More susceptible atrial remodeling in atrial fibrillation according to alcohol consumption and the impact of alcohol abstinence: MRI-based study from UK biobank.

Hyo-Jeong Ahn[1], Eue-Keun Choi[1,2], Tae-Min Rhee[3], JungMin Choi[1], Kyung-Yeon Lee[1], Soonil Kwon[1], So-Ryoung Lee[1], Seil Oh[1,2], Gregory Y. H. Lip[2,4,5]

[1] Department of Internal Medicine, Seoul National University Hospital, Seoul, Republic of Korea
[2] Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Republic of Korea
[3] Department of Internal Medicine, Seoul National University Hospital Healthcare System Gangnam Center, Seoul, Korea.
[4] Liverpool Centre for Cardiovascular Science at University of Liverpool, Liverpool John Moores University and Liverpool Chest & Heart Hospital, Liverpool, United Kingdom
[5] Danish Center for Clinical Health Services Research, Department of Clinical Medicine, Aalborg University, Aalborg, Denmark

Korean Heart Rhythm Society
COI Disclosure

Hyo-Jeong Ahn

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Importance of lifestyle modifications in AF

● The Atrial fibrillation Better Care (ABC) holistic pathway

'A' Anticoagulation/Avoid stroke; 'B' Better symptom management; 'C' Cardiovascular and Comorbidity optimization.

Treat AF: The ABC pathway

A
Anticoagulation/
Avoid stroke

B
Better
symptom
control

C
Comorbidities/
Cardiovascular
risk factor
management
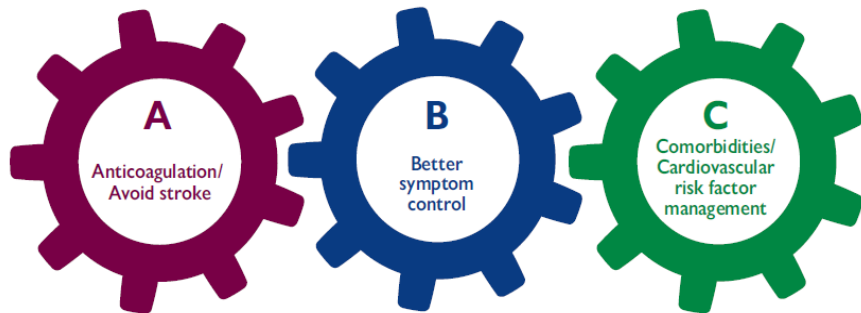
Lifestyle modification and other strategies to improve outcomes of ablation	
Strict control of risk factors and avoidance of triggers are recommended as part of rhythm control strategy.	I
Recommendations for lifestyle interventions and management of risk factors and concomitant diseases in AF	
Identification and management of risk factors and concomitant diseases is recommended as an integral part of treatment in AF patients.	I
Modification of unhealthy lifestyle and targeted therapy of intercurrent conditions is recommended to reduce AF burden and symptom severity.	I

Alcohol abstinence and low risk of stroke in AF

- Explainable mechanisms?
  - Alcohol intake and electrical/structural atrial remodeling → atrial myopathy
  - Alcohol abstinence and reduced arrhythmia recurrence in regular drinkers with AF

Lee SR, et al. Eur Heart J. 2021; Voskoboinik A, et al. N Engl J Med. 2020
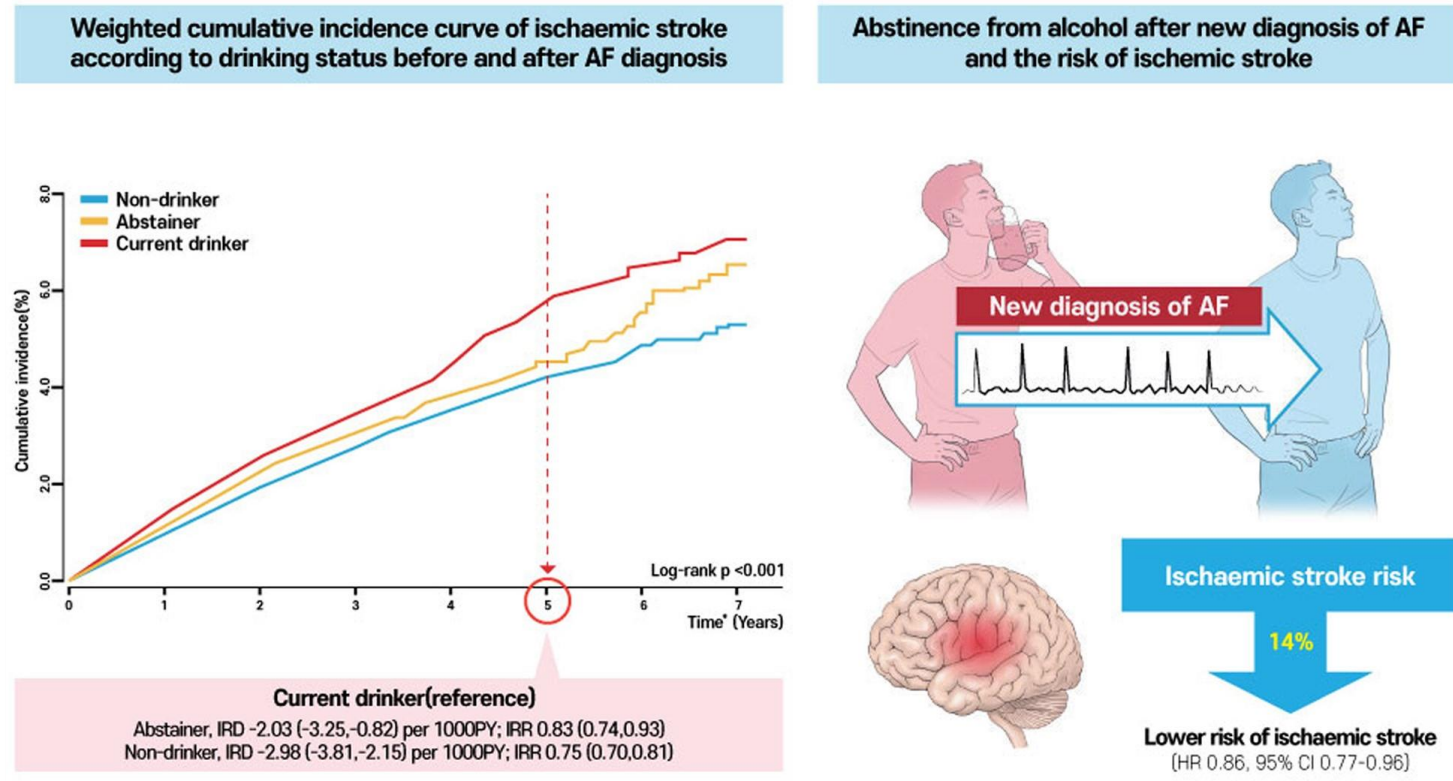
The aim of the study

- To explain possible mechanisms of benefit of alcohol abstinence

- Alcohol habit change and cardiac remodeling in AF based on CMR imaging

- Comparison with the change of the non-AF population

Method

- UK Biobank

  - A cohort of half a million adults aged 40-69 years

  - From 22 assessment centers in the UK (response rate, 5.4%) in 2006-2010

  - Globally accessible to approved researchers

  - Physical measurement, biosamples, questionnaires about lifestyle

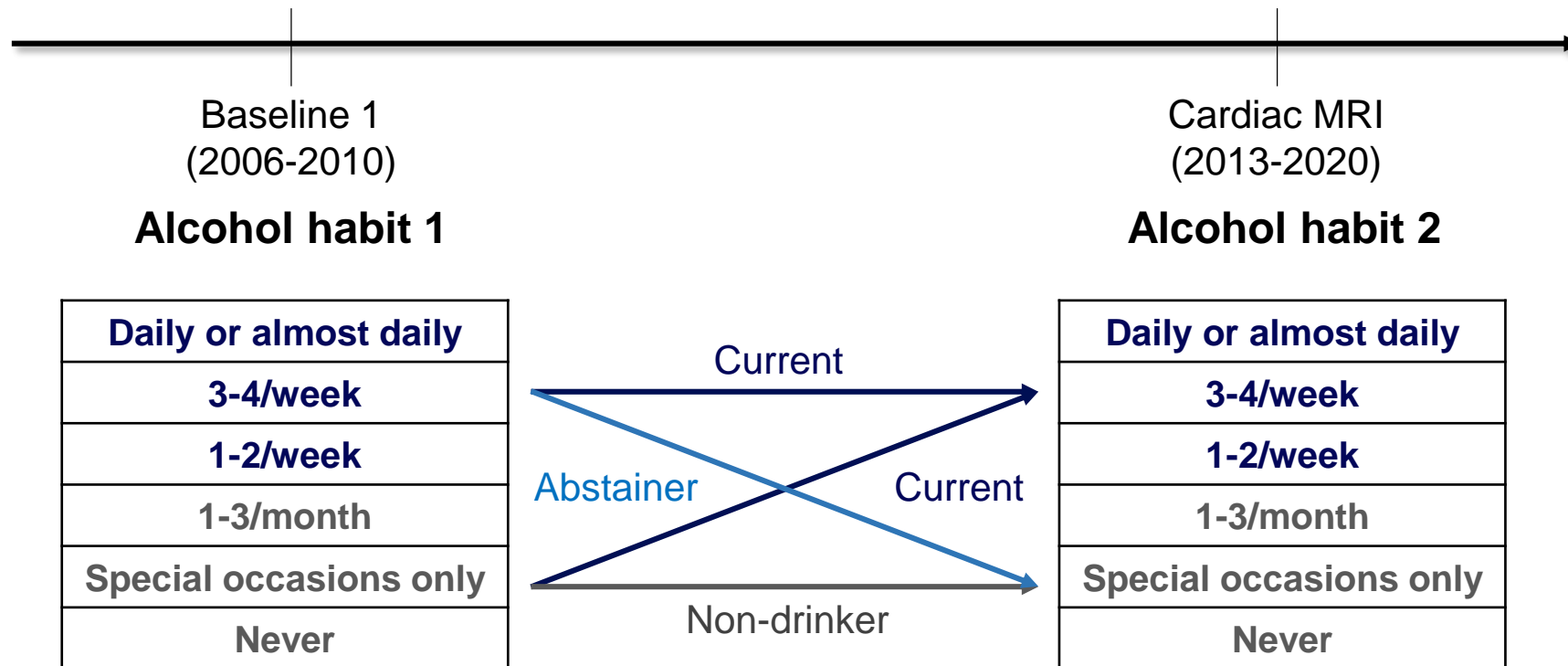 - Repeat assessments: every 2-3 years during follow up

Method

- Study population

    - Non-valvular AF (at baseline enrollment, in 2006-2010) who have CMR data (n=2,019)

    - 1:5 age- and sex- matched non-AF (n=10,095)

# Method

- **Timeline and alcohol habit change**

Baseline 1
(2006-2010)

Cardiac MRI
(2013-2020)

Alcohol habit 1

Alcohol habit 2

Alcohol habit 1
Daily or almost daily
3-4/week
1-2/week
1-3/month
Special occasions only
Never

Alcohol habit 2
Daily or almost daily
3-4/week
1-2/week
1-3/month
Special occasions only
Never

Current

Abstainer   Current

Non-drinker

Method

- **Outcomes**

  - CMR parameters of four cardiac chambers

RA	LA	RV	LV
RAVI	LAVI	RVEDVI	LVEDVI
RASVI	LASVI	RVESVI	LVESVI
RAEF	LAEF	RVEF	LVEF
		RVSVI	LVSVI
			LVCOI
			LVMI
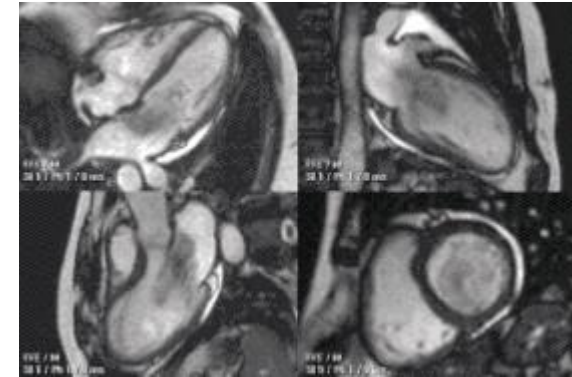
Results – Baseline characteristics

- AF vs. 1:5 age- and sex- matched non-AF

	AF N=2,019	Non-AF N=10,095	p-value
Age (at CMR)	68.8 ± 6.8	68.9 ± 6.7	0.455
Sex (male)	1,399 (69.3%)	6,918 (68.5%)	0.501
Ethnicity (white)	1,974 (97.8%)	9,826 (97.3%)	0.882
BMI (at CMR) (kg/m2)	27.4 ± 4.6	26.5 ± 4.0	<0.001
Current smoking (at CMR)	60 (3.0%)	299 (3.0%)	0.981
Comorbidities			
Hypertension	1,246 (61.7%)	4,185 (41.5%)	<0.001
Diabetes mellitus	242 (12.0%)	763 (7.6%)	<0.001
Dyslipidemia	1,112 (55.1%)	4,129 (40.9%)	<0.001
Myocardial infarction	241 (11.9%)	378 (3.7%)	<0.001
Stroke	151 (7.5%)	297 (2.9%)	<0.001
Heart failure	176 (8.7%)	89 (0.9%)	<0.001

Results – Baseline characteristics

● According to the alcohol habit change

	AF				Non-AF			
	Current drinker N=1,447 (71.7%)	Abstainer N=202 (10.0%)	Non-drinker N=370 (18.3%)	p-value	Current drinker N=7,508 (74.4%)	Abstainer N=922 (9.1%)	Non-drinker N=1,665 (16.5%)	p-value
Age (at CMR)	69.0 ± 6.6	69.3 ± 6.3	68.0 ± 7.5	0.028	68.9 ± 6.6	69.6 ± 6.8	68.5 ± 7.0	<0.001
Sex (male)	1,077 (74.4%)	120 (59.4%)	202 (54.6%)	<0.001	5,467 (72.8%)	569 (61.7%)	882 (53.0%)	<0.001
Ethnicity (white)	1,424 (98.4%)	201 (99.5%)	349 (94.3%)	<0.001	7,382 (98.3%)	892 (96.7%)	1,552 (93.2%)	<0.001
BMI (at CMR) (kg/m2)	27.2 ± 4.3	28.5 ± 5.5	28.0 ± 5.0	<0.001	26.4 ± 3.8	26.5 ± 4.2	26.9 ± 4.7	<0.001
Current smoking (at CMR)	46 (3.2%)	1 (0.5%)	13 (3.5%)	0.087	229 (3.1%)	29 (3.1%)	41 (2.5%)	0.42
Comorbidities								
Hypertension	877 (60.6%)	128 (63.4%)	241 (65.1%)	0.24	3,096 (41.2%)	403 (43.7%)	686 (41.2%)	0.35
Diabetes mellitus	141 (9.7%)	36 (17.8%)	65 (17.6%)	<0.001	491 (6.5%)	91 (9.9%)	181 (10.9%)	<0.001
Dyslipidemia	801 (55.4%)	117 (57.9%)	194 (52.4%)	0.42	3,101 (41.3%)	378 (41.0%)	650 (39.0%)	0.24
Myocardial infarction	153 (10.6%)	33 (16.3%)	55 (14.9%)	0.010	275 (3.7%)	42 (4.6%)	61 (3.7%)	0.40
Stroke	101 (7.0%)	14 (6.9%)	36 (9.7%)	0.19	225 (3.0%)	33 (3.6%)	39 (2.3%)	0.17
Heart failure	118 (8.2%)	20 (9.9%)	38 (10.3%)	0.36	56 (0.7%)	13 (1.4%)	20 (1.2%)	0.039

Results – CMR parameters

- Atrial and ventricular parameters in **AF**

	Current drinker N=1,447		Abstainer N=202	Non-drinker N=370	P-value
LAVI (ml/m²)	38.9 ± 18.7		36.8 ± 18.9	36.4 ± 17.8	0.042
LASVI (ml/m²)	22.0 ± 7.3		21.0 ± 6.3	21.6 ± 6.5	0.13
LAEF (%)	48.3 ± 16.6		49.1 ± 17.0	50.1 ± 16.2	0.16
RAVI (ml/m²)	45.8 ± 19.5		40.9 ± 17.2	41.3 ± 19.0	<0.001
RASVI (ml/m²)	21.5 ± 7.5		20.0 ± 7.6	20.6 ± 7.4	0.007
RAEF (%)	40.4 ± 12.8		41.6 ± 13.5	42.5 ± 12.6	0.015
LVEDVI (ml/m²)	82.5 ± 17.4		79.3 ± 21.4	78.3 ± 16.8	<0.001
LVESVI (ml/m²)	36.4 ± 11.6		35.3 ± 18.1	34.0 ± 11.3	0.003
LVEF (%)	56.2 ± 8.7		56.8 ± 10.1	56.9 ± 8.7	0.32
LVSVI (ml/m²)	46.2 ± 11.1		44.0 ± 9.9	44.3 ± 10.6	0.001
LVCOI (ml/m²)	2.8 ± 0.7		2.7 ± 0.6	2.8 ± 0.6	0.13
LVMI (g/m²)	49.5 ± 9.9		47.2 ± 11.4	46.6 ± 10.2	<0.001
RVEDVI (ml/m²)	86.4 ± 16.8		80.8 ± 15.8	81.0 ± 17.1	<0.001
RVESVI (ml/m²)	40.2 ± 11.0		36.8 ± 10.3	37.0 ± 10.7	<0.001
RVEF (%)	53.5 ± 8.8		54.5 ± 8.7	54.4 ± 8.8	0.089
RVSVI (ml/m²)	46.2 ± 11.3		43.9 ± 10.9	44.1 ± 11.4	<0.001

- EFs were preserved (except for RAEF)
- Hypertrophy in current drinker (dilation/mass)
- Abstainer ≈ Non-drinker

Results – CMR parameters

- Atrial and ventricular parameters in **non-AF**

	Current drinker N=7,508		Abstainer N=922	Non-drinker N=1,665	P-value
LAVI (ml/m²)	26.7 ± 9.2		25.8 ± 9.2	25.9 ± 8.7	<0.001
LASVI (ml/m²)	22.6 ± 5.9		22.0 ± 5.8	22.2 ± 5.8	<0.001
LAEF (%)	61.0 ± 9.4		61.4 ± 10.0	61.3 ± 8.9	0.23
RAVI (ml/m²)	36.5 ± 11.6		34.8 ± 11.5	33.2 ± 10.5	<0.001
RASVI (ml/m²)	21.8 ± 7.3		21.4 ± 7.5	20.5 ± 7.2	<0.001
RAEF (%)	46.4 ± 9.5		47.6 ± 10.1	47.4 ± 9.3	<0.001
LVEDVI (ml/m²)	79.9 ± 14.8		76.6 ± 14.6	74.5 ± 14.3	<0.001
LVESVI (ml/m²)	33.1 ± 9.4		31.3 ± 9.1	30.1 ± 9.4	<0.001
LVEF (%)	58.9 ± 6.3		59.5 ± 6.3	60.0 ± 6.3	<0.001
LVSVI (ml/m²)	46.8 ± 8.6		45.3 ± 8.4	44.4 ± 8.0	<0.001
LVCOI (ml/m²)	2.9 ± 0.6		2.8 ± 0.6	2.8 ± 0.6	<0.001
LVMI (g/m²)	47.8 ± 8.4		45.7 ± 8.0	44.5 ± 8.1	<0.001
RVEDVI (ml/m²)	85.1 ± 15.4		81.6 ± 15.5	78.7 ± 14.3	<0.001
RVESVI (ml/m²)	37.0 ± 9.3		35.2 ± 9.5	33.4 ± 8.8	<0.001
RVEF (%)	56.7 ± 6.2		57.1 ± 6.3	57.8 ± 6.1	<0.001
RVSVI (ml/m²)	48.0 ± 9.2		46.4 ± 8.9	45.2 ± 8.4	<0.001

- Slightly decreased EF (RA/LV/RV)
- Hypertrophy in current drinker (dilation/mass)
  * but, less degree than AF
- Abstainer ≈ Non-drinker

Results – CMR parameters

● Comparison of Δ betweeen AF and non-AF (Current drinkers vs. non-drinkers)
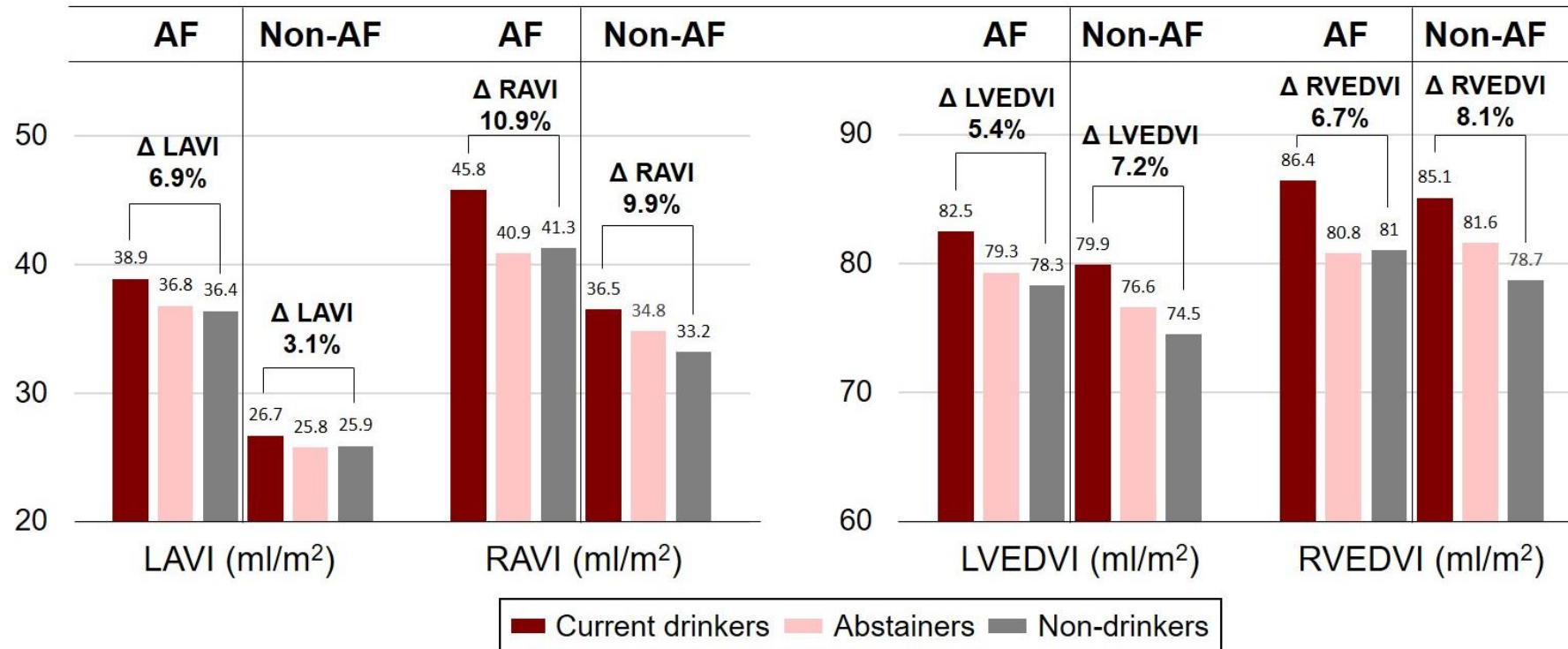
Greater LA dilation according to the consistent alcohol intake in AF than non-AF
Similar (or less) ventricular dilation according to the consistent alcohol intake in AF and non-AF
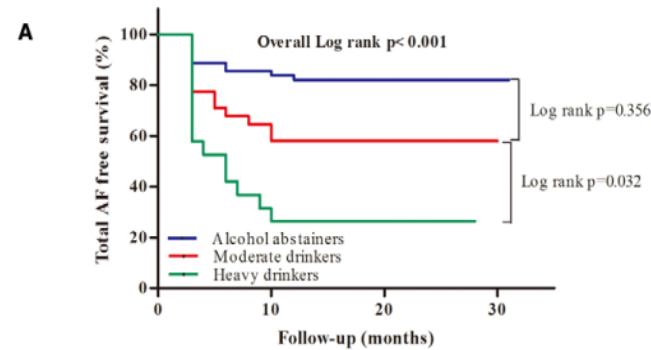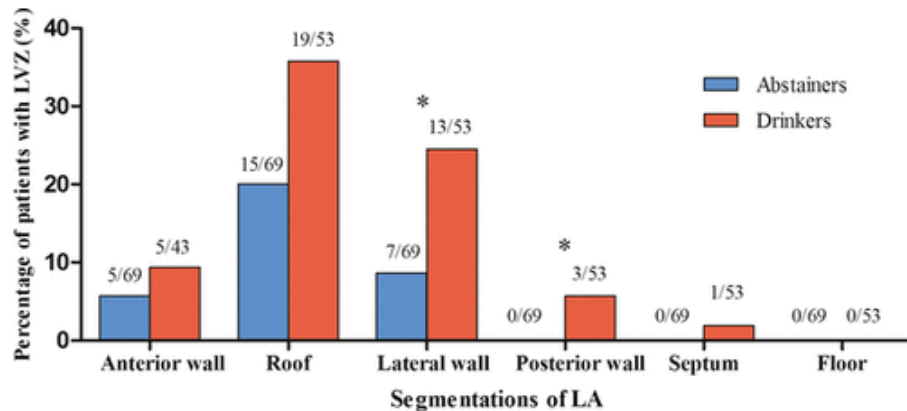
Major findings

- From UK biobank, about 72.0% of AF patients were current drinker (74.4% in non-AF)

- In AF, current drinkers were older, had lower BMI, and had less DM and MI than non-drinkers or abstainer

  the trend was consistent for non-AF, as well.

- Current drinkers presented cardiac hypertrophy (both atrium and ventricle),

  and the degree of the cardiac dimension increment was higher in AF than non-AF, especially for LA

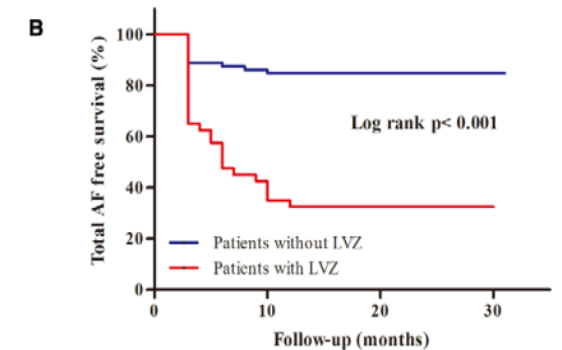- Abstainer and non-drinkers had similar cardiac dimension and systolic function

Generally accepted association between alcohol and AF

Observational studies

- Regular alcohol consumption (as compared with no alcohol consumption): dose-related increases in left atrial size, impairments in atrial mechanical and reservoir function, and adverse electrical remodeling.

- A higher rates of recurrence of AF after catheter ablation among regular drinkers than among nondrinkers.

McManus DD, et al. J Am Heart Assoc. 2016; Voskoboinik A, et al. Heart Rhythm. 2019; Qiao Y, et al. J Am Heart Assoc. 2015

Regular alcohol consumption and Impaired atrial mechanical function in AF

● Habitual alcohol consumption is associated with significantly increased LA size and atrial mechanical dysfunction compared with nondrinkers
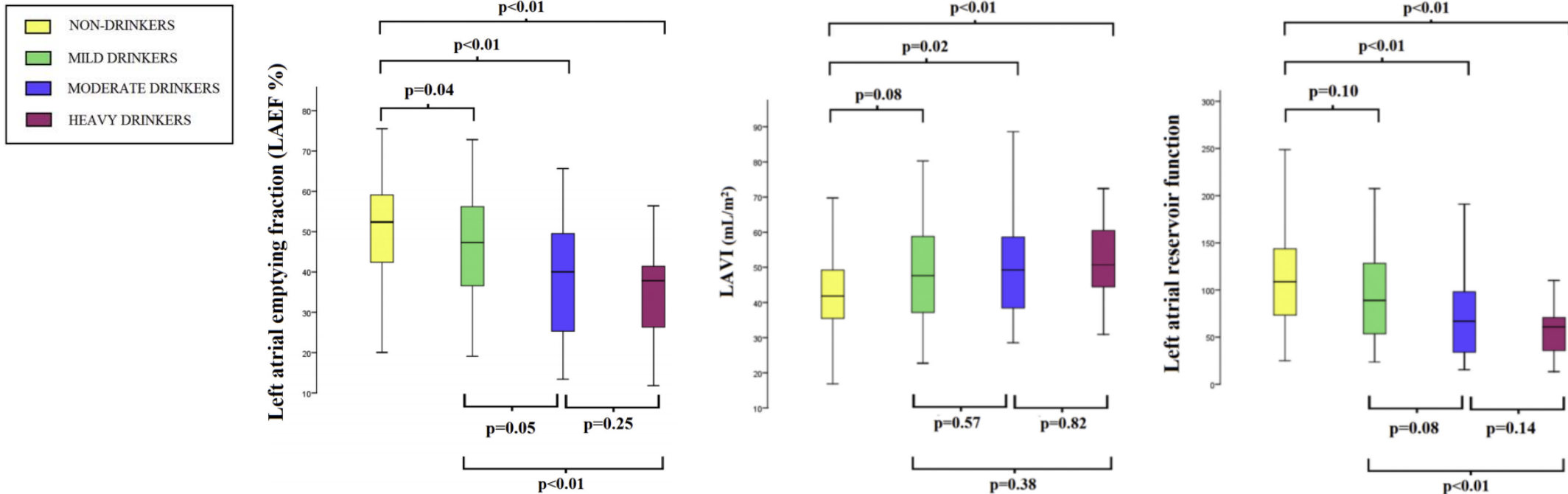
→ *Cross-sectional study, Small population, No comparison with the general population*

Limitations

- Influence of current drinking/abstinence in patients with **AF ≥70 yrs?**

- **Potential change** in drinking status from the index date to the follow up might introduce bias in the associations.

- Causality and direct mechanistic link cannot be answered.

Conclusion

- Alcohol consumption is associated with *greater bi-atrial enlargement* and *comparable ventricular enlargement in AF* than in non-AF. As AF patients are more susceptible to atrial remodeling and alcohol abstinence might prevent cardiac remodeling, *avoiding alcohol intake should be consistently encouraged*.

Thank you for your attention