

# **Risk Factors for AF**

## **- Who, When and How to Intervene**

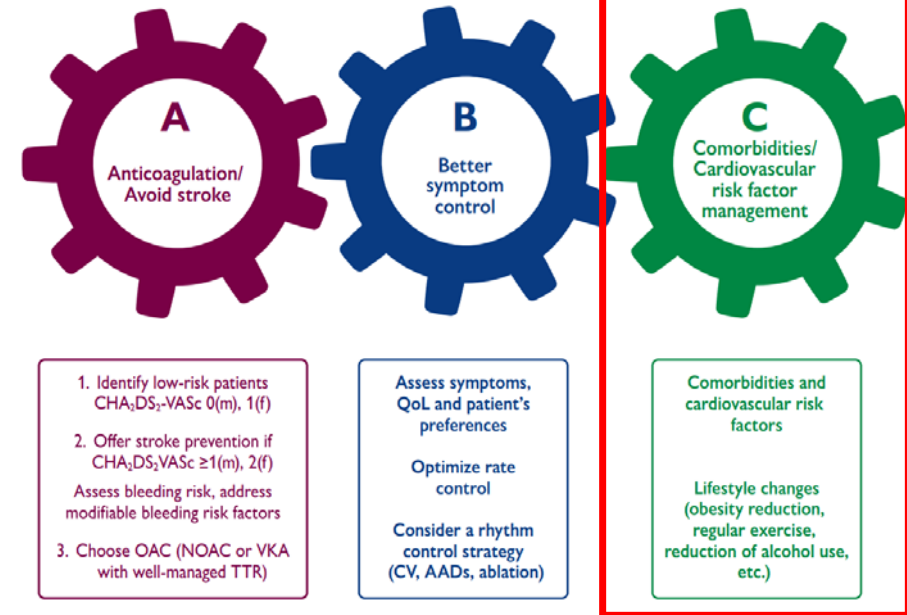
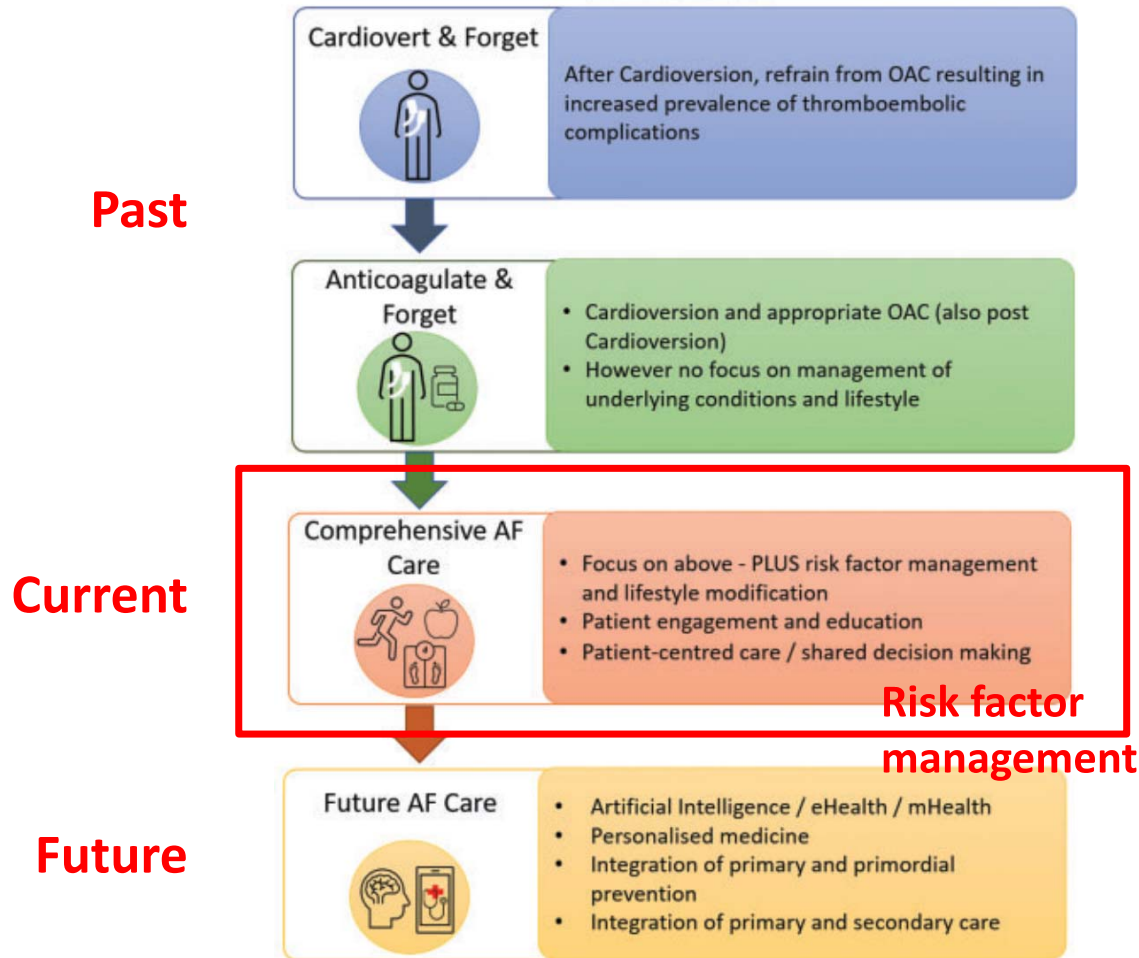
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CHA University, Korea**

# Disclosure

**No financial conflicts of interest to disclose concerning the presentation**

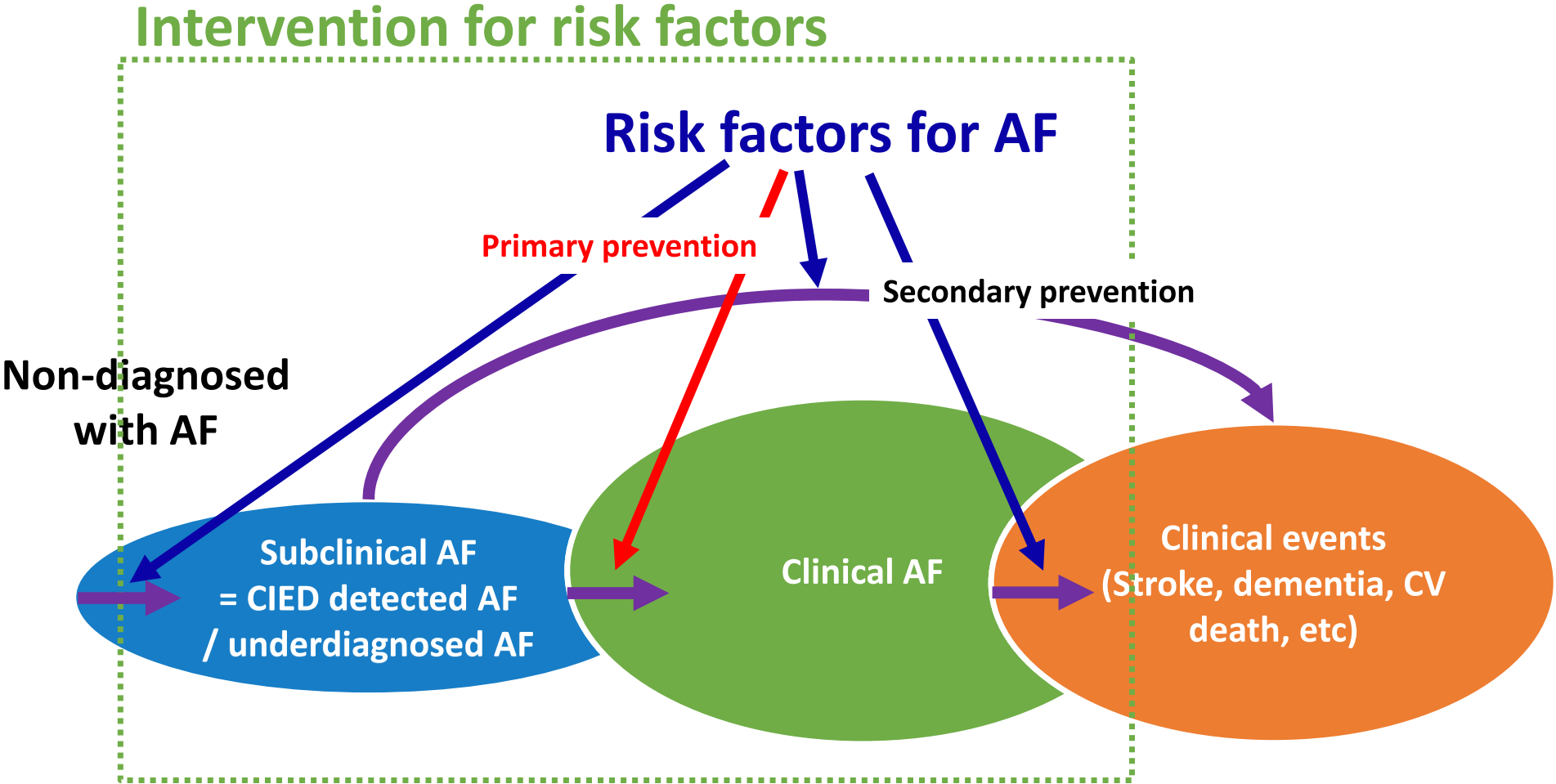
# Paradigm shifts in the clinical care of AF



ESC AF Guideline 2020

Hendriks et. al *Europace* 2021;23, ii52–ii60

# Risk Factors for AF – Intervention: Who? When? How?

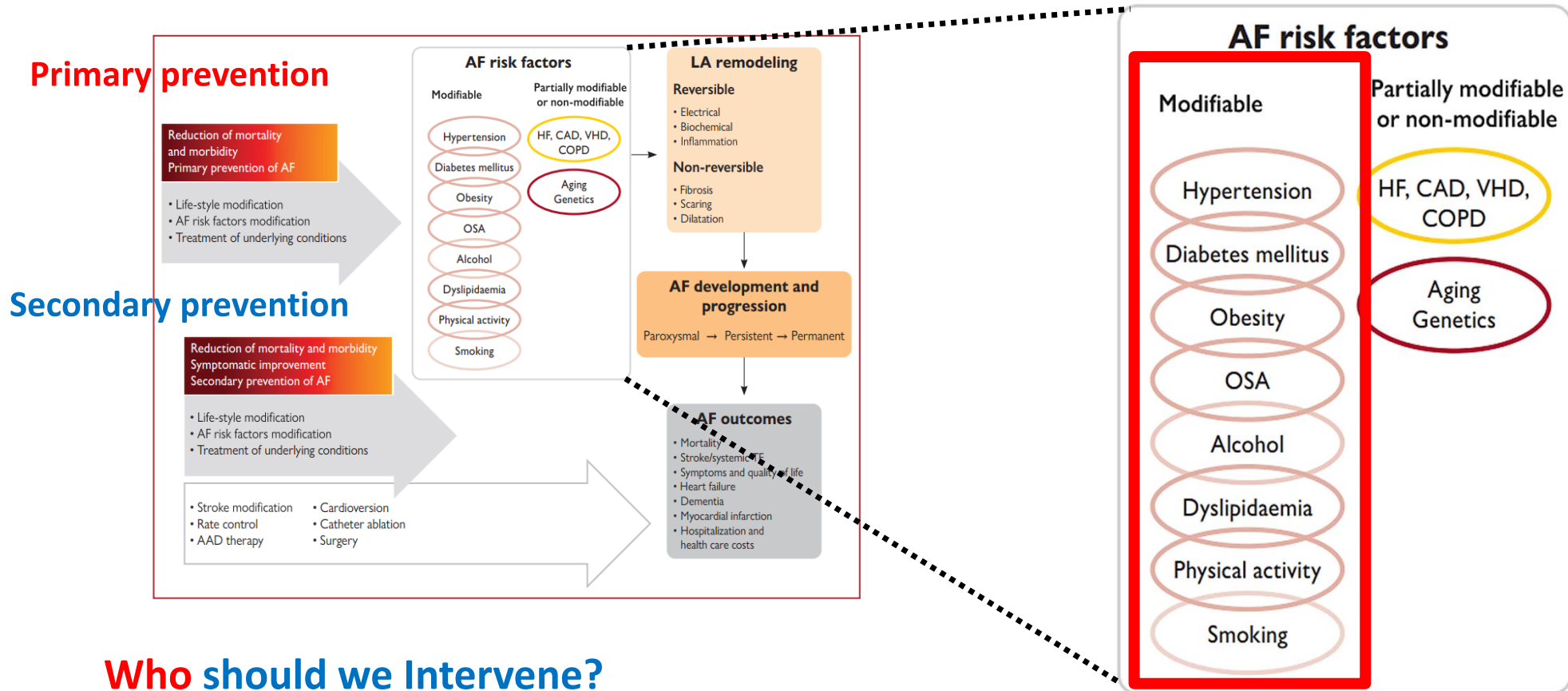


# Who?

**Who** should we Intervene?

**Who** should Intervene?

# What are the risk factors for AF that can be intervened?



## Who should we Intervene?

**: All patients with modifiable risk factors for AF.**

(HTN, DM, obesity, OSA, alcohol intake, dyslipidemia, low physical activity, or smoking)

ESC AF Guideline 2020

# Who should intervene? EP/cardiologist alone?



Is it possible to manage these risk factors by the EP/cardiologist alone?

Anticoagulation

Rhythm/rate control

## Modifiable Risk Factors to intervene

- Hypertension
- Diabetes mellitus
- Obesity
- Obstructive sleep apnea
- Alcohol
- dyslipidemia
- Physical activity
- Smoking

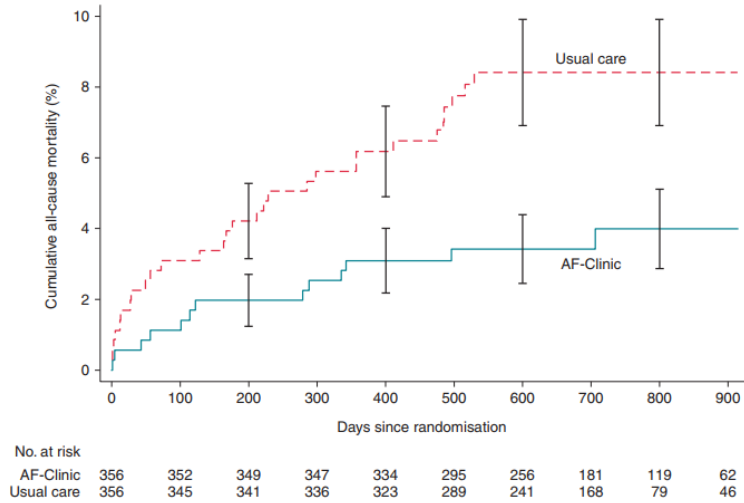
The **average outpatients consultation time** per person at general hospitals in Korea is between **6.2 to 7.4 minutes**.  
**Cardiology: mean 3.5 min** per person

Variable	Patient no. (mean patient no. in each section)	Real time (min)
Total	1,105	4.2±2.7 <sup>*†</sup>
Gender		
Male	475	4.3±2.9 <sup>*†</sup>
Female	630	4.1±2.6 <sup>*†</sup>
Clinical department		
Gastroenterology	96 (38)	4.4±2.2 <sup>*†</sup>
<b>Cardiology</b>	<b>105 (65)</b>	<b>3.5±2.1<sup>*†</sup></b>
Pulmonology	47 (39)	5.4±2.1 <sup>†</sup>
Endocrinology	55 (49)	4.0±1.5 <sup>*†</sup>
Nephrology	66 (36)	3.7±2.1 <sup>*†</sup>
Hemato-oncology	41 (16)	3.4±2.4 <sup>*†</sup>
Infection	28 (22)	7.0±4.6
Rheumatology	60 (47)	2.6±1.3 <sup>*†</sup>
Neurology	50 (38)	4.0±2.2 <sup>*†</sup>
Neuropsychiatry	53 (49)	4.9±4.7 <sup>†</sup>
Surgery	81 (28)	4.5±2.9 <sup>*†</sup>
Orthopedic surgery	88 (32)	4.0±3.0 <sup>*†</sup>
Neurosurgery	40 (11)	4.7±2.8 <sup>†</sup>
Obstetrics-gynecology	43 (28)	5.1±3.4 <sup>†</sup>

*Health Policy Manag. 2014;24(3):254–260.*

# Comprehensive AF care / Multidisciplinary team approach (1)

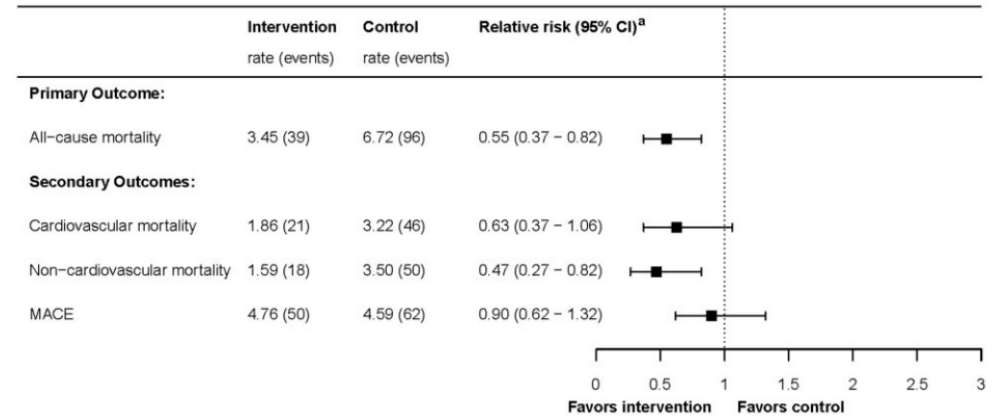
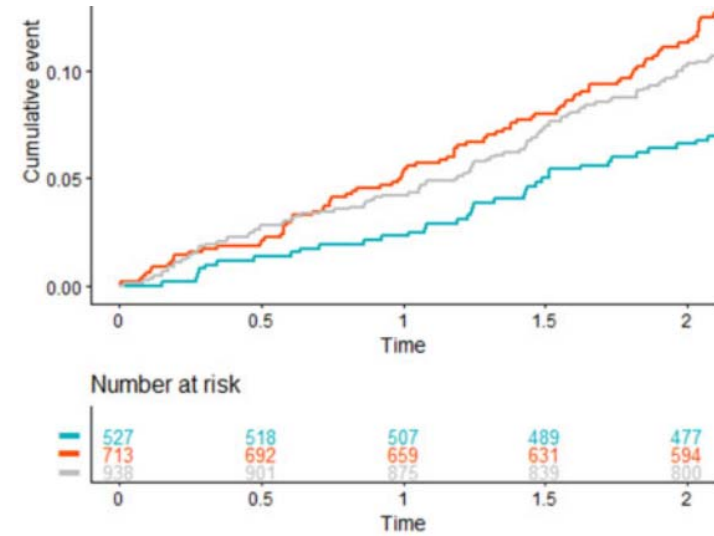
## AF-Clinic effectively reduce all-cause mortality



Mortality	AF-Clinic (n = 356)	Usual care (n = 356)	Hazard ratio (95% CI)	P-value
All-cause, n (%)	13 (3.7)	29 (8.1)	0.44 (0.23–0.85)	0.014
Non-cardiovascular, n (%)	9 (2.5)	15 (4.2)	0.59 (0.26–1.34)	0.206
Cardiovascular, n (%)	4 (1.1)	14 (3.9)	0.28 (0.09–0.85)	0.025

Hendriks et. al. *Europace* 2019; 21, 1785–1792

## ALL-IN trial in primary care setting

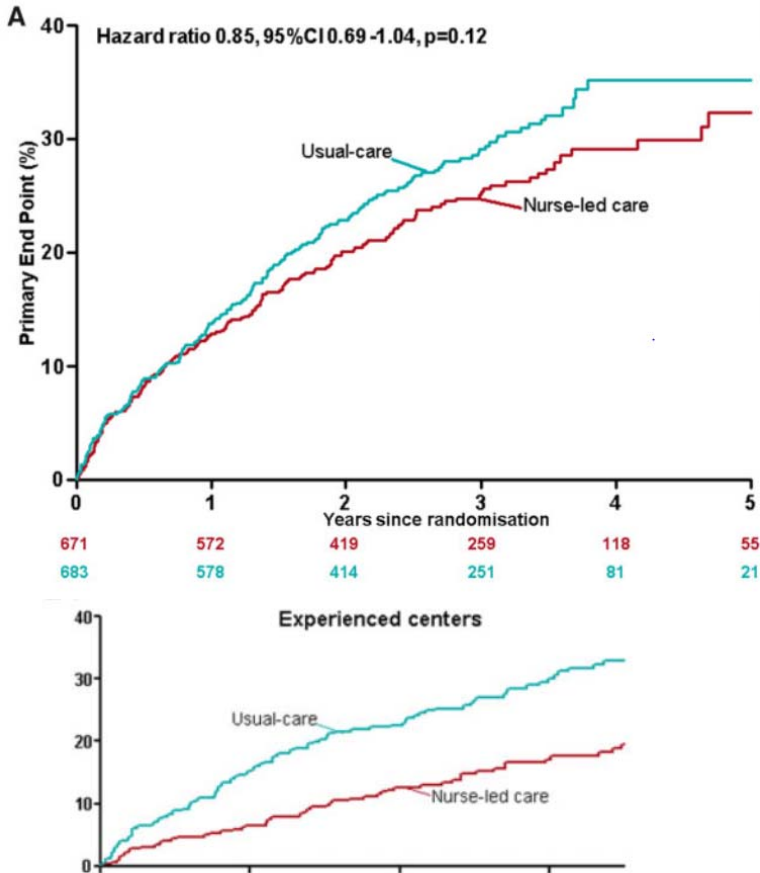


Carline et. al. *European Heart Journal* 2020;41,2836–2844



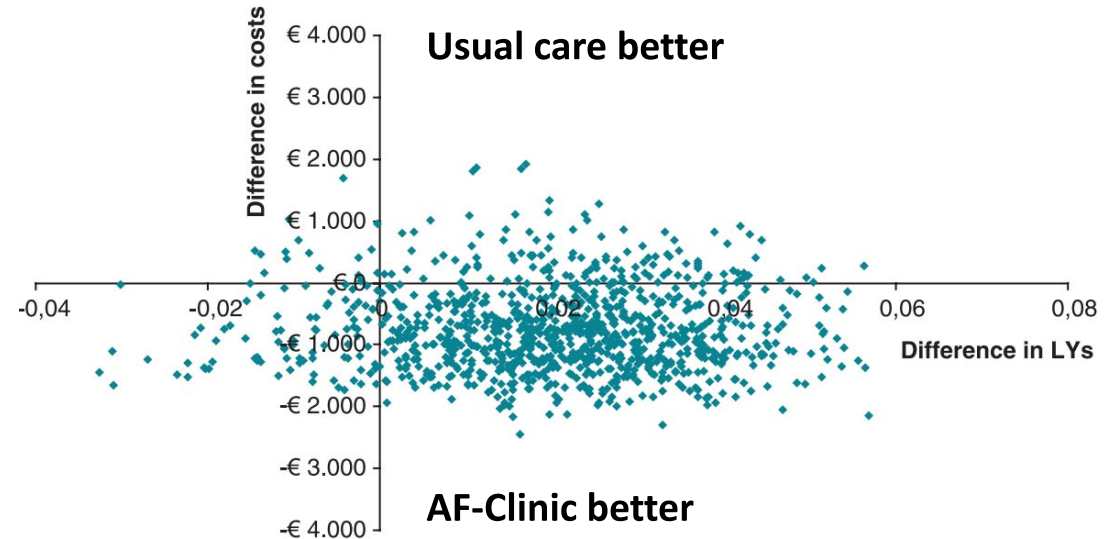
# Comprehensive AF care / Multidisciplinary team approach (2)

## RACE 4 trial



Wijtvliet et al. *European Heart Journal* 2020;41, 634–641

## Cost-effectiveness of a specialized AF clinic vs. usual care

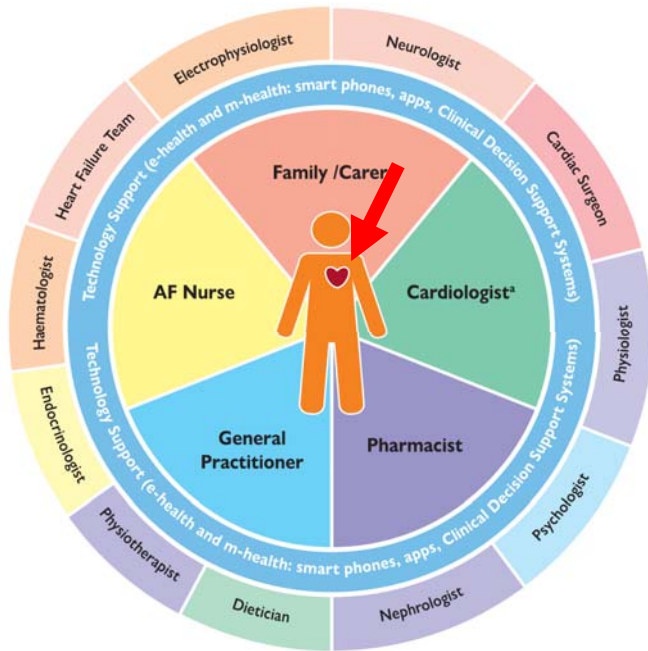


**Cost-effectiveness analysis demonstrated a reduction in the mean healthcare cost per patient in the AF-Clinic (€ 2302) compared with usual care (€ 3037).**

Hendriks et al. *Europace* 2013;15, 1128–1135

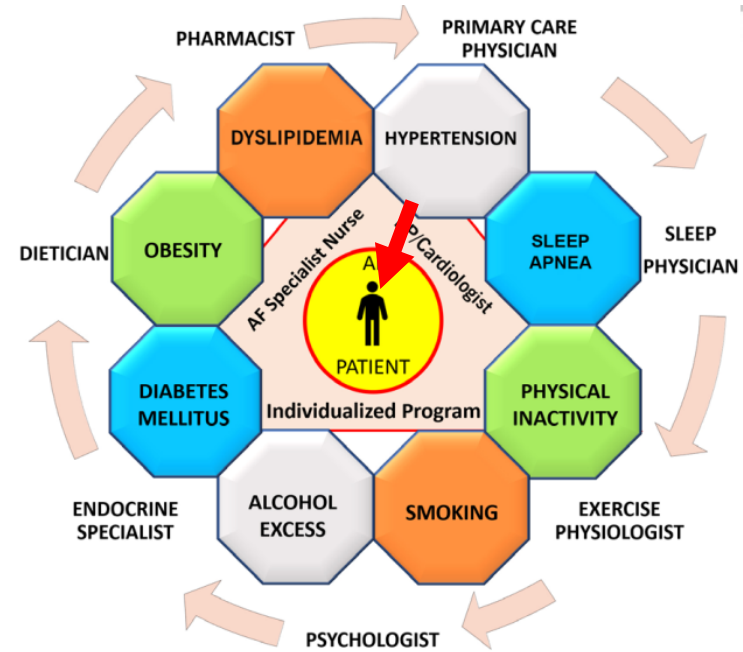
# Who should Intervene?

## AF Guideline 2020 from ESC



ESC AF Guideline 2020

## Scientific Statement From the AHA



Circulation. 2020;141:e750–e772

- A **multidisciplinary team approach** is recommended rather than treatment by one single healthcare professional due to the multifaceted nature of managing risk factors and comorbid conditions.
- Another fundamental thing is the **patient-centered approach**. Patients should be educated and empowered to self-manage their risk factors, and lifestyle behaviors.

# When?

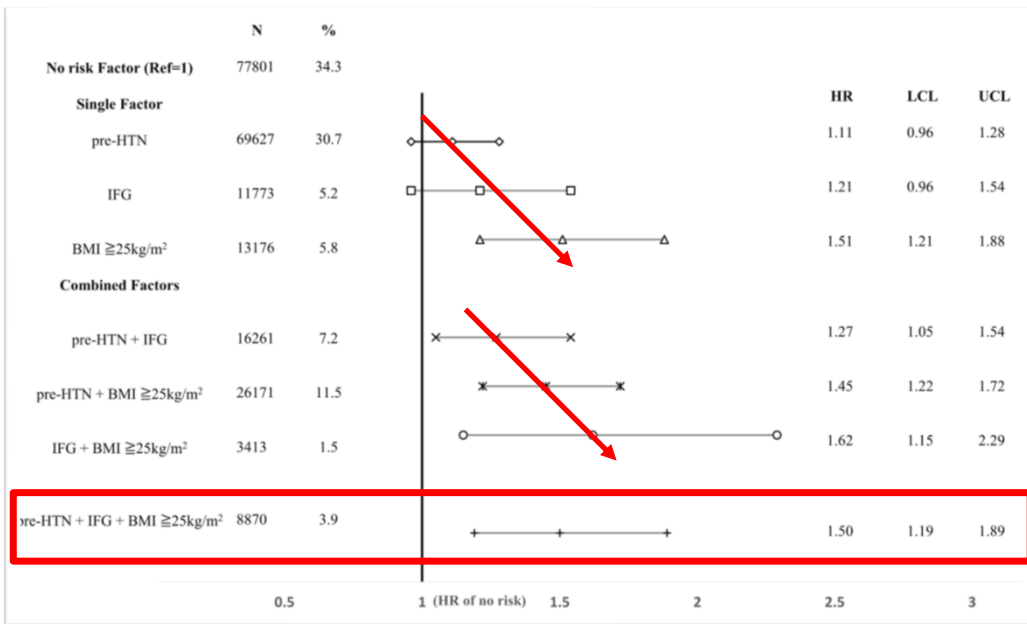
**When** should we Intervene?

Is there a **starting point to Intervene** in each risk factor?  
(With focusing Korean population data)

# AF risk factors: HTN, DM

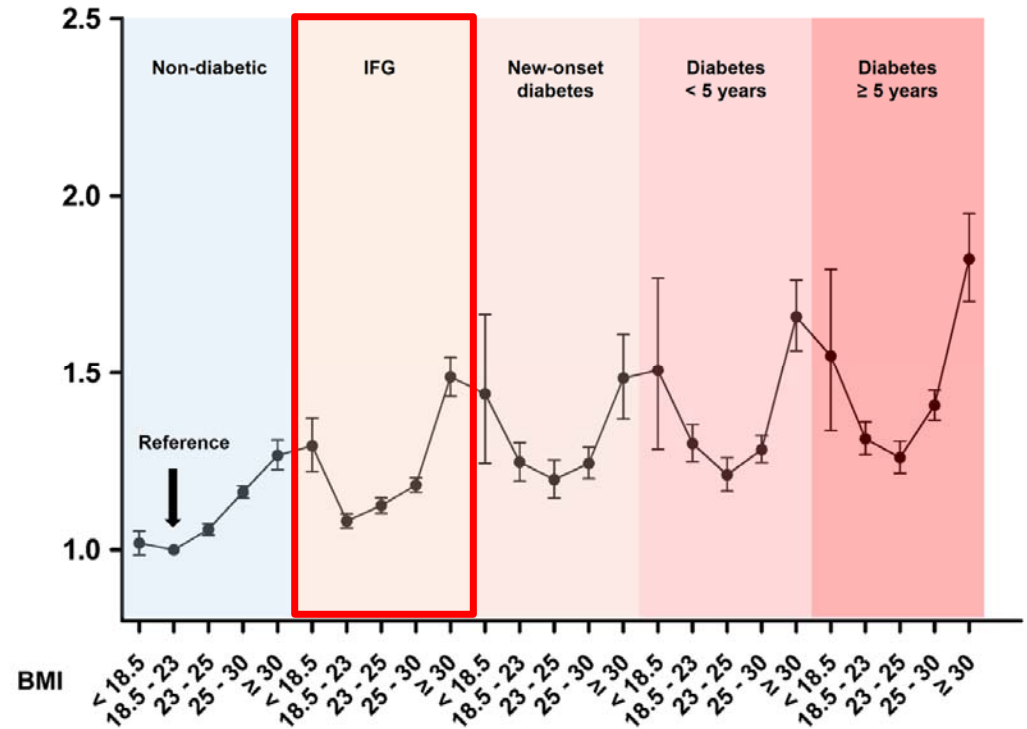
## Pre-HTN, pre-DM (IFG) and AF incidence in the Korean population

### HR for AF incidence



Lee SS, Park J. *European Heart Journal* 2017;38,2599–2607

### HR for AF incidence



Kim YG, Choi JI. *Cardiovasc Diabetol* 2019;18:128

- Not only HTN and DM, but also pre-HTN and pre-DM (IFG) are risk factors for AF.
- Controlling the BP and blood glucose in the prehypertensive and pre-diabetic range should be needed.

# AF risk factors: Obesity

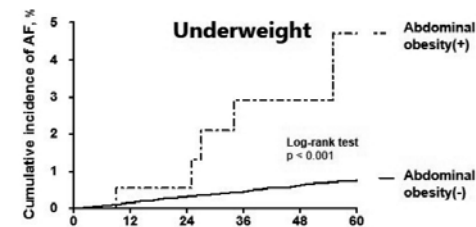
## BMI and AF incidence in the Korean population

	BMI (kg/m <sup>2</sup> )			
	Underweight	Normal	Overweight	Obese
Numbers of events/person-y	121/75 358	1907/1 225 534	1231/559 989	183/72 002
AF incidence per 1000 person-y	1.61	1.56	2.20	2.54

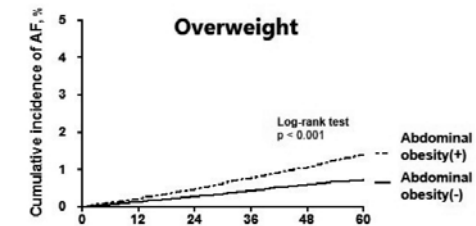
Model	Overall	
	HR (95% CI)	P Value
Adjusted for clinical variables*		
Underweight (<18.5)	1.21 (1.01–1.46)	0.041
Normal (18.5 to <25)	1	
Overweight (25 to <30)	1.14 (1.06–1.23)	<0.001
Obese (≥30)	1.52 (1.30–1.78)	<0.001

Baek YS, Yang PS, Joung B. J Am Heart Assoc. 2017;6:e004705

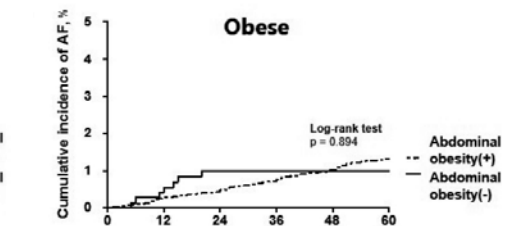
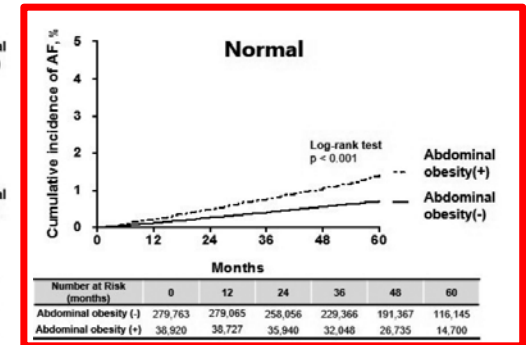
## Abdominal obesity and AF incidence in the Korean population



Number at Risk (months)	0	12	24	36	48	60
Abdominal obesity (-)	20,766	20,661	10,645	16,090	13,104	7,846
Abdominal obesity (+)	183	179	148	121	101	53



Number at Risk (months)	0	12	24	36	48	60
Abdominal obesity (-)	56,295	56,185	52,314	46,981	39,542	24,796
Abdominal obesity (+)	84,281	83,991	78,094	69,575	57,861	33,121



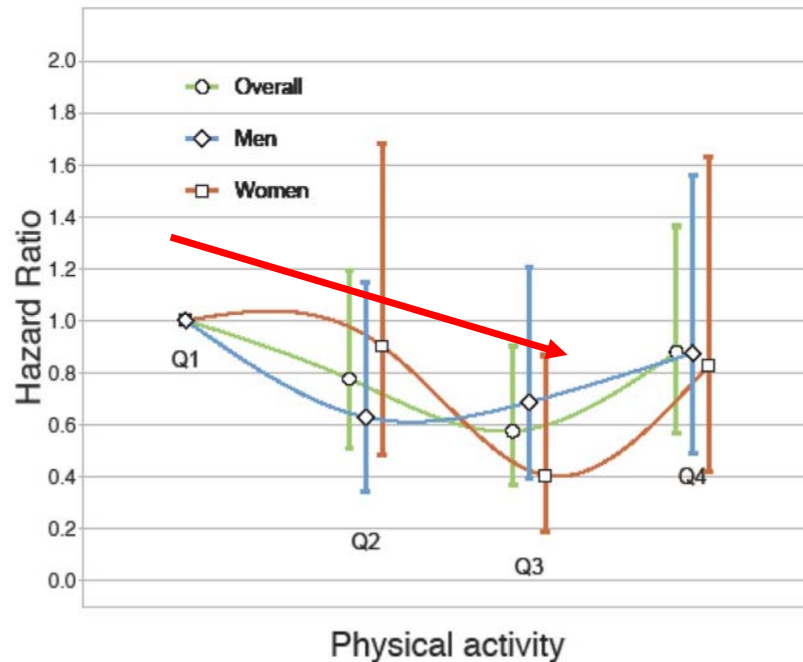
Number at Risk (months)	0	12	24	36	48	60
Abdominal obesity (-)	736	732	674	597	490	303
Abdominal obesity (+)	18,268	18,200	16,466	14,148	11,393	6,661

Baek YS, Yang PS, Joung B. J Am Heart Assoc. 2017;6:e004705

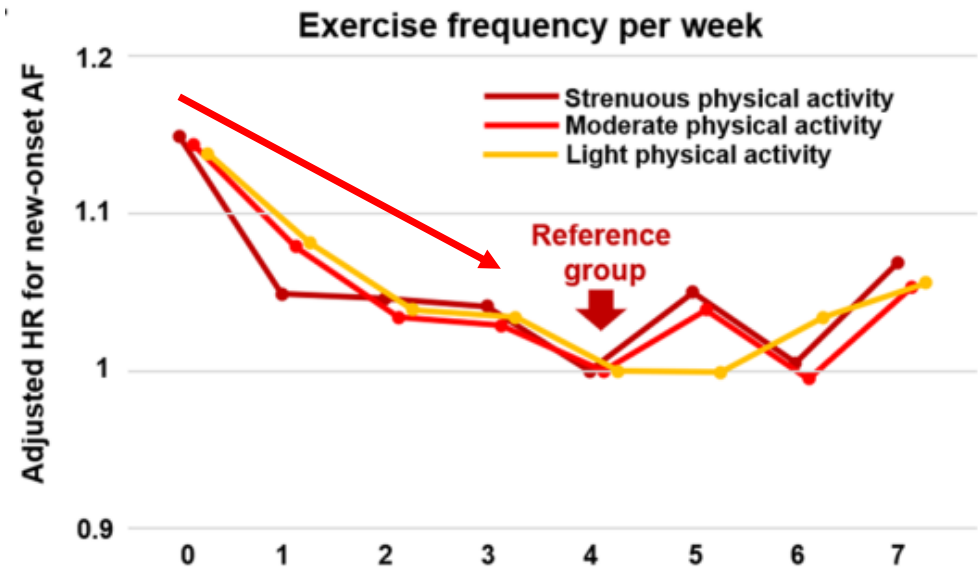
- Not only obese, but also overweight (BMI: 25-30) and underweight (BMI: <18.5) are risk factors for AF.
- Abdominal obesity is a risk factor for AF, even with a normal BMI
- Controlling the bodyweight even in the overweight and underweight range should be needed.

# AF risk factor: Physical activity

## AF incidence according to physical activity level in the Korean population



*Choi YW, Park JK. Scientific report 2019;9:11228*

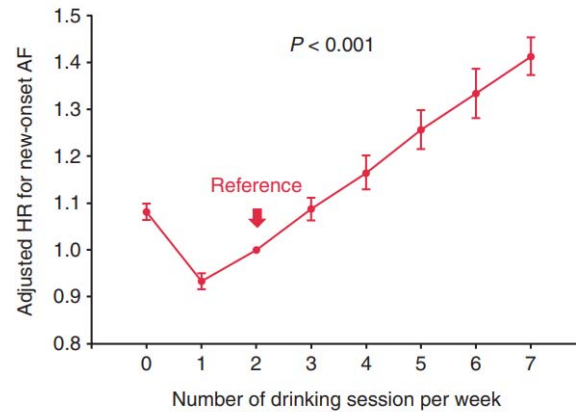
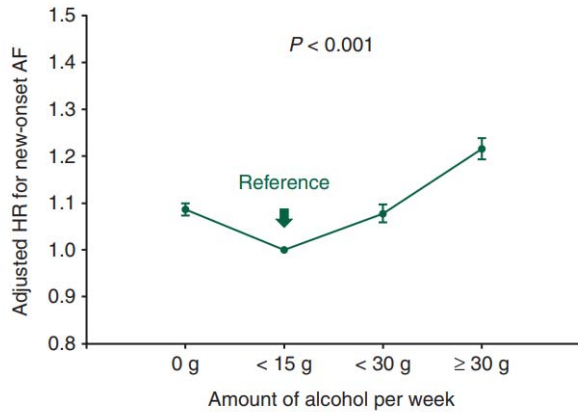


*Lee SR, Chi EK. Scientific report 2020;10:19224*

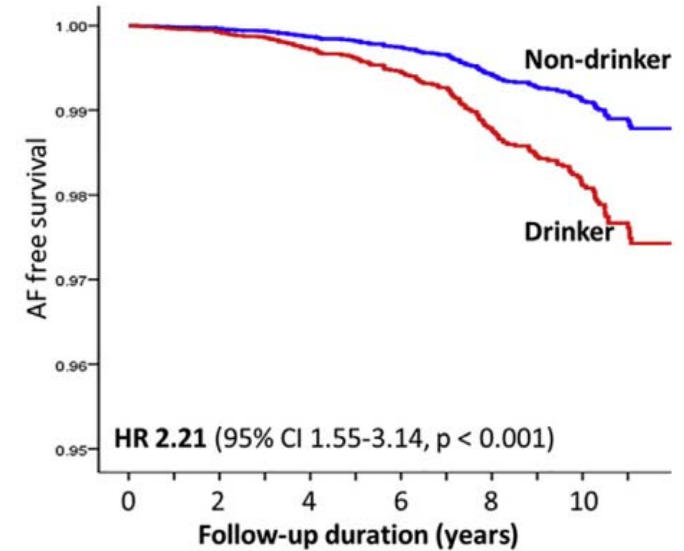
- Those who do not exercise at all are at the highest risk of AF.
- Even small amounts of physical activity can reduce your AF risk.

# AF risk factors: Alcohol

## Alcohol and AF incidence in the Korean population



*Kim YG, Choi JI. Europace 2020. 22, 216*



Number at risk							
Time (year)	0	2	4	6	8	10	12
Non-drinker	6559	6305	5977	5212	5917	4829	4509
Drinker	13075	12530	10774	7402	11574	11693	11288

*Cha MJ, Oh S. Heart rhythm 2020;17:2086–2092*

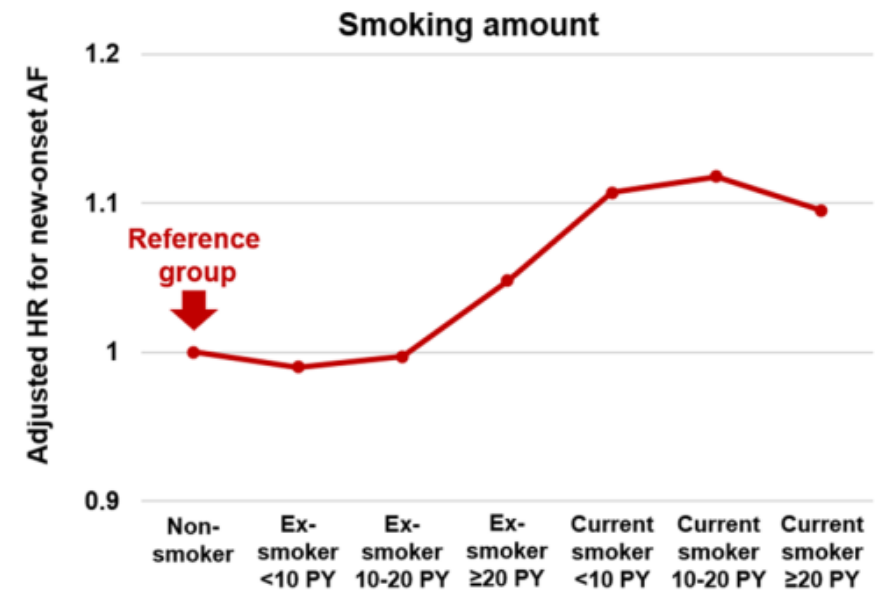
- Drinking more than alcohol 1 unit (=alcohol 14 g = Beer 1 can = Wine 1 glass = Soju 2 glasses = Whiskey 1 glass) per week and more than once a week are risk factors for AF.
- Age-adjusted HR for AF incidence was 2.21 (95% CI 1.55–3.14; p=0.001) in drinkers compared to non-drinkers.
- Control drinking even at the social drinking level should be needed.

# AF risk factor: Smoking

## Smoking and AF incidence in the Korean population

Variables	Cases/No.	Multivariate analysis	
		OR (95% CI)	P value
<b>Cotinine-verified smoking status</b>			
Never smoking	392/164,967	1	
Current smoking <sup>a</sup>	113/36,821	1.24 (0.98-1.58)	0.080
<b>Self-reported questionnaire</b>			
Never smoking	245/119,475	1	
Former smoking <sup>b</sup>	106/34,229	1.30 (0.97-1.73)	0.078
Current smoking <sup>b</sup>	103/35,281	1.42 (1.06-1.91)	0.019
<b>Daily amount of cigarette smoking, cigarettes/day<sup>c</sup></b>			
< 10	13/8,019	0.94 (0.54-1.65)	0.839
10-19	50/18,596	1.40 (0.98-2.00)	0.068
≥ 20	36/8,415	1.81 (1.19-2.76)	0.005
P for trend		0.012	
<b>Duration of cigarette smoking, yr<sup>d</sup></b>			
< 10	4/2,887	0.92 (0.34-2.50)	0.869
≥ 10	96/31,970	1.43 (1.06-1.94)	0.020
P for trend		0.035	

Lee SH. J Korean Med Sci. 2020;35:e296.



Lee SR, Chi EK. Scientific report 2020;10:19224

- AF risk is higher for current smokers than former smokers, for former smokers than never smokers.



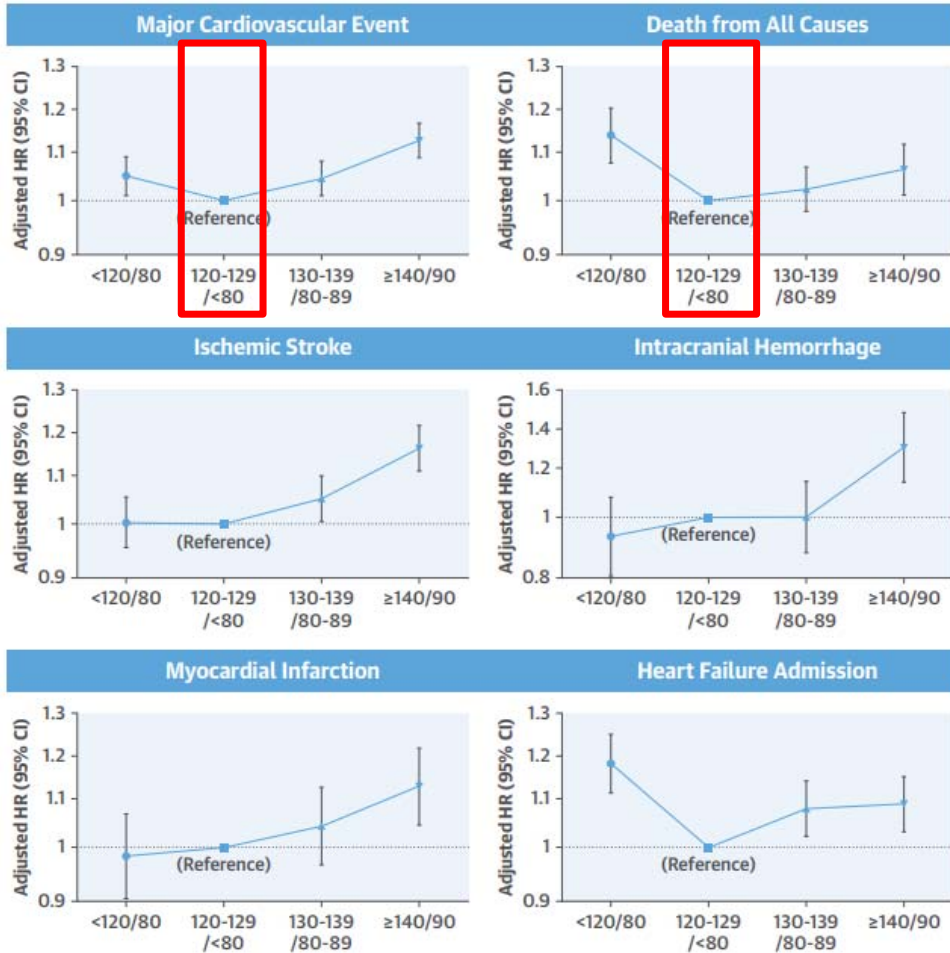
# How?

**How** should we Intervene?

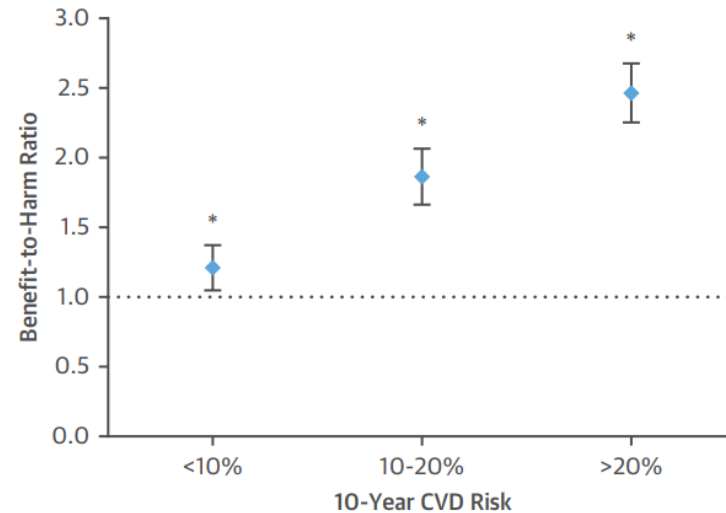
Is there an **optimal targets** or **way** in the management of each risk factor? (With focusing Korean population data)

# AF risk factors: HTN

## Blood pressure control and CVD risk of AF patients in the Korean population



Benefit-to-harm ratio of optimal BP control (120-129/<80 mmHg) according to 10-year CVD risk

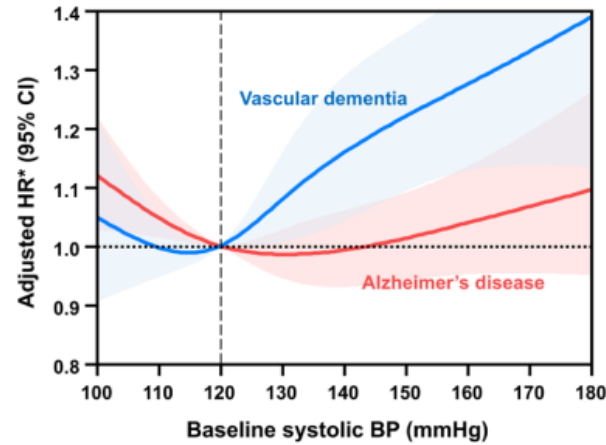
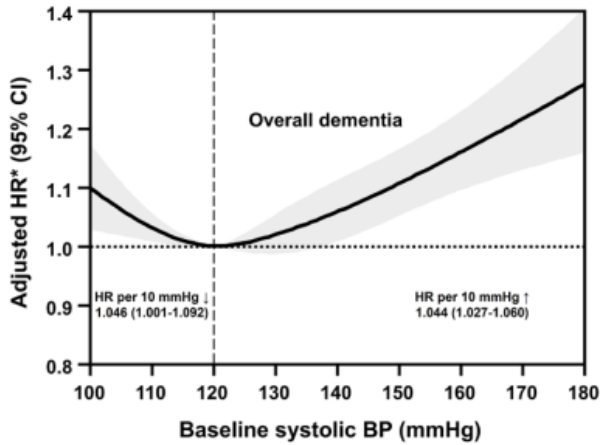


- In patients with AF under HTN treatment, **120–129/<80 mmHg** is the **optimal blood pressure treatment target**, regardless of the estimated CVD risk.

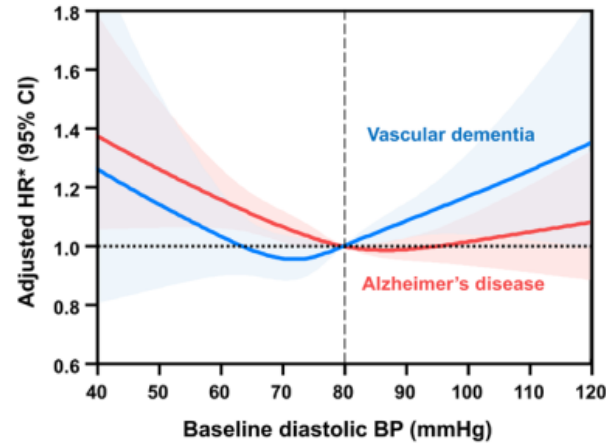
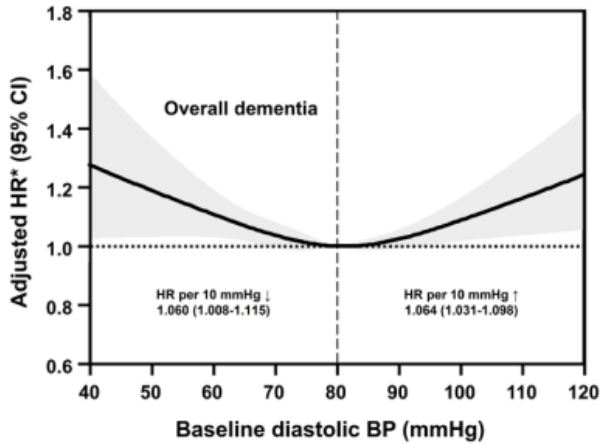
Kim D, Yang PS, Joung B, G.Y.H Lip. JACC 2018;72:1233–45

# Blood pressure control and dementia risk of AF patients in the Korean population

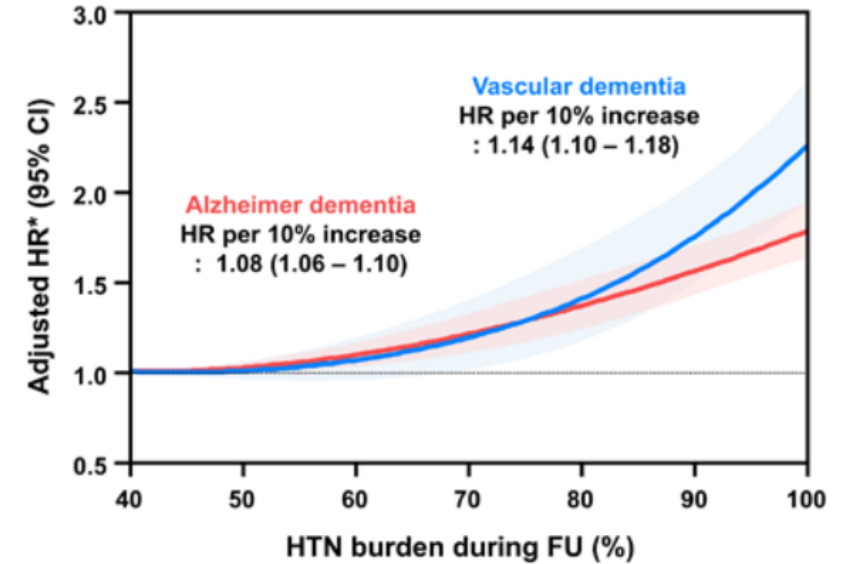
**A Systolic blood pressure and Dementia**



**B Diastolic blood pressure and Dementia**



HTN burden: the proportion of days with increased BP (at least 140/90 mmHg) to the observation time interval.

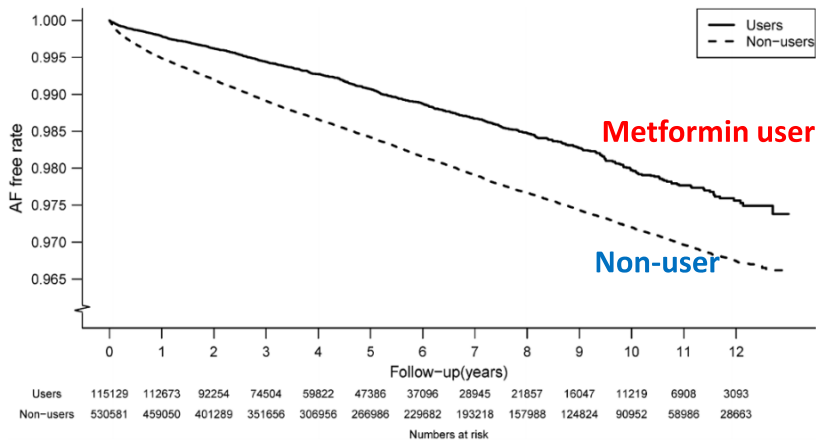
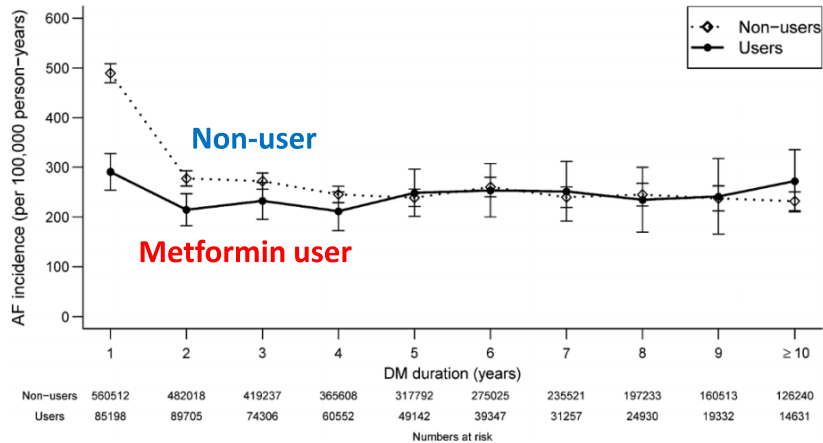


- Optimal BP range for preventing dementia in AF: 120 to 129/80 to 84 mmHg.
- Reducing the HTN burden help to minimize the risk of subsequent dementia in AF.

Kim D, Yang PS, G.Y.H Lip, Joung B. Hypertension. 2020;75:1296-1304

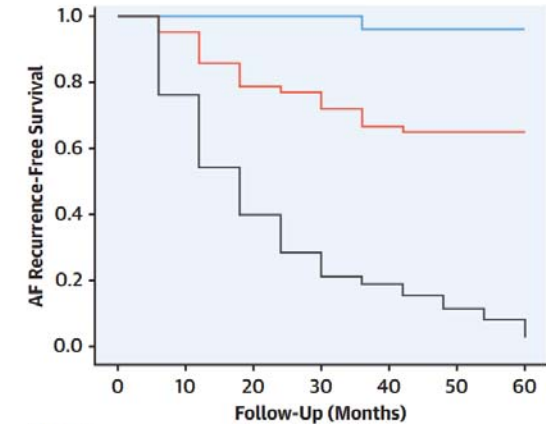
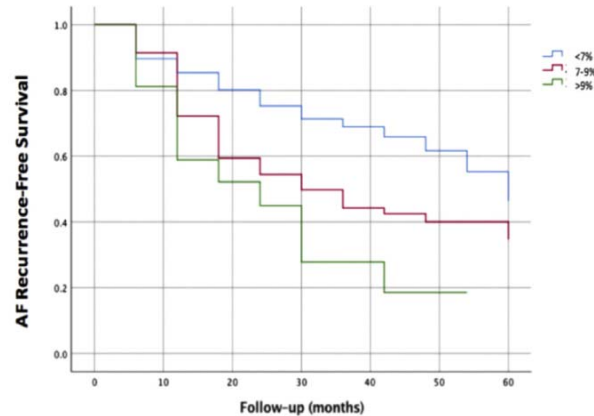
# AF risk factors: DM

## Taiwan, 645,710 DM patients, AF incidence



Chang SH. *Cardiovasc Diabetol* 2014;13:123

## Cleveland Clinic, 298 patients with DM undergoing AF ablation

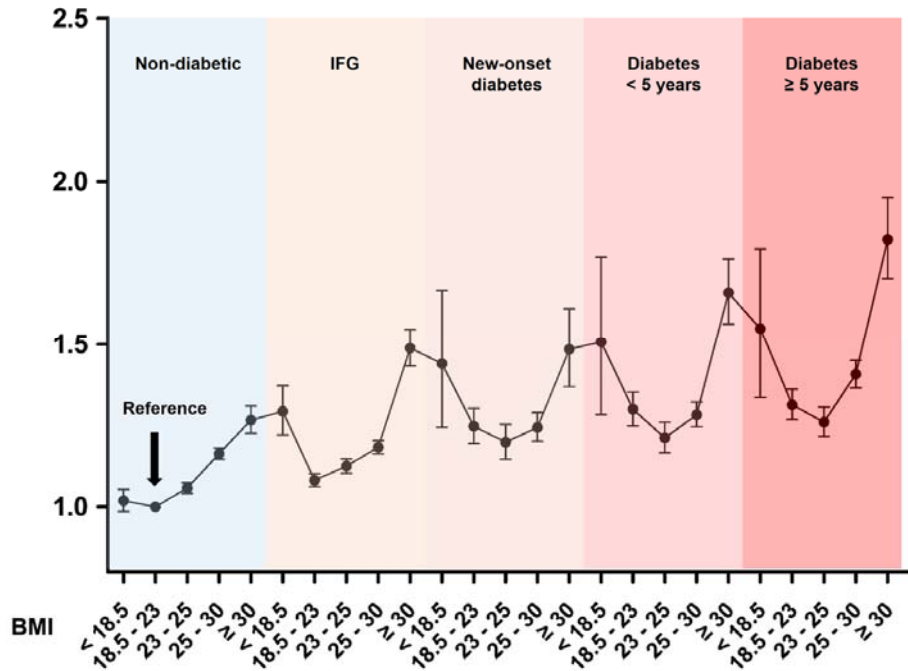


- Higher Hb A1c and worsening glycemic control prior to ablation predict AF recurrence after ablation.
- More than 10% reduction of Hb A1c can be beneficial.
- Reducing blood sugar level is the best way to improve the outcome.

Eoin Donnellan. *JACC EP* 2019;5:897-903

# AF risk factors: Obesity

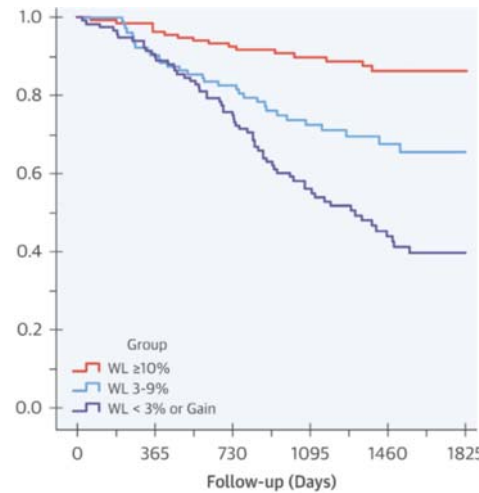
## Adjusted HR for AF incidence according to BMI in the Korean population



Kim YG, Choi JI. *Cardiovasc Diabetol* 2019;18:128

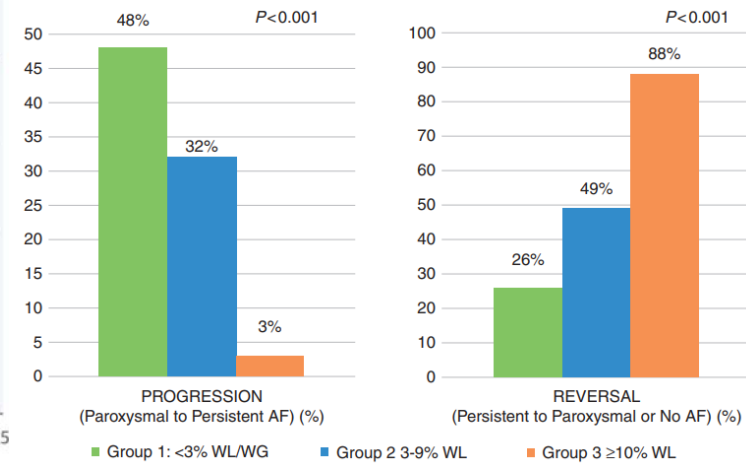
## Obesity and AF progression / burden/ ablation outcome

### LEGACY study



Pathak, Sanders. *JACC* 2015;65:2159

### REVERSE-AF study

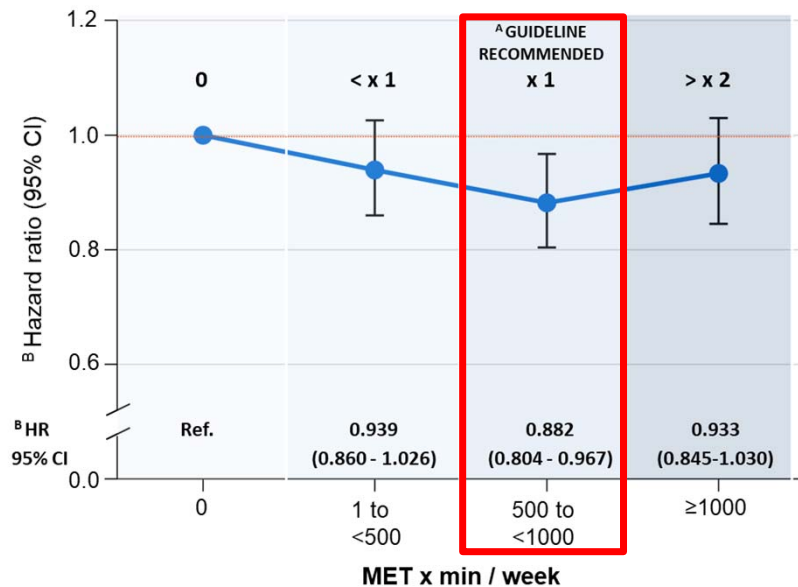


Middeldorp, Sanders. *Europace* 2018;20:1929

- Weight loss reduced AF burden and reverses heart condition in AF patients
- Maintaining the body weight in the normal range is the best way to prevent AF.

# AF risk factor: Physical activity

## AF incidence according to physical activity level in the Korean population



*Jin MN, Yang PS, Joung B. Scientific report 2019;9:13270*

## Stroke in AF patients according to physical activity (HUNT study)

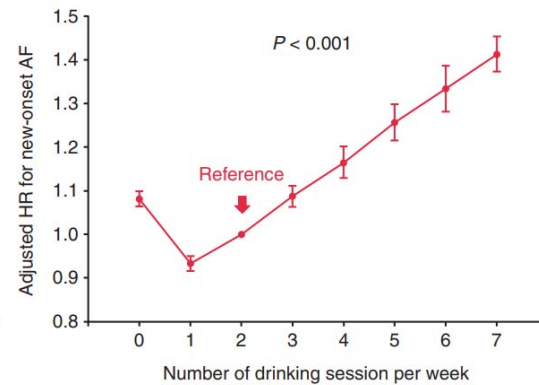
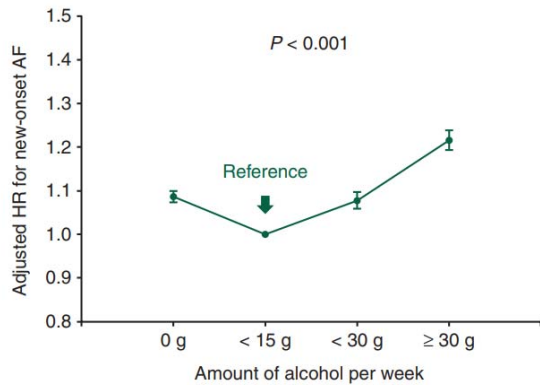
	n	Events	Model 1 <sup>a</sup>	Model 2 <sup>b</sup>
<b>Stroke</b>				
<b>PA recommendations</b>				
Inactive	306	42	1 (ref.)	1 (ref.)
Not meeting	447	58	0.97 (0.65–1.45)	0.99 (0.66–1.49)
<b>Meeting</b>	<b>364</b>	<b>30</b>	<b>0.68 (0.42–1.10)</b>	<b>0.70 (0.42–1.15)</b>
			P-trend 0.126	P-trend 0.177
<b>eCRF<sup>c</sup></b>				
Per MET	1117	130	0.93 (0.83–1.05)	0.93 (0.83–1.05)
Quartile 1	284	37	1 (ref.)	1 (ref.)
Quartile 2	276	41	1.18 (0.76–1.85)	1.22 (0.77–1.91)
Quartile 3	282	29	0.86 (0.53–1.40)	0.87 (0.53–1.42)
Quartile 4	275	23	0.66 (0.39–1.11)	0.65 (0.39–1.11)
			P-trend 0.071	P-trend 0.069

*Lars E. Garnvik. Eur Heart J 2020;41:1467*

- The guidelines recommended physical activity (500 to 1,000 MET-min/wk) was associated with a 12% decreased the risk of AF (adjusted HR 0.88)
- Meeting the physical activity recommendations is the best way to prevent AF and improve the outcome.

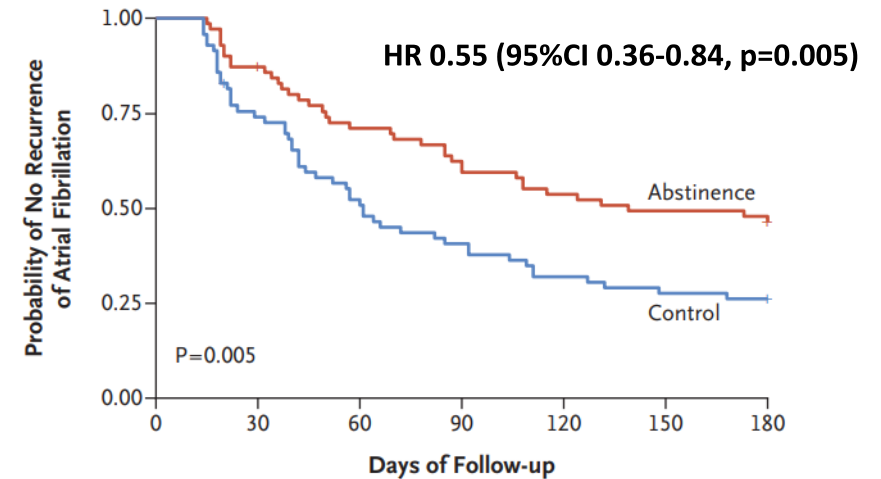
# AF risk factors: Alcohol

## Alcohol and AF incidence in the Korean population



*Kim YG, Choi JI. Europace 2020. 22, 216*

## Recurrence and burden of AF after alcohol abstinence



No. at Risk	0	30	60	90	120	150	180
Abstinence	70	61	49	43	37	34	33
Control	70	51	36	28	22	19	18

*Aleksandr Voskoboinik. N Engl J Med 2020; 382:20-28*

- Drinking more than alcohol 1 unit (=alcohol 14 g = Beer 1 can = Wine 1 glass = Soju 2 glasses = Whiskey 1 glass) per week and more than once a week are risk factors for AF.
- To abstain from alcohol is the best way to prevent AF and improve the outcome.

# AF risk factor: Smoking

## Outcomes according to smoking habit change of AF patients in the Korean population

	Continual smokers	Quitters	Sustained ex-smokers	Never smokers	<i>p</i> for trend
<b>Cardiovascular disease</b>					
Events	93	35	110	151	
Person-years	2407	1312	3382	4666	
aHR (95% CI) <sup>a</sup>	1.00 (reference)	0.65 (0.44–0.97)	0.76 (0.57–1.02)	0.68 (0.52–0.90)	0.020
<b>Total stroke</b>					
Events	60	20	65	92	
Person-years	2541	1374	3512	4871	
aHR (95% CI) <sup>a</sup>	1.00 (reference)	0.59 (0.35–0.99)	0.72 (0.50–1.04)	0.66 (0.46–0.93)	0.047

*Choi S, etc. BMC Public Health 2020 3;20(1):168*

Group	Number	Events	IR	Model 2 HR (95% CI)	Model 2* HR (95% CI)
<b>Ischemic stroke</b>					
				<i>p</i> < 0.001	<i>p</i> < 0.001
Never smoker	50,036	1607	10.1	1 (reference)	0.589 (0.522-0.666)
Ex-smoker	25,521	795	9.7	1.022 (0.917-1.139)	0.602 (0.537-0.675)
Quitter	6768	200	9.2	1.191 (1.014-1.398)	0.702 (0.595-0.827)
Current smoker	14,212	507	11.1	1.697 (1.502-1.917)	1 (reference)
<b>All-cause death</b>					
				<i>p</i> < 0.001	<i>p</i> < 0.001
Never smoker	50,036	2201	13.5	1 (reference)	0.579 (0.526-0.638)
Ex-smoker	25,521	1463	17.4	1.112 (1.024-1.207)	0.644 (0.589-0.704)
Quitter	6768	440	19.8	1.455 (1.300-1.629)	0.842 (0.748-0.948)
Current smoker	14,212	778	16.5	1.727 (1.569-1.902)	1 (reference)

*Lee SR, Chi EK. J. Clin. Med. 2021, 10, 2238.*

- Even if patients were already smoking, quitting smoking could reduce AF-related risk.
- Quitting smoking as soon as possible is the best way to prevent AF and improve outcomes.



# Summary

- **Risk factor management** is an important **paradigm shift** in the current clinical care of AF.
- **Who?**
  - We should intervene **in all patients with modifiable risk factors for AF** (HTN, DM, obesity, OSA, alcohol intake, dyslipidemia, low physical activity, or smoking).
  - A **multidisciplinary team based** and **patient-centered approach** are recommended rather than treatment by one single healthcare professional.
- **When?**
  - Risk management is required **from the pre-risk state**.
- **How?**
  - HTN: For AF patients, **120–129/<80 mmHg** is the optimal blood pressure treatment target.
  - DM: **Reducing blood sugar level** is the best way to improve the outcome.
  - Obesity: **Maintaining the body weight in the normal range (BMI : 18.5-25 in Asian)** is the best way to prevent AF.
  - Physical activity: **Meeting the physical activity recommendations (500 to 1,000 MET-min/wk)** is the best way to prevent AF and improve the outcome.
  - Alcohol: **To abstain from alcohol** is the best way to prevent AF and improve the outcome.
  - Smoking: **Quitting smoking as soon as possible** is the best way to prevent AF and improve outcomes.

**Thank you for your attention!**