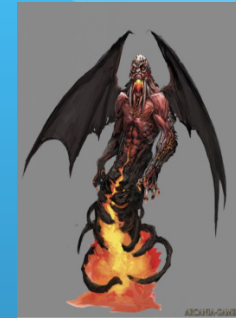


Investigations cardiaques et AVC-AIT

Jean-Martin Boulanger
Neurologue Hôpital Charles-Lemoyne
Septembre 2014

**BI, Sanofi-Aventis,
BMS, Roche, Bayer,
Novartis, Solvay,
Allergan, Merz,
Octa-Pharma,
Servier**



Objectifs-Plan

- Savoir rechercher de façon optimale les anomalies structurales emboligènes du cœur et de l'aorte;
- Déterminer l'investigation optimale des arythmies cardiaques emboligènes en post AVC- AIT;
- Définir le type de patients susceptible de bénéficier d'une investigation cardiaque en post AVC-ICT.

Étiologie des AVC et ICT

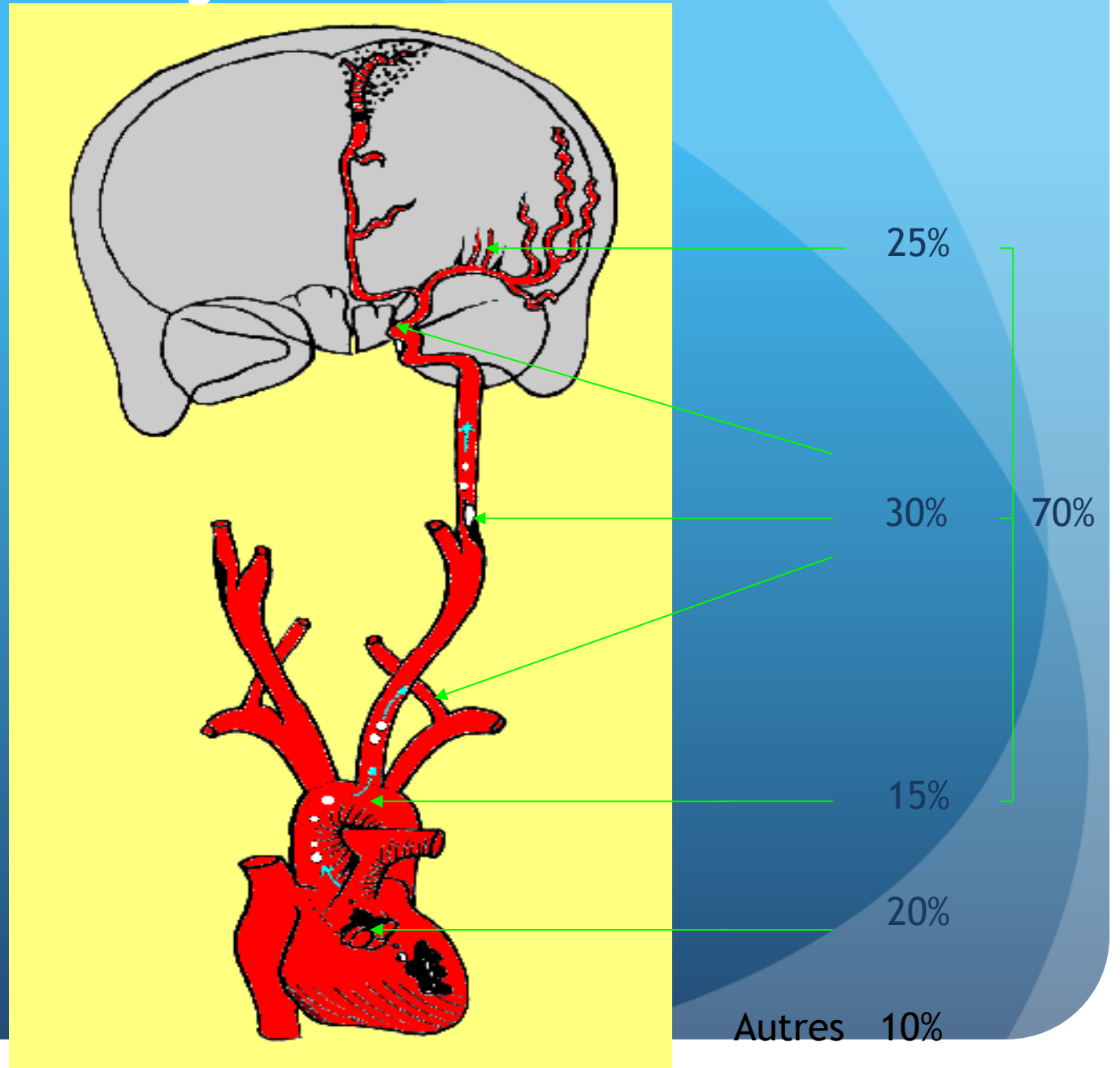


Table 1. Cardioembolic sources and embolic risk

High risk

Atrial

Atrial fibrillation
Sustained atrial flutter
Sick sinus syndrome
Left atrial thrombus
Left atrial appendage thrombus
Left atrial myxoma

Valvular

Mitral stenosis
Prosthetic valve
Infective endocarditis
Non-infective endocarditis

Ventricular

Left ventricular thrombus
Left ventricular myxoma
Recent anterior myocardial infarct
Dilated cardiomyopathy

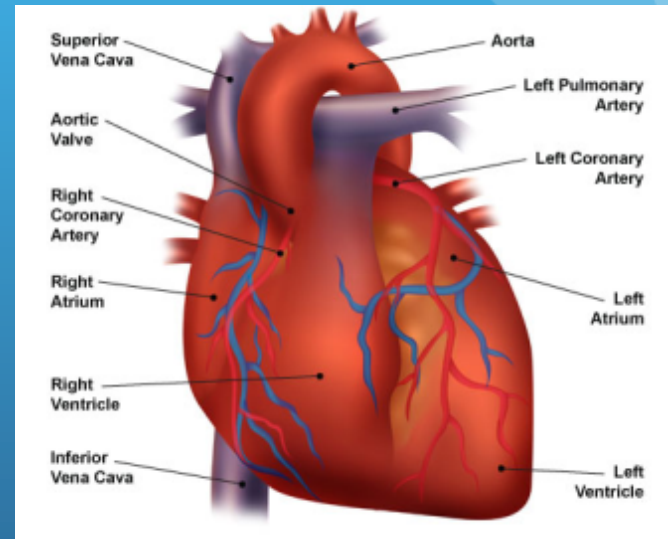
Low/uncertain risk

Patent foramen ovale
Atrial septal aneurysm
Atrial auto-contrast

Mitral annulus calcification
Mitral-valve prolapse
Calcified aortic stenosis
Fibroelastoma
Giant Lambl's excrescences

Akinetic/dyskinetic ventricular wall segment
Subaortic hypertrophic cardiomyopathy
Congestive heart failure

Investigations cardiaques post AVC-ICT

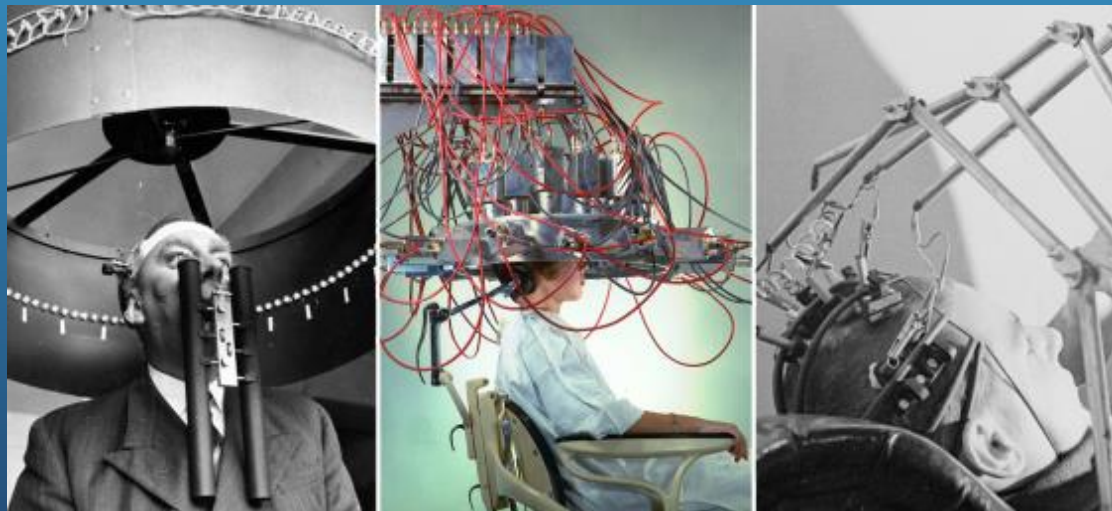


Cas clinique

- Homme 82 ans
- Épisode transitoire d'aphasie
- AP: HTA-MCAS -AVC cérébelleux
- IRM
 - Ancien AVC cérébelleux
 - Pluie de lésions DWI territoire ACM gauche
- Doppler -, ECG - , ETT N...

Questions?

- Indice de « cardioembolicité » d'un AVC-ICT?
- Utilité de l'échographie cardiaque?
 - ETT vs ETO?
- Utilité des ECG sériés vs holter vs monitoring?
- Rôle de l'enregistrement prolongé?



Bof...

Panel 1. Features suggestive of cardioembolic stroke

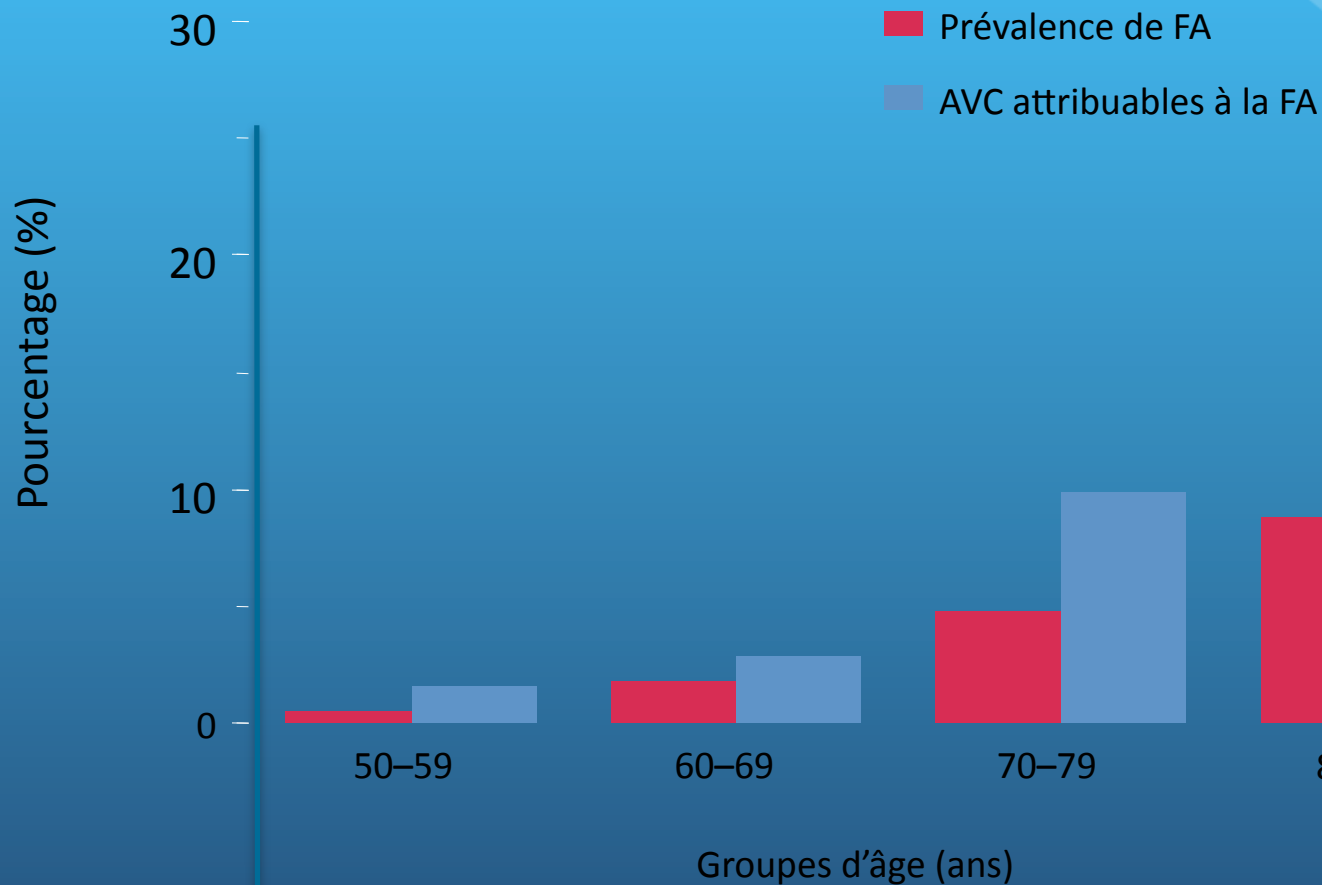
Clinical

- Decreased consciousness at onset
- Sudden onset to maximal defect
- Visual-field defect, neglect, or aphasia
- Rapid regression of symptoms

CT or MRI

Étude Framingham

Risque attribuable d'AVC



Troponin Elevation Predicts Atrial Fibrillation in Patients with Stroke or Transient Ischemic Attack

Isabelle Beaulieu-Boire, MD,* Nancy Leblanc, MSc,† Léo Berger, MD, FRCPC,†
and Jean-Martin Boulanger, MD, FRCPC†

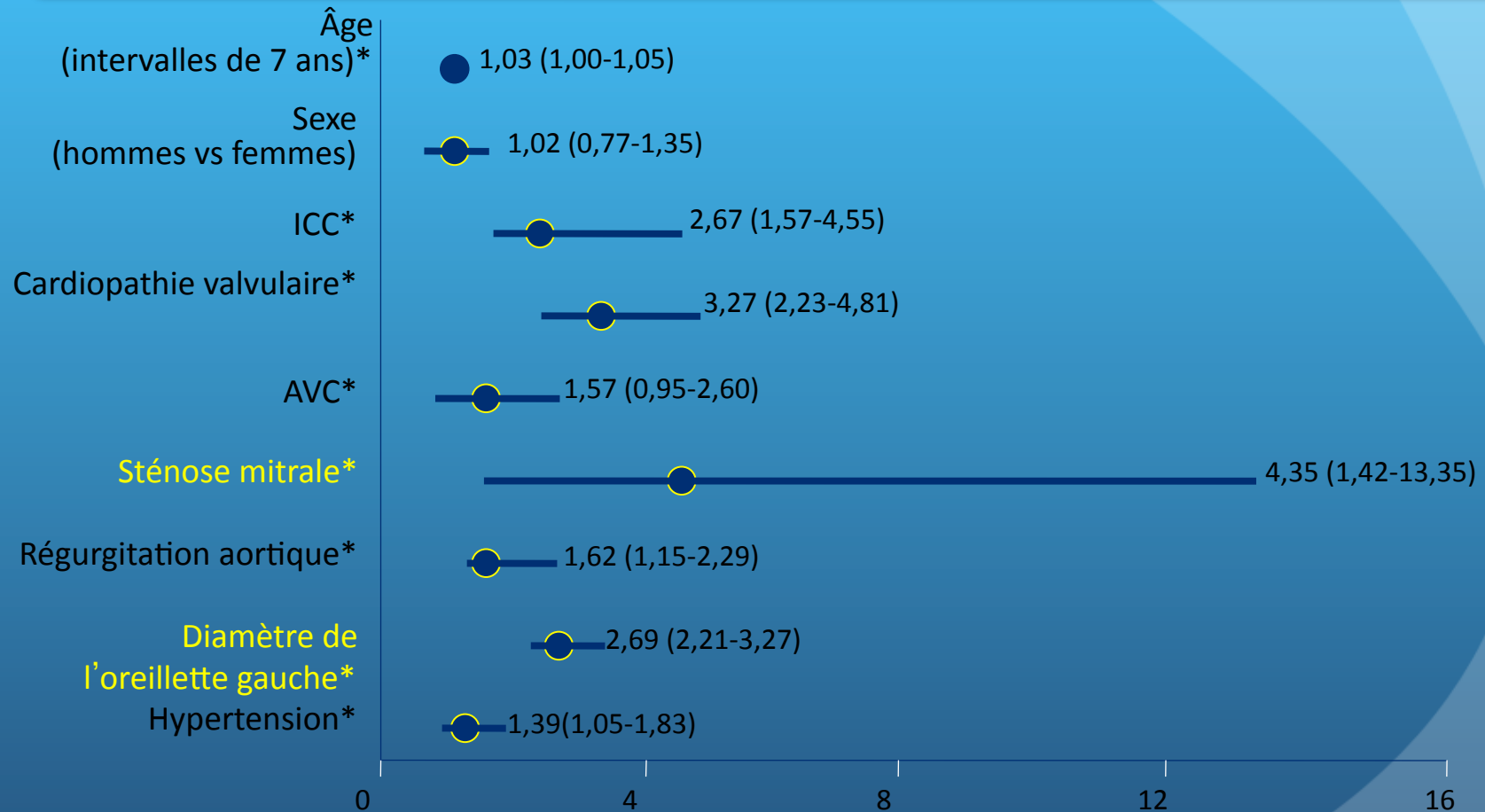
Table 2. Atrial fibrillation on electrocardiogram or Holter monitoring

	Normal troponin, ≤0.03 ug/L (n = 362)	Elevated troponin, >0.03 ug/L (n = 46)	P value
New-onset AF on 24-hour Holter, % (n)*	4.8 (12/250)	21.4 (6/28)	.0028
AF on baseline ECG, % (n)	6.4 (23/362)	21.7 (10/46)	.0009
AF on 24-hour Holter, % (n)	5.9 (15/253)	29.0 (9/31)	.0001
AF on baseline ECG or 24-hour Holter, % (n)	9.7 (35/362)	34.7 (16/46)	.0001

Abbreviations: AF, atrial fibrillation; ECG, electrocardiogram.

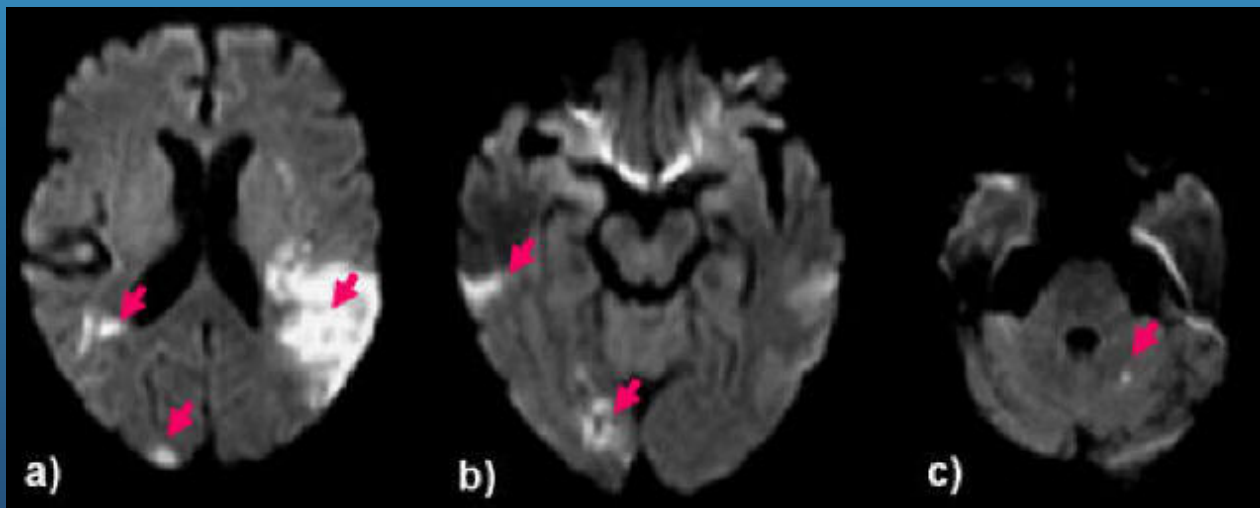
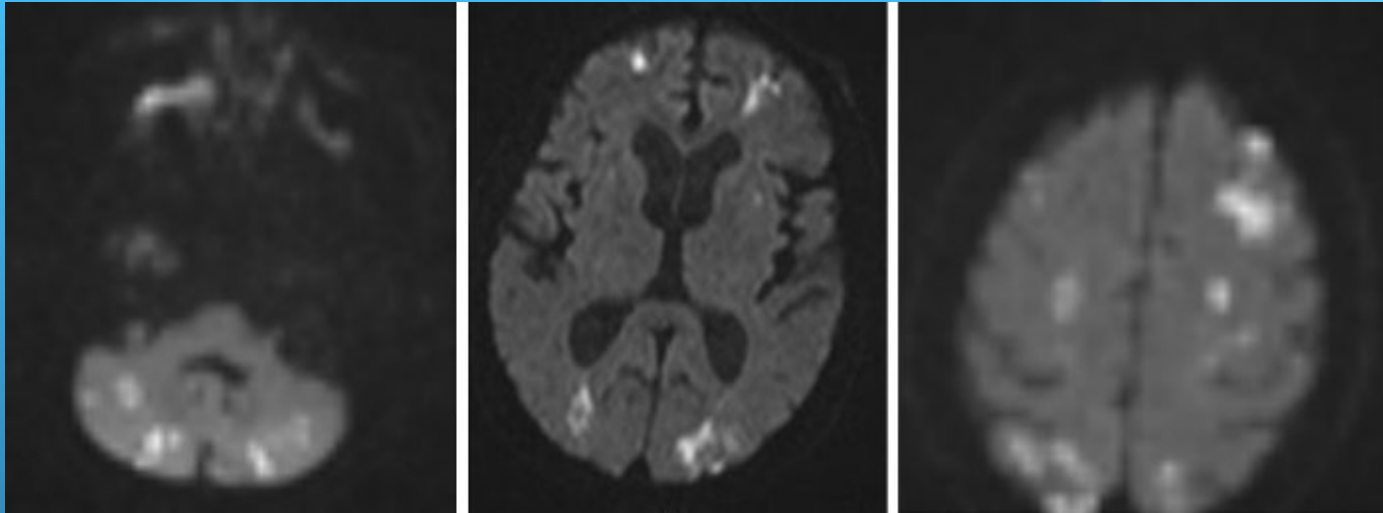
*AF on Holter monitoring in patients without AF on the baseline ECG.

Facteurs de risque de FA



* $p < 0,05$; IC 95 %

In MRI veritas...

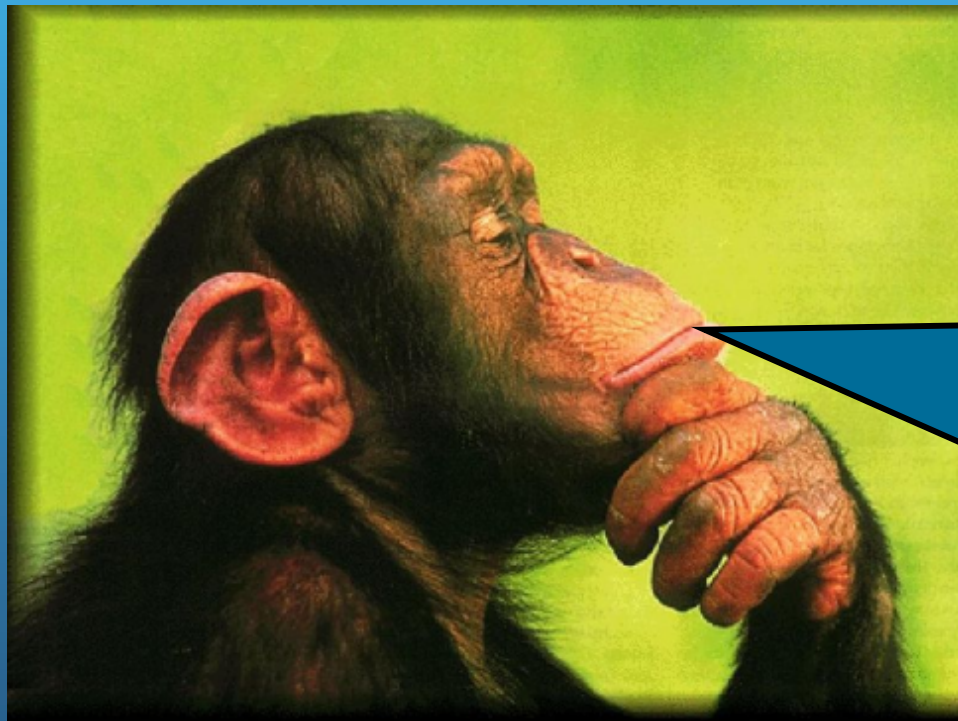


Identification of Embolic Stroke Patterns by Diffusion-Weighted MRI in Clinically Defined Lacunar Stroke Syndromes

Tiemo Wessels, MD; Carina Röttger, MD; Marek Jauss, MD;
Manfred Kaps, MD; Horst Traupe, MD; Erwin Stolz, MD

- *Lacune* = <1.5 cm
- *Syndromes lacunaires cliniques*:
 - 59% ont une image lacunaire classique
 - 22% ont des lésions dispersées dans un territoire vasculaire ou ont une lésion >1.5cm
 - 19% ont plusieurs lésions dans plusieurs territoires vasculaires

Durée du monitoring cardiaque



Combien de temps doit-on enregistrer ce foutu rythme cardiaque?

The longer the better...but how much longer....???

Improved Detection of Silent Atrial Fibrillation Using 72-Hour Holter ECG in Patients With Ischemic Stroke

A Prospective Multicenter Cohort Study

Martin Grond, MD; Marek Jauss, MD; Gerhard Hamann, MD; Erwin Stark, MD; Roland Veltkamp, MD; Darius Nabavi, MD; Markus Horn, MD; Christian Weimar, MD; Martin Köhrmann, MD; Rolf Wachter, MD; Ludger Rosin, MD; Paulus Kirchhof, MD, FESC

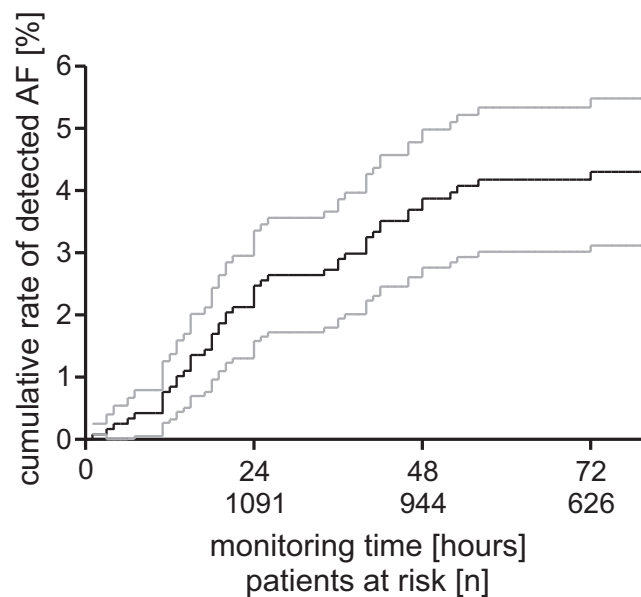


Figure 2. Kaplan–Meier survival data analysis of cumulative monitoring time for each patient on the x axis, and risk of atrial fibrillation (AF) in the study cohort at this time point given is in percentage on the y axis. Gray lines indicate the 95% confidence interval.

Detection of Atrial Fibrillation With Concurrent Holter Monitoring and Continuous Cardiac Telemetry Following Ischemic Stroke and Transient Ischemic Attack

Marc A. Lazzaro, MD,* Kousik Krishnan, MD,† and Shyam Prabhakaran, MD, MS*

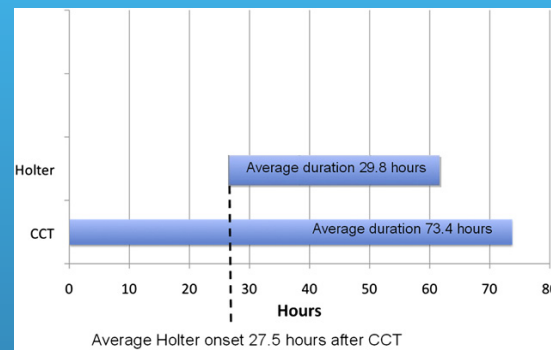


Figure 2. Durations and overlap of Holter monitoring and CCT.

Table 2. Comparison of abnormal cardiac rhythm detection rates

	Holter monitoring, n (%) [95% CI]	CCT, n (%) [95% CI]	P value
AF			
Ischemic stroke and TIA (n = 133)	8 (6.0%) [2.9-11.6]	0 [0-3.4]	.008
Ischemic stroke only (n = 101)	7 (6.9%) [3.2-13.9]	0 [0-4.4]	.016
Embolic topography (n = 75)*	7 (9.3%) [4.3-18.3]	0 [0-5.8]	.016
Cryptogenic stroke (n = 53)	5 (9.4%) [3.6-20.3]	0 [0-7.9]	.063
Age >65 years (n = 61)	7 (11.5%) [5.4-22.1]	0 [0-7.1]	.016
Coronary artery disease (n = 25)	4 (16.0%) [5.8-35.3]	0 [0-15.8]	.125
Embolic topography or age >65 (n = 86)	8 (9.3%) [4.6-17.5]	0 [0-5.1]	.008
Embolic topography and age >65 (n = 38)	6 (15.8%) [7.1-30.1]	0 [0-10.1]	.031
Embolic topography and age >65 or CAD (n = 38)	7 (18.4%) [8.9-33.7]	0 [0-10.9]	.016
NSVT			
Ischemic stroke and TIA (n = 133)	11 (8.3%) [4.5-14.3]	7 (5.3%) [3.8-8.7]	.180

*Includes those with cortical, multiple, or mixed cortical/subcortical patterns.

Detection of paroxysmal atrial fibrillation with transtelephonic EKG in TIA or stroke patients



ABSTRACT

Background: Paroxysmal atrial fibrillation (PAF) may remain underdiagnosed after stroke, as suggested by long-duration EKG monitoring. Here we report the sensitivity of transtelephonic EKG monitoring (TTM) for detection of PAF in patients following a recent stroke or TIA and a negative 24-hour Holter.

Methods: We analyzed data from 98 consecutive patients with TTM and noncardioembolic TOAST stroke (n = 78) or TIA (n = 20). Most were cryptogenic events (82%). Patients started TTM 0.8 months (interquartile range 0.4-2.5) after the indexed event and randomly recorded about 1 EKG per day for 1 month. Univariate and multivariate analyses were run to identify PAF predictors.

Results: Seventeen PAF episodes were detected in 9.2% (9/98) of the patients. The estimated duration of PAF episodes ranged from 4 to 72 hours. Two predictors were identified: premature atrial ectopic beats (more than 100) in 24-hour routine Holter (odds ratio [OR] = 11.0; 95% confidence interval [CI] 1.9-62; p = 0.007) and nonlacunar anterior circulation DWI hypersignals (OR = 9.9; 95% CI 1.1-90.6; p = 0.04). The PAF detection rate varied from 42.6% for patients meeting both criteria to 0% for patients with neither of them.

Conclusions: Transtelephonic EKG monitoring increases detection rate of paroxysmal atrial fibrillation in stroke and TIA patients whose 24-hour Holter result was negative, especially if they had frequent premature atrial ectopic beats, recent anterior circulation infarct on MRI, or both.

Neurology® 2010;74:1666-1670

Detection of Atrial Fibrillation After Ischemic Stroke or Transient Ischemic Attack

A Systematic Review and Meta-Analysis

Amit Kishore, MRCP; Andy Vail, MSc; Arshad Majid, MD; Jesse Dawson, MD;
Kennedy R. Lees, MD; Pippa J. Tyrrell, MD; Craig J. Smith, MD

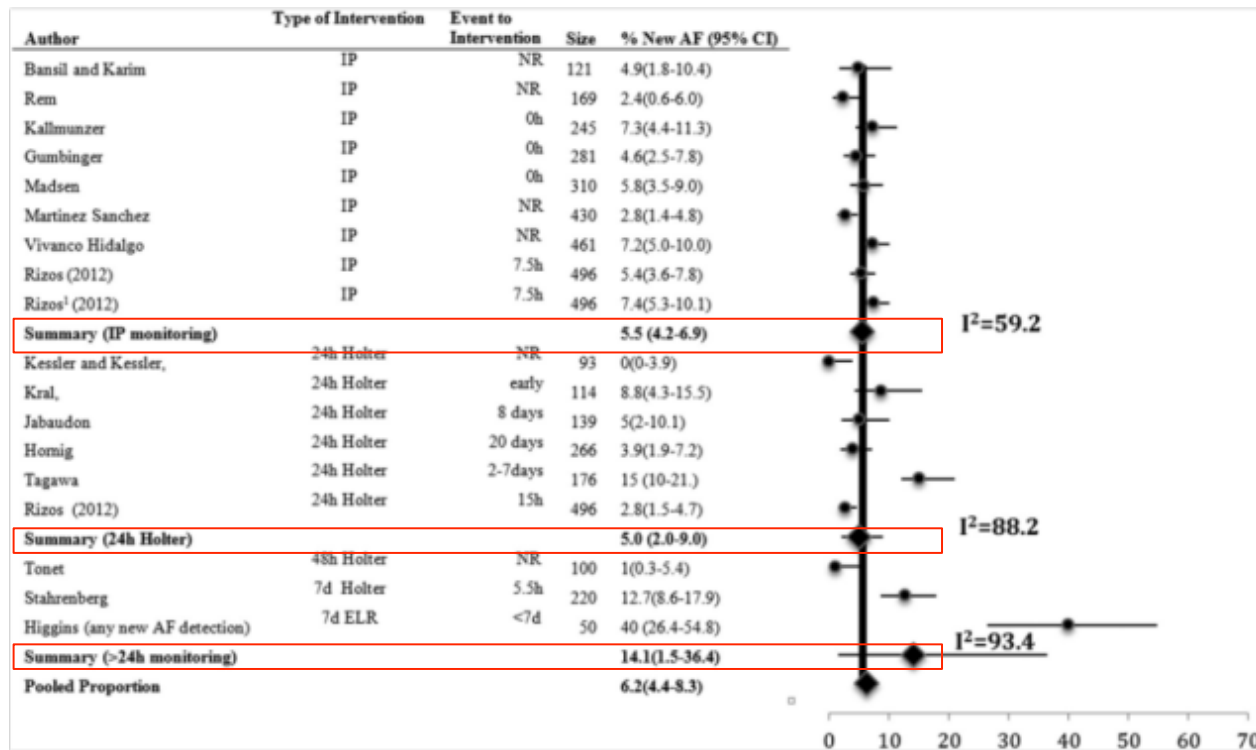
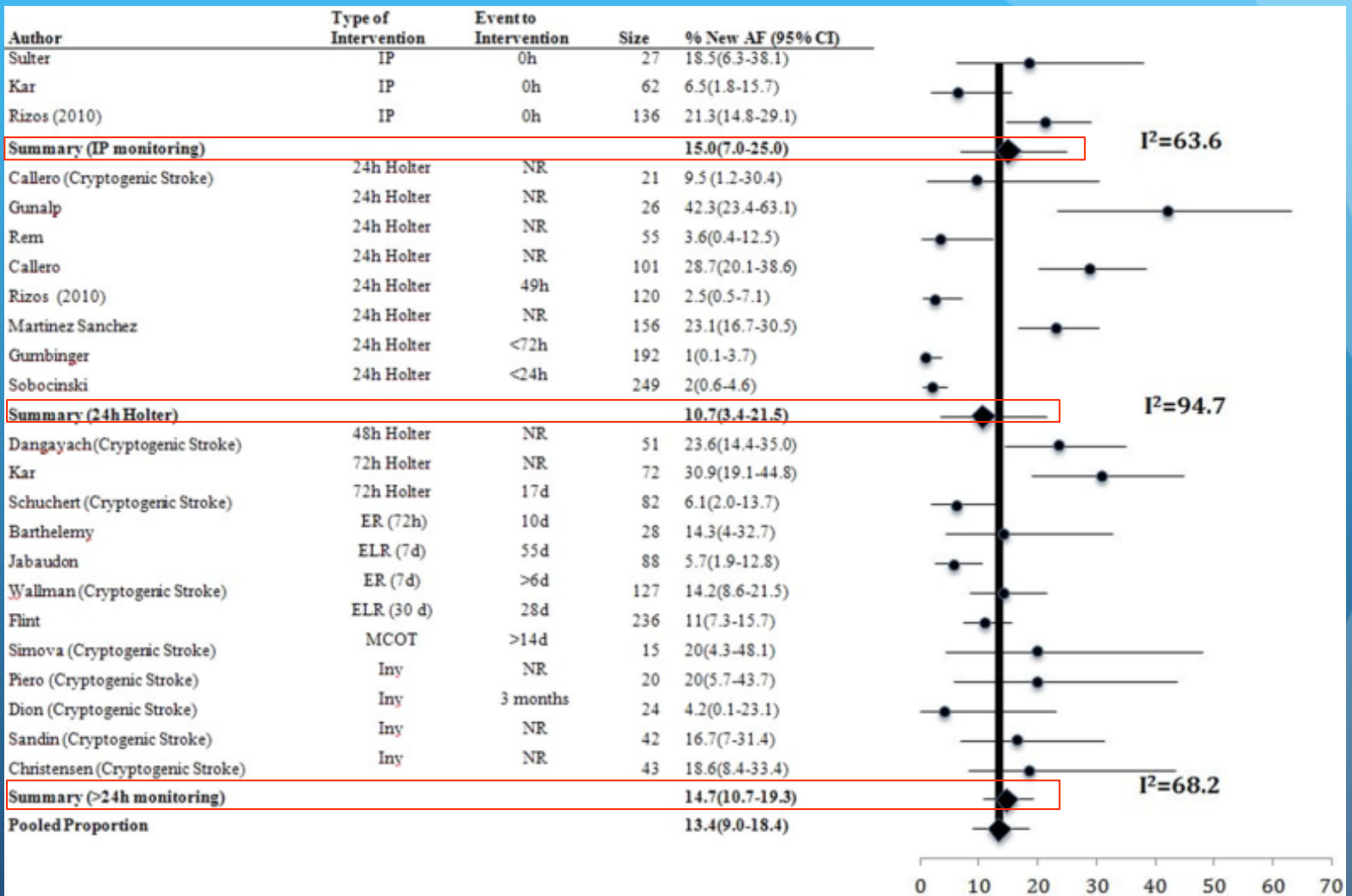


Figure 2. Forest plot unselected patient studies. AF indicates atrial fibrillation; CI, confidence interval; ELR, external loop recorder; IP, inpatient cardiac monitoring; and NR, not reported.

Patients sélectionnés



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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. Blakeley, 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

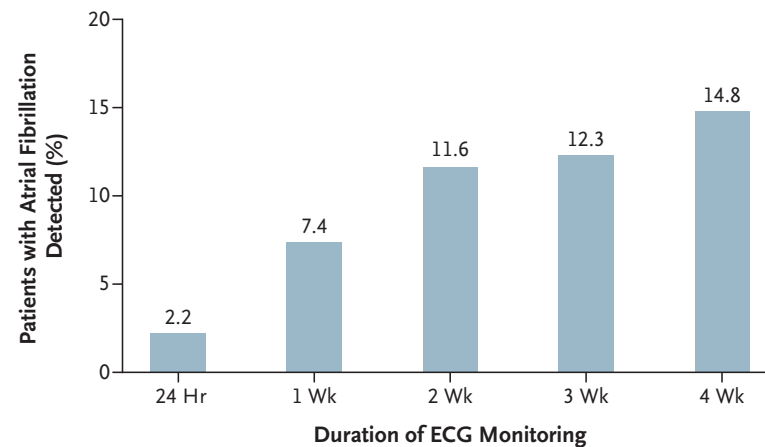


Figure 2. Incremental Yield of Prolonged ECG Monitoring for the Detection of Atrial Fibrillation in Patients with Cryptogenic Stroke or TIA.

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).

Plaque aortique et AVC...

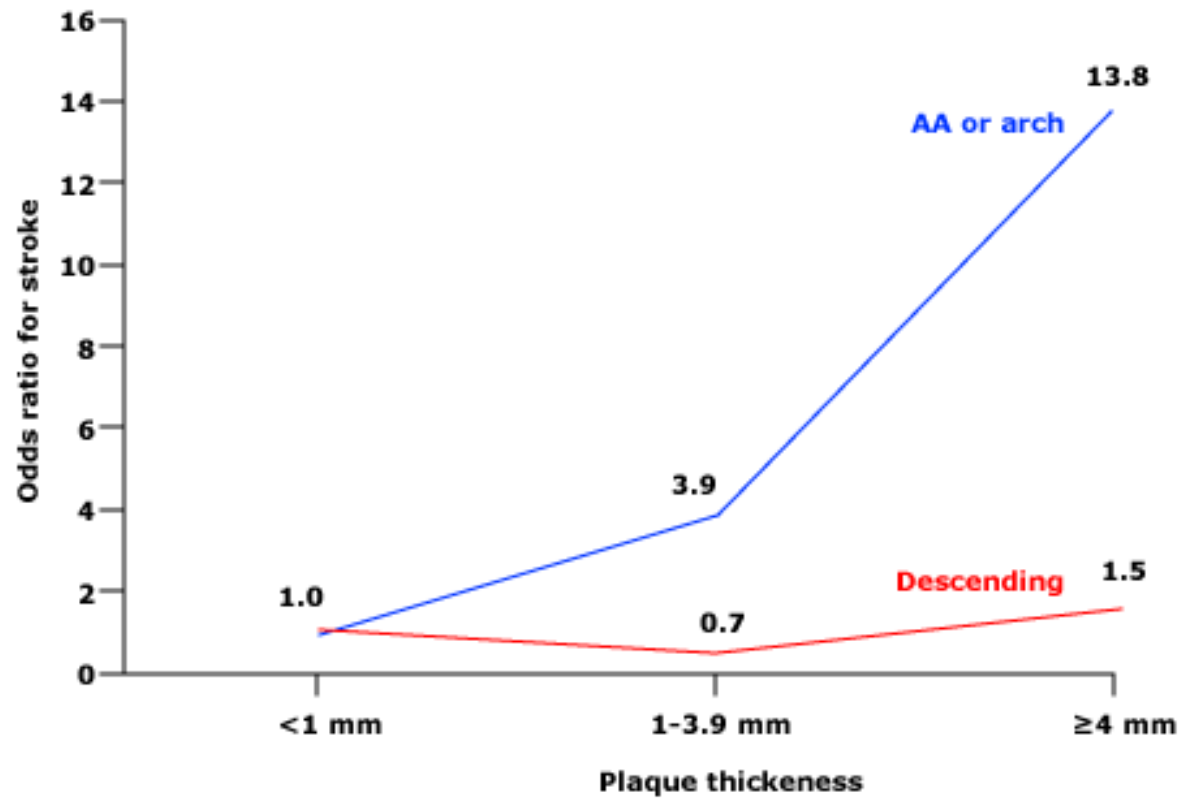


TABLE I

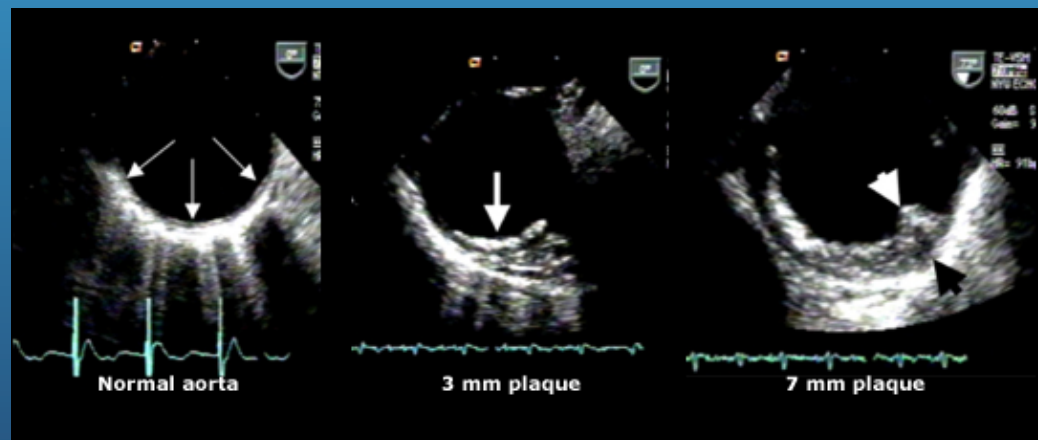
Characteristics of Complex and Simple Atheromatous Plaques

Complex Plaque:

- Protruding atheroma >4-mm thickness
- Presence of mobile components
- Presence of > 2-mm surface ulceration

Simple Plaque:

- Protruding atheroma <4-mm thickness
- No mobile debris
- No surface ulceration



Aortic Atherosclerotic Disease and Stroke
Itzhak Kronzon and Paul A. Tunick

Circulation. 2006;114:63-75

TABLE 2. Plaque Characteristics and Stroke Risk

Thickness, mm	<1	1–1.9	2–3.9	≥4
Risk, OR	1	3.3	4.1	13.8

Findings associated with high stroke risk

Thrombus (mobile or not)

Ulceration

Large lipid core (hypoechoic)

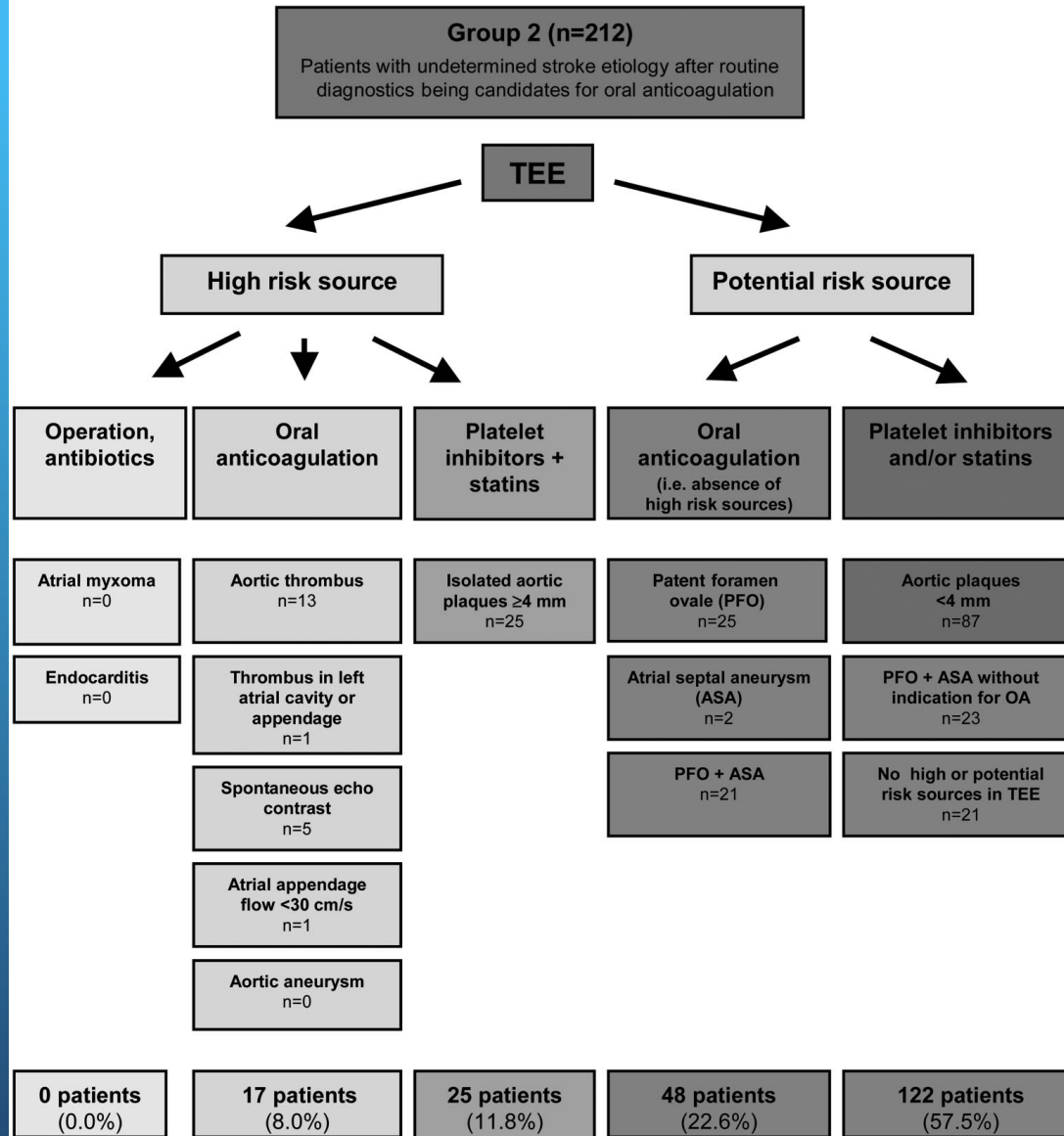
Finding associated with lower stroke risk

Plaque calcification (hyperechoic)

Data derived from Amarenco et al.¹²

Therapeutic Strategies After Examination by Transesophageal Echocardiography in 503 Patients With Ischemic Stroke

Andreas Harloff, MD; Michael Handke, MD; Matthias Reinhard, MD;
Annette Geibel, MD; Andreas Hetzel, MD



IRM cardiaque dans l'investigation de l'AVC ischémique...

On dirait qu'il n'y a pas grand-chose dans la littérature médicale là-dessus!



Figure 2. Apical infarct with LV thrombus. This contrast-enhanced two-chamber view was obtained from a patient with atrial fibrillation. There is a region of decreased signal in the apex that is due to LV thrombus (arrow). The region of infarction is not seen in this view. Also shown in this view is a LAA (arrowhead) with no thrombus.

Et t'as vraiment tout lu, incluant le très célèbre *Scandinavian Journal of small and medium size thrombi* ?

IRM cardiaque: Qui?

- Thrombus ventriculaire possible à l'ETO
- CI à l'ETO
- Masse cardiaque visualisée à l'ETO



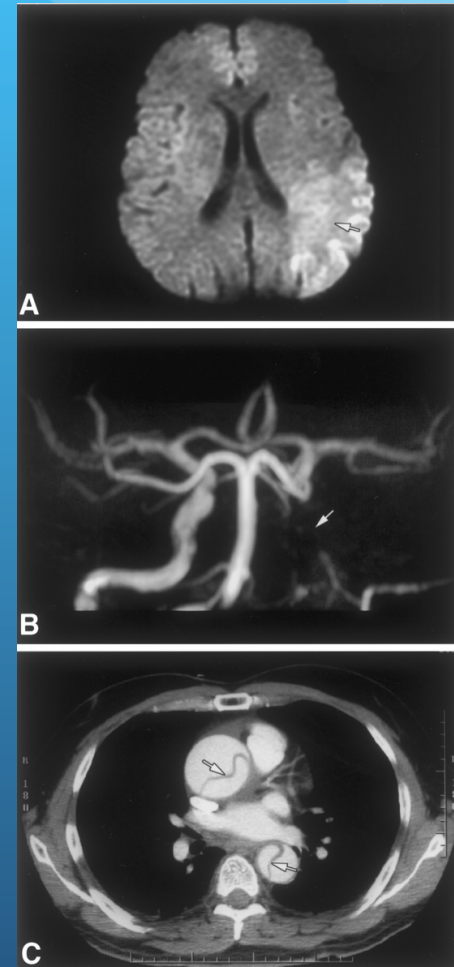
Figure 3. LAA thrombus. This contrast-enhanced two-chamber view shows a region of decreased signal in the LAA due to thrombus (arrow). The thrombus is attached to the roof of the appendage.



Figure 4. Aortic plaque. This contrast-enhanced image shows atherosclerotic plaque projecting 9 mm into the lumen of the proximal descending thoracic aorta (arrow). In addition, a thin layer of plaque can be seen extending proximally and distally along the arterial wall (arrowheads).

Angio-MRI ou angio-CT pour pathologies aortiques

- Dissection aortique
- Takayasu
- Plaque aortique



Dans la « vraie vie »

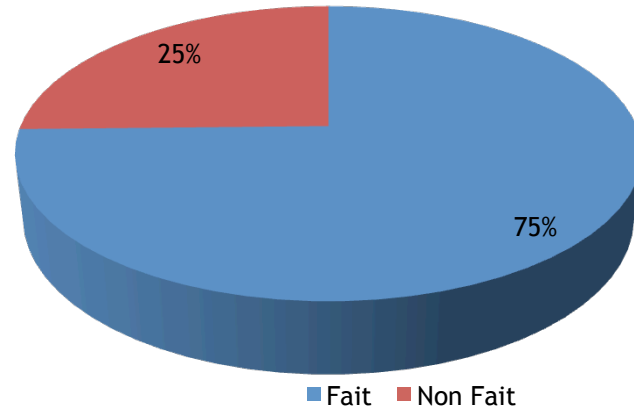
- Banque de données locale-HCLM



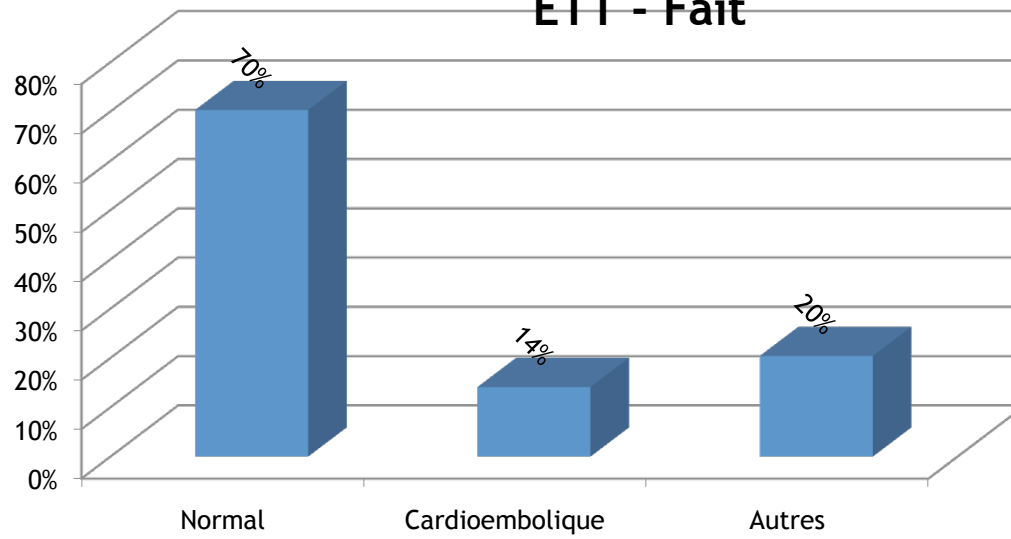
Un autre névrosé
qui veut parler de
son expérience...



ETT



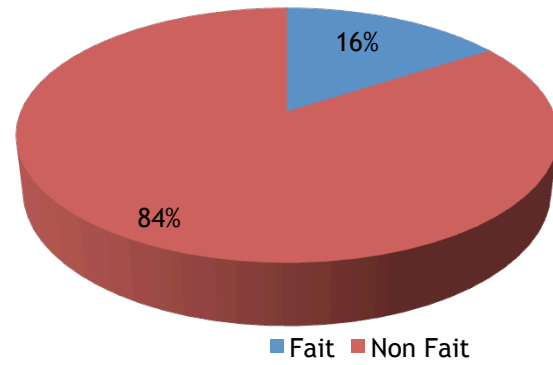
ETT - Fait



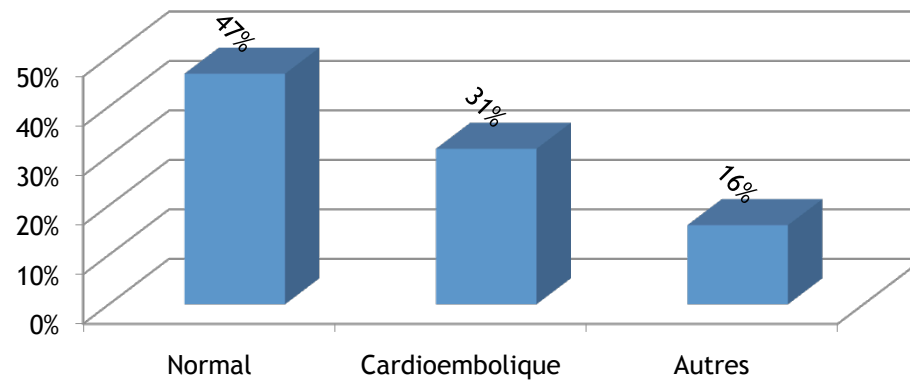
Sources cardioemboliques à l'ETT

- FA 56%
- Akinésie sévère 29%
- FEVG <30% 19%
- Foramen ovale 7%
- Valve mécanique 3%
- Thrombus 3%
- Végétations 2%
- Myxome de l'oreillette 0%

ETO



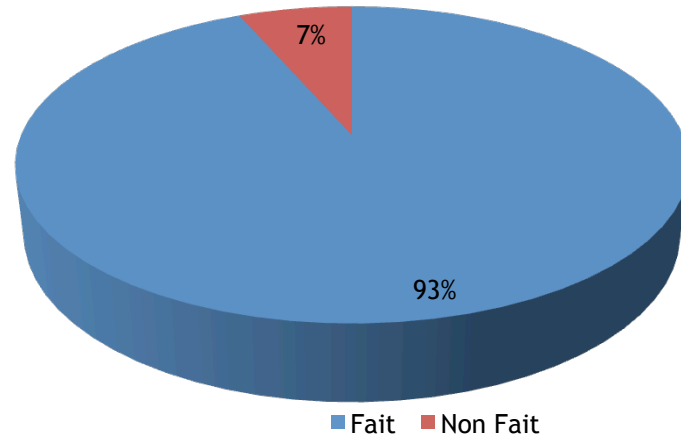
ETO - Fait



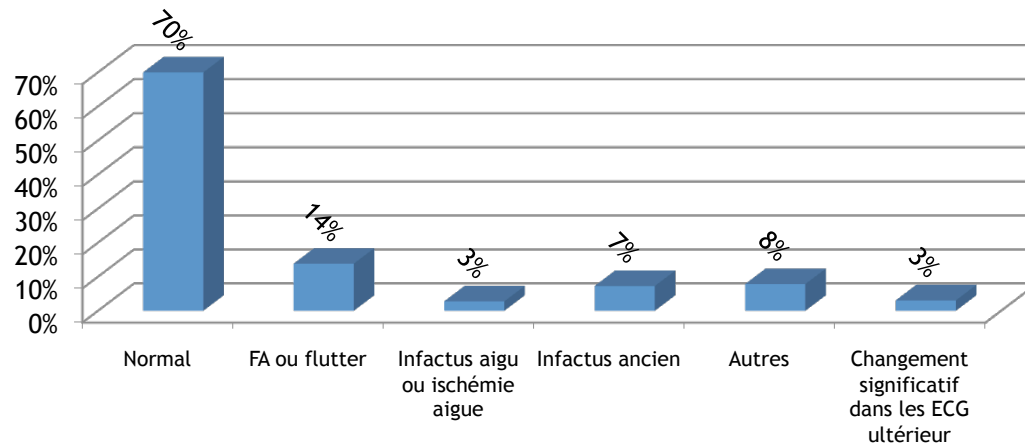
Sources cardioemboliques à l'ETO

- Foramen ovale 61%
- Végétations 10%
- FA 8%
- Thrombus 7%
- Akinésie sévère 6%
- FEVG <30% 4%
- Valve mécanique 3%
- Myxome de l'oreillette 1%

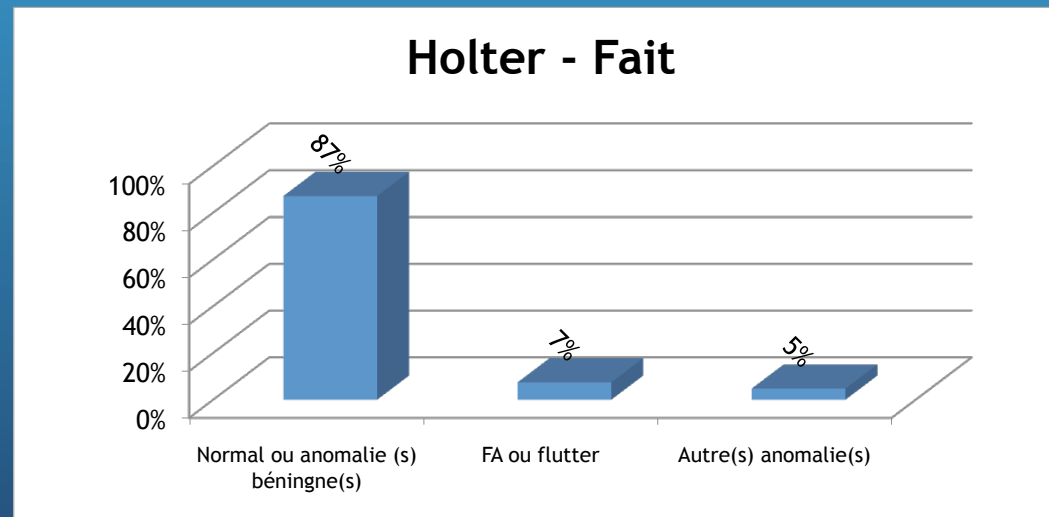
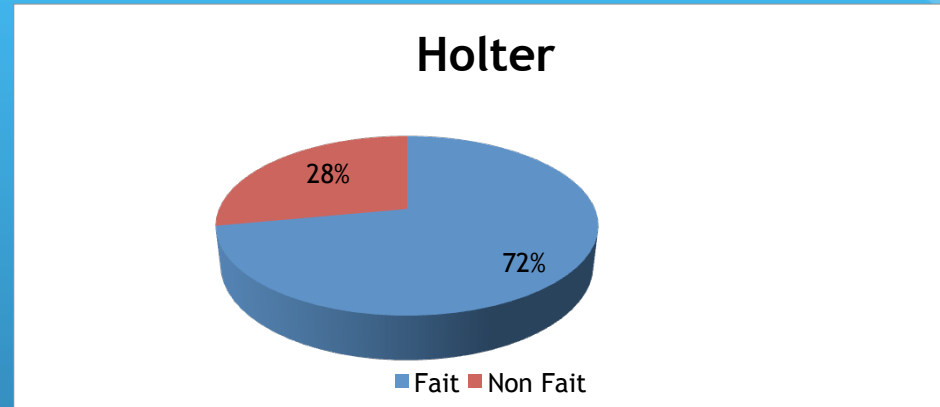
ECG



ECG - Fait



Population sans FA connue et sans FA à l'ECG au baseline



Guidelines....

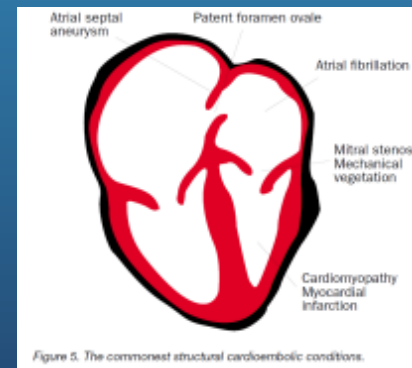
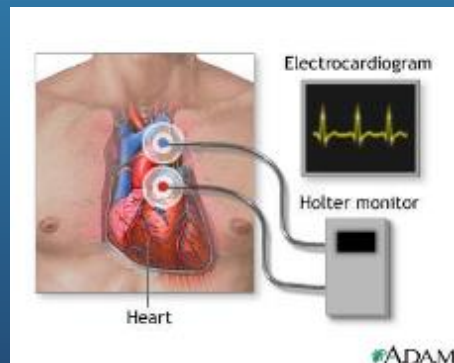
- Les recommandations sont des suggestions...
- Tout ne pas être « protocolé »

 Drive:	3,734 mi (about 29 days 6 hours)
1. Head south on Congress St toward Quaker Ln	0.1 mi
2. Turn left at Milk St	0.3 mi
3. Continue on Central St	0.1 mi
4. Turn right at Long Wharf	0.1 mi
5. Swim across the Atlantic Ocean Entering France	3,462 mi



3.3.3 : Investigations cardiovasculaires (Nouvelle section en 2010)

- i. Après l'électrocardiogramme initial, des électrocardiogrammes en série (p. ex., quotidiens) devraient être effectués au cours des 72 premières heures après l'AVC afin de dépister la fibrillation auriculaire (FA) et les autres arythmies aiguës [niveau de preuve B].
- ii. Les électrocardiogrammes en série durant les 72 premières heures combinés à un moniteur Holter durant la période d'hospitalisation peuvent être envisagés afin de faciliter le dépistage de la FA [niveau de preuve C].²¹⁵
- iii. L'échocardiographie, soit 2D, soit transœsophagienne, devrait être envisagée pour les patients présumés victimes d'un AVC embolique, avec imagerie neurovasculaire normale chez qui il n'y a pas de contre-indications à l'anticoagulation [niveau de preuve B].



AHA/ASA Guideline

Guidelines for the Early Management of Patients With Acute Ischemic Stroke

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

*The American Academy of Neurology affirms the value of this guideline as an educational
tool for neurologists.*

*Endorsed by the American Association of Neurological Surgeons and Congress
of Neurological Surgeons*

Recommendations

- 1. Cardiac monitoring is recommended to screen for atrial fibrillation and other potentially serious cardiac arrhythmias that would necessitate emergency cardiac interventions. Cardiac monitoring should be performed for at least the first 24 hours (*Class I; Level of Evidence B*). (Revised from the previous guideline¹³)**

Guidelines for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists.

Endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons

AF Recommendations

- 1. For patients who have experienced an acute ischemic stroke or TIA with no other apparent cause, prolonged rhythm monitoring (≈ 30 days) for AF is reasonable within 6 months of the index event (*Class IIa; Level of Evidence C*). (New recommendation)**

Bottom line...



- ECG = tous
- Holter ou télémétrie 24h = minimum
- ETT = utilité moins claire mais recommandation pour l'ensemble des cas, peut-être sauf si:
 - AVC lacunaire prouvé à l'imagerie
 - Source carotidienne convaincante (encore là...)

ETO: Qui?

- Endocardite
- Lésion suspecte de thrombus à l'ETT
- Lésions multiples au CT ou à l'IRM
- AVC chez le jeune (moins de 60-65 ans) ou en absence de facteur de risque classique
- ATCD d'AVC chez un patient se présentant avec un nouvel AVC et sans explication

Monitoring cardiaque prolongé

Si...

- En absence de CI à l'ATC et sans cause définie
- MCAS
 - ECG anormal (infarctus ancien, ischémie aigu, BBG, etc)
 - Troponines élevés
- Valvulopathies (sténose mitrale++) ou dilatation de l'oreillette gauche
- Sx d'arythmie (ex: palpitations)
- Source cardiaque fortement suspectée cliniquement ou radiologiquement (ex:lésions de plus d'un territoire)

Le temps d'enregistrement dépend surtout...

- Des ressources locales et de l'aspect réaliste de la chose...un pacemaker n'est pas souhaitable pour tous!!!
- Monitoring externe = préférable
- 7j-30j me semble raisonnable...
- Surtout

Cardiac Event Recorder
with Atrial Fibrillation
Auto-Capture



**Merci de votre
attention !**