = 20.19 (P < 0.00001)

Fig. 2. Forest plot of the mean difference in reported 6-minute walk distance following cardiac rehabilitation (CR). SE, standard error; CI, confidence interval.

6-minute walk distance after CR

Systematic review. Bellet RN. Physiotherapy 2012l;98:277.

- 6MWT suitable for outcome assessment before & after Cardiac Rehabilitation, despite learning effect 2% - 8% with repeated tests.
- An estimated change in 6MWD following cardiac rehabilitation of 60.4 m, with a median effect size of 0.65.
- Validity against symptom-limited & ventilatory threshold exercise tests & against quality-of-life-measurements remains inconclusive

Timed Up & Go, 6MWT in CR

J Cardiopulmonary Rehabil Prevention 2013;33:99-105

- Sixty-one of 154 consecutive community-based CR patients were prospectively recruited. Subjects undertook repeated TUGTs and 6MWTs at the start of CR (start-CR), postdischarge from CR (post-CR), and 6 months postdischarge from CR (6 months post-CR). The main outcome measurements were TUGT time (TUGTT) and 6MWT distance (6MWD).

Timed Up & Go, 6MWT in CR

J Cardiopulmonary Rehabil Prevention 2013;33:99-105

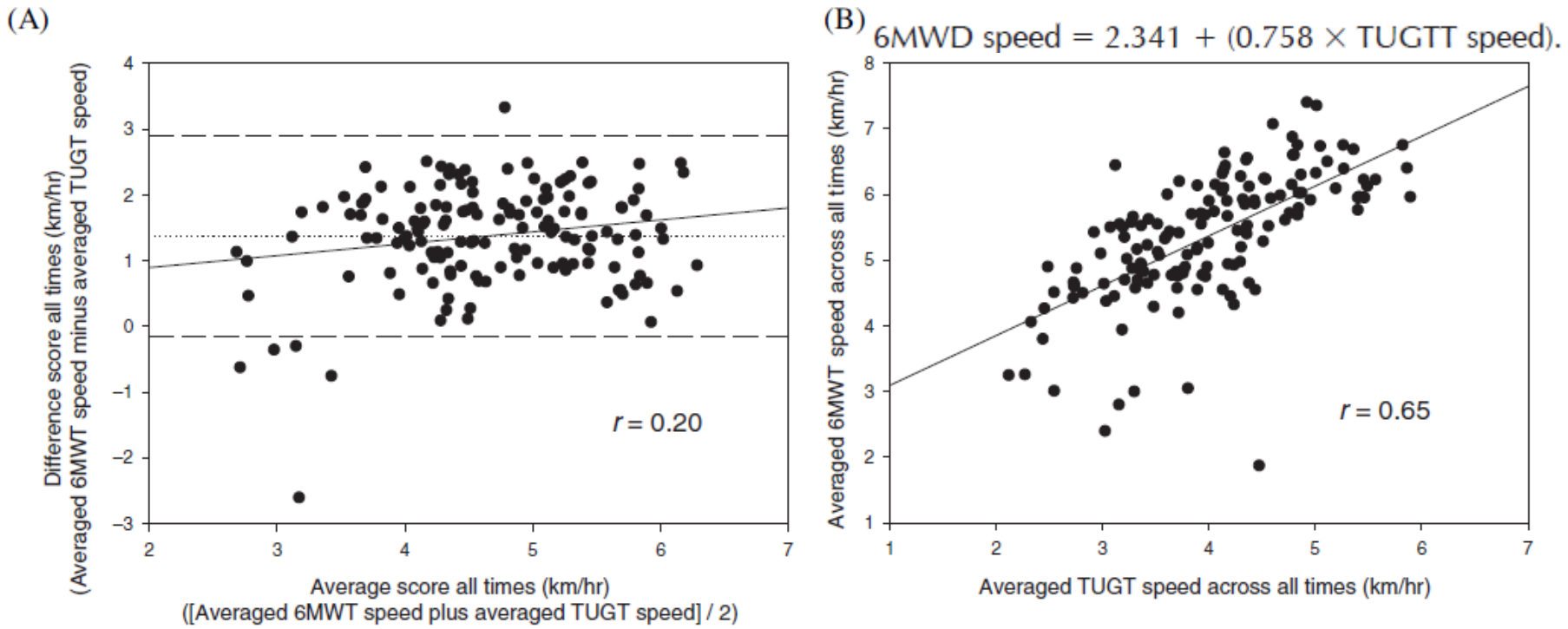


Figure 1. Comparison of speed calculated from averaged 6MWDs and averaged TUGTTs across all times. A, The dotted line (…) represents positive bias of 1.38 (SD = 0.76) km/h (CI of mean bias = 1.25-1.5) between tests, and the broken lines (- -) represent the 95% limits of agreement (2.90, −0.14 km/h). Pearson correlation coefficient, $r = 0.20$, $P = .02$. B, The unbroken line (—) represents the linear regression line, 6MWD speed = 2.341 + (0.758 × TUGTT speed). Pearson correlation coefficient, $r = 0.65$, $P = .0001$. Abbreviations: 6MWT, 6-minute walk test; 6MWD, 6-minute walk test distance; TUGT, Timed Up and Go Test; TUGTT, Timed Up and Go Test time.

Treadmill walking speed predict 10-y death in CVD men

Chiaranda G. doi: 10.1136/bmjopen-2013-003446

- Population-based prospective study. Outpatient 2^{ry} prevention programme in Ferrara, Italy.
- 1255 male stable cardiac pts, 25–85 years.
- Walking speed maintained during a 1 km treadmill test, measured at baseline and mortality over a median follow-up of 8.2 years: 141 died, average annual mortality of 1.4%

Treadmill walking speed predict 10-y death in CVD men

Chiaranda G. doi: 10.1136/bmjopen-2013-003446

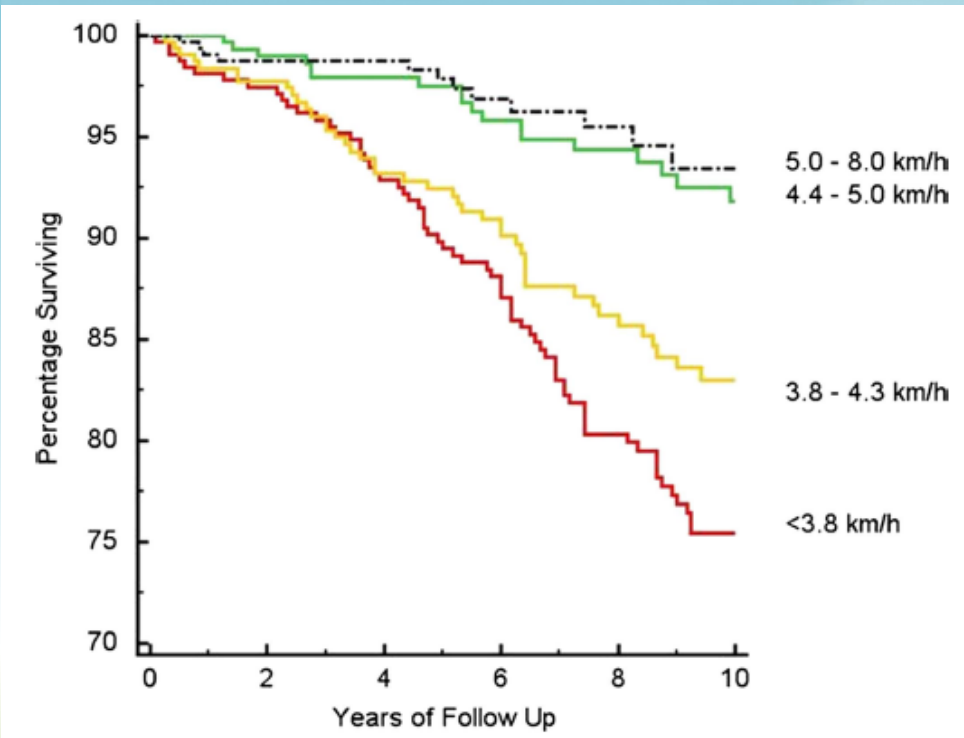


Figure 1 Survival curves of the quartiles stratified according to average walking speed.

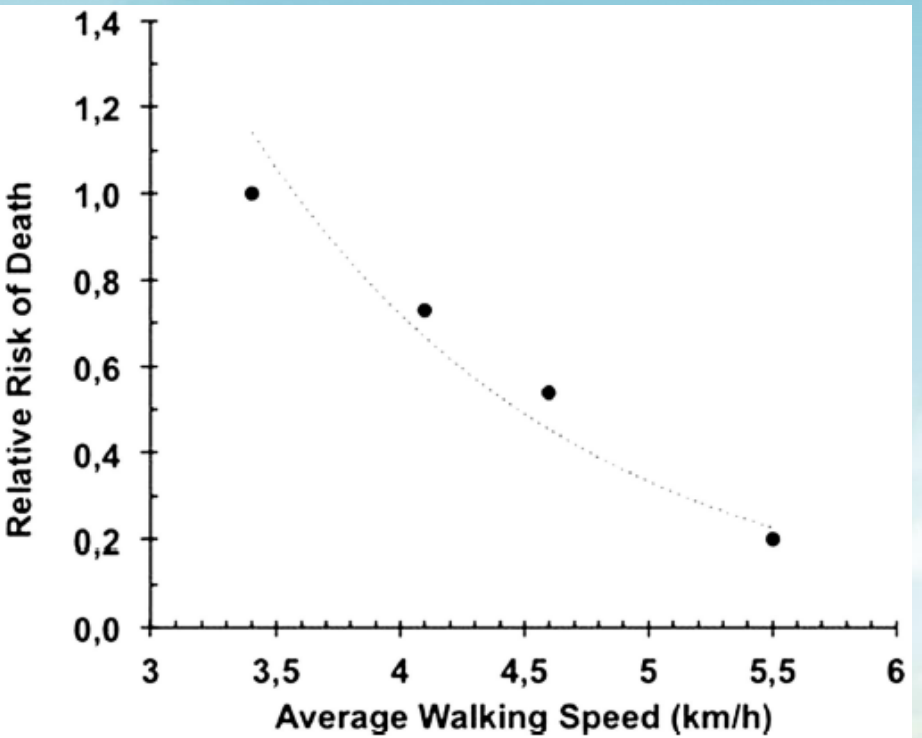


Figure 2 The exponential relationship between quartiles average walking speed and relative risk of death.

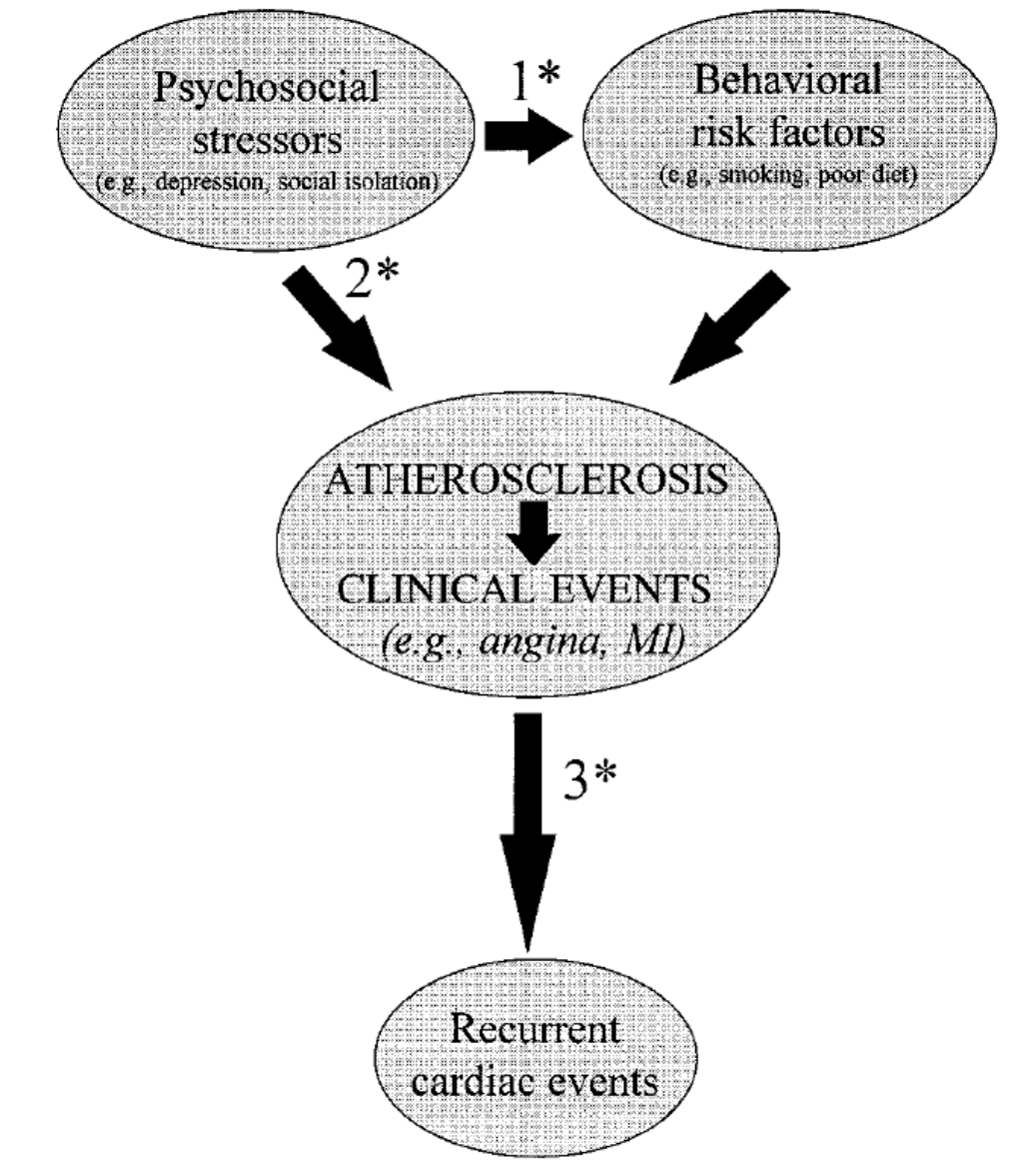
การดูแลผู้ป่วยหัวใจล้มเหลวด้วยตนเอง

ดัดแปลงจาก Eur J Heart fail 2003;5:363-70

กิจกรรมดูแลตนเอง (วันที่....ถึง....เดือน....ปี.....)	จ อ พ พฤ ศ ส อา
๑.ชั่งน้ำหนักทุกวันก่อนอาหารเช้า (น้ำหนักเป็นกิโลกรัม)	
๒. ถ้าเหนื่อย นั่งพักหายใจ ช้า ๆ (มากกว่า ๖ วินาทีต่อครั้ง)	
๓. ถ้าเหนื่อยเพิ่มขึ้น โทรติดต่อรพ.	
๔. ถ้าเท้าหรือขาบวมขึ้นกว่าปกติ กดบุ๋ม ติดต่อรพ.	
๕. ถ้าน้ำหนักเพิ่ม ๒ กก.ใน ๑ สัปดาห์ ติดต่อรพ.	
๖. จำกัดน้ำดื่ม (ไม่เกิน ๖ ถึง ๘ แก้วต่อวัน)	
๗. นอนพักกลางวันครึ่งชั่วโมงต่อวัน	
๘. ถ้ารู้สึกอ่อนเพลียเพิ่มขึ้น ติดต่อรพ.	
๙. อาหารไม่เค็มและเกลือน้อย (น้ำปลาน้อยกว่า ชต.ครึ่งต่อวัน)	
๑๐. รับประทานยาสม่ำเสมอ ไม่ปรับยาเอง ถ้าสงสัย ติดต่อรพ.	
๑๑ เดินออกกำลังกายทุกวัน อย่างน้อย ครึ่งชั่วโมง	
๑๒. เจริญสมาธิ ฝึกหายใจช้าวันละอย่างน้อย ๑๕ นาที	

Psychological factors, CVD & therapy

Rozanski A.Circulation 1999; 99: 2192-2217



Psycho-neuro-endocrino-immuno-cardiology ?

Behavior & acute coronary syndrome. Gidron Y. Cardiovascular Research 2002; 56: 15-21

Psychological, neuroendocrine, immunological and hemodynamic factors in the acute coronary syndrome

Psychological factors	Neuroendocrine factors	Immune and cell factors	Hemodynamic factors	Acute coronary syndrome stage
Hostility, depression, acute stress and vital exhaustion	Norepinephrine, CRH, ACTH, Cortisol	IL-1β, IL-6, TNF-α, IFN-γ, monocytes, MMPs		Plaque instability
Hostility and acute stress	Norepinephrine Epinephrine	IL-1β, IL-6, TNF-α	Vasoconstriction, elevated BP, shear stress	Plaque rupture
Hostility, depression	Epinephrine	IL-1β, IL-6, TNF-α,	Pro-coagulant and anti-coagulant factors (C-protein)	Thrombosis⇒ acute coronary syndrome

CRH, corticotrophic releasing hormone; ACTH, adrenocorticotrophic hormone; IL, interleukin; TNF, tumor necrosis factor; IFN, interferon; BP, blood pressure; MMPs, metalloproteinases.

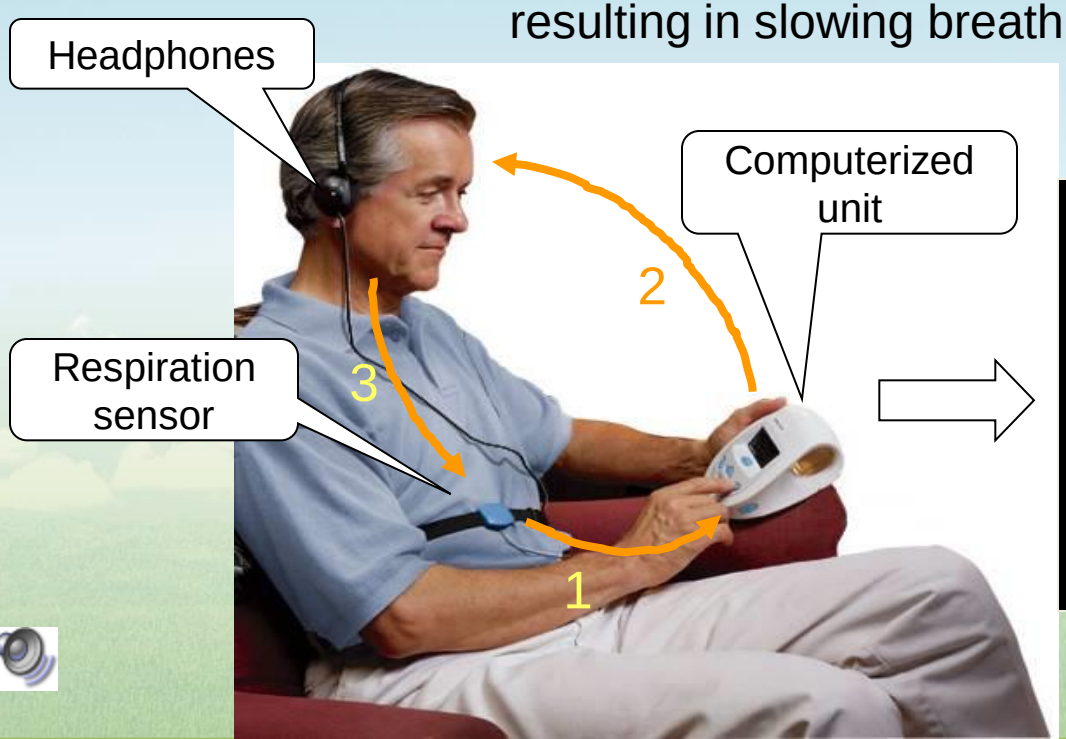
Slow breathing training device

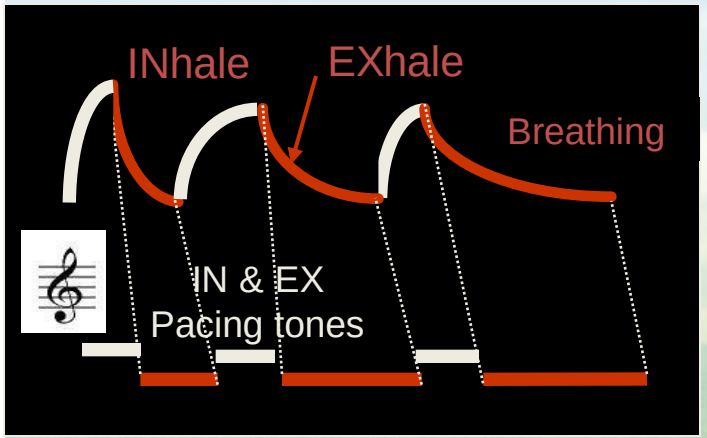
Device-Guided Paced-Breathing: the RESPeRATE System (RR)

1) Respiration sensor & computer unit
   monitors / analyzes Inspiration (IN) & Expiration (EX)

2) Real-time composition of “IN” & “EX” tones
   based on monitored IN & EX duration, but slightly longer.

3) User synchronizes breathing with tones
   resulting in slowing breathing effortlessly





RESPeRATE Significantly Reduces Blood Pressure

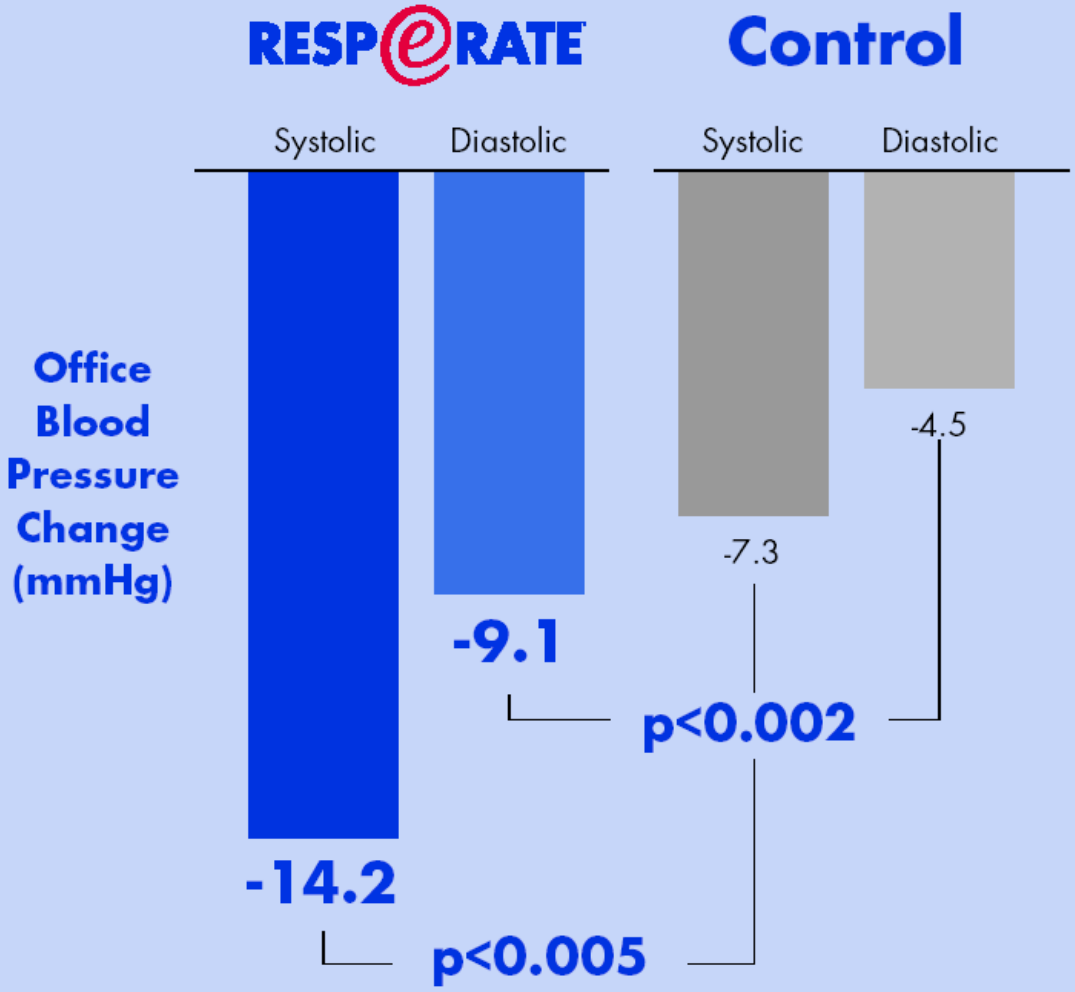


Figure 1: Subgroup of patients with baseline BP>140/90 mmHg (N=119). Data pooled from 6 separate clinical studies (N= 268).

Slow breathing in Chronic heart failure

Bernardi L. Lancet 1998; 351: 1308-11

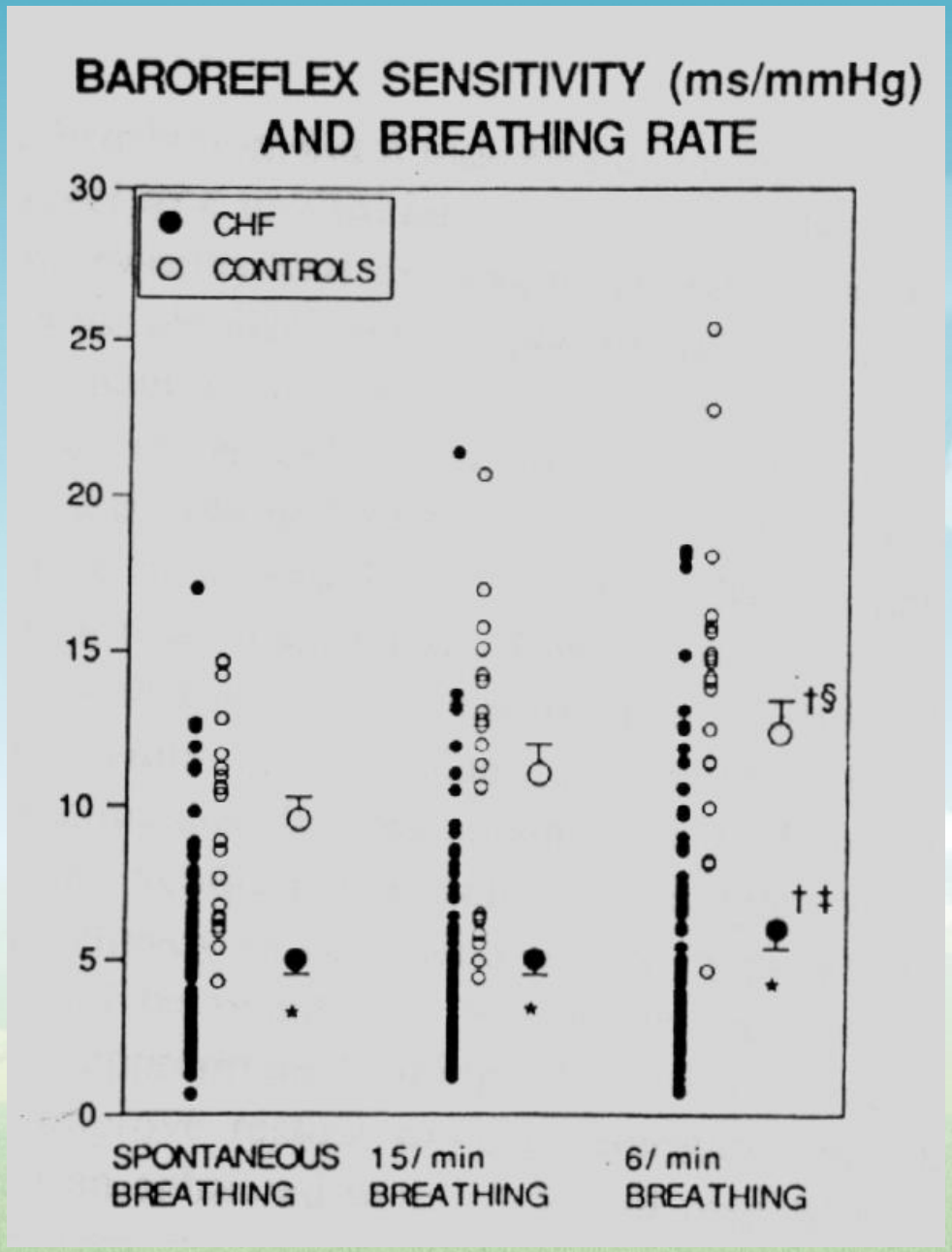
- Arterial oxygen saturation(SaO2) & other indices
- During baseline & controlled breathing at 15, 6 and 3 breaths / min (50 CHF vs. 11 controls)
- 15 CHF patients randomly allocated 1 month respiratory training (Yoga) to 6 breaths / min
- Respiratory indices were recorded before, at the end and 1 month after training.

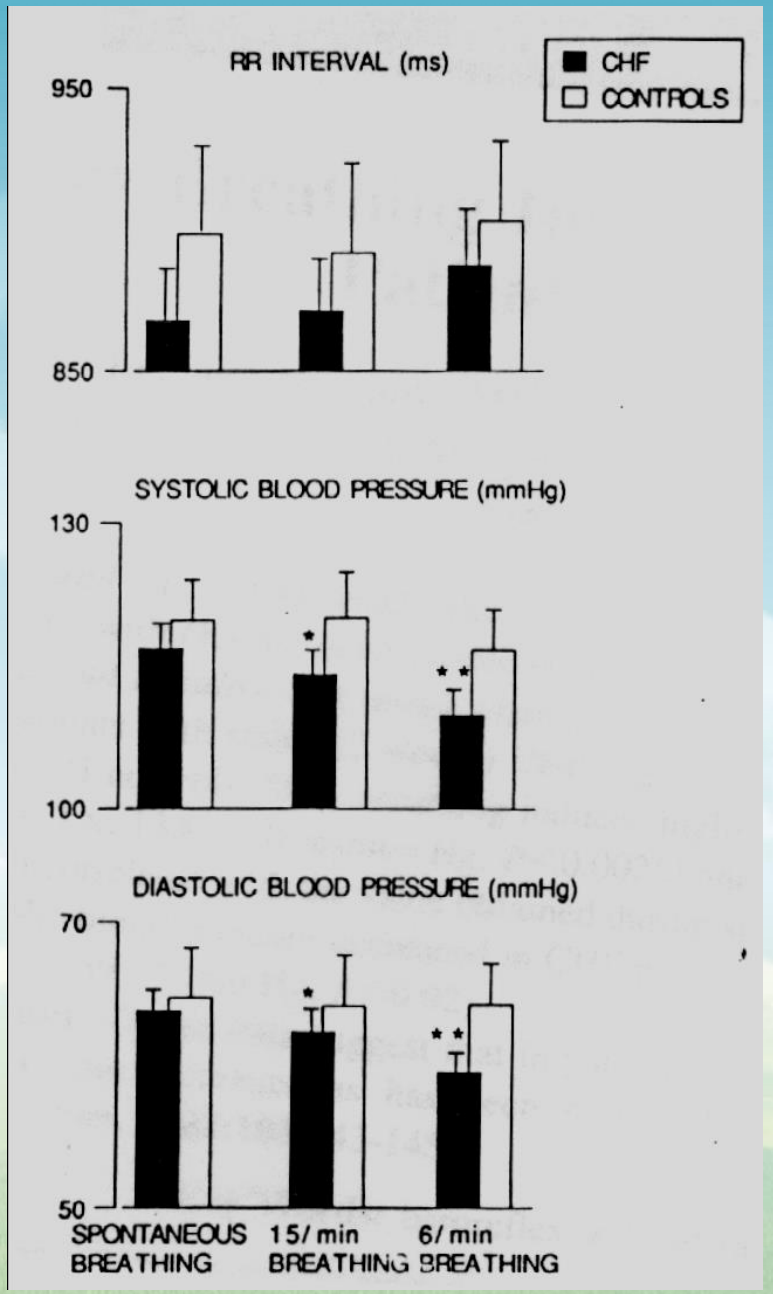
Slow breathing in Chronic heart failure

Bernardi L. Lancet 1998; 351: 1308-11

- SaO_2 CHF 91.4±0.4% vs. control 95.4±0.2% **
- After training (n = 9 CHF patients)
  - Breath rate 13.4 ± 1.5 to 7.6 ± 1.9/min **
  - SaO_2 92.5 ± 0.3 to 93.2 ± 0.4 *
  - Peak O_2 consumption 1157 ± 83 to 1368 ± 110 L/min *
  - Exercise time 583 ± 29 to 615 ± 23 min *
  - Dyspnea score 19.0 ± 0.4 to 17.3 ± 0.9 Borg scale *
  - Motivation to train 7.6 ± 0.3 to 9.1 ± 0.2 *
- No changes of indices in pts without training

* $p < 0.05$, ** $p < 0.001$


BAROREFLEX SENSITIVITY (ms/mmHg)
AND BREATHING RATE
CHF
CONTROLS
30
25
20
15
10
5
0
†§
† ‡
SPONTANEOUS BREATHING
15/ min BREATHING
6/ min BREATHING


RR INTERVAL (ms)
CHF
CONTROLS
950
850
SYSTOLIC BLOOD PRESSURE (mmHg)
130
100
DIASTOLIC BLOOD PRESSURE (mmHg)
70
50
SPONTANEOUS BREATHING
15/ min BREATHING
6/ min BREATHING

Device-guided paced breathing in HF

Parati G. Circ Heart Fail 2008;1:178-83.

- Open pilot study, 24 CHF pts (61% ♂, 64±9 yrs; NYHA 2.81±0.01) randomized to control (conventional Rx n=12) or conventional Rx & 18 min twice/d Resperate to <10 br/min (n=12).
- Baseline & after 10 wks: Doppler echo, pulmonary f^{n}, stress test & Minnesota QOL Life questionnaire).

Device-guided paced breathing in HF

Parati G. Circ Heart Fail 2008;1:178-83.

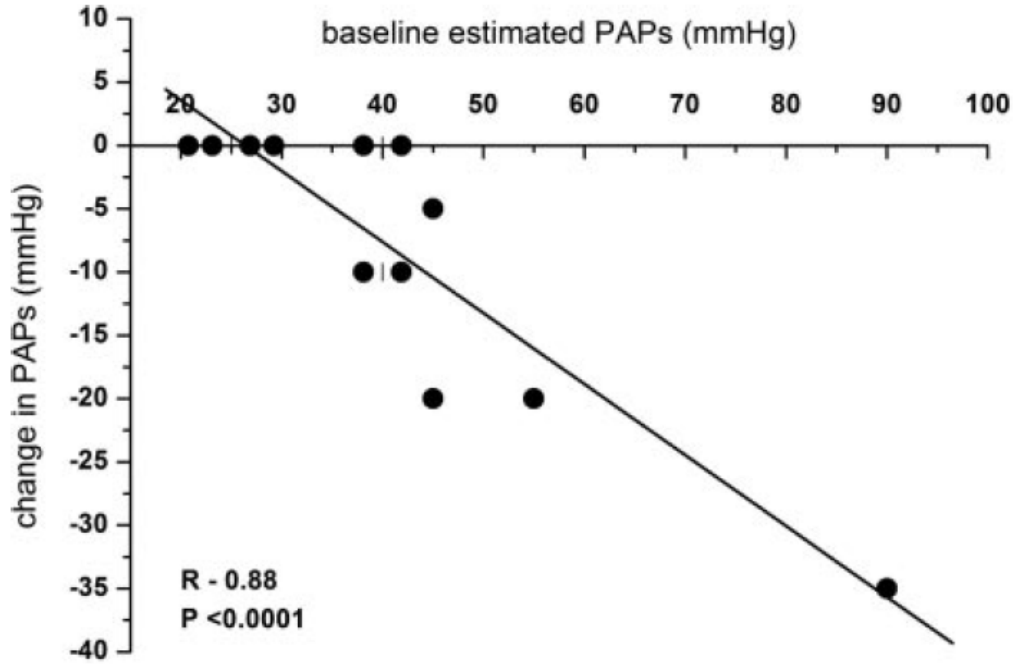


Figure. Relationship between baseline PAP and its changes in the group of patients who underwent paced breathing training. A greater effect was observed in patients with higher PAP at baseline.

Device-guided paced breathing in HF

Parati G. Circ Heart Fail 2008;1:178-83.

	NYHA	EF%	SBP, mm Hg	DBP, mm Hg	pVO_2, mL/(kg·min)	MQOL Score
Treated (n=12)						
Baseline	2.84±0.02	32±6	121±17	81±12	12.2±3.4	41.4±18.5
Home-based paced breathing	1.78±0.02*†	39±9*†	112±15*	76±11	14.1±3.2*	31.0±18.0*†
Controls (n=12)						
Baseline	2.72±0.03	33±4	111±11	77±9	13.4±4.4	39.8±15.5
After 10 weeks	2.78±0.02†	32±5†	110±10	77±14	13.6±3.9	40.6±13.5†

** $p < 0.05$ vs Baseline (within group, 2-tailed paired t test).*

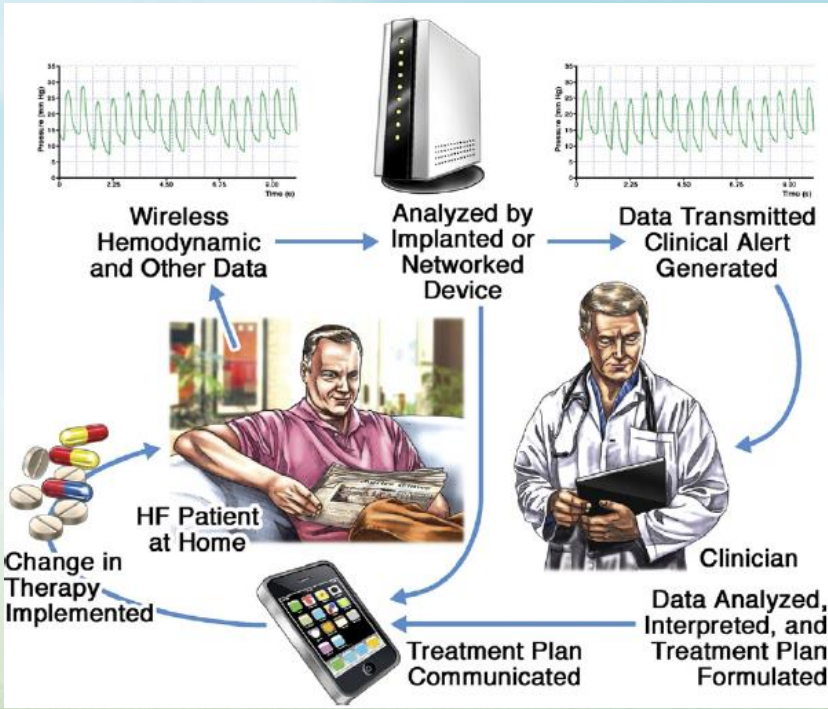
† $p < 0.05$ between groups after 10 weeks (ANOVA).

Slow breathing training

Home Monitoring for HF

Bui AL. J Am Coll Cardiol 2012;59:97.

	Usual Care	Hemodynamic Monitored and Guided Home Care
Daily Monitoring	Weight, symptoms	Weight, symptoms hemodynamics
Scheduled and PRN Assessments	Physical examination, laboratories, echocardiogram	Potentially less frequent need for physical exam, laboratories, echocardiogram
Visits	Patients regularly scheduled office visits 2-12 times a year. PRN calls, unscheduled office visits, ER visits if worsened symptoms	Opportunity for remote visits. Office visits only when needed. Less need for unscheduled office visits and ER visits
Therapy	Empiric and/or reactive adjustments in therapy	Proactive, guided, personalized adjustments in therapy



Heart failure Home-TeleMonitoring

Trans-European Network-Home-Care Management System.

Cleland JGF. JACC 2005;45:1654.

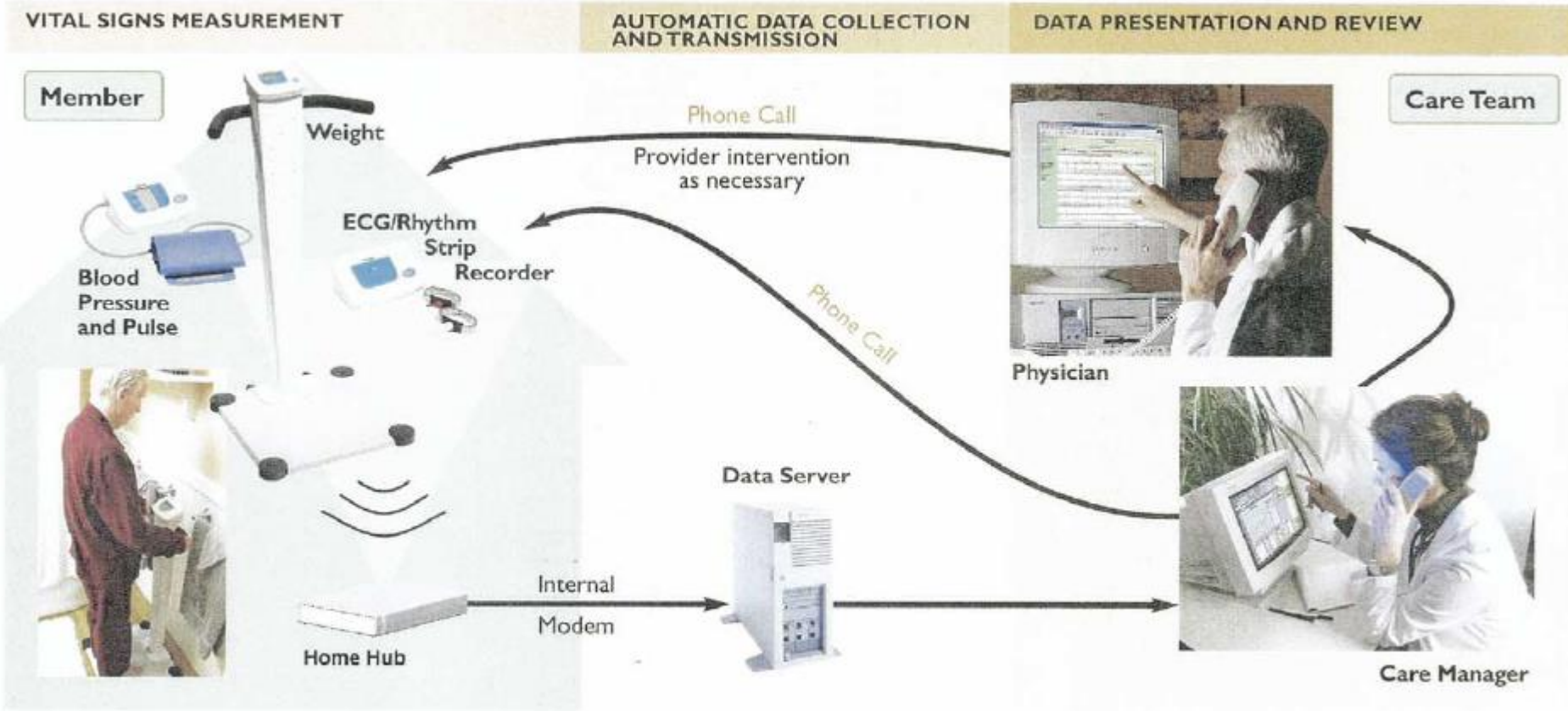
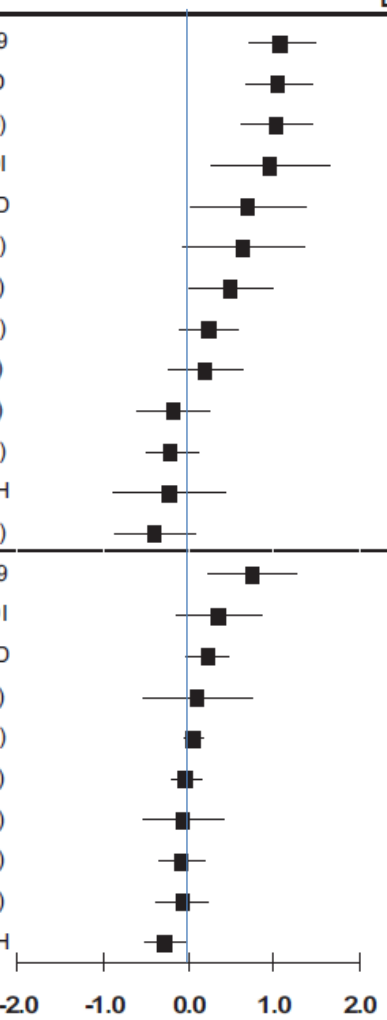


Figure 1. Diagrammatic representation of the telemonitoring system used in the trial. ECG = electrocardiogram.

Cardiac Rehabilitation & depression

Cardiac Rehabilitation & elderly depression

Meta-analysis. Gellis ZD. Am J Cardiol 2012;110:1219.



	Study	Effect Size	95% Confidence Interval for Effect Size	Treatment Group Mean (SD)	Treatment Group N	Control Group Mean (SD)	Control Group N
HF	Gellis et al (2012), PHQ-9	1.09	(0.70 - 1.48)	7.4(5.7)	57	13.6(5.6)	58
	Gellis et al (2012), CES-D	1.05	(0.66 - 1.44)	10.4(5.8)	57	18.7(9.4)	58
	Tibaldi et al. (2009)	1.03	(0.62 - 1.45)	12.9(3.4)	53	15.8(1.9)	48
	Gellis & Bruce (2010), BDI	0.96	(0.27 - 1.66)	18.3(7.7)	18	25.8(7.5)	18
	Gellis & Bruce (2010), HAM-D	0.70	(0.03 - 1.38)	11.4(8.3)	18	17.3(8.1)	18
	Gary et al. (2004)	0.65	(-0.06 - 1.36)	4.0(4.0)	16	7.0(5.0)	16
	Barrow et al. (2008)	0.50	(0.01 - 0.99)	51.5(10.7)	32	57.3(12.2)	33
	Riegel et al. (2006)	0.24	(-0.10 - 0.58)	1.5(2.0)	69	2.0(2.1)	65
	Witham et al. (2005)	0.20	(-0.23 - 0.64)	4.5(2.9)	41	5.1(3.0)	41
	Schwarz et al. (2008)	-0.17	(-0.60 - 0.26)	8.2(11.2)	44	6.6(6.7)	40
	Jolly et al. (2009)	-0.20	(-0.50 - 0.10)	6.3(3.7)	84	5.5(3.9)	85
	Gellis & Bruce (2010), SF36-MH	-0.21	(-0.87 - 0.44)	59.5(22.3)	18	54.7(21.6)	18
	Woodend et al. (2007)	-0.39	(-0.86 - 0.07)	81.3(18.1)	37	73.2(22.5)	36
CAD	Chung et al. (2010), PHQ-9	0.75	(0.23 - 1.27)	5.5(4.5)	28	9.2(5.2)	34
	Chung et al. (2010), BDI	0.36	(-0.15 - 0.86)	16.6(7.4)	28	19.4(8.1)	34
	Rollman et al. (2009), HAM-D	0.23	(-0.02 - 0.48)	8.9(7.5)	125	10.6(7.6)	126
	Seki et al. (2003)	0.11	(-0.53 - 0.75)	32.2(7.3)	20	33.2(10.3)	18
	Campbell et al. (1998)	0.07	(-0.05 - 0.18)	4.4(3.5)	581	4.6(3.3)	564
	Clark et al. (2000)	-0.02	(-0.20 - 0.16)	3.7(4.9)	235	3.6(4.8)	225
	Norris et al. (2009)	-0.06	(-0.53 - 0.41)	5.3(5.0)	26	5.0(5.1)	52
	Beckie et al (2011)	-0.07	(-0.34 - 0.19)	17.3(11.7)	133	16.5(10.3)	92
	Doughherty (2004)	-0.07	(-0.37 - 0.24)	9.2(9.3)	84	8.6(8.8)	84
	Rollman et al. (2009), SF36-MH	-0.27	(-0.51 - -0.02)	50.1(12.1)	126	46.9(11.8)	126

Positive affect reduced 10-y CHD

Davidson KW. Eur Heart J 2010;31:1065-70

- Positive affect & CV events, 862 adult ♂ 877 ♀, 1995 Nova Scotia Health Survey.
- Trained nurses,Type A Structured Interviews, outwardly displayed positive affect 5-point scale.
- Controlling depressive symptoms & other negative affects, covariates: Center for Epidemiological Studies Depressive symptoms Scale, Cook Medley Hostility scale, Spielberger Trait Anxiety Inventory.
- 145 (8.3%) acute non-fatal or fatal IHD events 14,916 person-yrs of observation.

Positive affect reduced 10-y CHD

Davidson KW. Eur Heart J 2010;31:1065-70

Table 2 **Hazard ratios (and 95% confidence intervals) for one unit increase in each psychosocial measure**

Predictor	Hazard rate (95% confidence interval)		
	Model 1[a]	Model 2[b]	Model 3[c]
Positive affect	0.73 (0.59–0.90)	0.77 (0.63–0.95)	0.78 (0.63–0.96)
Depressive symptoms	1.04 (1.02–1.06)	1.03 (1.01–1.05)	1.04 (1.01–1.07)
Hostility	1.02 (1.00–1.04)	1.02 (1.00–1.04)	1.01 (0.99–1.03)
Anxious symptoms	1.01 (0.99–1.03)	1.01 (0.99–1.03)	0.97 (0.95–1.00)

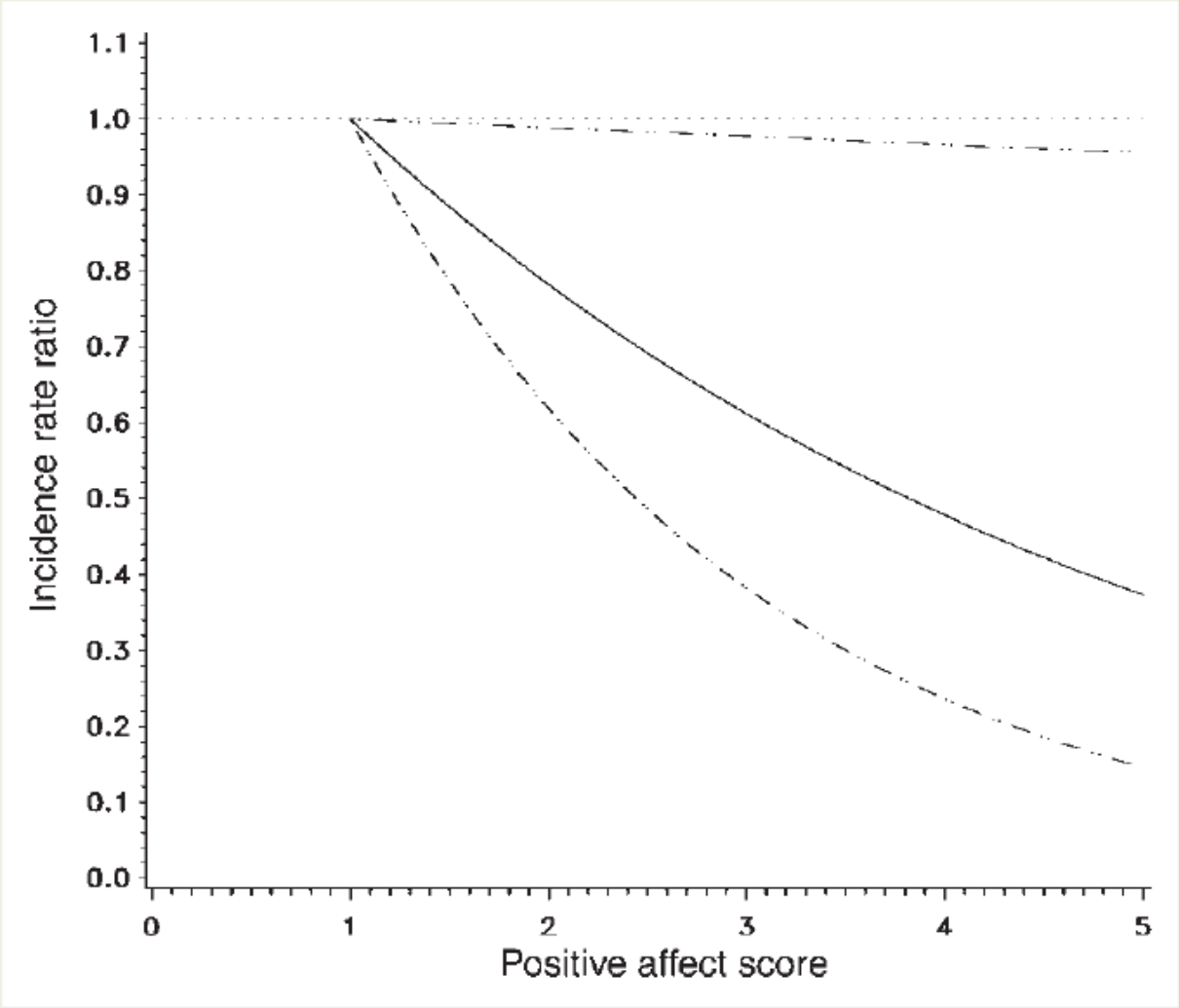
Baseline rates were allowed to vary by region.

[a]Adjusted for age at baseline (continuous) and sex.

[b]Adjusted for variables in Model 1 and smoking (smoking actively or within the

Positive affect reduced 10-y CHD

Davidson KW. Eur Heart J 2010;31:1065-70



ยาอดบุหรี่ตัวใหม่เพิ่มโอกาสโรคหัวใจและหลอดเลือด

ยาอดบุหรี่ Varenicline ↑โอกาสโรคหัวใจหลอดเลือด 72%

Systematic Review 14 DBRCTs.(n=8216, 7-52 wks) Singh S. CMAJ 2011. DOI:10.1503 /cmaj.110218

Study	Cardiovascular events, *n/N*		Weight, %	Peto OR (95% CI)
	Varenicline	Placebo		
Protocol A3051080[16]	1/394	0/199	1.2	4.50 (0.07–285.96)
Protocol A3051095[17]	1/493	0/166	1.0	3.81 (0.04–347.82)
Fagerstrom et al.[18]	0/214	1/218	1.4	0.14 (0.00–6.95)
Gonzales et al.[19]	2/352	2/344	5.4	0.98 (0.14–6.97)
Jorenby et al.[20]	1/344	1/341	2.7	0.99 (0.06–15.88)
Nakamura et al.[21]	1/465	0/154	1.0	3.79 (0.04–352.44)
Niaura et al.[22]	2/160	0/160	2.7	7.44 (0.46–119.40)
Nides et al.[23]	1/383	0/127	1.0	3.79 (0.04–352.09)
Oncken et al.[24]	2/518	0/129	1.7	3.49 (0.11–112.44)
Rigotti et al.[9]	25/355	20/359	57.3	1.28 (0.70–2.34)
Tashkin et al.[25]	5/250	2/254	9.4	2.42 (0.55–10.74)
Tonstad et al.[26]	4/603	0/607	5.4	7.48 (1.05–53.20)
Tsai et al.[27]	1/126	0/124	1.4	7.27 (0.14–366.57)
Williams et al.[28]	6/251	1/126	8.3	2.40 (0.49–11.67)
Overall	**52/4908**	**27/3308**	**1.72 (1.09–2.71)**	

Heterogeneity: $I^2 = 0\%$

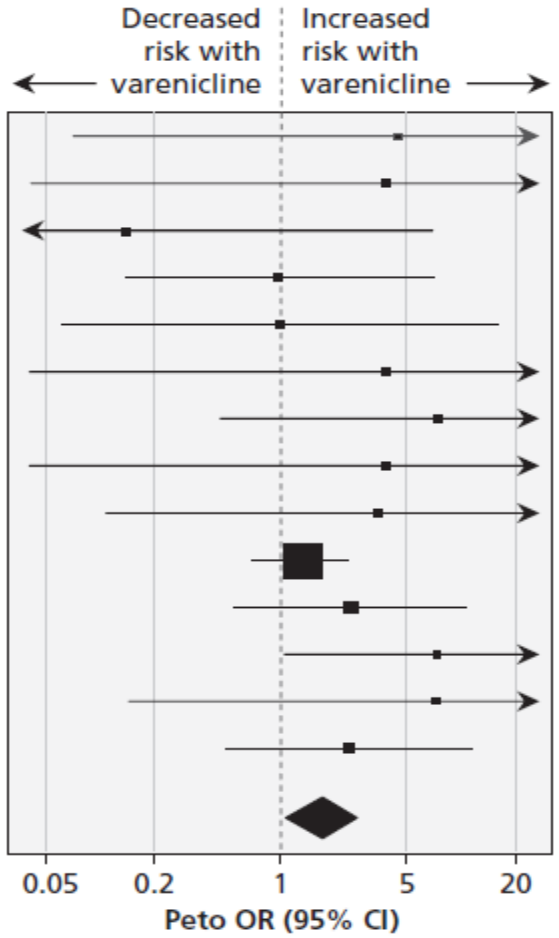


Figure 2: Meta-analysis of double-blind placebo-controlled randomized trials of the risk of serious adverse cardiovascular events associated with the use of varenicline. An odds ratio (OR) greater than 1.0 indicates an increased risk of a serious adverse cardiovascular event. CI = confidence interval.

ยาลดความอ้วนตัวใหม่เพิ่มโอกาส
โรคหัวใจและหลอดเลือด

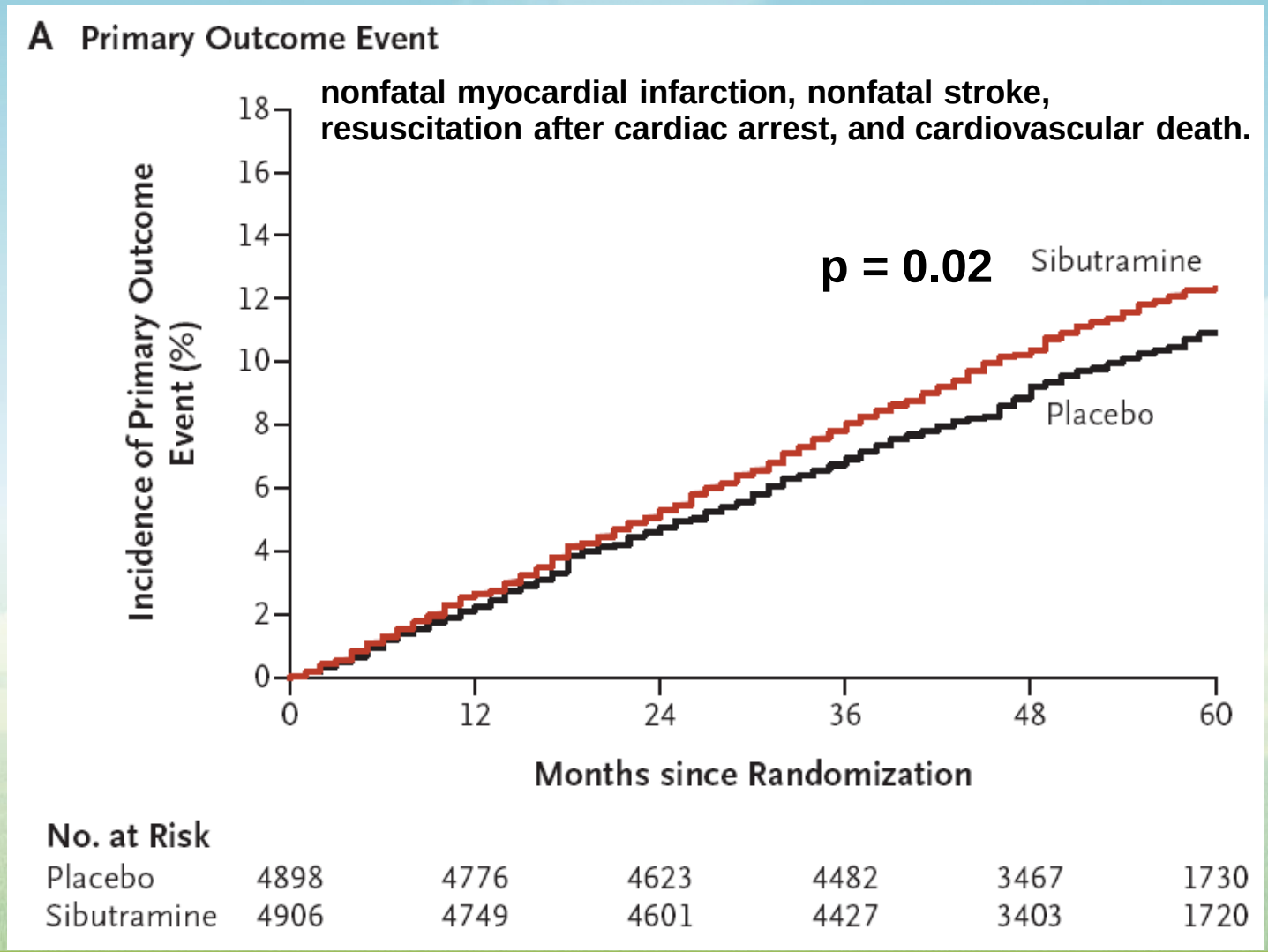
Sibutramine Cardiovascular Outcome Trial

James WPT. N Engl J Med 2010;363:905-17.

- 10,744 overweight or obese, ≥ 55 yrs with preexisting CVD ± T2DM assess CV consequences of weight Mx with and without sibutramine.
- Sibutramine in addition to participating in a weight-Mx program during 6-wk, single-blind, lead-in period, after which 9804 subjects underwent random assignment in a double-blind fashion to sibutramine (4906 subjects) or placebo (4898 subjects).

Sibutramine Cardiovascular Outcome Trial

James WPT. N Engl J Med 2010;363:905-17.



Sibutramine Cardiovascular Outcome Trial

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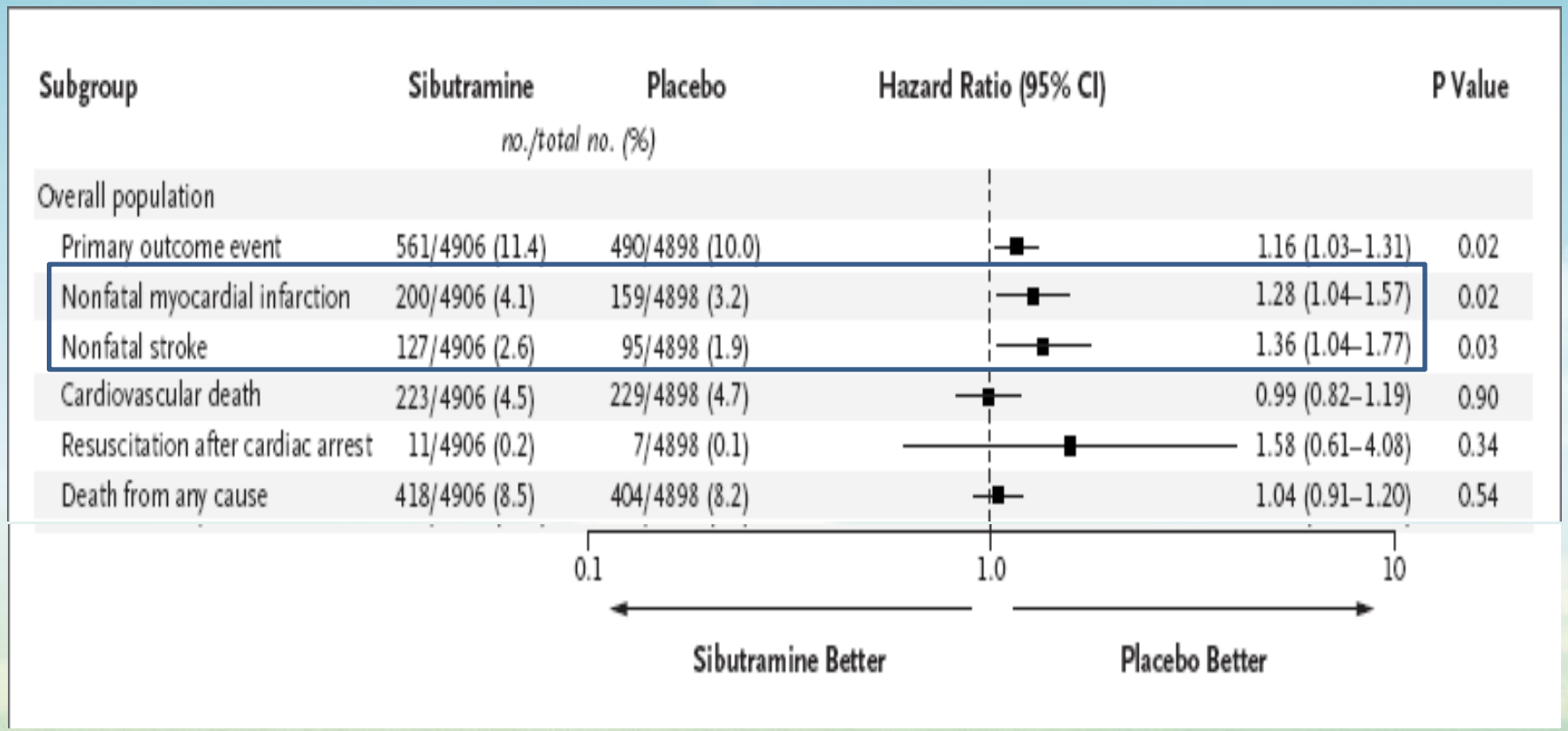

Subgroup	Sibutramine	Placebo	Hazard Ratio (95% CI)	P Value
	no./total no. (%)			
Overall population				
Primary outcome event	561/4906 (11.4)	490/4898 (10.0)	1.16 (1.03–1.31)	0.02
Nonfatal myocardial infarction	200/4906 (4.1)	159/4898 (3.2)	1.28 (1.04–1.57)	0.02
Nonfatal stroke	127/4906 (2.6)	95/4898 (1.9)	1.36 (1.04–1.77)	0.03
Cardiovascular death	223/4906 (4.5)	229/4898 (4.7)	0.99 (0.82–1.19)	0.90
Resuscitation after cardiac arrest	11/4906 (0.2)	7/4898 (0.1)	1.58 (0.61–4.08)	0.34
Death from any cause	418/4906 (8.5)	404/4898 (8.2)	1.04 (0.91–1.20)	0.54

ยาลดความอ้วนตัวใหม่ Sibutramine เพิ่มโรคหัวใจและหลอดเลือด 28-36%

”อะไรที่เหมาะกับคนยุ่งมาก ไม่มีเวลาอย่างคุณ ออกกำลัง ๑ ชม.ต่อวัน หรือ ตาย ๒๔ ชม.ต่อวัน ?”

ความจริง: ออกกำลัง ๑ ชั่วโมง อายุยืนขึ้น ๒ ชั่วโมง