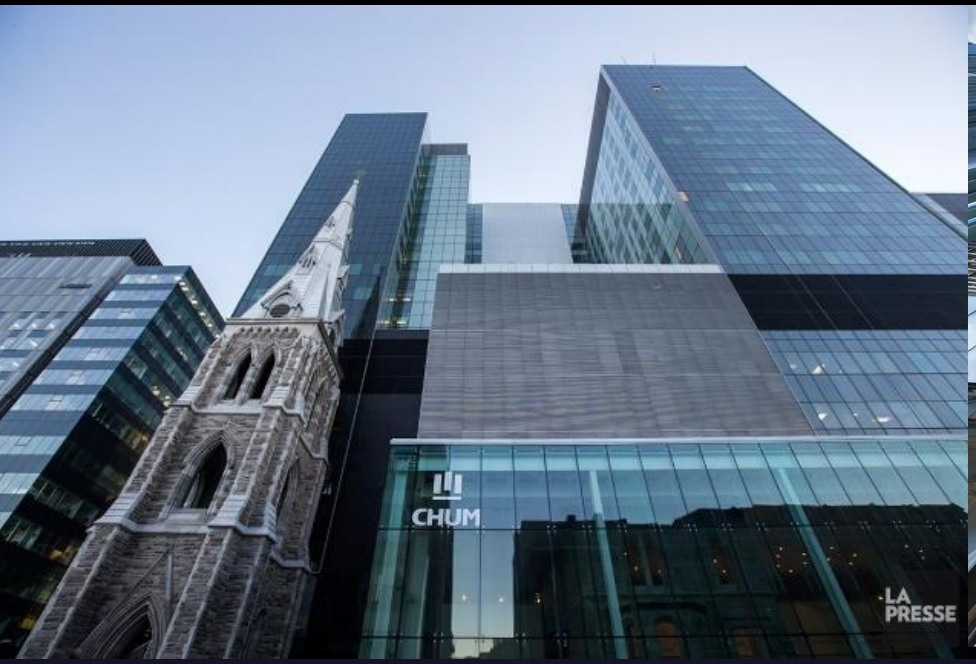
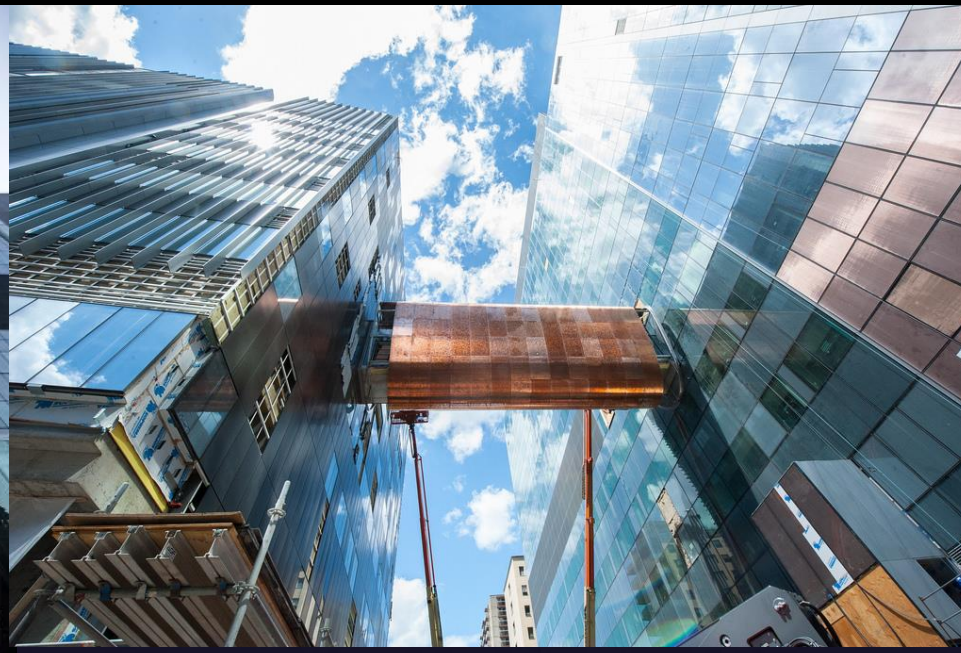




Fibrillatin auriculaire: screening
Trop ou pas assez?

Jean-Marc Raymond
Septembre 2018

CHUM

CENTRE CARDIOVASCULAIRE DU CHUM

J'ai établi des relations avec une organisation à but lucratif ou sans but lucratif

☐ Veuillez préciser l'organisation avec laquelle vous avez ou avez eu ces relations au cours des deux années antérieures et décrivez brièvement la nature de ces relations.

X

Nature des relations	Nom de l'organisation à but lucratif ou sans but lucratif	Description des relations
Les paiements directs incluant les honoraires	Cliquez ici pour saisir le texte. Alliance Bms-pfizer Servier Biosence Webster	Cliquez ici pour saisir le texte. Conférencier Conférencier Conférencier, Proctor
La participation à des comités consultatifs ou des bureaux de conférenciers	Cliquez ici pour saisir le texte. Alliance BMS-pfizer Servier	Cliquez ici pour saisir le texte. Comité consultatifs nationals pour elliquis Comité consultative regional pour Edoxaban
Le financement de subventions ou d'essais cliniques	Cliquez ici pour saisir le texte. Non	Cliquez ici pour saisir le texte.
Les brevets sur un médicament, un produit ou un appareil	Cliquez ici pour saisir le texte. non	Cliquez ici pour saisir le texte.
Tout autre investissement ou toute autre relation qu'un participant raisonnable et bien informé pourrait considérer comme un facteur d'influence sur le contenu de l'activité éducative	Cliquez ici pour saisir le texte.	Cliquez ici pour saisir le texte.

Cette section doit être remplie par les conférenciers seulement

Plan

- Recommandation du screening de la fa
- Monitoring de la SCAF sur cardiostimulateur
- Fa dans l'ACV cryptogénique
- Détection de masse

CHUM

Introduction.

- Près de 25% des pt avec AVC, découverte de la fa après l'évènement.
- Cause majeur des ACV cryptogénique
- On estime à 3%, la prévalence de Fa dans une population adulte
- Diminution de 70%, le risque d'ACV embolique avec ACO

CHUM

FA

- Risque plus élevé pour fa chronique que fap
  - Mais pas de différence importante pour changer recommandations
- On découvre la fa selon les symptômes mais pas plus emboligène si symptomatique
- SCAF commun
  - Augmente avec l'intensité de la recherche
  - augmente avec l'âge

CHUM

Management of SCAF

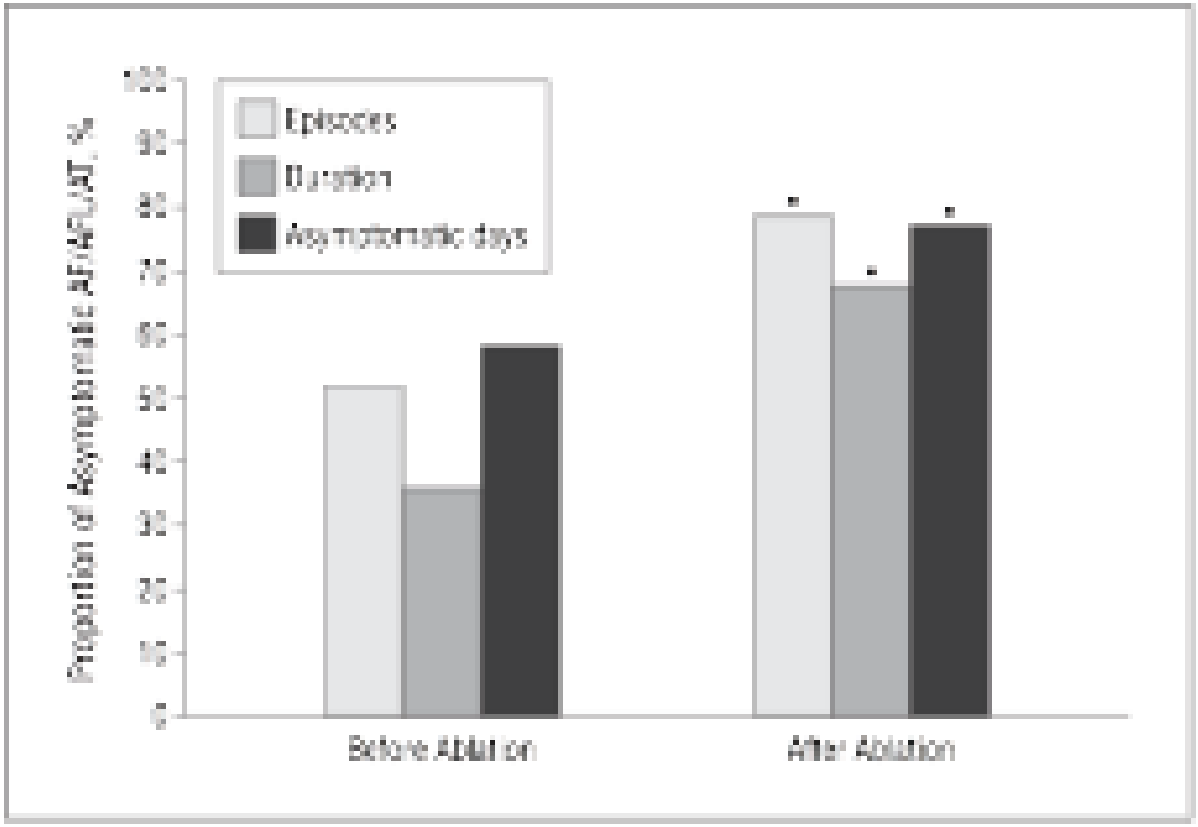


Figure 2. The percentage of asymptomatic atrial fibrillation/atrial flutter/atrial tachycardia (AF/AFL/AT) in patients before and after ablation. Whether measured by the percentage of AF/AFL/AT episodes, the total duration of the episodes, or the percentage of asymptomatic days, the percentage of asymptomatic AF/AFL/AT significantly increases after ablation ($P < .005$ for all). *$P < .05$ compared with preablation values.

Verma, A, JAMAINTERNMED/VOL173(NO.2), JAN28,2013

Establish AF Severity

Use to Guide Therapeutic Approach

CCS SAF Score	Impact on QOL
0	Asymptomatic
1	Minimal effect on QOL
2	Minor effect of QOL
3	Moderate effect on QOL
4	Severe effect on QOL

Dorian et al Can J Cardiol 2006;22:383-386

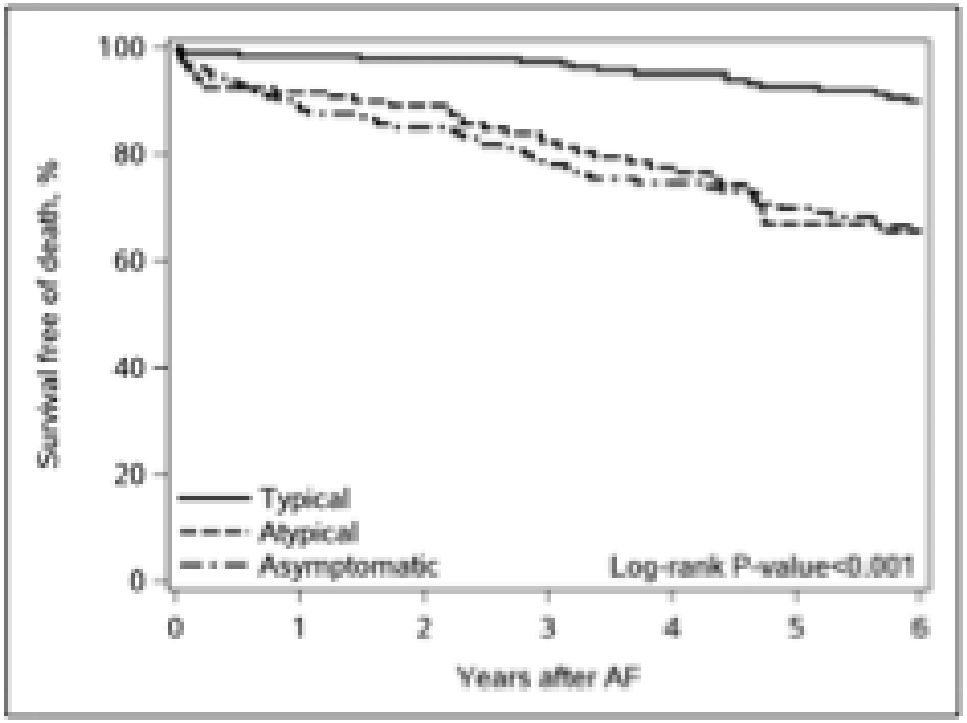
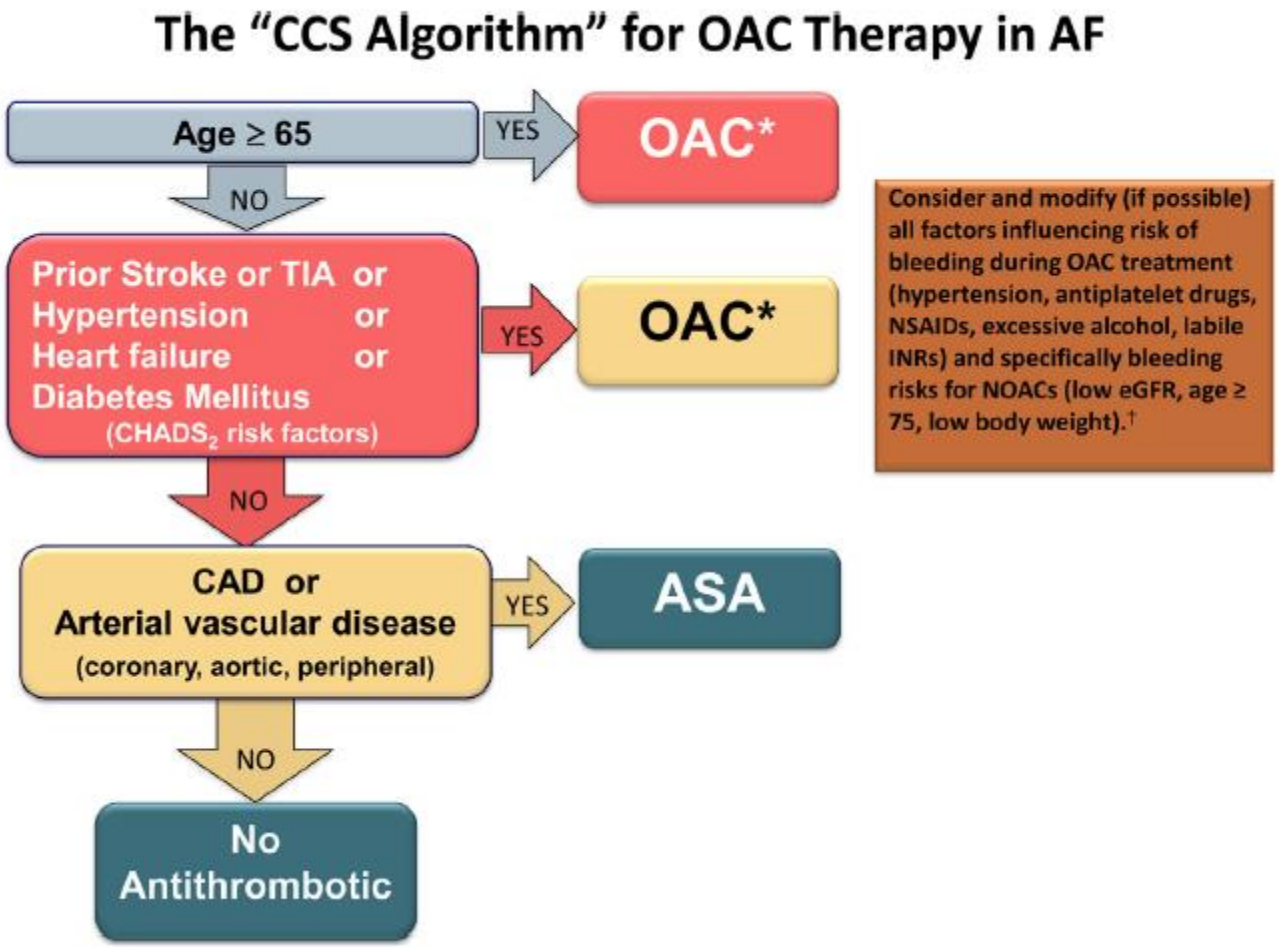
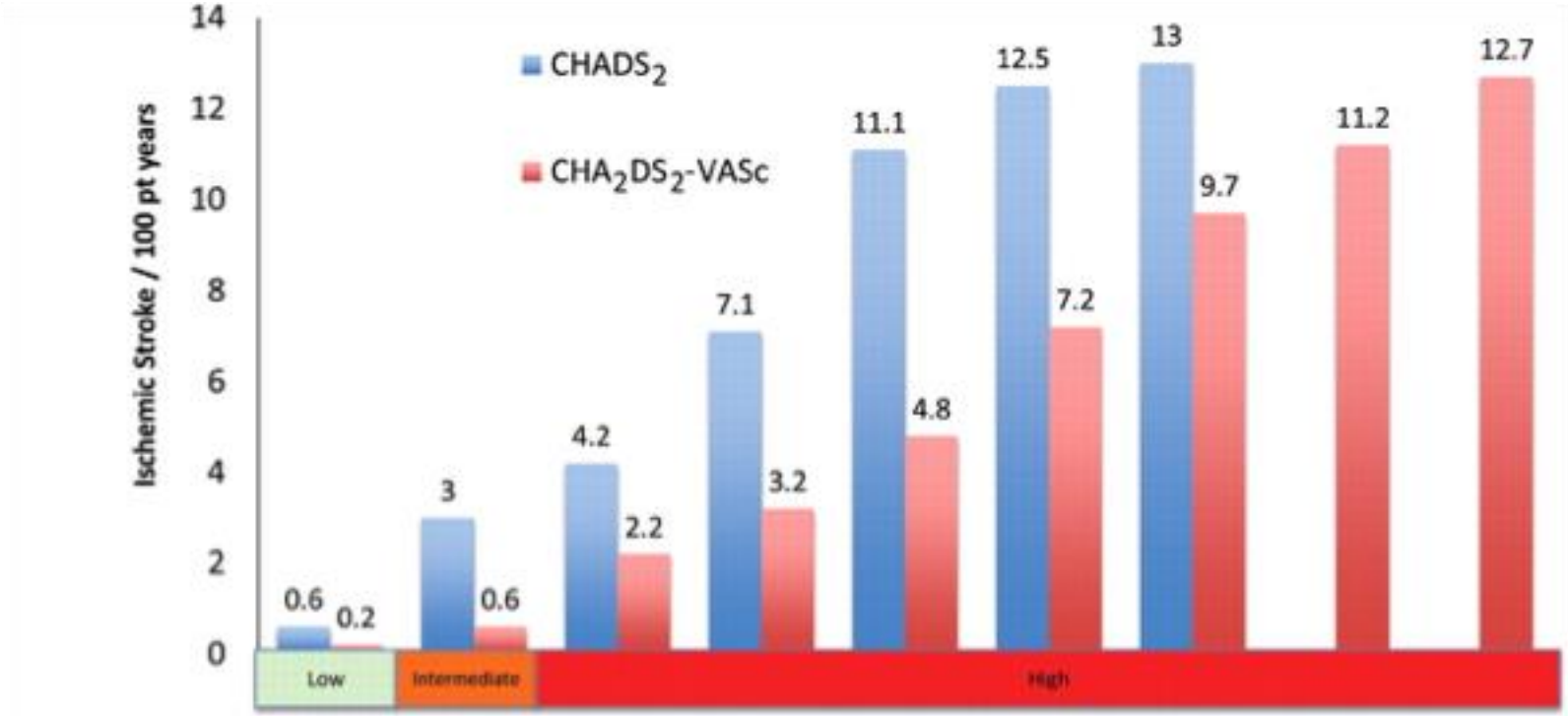


Figure 1. Survival stratified by type of AF presentation. Kaplan-Meier curve for all-cause mortality according to presentation with either typical AF symptoms (palpitations with or without other symptoms), atypical symptoms (fatigue, chest pain, shortness of breath, lightheadedness, syncope, decreased exercise tolerance, but without palpitations), or asymptomatic (AF detected incidentally during a routine visit for an unrelated problem). AF indicates atrial fibrillation. Reprinted from Siontis et al[21] with permission of the Heart Rhythm Society. Copyright © 2016, Heart Rhythm Society.

Freedman, Circulation. 2017

New CCS Algorithm





Score		0	1	2	3	4	5	6	7	8-9
$CHADS_2$	% of cohort	14.7	25.5	28.5	17.2	9.7	3.7	0.9	---	---
CHA_2DS_2-VASc	% of cohort	5.9	7.5	12.4	19.5	21.1	16	10.6	4.9	2.0

Screening for atrial fibrillation

Recommendations	Class	Level
Opportunistic screening for AF is recommended by pulse taking or ECG rhythm strip in patients >65 years of age.	I	B
In patients with TIA or ischaemic stroke, screening for AF is recommended by short-term ECG recording followed by continuous ECG monitoring for at least 72 hours.	I	B
It is recommended to interrogate pacemakers and ICDs on a regular basis for atrial high rate episodes (AHRE). Patients with AHRE should undergo further ECG monitoring to document AF before initiating AF therapy.	I	B
In stroke patients, additional ECG monitoring by long-term non-invasive ECG monitors or implanted loop recorders should be considered to document silent atrial fibrillation.	IIa	B
Systematic ECG screening may be considered to detect AF in patients aged >75 years, or those at high stroke risk.	IIb	B

European Heart Journal - doi:10.1093/eurheartj/ehw210

Cardiovascular and other conditions independently associated with atrial fibrillation (1)

Characteristic/comorbidity	Association with AF
Genetic predisposition (based on multiple common gene variants associated with AF)	HR range 0.4–3.2
Older age 50-59 years 60-69 years 70-79 years 80-89 years	HR: 1.00 (reference) 4.98 (95% CI 3.49–7.10) 7.35 (95% CI 5.28–10.2) 9.33 (95% CI 6.68–13.0)
Hypertension (treated) vs. none	HR 1.32 (95% CI 1.08–1.60)
Heart failure vs. none	HR 1.43 (95% CI 0.85–2.40)
Valvular heart disease vs. none	RR 2.42 (95% CI 1.62–3.60)
Myocardial infarction vs. none	HR 1.46 (95% CI 1.07–1.98)
Thyroid dysfunction Hypothyroidism Subclinical hyperthyroidism Overt hyperthyroidism	(reference: euthyroid) HR 1.23 (95% CI 0.77–1.97) RR 1.31 (95% CI 1.19–1.44) RR 1.42 (95% CI 1.22–1.63)
Obesity (body mass index) None (<25 kg/m²) Overweight (25–30 kg/m²) Obese (≥31 kg/m²)	HR: 1.00 (reference) 1.13 (95% CI 0.87–1.46) 1.37 (95% CI 1.05–1.78)
Diabetes mellitus vs. none	HR 1.25 (95% CI 0.98–1.60)

HR = hazard ratio; RR = risk ratio

Continued on next slide

European Heart Journal - doi:10.1093/eurheartj/ehw210

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Subclinical Atrial Fibrillation and the Risk of Stroke

Jeff S. Healey, M.D., Stuart J. Connolly, M.D., Michael R. Gold, M.D., Carsten W. Israel, M.D., Isabelle C. Van Gelder, M.D., Alessandro Capucci, M.D., C.P. Lau, M.D., Eric Fain, M.D., Sean Yang, M.Sc., Christophe Bailleul, M.D., Carlos A. Morillo, M.D., Mark Carlson, M.D., Ellison Themeles, M.Sc., Elizabeth S. Kaufman, M.D., and Stefan H. Hohnloser, M.D., for the ASSERT Investigators*

ABSTRACT

Table 2. Clinical Outcomes Occurring after the 3-Month Visit, According to Whether Subclinical Atrial Tachyarrhythmias Were or Were Not Detected between Enrollment and the 3-Month Visit.

Clinical Outcome	Subclinical Atrial Tachyarrhythmias between Enrollment and 3 Months				Hazard Ratio with Subclinical Atrial Tachyarrhythmias (95% CI)	P Value
	Present (N=261)		Absent (N=2319)			
	no. of events	%/yr	*no. of events*	%/yr		
Ischemic stroke or systemic embolism*	11	1.69	40	0.69	2.49 (1.28–4.85)	0.007
Ischemic stroke	10	1.54	36	0.62	2.52 (1.25–5.08)	0.01
Systemic embolism	1	0.15	4	0.07	2.24 (0.25–20.10)	0.47
Myocardial infarction	7	1.07	39	0.67	1.52 (0.68–3.42)	0.31
Death from vascular causes	19	2.92	153	2.62	1.11 (0.69–1.79)	0.67
Stroke, myocardial infarction, or death from vascular causes	29	4.45	206	3.53	1.25 (0.85–1.84)	0.27
Hospitalization for heart failure	20	3.07	131	2.24	1.36 (0.85–2.19)	0.20
Clinical atrial fibrillation or flutter on surface electrocardiogram	41	6.29	71	1.22	5.56 (3.78–8.17)	<0.001

* Five cases of confirmed stroke for which the cause (ischemic or hemorrhagic) was undetermined are included. All five cases occurred in the group of patients who did not have an episode of subclinical atrial tachyarrhythmia between enrollment and 6 months.

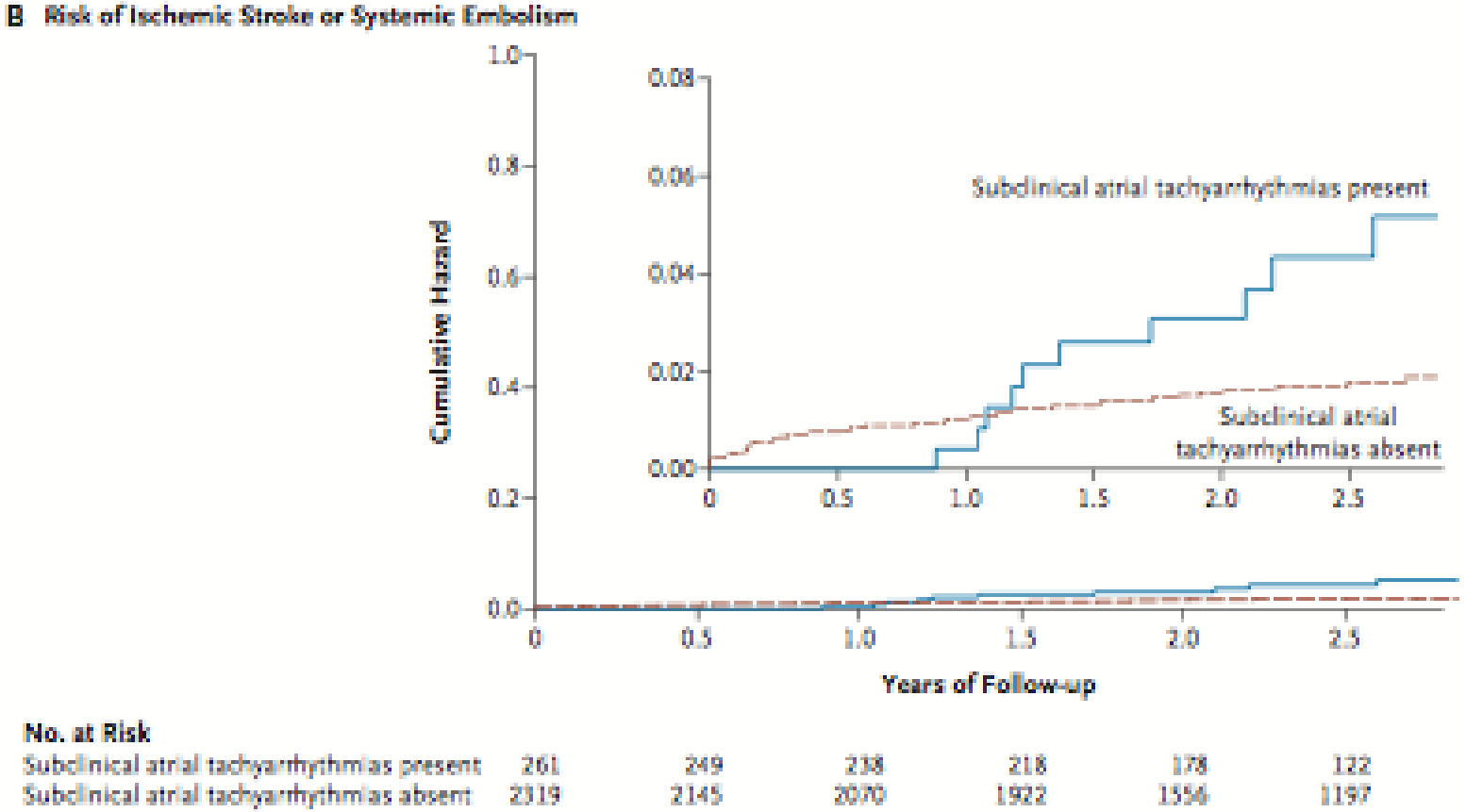


Figure 1. The Risk of Clinical Atrial Tachyarrhythmias and of Ischemic Stroke or Systemic Embolism, According to the Presence or Absence of Subclinical Atrial Tachyarrhythmias.

Panel A shows the risk of electrocardiographically documented clinical atrial tachyarrhythmias after the 3-month visit, according to whether subclinical atrial tachyarrhythmias were or were not detected between enrollment and the 3-month visit. Panel B shows the risk of ischemic stroke or systemic embolism after the 3-month visit, according to whether subclinical atrial tachyarrhythmias were or were not detected between enrollment and the 3-month visit. The insets show the same data on an enlarged y axis.

Table 3. Risk of Ischemic Stroke or Systemic Embolism after the 3-Month Visit, According to Baseline $CHADS_2$ Score and According to Whether Subclinical Atrial Tachyarrhythmias Were or Were Not Detected between Enrollment and the 3-Month Visit.

$CHADS_2$ Score	No. of Patients	Subclinical Atrial Tachyarrhythmias between Enrollment and 3 Months						Hazard Ratio for Ischemic Stroke or Systemic Embolism with Subclinical Atrial Tachyarrhythmias (95% CI)*
		Present			Absent			
		no. of patients	*no. of events*	*%/yr*	*no. of patients*	*no. of events*	*%/yr*	
1	600	68	1	0.56	532	4	0.28	2.11 (0.23–18.9)
2	1129	119	4	1.29	1010	18	0.70	1.83 (0.62–5.40)
>2	848	72	6	3.78	776	18	0.97	3.93 (1.55–9.95)

* The P value for trend is 0.35.

Table 1. Incidence of Cardiac Implanted Electronic Device–Detected Atrial High-Rate Episodes in the Population With Cardiac-Implanted Devices

Year	Trial	Device Indication	Clinical Profile of Patients	Mean Age	% Male	% LVEF	Mean $CHADS_2$	Follow-Up	AF Burden Threshold	Incidence of AF
2002	Gillis et al[4]	PPMs for sinus node disease	All	70±12	52%	NA	NA	718±383 days	>1 min	157/231 (68%)
2003	Ancillary MOST[12]	PPMs for sinus node disease	All	Median 73 (68,81) for no AHRE Median 75 (68,79) for AHRE detected	46%	NA	NA	Median 27 mo	>5 min	156/312 (50%)
2010	TRENDS[13]	PPMs and CDs All indications	History of prior stroke No history of AF No oral anticoagulant use ≥1 stroke risk factor	72.8±9.9 for no AHRE 74.0±9.1 for AHRE detected	63% for no AHRE 71% for AHRE detected	NA	4.1±0.8 for no AHRE 4.2±0.8 for AHRE detected	Mean 1.4 y	>5 min	45/163 (28%)
2012	TRENDS[14]	PPMs and CDs All indications	No history of prior stroke No history of AF No oral anticoagulant use ≥1 stroke risk factor	70.2±11.8	66%	NA	≥2 in 70%	1.1±0.7 y	>5 min	416/1368 (30%)
2012	ASSERT[11]	PPMs and CDs All indications	History of hypertension No history of AF No oral anticoagulant use	76±7 for no AHRE 77±7 for AHRE detected	58% for no AHRE 58% for AHRE detected	NA	2.3±1.0 for no AHRE 2.2±1.1 for AHRE detected	2.5 y	>6 min	885/2580 (34.7%)
2012	Home monitor CRT[15]	CRTDs and CRTPs Congestive heart failure	Heart failure No history of AF	66±10	77%	25 (20–30)	≥2 in 64%	370 days (253–290)	≥14 min	126/560 (23%)
2013	Healey et al[17]	PPMs All indications	All	71.7±14.4 for no AHRE 74.3±13.7 for AHRE detected	58% for no AHRE 58% for AHRE detected	NA	2.02±1.30 for no AHRE 2.23±1.47 for AHRE detected	Single center Retrospective	>5 min	246/445 (55.3%)
2015	IMPACT[9]	ICDs and CRTDs All indications	No permanent AF No contraindications for oral anticoagulant	64.2–11.5 for control 64.7–10.8 for intervention	73% for control 74% for intervention	29.4–11.3 for control 29.9–10.8 for	2 (median)	701 days	>4–12 sec	945/2718 (34.8%)
2016	RATE Registry[18]	PPMs and CDs	All No permanent AF	73.6±11.8 for PPMs 64.5±12.6 for	54% in PPM 72% in	57.8±10.5 for PPM 29.2±11.3	1.8±1.0 for PPM 2.0±0.8 for	22.9 mo (median)	> 3 atrial premature complexes	145/300 (48%) of PPM patients 156/300 (52%)

Freedman, Circulation. 2017

Original Articles

The Relationship Between Daily Atrial Tachyarrhythmia Burden From Implantable Device Diagnostics and Stroke Risk

The TRENDS Study

Taya V. Glotzer, MD; Emile G. Daoud, MD; D. George Wyse, MD, PhD; Daniel E. Singer, MD; Michael D. Ezekowitz, MD, PhD; Christopher Hilker, MS; Clayton Miller, BS; Dongfeng Qi, PhD; Paul D. Ziegler, MS

Glotzer, Circ Arrhythmia Electrophysiol. 2009;2:474-480

Table 2. TE Rates for the Overall Study Group (Unadjusted)

AT/AF Burden Subset	Annualized TE Rate (95% CI), %	Annualized TE Rate Excluding TIAs (95% CI), %
Zero AT/AF burden	1.1 (0.8–1.6)	0.5 (0.3–0.9)
Low AT/AF burden (<5.5 h)	1.1 (0.4–2.8)	1.1 (0.4–2.8)
High AT/AF burden (5.5 h)	2.4 (1.2–4.5)	1.8 (0.9–3.8)

Glotzer, Circ Arrhythmia Electrophysiol. 2009;2:474-480

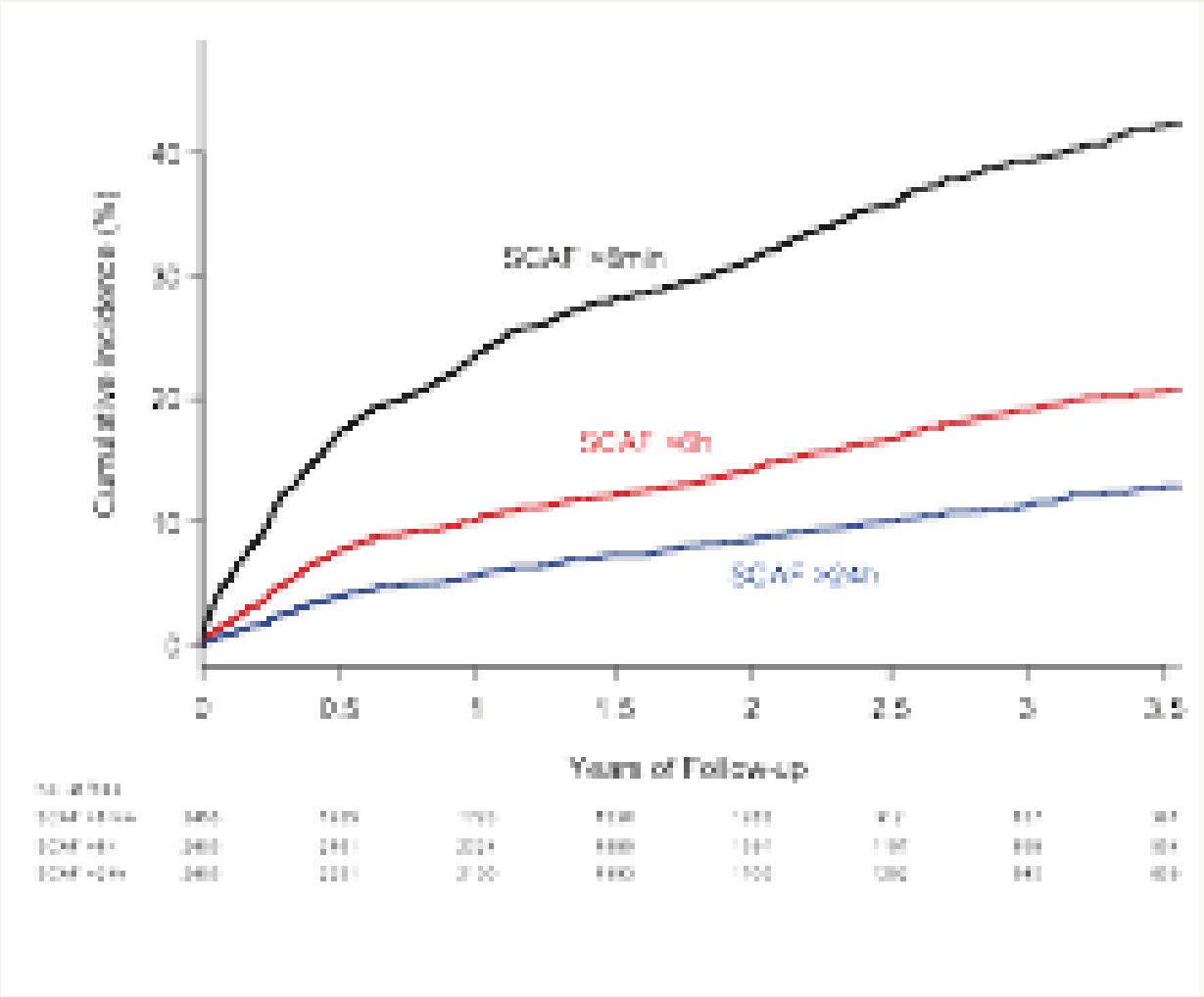


Figure 1 Kaplan–Meier estimates of cumulative incidence of SCAF >6 min, >6 h, and >24 h.

Van, Gelder, European Heart Journal (2017) 38, 1339–1344

Table 2 Number of patients in respective groups developing SCAF >24 h after first year of follow-up

AF duration within 1st year	No. of patients	No. of patients with >24 h SCAF after 1 year	Percentage
No SCAF	1811	67	3.70
>6 min–6 h	310	27	8.71
>6 h–24 h	105	33	31.43
>24 h	129	71	55.04

Van, Gelder, European Heart Journal (2017) 38, 1339–1344

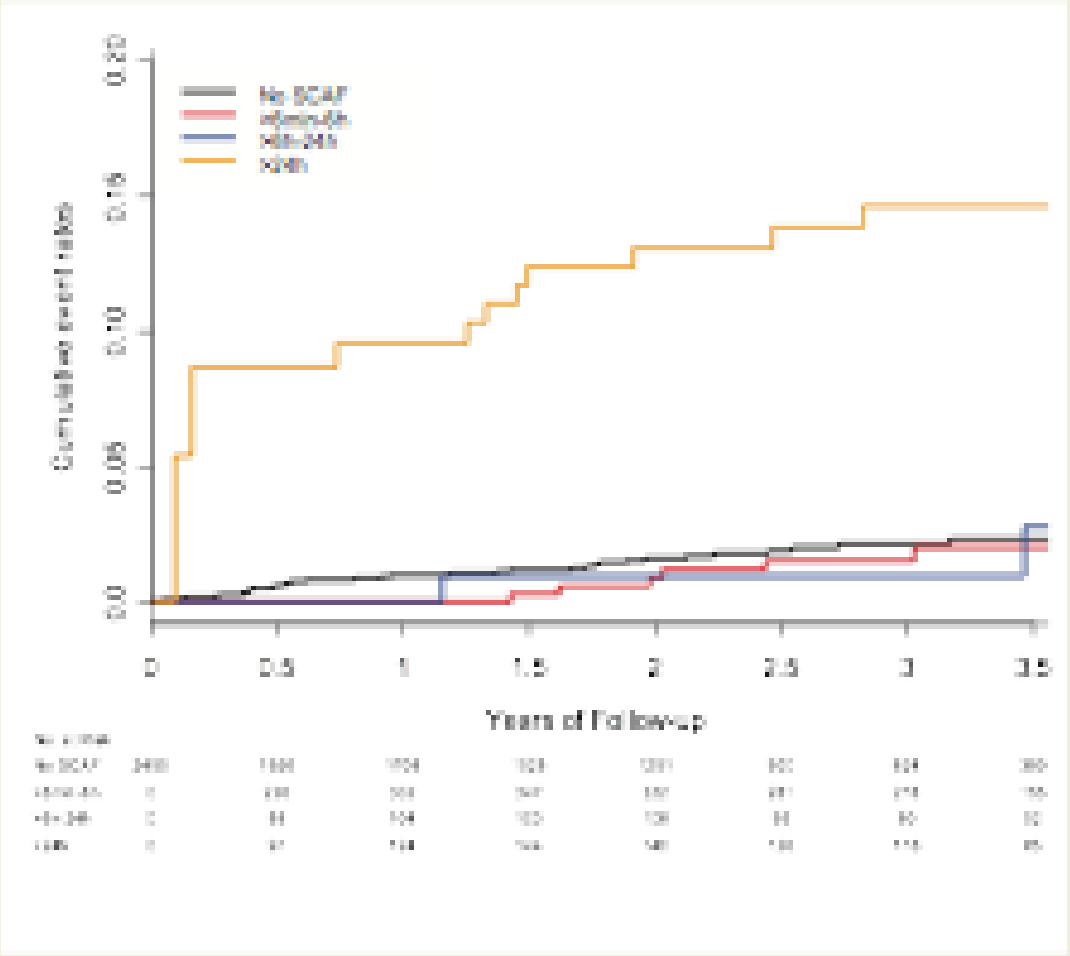


Figure 2 Extended Kaplan–Meier curves of ischemic stroke/systemic embolism stratified by time-dependent durations of SCAF with long-term effect.

Van, Gelder, European Heart Journal (2017) 38, 1339–1344

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JUNE 26, 2014 VOL. 370 NO. 26

Atrial Fibrillation in Patients with Cryptogenic Stroke

David J. Gladstone, M.D., Ph.D., Melanie Spring, M.D., Paul Dorian, M.D., Val Panzov, M.D., Kevin E. Thorpe, M.Math., Judith Hall, M.Sc., Haris Vaid, B.Sc., Martin O'Donnell, M.B., Ph.D., Andreas Laupacis, M.D., Robert Côté, M.D., Mukul Sharma, M.D., John A. Blakely, M.D., Ashfaq Shuaib, M.D., Vladimir Hachinski, M.D., D.Sc., Shelagh B. Coutts, M.B., Ch.B., M.D., Demetrios J. Sahlas, M.D., Phil Teal, M.D., Samuel Yip, M.D., J. David Spence, M.D., Brian Buck, M.D., Steve Verreault, M.D., Leanne K. Casaubon, M.D., Andrew Penn, M.D., Daniel Selchen, M.D., Albert Jin, M.D., David Howse, M.D., Manu Mehdiratta, M.D., Karl Boyle, M.B., B.Ch., Richard Aviv, M.B., Ch.B., Moira K. Kapral, M.D., and Muhammad Mamdani, Pharm.D., M.P.H., for the EMBRACE Investigators and Coordinators*

ABSTRACT

Glastone, NEJM, 2014, EMBRACE

Table 2. Detection of Atrial Fibrillation in the Two Monitoring Groups.

Outcome	Intervention Group (N = 286)	Control Group (N = 285)	Absolute Difference (95% CI)	P Value	No. of Patients Needed to Screen (95% CI)*
	number/total number (percent)		*percentage points*		
Primary outcome: detection of atrial fibrillation with duration ≥30 sec within 90 days†	45/280 (16.1)	9/277 (3.2)	12.9 (8.0–17.6)	<0.001	8 (5.7–12.5)
Secondary outcomes‡					
Detection of atrial fibrillation with duration ≥30 sec	44/284 (15.5)	7/277 (2.5)	13.0 (8.4–17.6)	<0.001	8 (5.7–11.9)
Detection of atrial fibrillation with duration ≥2.5 min	28/284 (9.9)	7/277 (2.5)	7.4 (3.4–11.3)	<0.001	14 (8.8–29.4)
Detection of atrial fibrillation of any duration	56/284 (19.7)	13/277 (4.7)	15.0 (9.8–20.3)	<0.001	7 (4.9–10.2)

Glastone, NEJM, 2014, EMBRACE

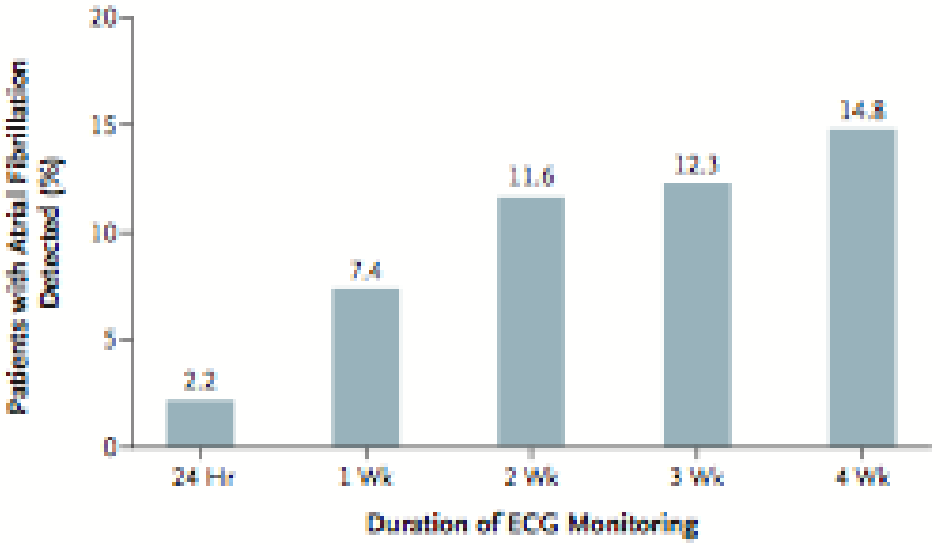


Figure 2. Incremental Yield of Prolonged ECG Monitoring for the Detection of Atrial Fibrillation in Patients with Cryptogenic Stroke or TIA.

The proportion of patients in whom atrial fibrillation was detected increased with increasing duration of ECG monitoring. The data reflect the timing of the first detected episode of atrial fibrillation; data for 2 patients are not shown because the exact date of the detection of atrial fibrillation was unknown. Atrial fibrillation was detected in 6 of 277 patients who underwent monitoring with a 24-hour Holter monitor (the control group). In the group of 284 patients who underwent 30-day monitoring, atrial fibrillation was detected in 21 patients within the first week of monitoring, in 33 within the first 2 weeks of monitoring, in 35 within the first 3 weeks of monitoring, and in 42 within 4 weeks of monitoring (including 1 patient with atrial fibrillation that was first detected on day 34).

Glastone, NEJM, 2014, EMBRACE

Table 3. Anticoagulant Therapy in the Two Monitoring Groups.*

Therapy	Intervention Group (N = 286)	Control Group (N = 285)	Absolute Difference (95% CI)	P Value
	no./total no. (%)		*percentage points*	
Baseline				
Anticoagulant therapy before the index stroke or TIA	3/286 (1.0)	2/285 (0.7)	—	—
Anticoagulant therapy at randomization after the index stroke or TIA	16/286 (5.6)	19/285 (6.7)	—	—
After study monitoring				
Therapy at 90 days after randomization				
Anticoagulant therapy	52/280 (18.6)	31/279 (11.1)	7.5 (1.6 to 13.3)	0.01
Antiplatelet therapy only	223/280 (79.6)	246/279 (88.2)	−8.6 (−14.6 to −2.5)	0.006
Therapy at randomization changed by 90 days				
From antiplatelet therapy to anticoagulant therapy	38/280 (13.6)	13/279 (4.7)	8.9 (4.2 to 13.6)	<0.001
From anticoagulant therapy to antiplatelet therapy	3/280 (1.1)	2/279 (0.7)	0.4 (−1.2 to 1.9)	0.66

* Anticoagulant therapy was defined as the use of any oral anticoagulant (warfarin, dabigatran, rivaroxaban, or apixaban)

Glastone, NEJM, 2014, EMBRACE

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Cryptogenic Stroke and Underlying Atrial Fibrillation

Tommaso Sanna, M.D., Hans-Christoph Diener, M.D., Ph.D., Rod S. Passman, M.D., M.S.C.E., Vincenzo Di Lazzaro, M.D., Richard A. Bernstein, M.D., Ph.D., Carlos A. Morillo, M.D., Marilyn Mollman Rymer, M.D., Vincent Thijs, M.D., Ph.D., Tyson Rogers, M.S., Frank Beckers, Ph.D., Kate Lindborg, Ph.D., and Johannes Brachmann, M.D., for the CRYSTAL AF Investigators*

Sanna, NEJM, 2014, CRYSTAL AF

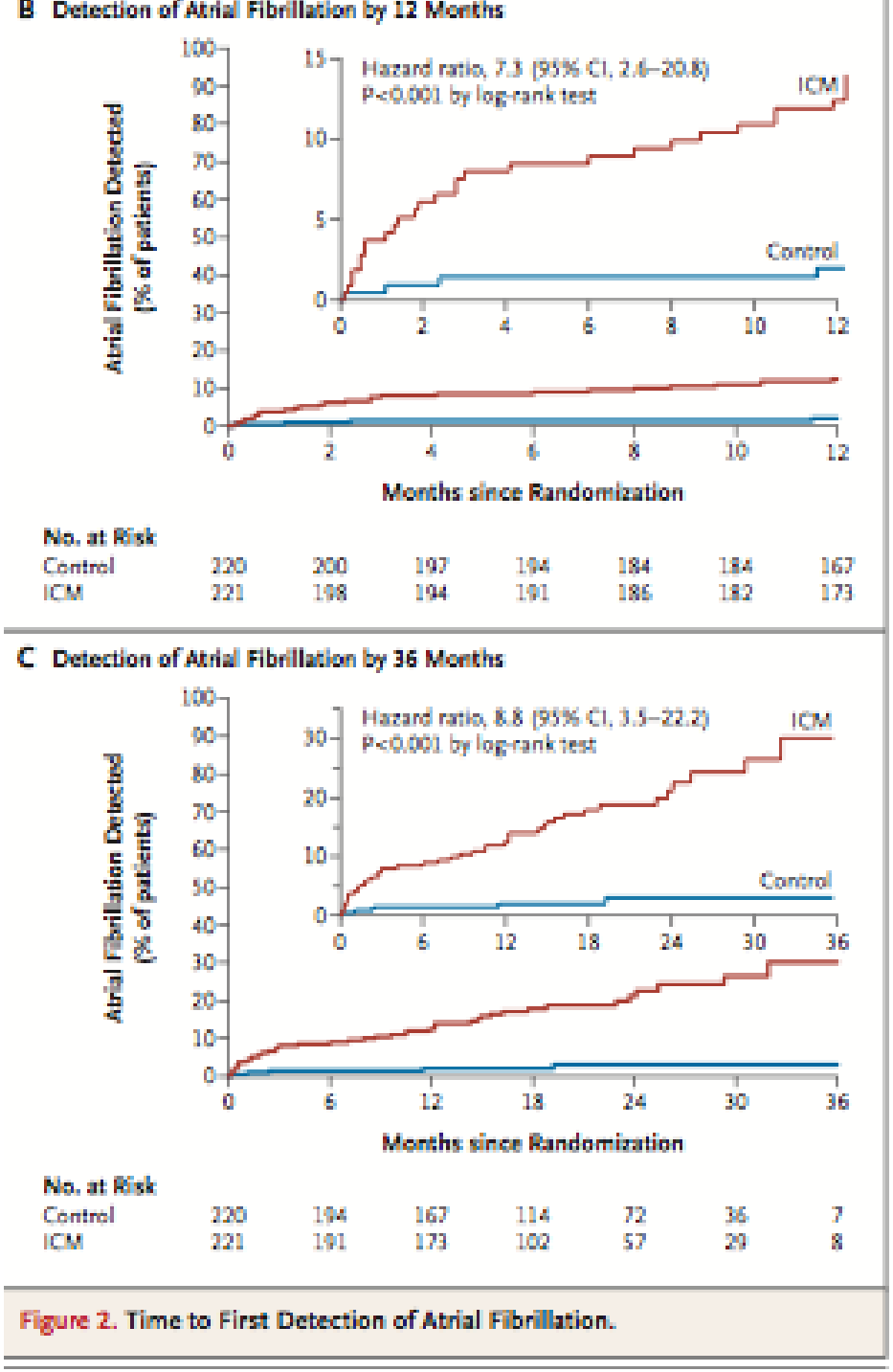


Figure 2. Time to First Detection of Atrial Fibrillation.

Sanna, NEJM, 2014

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Rivaroxaban for Stroke Prevention after Embolic Stroke of Undetermined Source

R.G. Hart, M. Sharma, H. Mundl, S.E. Kasner, S.I. Bangdiwala, S.D. Berkowitz, B. Swaminathan, P. Lavados, Y. Wang, Y. Wang, A. Davalos, N. Shamalov, R. Mikulik, L. Cunha, A. Lindgren, A. Arauz, W. Lang, A. Czlonkowska, J. Eckstein, R.J. Gagliardi, P. Amarenco, S.F. Ameriso, T. Tatlisumak, R. Veltkamp, G.J. Hankey, D. Toni, D. Bereczki, S. Uchiyama, G. Ntaios, B.-W. Yoon, R. Brouns, M. Endres, K.W. Muir, N. Bornstein, S. Ozturk, M.J. O'Donnell, M.M. De Vries Basson, G. Pare, C. Pater, B. Kirsch, P. Sheridan, G. Peters, J.I. Weitz, W.F. Peacock, A. Shoamanesh, O.R. Benavente, C. Joyner, E. Themeles, and S.J. Connolly, for the NAVIGATE ESUS Investigators*

Table 2. Efficacy Outcomes.*

Outcome	Rivaroxaban Group (N = 3609)	Aspirin Group (N = 3604)	Hazard Ratio (95% CI)†
	no. of patients (annualized rate)		
Primary efficacy outcome: any recurrent stroke or systemic embolism	172 (5.1)	160 (4.8)	1.07 (0.87–1.33)
Secondary efficacy outcomes			
Any recurrent stroke‡	171 (5.1)	158 (4.7)	1.08 (0.87–1.34)
Ischemic stroke‡	158 (4.7)	156 (4.7)	1.01 (0.81–1.26)
Hemorrhagic stroke§	13 (0.4)	2 (0.1)	6.50 (1.47–28.8)
Systemic embolism	1 (<0.1)	2 (0.1)	0.50 (0.05–5.51)
Any recurrent stroke, myocardial infarction, death from cardiovascular causes, or systemic embolism¶	207 (6.2)	195 (5.8)	1.06 (0.87–1.29)
Any disabling stroke	41 (1.2)	29 (0.8)	1.42 (0.88–2.28)
Myocardial infarction	17 (0.5)	23 (0.7)	0.74 (0.39–1.38)
Death from any cause	65 (1.9)	52 (1.5)	1.26 (0.87–1.81)
Death from cardiovascular causes¶	34 (1.0)	23 (0.7)	1.48 (0.87–2.52)

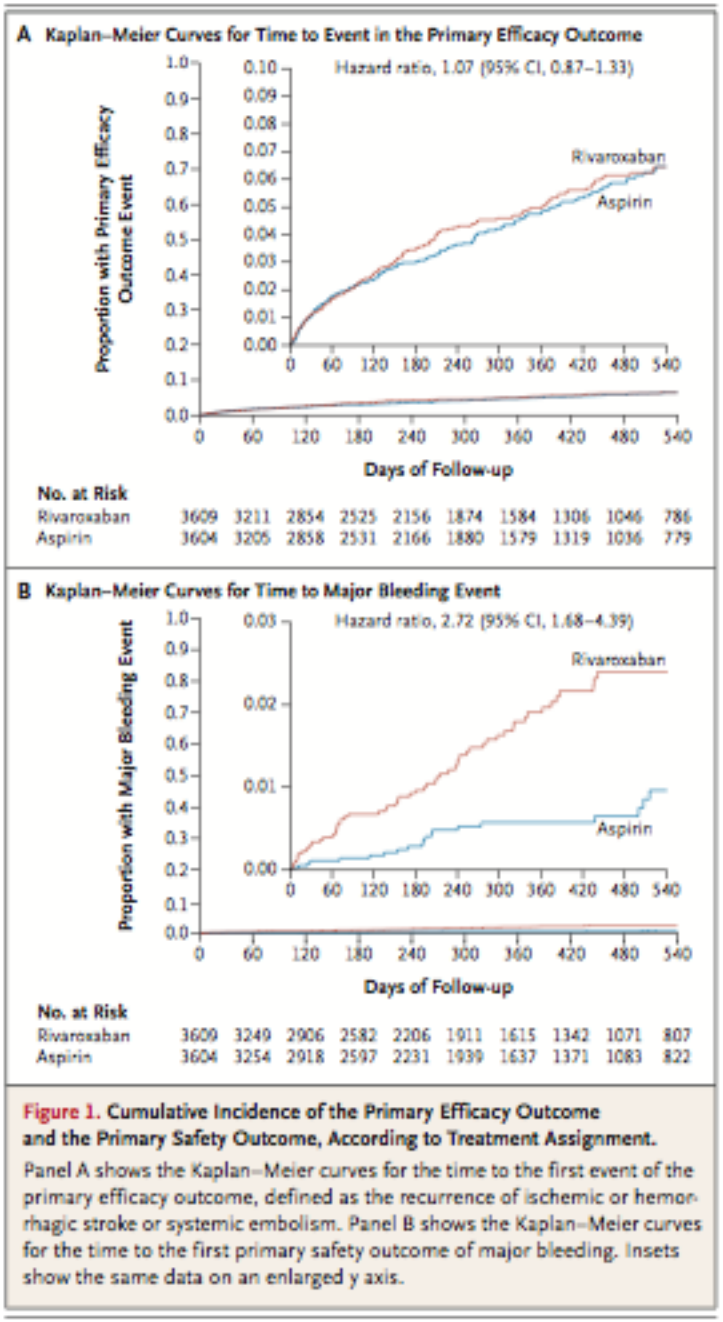


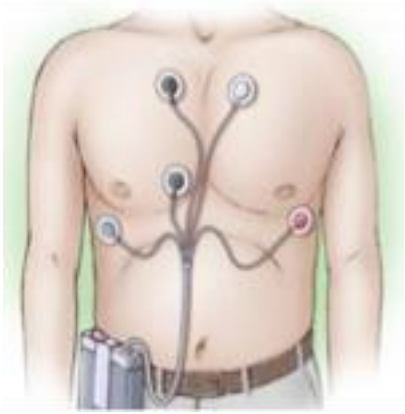
Figure 1. Cumulative Incidence of the Primary Efficacy Outcome and the Primary Safety Outcome, According to Treatment Assignment.

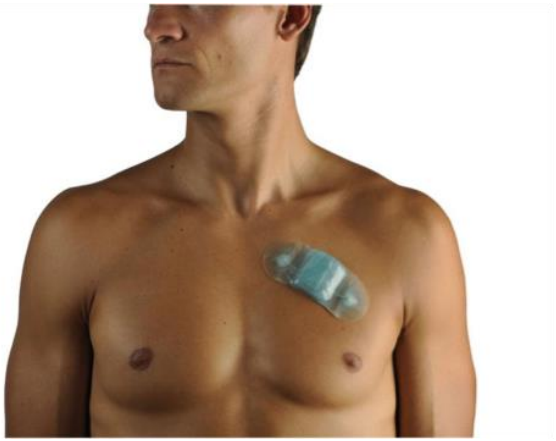
Panel A shows the Kaplan–Meier curves for the time to the first event of the primary efficacy outcome, defined as the recurrence of ischemic or hemorrhagic stroke or systemic embolism. Panel B shows the Kaplan–Meier curves for the time to the first primary safety outcome of major bleeding. Insets show the same data on an enlarged y axis.

Table 3. Safety Outcomes.*

Outcome	Rivaroxaban Group (N = 3609)	Aspirin Group (N = 3604)	Hazard Ratio (95% CI)†	P Value
	no. of patients (annualized rate)			
Primary safety outcome: ISTH major bleeding‡	62 (1.8)	23 (0.7)	2.72 (1.68–4.39)	<0.001
Secondary safety outcomes				
Life-threatening or fatal bleeding	35 (1.0)	15 (0.4)	2.34 (1.28–4.29)	0.004
Clinically relevant nonmajor bleeding	118 (3.5)	79 (2.3)	1.51 (1.13–2.00)	0.004
Symptomatic intracranial hemorrhage§	20 (0.6)	5 (0.1)	4.02 (1.51–10.7)	0.003
Intracerebral hemorrhage	12 (0.3)	3 (0.1)	4.01 (1.13–14.2)	0.02
Subarachnoid hemorrhage¶	5 (0.1)	1 (0.0)	5.03 (0.59–43.0)	0.10
Subdural or epidural hematoma¶	3 (0.1)	2 (0.1)	1.51 (0.25–9.02)	0.65

Changement dans le monitoring





Irhythm Technologies Inc
NASDAQ: IRTC

92,95 USD −0,35 (0,38 %) ↓

Fermé: 19 sept. 17 h 26 HAE · Clause de non-responsabilité
Avant l'ouverture 92,95 0,00 (0,00 %)

1 jour | 5 jours | 1 mois | 6 mois | YTD | 1 an | **5 ans** | Max.

Ouverture	93,30	Rend. bours.	-
+Haut	94,76	Cours de clôture	93,30
+Bas	92,78	Max 52 sem	98,37
Capitalis.	2,23 G	Min 52 sem	46,95
Co. cap. bén.	-		

Hexoskin


MARCH 19, 2012
INTEGRATED
ACTIVITY
SENSOR
INTEGRATED
HEART
SENSOR
INTEGRATED
RESPIRATION
SENSOR

ELSEVIER

Canadian Journal of Cardiology ■ (2018) 1–4

Training/Practice
Health Policy and Promotion

Is Screening for Atrial Fibrillation in Canadian Family Practices Cost-Effective in Patients 65 Years and Older?

Table 1. Base case cost-effectiveness analysis (CAD$)

	Cost	QALYs	Incremental costs	Incremental QALYs	Incremental costs per QALY gained	
					vs no Screen*	Sequential analysis†
No screen	$214.21	8.74195	Reference	Reference	Reference	Dominates
PC	$202.48	8.74362	−$11.73	0.00166	Dominates	Dominates
BP-AF	$211.03	8.74301	−$3.18	0.00106	Dominates	Dominates
SL-ECG	$222.18	8.74362	$7.97	0.00166	$4788	Dominates

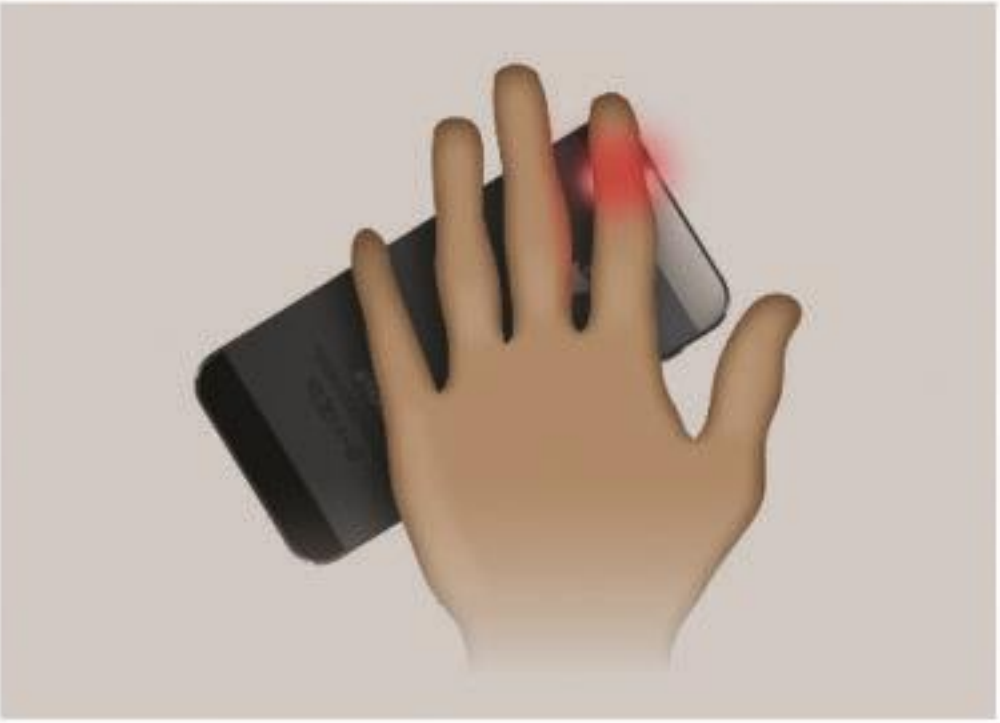
AF, atrial fibrillation; BP-AF, blood pressure machine with AF detection algorithms; PC, pulse check; QALY, quality-adjusted life-year; SL-ECG, single-lead electrocardiogram.

*These analyses compare each of the 3 AF screening strategies vs no screening.

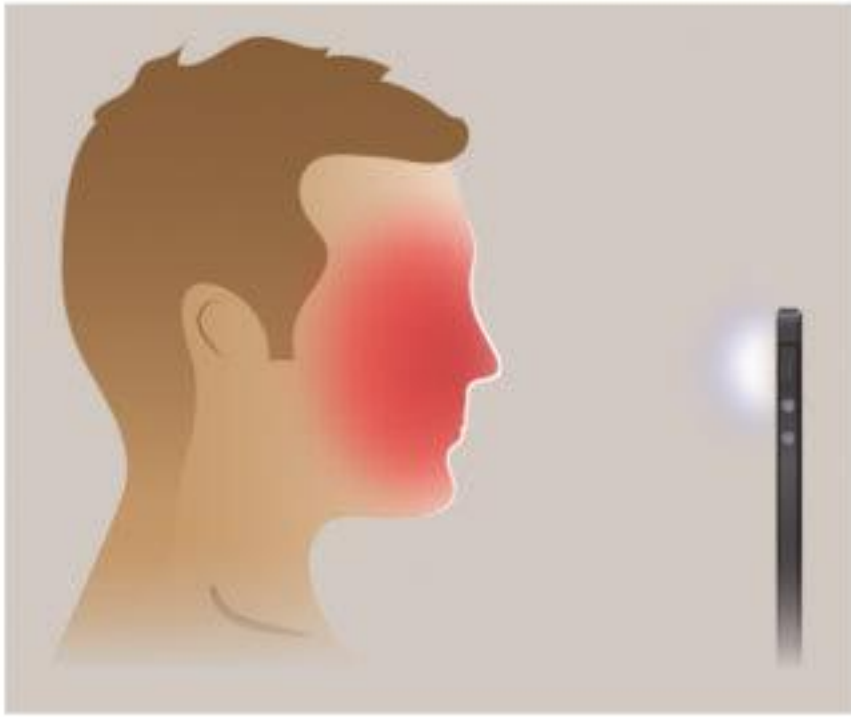
†All strategies are compared simultaneously. Because the no screening strategy is the least expensive and has the lowest number of QALYs it is the reference. If one single strategy had to be chosen among the 4, PC would be the optimal strategy regardless of willingness to pay for a QALY because it dominates all other strategies.

Healy, JCJ 2018

(a)



(b)



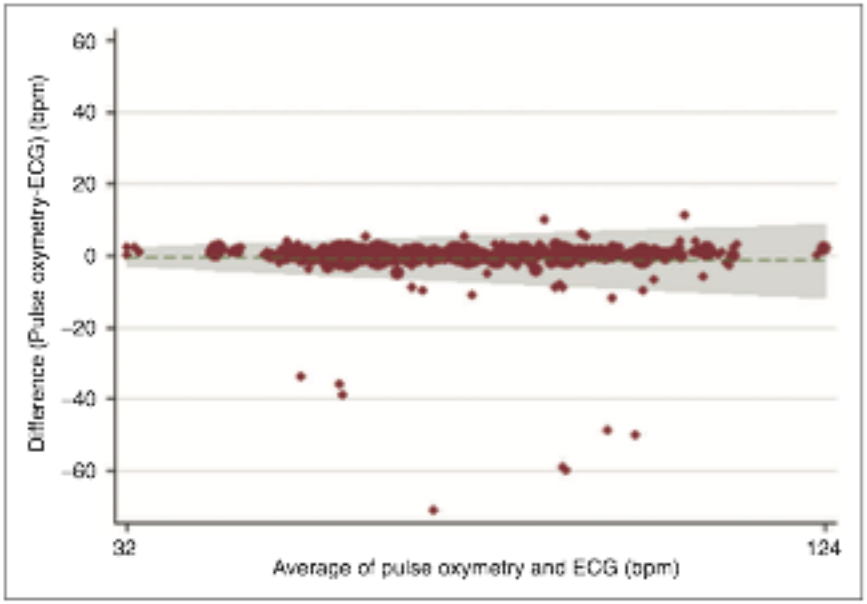


Figure 2. Heart rate measurement by electrocardiogram compared to pulse oximetry device.

Copetti, European Journal of Preventive Cardiology 2017

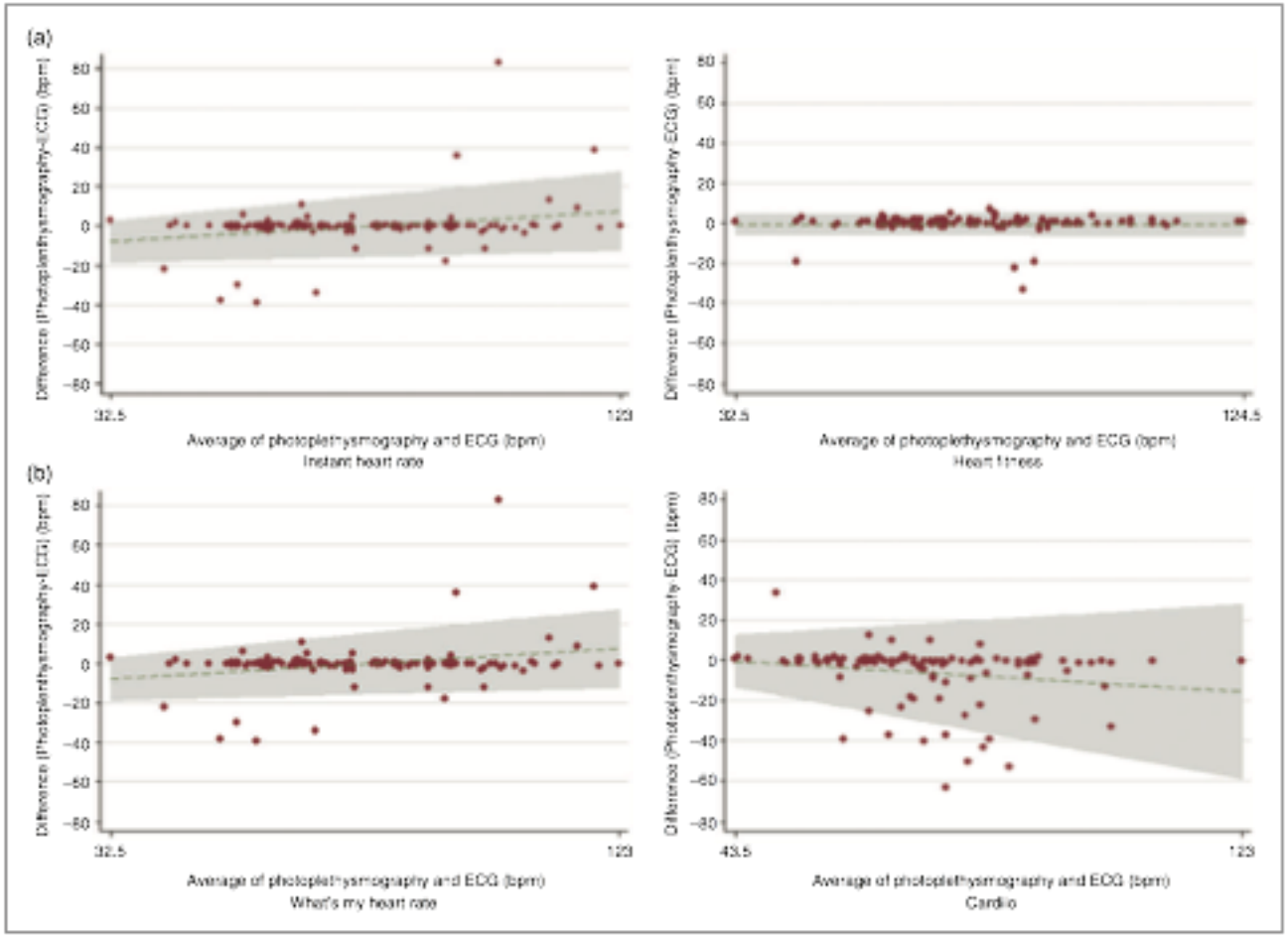
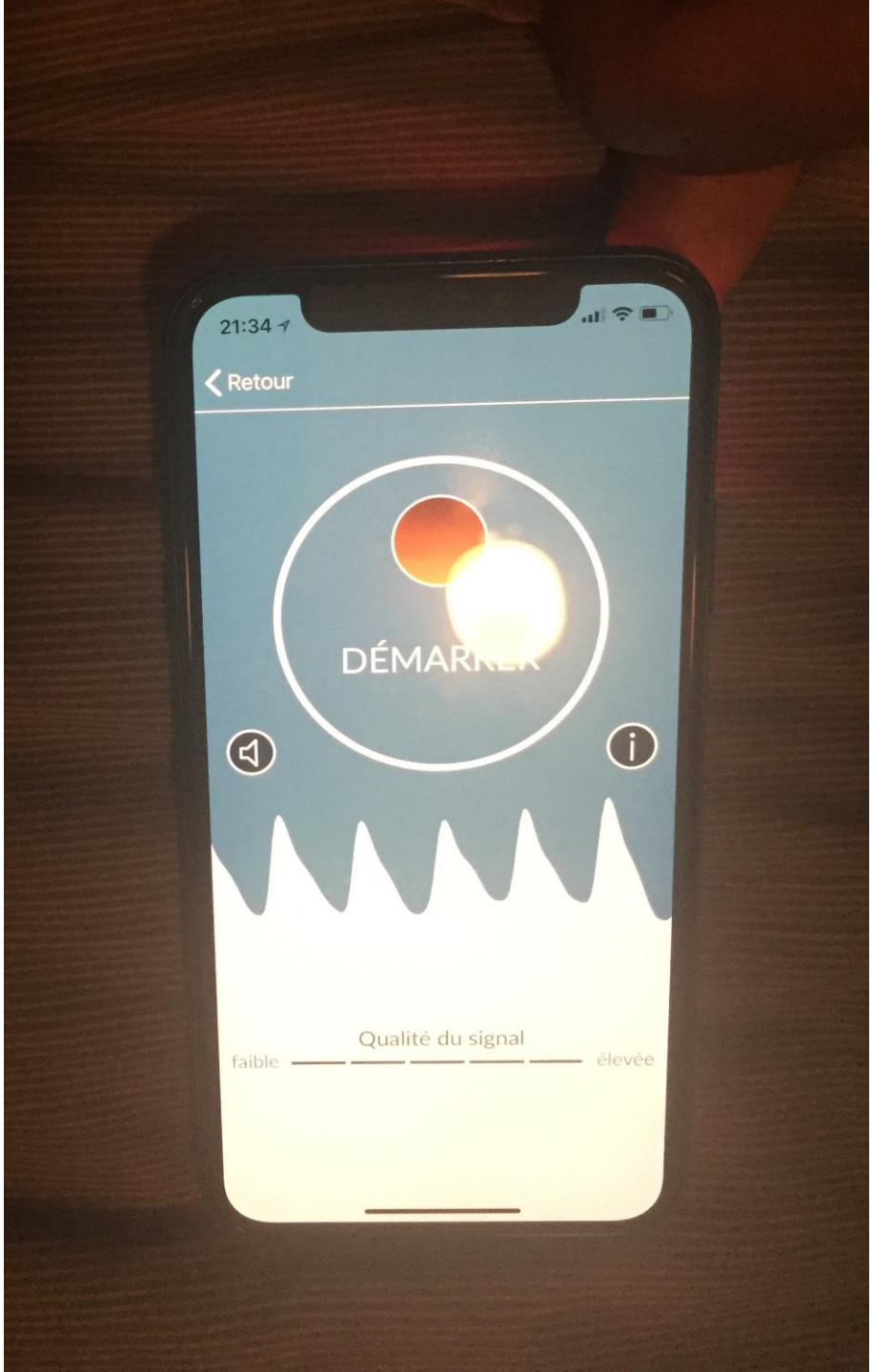


Figure 3. The Bland-Altman plots show considerable differences between the tested apps. Non-contact PPG measurements performed significantly worse compared to contact measurements. Both non-contact PPG based apps performed significantly worse at higher heart rates. They also have a tendency to underestimate higher heart rates. (a) Contact photoplethysmography; (b) non-contact photoplethysmography.

Copetti, European Journal of Preventive Cardiology 2017


21:34
Retour
DÉMARRER
Qualité du signal
faible
élevée

Heart rhythm
Your heart rhythm is regular.

Heart rate
Your heart rate is normal and averages 79 beats/minute (bpm).

Proposal
No abnormalities were observed. Repeat the measurement at regular intervals.

Heart rate time curve

Reportnummer: **#170608-0000642**

Pulse measurement

Pulse wave:

Symbolized R-spikes: Regular heartbeat | Irregular heartbeat (e.g. ectopic beat) | Extremely irregular heartbeat (absolute arrhythmia)

The R-spikes projected in the pulse waves have been artificially generated and do not correspond to the original shape of an ECG curve; they merely symbolize the trigger point of a detected heartbeat.

Eliminated disruptions:
If present

ESC European Society of Cardiology

Europace (2018) 0, 1–7
doi:10.1093/europace/euy176

CLINICAL RESEARCH

Detection of atrial fibrillation with a smartphone camera: first prospective, international, two-centre, clinical validation study (DETECT AF PRO)

Noé Brasier[1†], Christina J. Raichle[1†], Marcus Dörr[2,3], Adrian Becke[2], Vivien Nohturfft[2], Stefan Weber[4], Fabienne Bulacher[1], Lorena Salomon[1], Thierry Noah[1], Ralf Birkemeyer[5], and Jens Eckstein[1,6]*

[1]CMIO office, University Hospital Basel, Petersgraben 4, 4031 Basel, Switzerland; [2]Department of Internal Medicine B, University Medicine Greifswald, Greifswald, Germany; [3]German Centre for Cardiovascular Research (DZHK), partner site Greifswald, Greifswald, Germany; [4]Department of Internal Medicine, University Hospital Regensburg, Regensburg, Germany; [5]Herzklinik Ulm, Ulm, Germany; and [6]Department of Internal Medicine, University Hospital Basel, Petersgraben 4, 4031 Basel, Switzerland

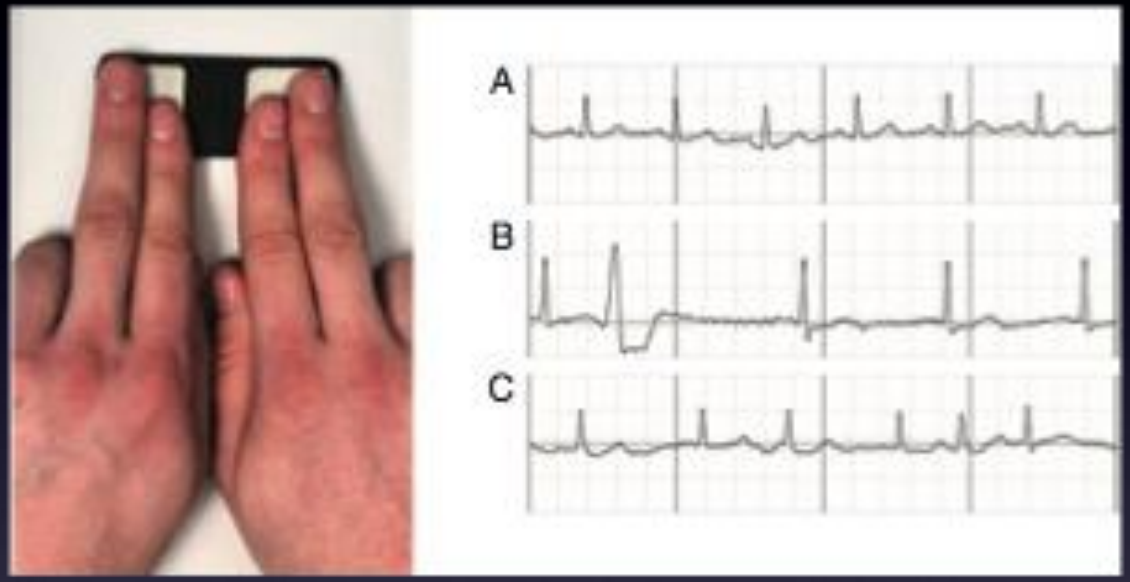


Figure 1 Index and middle fingers on a mobile iECG (left panel); excerpts from resulting iECGs (right panel): (A) SR, (B) SR with ectopic beats, and (C) AF (right panel). AF, atrial fibrillation; iECG, internet-enabled electrocardiography; SR, sinus rhythm.


Rhythmus
72
00:00

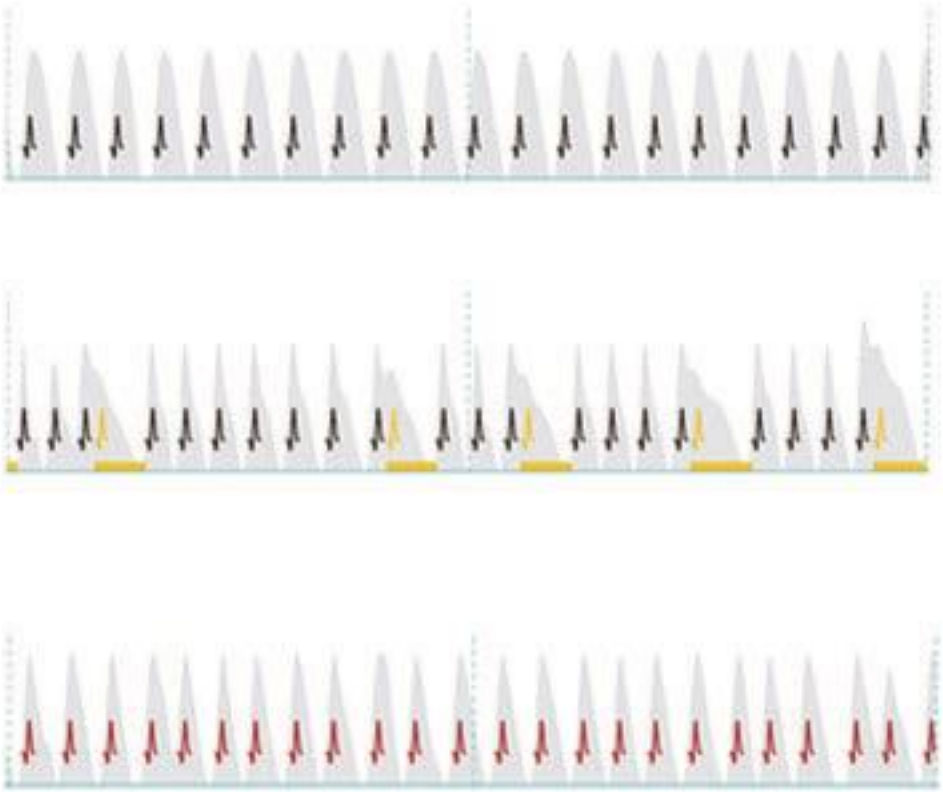


Table 3 Accuracy of the Kardia algorithm

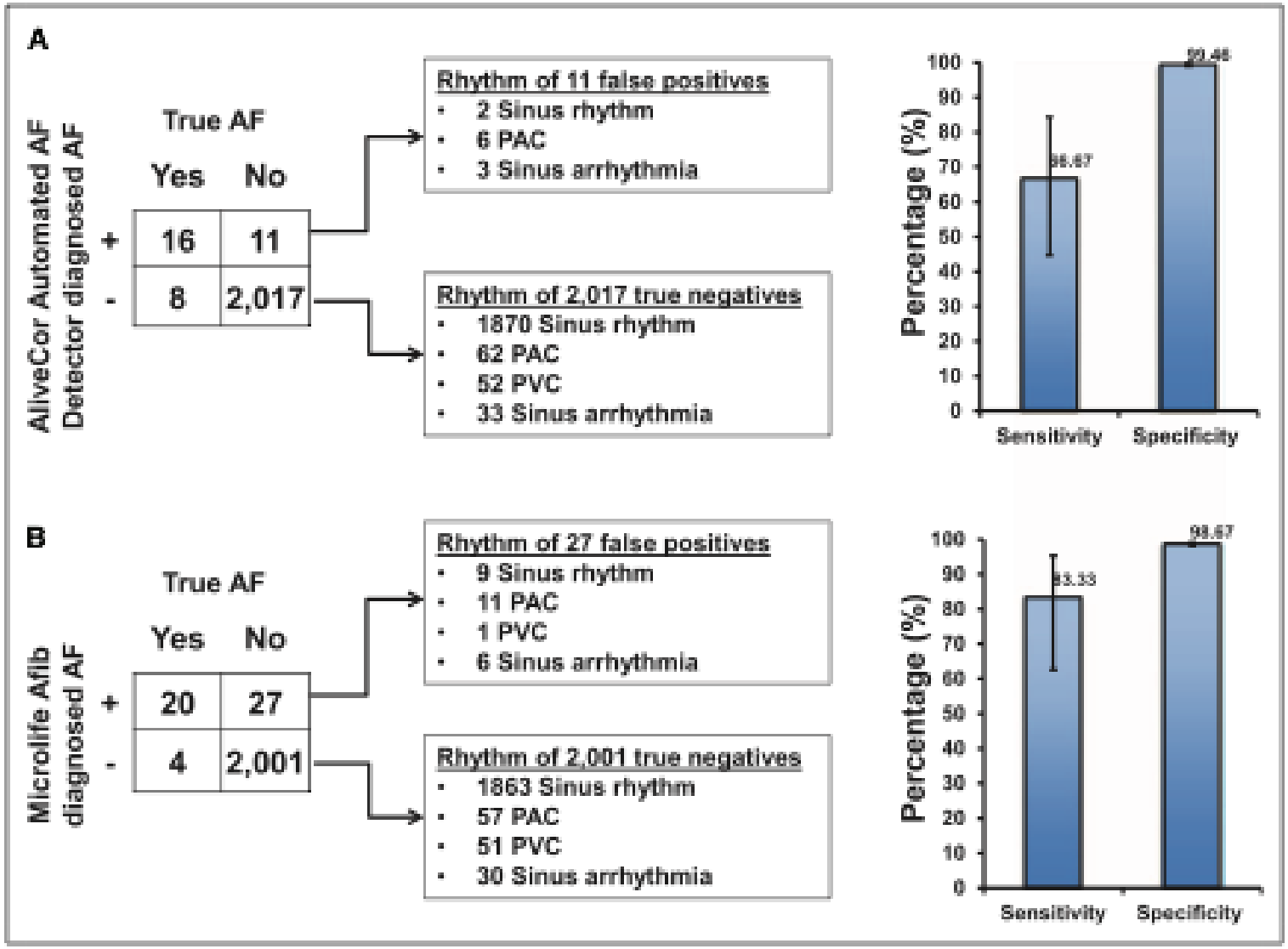
Test criterion	Value % (95% CI) 1-min analysis
Sensitivity (%)	99.6 (97.5–100)
Specificity (%)	97.8 (95.3–99.2)
No diagnosis (%)	18.8
CCR (%)	82.2

CCR, correctly classified rate; CI, confidence interval.

Table 2 Accuracy of the Heartbeats algorithm

Test criterion	Value % (95% CI)		
	1-min analysis	3-min analysis	5-min analysis
Sensitivity (%)	89.9 (85.5–93.4)	91.3 (86.5–94.7)	91.5 (85.9–95.4)
Specificity (%)	99.1 (97.5–99.8)	98.7 (96.7–99.6)	99.6 (97.8–100)
No diagnosis (%)	6.7	13	32.2
CCR (%)	88.8	77.6	60.9

CCR, correctly classified rate; CI, confidence interval.



Chan, Circulation 2017

A.1: Conventional lead-I placement

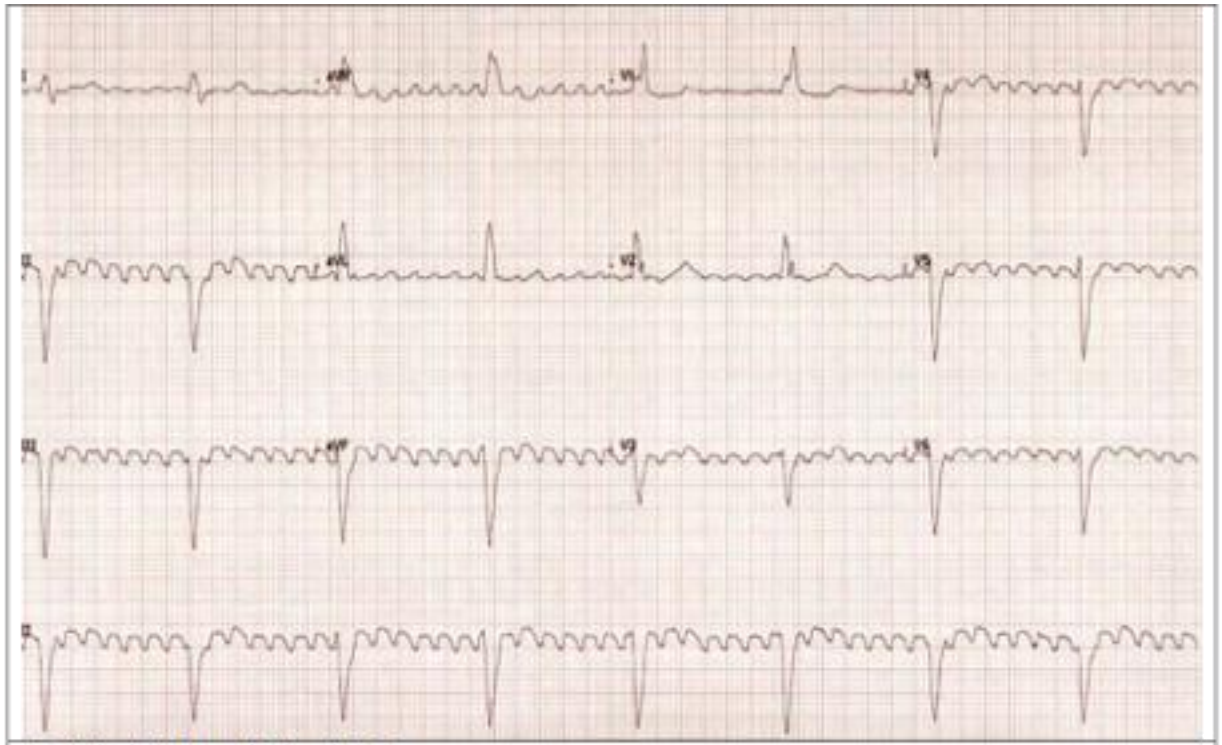
A.2: Direction of ECG vector using standard lead-I positioning

A.3: Modified lead-II placement (electrode facing upright)

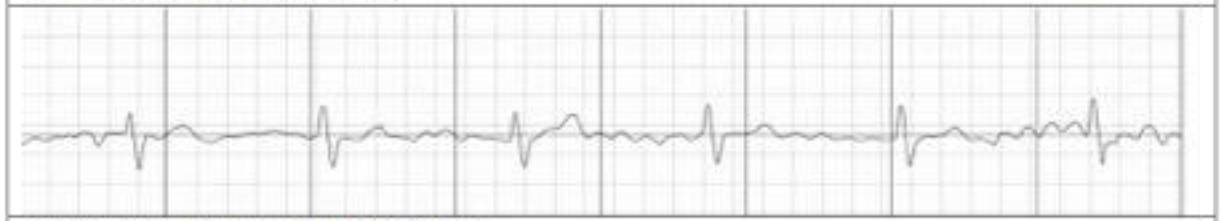
A.4: Direction of ECG vector using modified lead-II positioning

Fig. A. Lead-I vs lead-II positioning of AliveCor Kardia Mobile.

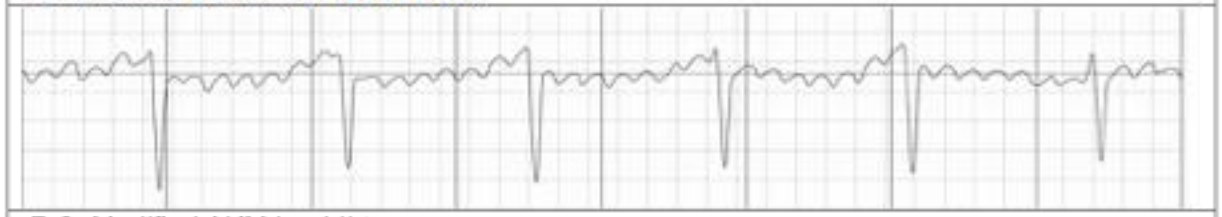
Rajakayar, journal of Electrocardiology, 2019



B.1: Atrial flutter 12-lead ECG



B.2: Conventional AKM lead-I trace



B.3: Modified AKM lead-II trace

Rajakayar, journal of Electrocardiology, 2018

ORIGINAL RESEARCH ARTICLE

Diagnostic assessment of a deep learning system for detecting atrial fibrillation in pulse waveforms

Ming-Zher Poh,[1] Yukkee Cheung Poh,[1] Pak-Hei Chan,[2] Chun-Ka Wong,[2] Louise Pun,[3] Wangie Wan-Chiu Leung,[3] Yu-Fai Wong,[3] Michelle Man-Ying Wong,[3] Daniel Wai-Sing Chu,[3] Chung-Wah Siu[2]

Poh, Heart, 2018

Photoplethysmographie PPG

- Normalement artisanal.
- intervalle entre les battements.
  - irrégularité
- Vs Deep learning.
  - 186317 segments PPG
    - FA, bruit, RSR et Rythme ectopique.

Photoplethysmographie PPG

- Comparer à des ECG une dérivation
  - ALIVE COR
- 2 Cardiologues indépendants.
- 2.8% de fa, confirmé avec un 12 dérivations.

Table 3 DCNN performance for detection of AF versus several state-of-the-art AF detectors on the MOBILE-SCREEN-AF (clinical validation) data set

	Single measurement, % (95% CI)				Triplicate measurements, % (95% CI)			
Method	Sensitivity	Specificity	PPV	NPV	Sensitivity	Specificity	PPV	NPV
CoSEn[6]	88.1 (79.2 to 94.1)	81.9 (80.5 to 83.3)	12.2 (11.0 to 13.4)	99.6 (99.3 to 99.8)	**100.0** (87.7 to 100)	84.7 (82.3 to 86.9)	15.6 (13.8 to 17.7)	**100.0** (99.4 to 100)
Poincaré plot[8]	92.9 (85.1 to 97.3)	82.8 (81.4 to 84.2)	13.3 (12.2 to 14.5)	99.8 (99.5 to 99.9)	**100.0** (87.7 to 100)	85.8 (83.5 to 87.9)	16.7 (14.6 to 18.9)	**100.0** (99.4 to 100)
nRMSSD + ShEn[7]	84.5 (75.0 to 91.5)	88.4 (87.2 to 89.5)	17.1 (15.3 to 19.1)	99.5 (99.2 to 99.7)	92.9 (76.5 to 99.1)	91.0 (89.0 to 92.7)	22.6 (18.9 to 26.8)	99.8 (99.2 to 99.9)
nRMSSD + SD1/SD2[8]	90.5 (82.1 to 95.8)	88.9 (87.7 to 90.0)	18.8 (17.0 to 20.8)	99.7 (99.4 to 99.8)	96.4 (81.7 to 99.9)	92.2 (90.3 to 93.8)	26.0 (21.9 to 30.5)	99.9 (99.3 to 100)
CoV[9]	**96.4** (89.9 to 99.3)	88.5 (87.3 to 89.6)	19.2 (17.6 to 21.0)	**99.9** (99.7 to 100)	**100.0** (87.7 to 100)	91.1 (89.1 to 92.8)	24.1 (20.7 to 28.0)	**100.0** (99.4 to 100)
Ensemble	90.5 (82.1 to 95.8)	90.3 (89.2 to 91.3)	20.9 (18.9 to 23.2)	99.7 (99.4 to 99.9)	**100.0** (87.7 to 100)	92.5 (90.7 to 94.1)	27.5 (23.3 to 32.0)	**100.0** (99.4 to 100)
SVM[10]	90.5 (82.1 to 95.8)	96.1 (95.3 to 96.8)	39.6 (35.1 to 44.2)	99.7 (99.5 to 99.9)	92.9 (76.5 to 99.1)	97.7 (96.5 to 98.5)	53.1 (42.7 to 63.2)	99.8 (99.2 to 100)
DCNN	95.2 (88.3 to 98.7)	**99.0** (98.6 to 99.3)	**72.7** (65.1 to 79.3)	**99.9** (99.7 to 100)	**100.0** (87.7 to 100)	**98.6** (98.0 to 99.0)	**87.5** (72.5 to 94.5)	**100.0** (99.4 to 100)

AF, atrial fibrillation; CoSEn, coefficient of sample entropy; CoV, coefficient of variation; DCNN, deep convolutional neural network; NPV, negative predictive value; nRMSSD, normalised root mean square of successive differences; PPV, positive predictive value; SD1/SD2, Poincaré plot geometry; ShEn, Shannon entropy; SVM, support vector machine. The highest score among all detectors is indicated in bold.

Poh, Heart, 2018

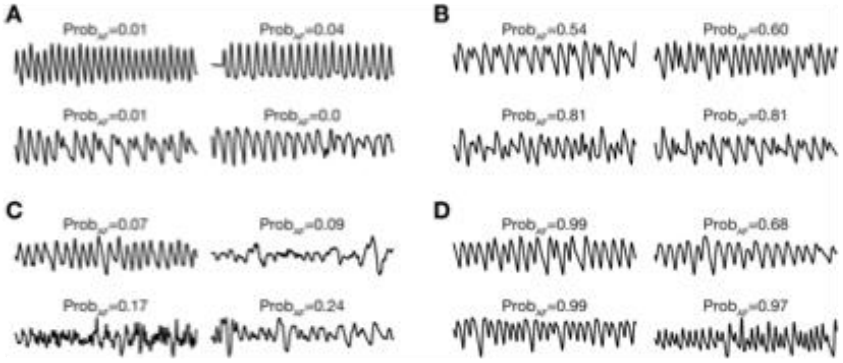


Figure 4 Example of pulse waveforms correctly and incorrectly classified by the DCNN. Examples of (A) true negatives, (B) false positives, (C) false negatives and (D) true positives, along with the probability of AF being present in the pulse waveform produced by the deep learning model ($Prob_{AF}$). AF, atrial fibrillation; DCNN, deep convolutional neural network.

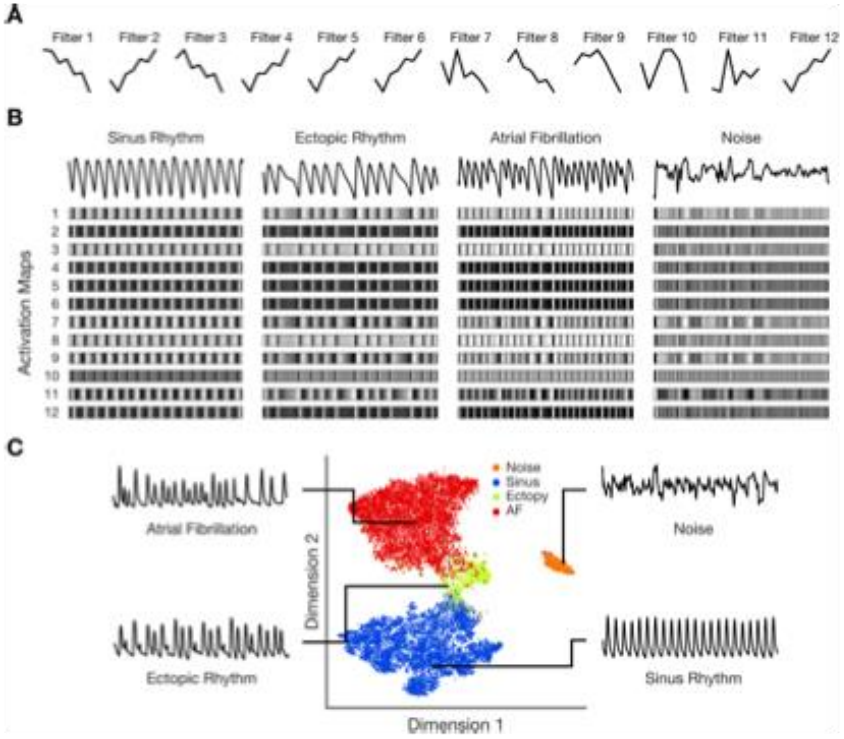


Figure 5 Visualising what the DCNN learns. (A) Learnt filters (first-layer weights) of the DCNN. (B) Layer activations. Examples of how pulse waveforms from the four different rhythm classes activate the neurons of the first convolutional layer of the DCNN. The activation maps represent the result of applying the learnt filters to the input pulse waveform. The position of a pixel in the activation map corresponds to the same position in the corresponding pulse waveform. White pixels represent strong positive activations, while black pixels represent strong negative activations at

Poh, Heart, 2018

1+1=2?

- ESV et classe 1c
- Plus de fa, plus d'ACO?
- Risque d'ACV moins grand avec fardeau plus petit.
- Probablement travailler sur autres facteurs également
  - hta, obésité, apnée du sommeil

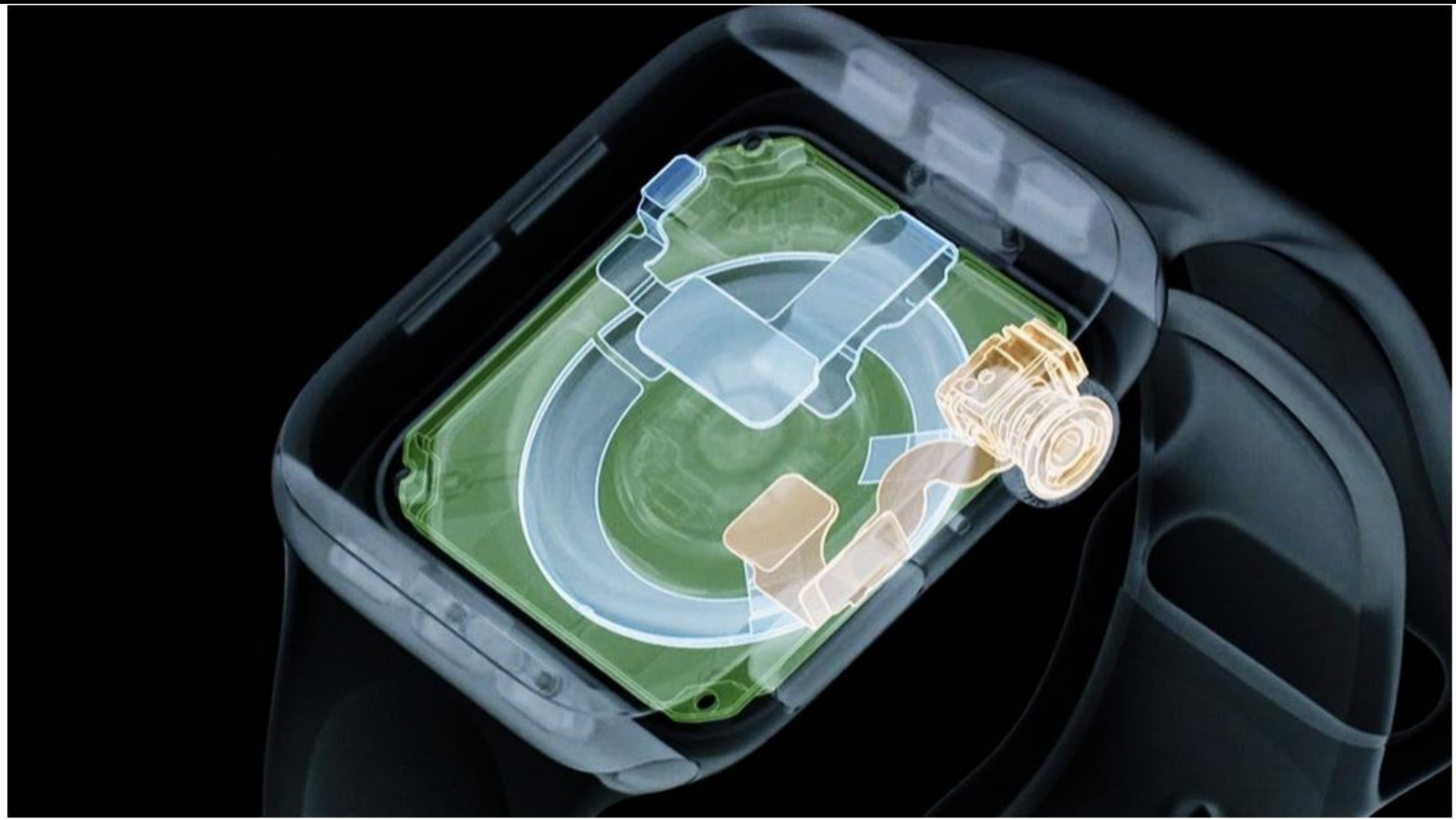
CHUM

1+1=2?

- Besoin d’étude randomisé
- Approche individualisée

CHUM


ECG
10:09
Sinus Rhythm
76 BPM AVERAGE
This ECG does not show signs of atrial fibrillation.
ECG
10:09
Hold your finger on the crown.
76 BPM
10:09
22sec
It helps to rest your arms on a table or your legs.



New Apple Apps: Overdiagnosis, Useful Addition, or Both?

Patrice Wendling

September 14, 2018