Actualités Néphrologiques 2023

Cardiologie et maladie rénale chronique

Fibrillation atriale

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Rythmologue

Paris

Université Paris Cité

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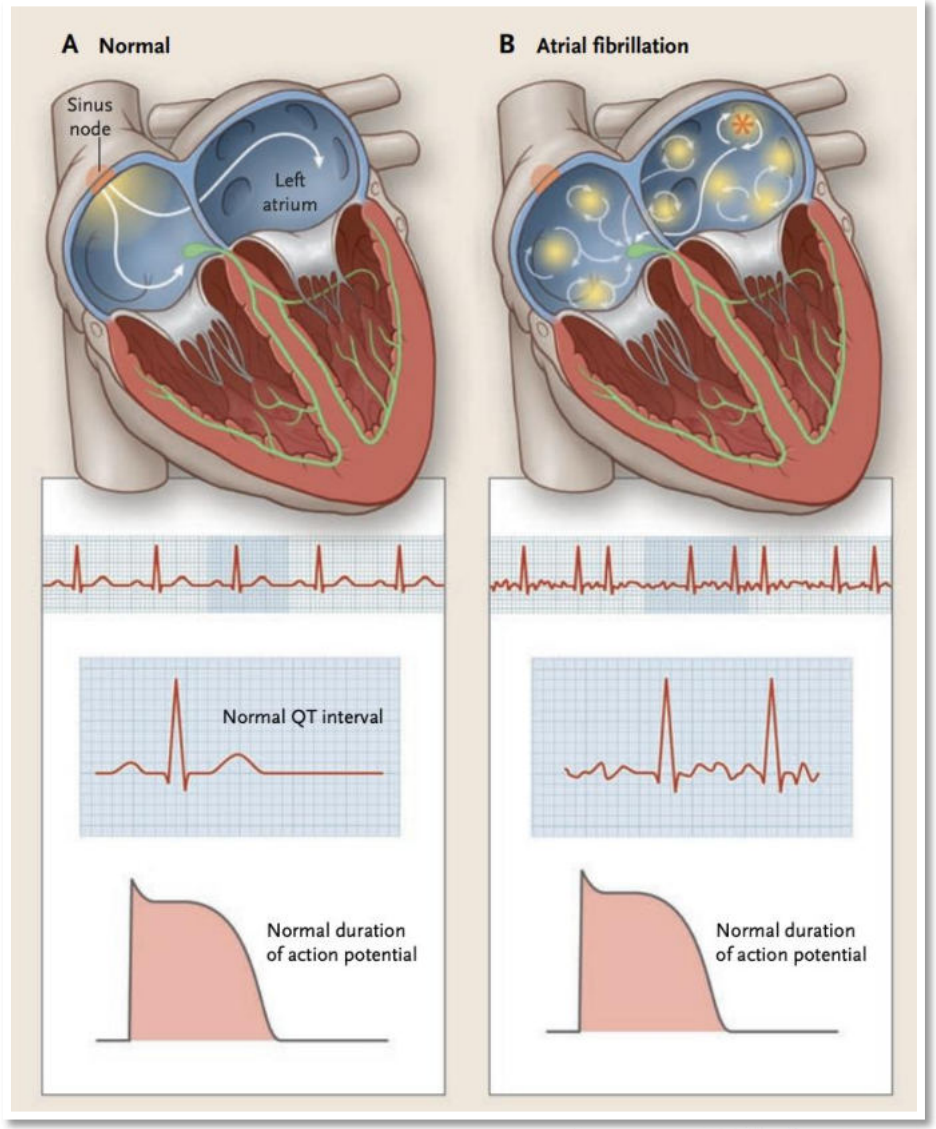
Disclosures

- Consulting fees :
  - Medtronic, Pfizer, Boston Scientific, Abbott, Sanofi

Atrial Fibrillation

- **Supraventricular arrhythmia** with :
  - Uncoordinated atrial electrical activation
  - Ineffective atrial contraction

- **ECG :**
  - Irregular R-R intervals
  - Absence of distinct repeating P waves and
  - Irregular atrial activations



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Zimetbaum et al.N Engl J Med. 2007 Mar 1;356(9):935-41.
Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

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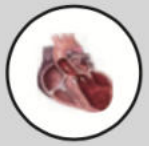
AF is not just an electrocardiographic abnormality

AF-Related Outcome	Frequency in AF	Mechanism(s)
Death 	1.5 - 3.5 fold increase	Excess mortality related to: • HF, comorbidities • Stroke
Stroke 	20-30% of all ischaemic strokes, 10% of cryptogenic strokes	• Cardioembolic, or • Related to comorbid vascular atheroma
LV dysfunction / Heart failure 	In 20-30% of AF patients	• Excessive ventricular rate • Irregular ventricular contractions • A primary underlying cause of AF
Cognitive decline / Vascular dementia 	HR 1.4 / 1.6 (irrespective of stroke history)	• Brain white matter lesions, inflammation, • Hypoperfusion, • Micro-embolism

AF-Related Outcome	Frequency in AF	Mechanism(s)
Depression 	Depression in 16-20% (even suicidal ideation)	• Severe symptoms and decreased QoL • Drug side effects
Impaired quality of life 	>60% of patients	• Related to AF burden, comorbidities, psychological functioning and medication • Distressed personality type
Hospitalizations 	10-40% annual hospitalization rate	• AF management, related to HF, MI or AF related symptoms • Treatment-associated complications

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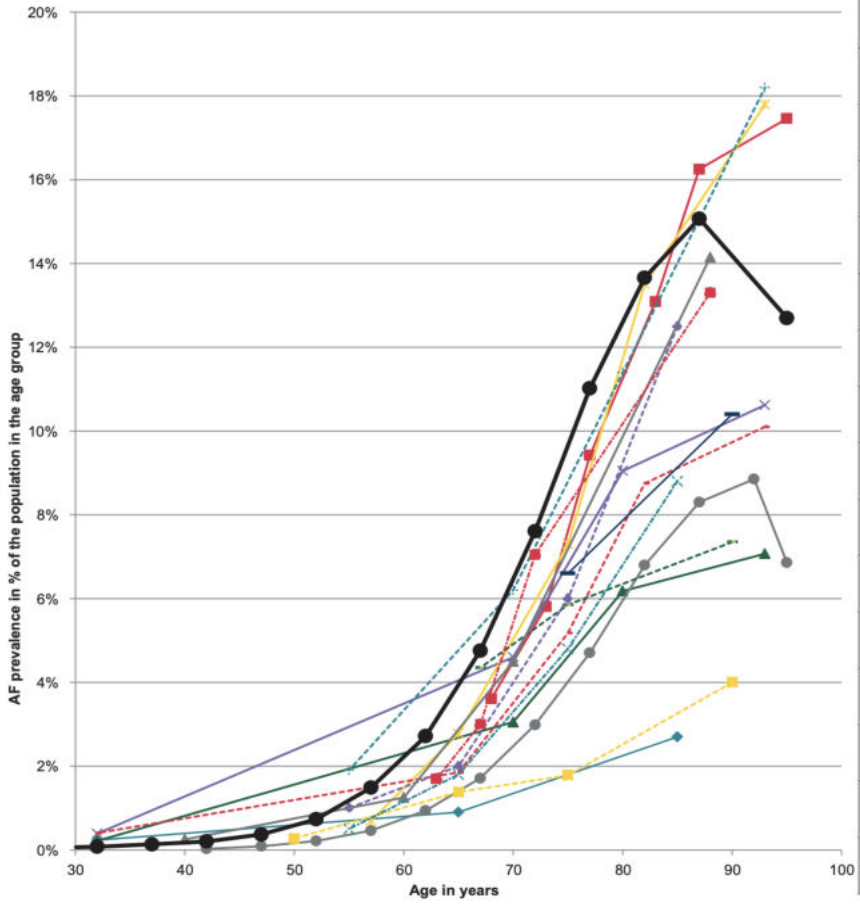
Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Epidemiology

- Prevalence of AF around 2-4%
- Increases with age
- ≥ 80 yo : 16%



Authors	Data source	Country	Study period
Ohsawa et al., 2005 [5]	Population-based survey	Japan	1980-2000
Piccini et al., 2012 [8]	5% sample of Medicare beneficaries ≥ 65 years	United States	1991-2007
Murphy et al., 2007 [9]	Data from primary care practices	Scotland	April 2001-March 2002
Majeed et al., 2001 [10]	Patients registered in 211 general practices	UK	1994-1998
Heeringa et al., 2006 [13]	Community-based cohort study	Nether-lands	1990-1993
Rietbrock et al., 2008 [14]	General Practice Research Database	UK	1993-2005
Miyasaka et al., 2006 [15]	Community-based cohort study	United States	1980-2000
Go et al., 2001 [16]	Cross-sectional study of adults enrolled in a large HMO	United States	July 1 1996-December 31 1997
Furberg et al., 1994 [17]	Random sample of Medicare recipients	United States	Not known
Naccarelli et al., 2009 [18]	Market scan/ Medicare databases	United States	July 1 2004-December 31, 2005
Jeong, 2005 [19]	Community-based cross-sectional study	Korea	April 2000-December 2000
Phillips et al., 1990 [20]	Community-based cohort study	United States	n.a.
Wolf et al., 1991 [21]	Population-based survey	United States	1948-1990
Lake et al., 1989 [22]	Population-based survey	Australia	1966-83
Bonhorst et al., 2010 [23]	Cross-sectional study of the Portugese population	Portugal	n.a.
Wilke et al., 2012	Claims data of two mandatory insurance funds	Germany	2006 - 2008

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Wilke et al. Europace. 2013 Apr;15(4):486-93.
Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

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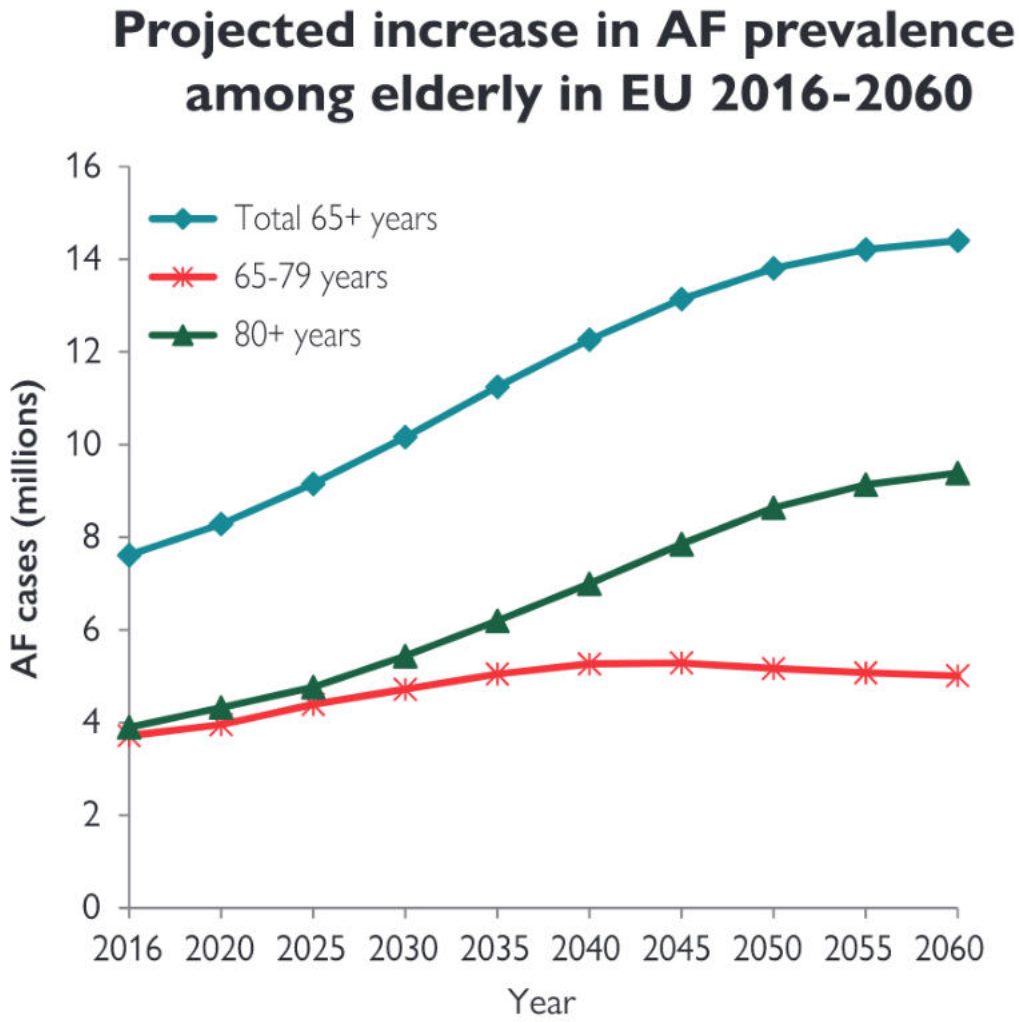
Projected AF prevalence



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Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.
Krijthe. Eur Heart J. 2013 Sep;34(35):2746-51.

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Global Burden of CKD

- Prevalence of CKD around 9 %
- CKD prevalence increased 29.3% since 1990
- **Hypertension, diabetes,** high BMI & diet high in sodium main causes of CKD

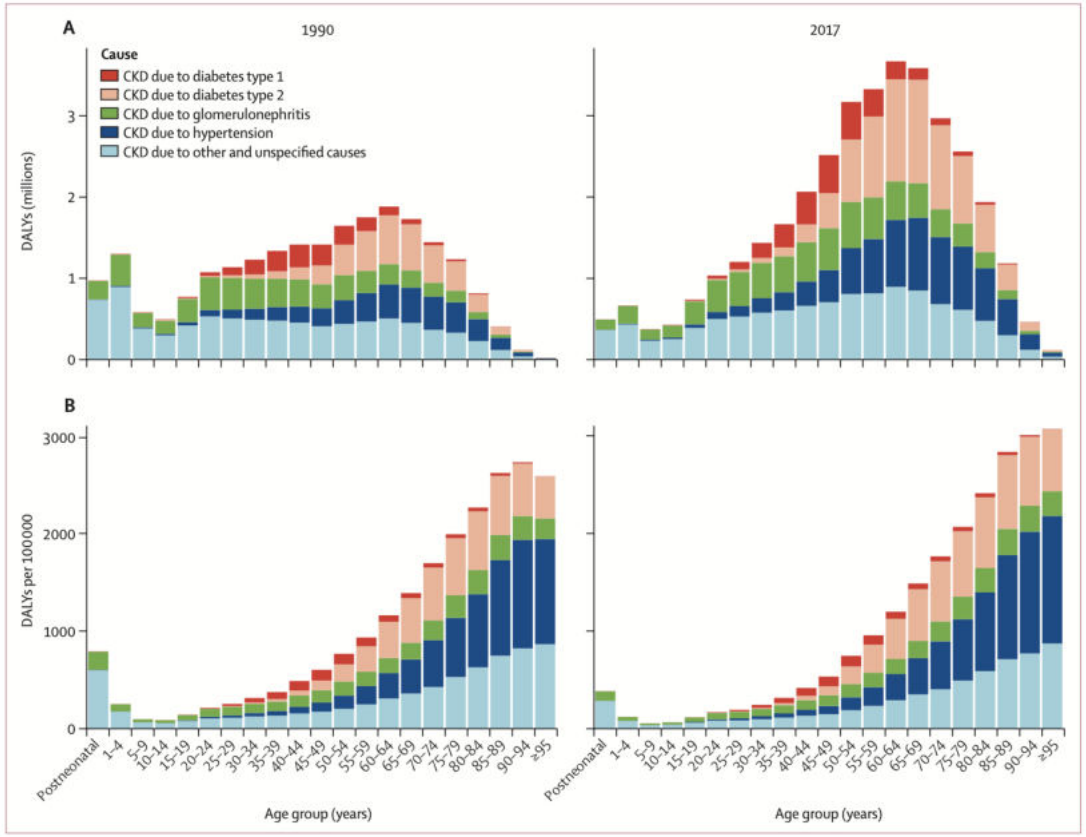

Figure 4: **Number (A) and rate (B) of global DALYs for CKD by underlying cause in 1990 and 2017**
DALY=disability-adjusted life-year. CKD=chronic kidney disease.

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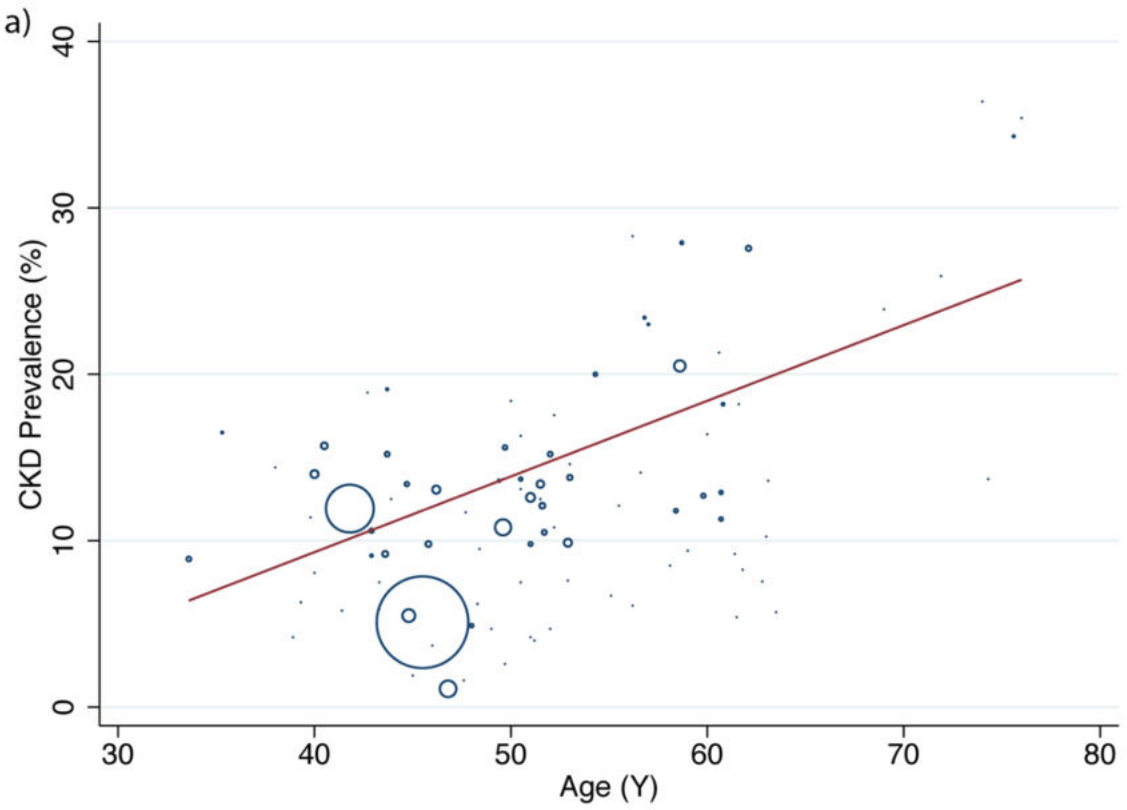
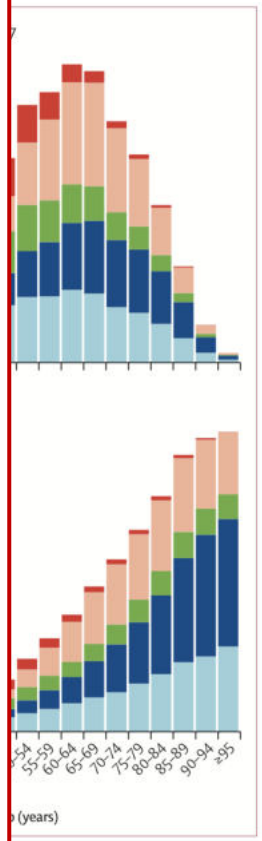
GBD Chronic Kidney Disease Collection Collaboration. Lancet. 2020 Feb 29;395(10225):709-733.

Global Burden of CKD

- Preval
- CKD p
- **Hyper**
  high in



CKD Prevalence increases with age



Hill et al. PLoS One. 2016 Jul 6;11(7):e0158765.

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GBD Chronic Kidney Disease Collection Collaboration. Lancet. 2020 Feb 29;395(10225):709-733.

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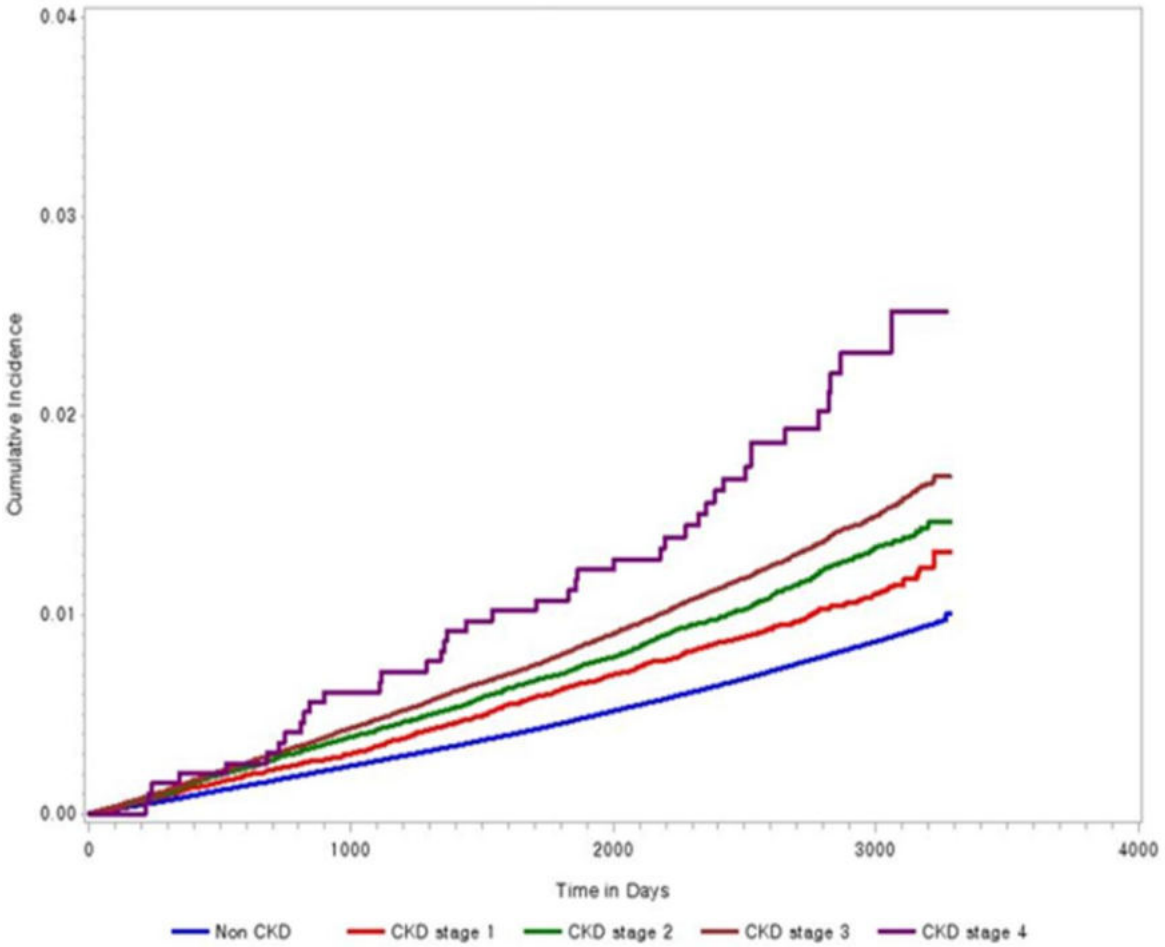
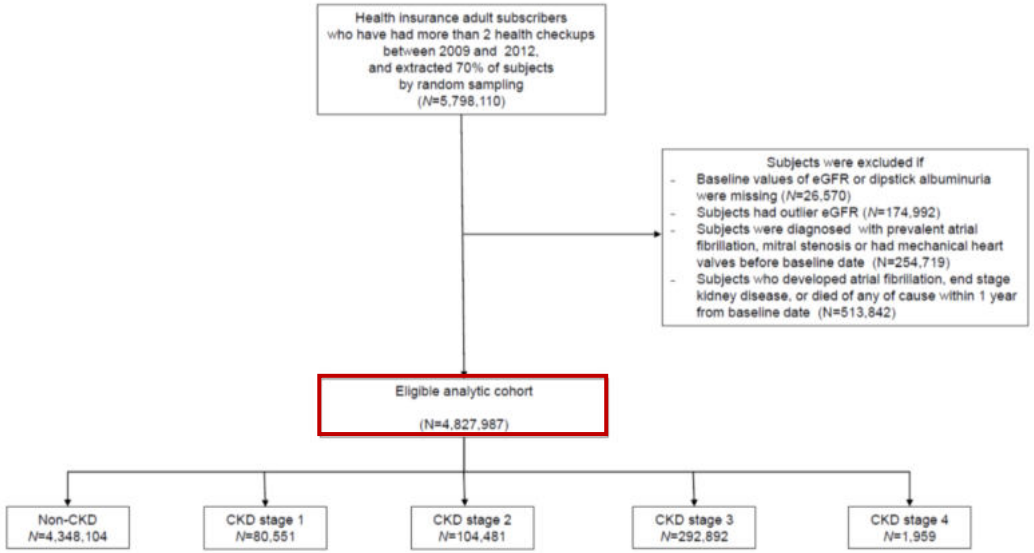
Incident AF according to the CKD Stage



Adjusted with age, body mass index, smoking, drinking, systolic/diastolic blood pressure and comorbidities.



CKD Stages (KDIGO)	Hazard ratio (95% CI)
Stage 1	1.77 (1.69-1.85)
Stage 2	1.85 (1.80-1.91)
Stage 3	1.99 (1.95-2.04)
Stage 4	4.04 (3.07-5.33)

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Kim et al. J Am Heart Assoc. 2023 Apr 18;12(8):e028496.

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Bidirectionnal Relationship

Study (year) (reference)	Population	n	Groups	Follow-up (years)	Finding(s)
Guo *et al.* (2019)[18]	Chinese adults	88 312	CKD vs. non-CKD	NA	Increased prevalence of AF by four-fold in CKD; dose–response relation between incident AF and worsening CKD
Carrero *et al.* (2018)[20]	eGFR <60 without AF	116 184	eGFR 45–60 vs. eGFR 30–44 vs. eGFR <30	3.9	Dose–response relation between incident AF and worsening eGFR; eGFR <30 was associated with a 1.6-fold increased risk of incident AF (reference eGFR 45–60)
Marcos *et al.* (2017)[28]	Population-based cohort, enriched by those with albuminuria	8265	Creatinine, eGFR, cystatin C and urine albumin excretion as continuous variables	9.8	No association between incidence of AF and markers of renal function (creatinine, eGFR, and cystatin C); dose–response relation between incident AF and urine albumin excretion
Laukkanen *et al.* (2016)[23]	Population-based cohort	1840	eGFR ≥90 vs. eGFR 60–89 vs. eGFR 15–59; macroalbuminuria vs. no albuminuria	3.7	eGFR 15–59 was associated with a 2.7-fold increased risk of incident AF (reference eGFR ≥90); higher incidence of AF with macroalbuminuria
Alonso *et al.* (2011)[25]	Population-based cohort	10 328	eGFR ≥90 vs. eGFR 60–80 vs. eGFR 30–59 vs. eGFR 15–29; macroalbuminuria vs. microalbuminuria vs. no albuminuria	10.1	Dose–response relation between incident AF and worsening eGFR; risk of incident AF increased even with mild renal dysfunction; eGFR 15–29 was associated with 3.2-fold increased risk of incident AF (reference eGFR ≥90); higher incidence of AF with albuminuria
Deo *et al.* (2010)[29]	Ambulatory elderly patients	4663	Cystatin C quartiles; eGFR ≥60 vs. eGFR <60	7.4	No association between incidence or prevalence of AF and eGFR; two highest quartiles of cystatin C levels were each associated with a 1.5-fold increased risk of incident AF (reference Quartile 1); no association between prevalence of AF and cystatin C levels
Iguchi *et al.* (2008)[24]	Population-based cohort	41 417	eGFR tertiles	NA	Higher prevalence of AF with decreasing eGFR tertiles; OR 1.91 (95% CI of 1.54–2.38) in the lowest tertile compared to the highest tertile
Bansal *et al.* (2016)[27]	CKD without AF and ESRD	3091	Incident AF vs. no incident AF	5.9	Incident AF in CKD was associated with a 3.2-fold increased risk of developing ESRD requiring RRT or kidney transplant
Bansal *et al.* (2013)[19]	eGFR <60 without AF and ESRD	206 229	Incident AF vs. no incident AF; eGFR 45-59 vs. eGFR 30–44 vs. eGFR 15–29 vs. eGFR <15; dipstick albuminuria	5.1	Incident AF in CKD was associated with a 1.7-fold increased risk of developing ESRD requiring RRT or kidney transplant; dose–response relation between incident AF and both worsening eGFR and albuminuria
Watanabe *et al.* (2009)[26]	Population-based cohort	235 818	Incident AF vs. no incident AF; eGFR ≥60 vs. eGFR 30–59 vs. eGFR <30	5.9	Incident AF was associated with a three-fold increased risk developing CKD; higher incidence of AF with worsening eGFR

Ding et al. Cardiovasc Res. 2021 Mar 21;117(4):1046-1059.

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Bidirectionnal Relationship

Study (year) (reference)	Population	n	Groups	Follow-up (years)	Finding(s)
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					(reference Quartile 1); no association between prevalence of AF and cystatin C levels
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AF Prevalence in CKD is around 18%
CKD Prevalence in AF is around 65%

Soliman et al. Am Heart J. 2010 Jun;159(6):1102-7.
Boriani, Sci Rep. 2016 Jul 28;6:30271.

Ding et al. Cardiovasc Res. 2021 Mar 21;117(4):1046-1059.

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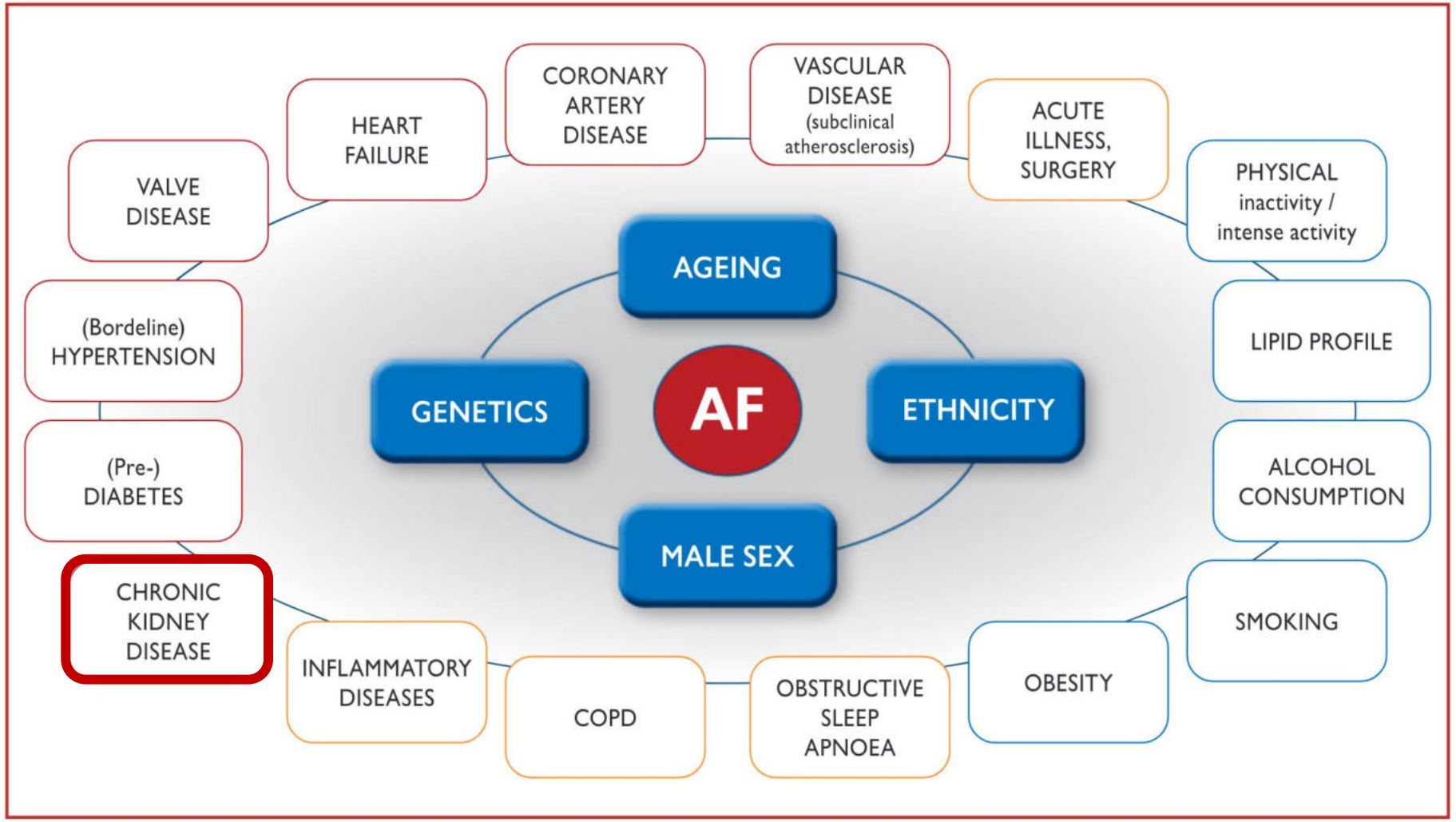
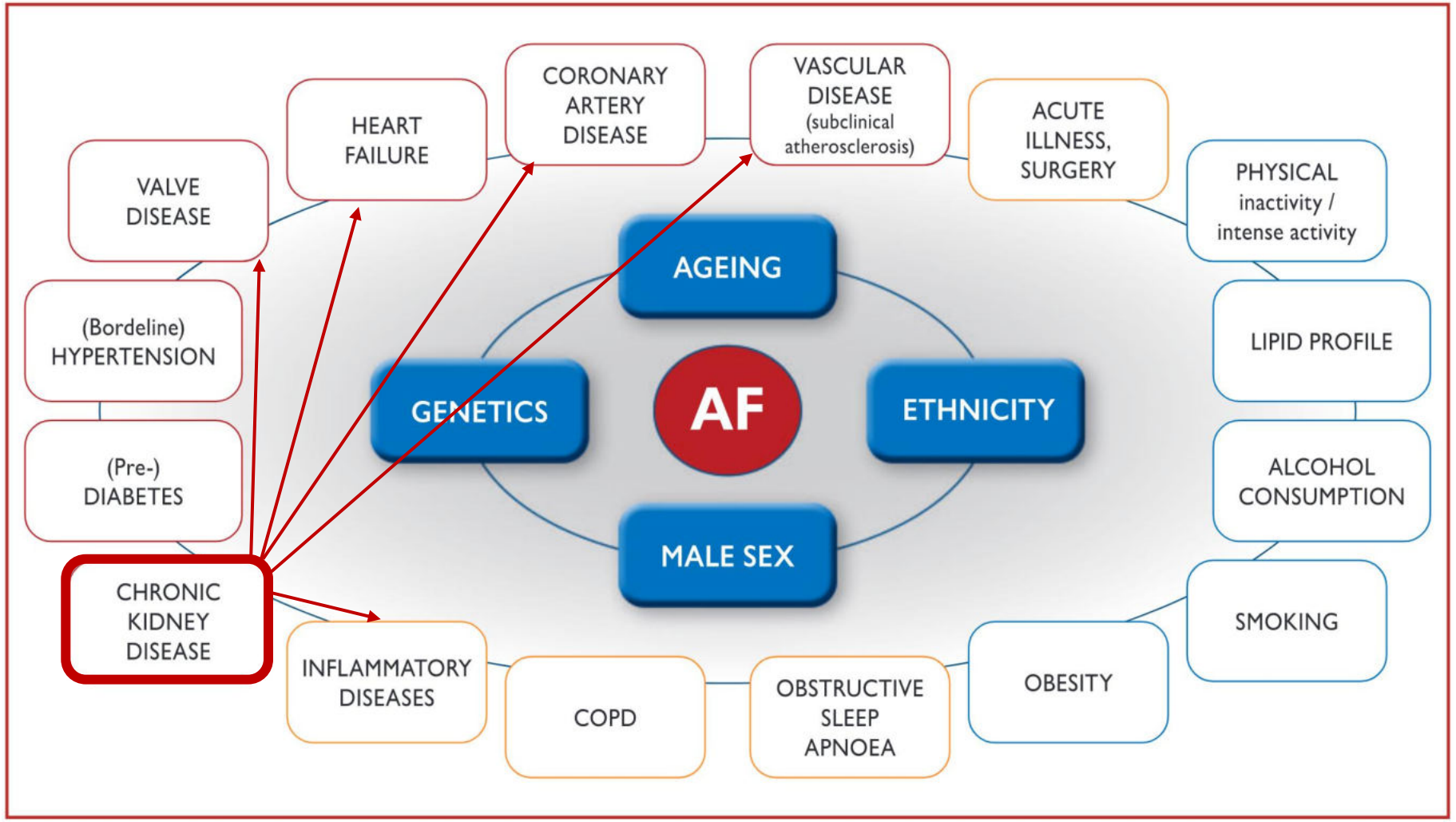
Risk Factors for incident AF



Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Risk Factors for incident AF



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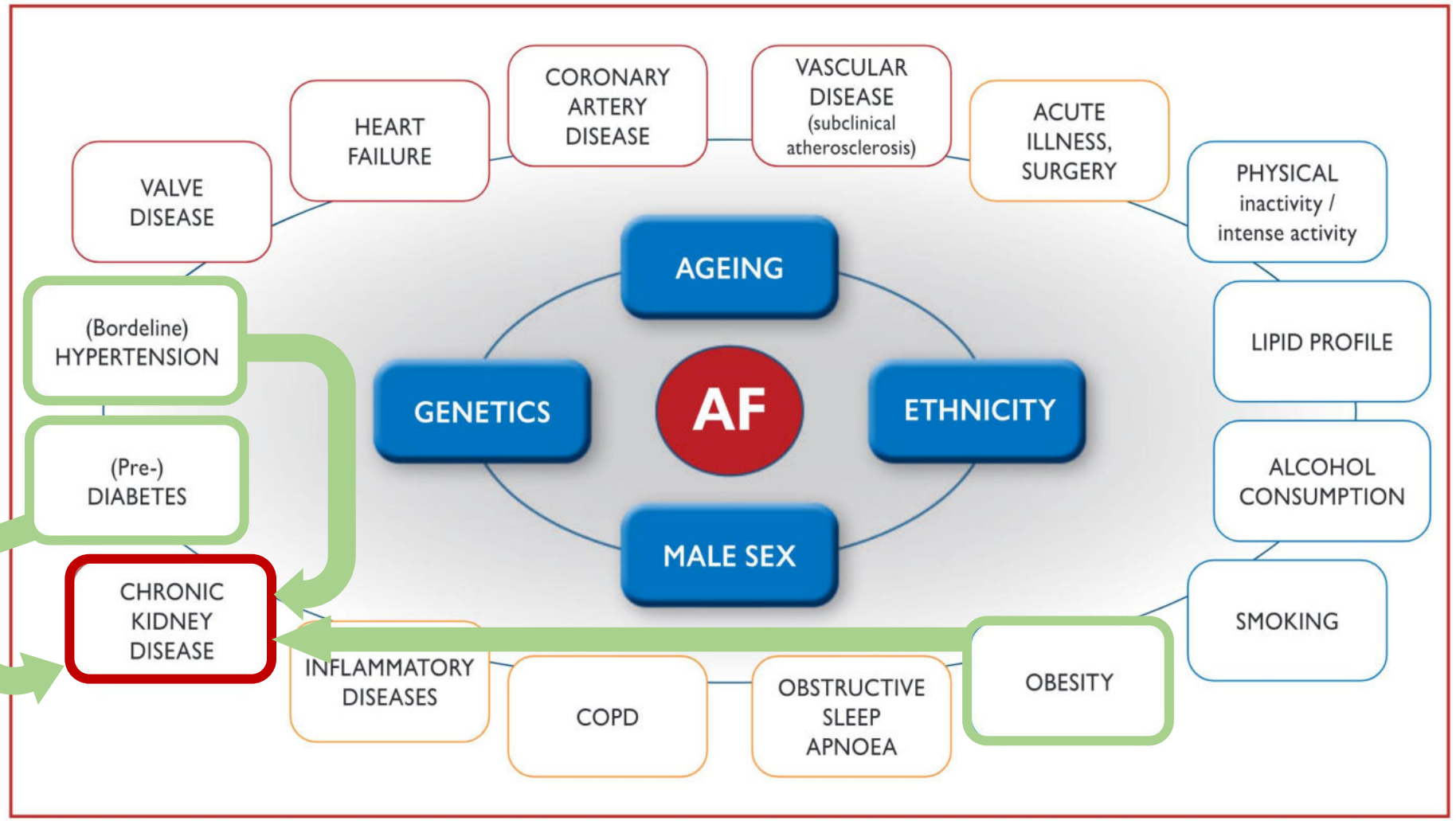
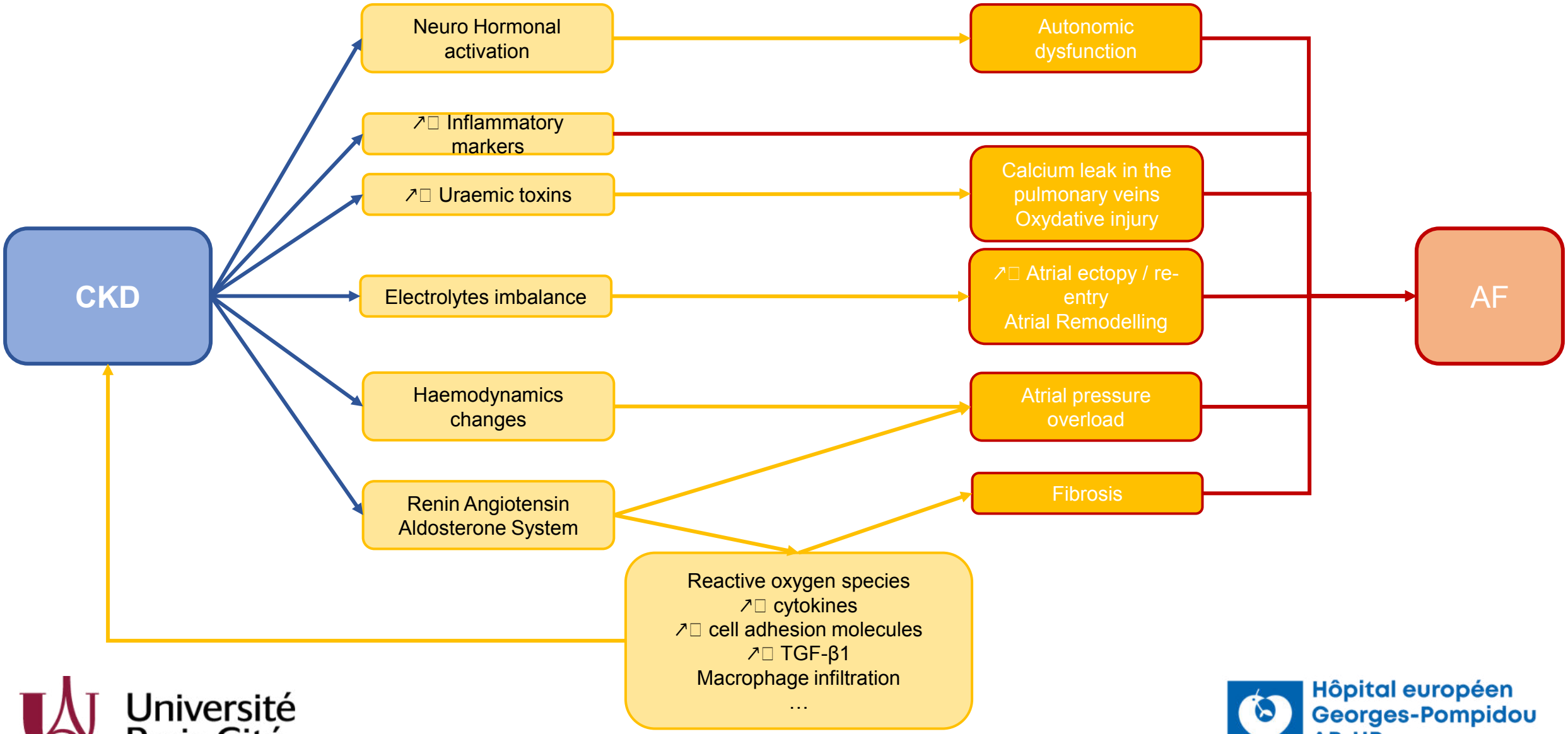
Risk Factors for incident AF



Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Mechanisms in CKD leading to AF



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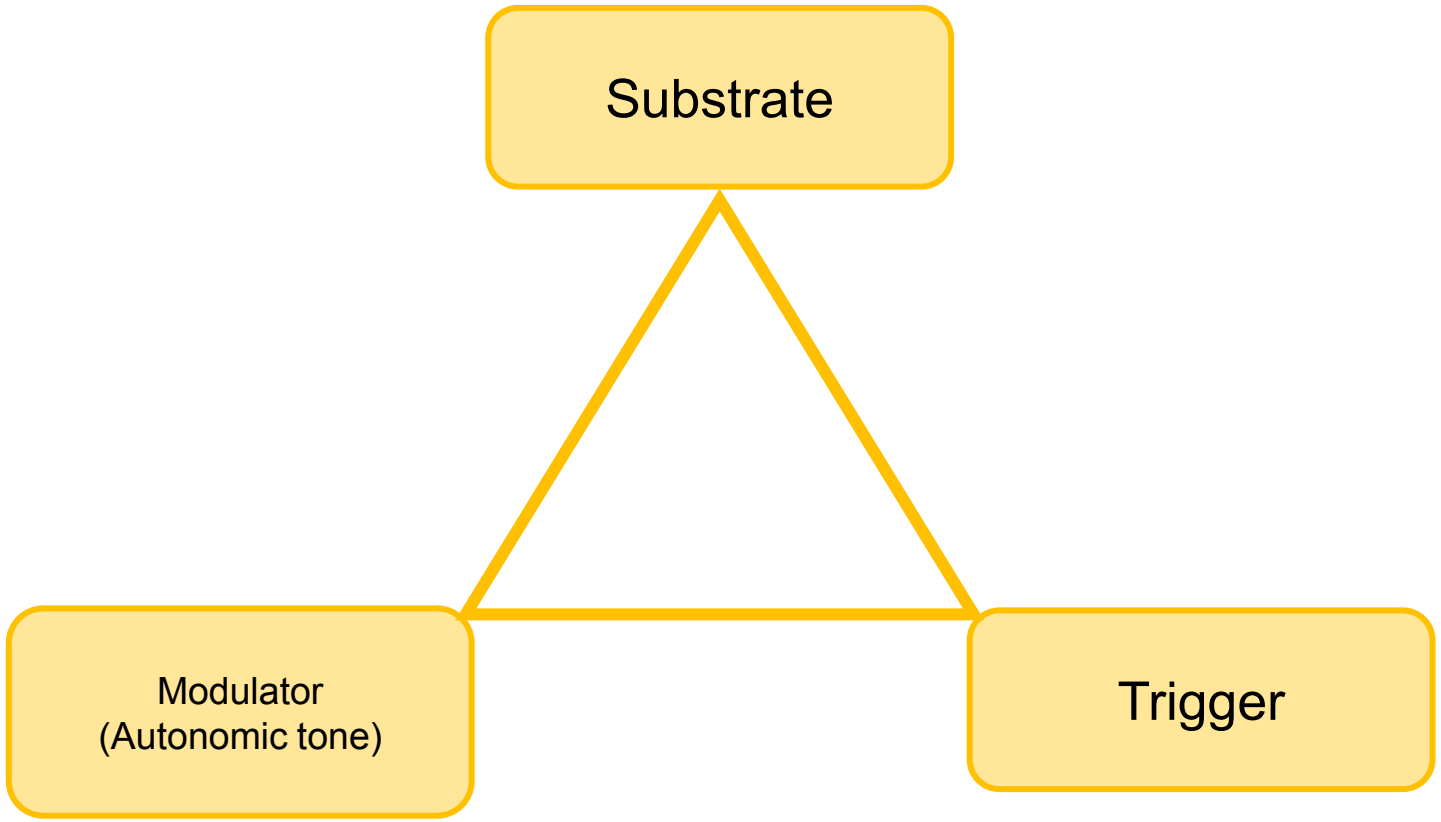
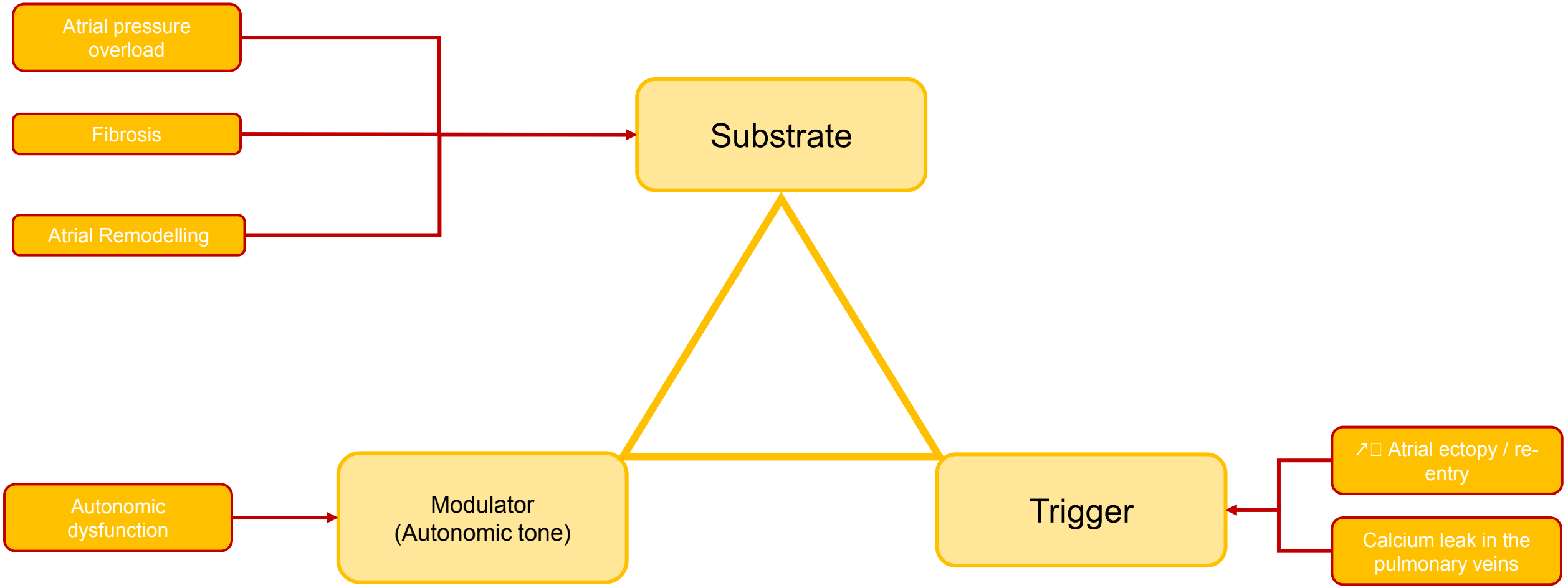
Ding et al. Cardiovasc Res. 2021 Mar 21;117(4):1046-1059.

Coumel Triangle



Coumel Triangle



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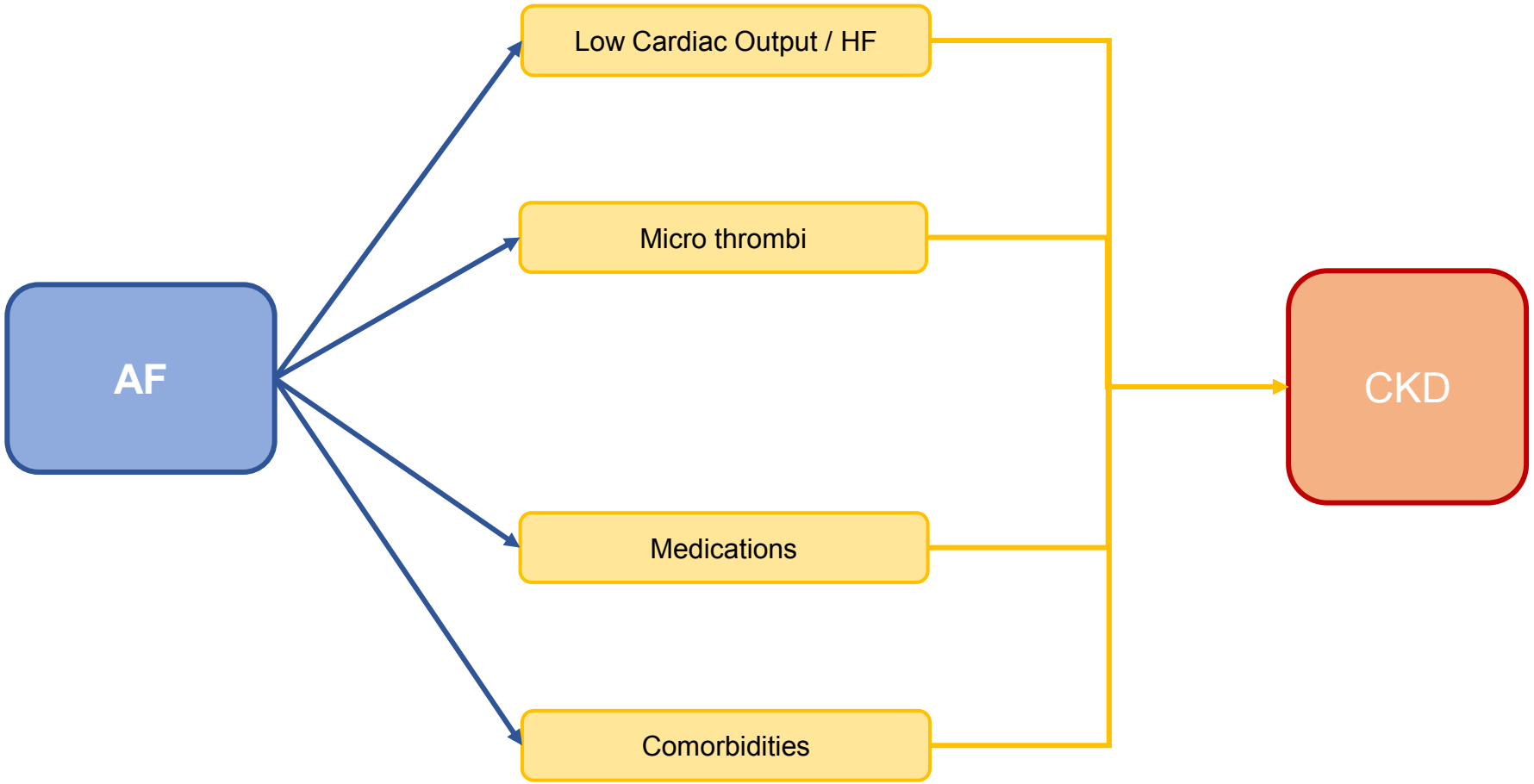
Mechanisms in AF leading to CKD



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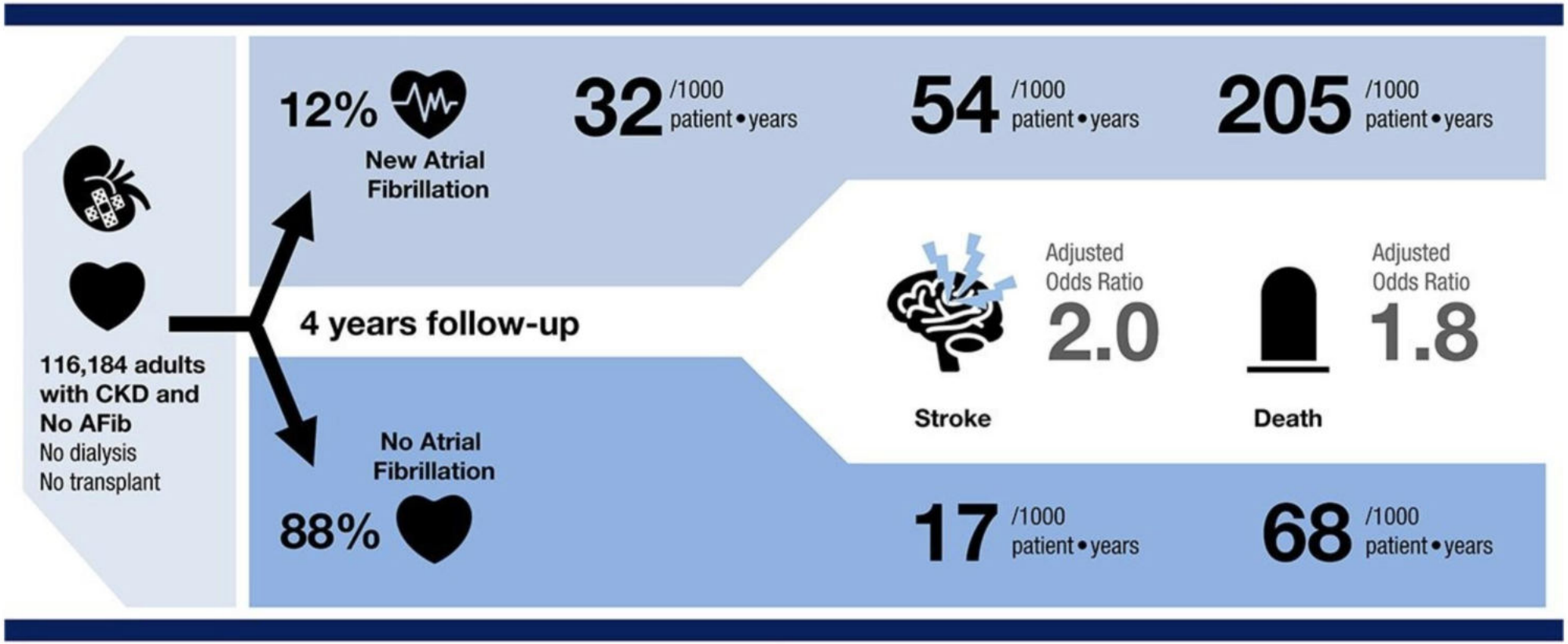
Ding et al. Cardiovasc Res. 2021 Mar 21;117(4):1046-1059.

Is AF dangerous in CKD?

Incident Atrial Fibrillation and the Risk of Stroke in Adults with Chronic Kidney Disease
The Stockholm CREAtinine Measurements (SCREAM) Project

Juan Jesus Carrero,[1] Marco Trevisan,[1] Manish M. Sood,[2] Peter Bárány,[3] Hong Xu,[1] Marie Evans,[3] Leif Friberg,[4] and Karolina Szummer[5]



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Carrero JJ, et al.Clin J Am Soc Nephrol. 2018 Sep 7; 13(9): 1314–1320

Is AF+CKD dangerous?

RESEARCH ARTICLE

Chronic kidney disease and atrial fibrillation: A dangerous combination

Gurbey Ocak[1,2,3]*, Meriem Khairoun[2], Othman Khairoun[2], Willem Jan W. Bos[1,4], Edouard L. Fu[3], Maarten J. Cramer[5], Jan Westerink[6], Marianne C. Verhaar[2], Frank L. Visseren[6], UCC-SMART study group¶

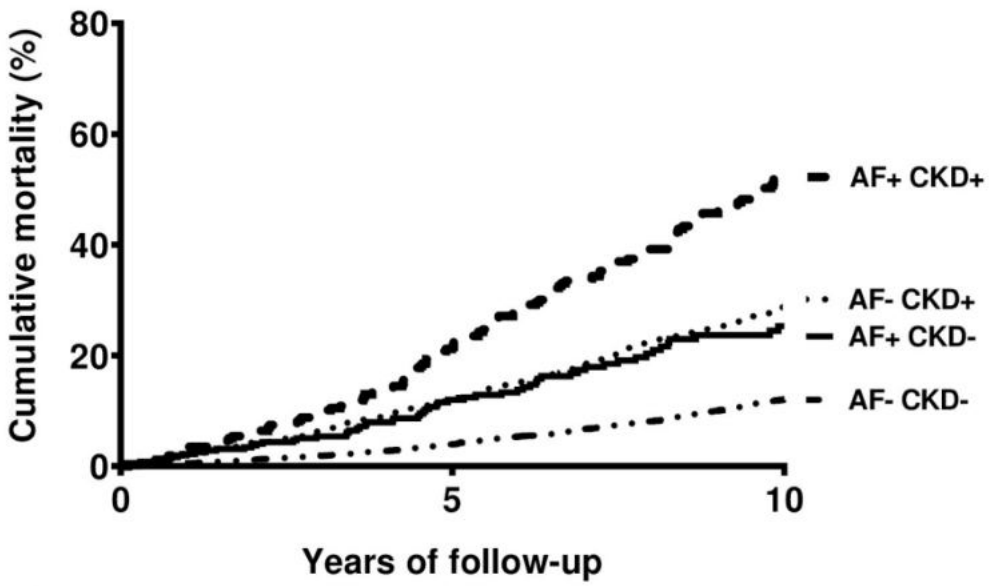

Table 2. Combination of atrial fibrillation and chronic kidney disease and risk of bleeding, ischemic stroke and mortality.

Atrial fibrillation	Chronic kidney disease		Number of events	IR	Crude HR (95%CI)	*Adjusted HR (95%CI)
BLEEDING						
No	No	N = 9,268	211	2.6	1 (ref)	1 (ref)
Yes	No	N = 374	18	7.7	2.7 (1.7–4.4)	1.9 (1.1–3.2)
No	Yes	N = 2,427	116	5.7	2.1 (1.7–2.7)	1.5 (1.2–1.9)
Yes	Yes	N = 325	37	17.2	6.1 (4.3–8.7)	3.0 (2.0–4.4)
ISCHEMIC STROKE						
No	No	N = 9,268	233	2.9	1 (ref)	1 (ref)
Yes	No	N = 374	19	8.0	2.7 (1.7–4.4)	1.8 (1.1–3.1)
No	Yes	N = 2,427	123	6.1	2.1 (1.7–2.6)	1.5 (1.2–1.9)
Yes	Yes	N = 325	46	21.3	7.3 (5.3–10.0)	4.2 (3.0–6.0)
MORTALITY						
No	No	N = 9,268	1,189	14.5	1 (ref)	1 (ref)
Yes	No	N = 374	75	30.7	2.5 (2.0–3.1)	1.4 (1.1–1.8)
No	Yes	N = 2,427	747	35.8	2.6 (2.4–2.8)	1.5 (1.3–1.6)
Yes	Yes	N = 325	192	81.7	6.5 (5.6–7.6)	2.2 (1.9–2.6)

Abbreviations: IR, incidence rate per 1000 person-years; HR, hazard ratio; CI, confidence interval.

Notes:

*Adjusted: Hazard ratio adjusted for age, sex, body mass index, hypertension, stroke, myocardial infarction, peripheral arterial disease, heart failure, diabetes mellitus, use of anticoagulant drugs (vitamin K antagonists and direct oral anticoagulants), antiplatelet agents and hemoglobin levels.

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Ocak et al. PLoS One. 2022; 17(4): e0266046

AF Diagnosis

Recommendations	Class[a]	Level[b]
ECG documentation is required to establish the diagnosis of AF. ● A standard 12-lead ECG recording or a single-lead ECG tracing of ≥30 s showing heart rhythm with no discernible repeating P waves and irregular RR intervals (when atrioventricular conduction is not impaired) is diagnostic of clinical AF.[6]	I	B

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Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

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AF Screening

Recommendation	Class[a]	Level[b]
Opportunistic screening for AF by pulse taking or ECG rhythm strip is recommended in patients ≥65 years of age.[188,211,223,225]	I	B
Systematic ECG screening should be considered to detect AF in individuals aged ≥75 years, or those at high risk of stroke.[212,224,227]	IIa	B

AF SCREENING

RISKS

- Abnormal results may cause anxiety
- ECG misinterpretation results may lead to overdiagnosis and overtreatment
- ECG may detect other abnormalities (true or false positives) that may lead to invasive tests and treatments that have the potential for serious harm (e.g., angiography / revascularisation with bleeding, contrast-induced nephropathy and allergic reactions to the contrast)

BENEFITS

Prevention of:
- Stroke/SE using OAC in patients at risk
- Subsequent onset of symptoms

Prevention/reversal of:
- Electrical/mechanical atrial remodelling
- AF-related haemodynamic derangements
- Atrial and ventricular tachycardia-induced cardiopmyopathy

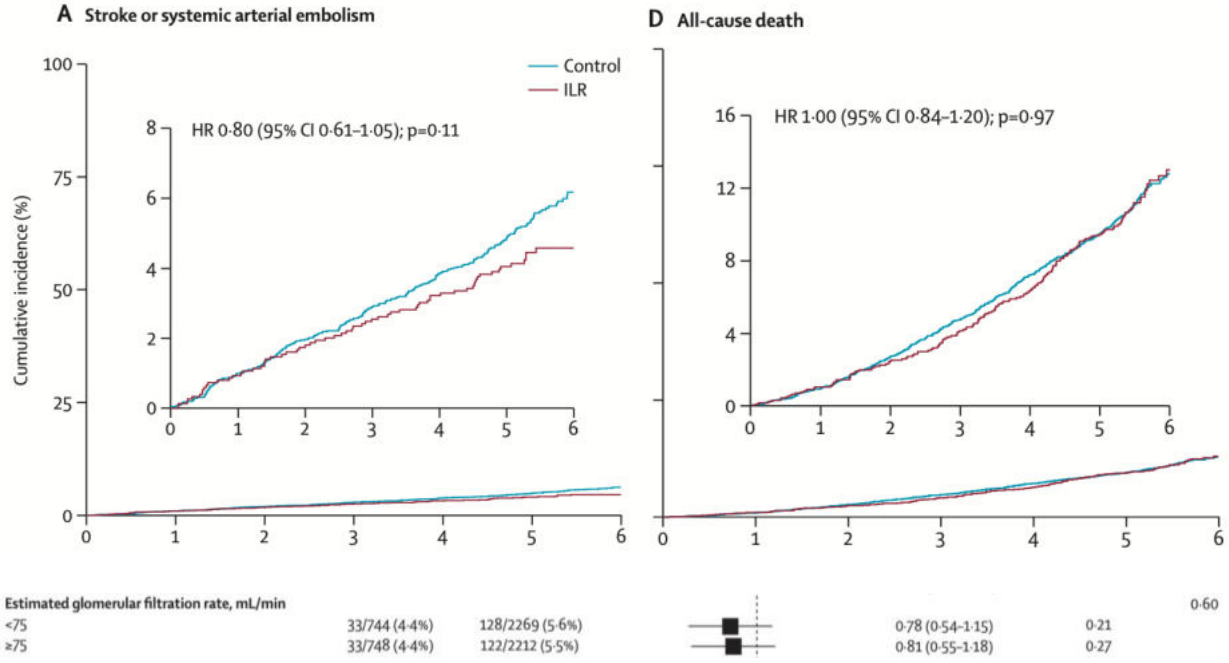
Prevention/reduction of:
- AF-related morbidity; hospitalization; mortality

Reduction of:
- The outcomes associated with conditions / diseases associated with AF that are discovered and treated as a consequence of the examinations prompted by AF detection

AF Screening

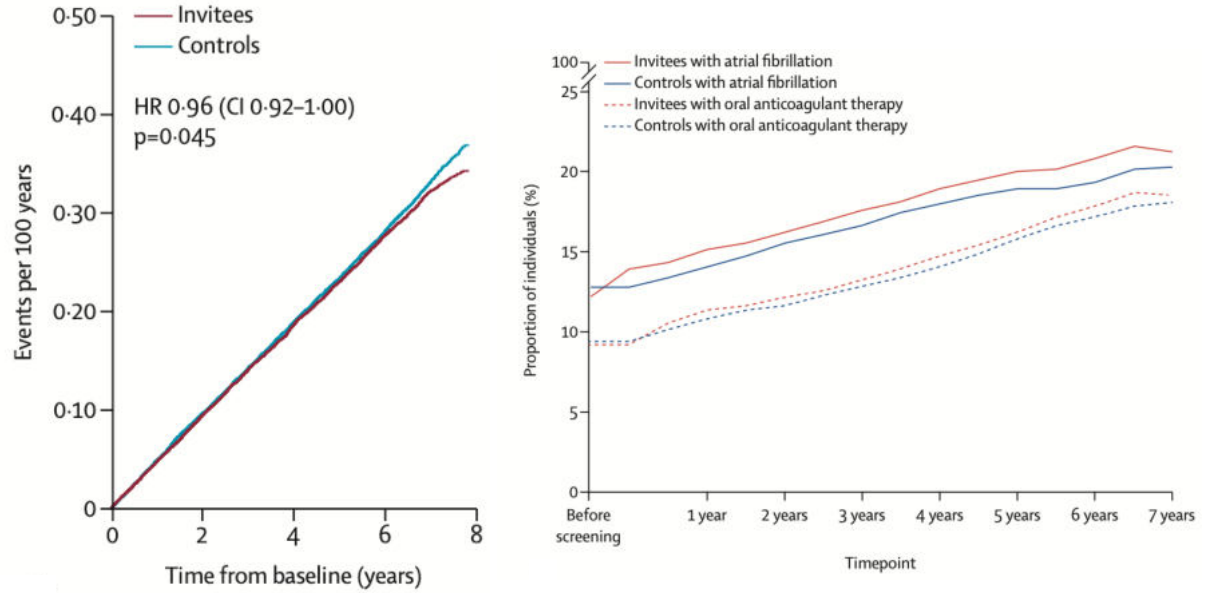
Implantable loop recorder detection of atrial fibrillation to prevent stroke (The LOOP Study): a randomised controlled trial

Jesper H Svendsen, Søren Z Diederichsen, Søren Højberg, Derk W Krieger, Claus Graff, Christian Kronborg, Morten S Olesen, Jonas B Nielsen, Anders G Holst, Axel Brandes, Ketil J Haugan, Lars Køber



Clinical outcomes in systematic screening for atrial fibrillation (STROKESTOP): a multicentre, parallel group, unmasked, randomised controlled trial

Emma Svennberg, Leif Friberg, Viveka Frykman, Faris Al-Khalili, Johan Engdahl, Mårten Rosenqvist**



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Svendsen et al. Lancet. 2021 Oct 23;398(10310):1507-1516.
Svennberg et al. Lancet. 2021 Oct 23;398(10310):1498-1506.

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AF Screening

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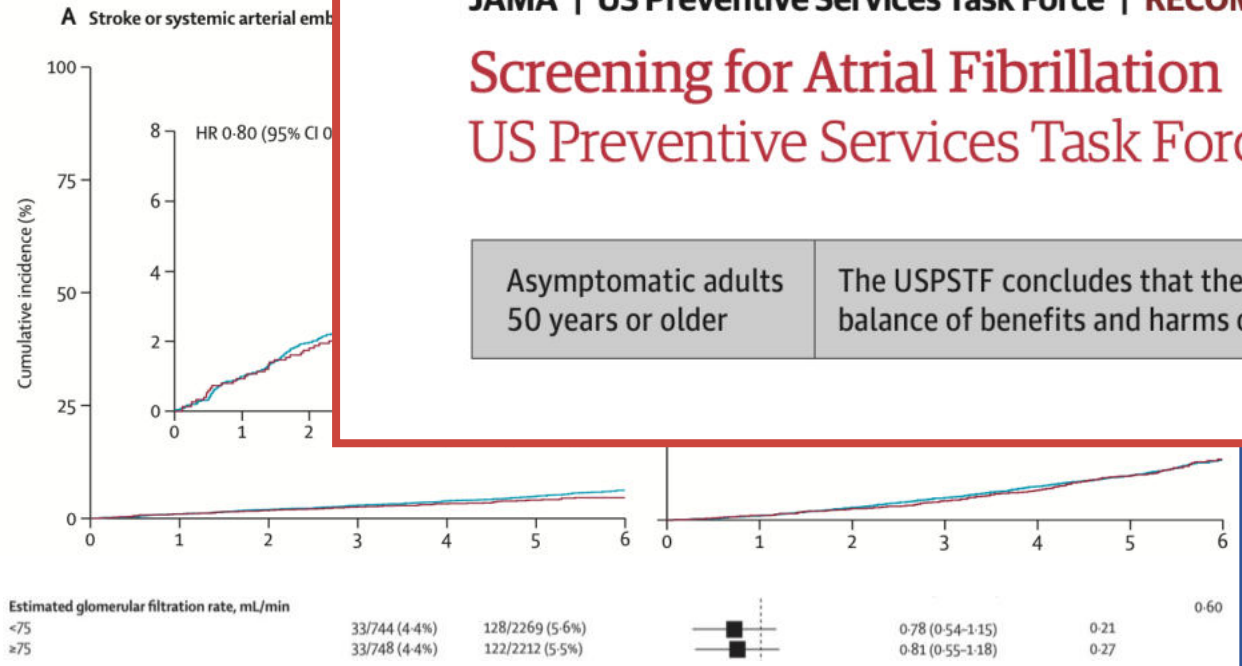
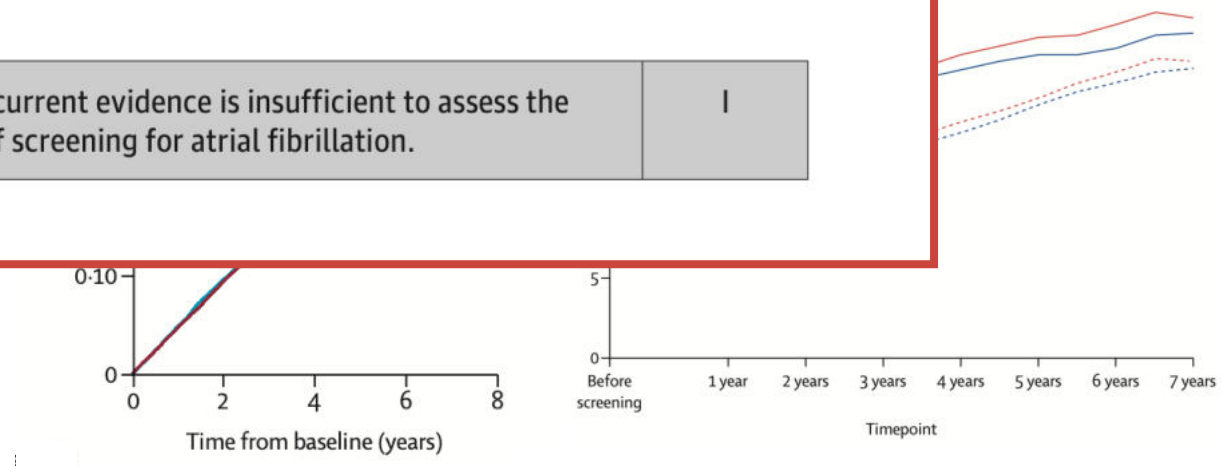


Clinical outcomes in systematic screening for atrial fibrillation (STROKESTOP): a multicentre, parallel group, unmasked, randomised controlled trial



JAMA | US Preventive Services Task Force | RECOMMENDATION STATEMENT

Screening for Atrial Fibrillation
US Preventive Services Task Force Recommendation Statement

Asymptomatic adults 50 years or older	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for atrial fibrillation.	I

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US Preventive Services Task Force. JAMA. 2022 Jan 25;327(4):360-367.
Svendsen et al. Lancet. 2021 Oct 23;398(10310):1507-1516.
Svennberg et al. Lancet. 2021 Oct 23;398(10310):1498-1506.

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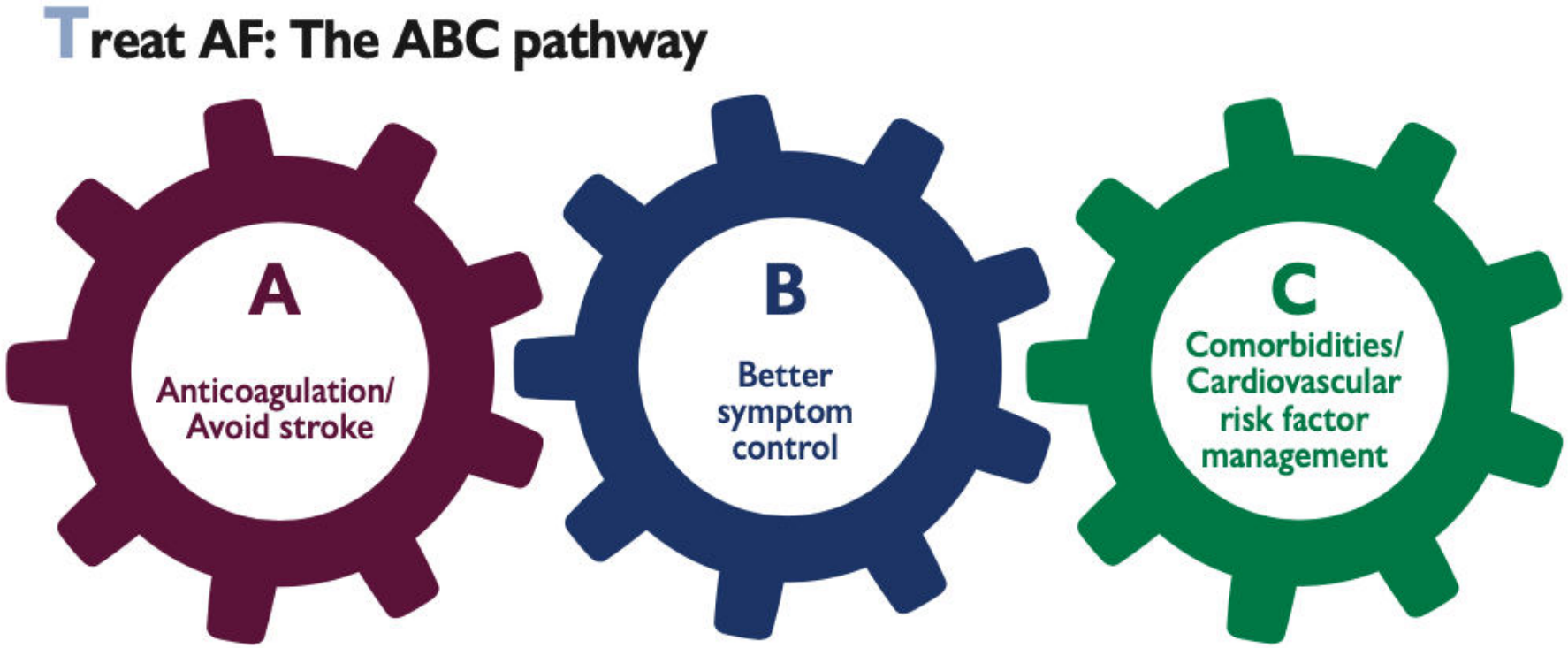
AF Treatment



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Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

AF Treatment

Management of Adults with Newly Diagnosed Atrial Fibrillation with and Without Chronic Kidney Disease

JASN
JOURNAL OF THE AMERICAN SOCIETY OF NEPHROLOGY

Methods

115,564 incident atrial fibrillation (AF) cases, along with AF medications and procedures were identified at two integrated health care delivery systems

AF medications (rate control medications, antiarrhythmic medications and anticoagulation), and AF-related procedures were identified from electronic health records

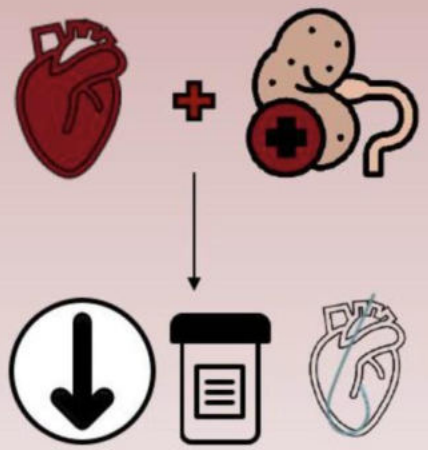
Baseline eGFR was calculated from at least 2 outpatient serum creatinine measures separated by ≥90 days

Results

- Compared to those with eGFR>60 ml/min/1.73 m^2, patients with eGFR 30-44 (adjusted hazard ratio [aHR] 0.91, 95%CI:0.99-0.93), 15-29 (aHR 0.78, 95%CI:0.75-0.82) and <15 ml/min/1.73 m2 (HR 0.64, 95%CI:0.58-0.70) had lower use of any AF therapy.
- In particular, AF patients with eGFR 15-29 ml/min/1.73 m^2 had lower adjusted use of rate control agents, warfarin, and DOACs compared with eGFR ≥60 ml/min/1.73 m^2

Conclusion

- In adults with newly diagnosed AF, CKD severity was associated with lower receipt of rate control agents, anticoagulation and AF procedures.
- Data on efficacy and safety of AF therapies in CKD patients are needed to inform management strategies.



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Bansal et al. J Am Soc Nephrol. 2022 Feb; 33(2): 442–453.

Stroke Risk

CHA_2DS_2-VASc score Risk factors and definitions		Points awarded	Comment
C	**Congestive heart failure** Clinical HF, or objective evidence of moderate to severe LV dysfunction, or HCM	1	Recent decompensated HF irrespective of LVEF (thus incorporating HFrEF or HFpEF), or the presence (even if asymptomatic) of moderate-severe LV systolic impairment on cardiac imaging[335]; HCM confers a high stroke risk[336] and OAC is beneficial for stroke reduction.[337]
H	**Hypertension** or on antihypertensive therapy	1	History of hypertension may result in vascular changes that predispose to stroke, and a well-controlled BP today may not be well-controlled over time.[324] Uncontrolled BP - the optimal BP target associated with the lowest risk of ischaemic stroke, death, and other cardiovascular outcomes is 120 - 129/<80 mmHg.[338]
A	**Age 75 years or older**	2	Age is a powerful driver of stroke risk, and most population cohorts show that the risk rises from age 65 years upwards.[339] Age-related risk is a continuum, but for reasons of simplicity and practicality, 1 point is given for age 65 - 74 years and 2 points for age ≥75 years.
D	**Diabetes mellitus** Treatment with oral hypoglycaemic drugs and/or insulin or fasting blood glucose >125 mg/dL (7 mmol/L)	1	Diabetes mellitus is a well-established risk factor for stroke, and more recently stroke risk has been related to duration of diabetes mellitus (the longer the duration of diabetes mellitus, the higher the risk of thromboembolism[340]) and presence of diabetic target organ damage, e.g. retinopathy.[341] Both type 1 and type 2 diabetes mellitus confer broadly similar thromboembolic risk in AF, although the risk may be slightly higher in patients aged <65 years with type 2 diabetes mellitus compared to patients with type 1 diabetes mellitus.[342]
S	**Stroke**Previous stroke, TIA, or thromboembolism	2	Previous stroke, systemic embolism, or TIA confers a particularly high risk of ischaemic stroke, hence weighted 2 points. Although excluded from RCTs, AF patients with ICH (including haemorrhagic stroke) are at very high risk of subsequent ischaemic stroke, and recent observational studies suggest that such patients would benefit from oral anticoagulation.[343–345]
V	**Vascular disease** Angiographically significant CAD, previous myocardial infarction, PAD, or aortic plaque	1	Vascular disease (PAD or myocardial infarction) confers a 17 - 22% excess risk, particularly in Asian patients.[346–348] Angiographically significant CAD is also an independent risk factor for ischaemic stroke among AF patients (adjusted incidence rate ratio 1.29, 95% CI 1.08 - 1.53).[349] Complex aortic plaque on the descending aorta, as an indicator of significant vascular disease, is also a strong predictor of ischaemic stroke.[350]
A	**Age 65 – 74 years**	1	See above. Recent data from Asia suggest that the risk of stroke may rise from age 50 - 55 years upwards and that a modified CHA_2DS_2-VASc score may be used in Asian patients.[351,352]
Sc	**Sex category (female)**	1	A stroke risk modifier rather than a risk factor.[353]
Maximum score		**9**	

Recommendations	Class[a]	Level[b]
For stroke prevention in AF patients who are eligible for OAC, NOACs are recommended in preference to VKAs (excluding patients with mechanical heart valves or moderate-to-severe mitral stenosis).[423,424]	I	A
For stroke risk assessment, a risk-factor-based approach is recommended, using the CHA_2DS_2-VASc clinical stroke risk score to initially identify patients at 'low stroke risk' (CHA_2DS_2-VASc score = 0 in men, or 1 in women) who should not be offered antithrombotic therapy.[334,388]	I	A
OAC is recommended for stroke prevention in AF patients with CHA_2DS_2-VASc score ≥2 in men or ≥3 in women.[412]	I	A
OAC should be considered for stroke prevention in AF patients with a CHA_2DS_2-VASc score of 1 in men or 2 in women. Treatment should be individualized based on net clinical benefit and consideration of patient values and preferences.[338,378,380]	IIa	B

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Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Stroke Risk

Most commonly studied clinical risk factors (a systematic review)[324]	Positive studies/All studies	Other clinical risk factors[325]	Imaging biomarkers[291,326–328]	Blood/urine biomarkers[329–332]
Stroke/TIA/systemic embolism	15/16	Impaired renal function/ CKD	*Echocardiography*	Cardiac troponin T and I Natriuretic peptides Cystatin C Proteinuria CrCl/eGFR CRP IL-6 GDF-15 von Willebrand factor D-dimer
Hypertension	11/20	OSA	LA dilatation Spontaneous contrast or thrombus in LA Low LAA velocities Complex aortic plaque	
Ageing (per decade)	9/13	HCM		
Structural heart disease	9/13	Amyloidosis in degenerative cerebral and heart diseases		
Diabetes mellitus	9/14	Hyperlipidaemia		
Vascular disease	6/17	Smoking	*Cerebral imaging*	
CHF/LV dysfunction	7/18	Metabolic syndrome[333]	Small-vessel disease	
Sex category (female)	8/22	Malignancy		

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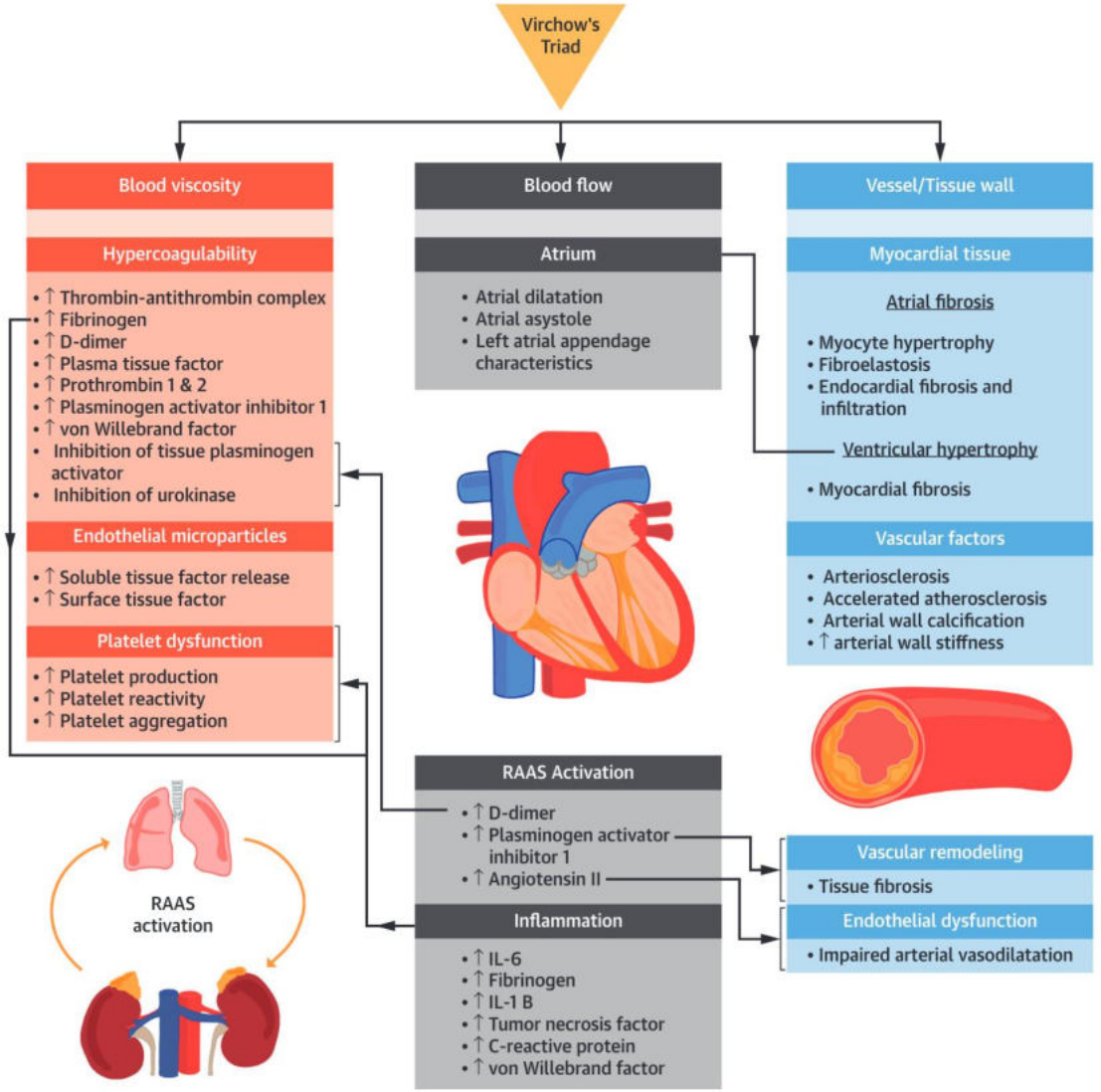
Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Stroke Risk in patients with AF + CKD



Kumar et al. J Am Coll Cardiol. 2019 Oct 29;74(17):2204-2215.

Bleeding Risk

Risk factors and definitions		Points awarded
H	**Uncontrolled hypertension** SBP >160 mmHg	1
A	**Abnormal renal and/or hepatic function** Dialysis, transplant, serum creatinine >200 µmol/L, cirrhosis, bilirubin > × 2 upper limit of normal, AST/ALT/ALP >3 × upper limit of normal	1 point for each
S	**Stroke** Previous ischaemic or haemorrhagic[a] stroke	1
B	**Bleeding history or predisposition** Previous major haemorrhage or anaemia or severe thrombocytopenia	1
L	**Labile INR[b]** TTR <60% in patient receiving VKA	1
E	**Elderly** Aged >65 years or extreme frailty	1
D	**Drugs or excessive alcohol drinking** Concomitant use of antiplatelet or NSAID; and/or excessive[c] alcohol per week	1 point for each
Maximum score		**9**

For bleeding risk assessment, a formal structured risk-score-based bleeding risk assessment is recommended to help identify non-modifiable and address modifiable bleeding risk factors in all AF patients, and to identify patients potentially at high risk of bleeding who should be scheduled for early and more frequent clinical review and follow-up.[388,395,404,406]	I	B
For a formal risk-score-based assessment of bleeding risk, the HAS-BLED score should be considered to help address modifiable bleeding risk factors, and to identify patients at high risk of bleeding (HAS-BLED score ≥3) for early and more frequent clinical review and follow-up.[388,395,404,406]	IIa	B

Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Bleeding Risk in patients with AF + CKD

The Risk of Major Hemorrhage with CKD

Amber O. Molnar,*†‡ Sarah E. Bota,§‖ Amit X. Garg,§‖¶ Ziv Harel,§¶** Ngan Lam,†† Eric McArthur,§ Gihad Nesrallah,‡‡ Jeffrey Perl,** and Manish M. Sood†‡§

Table 2. Association of eGFR and urine ACR with hemorrhage when examined as a continuous variable

Cohort and Variable	Unadjusted RR (95% CI)[a]	Adjusted RR (95% CI)	*P* Value
Total cohort			
eGFR, ml/min per 1.73 m^2	0.73 (0.72 to 0.74)	0.91 (0.89 to 0.92)[b]	<0.001
Urine ACR, mg/g	1.02 (1.01 to 1.02)	1.02 (1.01 to 1.02)[c]	<0.001
Age ≥66 yr old			
eGFR, ml/min per 1.73 m^2	0.81 (0.80 to 0.83)	0.91 (0.89 to 0.93)[b,d]	<0.001
Urine ACR, mg/g	1.02 (1.02 to 1.03)	1.02 (1.01 to 1.02)[c,d]	<0.001

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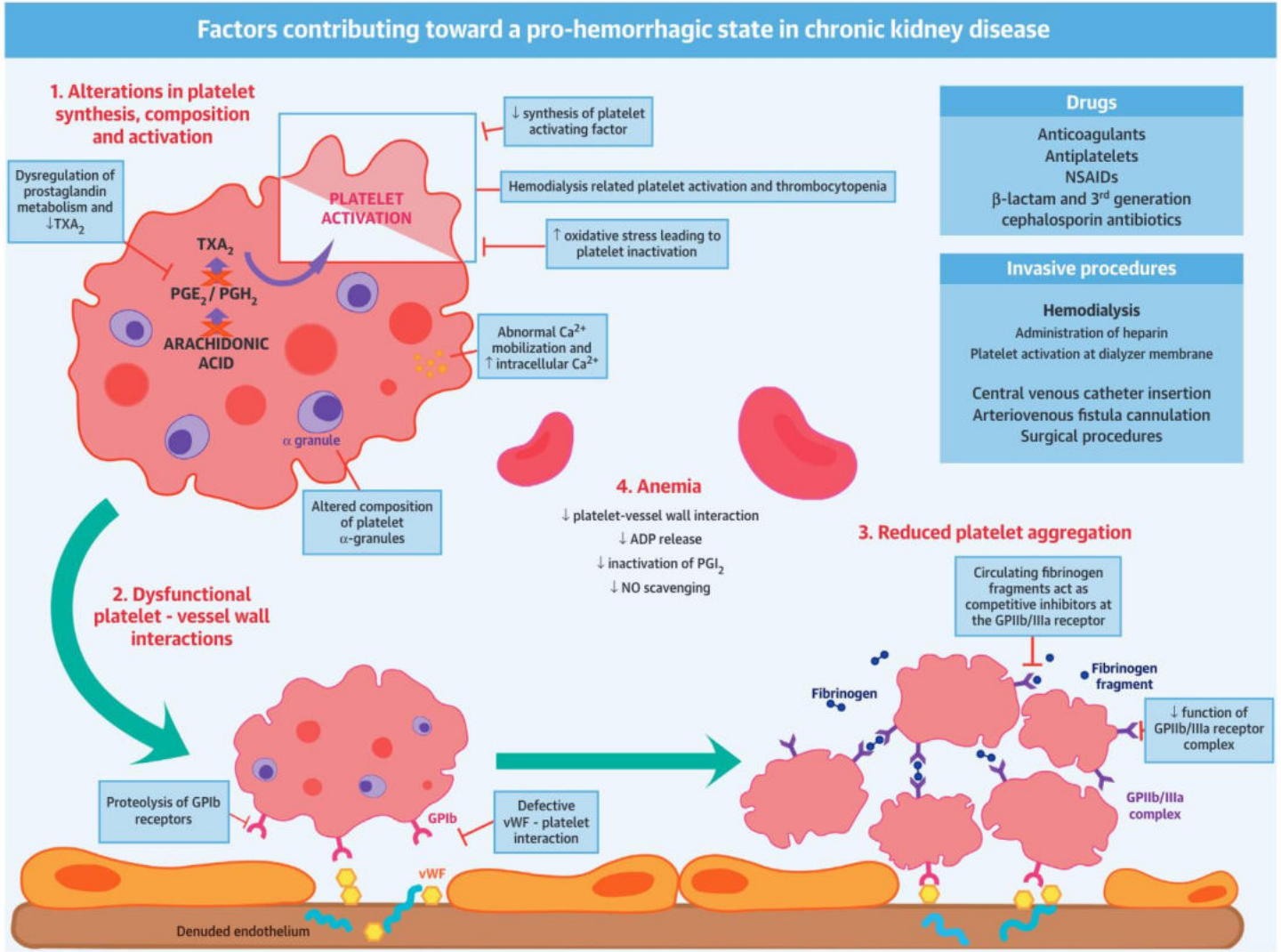
Molnar et al. J Am Soc Nephrol. 2016 Sep;27(9):2825-32.

Bleeding Risk in patients with AF + CKD



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Kumar et al. J Am Coll Cardiol. 2019 Oct 29;74(17):2204-2215.

Should we anticoagulate ?

Warfarin in Atrial Fibrillation Patients with Moderate Chronic Kidney Disease

Robert G. Hart, Lesly A. Pearce,† Richard W. Asinger,‡ and Charles A. Herzog‡*

Table 3. Effect of adjusted-dose warfarin in patients with stage 3 CKD[a]

	Adjusted-Dose Warfarin			Fixed, Low-Dose Warfarin + Aspirin			Relative Risk Reduction[c] (%) (95% CI); *P*
	n	No. of Events	2-year Rate (%)	*n*	No. of Events	2-year Rate (%)	
Ischemic stroke/systemic embolism[b]							
eGFR ≥60 ml/min per 1.73 m^2	242	5	5.1	259	16	8.5	67 (10, 88); $P = 0.02$
Stage 3 CKD	267	6	2.9	249	23	14.1	76 (42, 90); $P < 0.01$
All major bleeds							
eGFR ≥60 ml/min per 1.73 m^2	242	5	6.3	259	7	6.3	21 (−151, 75); $P = 0.69$
Stage 3 CKD	267	5	2.5	249	6	3.6	24 (−150, 77); $P = 0.65$
Deaths							
eGFR ≥60 ml/min per 1.73 m^2	242	10	7.9	259	15	10.1	26 (−64, 67); $P = 0.45$
Stage 3 CKD	267	21	13.7	249	22	17.7	15 (−55, 53); $P = 0.60$

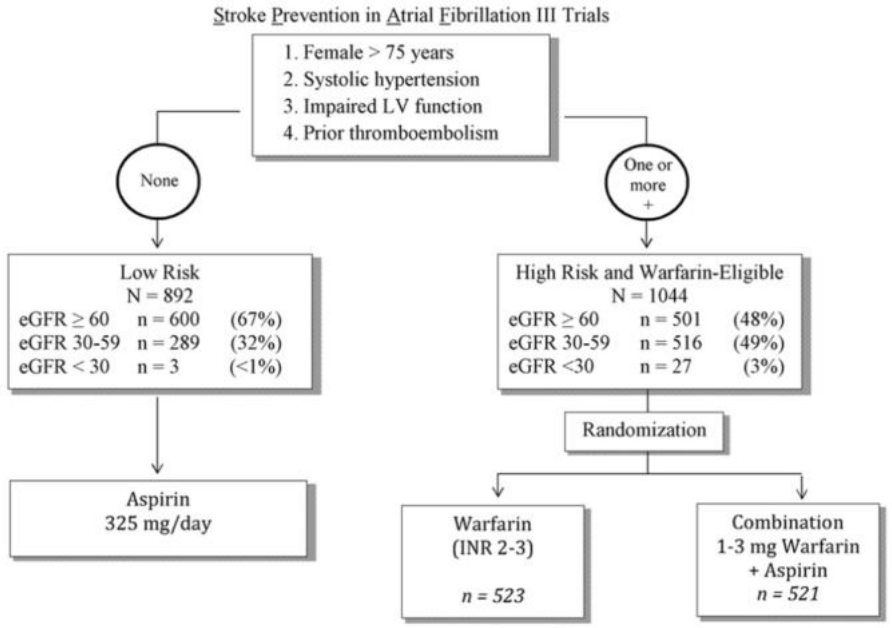

Figure 1. | Design of the Stroke Prevention in Atrial Fibrillation (SPAF) III trials. LV, left ventricular.

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Hart et al. Clin J Am Soc Nephrol. 2011 Nov;6(11):2599-604.

How to anticoagulate ?

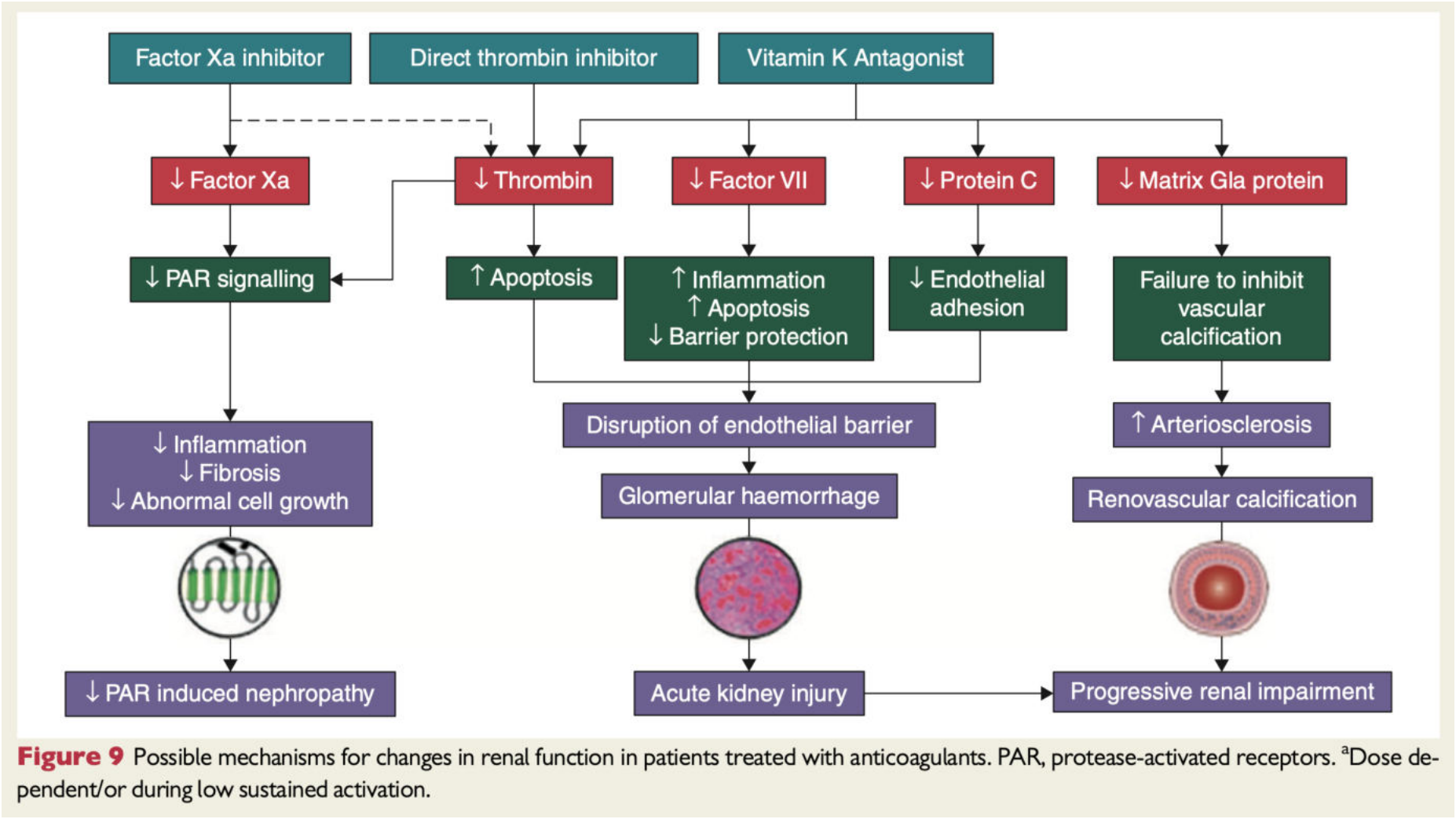

Figure 9 Possible mechanisms for changes in renal function in patients treated with anticoagulants. PAR, protease-activated receptors. [a]Dose dependent/or during low sustained activation.

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Fauchier et al. Europace. 2021 Dec 7;23(12):1873-1891.

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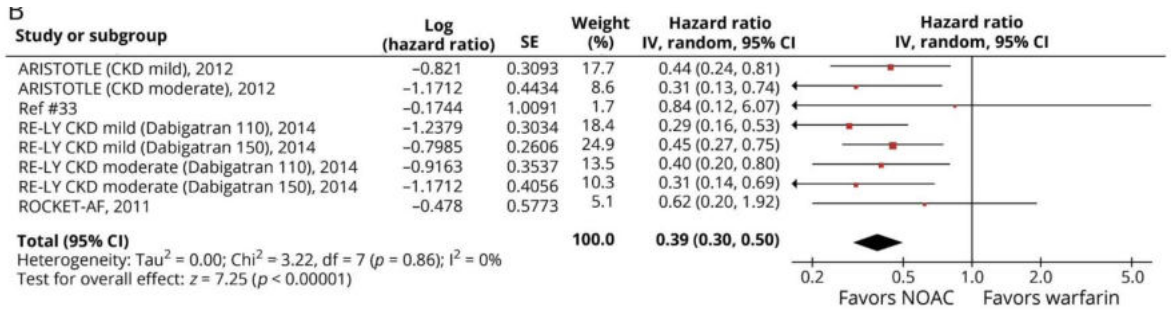
NOACs & CKD

Figure 1 Primary analyses on the risk of intracerebral hemorrhage

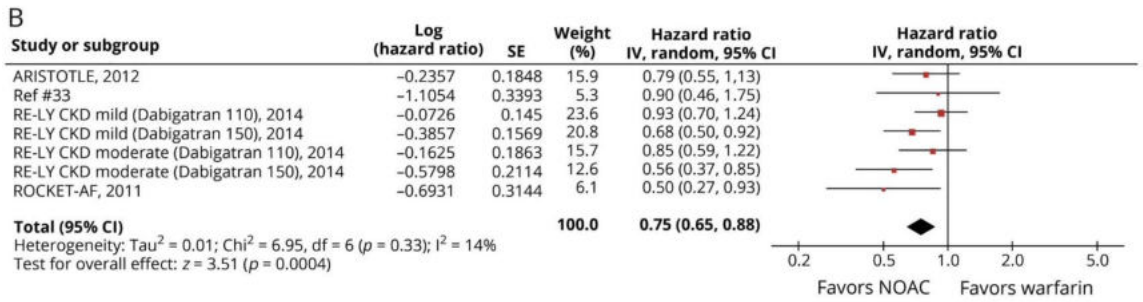


Study or subgroup	Log (hazard ratio)	SE	Weight (%)	Hazard ratio IV, random, 95% CI
ARISTOTLE (CKD mild), 2012	−0.821	0.3093	17.7	0.44 (0.24, 0.81)
ARISTOTLE (CKD moderate), 2012	−1.1712	0.4434	8.6	0.31 (0.13, 0.74)
Ref #33	−0.1744	1.0091	1.7	0.84 (0.12, 6.07)
RE-LY CKD mild (Dabigatran 110), 2014	−1.2379	0.3034	18.4	0.29 (0.16, 0.53)
RE-LY CKD mild (Dabigatran 150), 2014	−0.7985	0.2606	24.9	0.45 (0.27, 0.75)
RE-LY CKD moderate (Dabigatran 110), 2014	−0.9163	0.3537	13.5	0.40 (0.20, 0.80)
RE-LY CKD moderate (Dabigatran 150), 2014	−1.1712	0.4056	10.3	0.31 (0.14, 0.69)
ROCKET-AF, 2011	−0.478	0.5773	5.1	0.62 (0.20, 1.92)
Total (95% CI)			**100.0**	**0.39 (0.30, 0.50)**

Heterogeneity: Tau² = 0.00; Chi² = 3.22, df = 7 (p = 0.86); I² = 0%
Test for overall effect: z = 7.25 (p < 0.00001)

Hazard ratio IV, random, 95% CI
0.2 0.5 1.0 2.0 5.0
Favors NOAC Favors warfarin

Figure 2 Primary analyses on the risk of stroke/systemic embolism

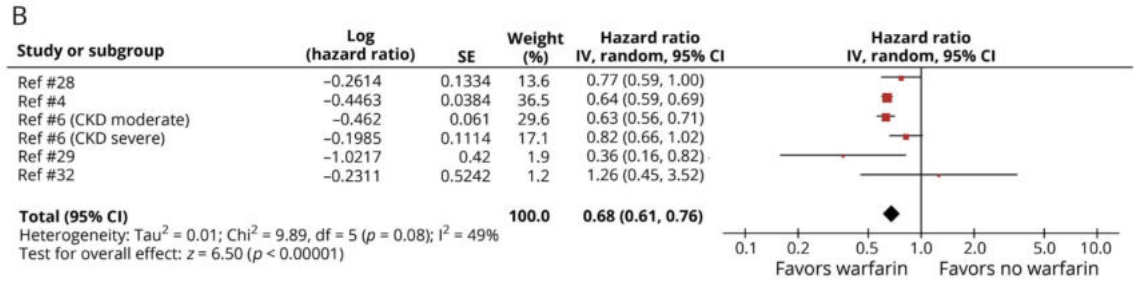


Study or subgroup	Log (hazard ratio)	SE	Weight (%)	Hazard ratio IV, random, 95% CI
ARISTOTLE, 2012	−0.2357	0.1848	15.9	0.79 (0.55, 1,13)
Ref #33	−1.1054	0.3393	5.3	0.90 (0.46, 1.75)
RE-LY CKD mild (Dabigatran 110), 2014	−0.0726	0.145	23.6	0.93 (0.70, 1.24)
RE-LY CKD mild (Dabigatran 150), 2014	−0.3857	0.1569	20.8	0.68 (0.50, 0.92)
RE-LY CKD moderate (Dabigatran 110), 2014	−0.1625	0.1863	15.7	0.85 (0.59, 1.22)
RE-LY CKD moderate (Dabigatran 150), 2014	−0.5798	0.2114	12.6	0.56 (0.37, 0.85)
ROCKET-AF, 2011	−0.6931	0.3144	6.1	0.50 (0.27, 0.93)
Total (95% CI)			**100.0**	**0.75 (0.65, 0.88)**

Heterogeneity: Tau² = 0.01; Chi² = 6.95, df = 6 (p = 0.33); I² = 14%
Test for overall effect: z = 3.51 (p = 0.0004)

Hazard ratio IV, random, 95% CI
0.2 0.5 1.0 2.0 5.0
Favors NOAC Favors warfarin

Figure 3 Primary analyses on the risk of mortality

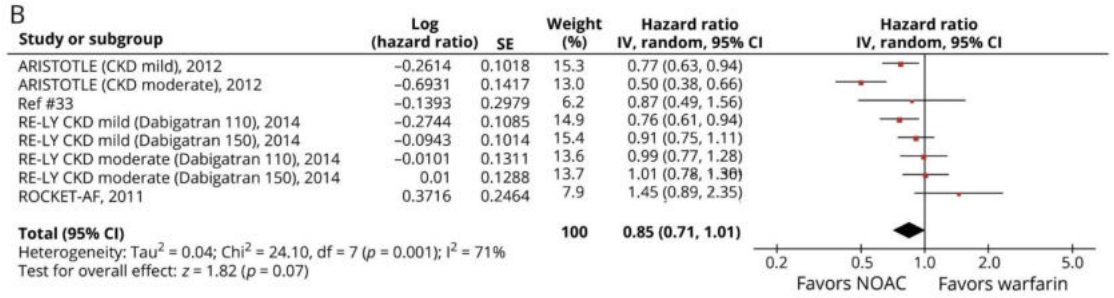


Study or subgroup	Log (hazard ratio)	SE	Weight (%)	Hazard ratio IV, random, 95% CI
Ref #28	−0.2614	0.1334	13.6	0.77 (0.59, 1.00)
Ref #4	−0.4463	0.0384	36.5	0.64 (0.59, 0.69)
Ref #6 (CKD moderate)	−0.462	0.061	29.6	0.63 (0.56, 0.71)
Ref #6 (CKD severe)	−0.1985	0.1114	17.1	0.82 (0.66, 1.02)
Ref #29	−1.0217	0.42	1.9	0.36 (0.16, 0.82)
Ref #32	−0.2311	0.5242	1.2	1.26 (0.45, 3.52)
Total (95% CI)			**100.0**	**0.68 (0.61, 0.76)**

Heterogeneity: Tau² = 0.01; Chi² = 9.89, df = 5 (p = 0.08); I² = 49%
Test for overall effect: z = 6.50 (p < 0.00001)

Hazard ratio IV, random, 95% CI
0.1 0.2 0.5 1.0 2.0 5.0 10.0
Favors warfarin Favors no warfarin

Figure 4 Primary analyses on the risk of major bleeding



Study or subgroup	Log (hazard ratio)	SE	Weight (%)	Hazard ratio IV, random, 95% CI
ARISTOTLE (CKD mild), 2012	−0.2614	0.1018	15.3	0.77 (0.63, 0.94)
ARISTOTLE (CKD moderate), 2012	−0.6931	0.1417	13.0	0.50 (0.38, 0.66)
Ref #33	−0.1393	0.2979	6.2	0.87 (0.49, 1.56)
RE-LY CKD mild (Dabigatran 110), 2014	−0.2744	0.1085	14.9	0.76 (0.61, 0.94)
RE-LY CKD mild (Dabigatran 150), 2014	−0.0943	0.1014	15.4	0.91 (0.75, 1.11)
RE-LY CKD moderate (Dabigatran 110), 2014	−0.0101	0.1311	13.6	0.99 (0.77, 1.28)
RE-LY CKD moderate (Dabigatran 150), 2014	0.01	0.1288	13.7	1.01 (0.78, 1.30)
ROCKET-AF, 2011	0.3716	0.2464	7.9	1.45 (0.89, 2.35)
Total (95% CI)			**100**	**0.85 (0.71, 1.01)**

Heterogeneity: Tau² = 0.04; Chi² = 24.10, df = 7 (p = 0.001); I² = 71%
Test for overall effect: z = 1.82 (p = 0.07)

Hazard ratio IV, random, 95% CI
0.2 0.5 1.0 2.0 5.0
Favors NOAC Favors warfarin

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Malhotra et al. Neurology. 2019 May 21;92(21):e2421-e2431.

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NOACs & CKD

Figure 1 Primary analyses on the risk of intracereb

Study or subgroup	Log (hazard ratio)
ARISTOTLE (CKD mild), 2012	−0.821
ARISTOTLE (CKD moderate), 2012	−1.1712
Ref #33	−0.1744
RE-LY CKD mild (Dabigatran 110), 2014	−1.2379
RE-LY CKD mild (Dabigatran 150), 2014	−0.7985
RE-LY CKD moderate (Dabigatran 110), 2014	−0.9163
RE-LY CKD moderate (Dabigatran 150), 2014	−1.1712
ROCKET-AF, 2011	−0.478

Total (95% CI)
Heterogeneity: Tau² = 0.00; Chi² = 3.22, df = 7 (*p* = 0.86); I² = 0%
Test for overall effect: *z* = 7.25 (*p* < 0.00001)

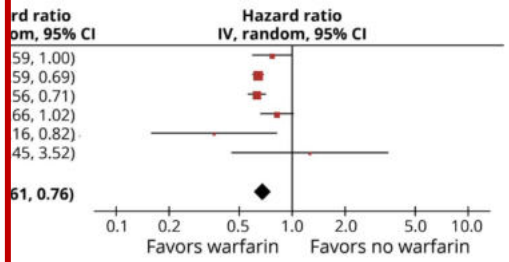


Figure 2 Primary analyses on the risk of stroke/syste

Study or subgroup	Log (hazard ratio)
ARISTOTLE, 2012	−0.2357
Ref #33	−1.1054
RE-LY CKD mild (Dabigatran 110), 2014	−0.0726
RE-LY CKD mild (Dabigatran 150), 2014	−0.3857
RE-LY CKD moderate (Dabigatran 110), 2014	−0.1625
RE-LY CKD moderate (Dabigatran 150), 2014	−0.5798
ROCKET-AF, 2011	−0.6931

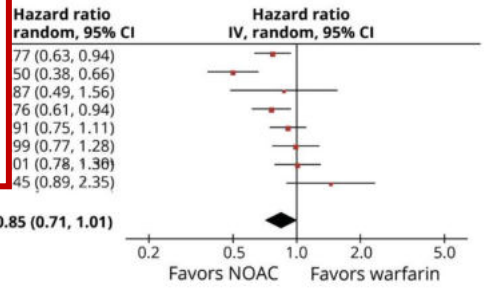
Total (95% CI)
Heterogeneity: Tau² = 0.01; Chi² = 6.95, df = 6 (*p* = 0.33); I² = 14%
Test for overall effect: *z* = 3.51 (*p* = 0.0004)

100.0 0.75 (0.65, 0.88)

0.2 0.5 1.0 2.0 5.0
Favors NOAC Favors warfarin

Total (95% CI)
Heterogeneity: Tau² = 0.04; Chi² = 24.10, df = 7 (*p* = 0.001); I² = 71%
Test for overall effect: *z* = 1.82 (*p* = 0.07)

100 0.85 (0.71, 1.01)



Efficacy and Safety of Oral Anticoagulants for Atrial Fibrillation Patients With Chronic Kidney Disease: A Systematic Review and Meta-Analysis

Tae-Min Rhee [1†], So-Ryoung Lee [1†], Eue-Keun Choi [1,2], Seil Oh [1,2] and Gregory Y. H. Lip [1,3,4]*

Conclusion: DOACs, particularly apixaban and edoxaban, presented superior efficacy and safety than warfarin in AF patients with CKD. Apixaban was associated with the lowest risk of major bleeding among OACs for patients with advanced CKD.

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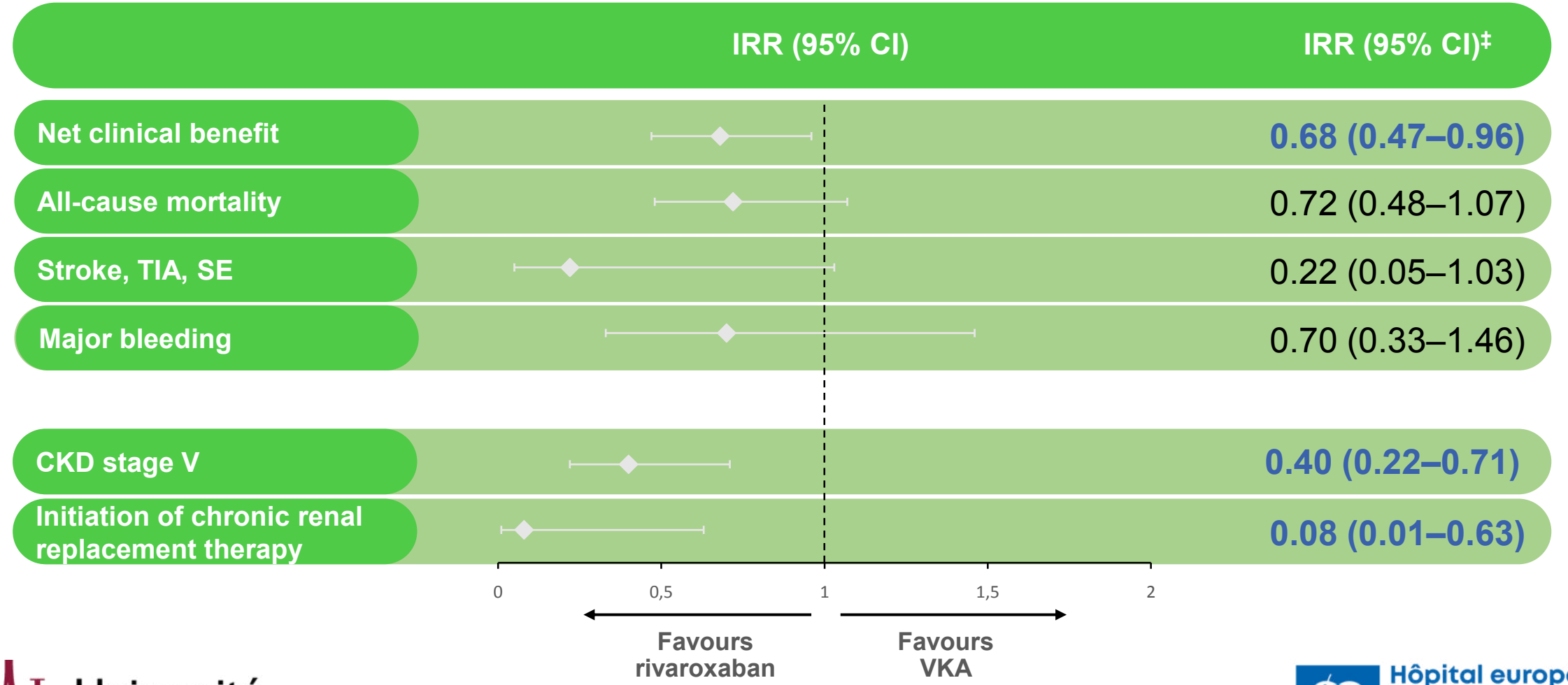
Rhee et al. Front Cardiovasc Med. 2022 Jun 10;9:885548.
Malhotra et al. Neurology. 2019 May 21;92(21):e2421-e2431.

New datas

- Incidence Risk Ratios and 95% Confidence Intervals After 1 Year of Follow-up*



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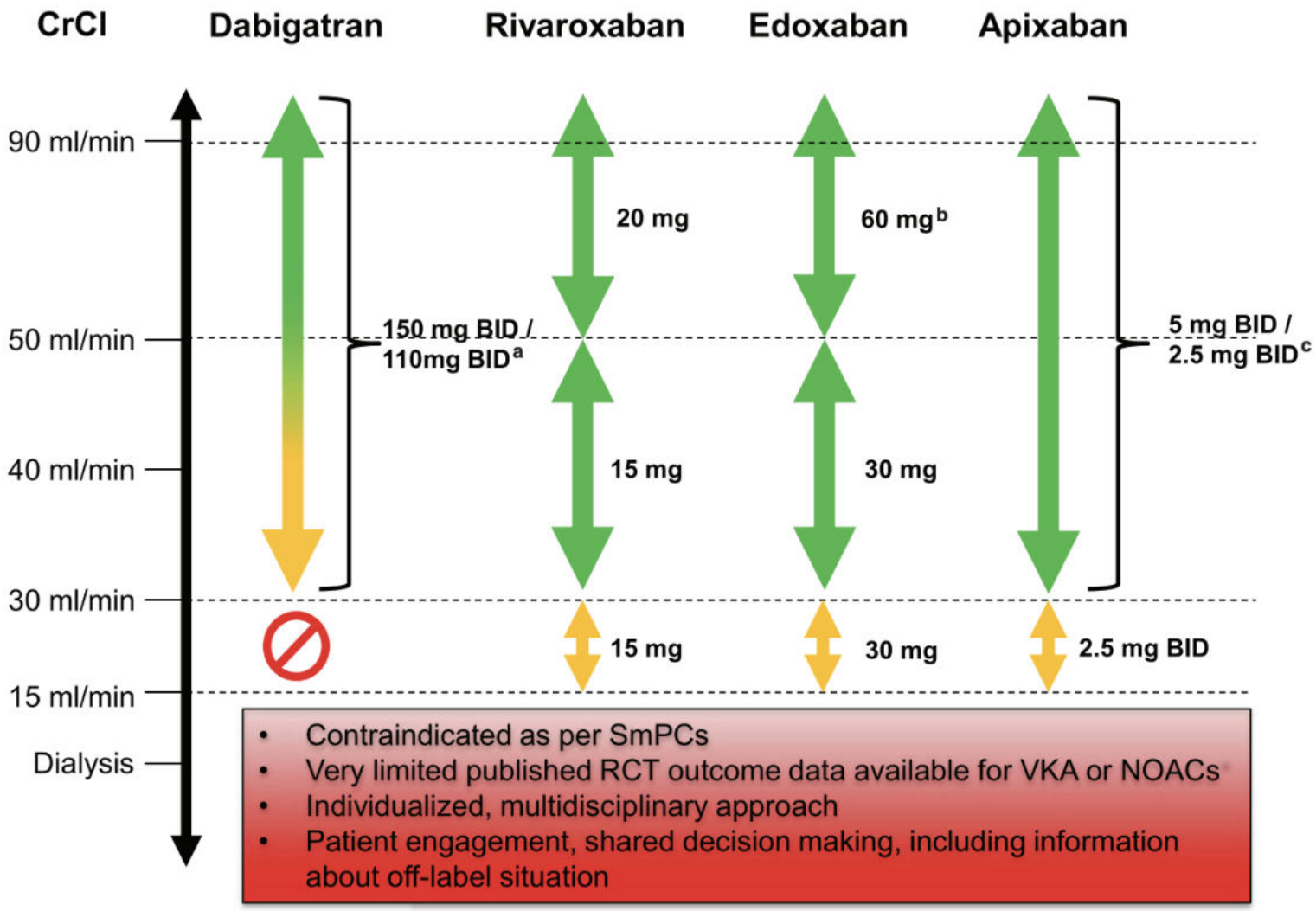
Kreutz et al. ACC. Washington DC, USA, 2–4 April 2022.

NOACs & CKD



Steffel et al. Europace. 2021 Oct 9;23(10):1612-1676.

NOACs & CKD

Circulation

ACC/AHA/HRS GUIDELINE

2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society

IIb	B-NR	13. For patients with AF who have a CHA_2DS_2-VASc score of 2 or greater in men or 3 or greater in women and who have end-stage chronic kidney disease (CKD; creatinine clearance [CrCl] <15 mL/min) or are on dialysis, it might be reasonable to prescribe warfarin (INR 2.0 to 3.0) or apixaban for oral anticoagulation[S4.1.1-26,S4.1.1-29,S4.1.1-30] **MODIFIED:** New evidence has been added. LOE was updated from B to B-NR. (Section 4.1. in the 2014 AF Guideline)

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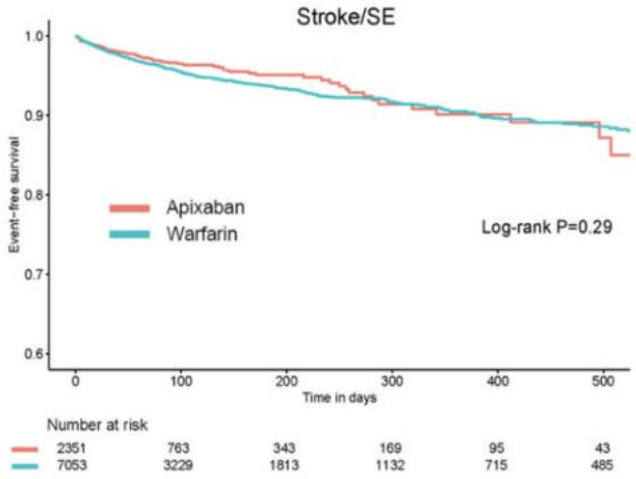
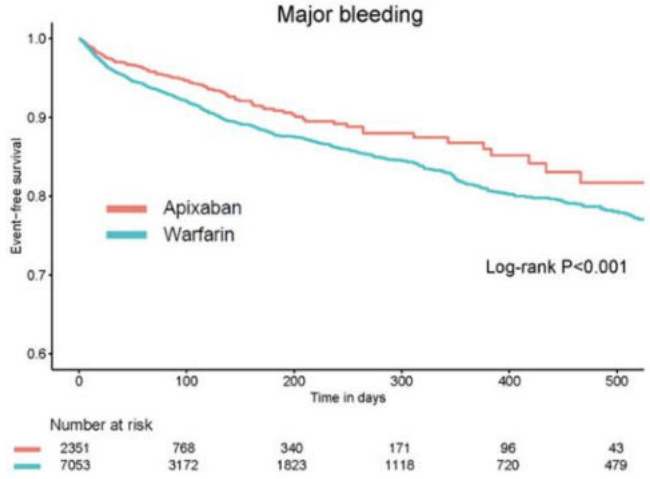
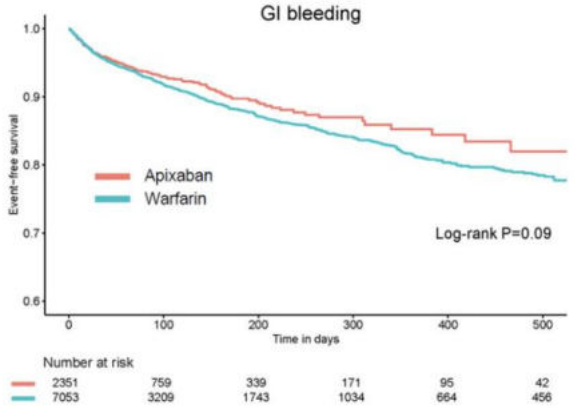
NOACs & CKD

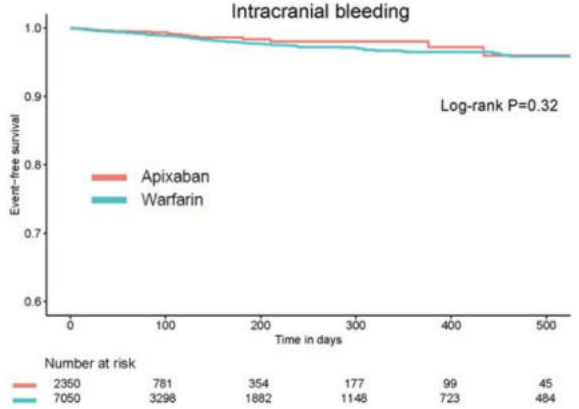
ORIGINAL RESEARCH ARTICLE

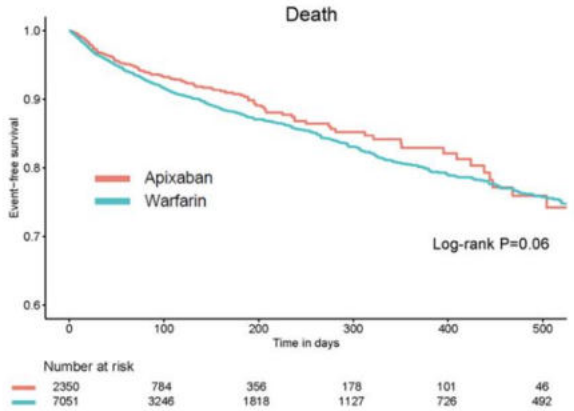
Outcomes Associated With Apixaban Use in Patients With End-Stage Kidney Disease and Atrial Fibrillation in the United States











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Sionti KC, et al. Circulation. 2018 Oct 9;138(15):1519-1529.

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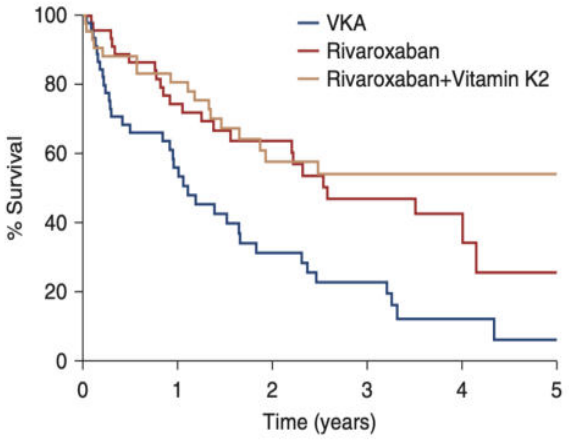
New datas

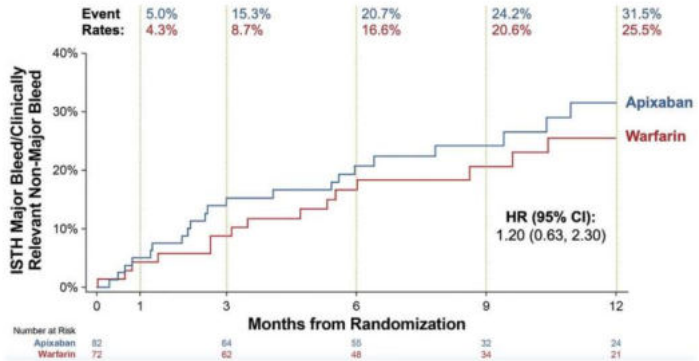
Safety and Efficacy of Vitamin K Antagonists versus Rivaroxaban in Hemodialysis Patients with Atrial Fibrillation: A Multicenter Randomized Controlled Trial

An S. De Vriese,[1,2] Rogier Caluwé,[3] Hans Van Der Meersch,[1] Koen De Boeck,[4] and Dirk De Bacquer[5]



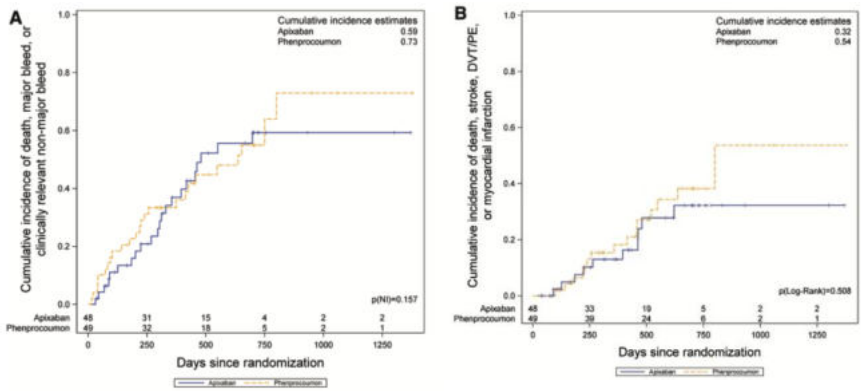
Apixaban for Patients With Atrial Fibrillation on Hemodialysis: A Multicenter Randomized Controlled Trial

Sean D. Pokorney, MD, MBA; Glenn M. Chertow, MD; Hussein R. Al-Khalidi, PhD; Dianne Gallup, MS; Pat Dignacco, BA; Kurt Mussina, MBA; Nisha Bansal, MD; Crystal A. Gadegbeku, MD; David A. Garcia, MD; Samira Garonzik, PharmD; Renato D. Lopes, MD, PhD; Kenneth W. Mahaffey, MD; Kelly Matsuda, PharmD; John P. Middleton, MD; Jennifer A. Rymer, MD, MBA; George H. Sands, MD; Ravi Thadhani, MD; Kevin L. Thomas, MD; Jeffrey B. Washam, PharmD; Wolfgang C. Winkelmayer, MD; Christopher B. Granger, MD; on behalf of the RENAL-AF Investigators



A Randomized Controlled Trial Comparing Apixaban With the Vitamin K Antagonist Phenprocoumon in Patients on Chronic Hemodialysis: The AXADIA-AFNET 8 Study

Holger Reinecke, MD; Christiane Engelbertz, PhD; Rupert Bauersachs, MD; Günter Breithardt, MD; Hans-Herbert Echterhoff, MD; Joachim Ger8, PhD; Karl Georg Haeusler, MD; Bernd Hewing, MD; Joachim Hoyer, MD; Sabine Juergensmeyer, PhD; Thomas Klingenheben, MD; Guido Knapp, PhD; Lars Christian Rump, MD; Hans Schmidt-Guertler, MD; Christoph Wanner, MD; Paulus Kirchhof, MD*; Dennis Goerlich, PhD*



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De Vriese et al. J Am Soc Nephrol. 2020 Jan;31(1):186-196.
Pokorney et al. Circulation. 2022 Dec 6;146(23):1735-1745.
Reinecke et al. Circulation. 2023;147:296–309.

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Left Atrial Appendage Closure

Recommendations for occlusion or exclusion of the LAA		
LAA occlusion may be considered for stroke prevention in patients with AF and contraindications for long-term anticoagulant treatment (e.g. intracranial bleeding without a reversible cause).[448,449,481,482]	IIb	B

« Patients en FA non valvulaire à haut risque thromboembolique (score CHA_2DS_2-VASc ≥ 4) avec une contre-indication formelle et permanente aux anticoagulants (validée par un comité pluridisciplinaire)».

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Hindicks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.
HAS 2014

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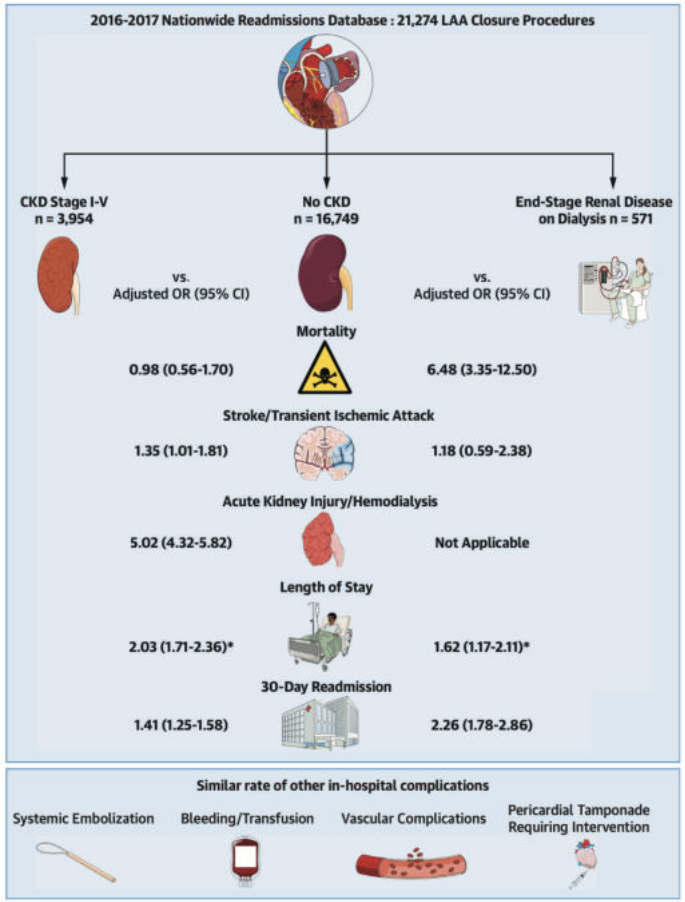
LAAC in CKD / ERSD

The Association of Chronic Kidney Disease With Outcomes Following Percutaneous Left Atrial Appendage Closure

Keerat Rai Ahuja, MD,[a,*] Robert W. Ariss, BS,[b,*] Salik Nazir, MD,[b] Rohit Vyas, MD,[b] Anas M. Saad, MD,[c] Michael Macciocca, MD,[a] George V. Moukarbel, MD[b]



PACE
PACING AND CLINICAL ELECTROPHYSIOLOGY

DEVICES

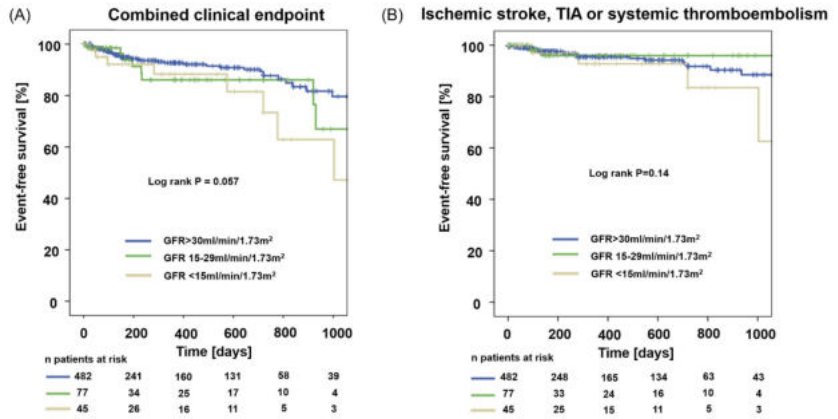
Left atrial appendage closure using WATCHMAN device in chronic kidney disease and end-stage renal disease patients

Shakeel Jamal MD, Mohsin Sheraz Mughal MD, Asim Kichloo MD, Ehizogie Edigin MD, Muhammad Zia Khan MD, Abdul Mannan Khan Minhas MD, Muzaffar Ali MD, DM, Khalil Kanjwal MD

ORIGINAL ARTICLE - CLINICAL SCIENCE

WILEY

Left atrial appendage closure in end-stage renal disease and hemodialysis: Data from a German multicenter registry



Ahuja et al. JACC Cardiovasc Interv. 2021 Aug 23;14(16):1830-1839.
Jamal et al. Pacing Clin Electrophysiol. 2022 Jul;45(7):866-873.
Fink et al. Catheter Cardiovasc Interv. 2023 Feb;101(3):610-619.

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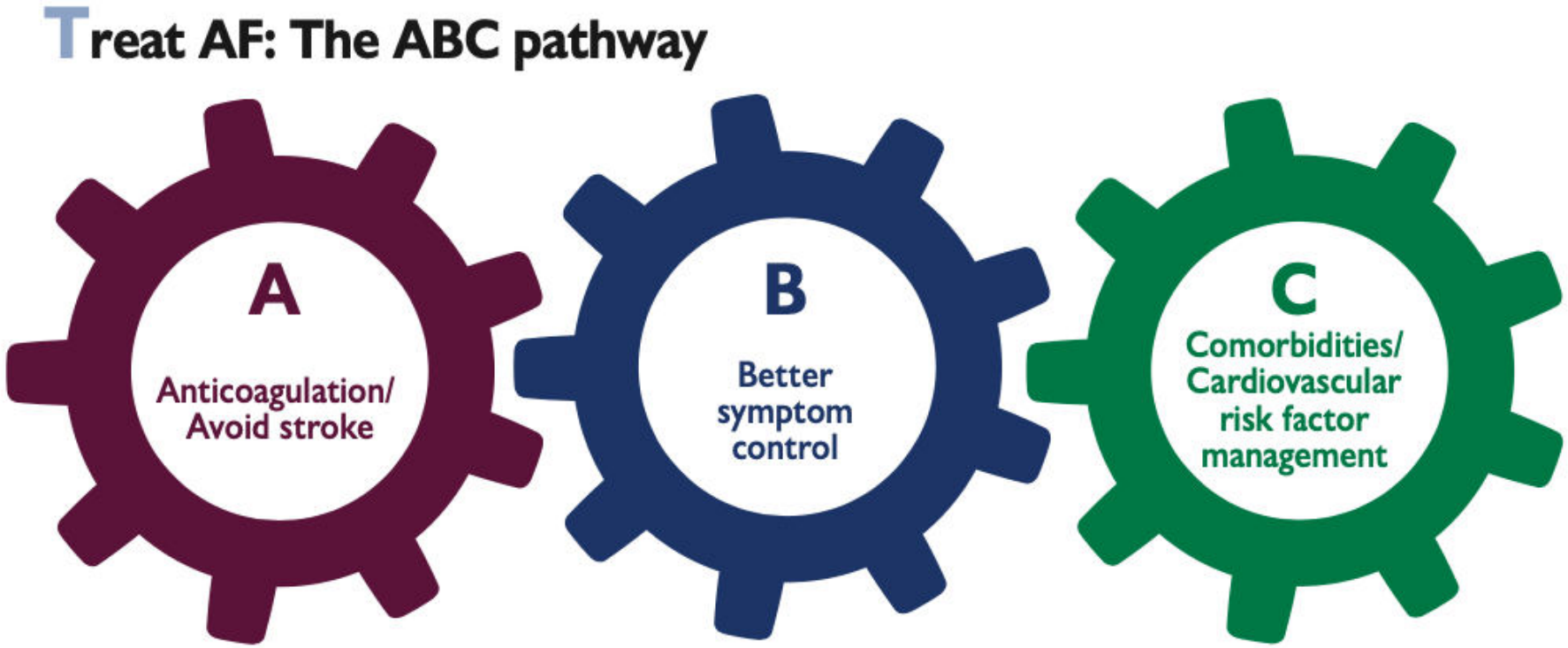
AF Treatment



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Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Rhythm Control or Rate Control ?

AF pattern	Definition
First diagnosed	AF not diagnosed before, irrespective of its duration or the presence/severity of AF-related symptoms.
Paroxysmal	AF that terminates spontaneously or with intervention within 7 days of onset.
Persistent	AF that is continuously sustained beyond 7 days, including episodes terminated by cardioversion (drugs or electrical cardioversion) after ≥7 days
Long-standing persistent	Continuous AF of >12 months' duration when decided to adopt a rhythm control strategy.
Permanent	AF that is accepted by the patient and physician, and no further attempts to restore/maintain sinus rhythm will be undertaken. Permanent AF represents a therapeutic attitude of the patient and physician rather than an inherent pathophysiological attribute of AF, and the term should not be used in the context of a rhythm control strategy with antiarrhythmic drug therapy or AF ablation. Should a rhythm control strategy be adopted, the arrhythmia would be re-classified as 'long-standing persistent AF'.

Favors Rate Control			
AFFIRM	NEJM, 2002	RCT	Mortality
RACE	NEJM, 2002	RCT	Mortality
STAF	JACC, 2003	RCT	Mortality, , Morbidity, QoL
HOT CAFE	CHEST, 2004	RCT	Mortality
AF CHF	NEJM, 2008	RCT	Mortality

Favors Rythm Control			
Dorian	Am Heart J, 2002	RCT	QoL
CAFE II	HEART, 2009	RCT	QoL / LVEF
RECORD AF	Circ, 2014	Obs	QoL
Sethi	PLoSOne, 2017	Meta A	QoL / LVEF
Purmah	Europace, 2018	Obs	Mortality
Kelly	JAHA, 2019	Obs	Mortality

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Hindicks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

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Rhythm Control vs Rate Control

Early rhythm control vs. rate control in atrial fibrillation: A systematic review and meta-analysis

Shaojie Han[1†], Ruikun Jia[1†], Zhifu Cen[1], Ran Guo[1], Shenyu Zhao[1], Yixuan Bai[1], Min Xie[2*] and Kaijun Cui[1*]

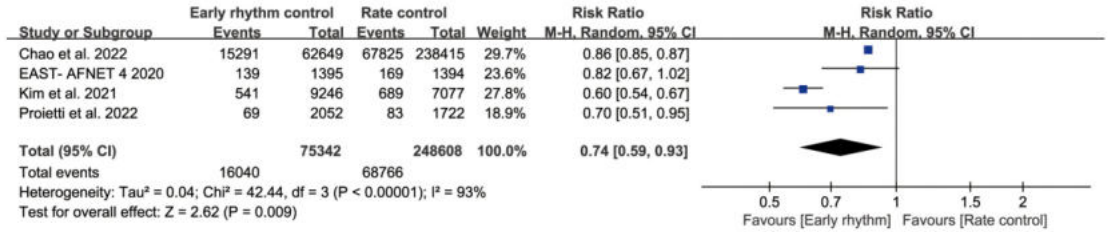

FIGURE 4
Forest plot showing risk of heart failure hospitalization between early rhythm group and rate group.

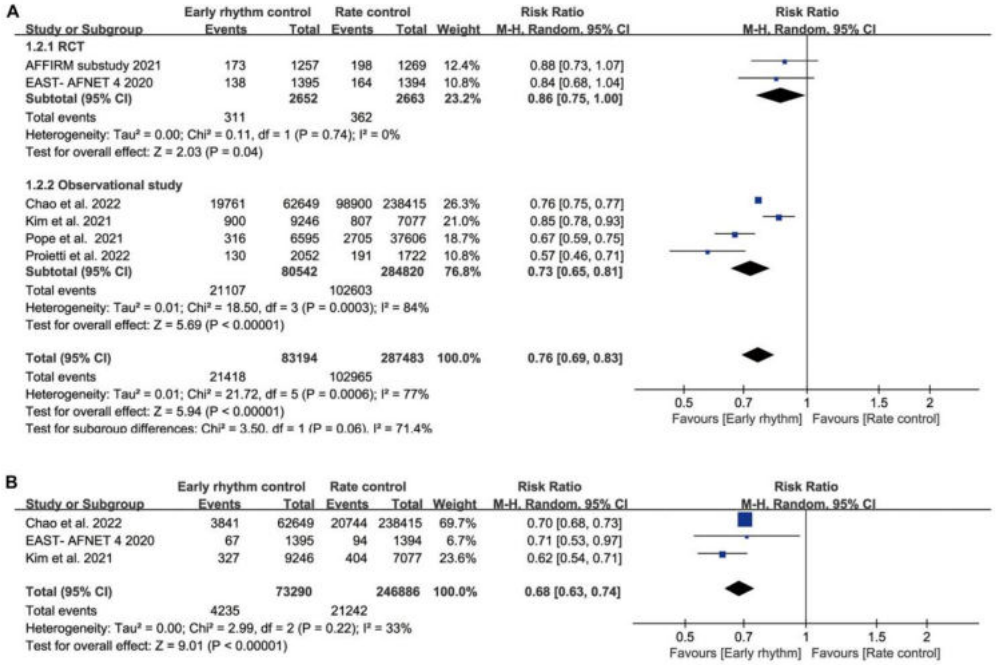

FIGURE 2
(A) Forest plot showing all-cause mortality between early rhythm group and rate group. (B) Forest plot showing cardiovascular mortality between early rhythm group and rate group.

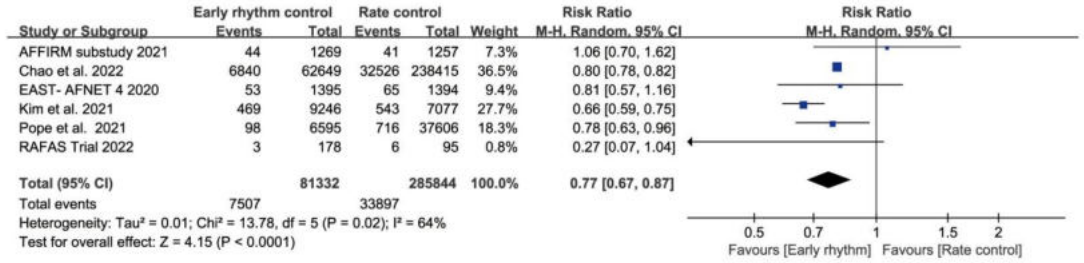

FIGURE 3
Forest plot showing risk of stroke between early rhythm group and rate group.

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Han et al. Front Cardiovasc Med. 2023 Feb 6;10:978637.

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How to control the Rhythm ?

ARRHYTHMIA/ELECTROPHYSIOLOGY

Catheter Ablation Versus Antiarrhythmic Drugs for Atrial Fibrillation

The A4 Study

Pierre Jaïs, MD, Bruno Cauchemez, MD, Laurent Macle, MD, Emile Daoud, MD, Paul Khairy, MD, PhD, Rajesh Subbiah, BSc (Med), MBBS, PhD, Mélèze Hocini, MD, Fabrice Extramiana, MD, Fréderic Sacher, MD, Pierre Bordachar, MD, George Klein, MD, Rukshen Weerasooriya, MBBS, Jacques Clémenty, MD, and Michel Haïssaguerre, MD

JAMA | Original Investigation

Effect of Catheter Ablation vs Antiarrhythmic Medication on Quality of Life in Patients With Atrial Fibrillation
The CAPTAF Randomized Clinical Trial

Carina Blomström-Lundqvist, MD, PhD; Sigfus Gizurarson, MD, PhD; Jonas Schwieler, MD, PhD; Steen M. Jensen, MD, PhD; Lennart Bergfeldt, MD, PhD; Göran Kennebäck, MD, PhD; Aigars Rubulis, MD, PhD; Helena Malmborg, MD, PhD; Pekka Raatikainen, MD, PhD; Stefan Lönnerholm, MD, PhD; Niklas Höglund, MD, PhD; David Mörtsell, MD

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 FEBRUARY 1, 2018 VOL. 378 NO. 5

Catheter Ablation for Atrial Fibrillation with Heart Failure

Nassir F. Marrouche, M.D., Johannes Brachmann, M.D., Dietrich Andresen, M.D., Jürgen Siebels, M.D., Lucas Boersma, M.D., Luc Jordaens, M.D., Béla Merkely, M.D., Evgeny Pokushalov, M.D., Prashanthan Sanders, M.D., Jochen Proff, B.S., Heribert Schunkert, M.D., Hildegard Christ, M.D., Jürgen Vogt, M.D., and Dietmar Bänsch, M.D., for the CASTLE-AF Investigators*

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JAMA | Original Investigation

Effect of Catheter Ablation vs Medical Therapy on Quality of Life Among Patients With Atrial Fibrillation
The CABANA Randomized Clinical Trial

Daniel B. Mark, MD, MPH; Kevin J. Anstrom, PhD; Shubin Sheng, PhD; Jonathan P. Piccini, MD, MHS; Khaula N. Baloch, MPH; Kristi H. Monahan, RN; Melanie R. Daniels, BA; Tristram D. Bahnson, MD; Jeanne E. Poole, MD; Yves Rosenberg, MD, MPH; Kerry L. Lee, PhD; Douglas L. Packer, MD; for the CABANA Investigators

Original Investigation

Radiofrequency Ablation vs Antiarrhythmic Drugs as First-Line Treatment of Paroxysmal Atrial Fibrillation (RAAFT-2)
A Randomized Trial

Carlos A. Morillo, MD, FRCPC; Atul Verma, MD, FRCPC; Stuart J. Connolly, MD, FRCPC; Karl H. Kuck, MD, FHRS; Girish M. Nair, MBBS, FRCPC; Jean Champagne, MD, FRCPC; Laurence D. Sterns, MD, FRCPC; Heather Beresh, MSc; Jeffrey S. Healey, MD, MSc, FRCPC; Andrea Natale, MD; for the RAAFT-2 Investigators

Catheter ablation vs. antiarrhythmic drug treatment of persistent atrial fibrillation: a multicentre, randomized, controlled trial (SARA study)

Lluís Mont[1]*, Felipe Bisbal[1], Antonio Hernández-Madrid[2], Nicasio Pérez-Castellano[3], Xavier Viñolas[4], Angel Arenal[5], Fernando Arribas[6], Ignacio Fernández-Lozano[7], Andrés Bodegas[8], Albert Cobos[9], Roberto Matía[2], Julián Pérez-Villacastín[3], José M. Guerra[4], Pablo Ávila[5], María López-Gil[6], Victor Castro[7], José Ignacio Arana[8], and Josep Brugada[1], on behalf of SARA investigators

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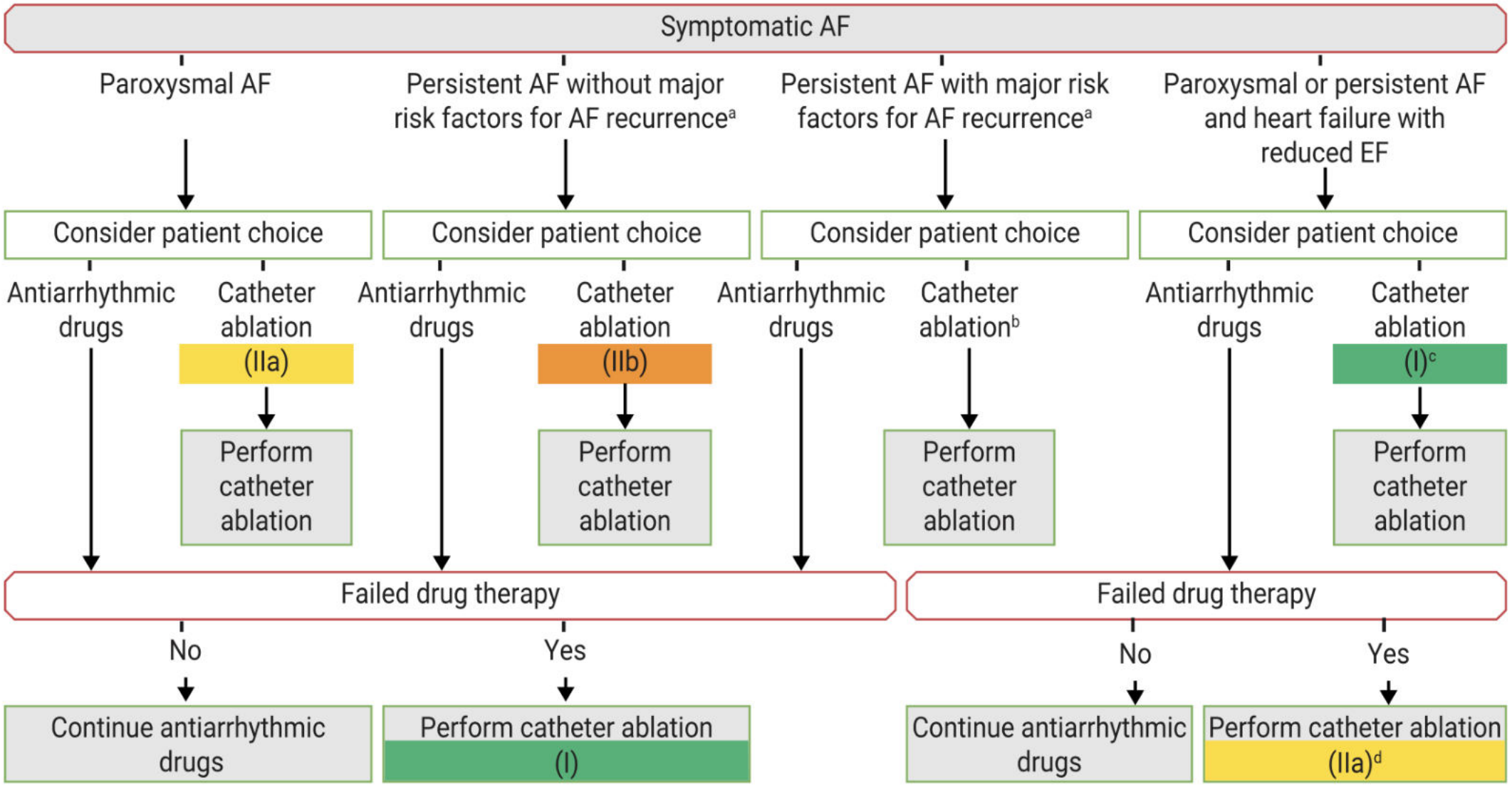
Rhythm Control



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Hindicks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

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Catheter Ablation for first line therapy ?

JAMA Cardiology | Original Investigation

Assessment of Catheter Ablation or Antiarrhythmic Drugs for First-line Therapy of Atrial Fibrillation
A Meta-analysis of Randomized Clinical Trials

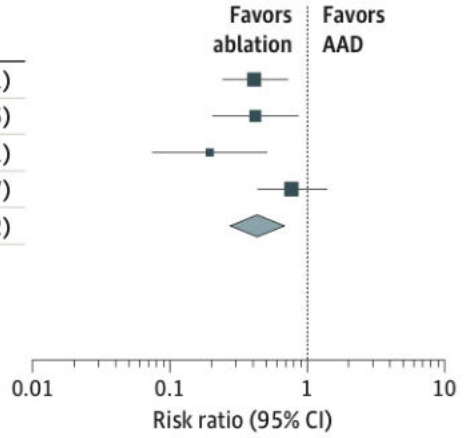
Mohit K. Turagam, MD; Daniel Musikantow, MD; William Whang, MD; Jacob S. Koruth, MD; Marc A. Miller, MD; Marie-Noelle Langan, MD; Aamir Sofi, MD; Subbarao Choudry, MD; Srinivas R. Dukkipati, MD; Vivek Y. Reddy, MD

A Symptomatic atrial arrhythmia recurrence

Study	Ablation Events	Ablation Total	Drug therapy Events	Drug therapy Total	Risk ratio (95% CI)	Weight, %
EARLY AF[21]	17	154	39	149	0.42 (0.25-0.71)	30.5
MANTRA-PAF[18]	10	146	24	148	0.42 (0.21-0.85)	23.8
RAAFT-1[17]	4	32	22	35	0.20 (0.08-0.51)	16.9
RAAFT-2[19]	16	66	19	61	0.78 (0.44-1.37)	28.8
Total (95% CI)		398		393	0.44 (0.27-0.72)	100.0
Total events	47		104			

Heterogeneity: $\tau^2 = 0.13$; $\chi^2_3 = 6.56$; $P = .09$; $I^2 = 54\%$

Total overall effect: $z = 3.27$; $P = .001$

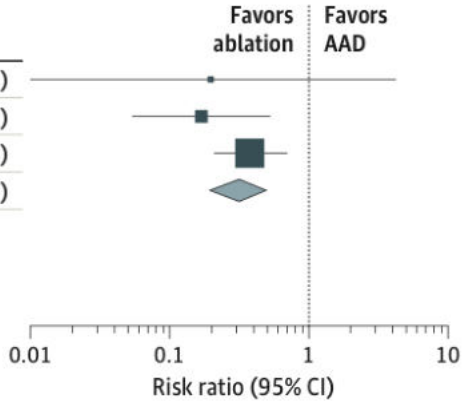


B Hospitalization

Study	Ablation Events	Ablation Total	Drug therapy Events	Drug therapy Total	Risk ratio (95% CI)	Weight, %
MANTRA-PAF[18]	0	146	2	148	0.20 (0.01-4.19)	2.8
RAAFT-1[17]	3	32	19	35	0.17 (0.06-0.53)	20.7
STOP-AF[22]	13	104	32	99	0.39 (0.22-0.69)	76.4
Total (95% CI)		282		282	0.32 (0.19-0.53)	100.0
Total events	16		53			

Heterogeneity: $\tau^2 = 0.00$; $\chi^2_2 = 1.70$; $P = .43$; $I^2 = 0\%$

Total overall effect: $z = 4.37$; $P < .001$



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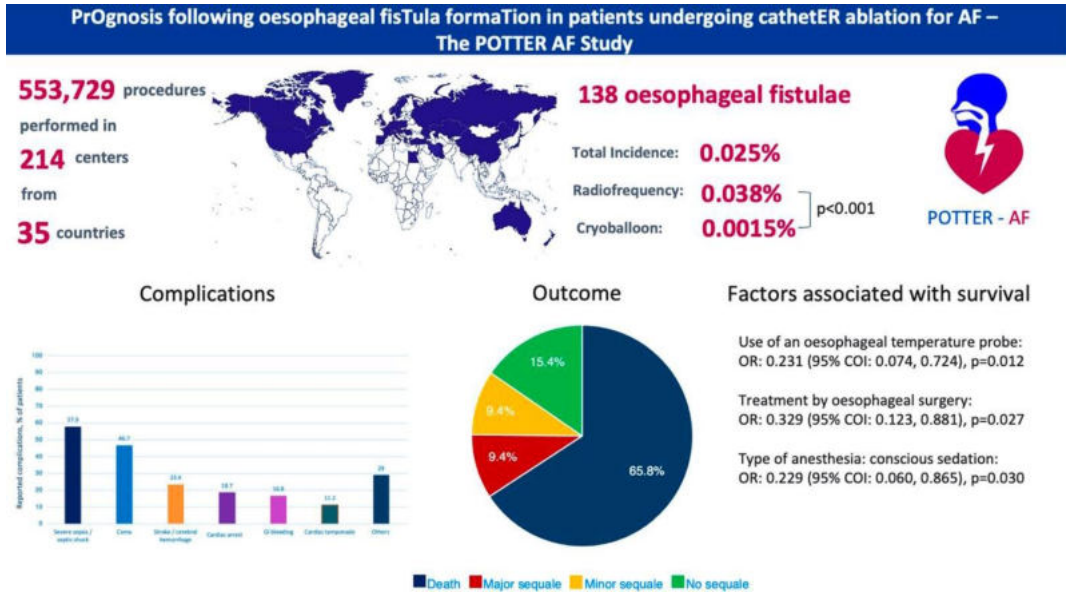
Turagam et al. JAMA Cardiol. 2021 Jun 1;6(6):697-705.

AF Ablation : Complications

Complication severity	Complication type	Complication rate Catheter ablation
Life-threatening complications	Periprocedural death	<0.1%
	Oesophageal perforation/fistula	<0.5%
	Periprocedural thromboembolic event	<1.0%
	Cardiac tamponade	≈1%
Severe complications	Pulmonary vein stenosis	<1.0%
	Persistent phrenic nerve palsy	<1.0%
	Vascular complications	2-4%
	Conversion to sternotomy	N/A
	Pneumothorax	N/A



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Hindicks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.
Tilz et al. Eur Heart J. 2023 Apr 16;ehad250.

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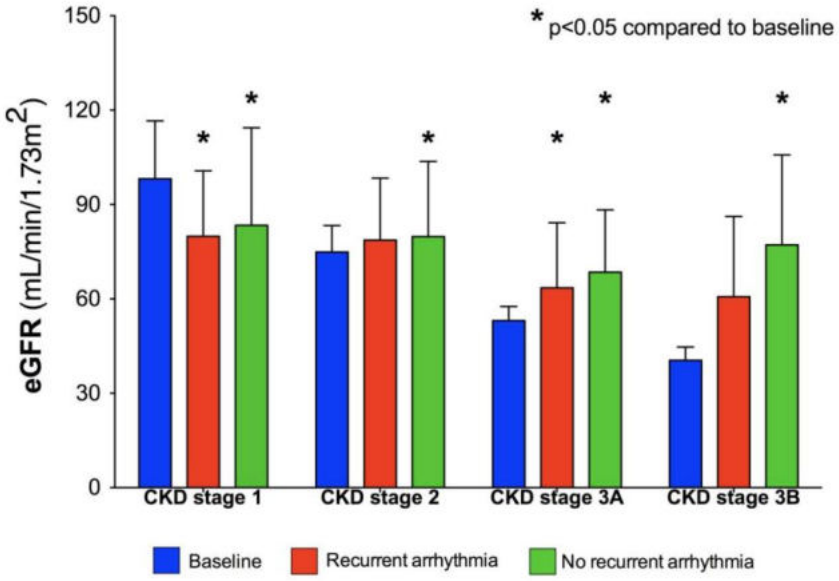
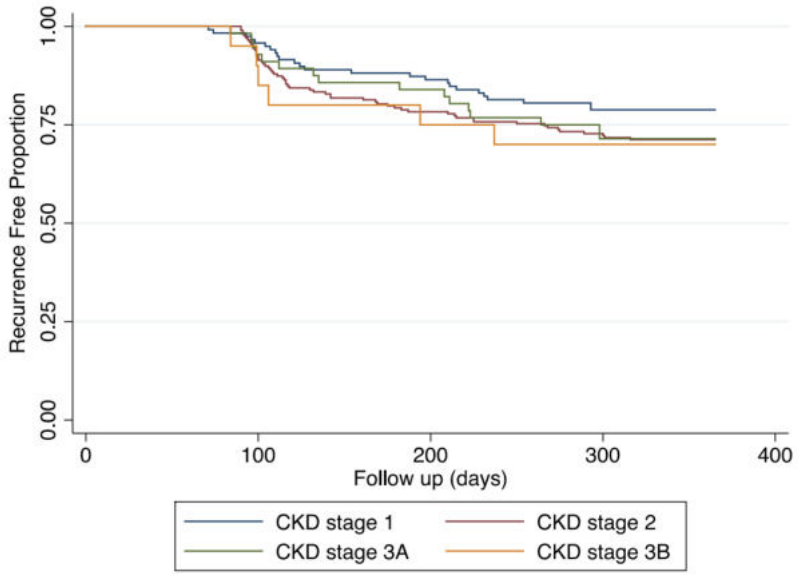
AF ablation and Renal Function

Journal of Cardiovascular Electrophysiology
THE OFFICIAL JOURNAL OF THE WORLD SOCIETY OF ARRHYTHMIAS
World Society of Arrhythmias
Editor-in-Chief
Bradley P. Knight

Original Article

Improvement in Estimated Glomerular Filtration Rate in Patients with Chronic Kidney Disease Undergoing Catheter Ablation for Atrial Fibrillation





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Navaravong et al.J Cardiovasc Electrophysiol. 2015 Jan;26(1):21-7.

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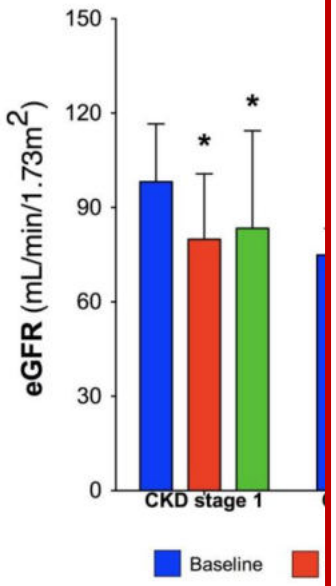
AF ablation and Renal Function

Journal of Cardiov
Electrophysiology
THE OFFICIAL JOURNAL OF THE WORLD SOCIETY

Original Article

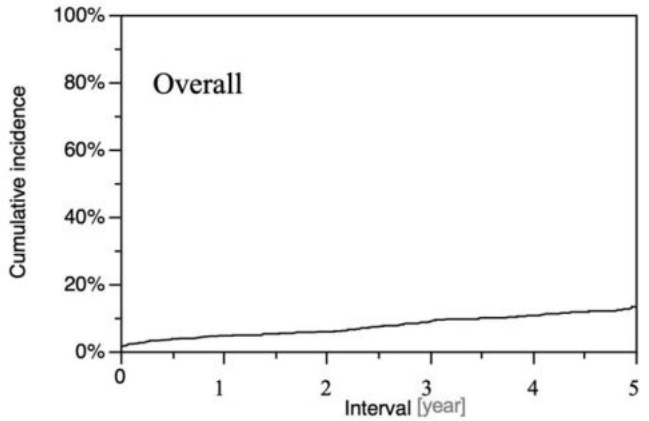
Improvement in Estim
with Chronic Kidney D
Atrial Fibrillation



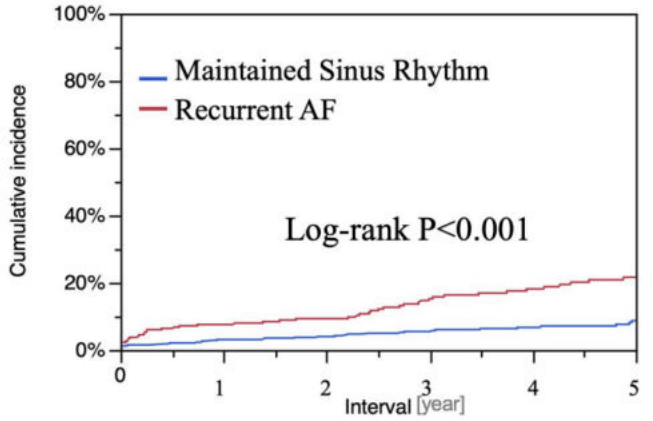
RESEARCH ARTICLE

Renal function and outcomes in atrial fibrillation patients after catheter ablation

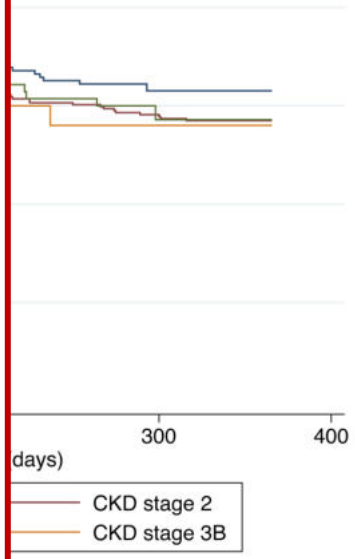
Tetsuma Kawaji[1,2], Satoshi Shizuta[2¤*], Takanori Aizawa[2], Shintaro Yamagami[2], Yasuaki Takeji[2], Yusuke Yoshikawa[2], Masashi Kato[1], Takafumi Yokomatsu[1], Shinji Miki[1], Koh Ono[2], Takeshi Kimura[2]



Interval	0d	6m	1y	3y	5y
Overall					
N of events		28	36	62	80
N of patients at risk	791	763	691	498	256
Cumulative incidence		3.5%	4.6%	8.8%	13.2%



Interval	0d	6m	1y	3y	5y
Maintained sinus rhythm					
N of events		11	16	26	34
N of patients at risk	526	515	466	341	160
Cumulative incidence		2.1%	3.1%	5.5%	8.7%
Recurrence Atrial fibrillation					
N of events		17	20	36	46
N of patients at risk	265	248	225	214	96
Cumulative incidence		6.4%	7.6%	15.3%	21.6%



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AF ablation and CKD

Journal of Cardiovascular Electrophysiology
THE OFFICIAL JOURNAL OF THE WORLD SOCIETY OF ARRHYTHMIAS
World Society of Arrhythmias
Editor-in-Chief Bradley P. Knight

Original Article

Safety and Clinical Outcomes of Catheter Ablation of Atrial Fibrillation in Patients With Chronic Kidney Disease

30-Day complications after AF ablation.

30-Day complications	All patients (N=21,091)	Chronic Kidney Disease (CKD) Status		
		CKD (N=1,593)	No CKD (N=19,498)	p
All-cause hospitalization [any admission in Inpatient Admissions file between t+1 and t+30 days after ablation]	1,868 (8.9%)	209 (12.9%)	1,659 (8.5%)	<0.001
Vascular complication [ICD-9 codes: 998.11, 998.12, 998.2, 39.31, 39.41, 39.49, 39.52, 39.53, 39.56, 39.57, 39.58, 39.59, 39.79]	463 (2.2%)	38 (2.4%)	425 (2.2%)	0.59
Blood Transfusion [ICD-9 codes: 99.03, 99.04 and CPT-4 code: 36430]	115 (0.55%)	26 (1.63%)	89 (0.46%)	<0.001
Hematoma or hemorrhage [ICD-9 codes: 998.11, 998.12]	376 (1.8%)	32 (2.0%)	344 (1.8%)	0.48
Perforation or tamponade [ICD-9 codes: 37.0, 423.0, 423.3, 423.9]	656 (3.1%)	51 (3.2%)	605 (3.1%)	0.83
Pneumothorax or hemothorax [ICD-9 code: 340.4, 512.0, 512.1, 511.8, 512.8]	29 (0.14%)	4 (0.25%)	25 (0.13%)	0.27
Stroke or transient ischemic attack [ICD-9 codes: 434.0x, 434.1x, 434.9x, 435.9]	27 (0.13%)	2 (0.13%)	25 (0.13%)	1.00
Pacemaker implantation [ICD-9 codes: 00.50, 00.52, 00.53, 37.71, 37.72, 37.73, 37.74, 37.75, 37.76, 37.77, 37.78, 37.79, 37.81, 37.82, 37.83, 37.84, 37.85, 37.86, 37.87, 37.88, 37.89]	124 (0.59%)	16 (1.0%)	108 (0.55%)	0.02
Implantable cardioverter defibrillator implantation [ICD-9 codes: 37.94, 37.95, 37.96, 37.97, 37.98, 00.51, 00.54]	16 (0.08%)	2 (0.13%)	14 (0.07%)	0.34
Heart failure [ICD-9 codes: 398.91,402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93,425.0, 4251,425.2, 425.3, 425.4, 425.5, 425.7, 425.8, 425.9, 428.0, 428.1, 428.20, 428.21, 428.22, 428.23, 428.30, 428.31, 428.32, 428.33, 428.40, 428.41, 428.42, 428.43, 428.9, 429.3]	116 (0.55%)	34 (2.1%)	82 (0.4%)	<0.001
In-hospital Death [Discharge Status file codes: 20, 21]	7 (0.03%)	1 (0.06%)	6 (0.03%)	0.42

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CLINICAL RESEARCH

Association of Kidney Function With Risk of Adverse Effects of Therapies for Atrial Fibrillation

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Table 2. Frequency of adverse effects within 12 months after AF pharmacotherapy initiation in patients with incident AF stratified by CKD status (defined as eGFR <60 ml/min per 1.73 m^2) at baseline

Newly initiated therapy for atrial fibrillation within 1 yr after index date[a]	Adverse effects within 12 mo of therapy initiation (unless otherwise specified)	Patients with CKD	Patients without CKD	*P* value
Rate control medication (n = 32,873)	N at risk	8128	24,745	
	Bradycardia (<50 bpm), n = 5104	1375 (16.9%)	3729 (15.1%)	<0.001
	Hypotension (SBP < 90 mm Hg), n = 3467	1004 (12.4%)	2463 (10.0%)	<0.001
	Complete heart block, n = 743	231 (2.8%)	512 (2.1%)	<0.001
	Pacemaker, n = 609	169 (2.1%)	440 (1.8%)	0.08
	Overall having at least 1 AE, n = 8379	2345 (28.9%)	6034 (24.4%)	<0.001
Antiarrhythmic medication (n = 12,972)	N at risk	3572	9400	
	Tachycardia (HR > 110 bpm); n = 598	163 (4.6%)	435 (4.6%)	0.88
	Torsades de pointes, n = 140	50 (1.4%)	90 (1.0%)	0.03
	Liver injury or liver failure, n = 13	3 (0.08%)	10 (0.11%)	0.72
	Hyper or hypothyroidism, n = 924	351 (9.8%)	573 (6.1%)	<0.001
	Amiodarone lung toxicity, n = 89	29 (0.81%)	60 (0.64)	0.28
	ECG measure: prolonged QRS ≥ 120 ms, n = 1225	382 (10.7%)	843 (9.0%)	0.03
	ECG measure: prolonged QTC > 450 ms, n = 1105	257 (7.2%)	848 (9.0%)	0.001
	Overall: having at least 1 AE, n = 3329	987 (27.63%)	2342 (24.91%)	0.002
Warfarin (n = 37,325)	N at risk	12,929	24,396	
	Major bleeding	538 (4.16%)	604 (2.48%)	<0.001
DOAC (n = 12,990)	N at risk	2940	10050	
	Major bleeding	91 (3.10%)	165 (1.64%)	<0.001
AF procedure (i.e., catheter ablation, cardioversion, or combination of pacemaker and atrioventricular node ablation)[a]	N at risk	1320	4933	
	Cardiac tamponade	1 (0.08%)	1 (0.02%)	0.3
	Hemoptysis	3 (0.2%)	2 (0.04%)	0.03
	Hemothorax	0	1 (0.02%)	0.6
	Retroperitoneal bleeding	5 (0.4%)	17 (0.3%)	0.8
	Cardiac perforation	1 (0.08%)	3 (0.06%)	0.8
	Pneumothorax	0	1 (0.02%)	0.6
	Pericardial effusion	7 (0.5%)	14 (0.3%)	0.17
	Pulmonary vein stenosis	0	0	
	Atrial esophageal fistula	0	0	
	Pseudoaneurysm	0	2 (0.04%)	0.46
	Phrenic nerve injury	0	0	
	Esophageal ulcer	1 (0.08%)	0	0.05
	Overall with ≥1 procedure-related adverse effect	18 (1.4%)	40 (0.81%)	0.08

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AP-HP

Ullal et al. J Cardiovasc Electrophysiol. 2017 Jan;28(1):39-48.
Bansal et al. Kidney Int Rep. 2022 Dec 13;8(3):606-618.

AF ablation and ESRD

Efficacy and safety of radiofrequency catheter ablation for atrial fibrillation in chronic hemodialysis patients

Journal of Cardiovascular Electrophysiology
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Editor-in-Chief
Bradley P. Knight

Outcomes of Ablation of Paroxysmal Atrial Fibrillation in Patients on Chronic Hemodialysis

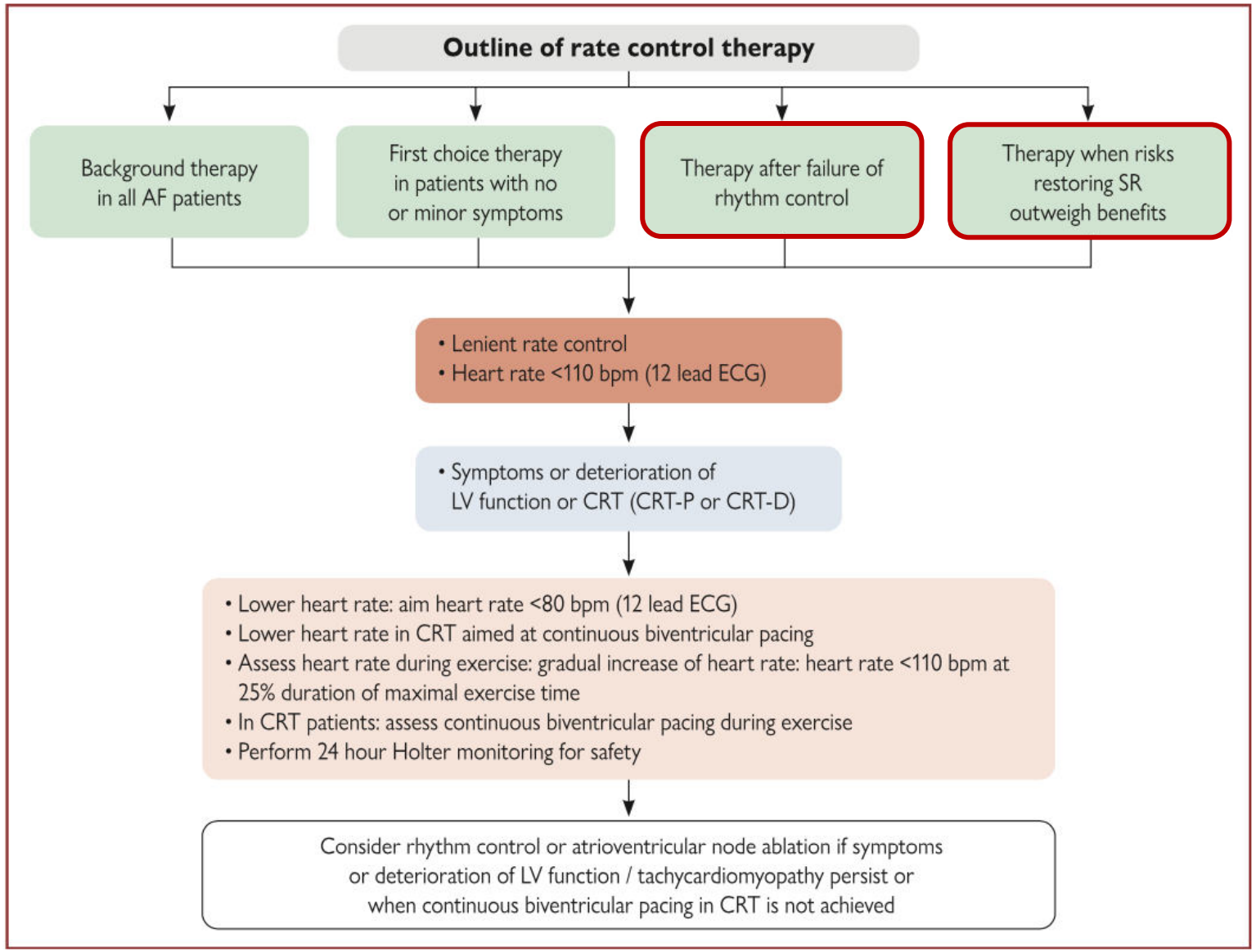
CJC Open 4 (2022) 748–755

Original Article

Improvement in Quality of Life via Catheter Ablation for Atrial Fibrillation in Patients Undergoing Hemodialysis Therapy

Hayashi et al. Nephrol Dial Transplant. 2014 Jan;29(1):160-7.
Sairaku et al. J Cardiovasc Electrophysiol. 2012 Dec;23(12):1289-94.
Hachisuka et al. CJC Open. 2022 Jun 13;4(9):748-755.

If Rhythm Control Failed



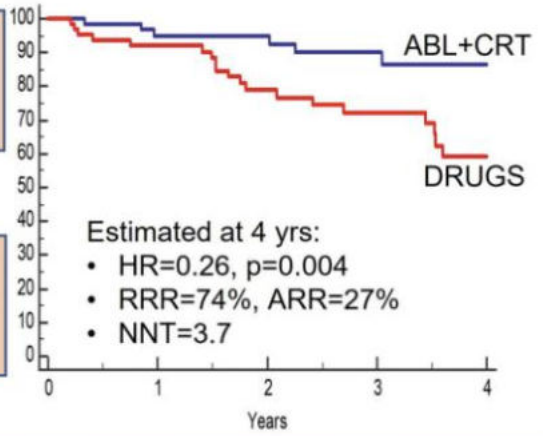
Hindicks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Rhythm Control vs Rate Control

Graphical Abstract

AV junction ablation and cardiac resynchronization for patients with permanent atrial fibrillation and narrow QRS: The APAF-CRT Mortality Trial. ***Brignole M et al.***

Trial population	Randomization	Optimization	Death from any cause (ITT analysis)
133 pts with: • Permanent AF • Narrow QRS • ≥1 HF hospitalization • Severe symptoms	**63** Rate control **ABL+CRT**	HR = **70** bpm	**11%** (7 pts)
	70 Rate control **DRUGS**	HR = **82** bpm	**29%** (20 pts)



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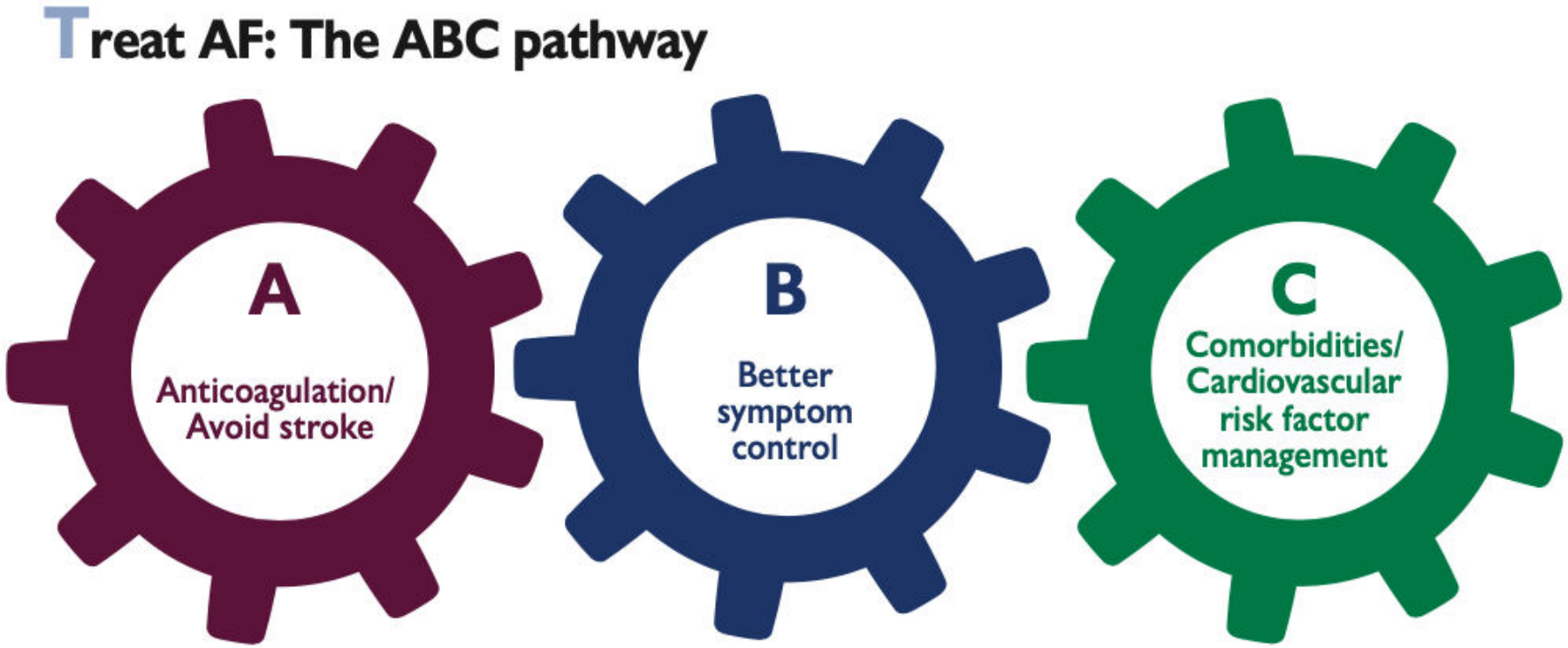
Brignole et al. Eur Heart J. 2021 Dec 7;42(46):4731-4739.

AF Treatment



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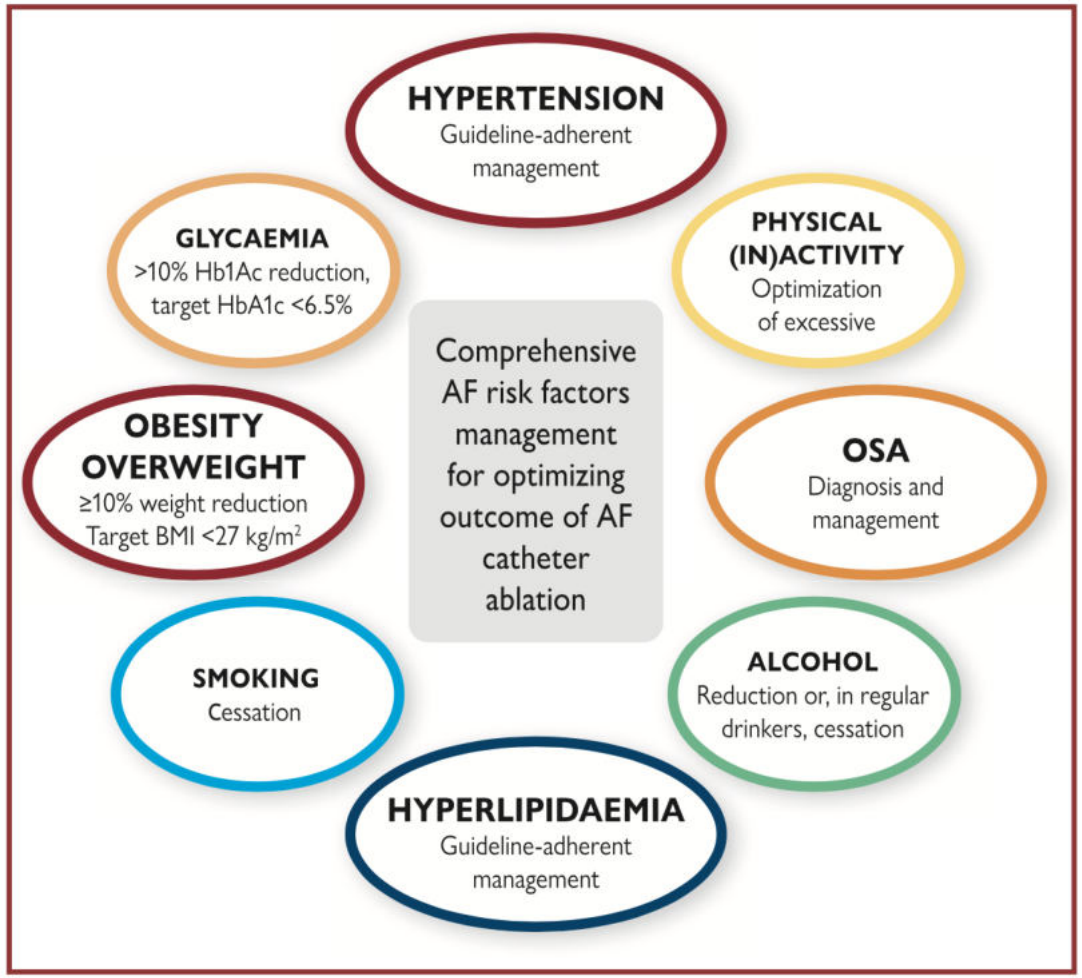
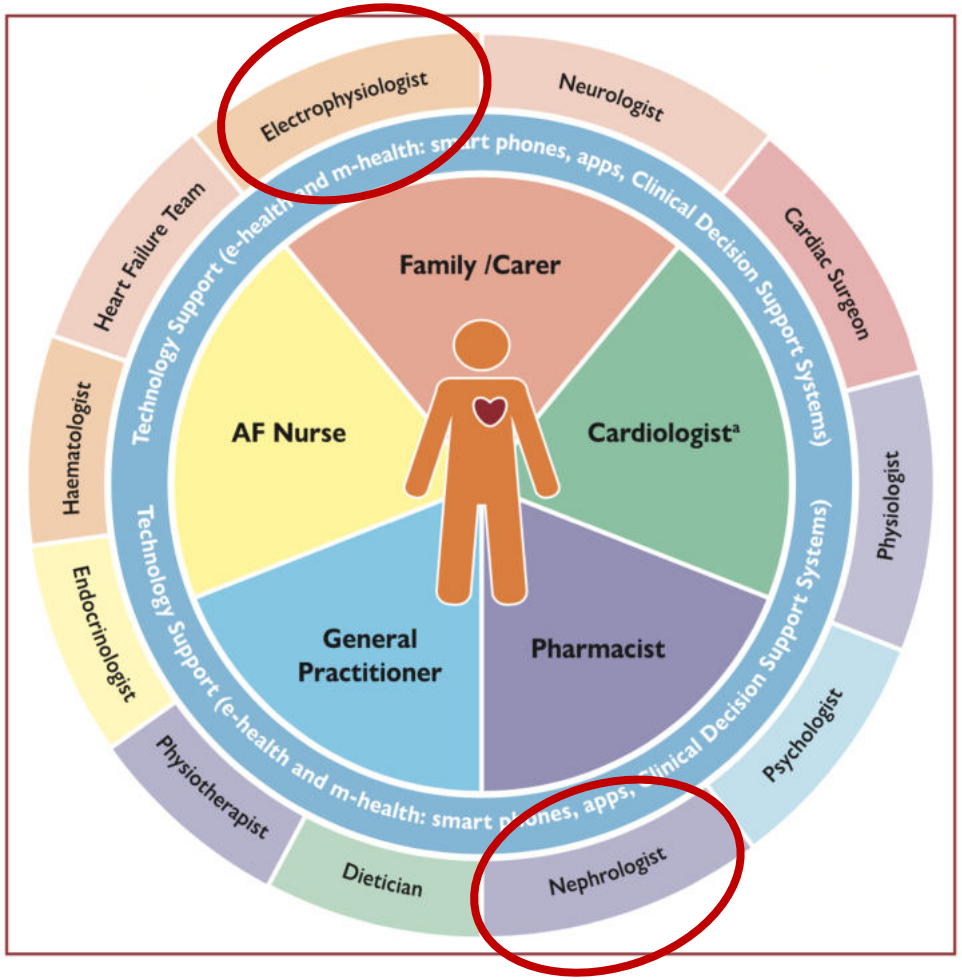
Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Multidisciplinary Management





Hindricks, et al. Eur Heart J. 2021 Feb 1;42(5):373-498.

Take Home Messages

- AF & CKD = Frequent and Dangerous association
- Patients with CKD are under treated
- NOACs are safe & efficient in CKD
- Rhythm Control > Rate Control especially in CKD
- Catheter Ablation seems to be safe in patients with CKD

Actualités Néphrologiques 2023

Cardiologie et maladie rénale chronique

Merci de votre attention

Dr Pierre BAUDINAUD

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