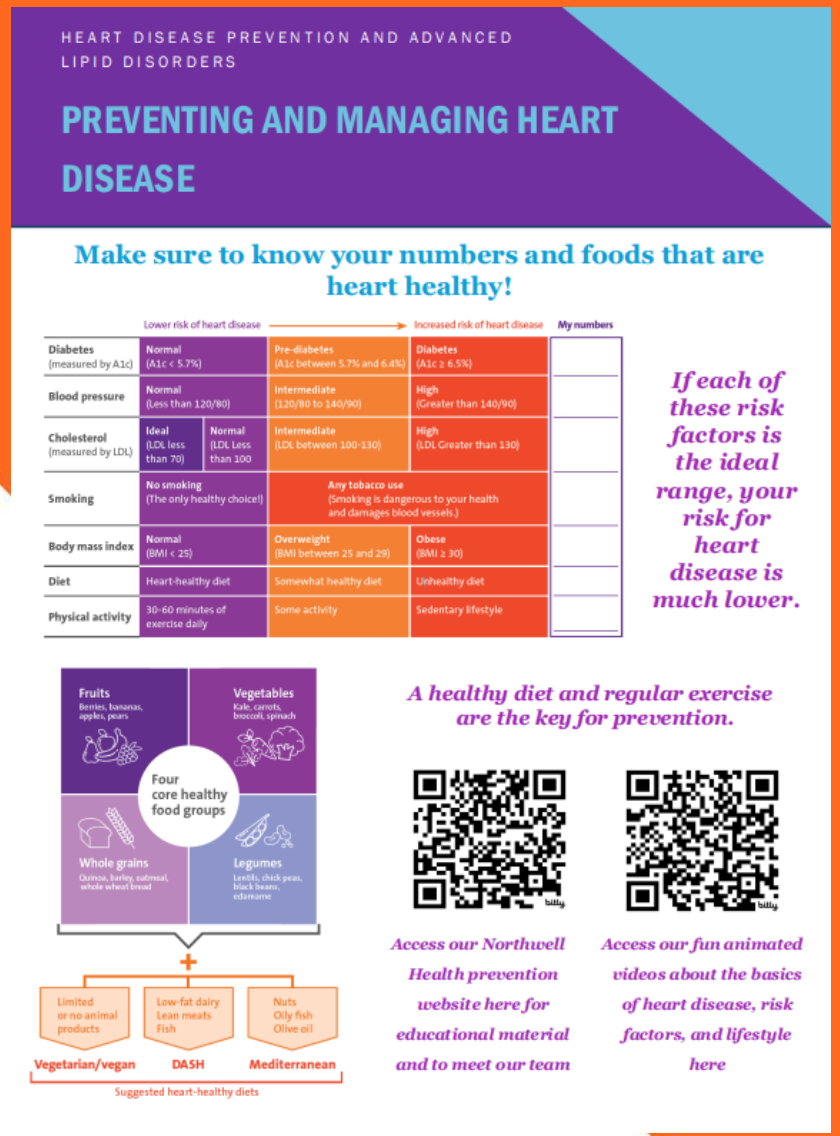

Northwell[SM]
Cardiovascular Institute

Atrial Fibrillation: Risk Reduction

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September 19, 2024

•DISCLOSURES:

IRB: NON-CONSENT CO-INVESTIGATOR: 18-0805, PE FOCUSED RCT

IRB: NON-CONSENT SITE LEAD INVESTIGATOR: NCT0552566

OBJECTIVES

Discuss Guideline recommendations

Discuss a few Modifiable Risk Factors:
- Lipoprotein (a)
- Hypertension
- Activity Level
- Obstructive sleep apnea (OSA)
- Type 2 Diabetes Mellitus

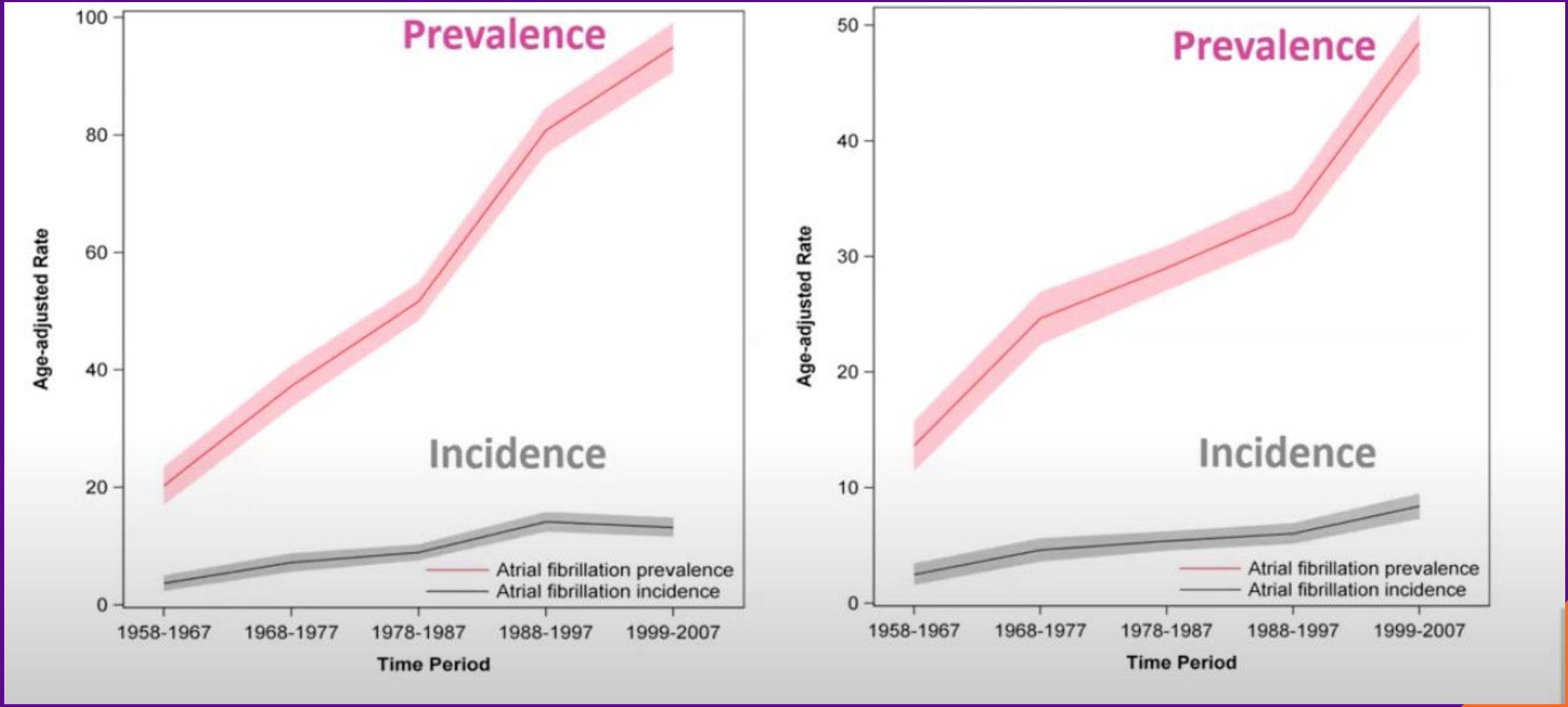
+ MASLD
Introduction into Polygenic Risk Score

Post Ablation Atrial Fibrillation and Risk factor modification

Nutrition

Men

Women



Framingham Heart study: Increasing age-adjusted AF prevalence and incidence

Schnabel, Lancet. 2015;385:154

GUIDELINES WHAT DO THEY SAY

Foundation: Risk Factors

FIGURE 5 Pillars for AF Management

AF indicates atrial fibrillation.

FIGURE 4 AF Stages: Evolution of Atrial Arrhythmia Progression

1	2	3				4
At risk for AF	Pre-AF	AF				Permanent AF
		Patients may transition among different substages of AF				
Presence of modifiable and nonmodifiable risk factors associated with AF. Modifiable risk factors: • Obesity • Lack of fitness • Hypertension • Sleep apnea • Alcohol • Diabetes Nonmodifiable risk factors: • Genetics • Male sex • Age	Evidence of structural or electrical findings further predisposing a patient to AF: • Atrial enlargement • Frequent atrial ectopy • Short bursts of atrial tachycardia • Atrial flutter • Other high AF risk scenarios*	Paroxysmal AF (3A) AF that is intermittent and terminates within ≤7 d of onset	Persistent AF (3B) AF that is continuous and sustains for >7 d and requires intervention	Long-standing persistent AF (3C) AF that is continuous for >12 mo in duration	Successful AF ablation (3D) Freedom from AF after percutaneous or surgical intervention to eliminate AF	No further attempts at rhythm control after discussion between patient and clinician
Treat Modifiable Risk Factors						
	Consider heightened surveillance	Ongoing monitoring as clinically appropriate for AF burden				
		Is AF associated with pathophysiological changes?				
		Stroke risk assessment and therapy if appropriate				
		Treat symptoms				

*Heart failure, valve disease, coronary artery disease, hypertrophic cardiomyopathy, neuromuscular disorders, thyroid disease. *Original figure created by the 2023 Atrial Fibrillation Guideline Writing Committee.* AF indicates atrial fibrillation.

Joglar, J, Chung, M. et al. 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. JACC. 2024 Jan, 83 (1) 109–279. https://doi.org/10.1016/j.jacc.2023.08.017

TABLE 3 Risk Factors for Diagnosed AF

Condition	Study Type	Effect on Risk of AF	Summary Risk of Incident AF	Effect of LRFM
Risk Factors				
Advancing age	■ SR/MA	■ Age per 5 y: ↑ risk (HR, 1.43-1.66)[2,3]	↑ Risk	N/A
	■ MR	■ Accelerated epigenetic age by MR: no association[4]		
Smoking	■ Single study	■ Current smoking: ↑ risk (9.8%)[5]	↑ Risk	N/A
	■ SR/MA	■ Smoking: ↑ risk (HR, 1.21-1.43)[2,6]		
	■ MR	■ Smoking initiation: ↑ risk (OR, 1.11)[7]		
Physical activity	■ SR/MA	■ Sedentary lifestyle: ↑ risk (OR, 2.47)[8] ■ Guideline-recommended physical activity: ↓ risk (HR, 0.94)[9] ■ Elite athletes vs nonathletes: ↑ risk (OR, 2.46)[10]	U curve: Sedentary lifestyle and elite/extreme exercise: ↑ risk	Exercise: ↓ AF burden, recurrence, symptoms; ↑ quality of life, functional capacity[11-16]

Continued on the next page

TABLE 3 Continued

Condition	Study Type	Effect on Risk of AF	Summary Risk of Incident AF	Effect of LRFM
Alcohol	■ Single studies	■ Risk of AF episode within 4 h of 1 drink: ↑ risk (OR, 2.02)[17] ■ Greater access to alcohol law: ↑ risk[18]	↑ Risk	■ Randomized abstinence: ↓ AF recurrence and burden[19] ■ N-of-1 studies of alcohol avoidance: ↓ near-term AF[20]
	■ SR/MA	■ Dose response (#drinks/d): ↑ risk (RR) ■ 1: 1.08; 2: 1.17; 3: 1.33; 4: 1.36; 5: 1.47[25]		■ Alcohol avoidance or reduction as part of a comprehensive LRFM program: ↓ AF burden, symptoms, progression of AF[21-24]
	■ MR	■ Genetically predicted heavy alcohol consumption (>35 U/wk for women and >50 U/wk for men): ↑ risk (OR, 1.11)[7]		
Adiposity markers: weight, BMI, obesity	■ Single study	■ Obesity: population attributable fraction 12.7%-16.9%[5,26]	↑ Risk	■ Weight loss in overweight or obese patients with AF as part of a comprehensive LRFM program: ↓ AF symptoms, burden, recurrence, progression[21-24]
	■ SR/MA	■ BMI: RR, 1.28 per 5-unit ↑ in BMI[31] ■ Weight:[2] HR, 1.12 per 15 kg ↑		■ Bariatric surgery in class III obesity: associated with reversal of AF type, ↑ sinus rhythm postablation[27-29]
	■ MR	■ Obesity[3] ■ Birthweight: 1.26 per SD ↑[32] ■ Childhood BMI (OR, 1.18)[32] ■ BMI 1.31 per unit BMI[33]		■ Weight loss in long-lasting persistent AF and obesity: ↔[30]
Height	■ MA	■ Height per 10 cm: ↑ risk (HR, 1.28)[2]	↑ Risk	N/A
	■ SR/MA	■ Increasing height: ↑ risk[3]		
	■ MR	■ Increasing height: ↑ risk (OR per unit, 1.33)[33]		
Hypertension and BP	■ Single studies	■ Elevated BP: ↑ risk, population attributable fraction, 21.6%[5] ■ Presence of hypertension treatment: ↑ risk (HR, 1.35-1.68), incidence 9.8%-19.5%; both AF and SBP decreased over time[26]	■ Hypertension: ↑ risk ■ SBP: ↑ risk ■ DBP: ↑↓↔ risk	■ Renal denervation: ↓ AF postablation[34] ■ Mineralocorticoid receptor antagonists: ↓ AF burden[35] ■ BP control postablation: ↔[36] ■ Intensive BP control to SBP <120 mm Hg in patients with hypertension at high risk for CVD: ↓ AF risk[37] ■ BP control as part of a comprehensive LRFM program: ↓ AF burden[21-24,38]
	■ MA	■ BP: SBP: ↑ risk (HR per 20 mm Hg, 1.22); DBP per 10 mm Hg ↓ risk (HR, 0.90); use of BP medications ↑ risk (HR, 1.42)[2]		
	■ SR/MA	■ Hypertension: ↑ risk[3]		
	■ MR	■ SBP[33,39] ↑ risk; DBP mixed results ↔↑ risk[39,40]; pulse pressure ↑ risk[40]		
Resting heart rate	■ SR/MA	■ Resting heart rate: J-shaped relationship with incident AF. Lowest risk at 68-80 bpm; <70 bpm (RR, 1.09 per 10 bpm ↓); >70 bpm (RR, per 10 bpm ↑ RR 1.06)[41]	■ Slow heart rate: ↑↓ variable risk ■ Higher heart rate: ↑↓ variable risk	N/A
	■ MR	■ Heart rate: <65 bpm slower (HR ↑ risk); heart rate per 5 bpm ↑, 0.82[42]		
Diabetes	■ Single study	■ Diabetes: ↑ risk, population attributable fraction 3.1%[5] ■ Diabetes: ↑ risk, population attributable fraction ↑ over time 3.2%-5.9%[26]	↑ Risk	■ Optimal glycemic control preablation may ↓ AF recurrence postablation[43]
	■ MA	■ Diabetes: ↑ risk (HR, 1.27 [95% CI, 1.10-1.46])[2]		
	■ SR/MA	■ Diabetes: ↑ risk (RR, 1.28, excluding large outlying study)[44] ■ Pre-diabetes: ↑ risk (RR, 1.20)[44] ■ Blood glucose: ↑ risk (RR per 20 mg/dL ↑, 1.11)[44]		
Cardiovascular disease				
HF or CAD	Single study	■ HF or CAD: population attributable fraction 5.4%[5]	↑ Risk	N/A
HF	■ Single studies	■ HF: ↑ risk but population attributable fraction ↓ d over time 7.8%-1.4%[26] ■ Bidirectional relation between AF and HF[45]	↑ Risk	N/A
	■ MA	■ History of HF: ↑ risk (HR, 2.02)[2]		
	■ MR	■ Genetically predicted HF: ↑ risk (OR, 1.86)[46]		

TABLE 3 Continued

Condition	Study Type	Effect on Risk of AF	Summary Risk of Incident AF	Effect of LRFM
CAD	■ Single study	■ MI: Population attributable fraction 3.6%[26]	↑ Risk	N/A
	■ MA	■ History of MI: HR, 1.64[2]		
	■ MR	■ Genetically predicted CAD: OR, 1.18[33]		
VHD	■ Single studies	■ Significant heart murmur: ↑ risk (HR, 2.38)[47] ■ Significant heart murmur (any diastolic and grade ≥3/6 systolic murmur): ↑ risk, population attributable fraction 21.9% ↓ d over time to 3.1%[26]	↑ Risk	N/A
	■ MR	■ Genetically predicted risk of AF in individuals of European ancestry: associated with VHD with rheumatic fever (OR, 1.26) and non-rheumatic VHD (OR, 1.27)[48]		
Cardiac surgery	■ Single study	■ Multicenter validated risk prediction model: ↑ risk AF after CABG[49]	↑ Risk	■ Prophylactic amiodarone, beta blockers: ↓↔ postop AF[50-54] ■ Posterior left pericardiotomy during CABG, aortic valve, ascending aortic aneurysm surgery: ↓ postop AF[55,56]
	■ SR/MA	■ Postop AF incidence: 23.7%-25.5%[56] of cardiac surgery patients[57]		
Other conditions				
CKD	■ SR/MA	■ CKD: ↑ risk (HR, 1.47)[58]	↑↔ Risk	N/A
	■ MR	■ Bidirectional relation between CKD and AF[59] ■ AF causal for CKD; CKD not causal for AF[60]		
Obstructive sleep apnea	■ SR/MA	■ OSA: ↑ risk (OR, 1.71), with potential dose response relation by severity[61]	↑ Risk	■ Observational studies of SDB treatment: ↓ AF burden[62-67] ■ Small RCTs of SDB treatment: ↔ [68-70]
	■ MR	■ Genetically predicted OSA: ↑ risk (OR, 1.21)[71]		
Thyroid disease	■ SR/MA	■ Clinical hyperthyroidism: ↑ risk (RR, 2.35)[72]	↑ Risk	
	■ MR	■ Hyperthyroidism: ↑ risk (OR, 1.31)[73]		
Sepsis	■ Single study	■ Severe sepsis: ↑ risk (OR, 6.82)[74]; Medicare population[75]	↑ Risk	N/A
	■ SR/MA	■ Sepsis severity: ↑ risk[76]		
Markers on ECG				
PR interval	■ SR/MA	■ Prolonged PR: ↑ risk (RR, 1.45)[77]	■ Prolonged PR: ↑ risk ■ PR interval polygenic risk score: ↓ risk ■ PR interval risk SNPs: variable ↑↓ risk	N/A
	■ MR	■ Polygenic risk score PR interval prolongation: ↓ AF risk (OR, 0.95; $P=4.30\times10^{-8}$) with some variants associated with ↑ and some with ↓ AF risk[78]		
LVH	■ Single study	■ ECG LVH: Population attributable fraction 10.4% ↓ d over time to 1.8%[26]	↑ Risk	N/A
	■ SR/MA	■ LVH: ↑ risk (RR, 1.46)[79]		
Biomarkers				
Natriuretic peptides	■ MA	■ BNP: ↑ risk (HR per 1-SD ln-BNP, 1.66)[80]	↑↔ Risk	N/A
	■ MR	■ Natriuretic peptides not associated[81]		
Inflammatory markers	■ SR/MA	■ CRP: ↑ risk (SMD, 0.95)[82] ■ IL-6: ↑ risk (SMD, 0.89)[82] ■ TNF-α: ↑ risk (SMD, 2.20)[82]	■ CRP, IL-6, TNF-α, DUSP13, FKBP7, Spondin-1: ↑ risk ■ IL-6R, TNFS12: ↓ risk	N/A
	■ MR	■ DUSP13, FKBP7, Spondin-1 ↑ risk[33] ■ IL-6R, TNFS12 ↓ risk[33]		
Lp(a)	■ SR/MA	■ Lp(a): HR, 1.03; only 39% of Lp(a) risk mediated via ASCVD[83]	↑ Risk	N/A
	■ MR	■ Genetically predicted ↑ Lp(a): ↑ risk (HR per 23 mg/dL genetically predicted ↑ Lp(a), 1.04)[83]		

Condition	Study Type	Effect on Risk of AF	Summary Risk of Incident AF	Effect of LRFM
Imaging markers				
LA size or function	■ Single studies	■ LA anterior-posterior dimension: ↑ risk (HR per 5 mm ↑, 1.39)[84] ■ End diastolic LA volume (min): ↑ risk (HR, 1.12)[85] ■ LA emptying fraction: ↑ risk (HR, 1.03)[85]	↑ LA size, emptying fraction: ↑ risk	Surgical LA reduction in conjunction with cardiac surgery or surgical AF ablation in patients with persistent AF may ↑ rates of sinus rhythm[86-89]
	■ MR	■ Genetic susceptibility to AF (independent measure) is associated with ↑indexed LA size and ↓ LA ejection fraction (dependent measures)[90]		
LV wall thickness	■ Single study	■ LV posterior wall thickness: ↑ risk (HR per 4-mm ↑, 1.28)[84]	↑ Risk	N/A
	■ SR/MA	■ LVH: ↑ risk (RR, 1.46)[79]		
Social determinants of health				
Education	■ Single studies	■ Higher education: ↑ lifetime risk of AF (U.S.-based ARIC study)[91] ■ Higher education in young individuals: ↓ risk of AF diagnosis (Danish study)[92]	Variable ↑↓ risk	N/A
	■ MR	■ AF risk related but largely mediated via BMI (57.5%), type 2 diabetes (9.8%), SBP (18.7%), and smoking (7.1%)[93]		
Income	■ Single studies	■ Higher income: ↑ lifetime risk of AF (U.S.-based ARIC study)[91] ■ Higher income in young individuals: ↓ risk of AF diagnosis (Danish study)[92]	Variable ↑↓ risk	N/A
SES	■ Single studies	■ Cumulative socioeconomic disadvantage: ↑ risk (HR, 1.57)[94] ■ Individual's poorest areas: 12% ↑ d risk[95]	Low SES: ↑↔ risk	N/A
	■ SR/MA	■ Heterogeneous results[96]		
Genetics				
Family history/ heritability	■ Single studies	■ Family history of AF: ↑ risk[97-99]	↑ Risk	N/A
	■ MR	■ Proportion heritability explained by loci in European ancestry analysis, 42%[100]		
GWAS	■ MA	■ Number of AF risk loci ↑s with ↑ number of subjects studied. In 2018, 97-111 loci explained ~11%-42% of the heritability of AF in individuals of European ancestry[100,101]	↑ Risk	N/A

Population attributable fraction: the proportional disease incidence in the population that is estimated to be due to the risk factor. Statistically significant associations reported, unless otherwise indicated.

↓ indicates decreased; ↑, increased; ↔ no significant change in risk; AF, atrial fibrillation; ASCVD, atherosclerotic cardiovascular disease; BMI, body mass index; BNP, brain natriuretic peptide; BP, blood pressure; CABG, coronary artery bypass graft surgery; CAD, coronary artery disease; CI, confidence interval; CKD, chronic kidney disease; DBP, diastolic blood pressure; ECG, electrocardiogram; GWAS, genome-wide association study; HF, heart failure; HR, hazard ratio; LA, left atrial; LRFM, lifestyle and risk factor modification; LV, left ventricular; LVH, left ventricular hypertrophy; MA, meta-analysis; MR, Mendelian randomization; N/A, not available/applicable; OR, odds ratio; RR, relative risk; OSA, obstructive sleep apnea; SMD, standardized mean difference; SBP, systolic blood pressure; SES, socioeconomic status; SR, systematic review; and VHD, valvular heart disease.

COR	LOE	RECOMMENDATION
1	B-NR	1. Patients at increased risk of AF should receive comprehensive guideline-directed LRFM for AF, targeting obesity,[1] physical inactivity,[2] unhealthy alcohol consumption,[3] smoking,[4] diabetes,[5] and hypertension.[6]

COR	LOE	RECOMMENDATION
1	B-R	1. In patients with AF who are overweight or obese (with body mass index [BMI] >27 kg/m^2), weight loss is recommended, with an ideal target of at least 10% weight loss to reduce AF symptoms, burden, recurrence, and progression to persistent AF.[1-4]

COR	LOE	RECOMMENDATION
1	B-NR	1. Patients with a history of AF who smoke cigarettes should be strongly advised to quit smoking and should receive GDMT for tobacco cessation[1,2] to mitigate increased risks of AF-related cardiovascular complications and other adverse outcomes.[3-6]

COR	LOE	RECOMMENDATION
1	B-R	1. Patients with AF seeking a rhythm-control strategy should minimize or eliminate alcohol consumption to reduce AF recurrence and burden.[1-3]

COR	LOE	RECOMMENDATION
1	B-NR	1. For patients with AF and hypertension, optimal BP control is recommended to reduce AF recurrence and AF-related cardiovascular events.[1-7]

COR	LOE	RECOMMENDATION
2b	B-NR	1. Among patients with AF, it may be reasonable to screen for obstructive sleep apnea, given its high prevalence in patients with AF, although the role of treatment of sleep-disordered breathing (SDB) to maintain sinus rhythm is uncertain.[1-13]

COR	LOE	RECOMMENDATION
3: No Benefit	B-NR	1. For patients with AF, recommending caffeine abstention to prevent AF episodes is of no benefit, although it may reduce symptoms in patients who report caffeine triggers or worsens AF symptoms.[1-9]

COR	LOE	RECOMMENDATIONS
1	A	1. Patients with AF should receive comprehensive care addressing guideline-directed LRFM, AF symptoms, risk of stroke, and other associated medical conditions to reduce AF burden, progression, or consequences.[1-3]
2a	B-R	2. In patients with AF, use of clinical care pathways, such as nurse-led AF clinics, is reasonable to promote comprehensive, team-based care and to enhance adherence to evidence-based therapies for AF and associated conditions.[4-6]

COR	LOE	RECOMMENDATION
1	B-R	1. In individuals with AF,* moderate-to-vigorous exercise training to a target of 210 minutes per week is recommended to reduce AF symptoms[1-3] and burden,[2,3] increase maintenance of sinus rhythm,[3-5] increase functional capacity, and improve QOL.[3,5,6]

*In patients without AF related to excessive exercise training.

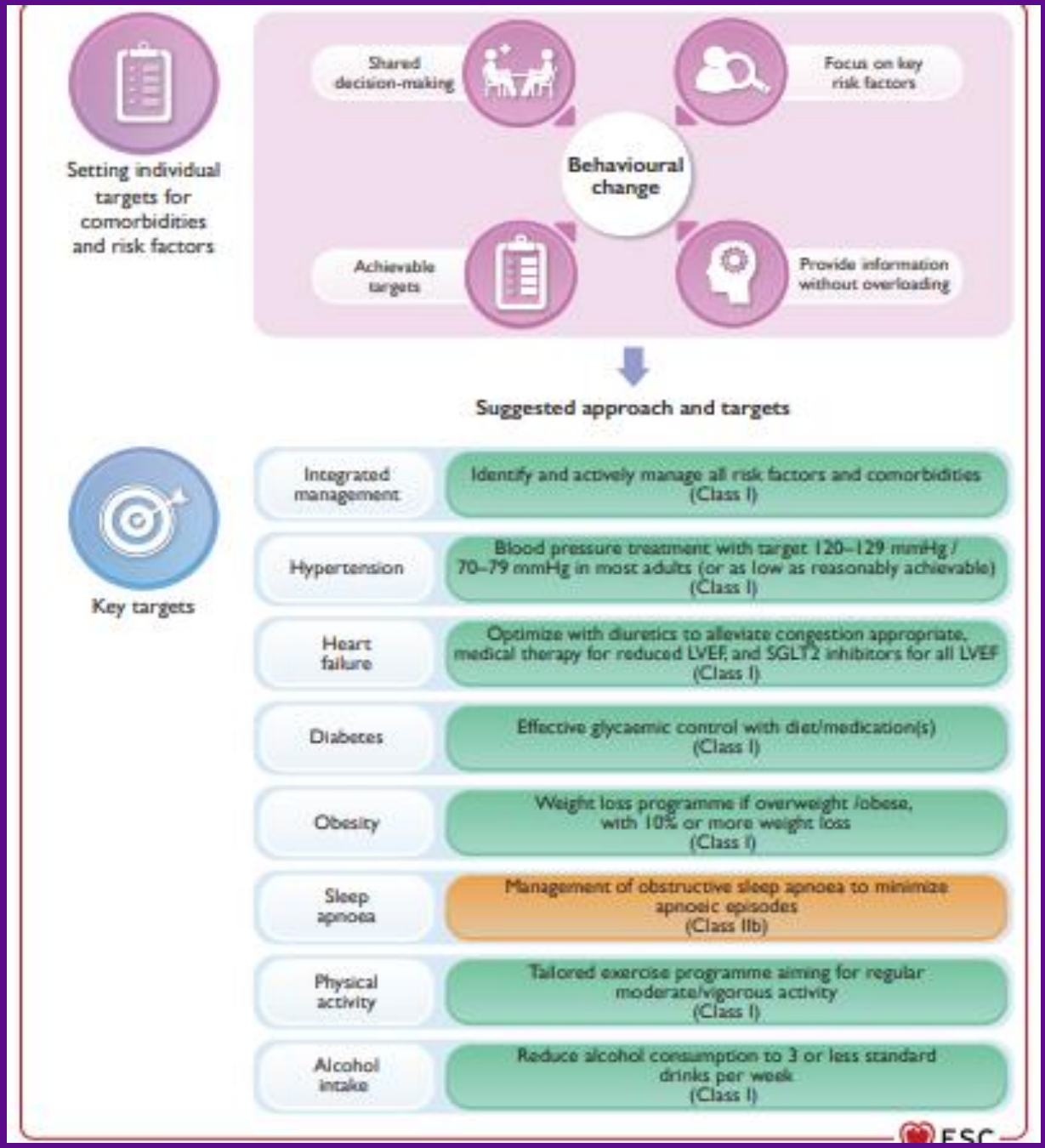
ESC: AF-Care Model 08/30/2024

C = Co-morbidity management.

A = Avoid Stroke and thromboembolism

R= Reduce Symptoms by rate and rhythm control

E = Evaluation and dynamic reassessment



Van Gelder, I, C, Rienstra, M, et. al, ESC Scientific Document Group , 2024 ESC Guidelines for the management of atrial fibrillation *European Heart Journal*, 2024;, ehae176, https://doi.org/10.1093/eurheartj/ehae176

LIPOPROTEIN (A)

Lipoprotein (a)

Current Problems in Cardiology
Volume 49, Issue 1, Part A, January 2024, 102024

Association Between Lipoprotein (a) and Risk of Atrial Fibrillation: A Systematic Review and Meta-analysis of Mendelian Randomization Studies

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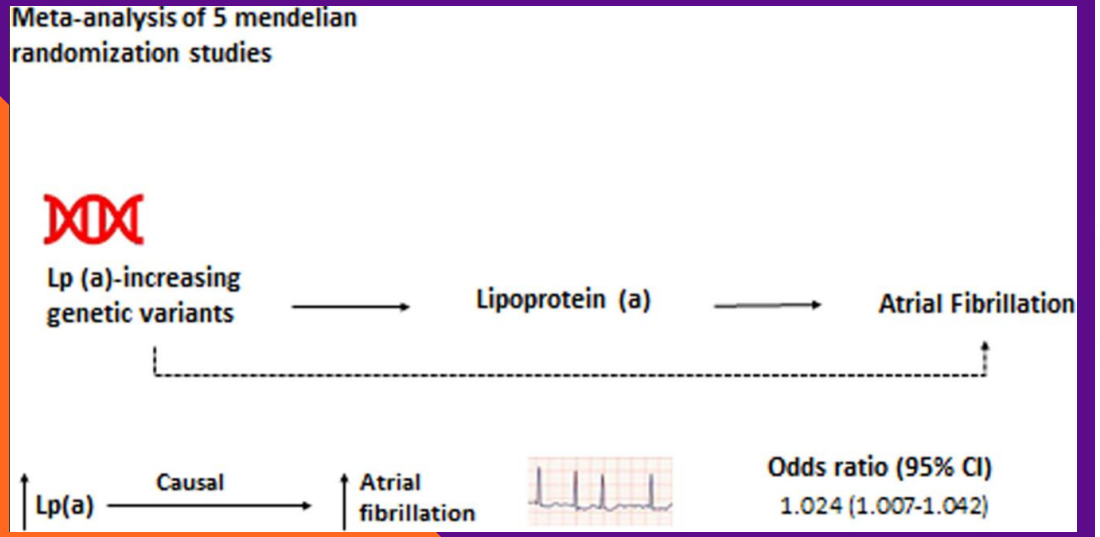
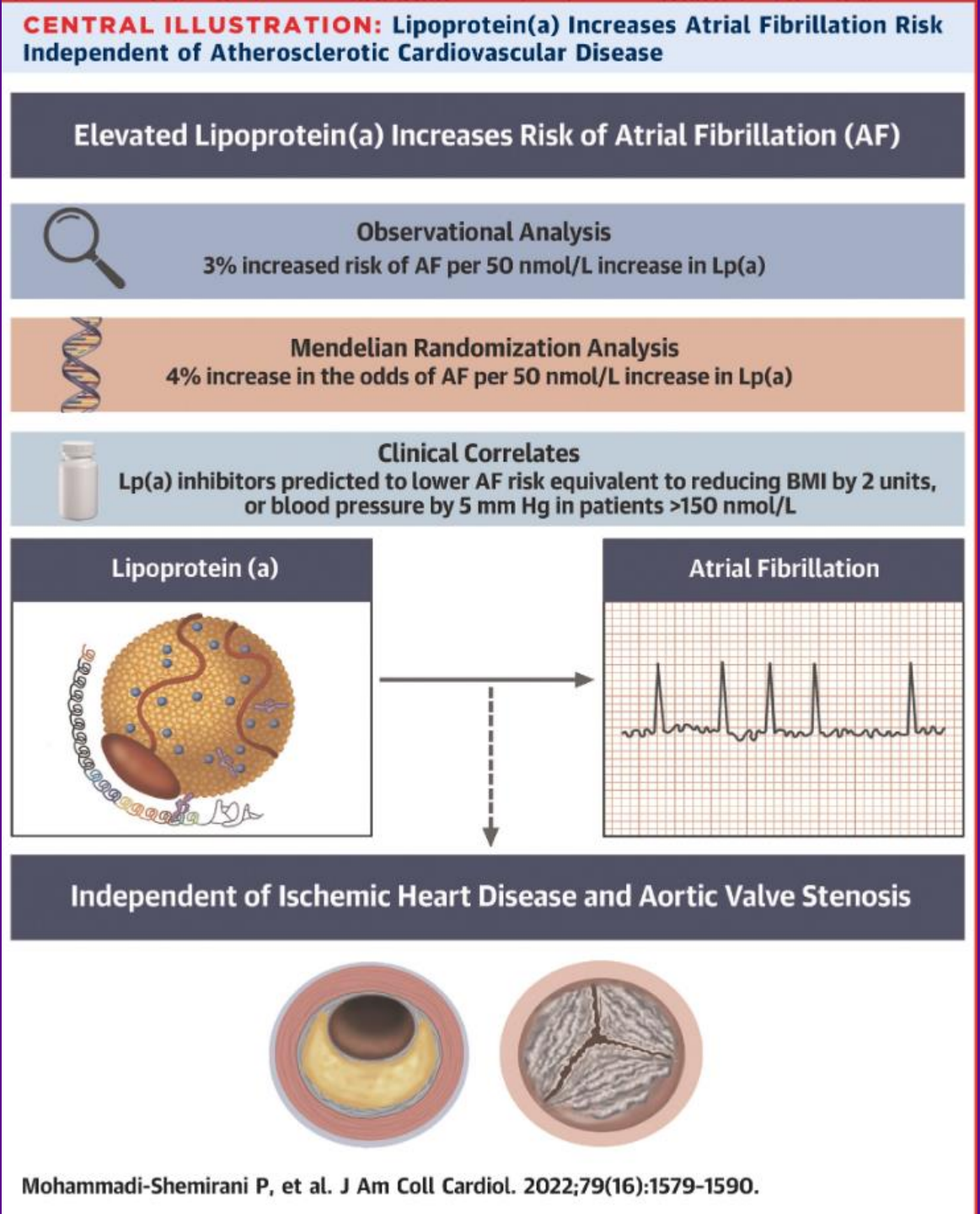
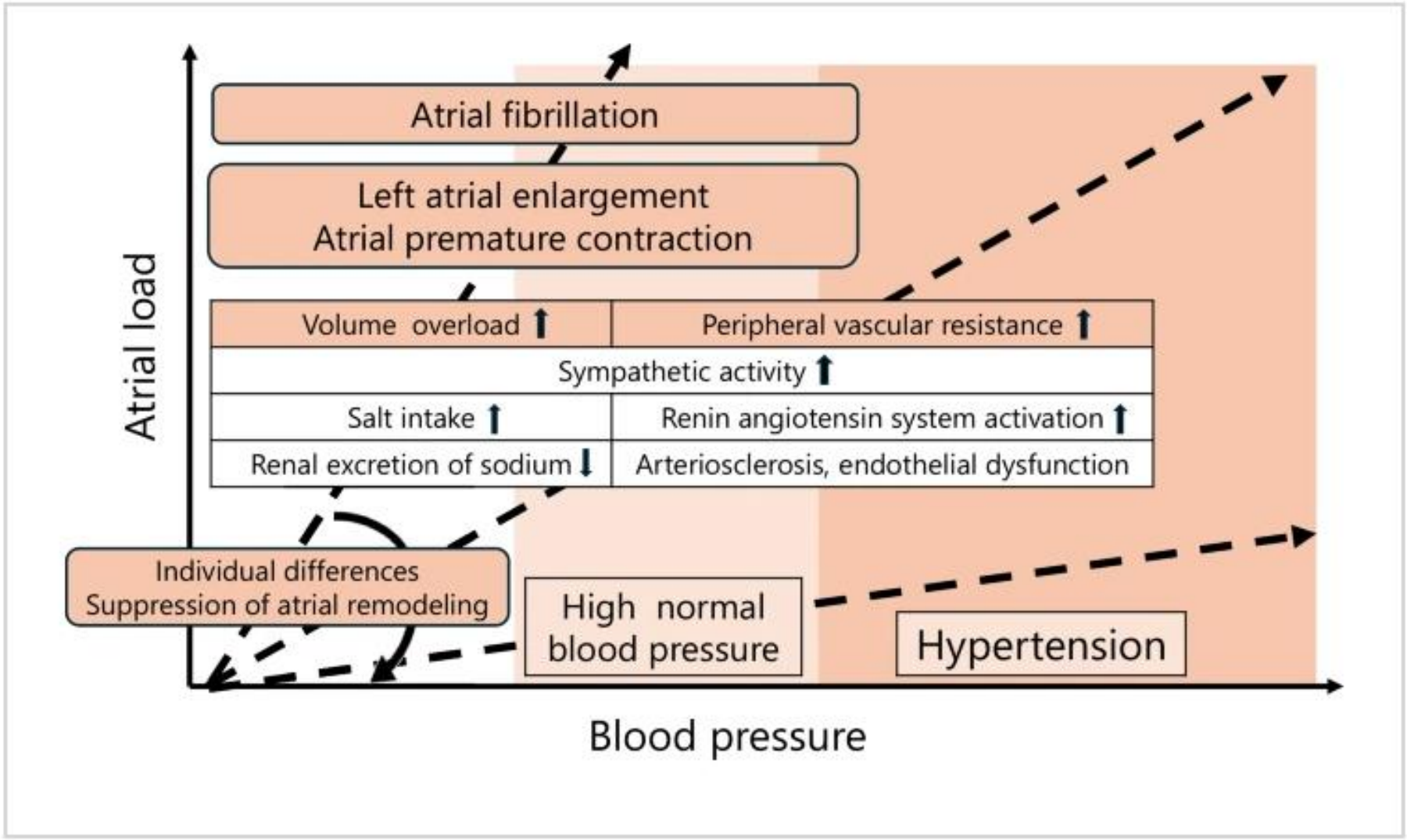




Mohammadi-Shemirani P, et al. J Am Coll Cardiol. 2022;79(16):1579-1590.

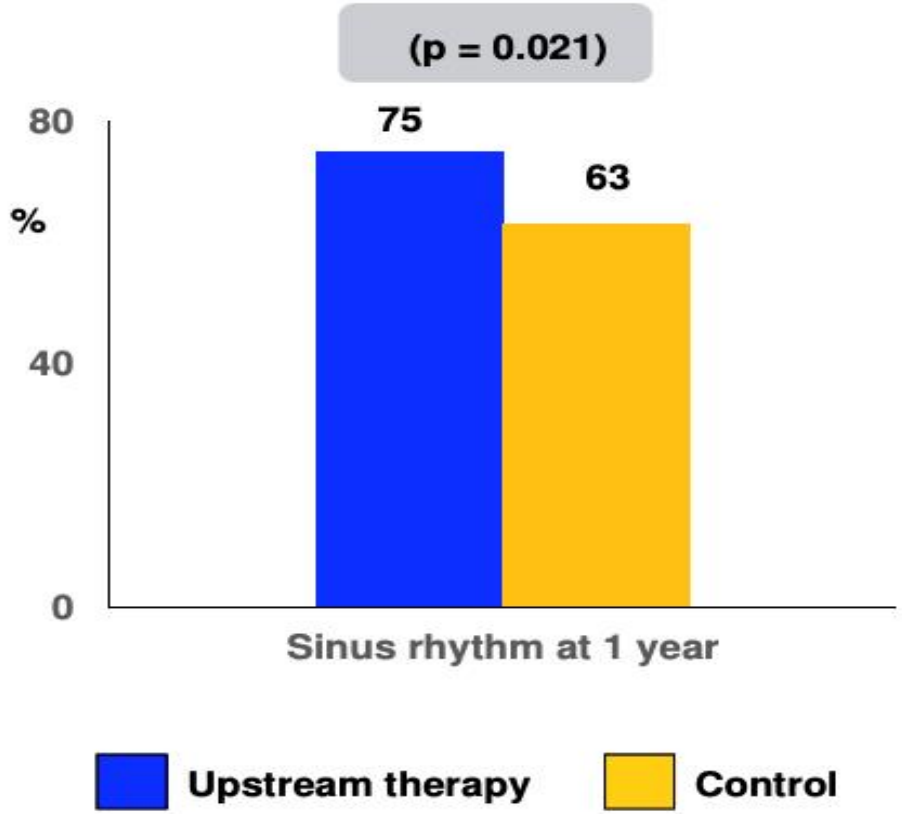
HYPERTENSION



Kabutoya, T., Kario, K. How should we treat high-normal blood pressure and pre-atrial fibrillation?. *Hypertens Res* **47**, 2225–2227 (2024). https://doi.org/10.1038/s41440-024-01736-1

RACE 3

Trial design: Patients with early persistent atrial fibrillation and heart failure were randomized to upstream therapy (n = 119) vs. conventional therapy (n = 126).



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Results

- Incidence of sinus rhythm at 1 year: 75% of the upstream therapy group vs. 63% of the conventional therapy group (p = 0.021)

Conclusions

- Among patients with early persistent atrial fibrillation, upstream risk factor modification was effective at maintaining sinus rhythm at 1 year

Presented by Dr. Michiel Rienstra at ESC.17

Article

jraas

A multicentre, randomized study of telmisartan versus carvedilol for prevention of atrial fibrillation recurrence in hypertensive patients

Domenico Galzerano[1], Sara Di Michele[2], Giuseppe Paolisso[3], Bernardino Tuccillo[4], Diana Lama[3], Sabino Carbotta[2], Antonio Cittadini[5], Michele Adolfo Tedesco[6] and Carlo Gaudio[2]

Journal of the Renin-Angiotensin-Aldosterone System
13(4) 496–503

DOI: 10.1177/1470320312443909
jra.sagepub.com
SAGE

Effect of Nifedipine Versus Telmisartan on Prevention of Atrial Fibrillation Recurrence in Hypertensive Patients

Huaan Du,* Jinqi Fan,* Zhiyu Ling, Kamsang Woo, Li Su, Shaojie Chen, Zengzhang Liu, Xianbin Lan, Bei Zhou, Yanping Xu, Weijie Chen, Peilin Xiao, Yuehui Yin

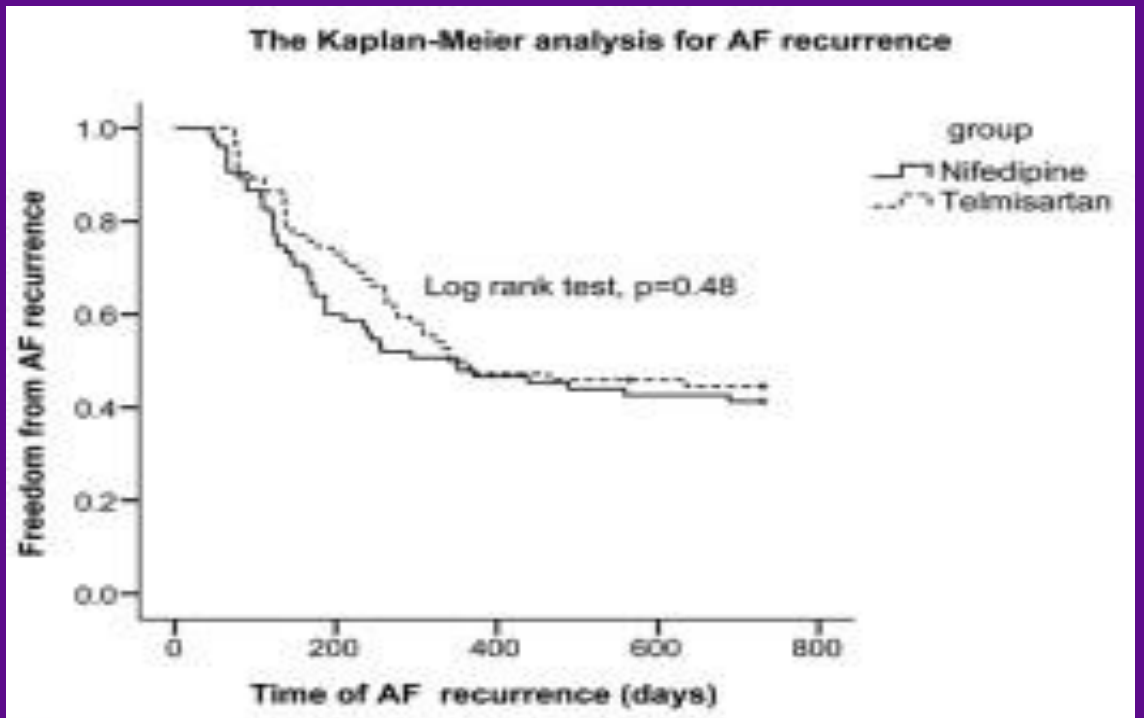
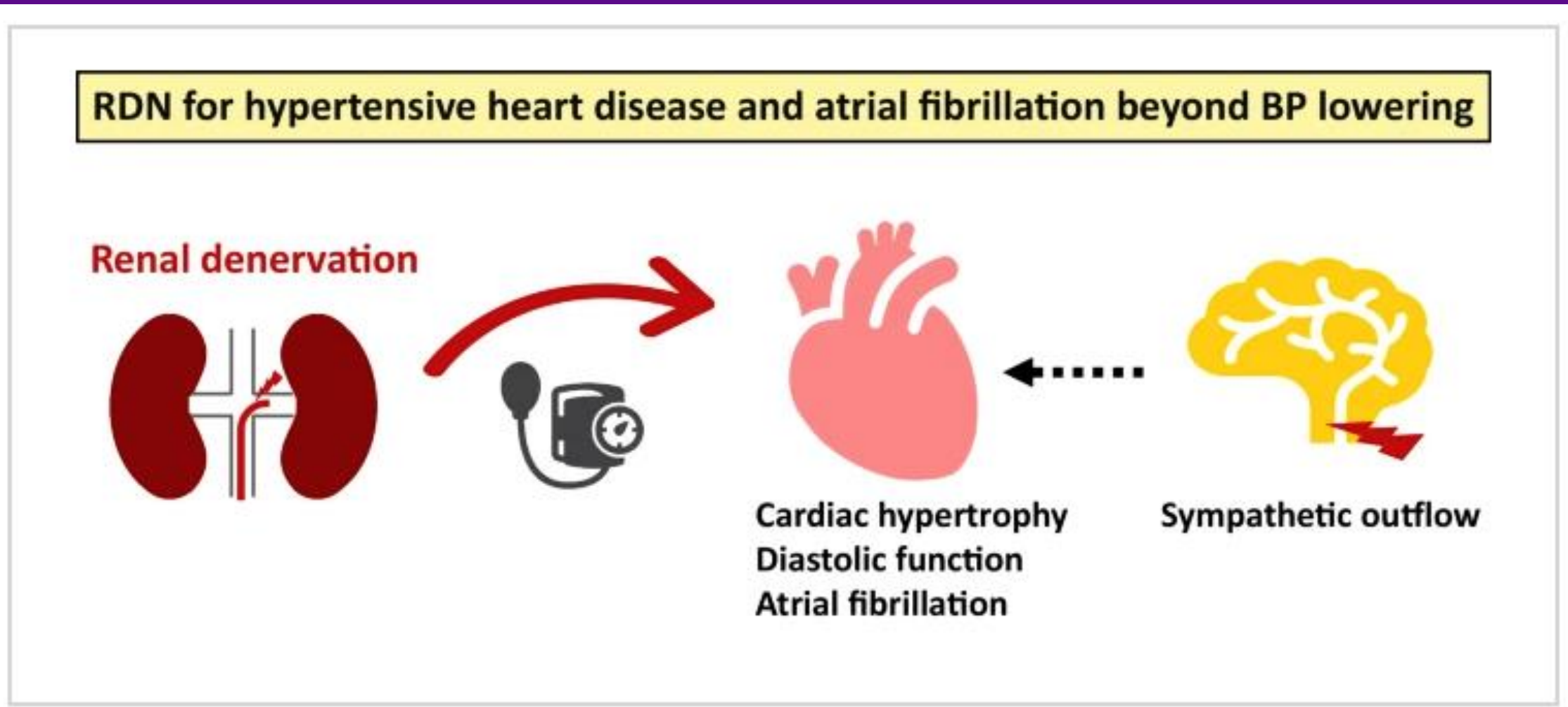


Figure 2. The log-rank test demonstrated that survival distribution of atrial fibrillation (AF) recurrence between the nifedipine and telmisartan groups was not significant (P=0.48).



Shinohara, K. Renal denervation for hypertensive heart disease and atrial fibrillation. *Hypertens Res* (2024). https://doi.org/10.1038/s41440-024-01755-y

Hypertension: Key Points

Meta-Analysis: 22 RCT's reporting baseline AF, a 5 mmHg reduction in Systolic BP reduced the risk of a major cardiovascular event by 9% (HR, 0.91; 95% CI, 0.83-1) with identical effect in patients with AF or sinus rhyhtm

Hypertension often co-exists with other modifiable and non-modifiable risk factors that contribute to AF occurrence and re-occurence.

Optimal BP control is an essential component in preventing AF and undertaking a strategy of comprehensive risk factor management.

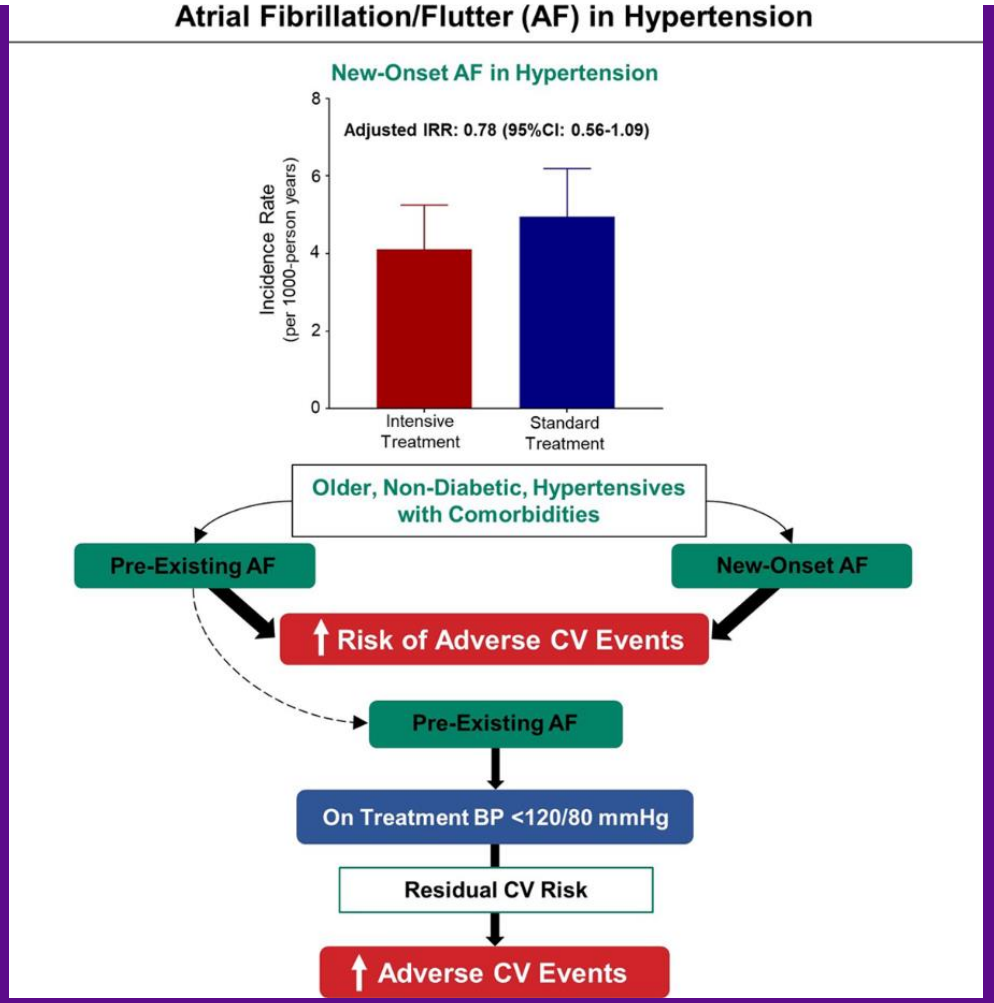
Hypertension treatment suggests that use of ACE/ARB may be superior to prevent recurrent AF

RESEARCH ARTICLE | Originally Published 4 May 2020 | Check for updates

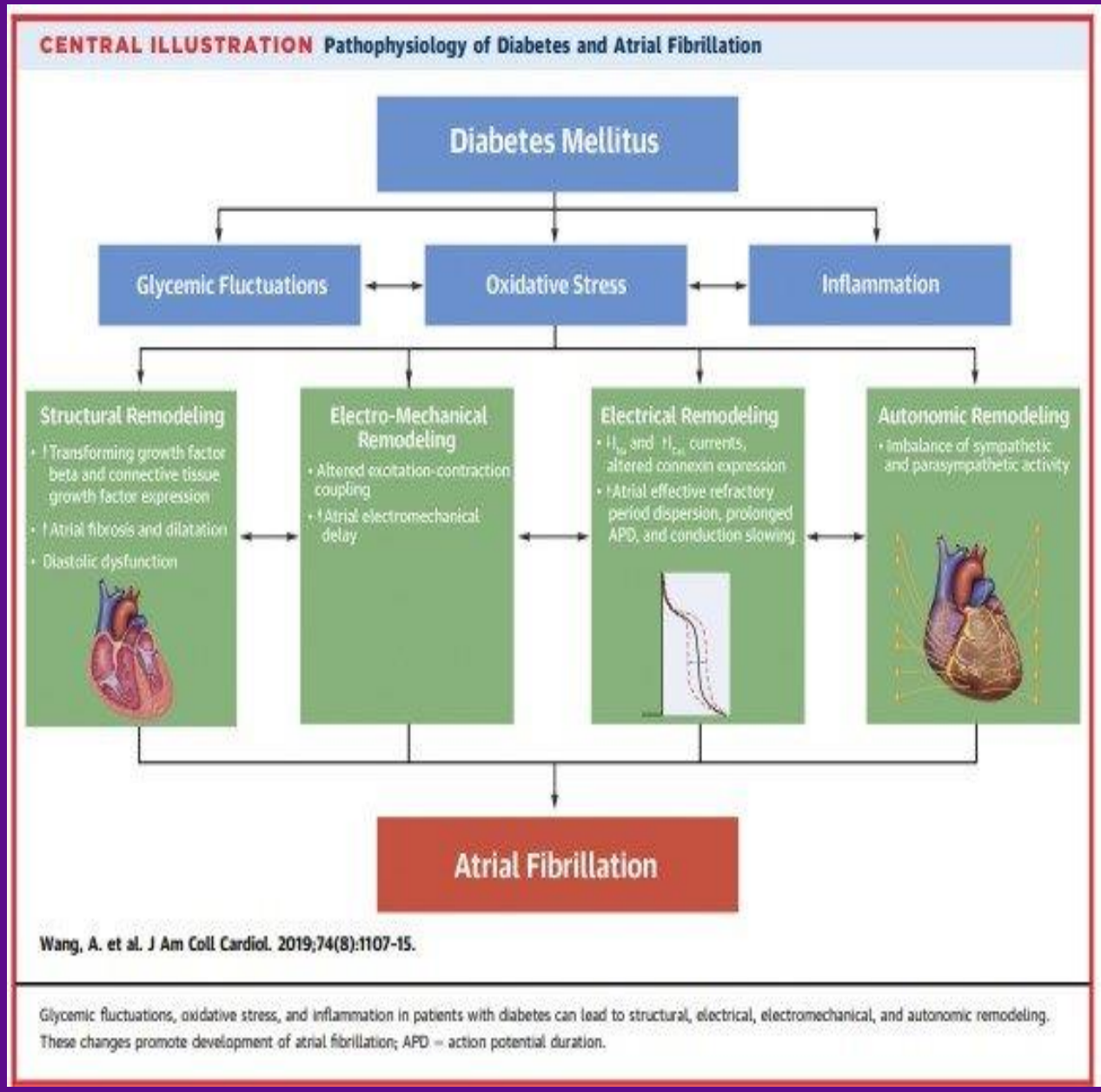
Incidence and Implications of Atrial Fibrillation/Flutter in Hypertension: Insights From the SPRINT Trial

Vibhu Parcha, Nirav Patel, Rajat Kalra, Joonseok Kim, Orlando M. Gutiérrez, Garima Arora, and Pankaj Arora | AUTHOR INFO & AFFILIATIONS

Hypertension • Volume 75, Number 6 • https://doi.org/10.1161/HYPERTENSIONAHA.120.14690

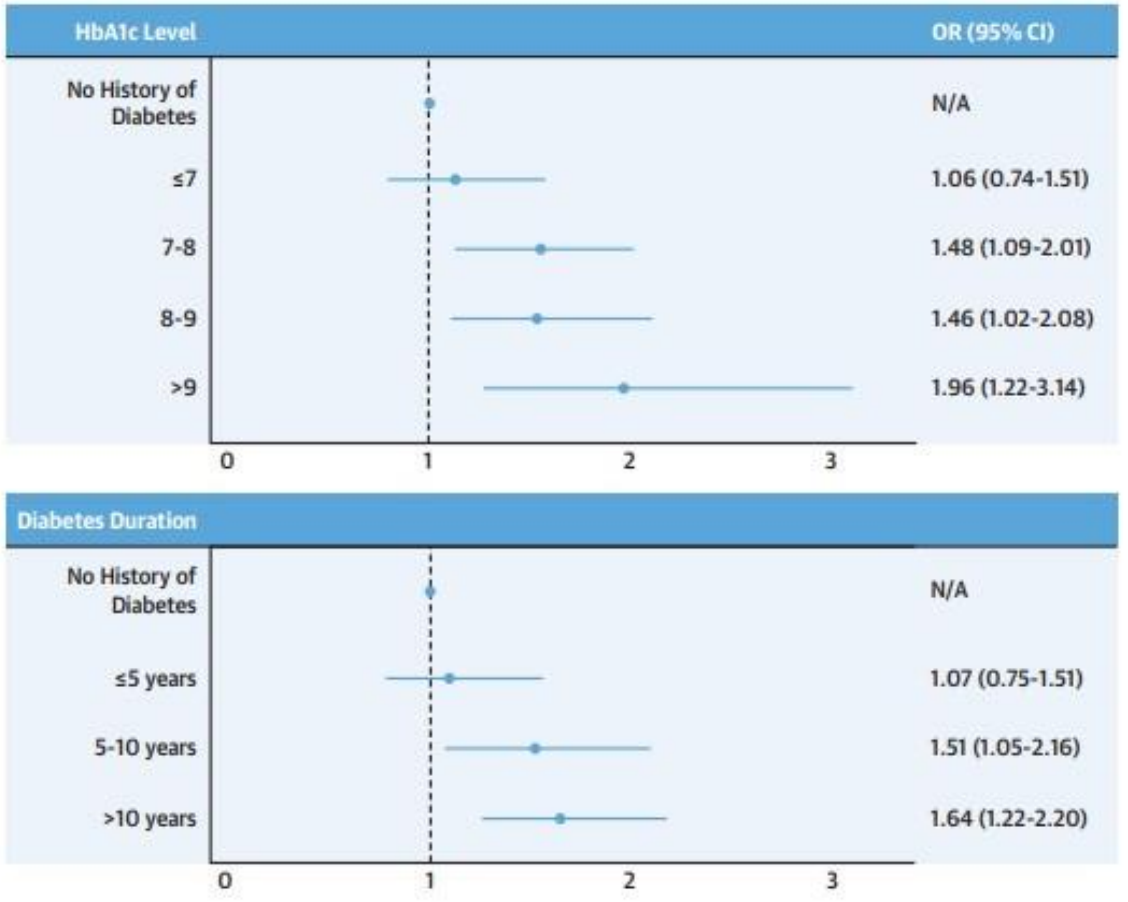


TYPE 2 DIABETES MELLITUS



Glycemic fluctuations, oxidative stress, and inflammation in patients with diabetes can lead to structural, electrical, electromechanical, and autonomic remodeling. These changes promote development of atrial fibrillation; APD = action potential duration.

FIGURE 1 Effect of Glycemic Control and Duration of Diabetes on Risk of AF



Poor glycemic control and longer duration of diabetes is associated with increased risk of AF. **Dots** indicate OR, whereas **horizontal lines** indicate 95% CI. Data from Dublin et al. [7]. CI = confidence interval; HbA1c = hemoglobin A1c; OR = odds ratio.

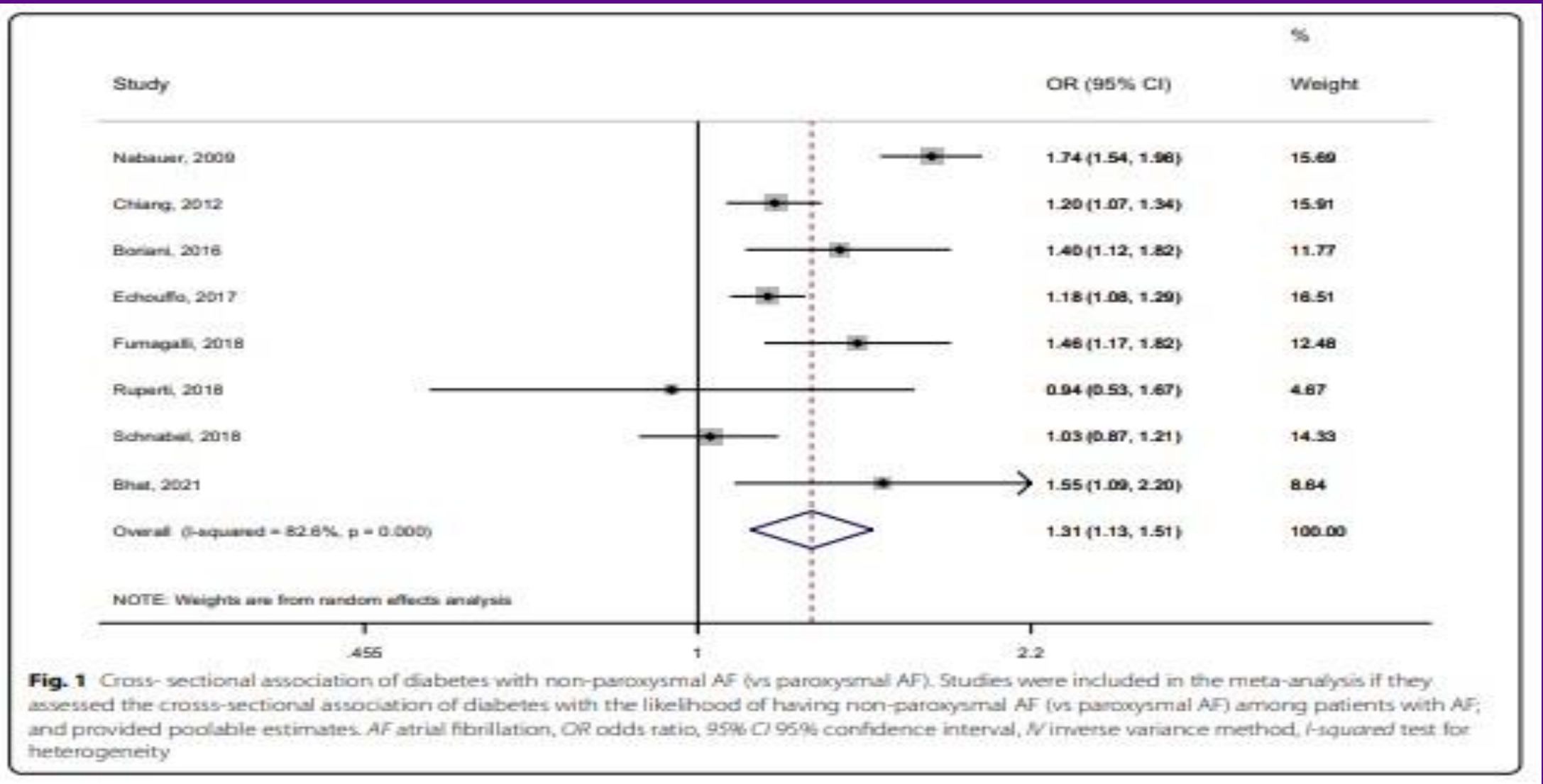


Fig. 1 Cross- sectional association of diabetes with non-paroxysmal AF (vs paroxysmal AF). Studies were included in the meta-analysis if they assessed the crosss-sectional association of diabetes with the likelihood of having non-paroxysmal AF (vs paroxysmal AF) among patients with AF; and provided poolable estimates. *AF* atrial fibrillation, *OR* odds ratio, *95% CI* 95% confidence interval, *IV* inverse variance method, *I-squared* test for heterogeneity

Alijla *et al. Cardiovascular Diabetology* (2021) 20:230
https://doi.org/10.1186/s12933-021-01423-2

Cardiovascular Diabetology

REVIEW Open Access

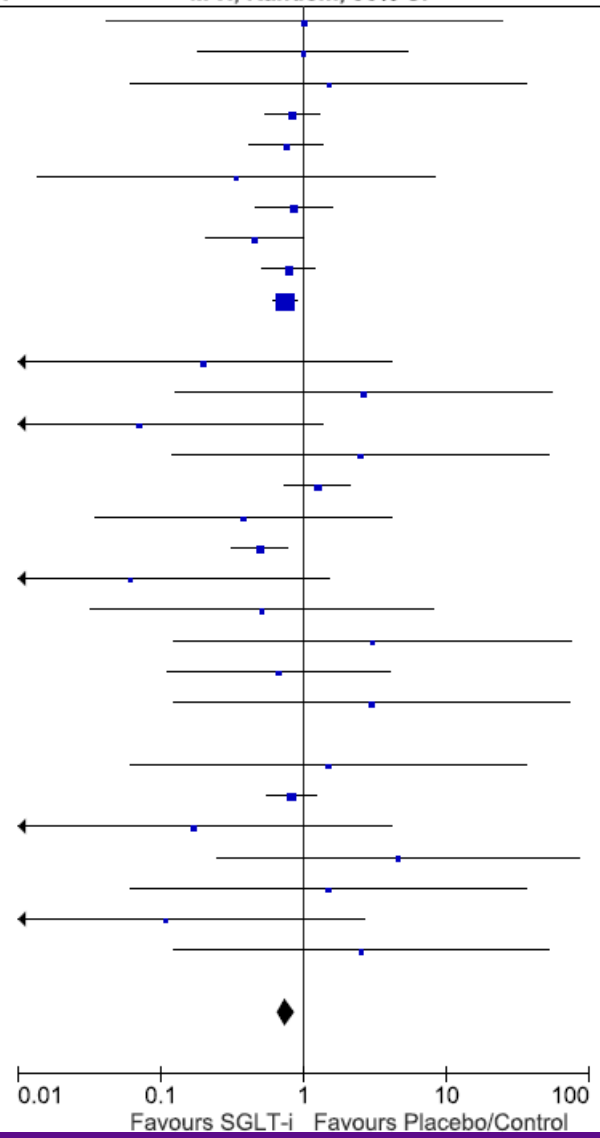
Association of diabetes with atrial fibrillation types: a systematic review and meta-analysis

Fadi Alijla[1†], Chepkoech Buttia[1†], Tobias Reichlin[2], Salman Razvi[3,4], Beatrice Minder[5], Matthias Wilhelm[2], Taulant Muka[1], Oscar H. Franco[1] and Arjola Bano[1,2*]

Study or Subgroup	SGLT-i Events	SGLT-i Total	Placebo/Control Events	Placebo/Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Bailey et al. 2013	1	409	0	137	0.2%	1.01 [0.04, 24.64]
Bode et al. 2015	4	477	2	237	0.6%	0.99 [0.18, 5.39]
CANTATA-MSU	1	313	0	156	0.2%	1.50 [0.06, 36.61]
CANVAS	53	2886	32	1441	8.9%	0.83 [0.54, 1.28]
CANVAS-R	19	2904	25	2903	4.7%	0.76 [0.42, 1.38]
Cefalu et al. 2015	0	460	1	462	0.2%	0.33 [0.01, 8.20]
CREDENCE	18	2200	21	2197	4.3%	0.86 [0.46, 1.60]
DAPA-CKD	9	2149	20	2149	2.7%	0.45 [0.21, 0.99]
DAPA-HF	36	2368	46	2368	9.0%	0.78 [0.51, 1.21]
DECLARE-TIMI 58	163	8582	221	8578	41.8%	0.74 [0.60, 0.90]
DELIGHT	0	145	0	148		Not estimable
DURATION-8	0	231	2	230	0.2%	0.20 [0.01, 4.13]
EMPA-REG BASAL	2	324	0	170	0.2%	2.63 [0.13, 54.49]
EMPA-REG EXTEND MONO	0	1655	3	822	0.2%	0.07 [0.00, 1.37]
EMPA-REG EXTEND PIO	2	333	0	165	0.2%	2.49 [0.12, 51.47]
EMPA-REG OUTCOME	48	4687	19	2333	6.0%	1.26 [0.74, 2.13]
EMPA-REG RENAL	1	419	2	319	0.3%	0.38 [0.03, 4.18]
EMPEROR-Reduced	27	1863	55	1863	8.1%	0.49 [0.31, 0.77]
Ferrannini et al. 2010	0	410	1	75	0.2%	0.06 [0.00, 1.50]
inTandem1	1	525	1	268	0.2%	0.51 [0.03, 8.13]
inTandem3	1	699	0	703	0.2%	3.02 [0.12, 73.94]
Leiter et al. 2014	2	482	3	483	0.5%	0.67 [0.11, 3.98]
Mathieu et al. 2015	1	160	0	160	0.2%	3.00 [0.12, 73.09]
Roden et al. 2013	0	534	0	229		Not estimable
Søfteland et al. 2017	1	222	0	110	0.2%	1.49 [0.06, 36.36]
VERTIS CV	61	5493	37	2745	10.2%	0.82 [0.55, 1.24]
VERTIS FACTORIAL	0	487	1	247	0.2%	0.17 [0.01, 4.14]
VERTIS-MET	4	412	0	209	0.2%	4.58 [0.25, 84.60]
VERTIS RENAL	1	313	0	154	0.2%	1.48 [0.06, 36.14]
Wilding et al. 2012	0	610	1	197	0.2%	0.11 [0.00, 2.64]
Yale et al. 2014	2	179	0	90	0.2%	2.53 [0.12, 52.10]
Total (95% CI)		**42931**		**32348**	**100.0%**	**0.75 [0.66, 0.86]**
Total events	458		493			

Heterogeneity: Tau² = 0.00; Chi² = 23.14, df = 28 (P = 0.73); I² = 0%

Test for overall effect: Z = 4.31 (P < 0.0001)



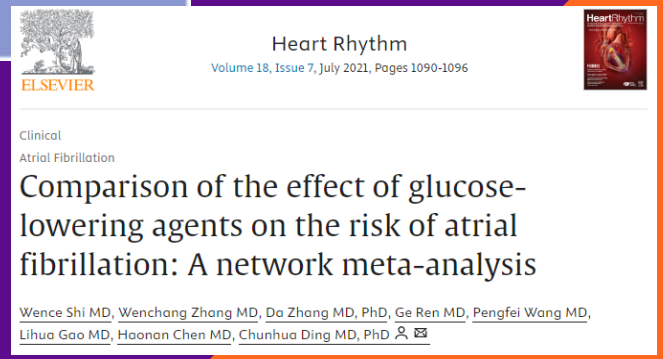
REVIEW ARTICLE | Originally Published 28 August 2021 | Check for updates

Sodium-Glucose Co-Transporter Inhibitors and Atrial Fibrillation: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Arjun K. Pandey, BHSc, Iva Okaj, BSc, Hargun Kaur, Emilie P. Belley-Cote, MD, PhD, Jia Wang, MSc, Alireza Oraii, MD, Alexander P. Benz, MD, ... SHOW ALL ..., and William F. McIntyre, MD, PhD | AUTHOR INFO & AFFILIATIONS

Journal of the American Heart Association • Volume 10, Number 17 • https://doi.org/10.1161/JAHA.121.022222

	TZD	Met	SU	Insu	DPP-4i	GLP-1RA	SGLT2i	AGI	nSU
TZD		0.43 (0.15-1.50)	0.60 (0.26-1.50)	0.53 (0.25-1.90)	1.40 (0.61-3.40)	2.60 (0.86-9.50)	1.40 (0.52-3.90)	0.71 (0.21-2.50)	0.46 (0.16-1.30)
Met	2.30 (0.67-6.70)		1.40 (0.43-4.20)	1.20 (0.46-4.70)	3.20 (0.97-9.60)	***6.00 (1.60-23.0)***	3.20 (0.74-12.0)	1.60 (0.36-6.90)	1.10 (0.26-3.80)
SU	1.70 (0.66-3.80)	0.72 (0.24-2.30)		0.87 (0.42-2.90)	2.30 (0.95-5.40)	***4.30 (1.40-15.0)***	2.30 (0.69-7.30)	1.20 (0.36-3.80)	0.76 (0.30-1.80)
Insu	1.90 (0.53-3.90)	0.84 (0.20-2.20)	1.20 (0.34-2.40)		2.60 (0.77-5.50)	***5.00 (1.20-14.0)***	2.70 (0.56-7.20)	1.40 (0.28-3.90)	0.88 (0.21-2.10)
DPP-4i	0.73 (0.30-1.60)	0.31 (0.10-1.00)	0.44 (0.19-1.00)	0.38 (0.18-1.30)		1.90 (0.60-6.60)	1.00 (0.36-2.70)	0.52 (0.16-1.70)	***0.33 (0.12-0.92)***
GLP-1RA	0.38 (0.10-1.20)	***0.17 (0.04-0.61)***	***0.23 (0.07-0.73)***	***0.20 (0.07-0.86)***	0.53 (0.15-1.70)		0.53 (0.12-2.10)	0.27 (0.06-1.20)	***0.18 (0.04-0.66)***
SGLT2i	0.73 (0.26-1.90)	0.31 (0.08-1.30)	0.44 (0.14-1.50)	0.38 (0.14-1.80)	0.99 (0.37-2.70)	1.90 (0.47-8.60)		0.52 (0.12-2.20)	0.33 (0.09-1.30)
AGI	1.40 (0.40-4.70)	0.61 (0.14-2.80)	0.85 (0.26-2.80)	0.74 (0.25-3.50)	1.90 (0.59-6.40)	3.70 (0.85-18.0)	1.90 (0.45-8.40)		0.65 (0.18-2.30)
nSU	2.20 (0.74-6.20)	0.94 (0.26-3.80)	1.30 (0.56-3.30)	1.10 (0.47-4.70)	***3.00 (1.10-8.70)***	***5.70 (1.50-24.0)***	3.00 (0.80-11.0)	1.50 (0.44-5.50)	



Type 2 Diabetes mellitus: Key Points

AF: Found as co-morbid condition in 25% of patients.

Following development of AF, major risk factor increasing thromboembolic risk as well as increased length of stay and recurrence of AF.

SGLT2 and GLP-1 are emerging treatments in lowering risk.

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journal homepage: www.elsevier.com/locate/ejim

Original article

Impact of diabetes on the management and outcomes in atrial fibrillation: an analysis from the ESC-EHRA EORP-AF Long-Term General Registry

Wern Yew Ding [a], Agnieszka Kotalczyk [a,b], Giuseppe Boriani [c], Francisco Marin [d], Carina Blomström-Lundqvist [e], Tatjana S. Potpara [f,g], Laurent Fauchier [h], Gregory.Y.H. Lip [a,i,*], on behalf of theESC-EHRA EORP-AF Long-Term General Registry Investigators [j]

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OBESITY + ACTIVITY

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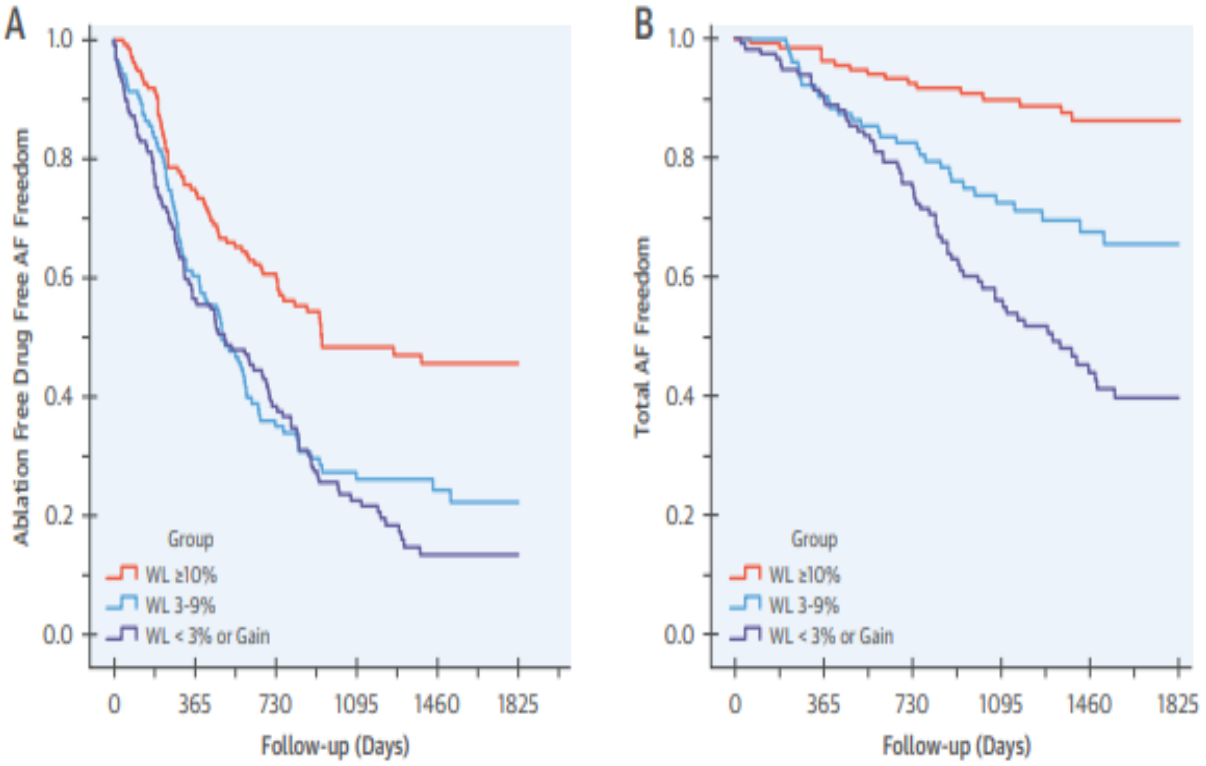
ORIGINAL INVESTIGATIONS

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, MAcrSr,†
Rajiv Mahajan, MD, PsD,* Christopher X. Wong, MBBS, PsD,*† Darragh Twomey, MBBS,* Adrian D. Elliott, PsD,*¶
Jonathan M. Kalman, MBBS, PsD,¶ Walter P. Abhayaratna, MBBS, PsD,# Dennis H. Lau, MBBS, PsD,*
Prashanthan Sanders, MBBS, PsD*

FIGURE 2 Atrial Fibrillation Freedom Outcome According to Group

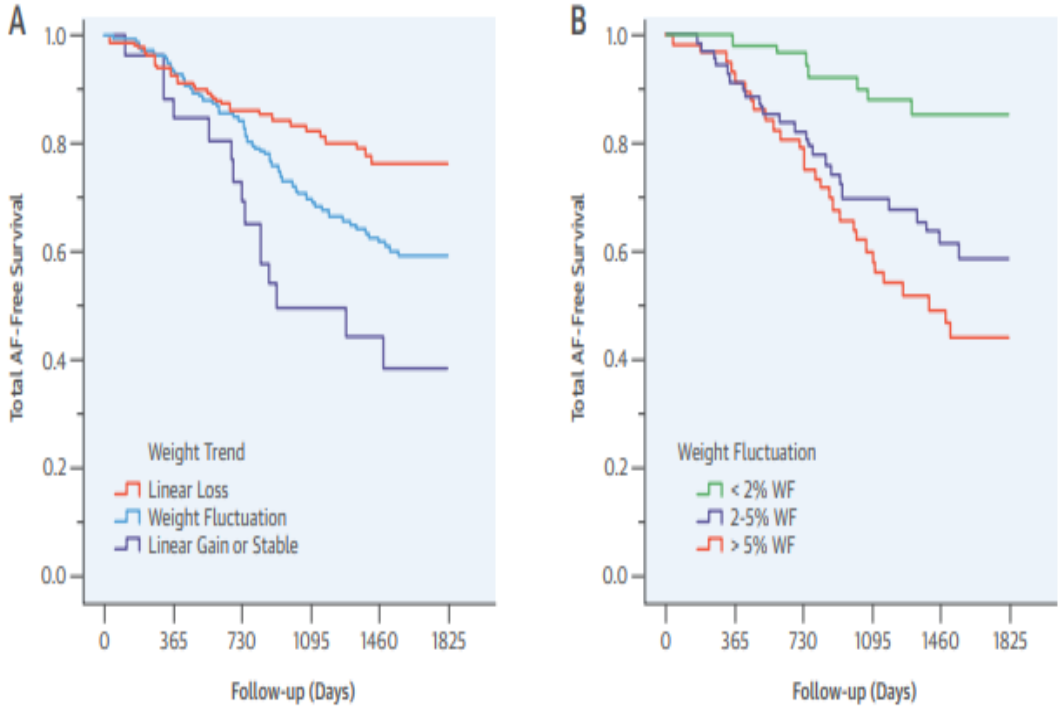


Time (Days)	0	365	730	1095	1460	1825
≥10 WL	135	101	72	42	31	18
3-9% WL	103	62	36	22	13	7
<3% WL or gain	117	66	44	22	11	9

0	365	730	1095	1460	1825
135	130	114	86	67	36
103	93	83	57	35	22
117	105	85	53	32	22

(A) Kaplan-Meier curve for AF-free survival without the use of rhythm control strategies. **(B)** Kaplan-Meier curve for AF-free survival for total AF-free survival (multiple ablation procedures with and without drugs). Abbreviations as in Figure 1.

FIGURE 3 Outcomes of Atrial Fibrillation Freedom According to Weight Trend and Weight Fluctuation

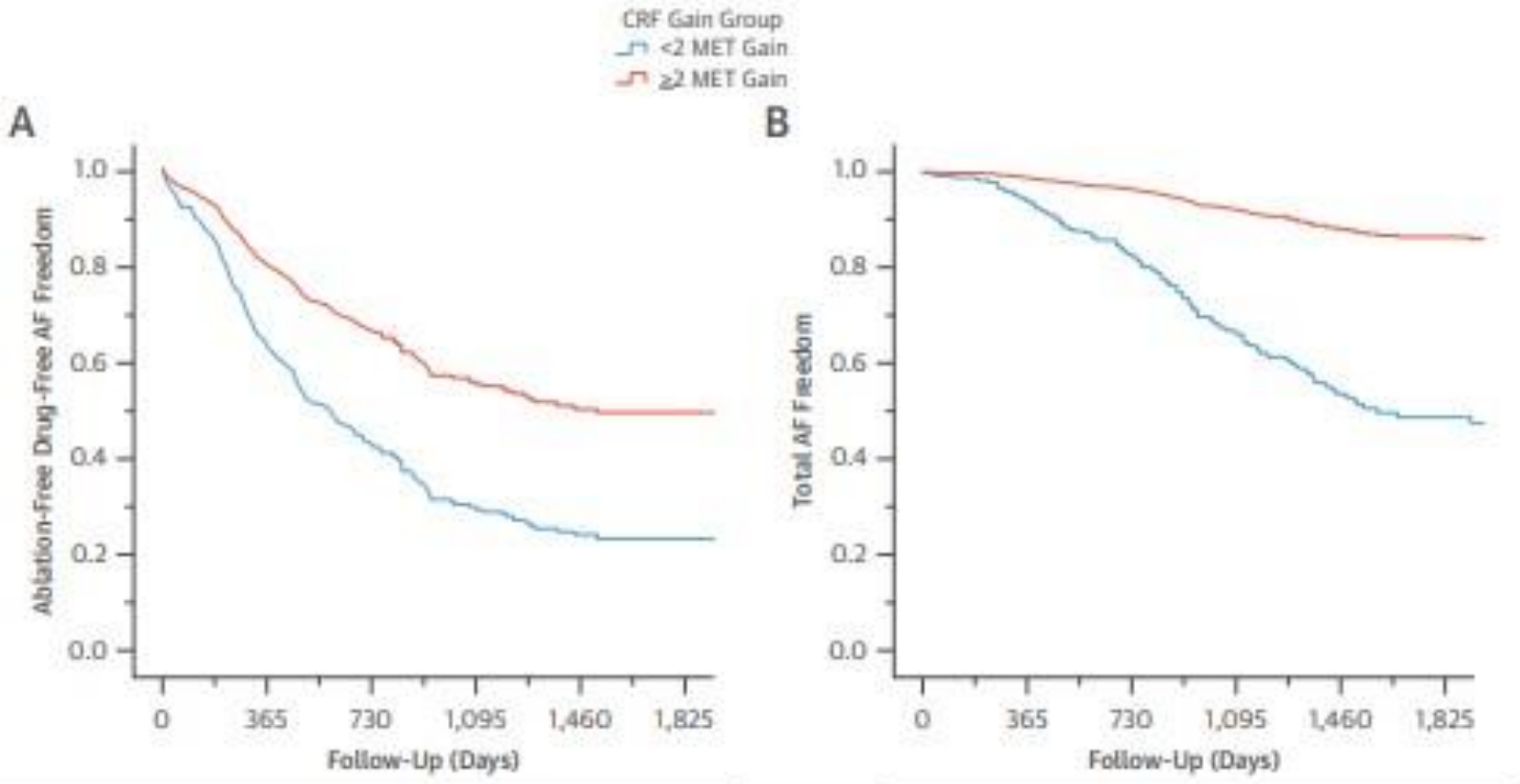


Time (Days)	0	365	730	1095	1460	1825
Linear Loss	141	130	122	80	52	29
Fluctuation	179	165	140	99	71	44
Linear Gain	24	20	18	12	8	5

Time (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

(A) Kaplan-Meier curve for total AF-free survival (multiple ablation procedures with and without drugs) according to weight trend. **(B)** Kaplan-Meier curve for total AF-free survival (multiple ablation procedures with and without drugs) according to weight fluctuation. Abbreviations as in Figure 1.

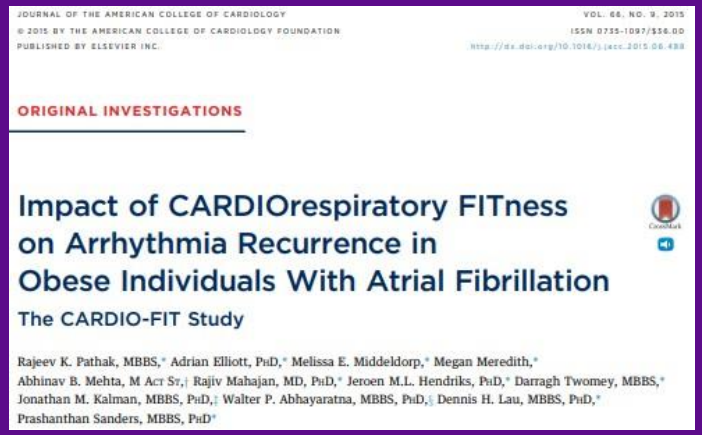
FIGURE 3 Outcomes of AF Freedom According to Cardiorespiratory Fitness Gain (<2 METs Gain vs. ≥2 METs Gain)



Time (Days)	0	365	730	1,095	1,460	1,825
≥2 MET Gain	127	105	78	52	38	19
<2 MET Gain	181	104	63	36	20	16

0	365	730	1,095	1,460	1,825
127	124	109	84	62	33
181	166	132	86	51	32

(A) Kaplan-Meier curve for total AF-free survival (multiple ablation procedures ± drugs) according to weight trend. **(B)** Kaplan-Meier curve for total AF-free survival (multiple ablation procedures ± drugs) according to weight fluctuation. Abbreviations as in Figure 1.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ORIGINAL INVESTIGATIONS

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 Act 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*

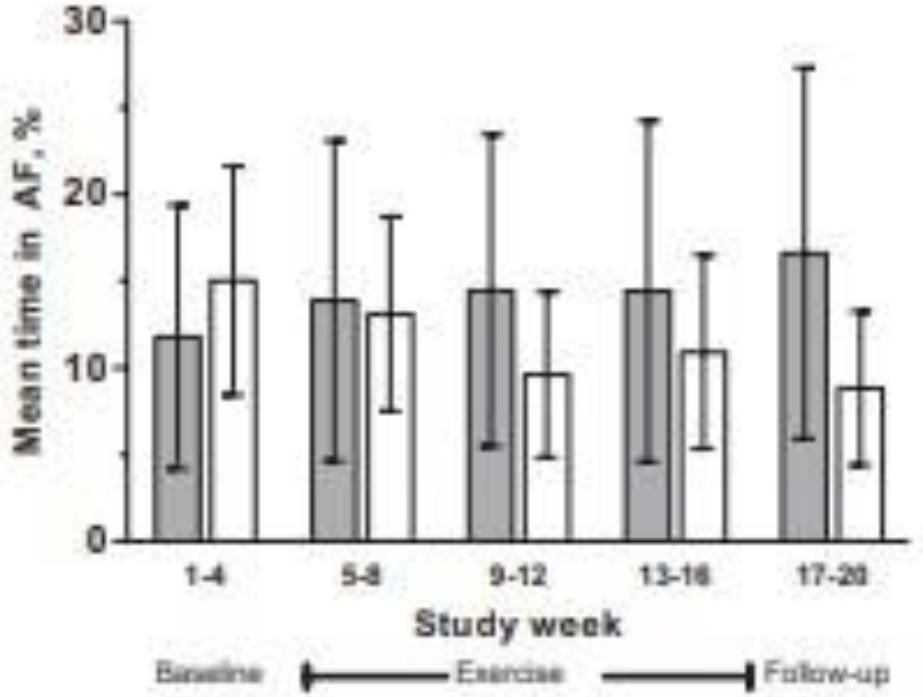


Figure 2. Atrial fibrillation (AF) burden in patients with AF during the study. Mean time in AF was measured by an implanted loop recorder (n=36) before, during, and after 12 weeks of aerobic interval training (exercise) or usual care (control). Patients without AF during the study period are excluded. Mean changes from baseline to follow up were −6.2±8.9 percentage points (pp), *P*=0.02 for exercise; 4.8±12.5 pp, *P*=0.09 for control; and 11.0±3.9 pp, *P*=0.007 between groups. Error bars show the 95% confidence interval.

Arrhythmia/Electrophysiology

Aerobic Interval Training Reduces the Burden of Atrial Fibrillation in the Short Term

A Randomized Trial

Vegard Malmo, MD; Bjarne M. Nes, PhD; Brage H. Amundsen, MD, PhD; Arnt-Erik Tjonna, PhD; Asbjorn Stoylen, MD, PhD; Ole Rossvoll, MD; Ulrik Wisloff, PhD; Jan P. Loennechen, MD, PhD

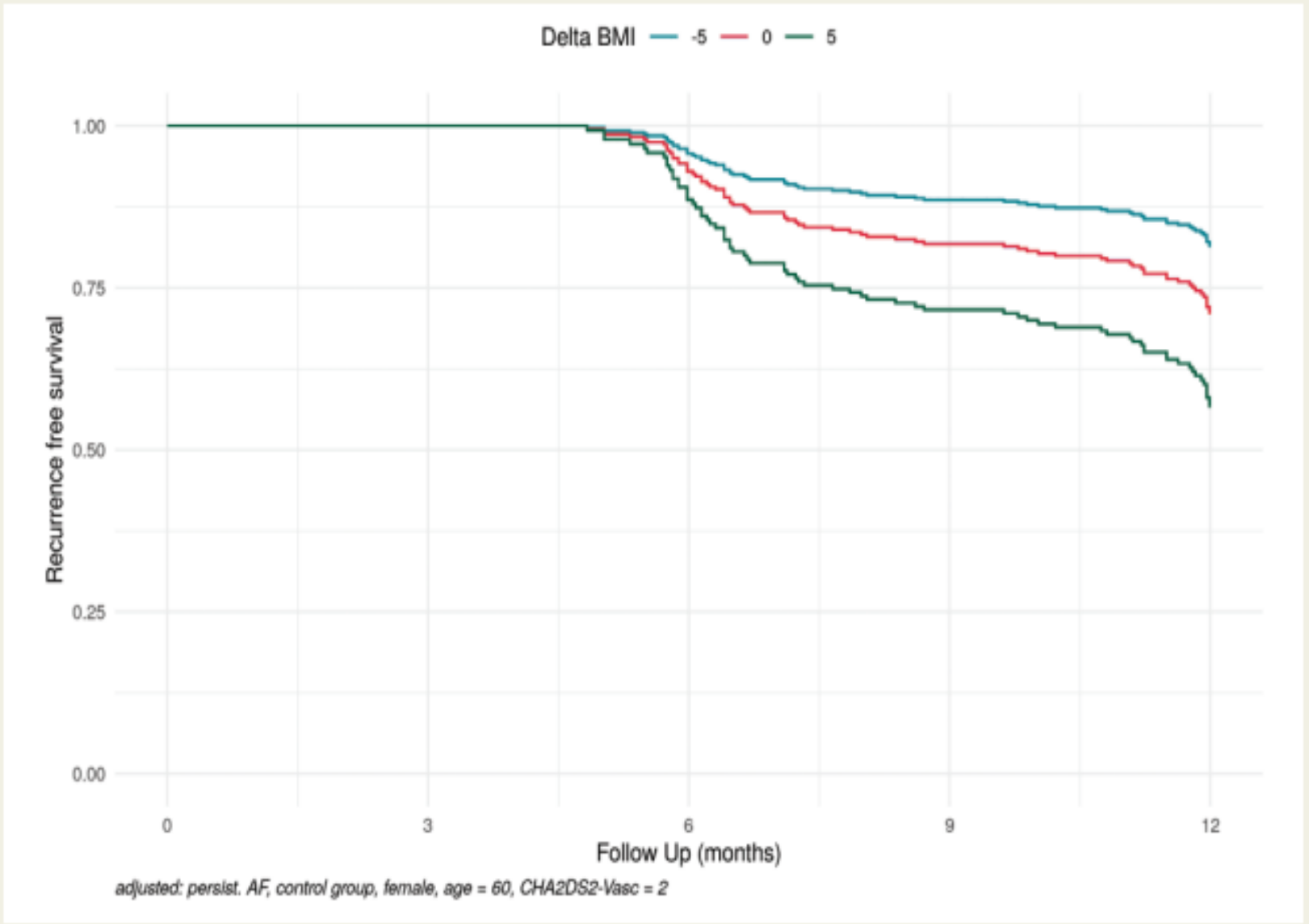


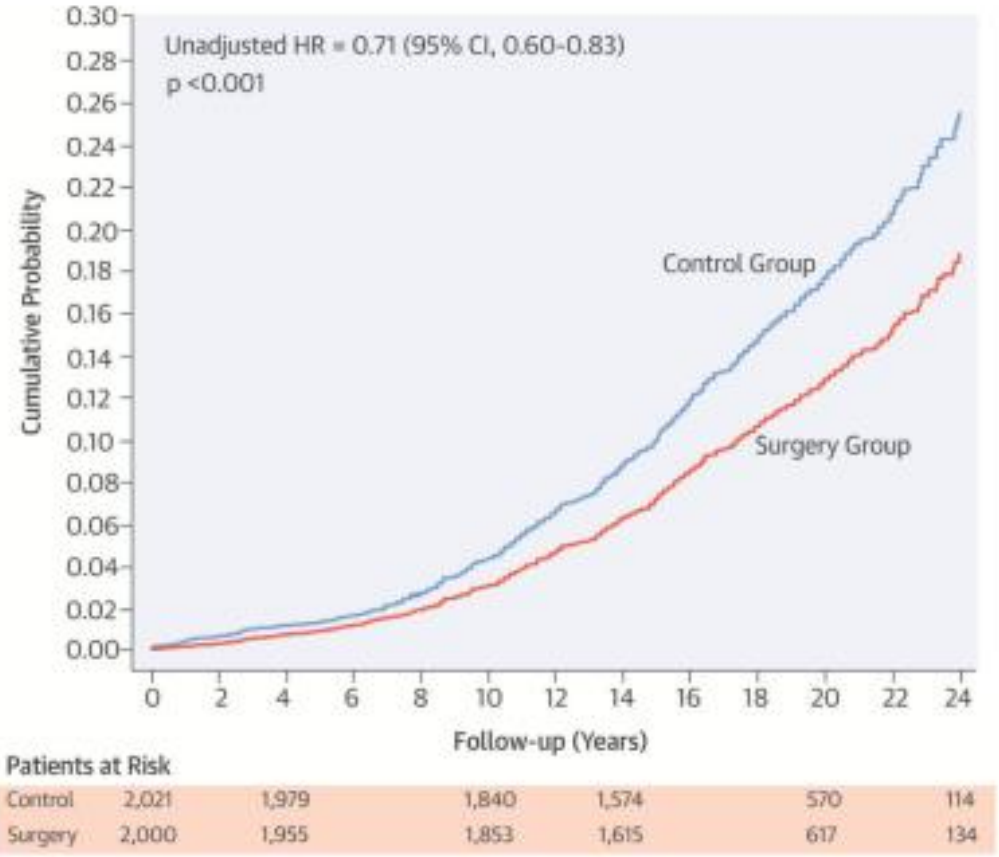
Figure 6 Model-based estimates of BMI change on recurrence free survival in persistent AF (adjusted: persistend AF, control group, female, age = 60, CHA_2DS_2-VASc score = 2). AF, atrial fibrillation; BMI, body mass index.

ESC European Society of Cardiology
Europace (2021) **23**, 1548–1558
doi:10.1093/europace/euab122

CLINICAL RESEARCH
Ablation for atrial fibrillation

Supervised Obesity Reduction Trial for AF ablation patients: results from the SORT-AF trial

Nele Gessler[1,2,3], Stephan Willems [1,3,4*†], Daniel Steven [5], Jens Aberle[6], Ruken Oezge Akbulak[1,3], Nils Gosau[1,3], Boris A. Hoffmann[7], Christian Meyer [3,8,9], Arian Sultan[5], Roland Tilz[3,10], Julia Vogler[3,10], Peter Wohlmuth[11], Susanne Scholz[1,2], Melanie A. Gunawardene[1,3], Christian Eickholt[1,3], and Jakob Lüker[5]



Central Illustration. Bariatric Surgery and the Risk of Atrial Fibrillation

Cumulative incidence estimates of first time atrial fibrillation in the surgery and control groups showing reduced risk of atrial fibrillation following weight loss through bariatric surgery.

Published in final edited form as:

J Am Coll Cardiol. 2016 December 13; 68(23): 2497–2504. doi:10.1016/j.jacc.2016.09.940.

Bariatric Surgery and the Risk of New-Onset Atrial Fibrillation in Swedish Obese Subjects

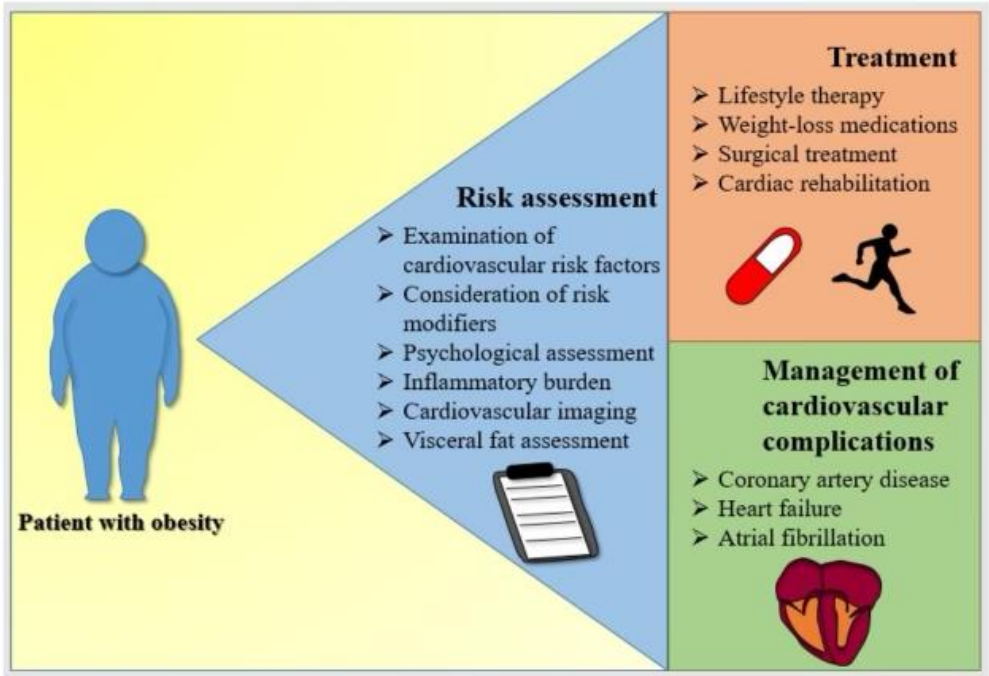
Shabbar Jamaly, MD[a], Lena Carlsson, MD, PhD[b], Markku Peltonen, PhD[c], Peter Jacobson, MD, PhD[b], Lars Sjöström, MD, PhD[b], and Kristjan Karason, MD, PhD[a]

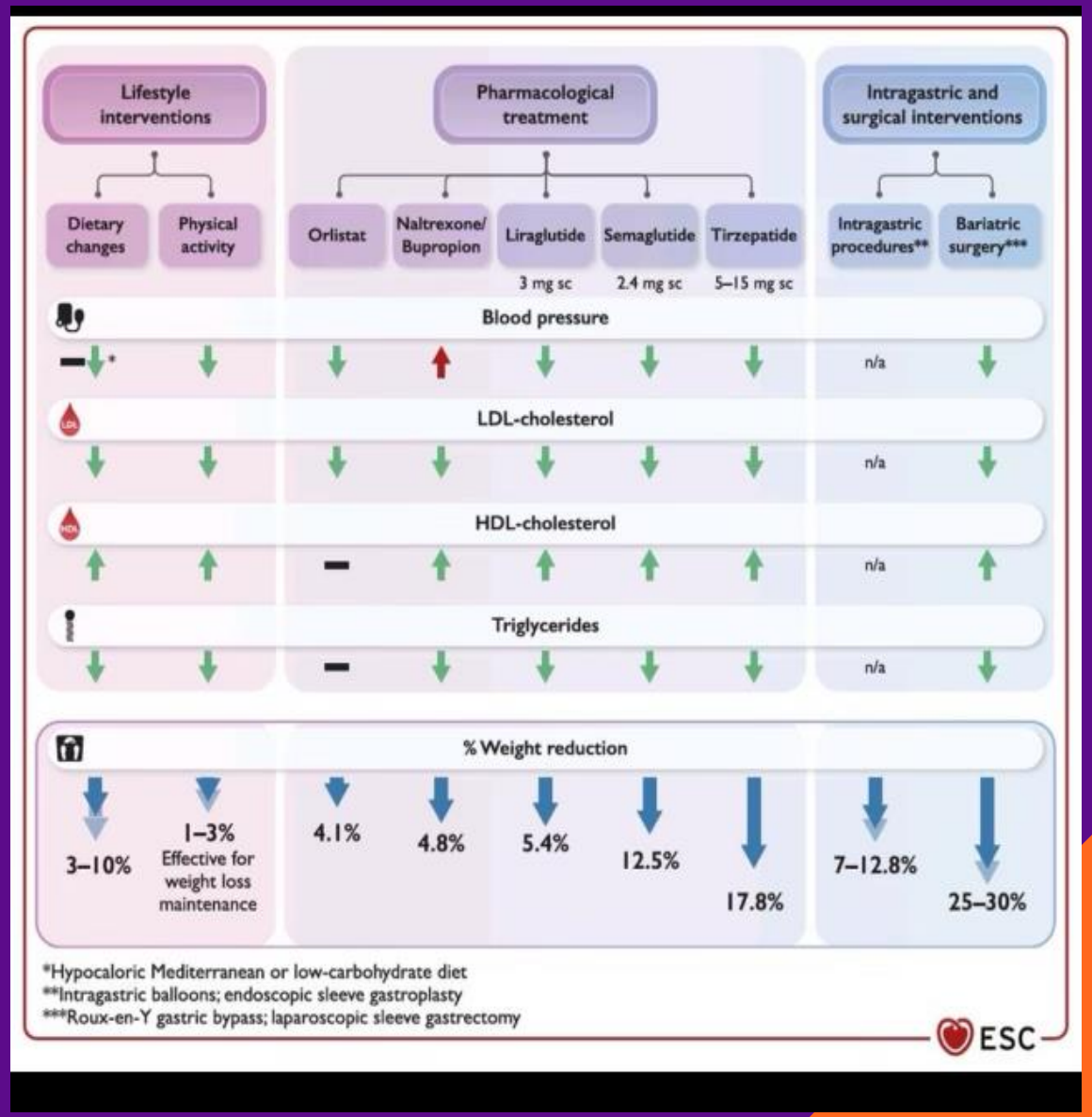
International Journal of Cardiology
Cardiovascular Risk and Prevention
Available online 5 September 2024, 200331
In Press, Journal Pre-proof ? What's this?

Obesity and cardiovascular disease: risk assessment, physical activity, and management of complications

Francesco Perone [1], Luigi Spadafora [2], Alessandra Pratesi [3], Giulia Nicolaio [4], Barbara Pala [5], Giulia Franco [6], Matteo Ruzzolini [7], Marco Ambrosetti [8]

https://doi.org/10.1016/j.ijcrp.2024.200331





Obesity + Activity Level: Key points

Obesity (BMI>30 kg/m^2), and overweight (BMI> 25 kg/m^2) have a 13% risk increase for every 5 kg/m^2 higher BMI than normal population.

Weight loss of >10% has shown reduced AF symptoms and burden with goal BMI <27 kg/m^2)

- SORT-AF: Sole weight loss intervention of 4% at 12 months did not change outcomes once AF develops, however did demonstrate lifestyle improvement

- LEGACY 5-year cohort weight loss <3% does not show impact on AF recurrence. Goal must be >5-10%

Bariatric surgery improves symptoms and reduces AF recurrence

Regular aerobic exercise may improve AF-related symptoms, quality of life and exercise capacity.

Fitness over time is associated with greater reduction in AF burden and improved maintenance of sinus rhythm.

OBSTRUCTIVE SLEEP APNEA

Obstructive Sleep Apnea: Key Points

Screening tools are not optimal but they are reasonable to develop a habit to screen patients.

CPAP lowers risk of recurrence after cardioversion and ablation

CPAP vs. No therapy, CPAP use demonstrates improvement in atrial remodeling if moderate-severe OSA.

OSA is highly prevalant condition.

Journal of *Cardiovascular Development and Disease*

MDPI

Review

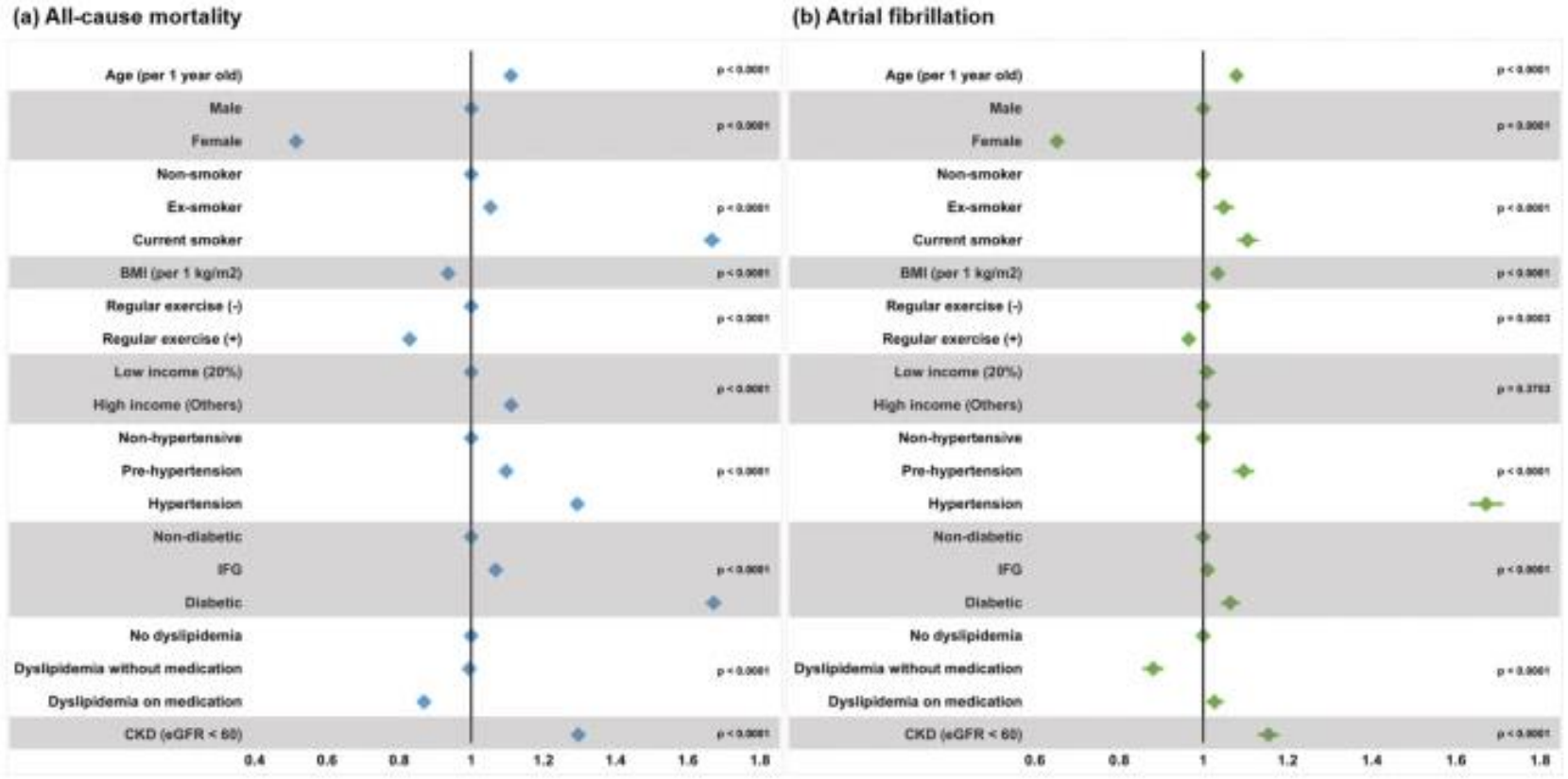
The Role of Risk Factor Modification in Atrial Fibrillation: Outcomes in Catheter Ablation

Shahana Hussain [1], Neil Srinivasan [2,3], Syed Ahsan [1] and Nikolaos Papageorgiou [1,4,*]

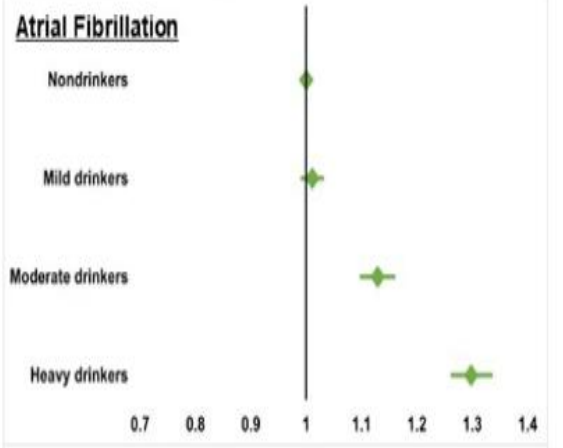
Study	Year	Patient Number	Median Follow Up (Months)	Study Design	Intervention	Results
Fein et al.	2013	62	12	Prospective observational cohort study	Evaluation of impact of CPAP therapy on AF recurrence in patients with polysomnography confirmed OSA undergoing AF ablation.	Patients receiving CPAP therapy had increased likelihood of freedom from AF/AT/AFL occurrence compared to patients that did not receive CPAP (71.9% vs. 36.7%, $p = 0.01$). The AF recurrence rate in the CPAP treated population was similar to patients without a diagnosis of OSA [46].
Congrete et al.	2018	4.572	12	Meta-analysis (7 observational studies)	Evaluation of AF recurrence in patients with OSA after AF ablation and the effect of CPAP on recurrence of AF.	AF recurrence was higher in patients with a diagnosis of OSA than without (pooled OR 1.70 (95% CI, 1.40–2.06)). The use of CPAP in patients with OSA was associated with a reduced risk of AF recurrence after catheter ablation (pooled OR of 0.28 (95% CI, 0.19–0.40)) [48].
Hunt et al.	2022	83	12	Randomised control trial	Impact of CPAP treatment on AF recurrence following PVI ablation in patients with PAF and OSA.	AF burden decreased in both cohorts but there was no significant different between groups ($p = 0.69$) [51].

ALCOHOL

Figure 3



Atrial Fibrillation					
Non-drinkers	2,043,728	40,364	16,654,818	2.424	1 (reference)
Mild-drinkers	1,167,656	14,736	9,603,714	1.534	1.011 (0.990 – 1.032)
Moderate-drinkers	460,144	6,896	3,768,512	1.830	1.129 (1.097 – 1.161)
Heavy-drinkers	318,845	6,256	2,590,906	2.415	1.298 (1.261 – 1.337)



Kim, Y.G., Kim, D.Y., Roh, SY. *et al.* Alcohol and the risk of all-cause death, atrial fibrillation, ventricular arrhythmia, and sudden cardiac arrest. *Sci Rep* **14**, 5053 (2024). https://doi.org/10.1038/s41598-024-55434-6

Alcohol Excess: Key Points

Abstinence has shown reduction of risk.

If receiving an OAC, alcohol excess associated with greater risk of bleeding.

Dose dependent relationship for recurrence of AF.

Non-binge drinkers: abstinence led to reduction in AF recurrence and burden.

If receiving ablation <7 standard drinks per week was associated with improved maintenance of sinus rhythm.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Alcohol Abstinence in Drinkers with Atrial Fibrillation

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Table 2. Alcohol Intake at Baseline.

Variable	Abstinence Group (N = 70)	Control Group (N = 70)
Alcohol intake — no. of standard drinks/wk	16.8±7.7	16.4±6.9
Beverages consumed — no. (%)		
Wine	48 (69)	47 (67)
Beer	34 (49)	34 (49)
Spirits	13 (19)	9 (13)
Binge drinking — no. (%)*	20 (29)	16 (23)

* Binge drinking was defined as consumption of 5 or more drinks on a single occasion at least once a month.

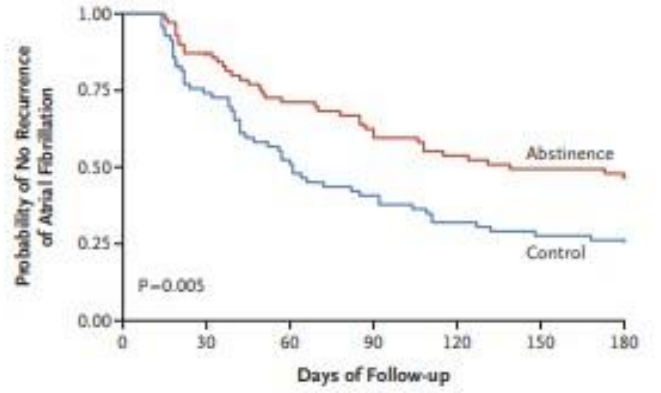


Figure 2. Time to Recurrence of Atrial Fibrillation.

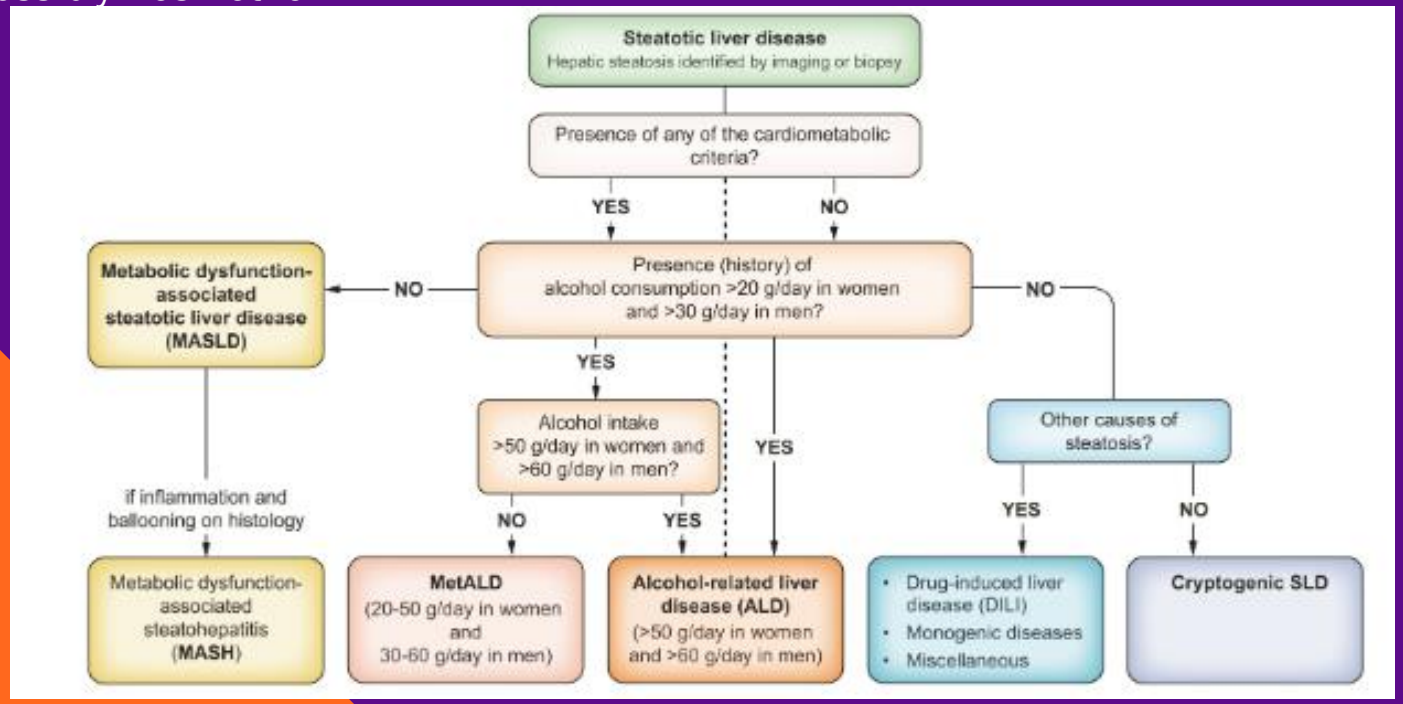
METABOLIC DYSFUNCTION ASSOCIATED-STEATOTIC LIVER DISEASE (MASLD)

Steatotic Liver Disease

Under-recognized global health concern. Affects 1 in 3 adults leading to liver related morbidity and mortality.

There is a Positive association with Atrial Fibrillation

Treatment with Lifestyle modifications, Statins, GLP-1 and possibly Resmetirom



1. EASL–EASD–EASO Clinical Practice Guidelines on the management of metabolic dysfunction-associated steatotic liver disease (MASLD)
Tacke, Frank et al.
Journal of Hepatology, Volume 81, Issue 3, 492 - 542

ELSEVIER
Current Problems in Cardiology
Volume 49, Issue 7, July 2024, 102580

Electrocardiographic abnormalities in patients with metabolic dysfunction-associated steatotic liver disease: A systematic review and meta-analysis

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Atrial fibrillation

There was a statistically significant association between the prevalence of atrial fibrillation and MASLD (pooled OR: 1.34 95 % CI: 1.20–1.49, $p < 0.001$, $n = 12$, $I^2 = 71.7$ %, $p < 0.001$) (Fig. 2).

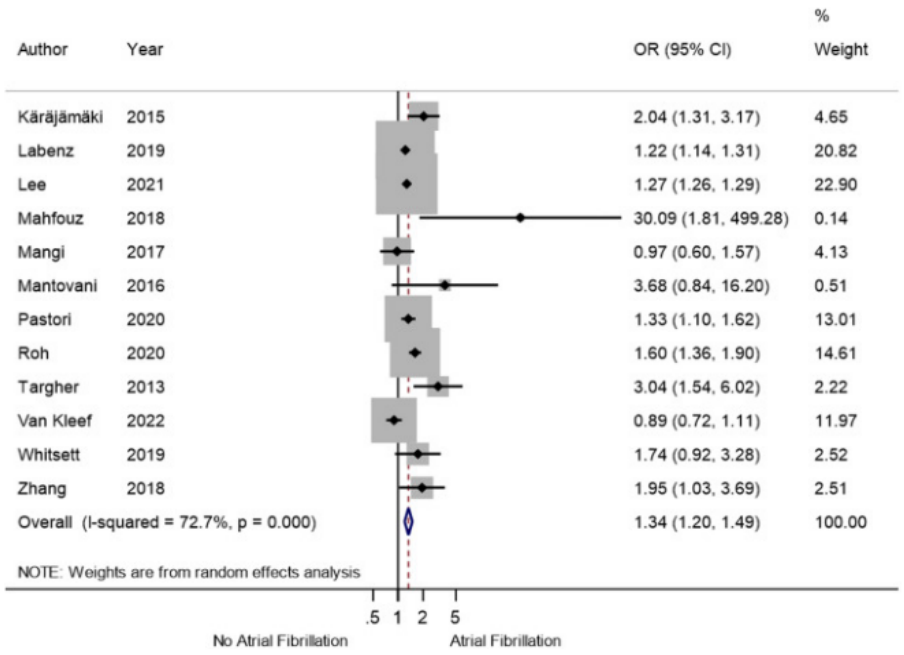

Table 3 Cardiometabolic risk factors in the definition of MASLD.[2]

Metabolic risk factor	Adult criteria
Overweight or Obesity	Body mass index ≥25 kg/m^2 (≥23 kg/m^2 in people of Asian ethnicity)
	Waist circumference•≥94 cm in men and ≥80 cm in women (Europeans)•≥90 cm in men and ≥80 cm in women (South Asians and Chinese)•≥85 cm in men and ≥90 cm in women (Japanese)
Dysglycaemia or type 2 diabetes	Prediabetes: HbA_{1c} 39-47 mmol/mol (5.7-6.4%) or fasting plasma glucose 5.6-6.9 mmol/L (100-125 mg/dl) or 2-h plasma glucose during OGTT 7.8-11 mmol/L (140-199 mg/dl) *or* Type 2 diabetes: HbA_{1c} ≥48 mmol/mol (≥6.5%) or fasting plasma glucose ≥7.0 mmol/L (≥126 mg/dl) or 2-h plasma glucose during OGTT ≥11.1 mmol/L (≥200 mg/dl) *or* Treatment for type 2 diabetes
Plasma triglycerides	≥1.7 mmol/L (≥150 mg/dl) *or* lipid-lowering treatment
HDL-cholesterol	≤1.0 mmol/L (≤39 mg/dl) in men and ≤1.3 mmol/L (≤50 mg/dl) in women *or* lipid-lowering treatment
Blood pressure	≥130/85 mmHg *or* treatment for hypertension

HbA1c, glycated haemoglobin; HDL, high-density lipoprotein; OGTT, oral glucose tolerance test.

Cardiovascular disease	Fasting plasma uric acid Serum high-sensitivity C-reactive protein (hsCRP) Serum ferritin Systolic and diastolic blood pressure *Further investigations**: 24-h ambulatory blood pressure monitoring Echocardiography for heart failure Serum NT-ProBNP Transferrin saturation	25,26
Atherosclerosis	Complete blood count; Platelets Elevated lipoprotein (a) is an independent causal risk factor for atherosclerotic cardiovascular disease *Further investigations**: Fibrinogen Homocysteine Von Willebrand factor antigen Carotid artery intima media thickness EchoDoppler plaque instability Coronary artery calcification	25,26

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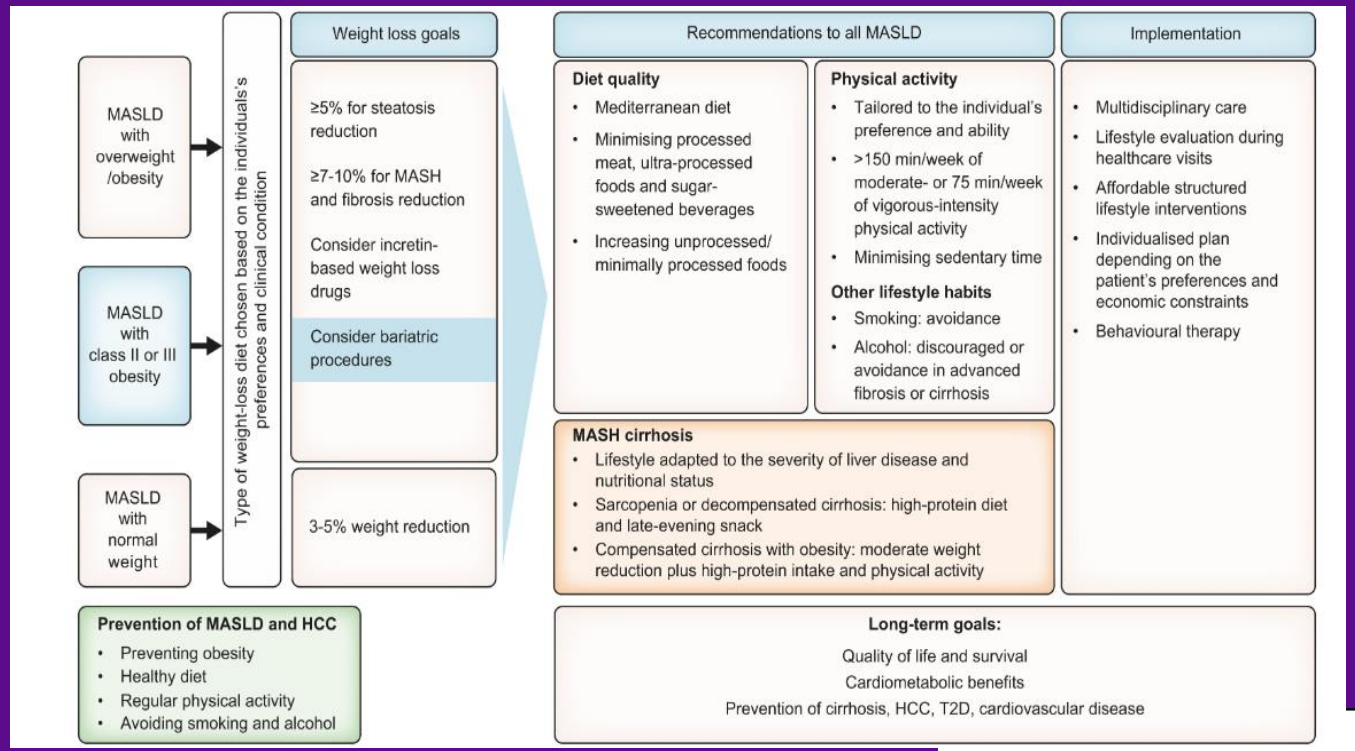

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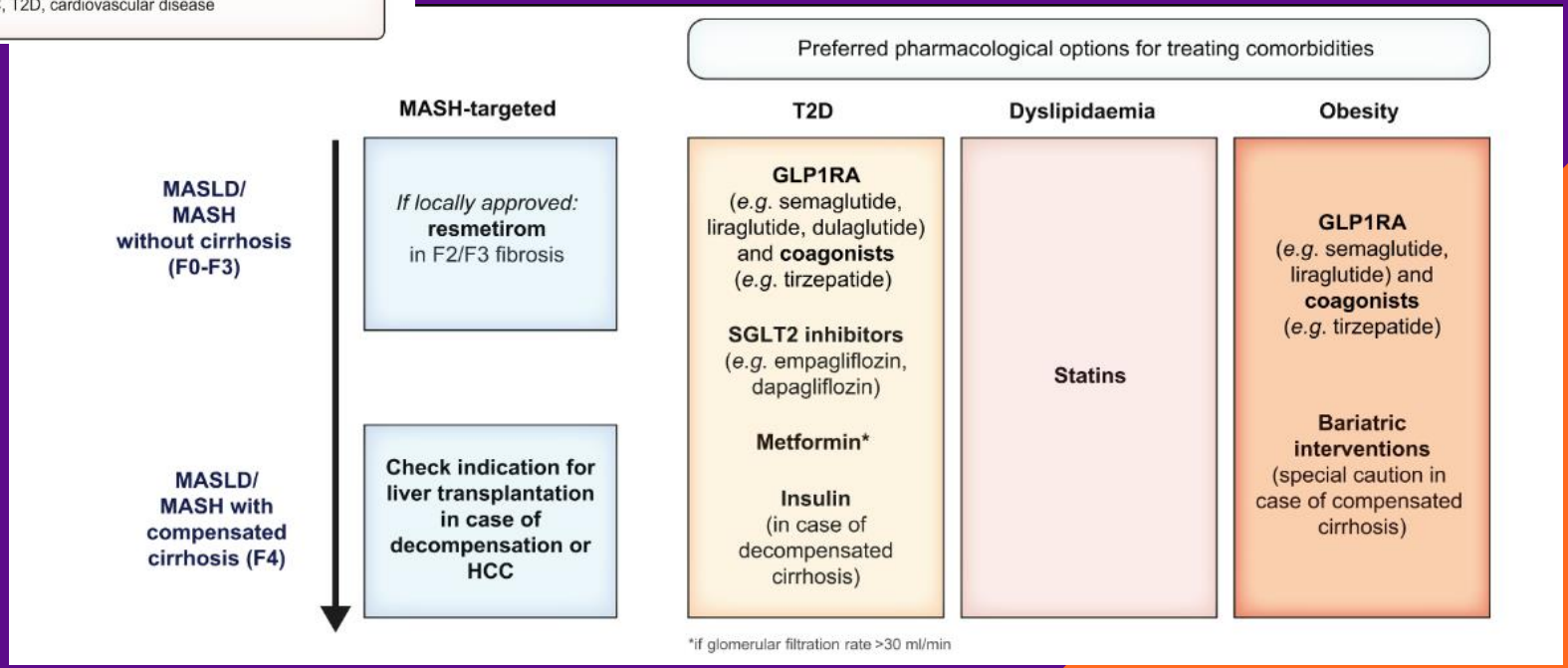

POLYGENIC RISK SCORE

Polygenic Risk Score Risk Calculators

Polygenic risk scores (PRSs) have become a popular method of quantifying aggregated genetic risk from common risk alleles identified from genome-wide association studies.

There is a correlation between Risk factors + elevated PRS scores

CHARGE-AF study: most well known

C2HEST score: Asian cohorts.

TABLE 6 CHARGE-AF Risk Score for Detecting Incident AF*

Variable (X)	Estimated β Coefficient (SE)	HR (95% CI)
Age (per 5-y increment)	0.508 (0.022)	1.66 (1.59-1.74)
White race	0.465 (0.093)	1.59 (1.33-1.91)
Height (per 10-cm increment)	0.248 (0.036)	1.28 (1.19-1.38)
Weight (per 15-kg increment)	0.115 (0.033)	1.12 (1.05-1.20)
Systolic BP (per 20-mm Hg increment)	0.197 (0.033)	1.22 (1.14-1.30)
Diastolic BP (per 10-mm Hg increment)	0.101 (0.032)	0.90 (0.85-0.96)
Smoking (current versus former/never)	0.359 (0.063)	1.42 (1.25-1.60)
Diabetes (yes)	0.237 (0.073)	1.27 (1.64-2.48)
Myocardial infarction (yes)	0.496 (0.089)	1.64 (1.38-1.96)

Table 6 does not encompass all complications.
*Five-year risk is given by: $1 - 0.97818412736^{\exp(\beta x - 12.4411365)}$, where β is the regression coefficient (column 2) and X is the level of each variable risk factor.[2]

AF indicates atrial fibrillation; BP, blood pressure; CHARGE-AF, Cohorts for Heart and Aging Research in Genomic Epidemiology model for atrial fibrillation; HR, hazard ratio; and SE, standard error.

TABLE 7 C_2HEST Risk Score for Detecting Incident AF*

Acronym	Risk Factor	Points
C_2	CAD/COPD	1-2
H	Hypertension	1
E	Elderly (age ≥75 y)	2
S	Systolic heart failure	2
T	Thyroid disease (hyperthyroidism)	1

*Total points 0-8. For the C_2HEST score, the C statistic was 0.749, with 95% CI of 0.729-0.769.[80] The incident rate of AF increased significantly with higher C_2HEST scores.

AF indicates atrial fibrillation; CAD, coronary artery disease; C_2HEST, coronary artery disease or chronic obstructive pulmonary disease [1 point each]; hypertension [1 point]; elderly [age ≥75 y, 2 points]; systolic HF [2 points]; thyroid disease [hyperthyroidism, 1 point]; and COPD, chronic obstructive pulmonary disease.

Joglar, J, Chung, M. et al. 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. JACC. 2024 Jan, 83 (1) 109–279. https://doi.org/10.1016/j.jacc.2023.08.017

Risk Model	Charge-AF	FHS-Score	ARIC Score	C2HEST Score	WHS Score	MHS Score	JMC Score	Shandong Score	EHR-AF
Prediction of AF incidence (years)	5	10	10	11	10	10	7		5
Variables					-				
Age	√	√	√	√	√	√	√	√	√
Sex	-	√	-	-	-	√	-	√	√
Race	√	-	√	-	-	-	-	-	√
Body measurements	√	√	√	√	√	√	√	-	√
Blood pressure	√	-	√	-	-	-	-	-	-
Heart Rate	-	-	-	-	-	-	√	-	-
History of Heart Failure	√	√	√	√	-	√	-	-	√
Hypertension	√	√	√	√	√	√	√	√	√
Diabetes Mellitus	√	-	√	-	-	√	-	-	-
Stroke	-	-	-	-	-	-	-	-	√
Coronary Artery Disease	√	-	√	√	-	-	-	√	√
Vascular Disease	-	-	-	-		√		-	√
Alcohol use	-	-	-	-	√	-	√	-	
Smoking	√		√	-	√	-	-	-	√
ECG parameters	-	√	√	-	-	-	-	-	-
COPD	-	-	-	√	-	√	-	-	-
Autoimmune/ Connective Tissue/ Inflammatory Disease	-	-	-	-	-	√	-	-	-
Significant Murmur	-	√	√	-	-	-	√	-	-
Serum Lipids	-	-	-	-	-	-	-	-	-
Glomerual Filtration Rate	-	-	-	-	-	-	-	-	√
Urine Albumin Secretion	-	-	-	-	-	-	-	-	-
Thyroid Disease	-	-	-	√				-	√
Dyslipidemia	-	-	-	-	-	-	-	-	√
Valvular Disease	-	-	-	-	-	-	-	-	√

Goudis, C., Daios, S., Dimitriadis, F., & Liu, T. (2023). CHARGE-AF: A Useful Score For Atrial Fibrillation Prediction?. *Current cardiology reviews*, *19*(2), e010922208402. https://doi.org/10.2174/1573403X18666220901102557

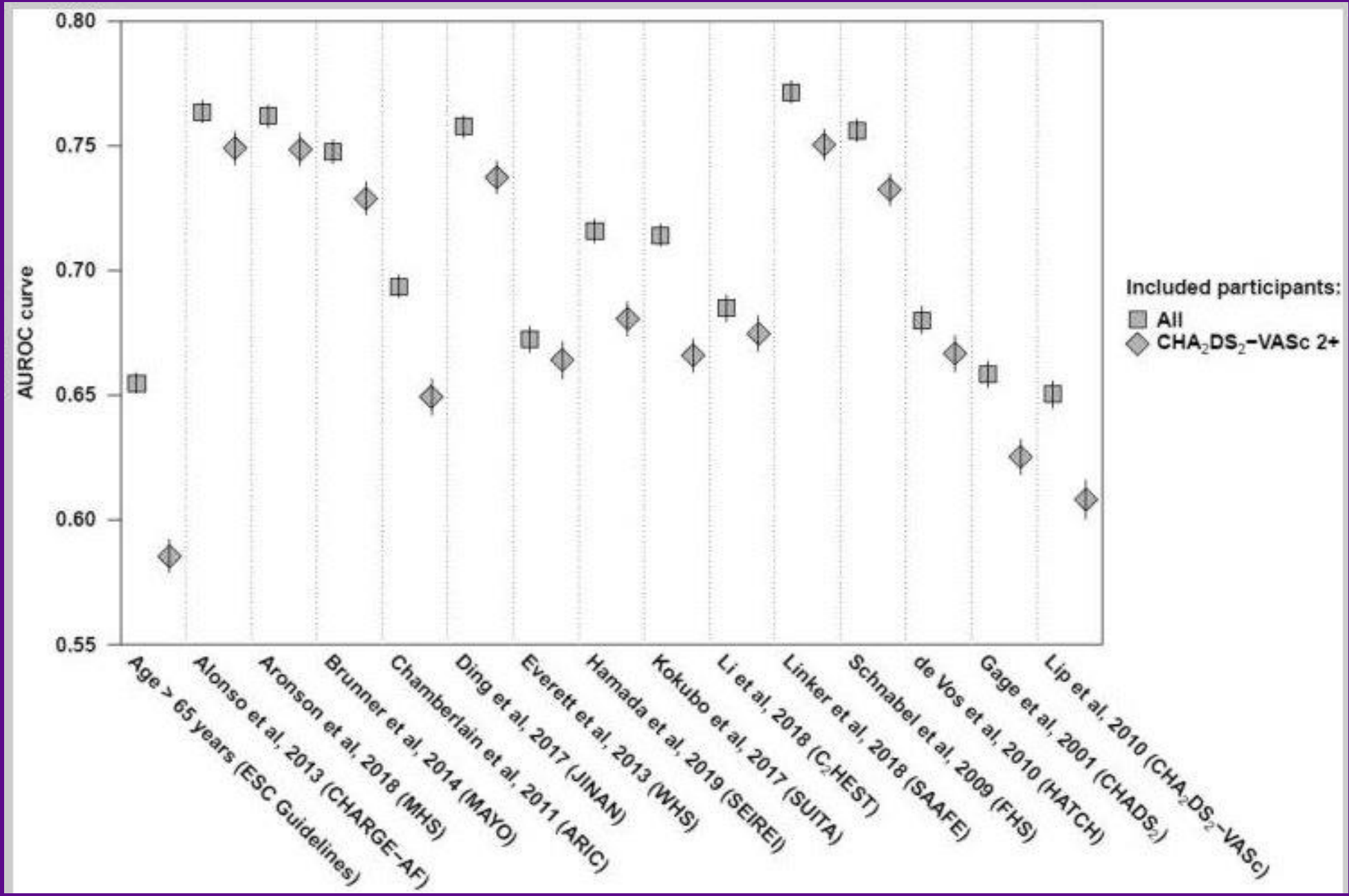

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Table 2 Summary of psychosocial and health behavior outcomes among studies evaluating differences in PGS risk level ($N = 14$)

Outcome type	Outcome	Low PGS	High PGS	No Difference in Outcome Based on Risk Level
Psychosocial ($n = 9$)	Risk perception	All participants acknowledged low PGS does not mean no risk[19,25,39] Decreased risk perception compared with high PGS[16]	Increased risk perception[26]	
	Generalized distress, anxiety, and depression		Increased short-term distress that dissipated spontaneously[17,39]	Depression and/or anxiety[20]
	Genetic testing-specific distress		Higher long-term distress compared to low PGS, that remained low overall[15,16,33]	
	Cancer-specific worry		Higher worry for melanoma compared to low PGS, that remained low overall[15]	Skin cancer worry[33]
	Other		Reduced shame and guilt over condition[17,24,25]	Satisfaction[34]
Behavior ($n = 9$)	Cancer screening/ sun safety	Not associated with maladaptive change in breast screening behavior;[16] Not associated with maladaptive changes in prostate screening behavior[19]	Increased skin examinations[39]	Skin checks,[15] prostate screening[28]
	Communication		Increased communication with health care provider[18,31]	Communication with family[31]
	Lifestyle	One participant in a qualitative study reported more relaxed sun safety,[39] No maladaptive effect on sun protection behavior[15] No maladaptive effect on diet, smoking,[18] or exercise[20]	Increased sun safety;[15,39] Short term increase in sunscreen use;[15] increased weight loss,[18,23] exercise,[23] and vitamin intake[28]	Smoking cessation,[18,30] diet,[28,30] weight loss,[28,30] and exercise[28,30]
	Cholesterol		Decreased LDL cholesterol levels,[18,22] Increased statin use[22]	

LDL, low density lipoprotein; *PGS*, polygenic score.

Genetics in Medicine (2023) 25, 1–11

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SYSTEMATIC REVIEW

Models of communication for polygenic scores and associated psychosocial and behavioral effects on recipients: A systematic review

Courtney K. Wallingford[1], Hannah Kovilpillai[2], Chris Jacobs[2], Erin Turbitt[2], Clare A. Primiero[1], Mary-Anne Young[3,4], Deanna G. Brockman[5], H. Peter Soyer[1,6], Aideen M. McInerney-Leo[1], Tatiane Yanes[1,*]

POST-CATHETER ABLATION RISK FACTOR MODIFICATION

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Aggressive Risk Factor Reduction Study for Atrial Fibrillation and Implications for the Outcome of Ablation

The ARREST-AF Cohort Study

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Rajiv Mahajan, MD,* Darragh Twomey, MBBS,* Muayad Alasady, MBBS,*† Lorraine Hanley, BSc,*
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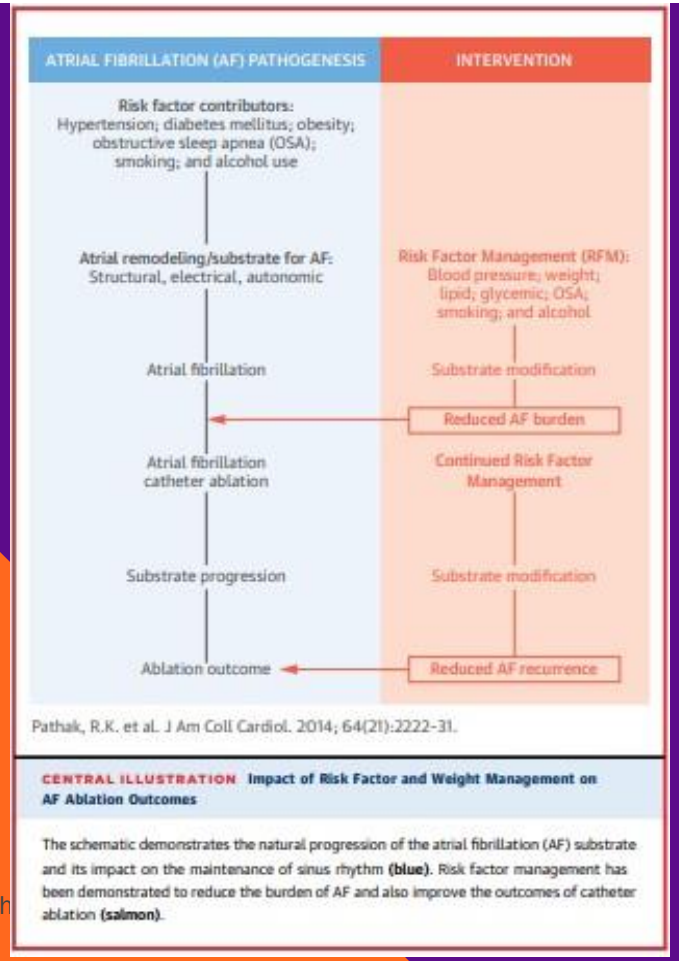
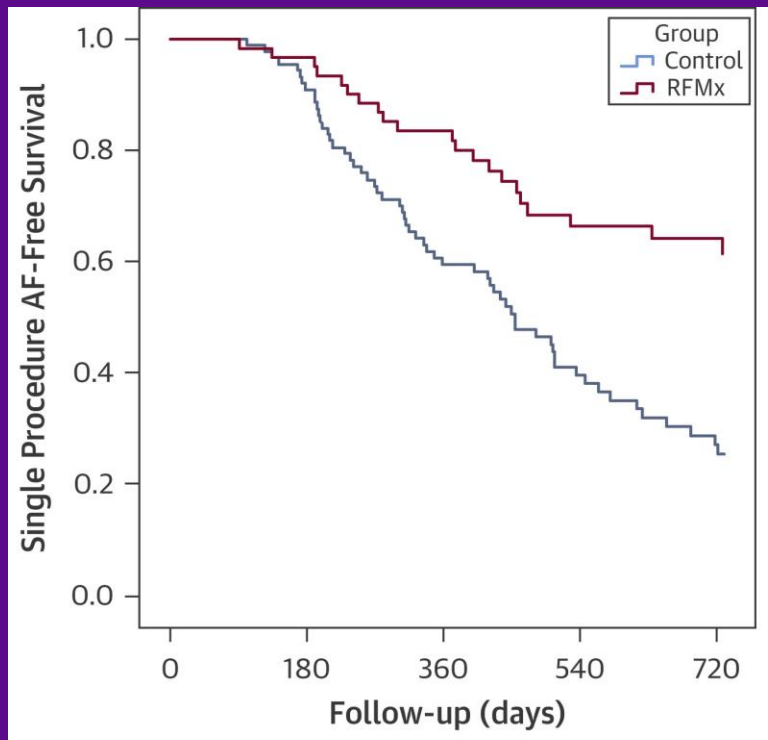
Walter P. Abhayaratna, MBBS, PhD,‖ Prashanthan Sanders, MBBS, PhD*



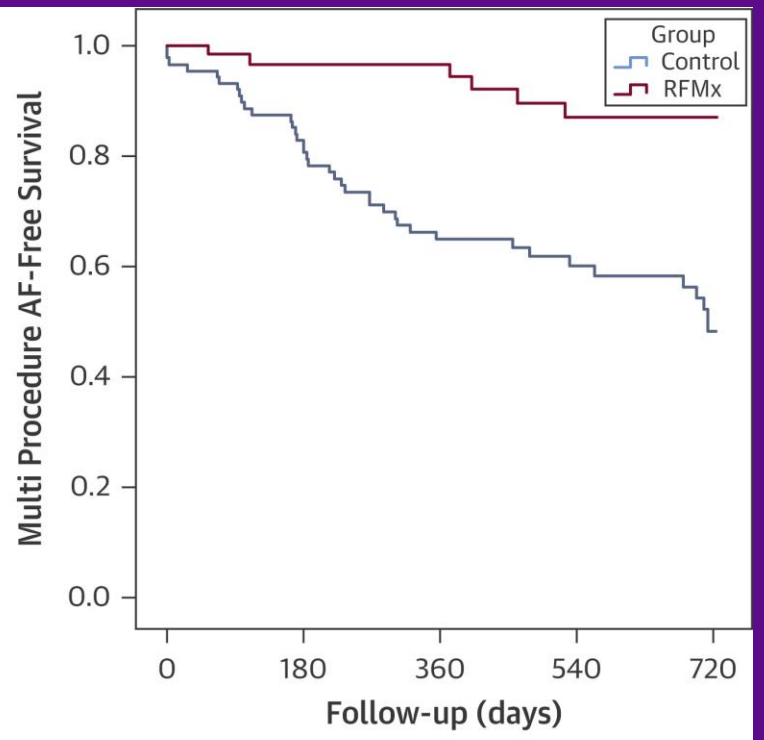
Pathak, R.K. et al. J Am Coll Cardiol. 2014; 64(21):2222-31.

CENTRAL ILLUSTRATION **Impact of Risk Factor and Weight Management on AF Ablation Outcomes**

The schematic demonstrates the natural progression of the atrial fibrillation (AF) substrate and its impact on the maintenance of sinus rhythm **(blue)**. Risk factor management has been demonstrated to reduce the burden of AF and also improve the outcomes of catheter ablation **(salmon)**.



Time (days)	0	180	360	540	730
RFM	61	59	48	33	27
Control	88	79	51	28	16



	0	180	360	540	730
	61	55	46	32	25
	88	72	51	36	23

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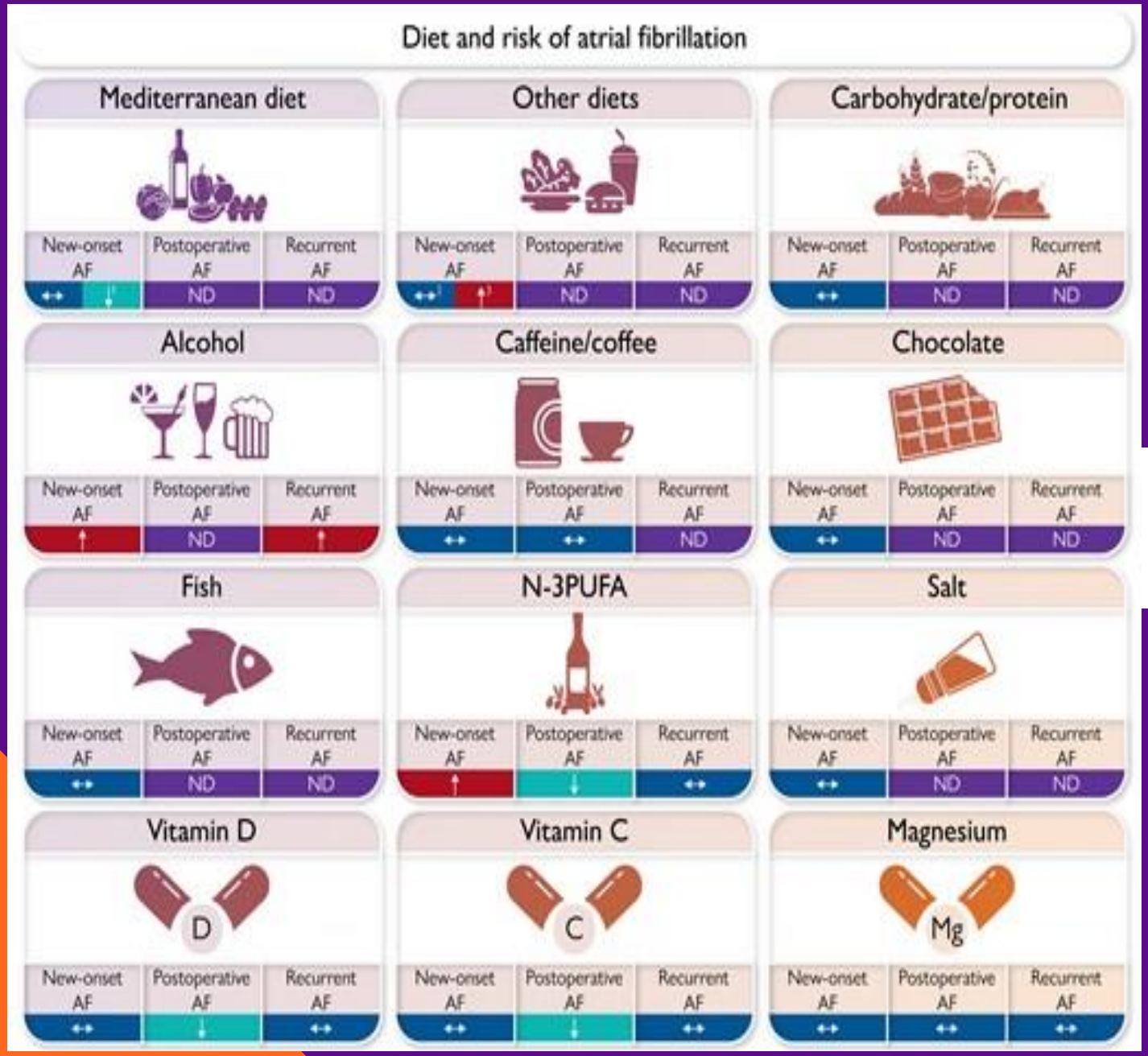
NUTRITION



Monika Gawałko, Melissa E Middeldorp, Arnela Saljic, John Penders, Thomas Jespersen, Christine M Albert, Gregory M Marcus, Christopher X Wong, Prashanthan Sanders, Dominik Linz, Diet and risk of atrial fibrillation: a systematic review, *European Heart Journal*, 2024;, ehae551, https://doi.org/10.1093/eurheartj/ehae551

SUMMARY

WE ARE ALL PREVENTIONISTS:

We must ask about	We screen	We treat
Alcohol use/intake	Routine interview: CAGE/AUDIT-C	CBT, Groups, LRFM, Rx
Diabetes Mellitus	Routine HbA1c check annually	LRFM, Rx
Increase Stress	PHQ 2/9 annually	CBT, LRFM, Specialists, Rx
Hypertension	Every Physical Encounter	ABPM, RPM, LRFM, Rx
Nutrition	Every Encounter	Nutrition/Dietician referrals
Obesity	Every Physical Encounter	LRFM, Nutrition, Rx
Obstructive Sleep Apnea	Routine Interview: STOP-BANG, Epsworth (ESS), Berlin Questionaire (BQ), sleep apnea testing	LRFM Nutrition, Exercise,
Physical Activity	Level of Activity per ACC/AHA Standard (minutes per week >220)	Rehab, Exercise Prescriptions, Step Trackers, Incentives
Thyroid Disease	Annual Lab work	LRFM, Rx
Tobacco use	Routine Interview	CBT, LRFM, Rx

+ MASLD

SUMMARY POINTS:

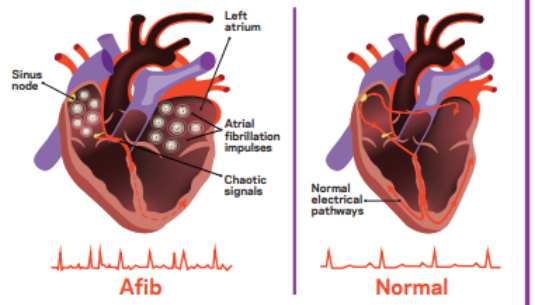
1) **Lifestyle Risk Modification is the single biggest key to lowering risk for developing or ceasing the cycle of Atrial Fibrillation.**
2) Lose weight by 10%, lower your risk
3) Exercise regularly, lower risk
4) Limit Alcohol Consumption to 0 if possible and no more than 4-5 drinks per week.
5) Treat Diabetes Mellitus Aggressively.
6) Obstructive sleep apnea screening and treatment is warranted.
7) Polygenic Risk Scores, an emerging preventive tool.
8) Screen for Steatotic Liver Disease.

KNOW YOUR AFIB RISK

Atrial fibrillation (Afib) is the most common kind of irregular heart rhythm—and it increases risk of stroke and heart failure.

Afib is often caused by controllable medical conditions, like hypertension, sleep apnea or being overweight. It's generally not life-threatening. The chart below can help you figure out your risk for afib. As you approach the ideal range for each, your heart can remodel and your risk for afib will decrease.

We can help restore your heart



Treatment for afib can remodel your heart and help it function more normally.

Stay in the healthy zone to cut your risk

	Lower risk of afib		Increased risk of afib		My numbers
Blood sugar	Normal (A1c < 5.7%)		Prediabetes (A1c between 5.7% and 6.4%)	Diabetes (A1c ⩾ 6.5%)	
Blood pressure	Normal (below 120/80 mmHg)		Intermediate (120/80 to 140/90 mmHg)	High (above 140/90 mmHg)	
Cholesterol	Ideal (LDL < 70 mg/dL)	Normal (LDL < 100 mg/dL)	Intermediate (LDL between 100 and 130 mg/dL)	High (LDL > 130 mg/dL)	
Smoking	No smoking/tobacco use		Any smoking/tobacco use		
Body mass index	Normal (BMI < 25)		Overweight (BMI between 25 and 29)	Obese (BMI ⩾ 30)	
Diet	Heart-healthy diet		Somewhat healthy diet	Unhealthy diet	
Physical activity	30 to 60 minutes of exercise daily		Some activity	Sedentary lifestyle	
Alcohol	0 to 1 drink/day			>1 drink/day	
Sleep apnea	None, or treated			Never tested, or not treated	

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MOVES THAT MAKE A DIFFERENCE

ADOPT A HEART-HEALTHY DIET

Taking steps toward eating more healthy foods, and fewer unhealthy ones, is the key to improving your diet.

Four core healthy food groups

- **Fruits** — Berries, bananas, apples, pears
- **Vegetables** — Kale, carrots, broccoli, spinach
- **Whole grains** — Quinoa, barley, oatmeal, whole wheat
- **Legumes** — Lentils, chickpeas, black beans, edamame

+

- Limited or no animal products
- Low-fat dairy Lean meats Fish
- Nuts Oily fish Olive oil

Heart-healthy diets to try

Vegetarian/vegan · DASH · Mediterranean

What your heart doesn't need

Limit or eliminate the following:

Red and processed meats
(sausages, cold cuts, bacon, beef, lamb)

Saturated fats
(red meats, ice cream, cheese, butter)

Trans fats
(hydrogenated fat, partially hydrogenated fat)

Sweets and refined carbs
(sugar, juices, corn syrup, candy)

Excess sodium
(found in frozen meals, canned foods, pickles, chips)

The vitamin K connection

If you take an older blood thinner, you may need to limit foods high in vitamin K, like leafy greens. With newer blood thinners, you don't need to avoid any foods. Ask your doctor about your blood thinner.

Stay active to stay ahead of afib

A few simple moves can make a big difference:

- Get 150 minutes of moderate physical activity per week.
- Include strength training at least two days per week.
- Reduce stress through yoga, mindfulness meditation or another form of centering/relaxation.

THANK YOU

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HEART DISEASE PREVENTION AND ADVANCED LIPID DISORDERS

PREVENTING AND MANAGING HEART DISEASE

Make sure to know your numbers and foods that are heart healthy!

	Lower risk of heart disease →		Increased risk of heart disease	My numbers
Diabetes (measured by A1c)	Normal (A1c < 5.7%)	Pre-diabetes (A1c between 5.7% and 6.4%)	Diabetes (A1c ≥ 6.5%)	
Blood pressure	Normal (Less than 120/80)	Intermediate (120/80 to 140/90)	High (Greater than 140/90)	
Cholesterol (measured by LDL)	Ideal (LDL less than 70) / Normal (LDL Less than 100	Intermediate (LDL between 100-130)	High (LDL Greater than 130)	
Smoking	No smoking (The only healthy choice!)	Any tobacco use (Smoking is dangerous to your health and damages blood vessels.)		
Body mass index	Normal (BMI < 25)	Overweight (BMI between 25 and 29)	Obese (BMI ≥ 30)	
Diet	Heart-healthy diet	Somewhat healthy diet	Unhealthy diet	
Physical activity	30-60 minutes of exercise daily	Some activity	Sedentary lifestyle	

If each of these risk factors is the ideal range, your risk for heart disease is much lower.

A healthy diet and regular exercise are the key for prevention.

Access our Northwell Health prevention website here for educational material and to meet our team

Access our fun animated videos about the basics of heart disease, risk factors, and lifestyle here