

Actualités sur le FOP

Relation FOP/AVC cryptogénique

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Jean-Michel Juliard

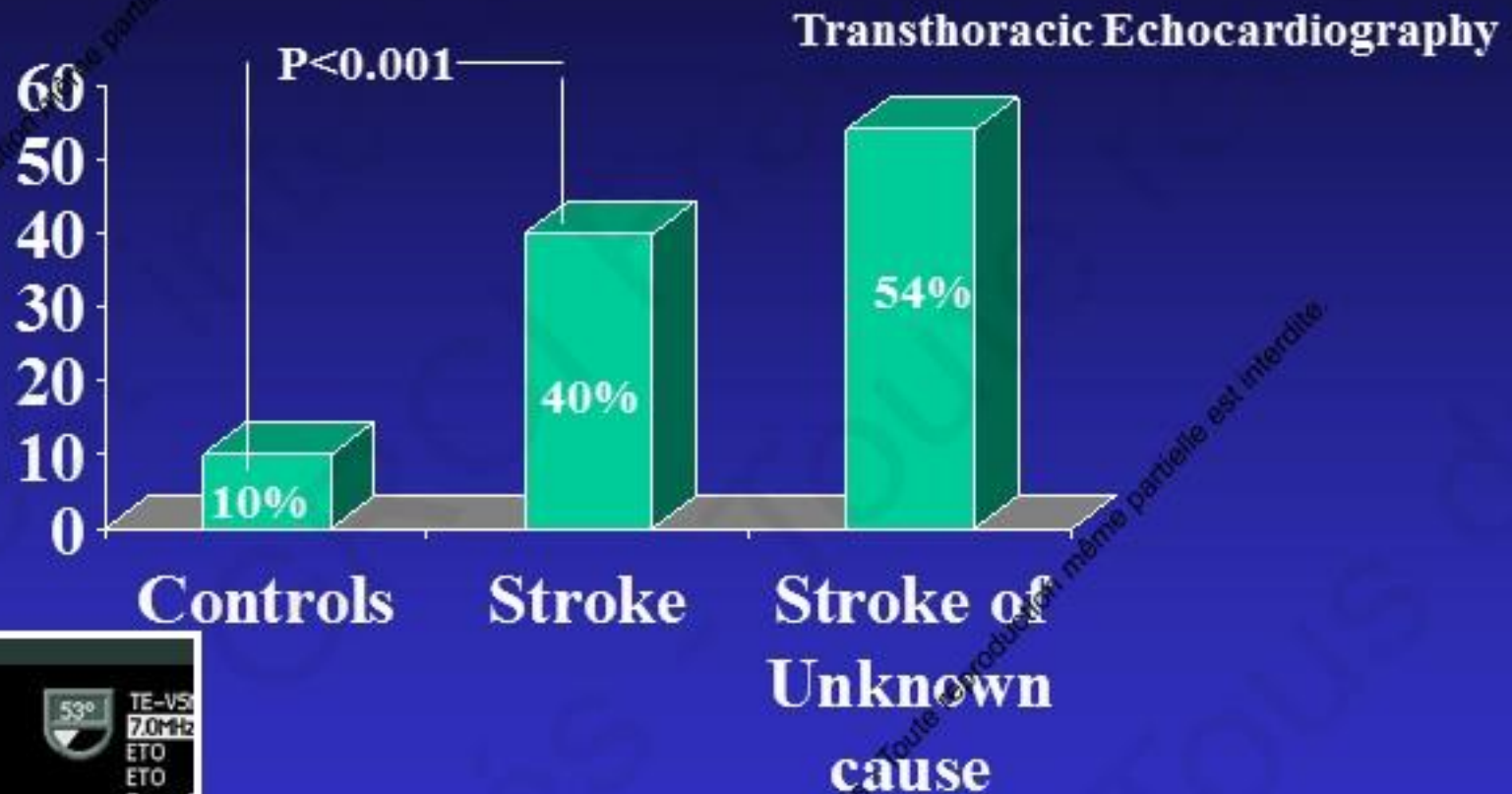
Hôpital Bichat, APHP, Paris

Liens d'intérêts

- Aucun

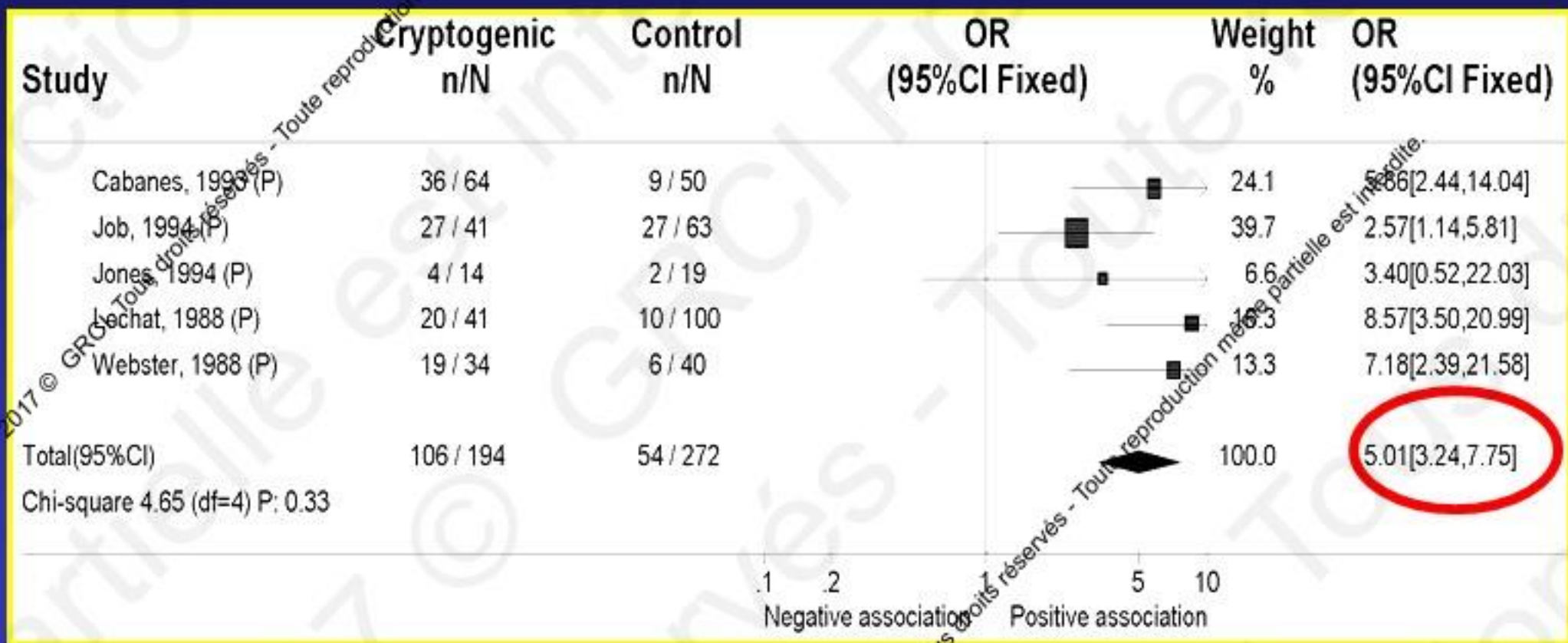
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FOP et AVC cryptogénique



FOP et AVC du sujet jeune < 55 ans

Etudes cas-contrôles



Risque d'infarctus cérébral chez les sujets ayant un FOP

Etudes en population générale

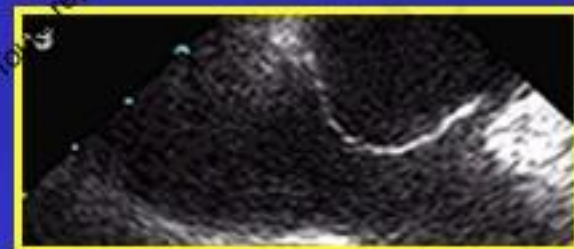
Etudes	Pts	Age	Suivi	FOP	ASIA	FOP + ASIA
1	585	> 45 ans	5,1 ans	1.46 0.74-2.88	3.72 0.88-15.71	
2	1100	>39 ans	79.7 mois	1.79 0.93-3.45	3.66 0.88-15.30	1.04 0.14-7.74

1. Meissner et al J Am Coll Cardiol 2006;47:440-5
2. Di Tullio MR et al J Am Coll Cardiol 2007;49:797-802

Risque de récurrence d'AVC en fonction de l'anatomie du septum interauriculaire

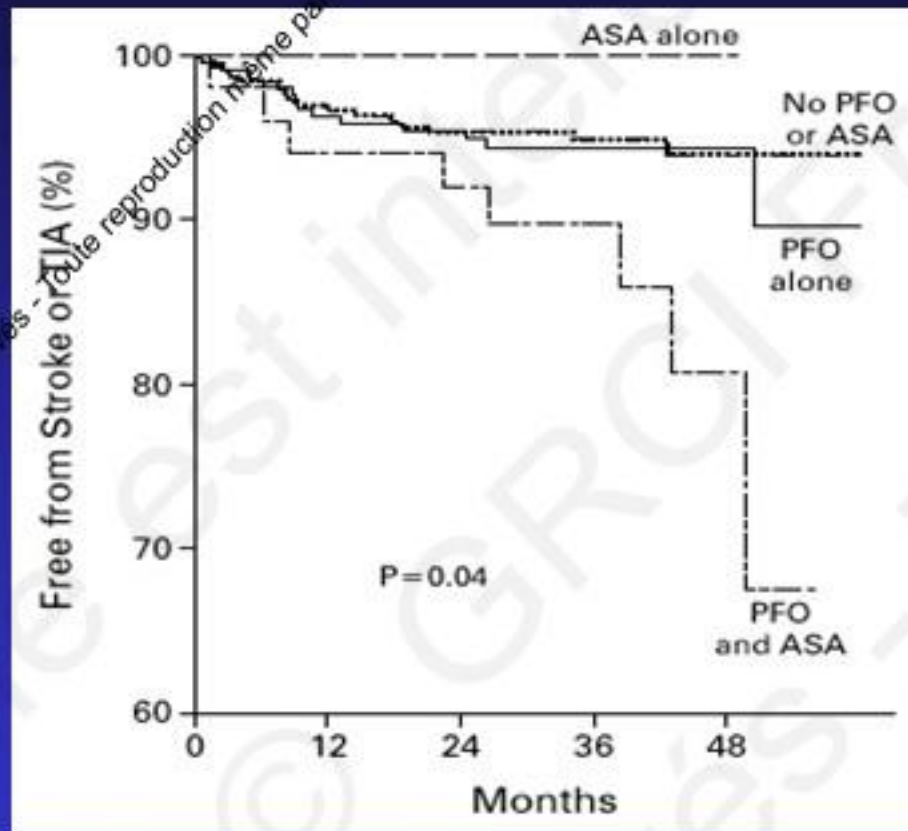
n = 581 patients

- 304 (52%) pts : no septal abnormality
- 216 (37%) pts : PFO alone
- 10 (2%) pts : ASA alone
- 51 (9%) pts : PFO + ASA



Risque de récurrence AVC/AIT

581 pts 18-55 y-o
F-U on 300mg ASA



**Stroke at 4 yrs
(TIAs excluded)**

PFO 2.3%

PFO+ASA 15.2%

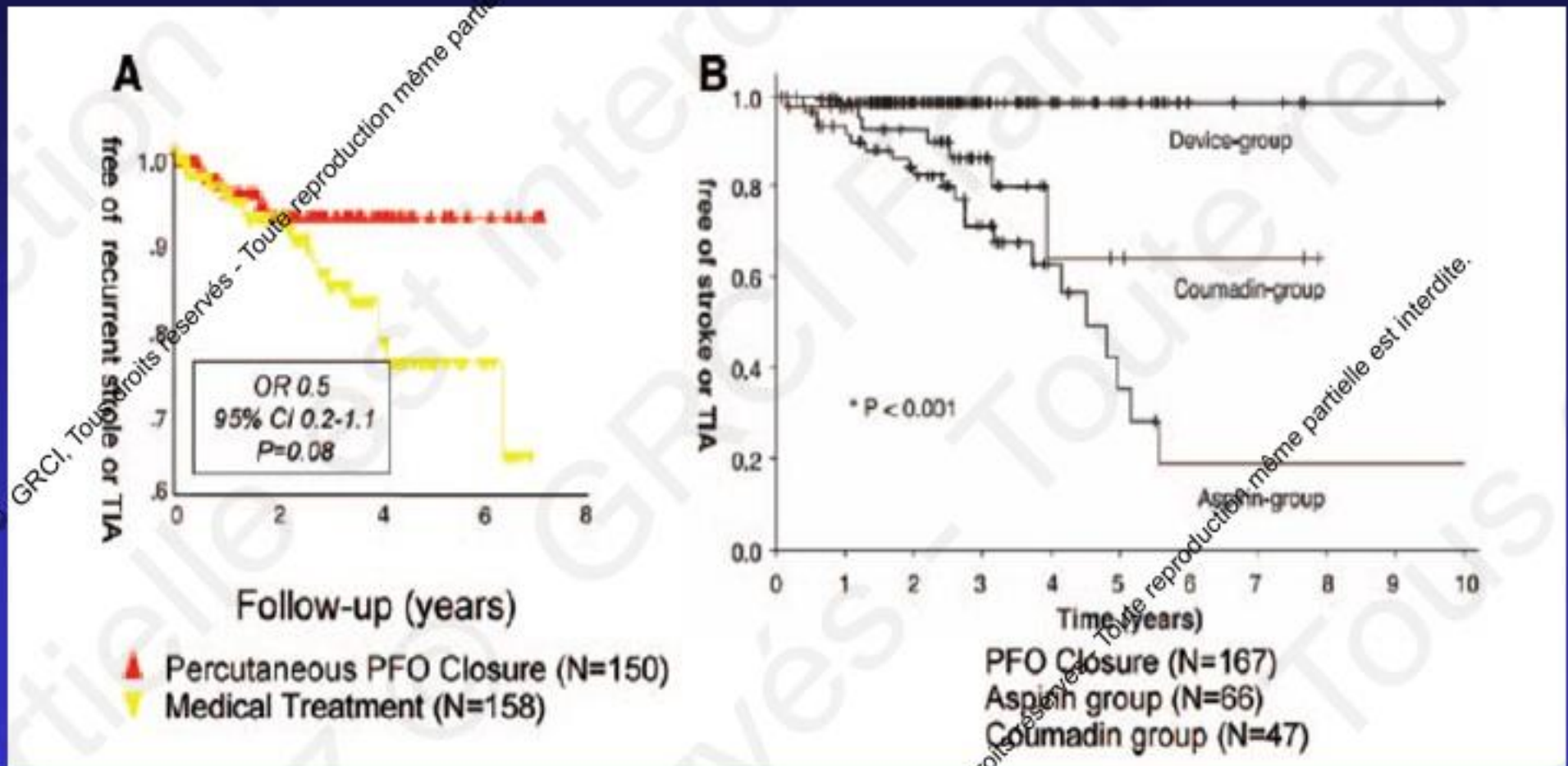
ASA 0%

No PFO no ASA 4.2%

No PFO or ASA	304	291	267	158	48
PFO alone	216	207	198	122	43
ASA alone	10	10	9	4	1
PFO or ASA	51	46	44	25	10

Risque AVC après fermeture FOP

Comparaison non randomisée entre fermeture et traitement médical



Windecker S et al J Am Coll Cardiol 2004;44:750-8

Schuchlenz HW et al Int J Cardiol 2005;101:77-82

Probabilité de causalité du FOP

- Caractéristiques anatomiques
- Type d'AVC
- Score RoPe

Caractéristiques Anatomiques



Patent foramen ovale morphology

Morphologic Characteristic	Symptomatic PFO (Stroke or TIA) (n = 58)	Asymptomatic PFO (n = 58)	p Value
Size (mm)	3.9 ± 1.6	2.9 ± 1.4	0.001
Large PFO (size ≥4 mm)	27 (46%)	10 (17%)	0.001
Presence of ASA	26 (45%)	12 (21%)	0.005
Length of the tunnel (mm)	14 ± 6	12 ± 6	0.05
Long tunnel (≥1 cm)	5 (78%)	32 (55%)	0.01
Degree of shunting			
Mild	30 (52%)	35 (60%)	0.34
Moderate	12 (21%)	12 (21%)	1.0
Severe	9 (16%)	3 (5%)	0.06
Prominent Eustachian valve	12 (21%)	9 (16%)	0.4
Prominent Chiari's network	1 (2%)	1 (2%)	1.0

Type d'AVC

Neuroimaging Findings in Cryptogenic Stroke Patients With and Without Patent Foramen Ovale

David E. Thaler, MD, PhD; Robin Ruthazer, MPH; Emanuele Di Angelantonio, MD, MSc; Marco R. Di Tullio, MD; Jennifer S. Donovan, MS; Mitchell S.V. Elkind, MD, MS; John Griffith, PhD; Shunichi Homma, MD, FACC; Cheryl Jaigobin, MD, FRCP, MSc; Jean-Louis Mas, MD; Heinrich P. Mattle, MD; Patrik Michel, MD; Marie-Luise Mono, MD; Krassimir Nedelchev, MD, FESC; Federica Papetti, MD; Joaquín Serena, MD, PhD; Christian Weimar, MD; David M. Kent, MD, CM, MSc

Variable	Total, n	% With PFO	Adjusted Odds Ratio	P Value
Index stroke large				
No	681	37		
Yes	1290	43	1.36	0.0025
Index stroke seen				
No	265	36		
Yes	2040	43	1.53	0.003
Superficial location				
No	779	37		
Yes	1018	48	1.54	<0.0001
Multiple index strokes				
No	1601	41		
Yes	278	43	1.21	0.1614
Prior stroke				
No	1547	43		
Yes	592	33	0.66	<0.0001

RoPE Score

Points are subtracted from 10 for each risk factor:

- A patient less than 30 years with no risk factors has a score of 10;
- A patient ≥ 70 years with all 5 risk factors has a score of 0

**RoPE
SCORE**

Maximum Score = 10

Risk Factor (0 to 5 points)

Hypertension (1)

Diabetes (1)

Prior Stroke or TIA (1)

Current Smoker (1)

Absence of visible cortical infarct on CT or MRI (1)

Age (0 to 5 points)

<30 years (0)

30 to 39 years (1)

40 to 49 years (2)

50 to 59 years (3)

60 to 69 years (4)

≥ 70 years (5)

Total Score =

Prévalence du FOP en fonction du RoPE score

RoPE SCORE	Cryptogenic Stroke (N=3023)			
	Number of Patients	Prevalence of Patients with a PFO % (95% CI)	PFO-Attributable Fraction* % (95% CI)	PFO-Attributable Fraction
0-3	613	23% (19% to 26%)	0% (0% to 0%)	40% (36% to 43%)
4	511	35% (31% to 39%)	38% (30% to 46%)	
5	516	34% (30% to 38%)	35% (28% to 42%)	
6	482	47% (42% to 51%)	62% (56% to 69%)	80% (77% to 83%)
7	434	54% (49% to 59%)	72% (66% to 77%)	
8	287	67% (62% to 73%)	84% (79% to 88%)	
9-10	180	73% (66% to 79%)	88% (82% to 93%)	

Risque de récurrence à 2 ans AVC/AIT en fonction du RoPE score

Table 5 PFO prevalence, attributable fraction, and estimated 2-year risk of stroke/TIA by point score strata, using control rate of 25%

RoPE score	Cryptogenic stroke (n = 3,023)			CS patients with PFO (n = 1,324)	
	No. of patients	Prevalence of patients with a PFO, % (95% CI) ^a	PFO-attributable fraction, % (95% CI) ^a	No. of CS patients with PFO ^a	Estimated 2-y stroke/TIA recurrence rate (Kaplan-Meier), % (95% CI)
0-3	613	23 (19-26)	0 (0-4)	108	20 (12-28)
4	511	35 (31-39)	38 (25-48)	148	12 (6-18)
5	516	34 (30-38)	34 (21-45)	186	7 (3-11)
6	482	47 (42-51)	62 (54-68)	236	8 (4-12)
7	434	54 (49-59)	72 (66-76)	263	6 (2-10)
8	287	67 (62-73)	84 (79-87)	233	6 (2-10)
9-10	180	73 (66-79)	88 (83-91)	150	2 (0-4)

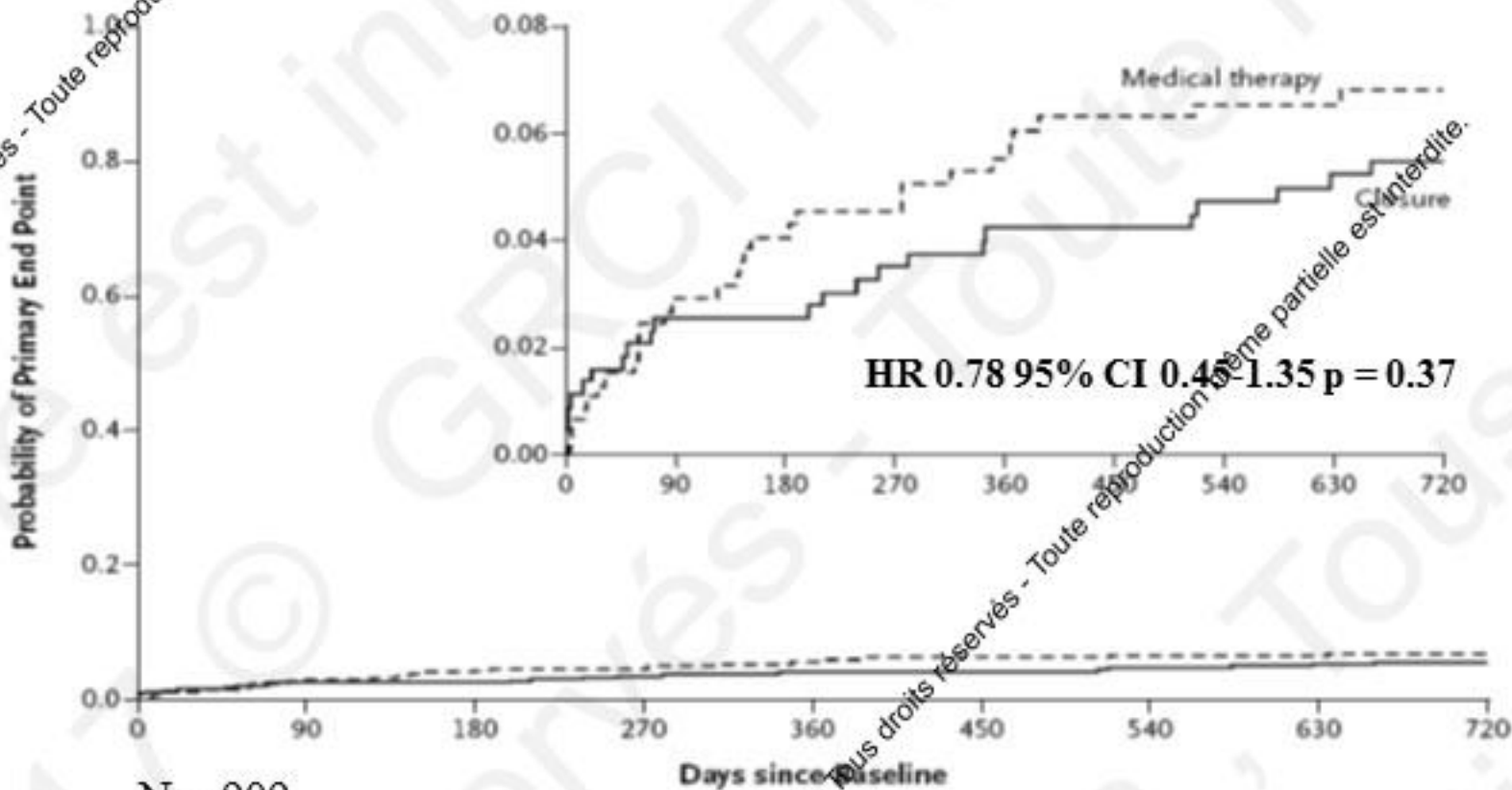
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Etudes Randomisées

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Closure or Medical Therapy for Cryptogenic Stroke with Patent Foramen Ovale

Anthony J. Furlan, M.D., Mark Reisman, M.D., Joseph Massaro, Ph.D.,
 Laura Mauri, M.D., Harold Adams, M.D., Gregory W. Albers, M.D.,
 Robert Felberg, M.D., Howard Herrmann, M.D., Saibal Kar, M.D.,
 Michael Landzberg, M.D., Albert Raizner, M.D.,
 and Lawrence Wechsler, M.D., for the CLOSURE I Investigators*

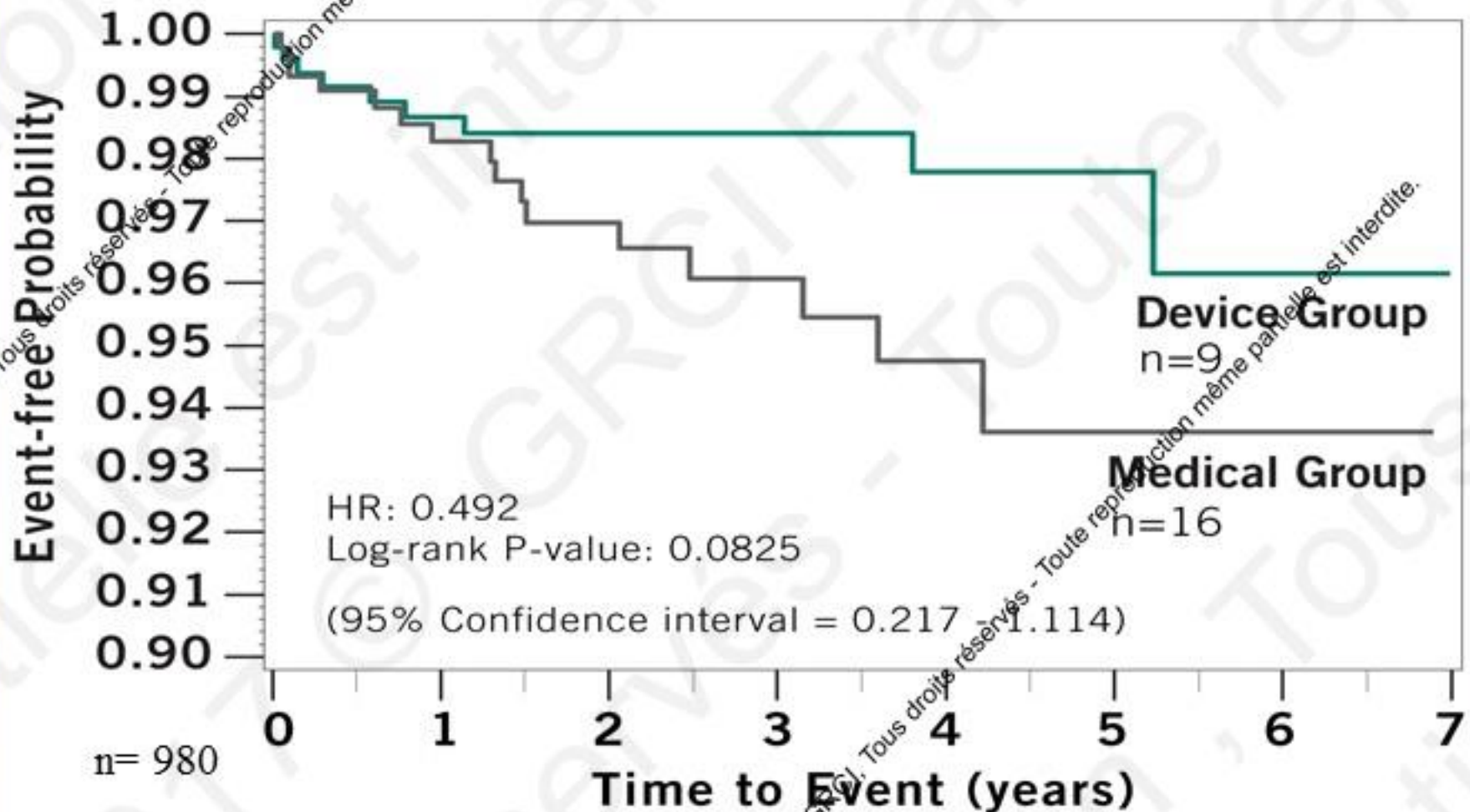


No. at Risk

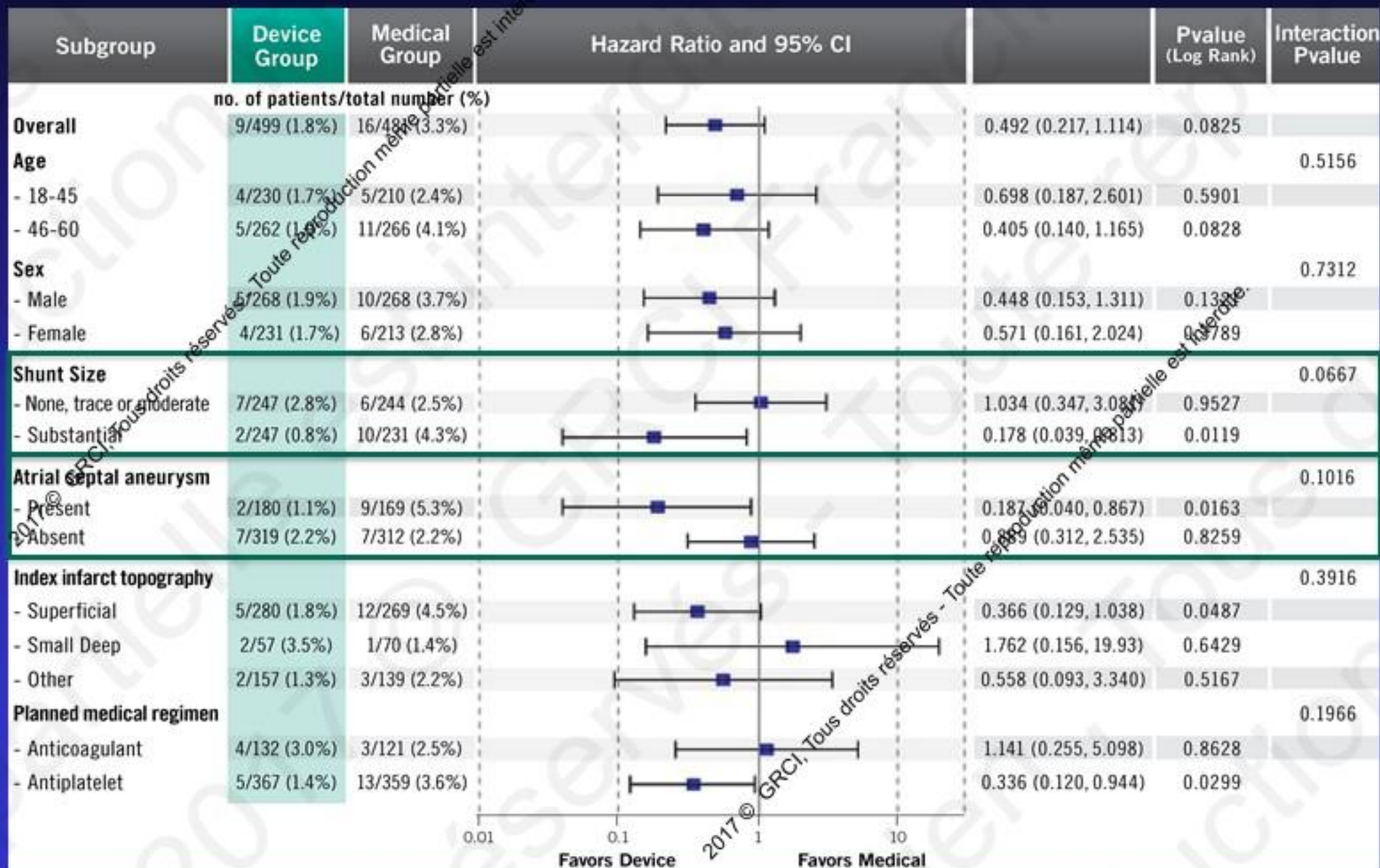
Closure	447	411	406	399	392	389	384	380	254
Medical therapy	462	421	405	388	378	365	359	356	242

Closure of Patent Foramen Ovale versus Medical Therapy after Cryptogenic Stroke

John D. Carroll, M.D., Jeffrey L. Saver, M.D., David E. Thaler, M.D., Ph.D.,
Richard W. Smalling, M.D., Ph.D., Scott Berry, Ph.D., Lee A. MacDonald, M.D.,
David S. Marks, M.D., and David L. Tirschwell, M.D.,
for the RESPECT Investigators*

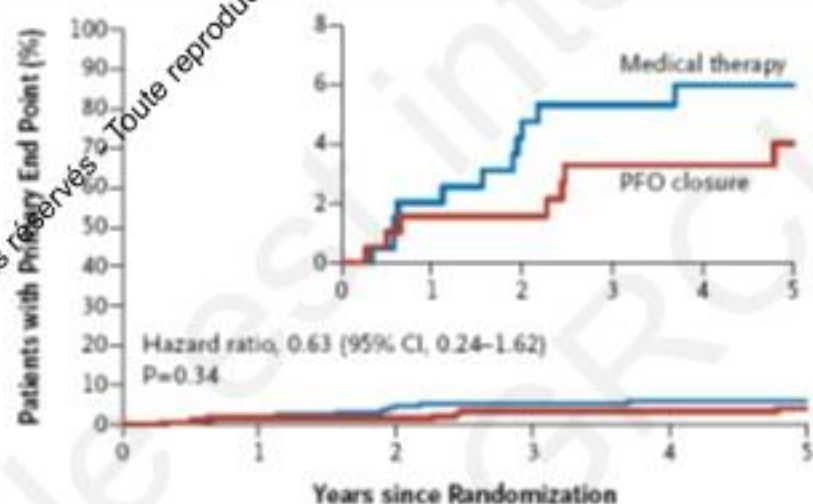


RESPECT / Etudes en sous-groupes



Percutaneous Closure of Patent Foramen Ovale in Cryptogenic Embolism

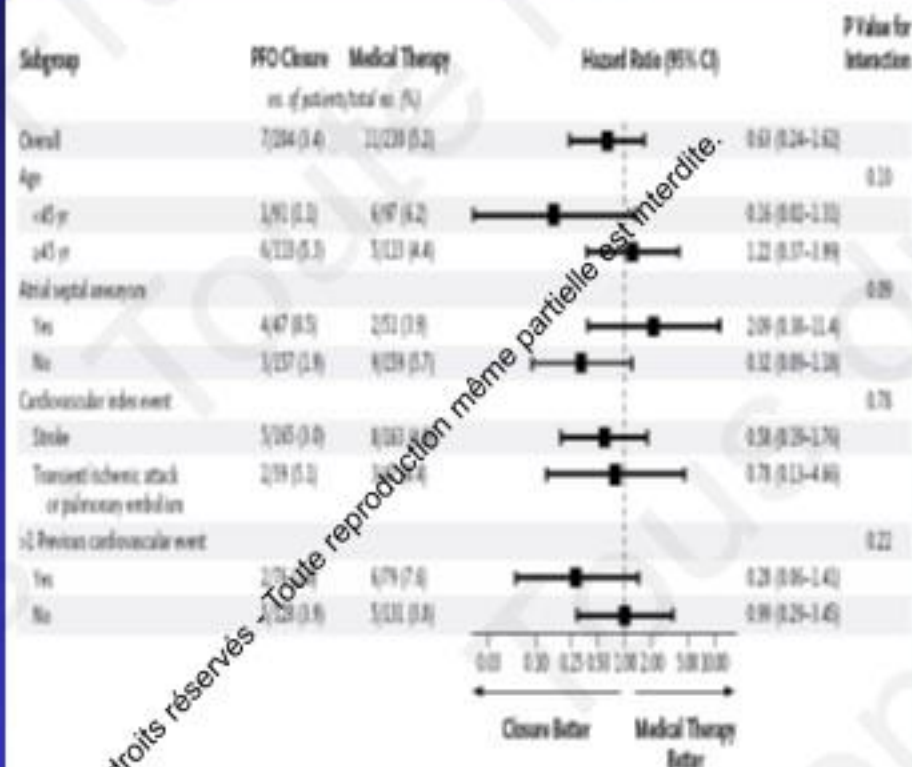
Bernhard Meier, M.D., Bindu Kalesan, Ph.D., Heinrich P. Mattle, M.D., Ahmed A. Khattab, M.D., David Hildick-Smith, M.D., Dariusz Dudek, M.D., Grethe Andersen, M.D., Reda Ibrahim, M.D., Gerhard Schuler, M.D., Antony S. Walton, M.D., Andreas Wahl, M.D., Stephan Windecker, M.D., and Peter Jüni, M.D., for the PC Trial Investigators*



No. at Risk	0	1	2	3	4	5
Medical therapy	210	185	170	159	131	90
PFO closure	204	186	181	163	142	110

Figure 1. Kaplan-Meier Cumulative Estimates of the Rate of the Primary End Point.

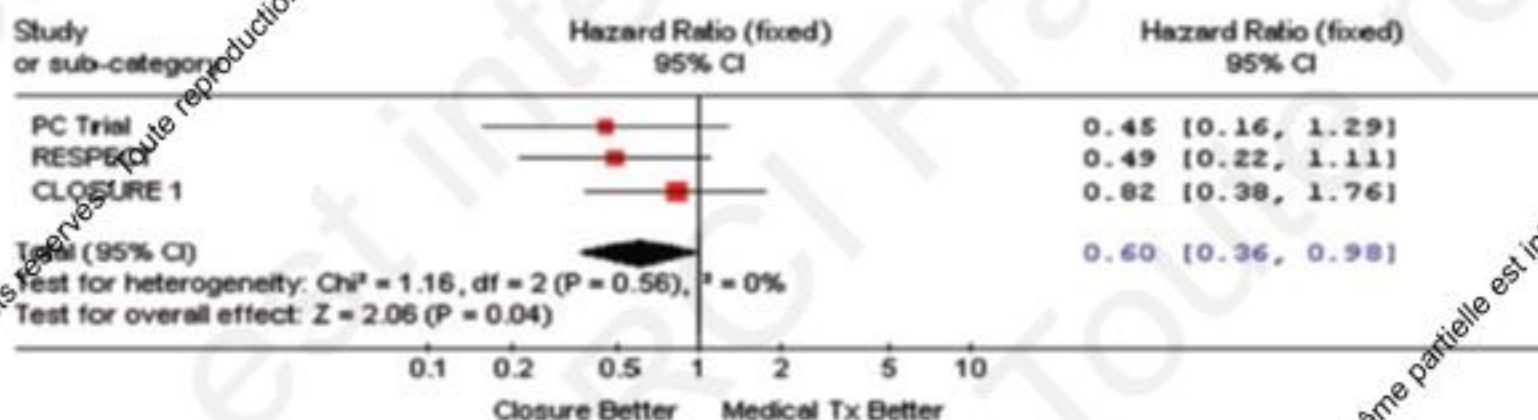
PFO denotes patent foramen ovale.



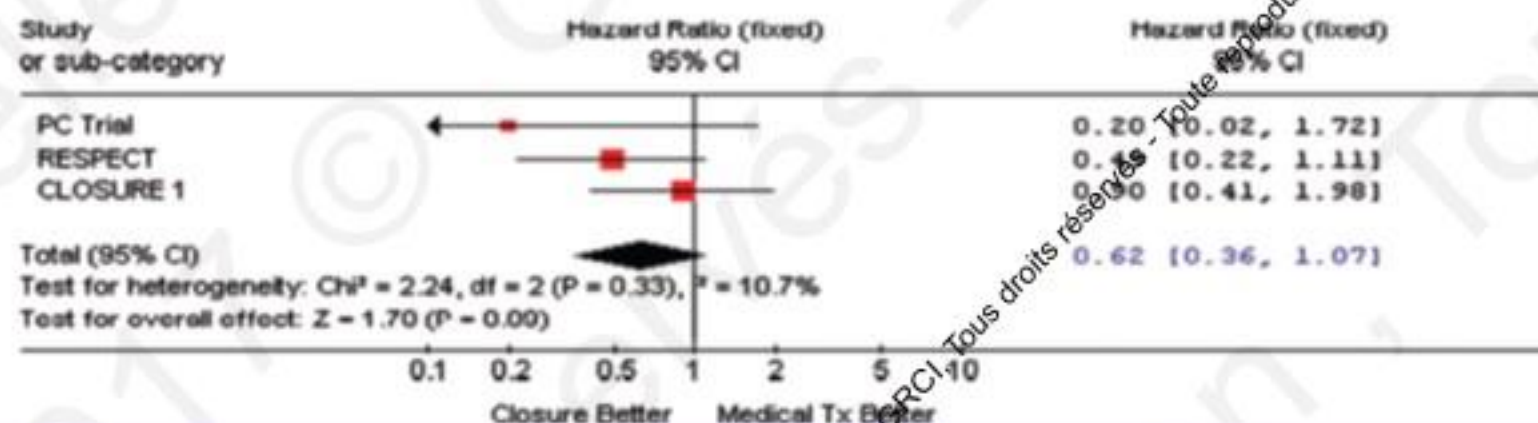
Patent foramen ovale transcatheter closure vs. medical therapy on recurrent vascular events: a systematic review and meta-analysis of randomized controlled trials

Pablo Rengifo-Moreno¹, Igor F. Palacios², Parichart Junpaparp³, Christian F. Witzke¹, D. Lynn Morris^{1,4}, and Abel Romero-Corral^{1,5*}

A Outcome: 09 PFO Closure and TIA/Stroke



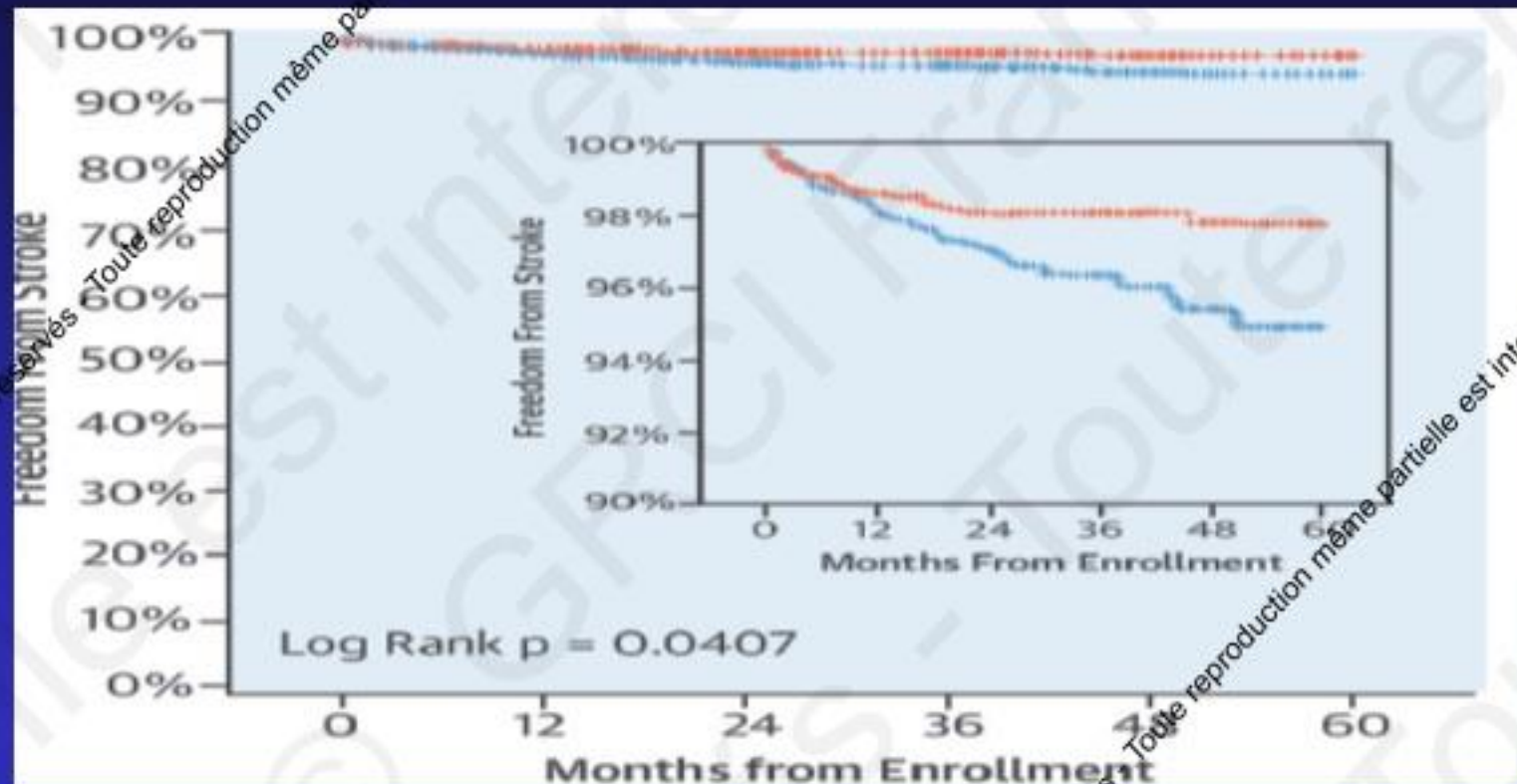
B Outcome: 13 PFO Closure and Stroke



Device Closure of Patent Foramen Ovale After Stroke



Pooled Analysis of Completed Randomized Trials



Recurrent ischemic stroke	0.7 (22/3,099)	1.3 (36/2,839)	0.0407	0.58 (0.34-0.98), 0.0433	0.58 (0.34-0.99), 0.0443
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Are Meta-Analysis a Form of Medical Fake News ?

The NEW ENGLAND JOURNAL of MEDICINE

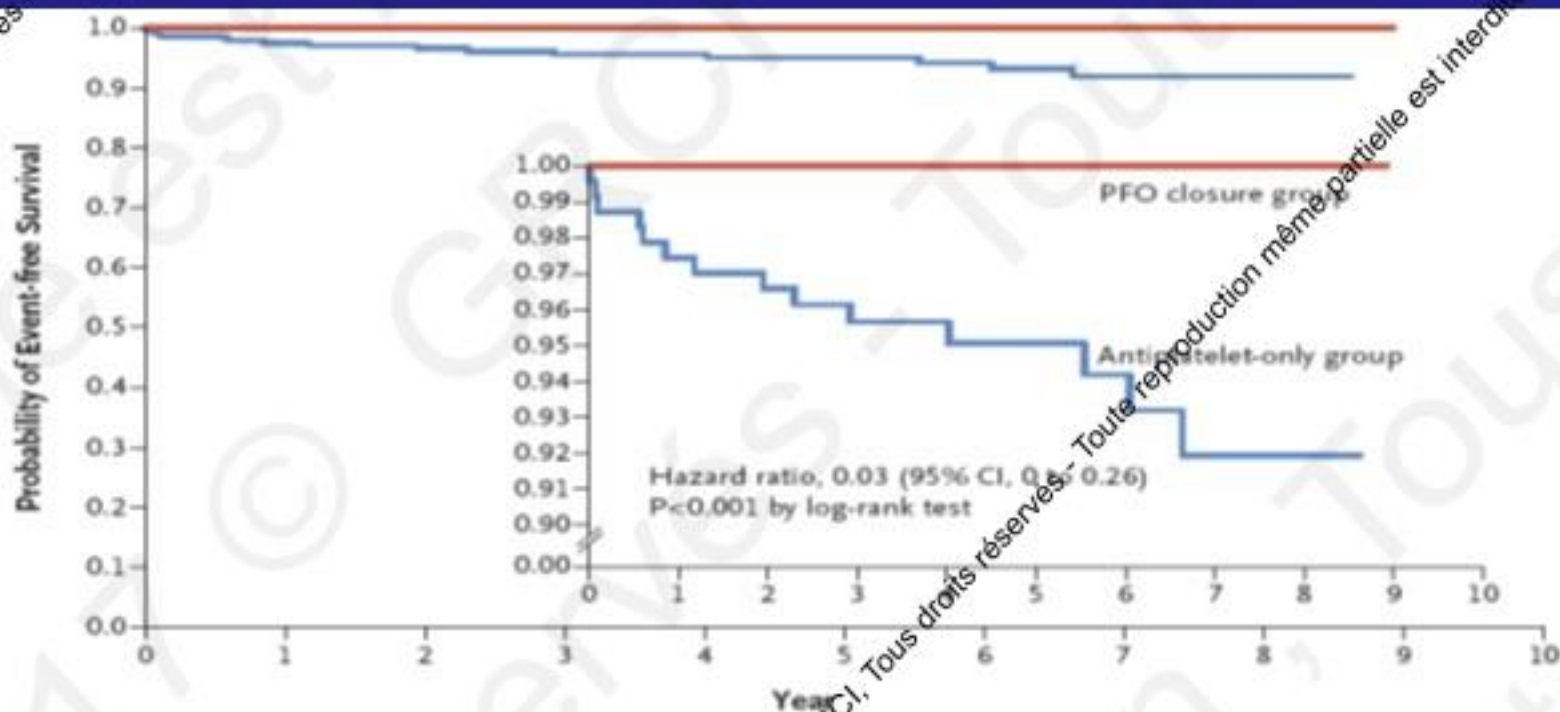
ESTABLISHED IN 1812

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Patent Foramen Ovale Closure or Anticoagulation vs. Antiplatelets after Stroke

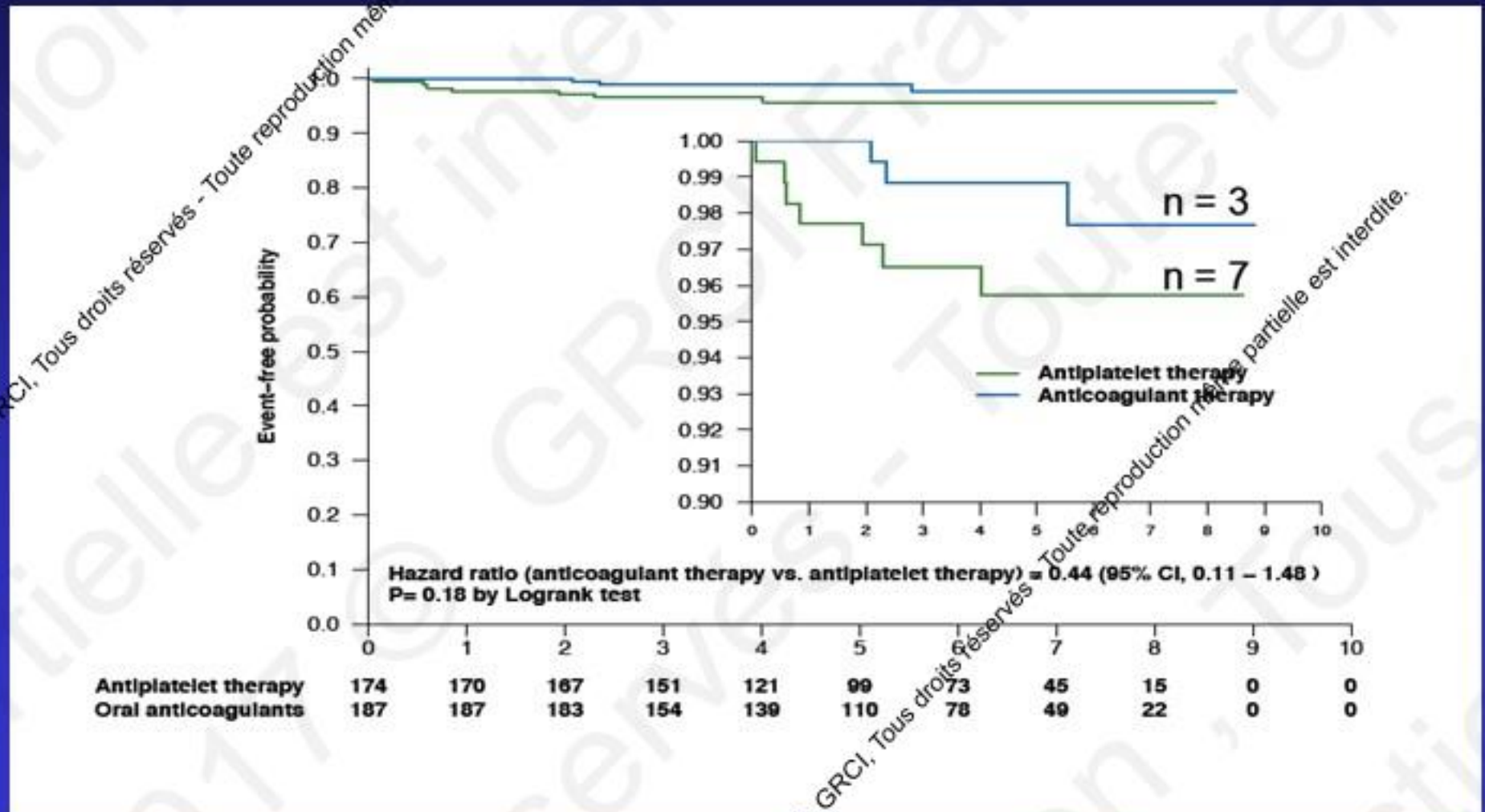
J.-L. Mas, G. Derumeaux, B. Guillon, E. Massardier, H. Hosseini, L. Mechtouff, C. Arquizan, Y. Béjot, F. Vuillier, O. Detante, C. Guidoux, S. Lanaple, C. Vaduva, N. Dequatre-Ponchelle, I. Sibon, P. Garnier, A. Ferrier, S. Timsit, E. Robinet-Borgomano, Sablot, J.-C. Lacour, M. Zuber, P. Favrole, J.-F. Pinel, M. Apoil, P. Reiner, C. Lefebvre, P. Guérin, C. Piot, R. Ravi, J.-L. Dubois-Randé, J.-C. Eicher, N. Meneveau, J.-R. Lussion, B. Bertrand, J.-M. Schleich, F. Godart, J.-B. Tharion, L. Leborgne, P. Michel, L. Pierard, G. Turc, M. Barthelet, A. Charles-Nelson, C. Weimar, T. Moulin, J.-M. Juliard, and G. Chatellier, for the CLOSE Investigators*



No. at Risk

PFO closure group	238	238	232	200	179	141	99	64	20	0	0
Antiplatelet-only group	235	229	223	198	160	130	96	55	19	0	0

Anticoagulants versus antiplaquettaires en intention de traitement

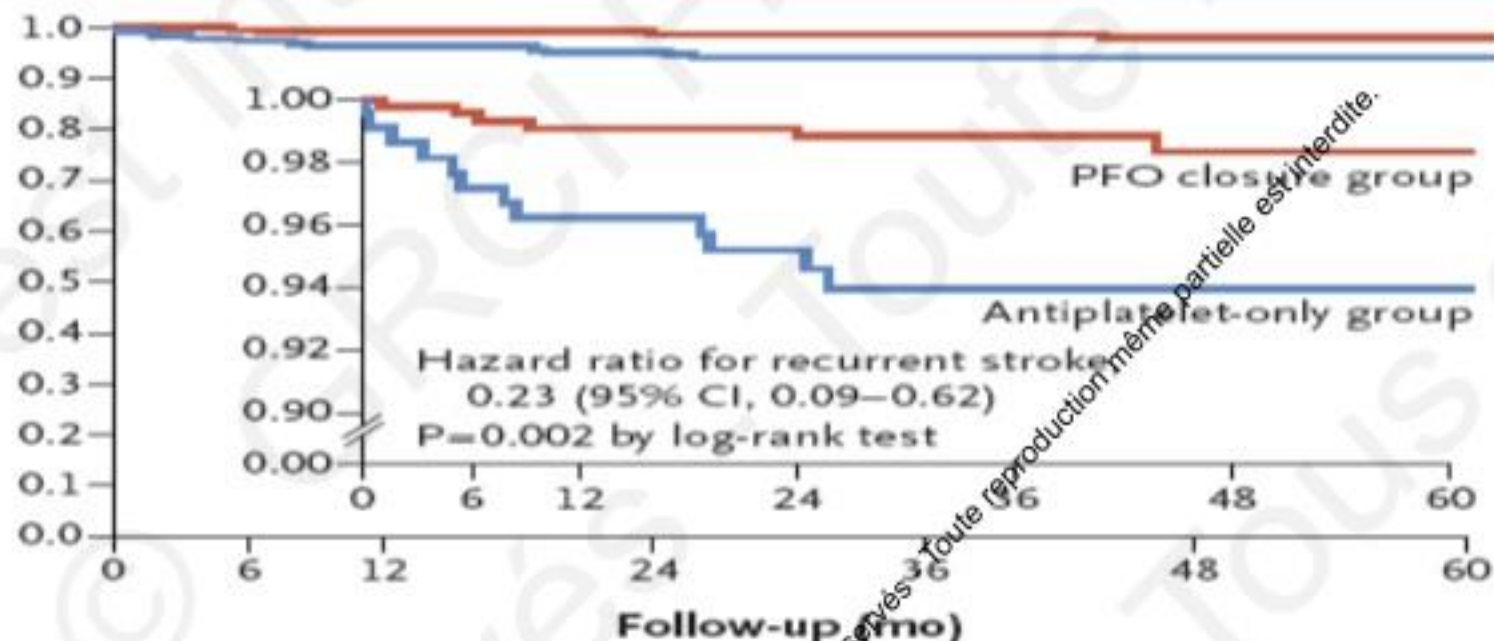


Patent Foramen Ovale Closure or Antiplatelet Therapy for Cryptogenic Stroke

Lars Søndergaard, M.D., Scott E. Kasner, M.D., John F. Rhodes, M.D.,
 Grethe Andersen, M.D., D.M.Sc., Helle K. Iversen, M.D., D.M.Sc.,
 Jens E. Nielsen-Kudsk, M.D., D.M.Sc., Magnus Settergren, M.D., Ph.D.,
 Christina Sjöstrand, M.D., Ph.D., Risto O. Roine, M.D.,
 David Hildick-Smith, M.D., J. David Spence, M.D., and Lars Thomassen, M.D.,
 for the Gore PFOCLOSURE Clinical Study Investigators*

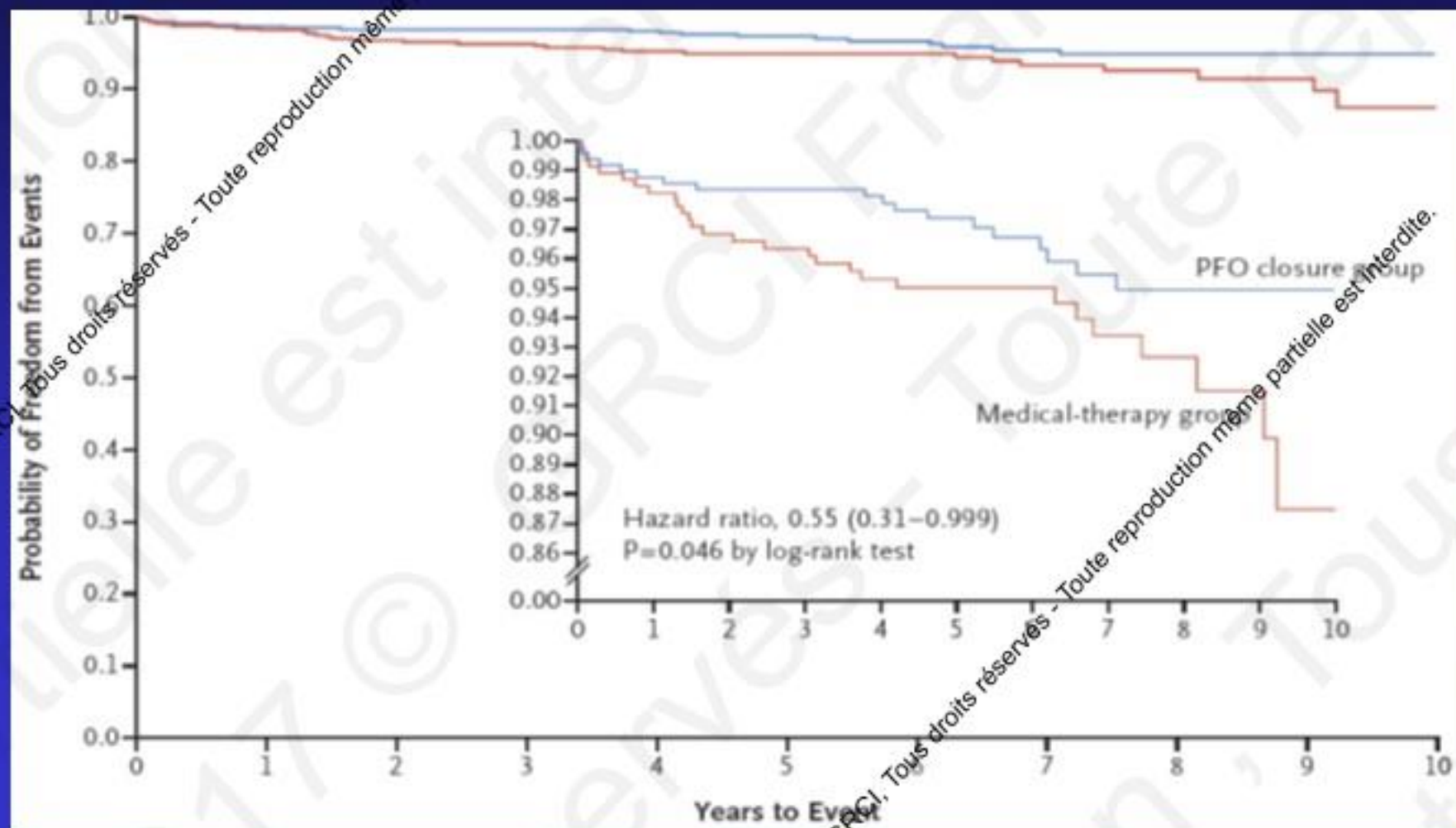


Probability of Freedom from Recurrent Stroke



No. at Risk	0	6	12	24	36	48	60
PFO closure group	441	422	417	398	278	182	102
Antiplatelet-only group	223	202	194	173	116	78	30

Etude RESPECT / suivi à long terme



FDA Approval

October 28, 2016

The AMPLATZER PFO Occluder should only be used in cryptogenic stroke patients who also have a PFO after a comprehensive clinical evaluation by a neurologist and cardiologist has ruled out other causes of stroke

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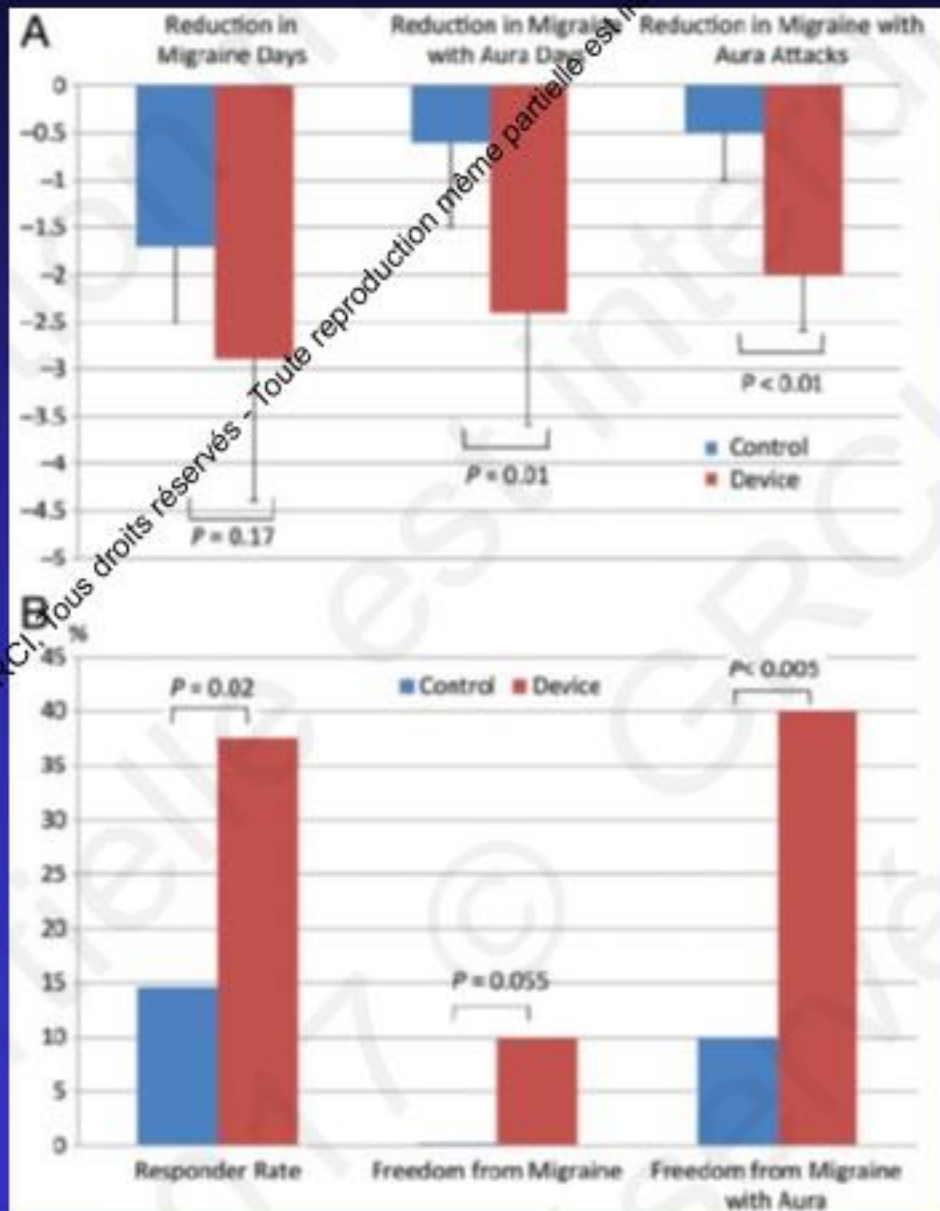
Actualités sur le FOP

Relation FOP/AVC cryptogénique

- Réviser les recommandations HAS
- Affirmer le caractère cryptogénique : bilan neurologique
- Caractéristiques anatomiques du FOP
- Bilan thrombophilique
- Bilan rythmologique
- Stratégie optimale de la fermeture percutanée

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Percutaneous closure of patent foramen ovale in migraine with aura, a randomized controlled trial



PRIMA Trial

Amplatzer PFO occluder n = 53
Medical treatment n = 54

Primary endpoint : reduction in monthly migraine days 9-12 months after randomization compared with 3 months before

Percutaneous Closure of Patent Foramen Ovale in Patients With Migraine

The PREMIUM Trial

Amplatzer PFO Occluder (n=117) vs medical treatment (n=103)
Primary endpoint : responder rate defined as 50% reduction in migraine attacks

