Special Conditions of NOAC PCI

가톨릭의대
순환기내과
장성원

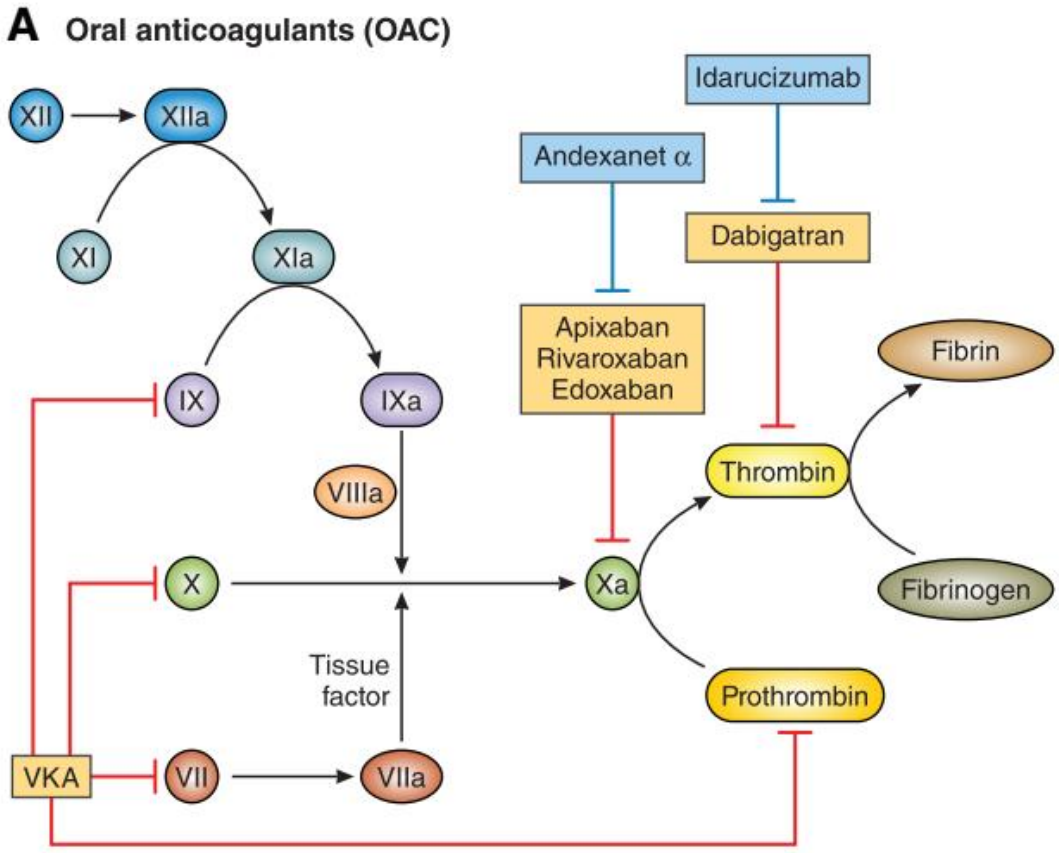
Issues on Patients with NOAC

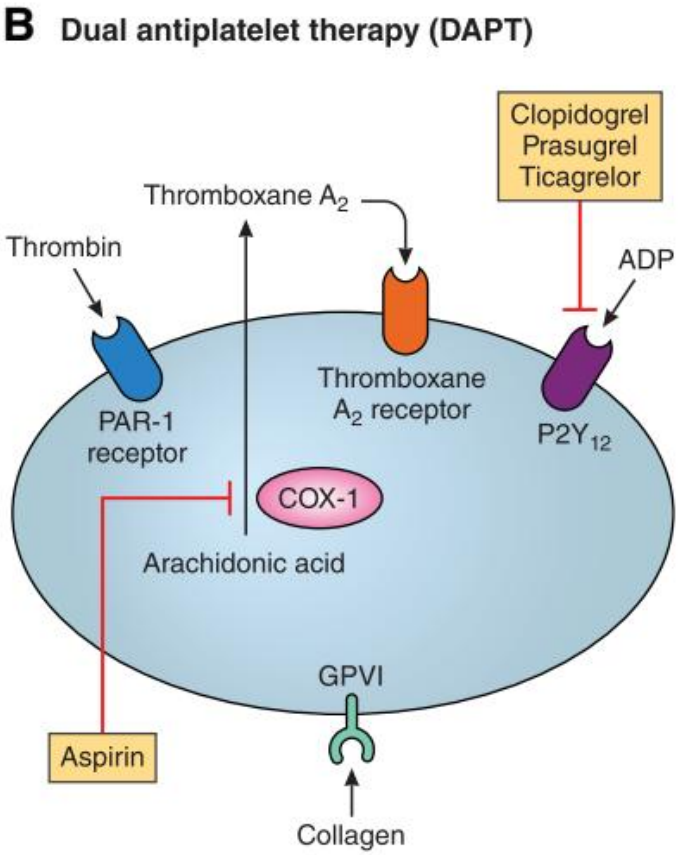
- PCI
- Peri-procedural management
- CKD or dialysis
- Cardioversion
- Neurological situations

Dual Antiplatelet Therapy with Oral Anticoagulants

PCI IN ATRIAL FIBRILLATION

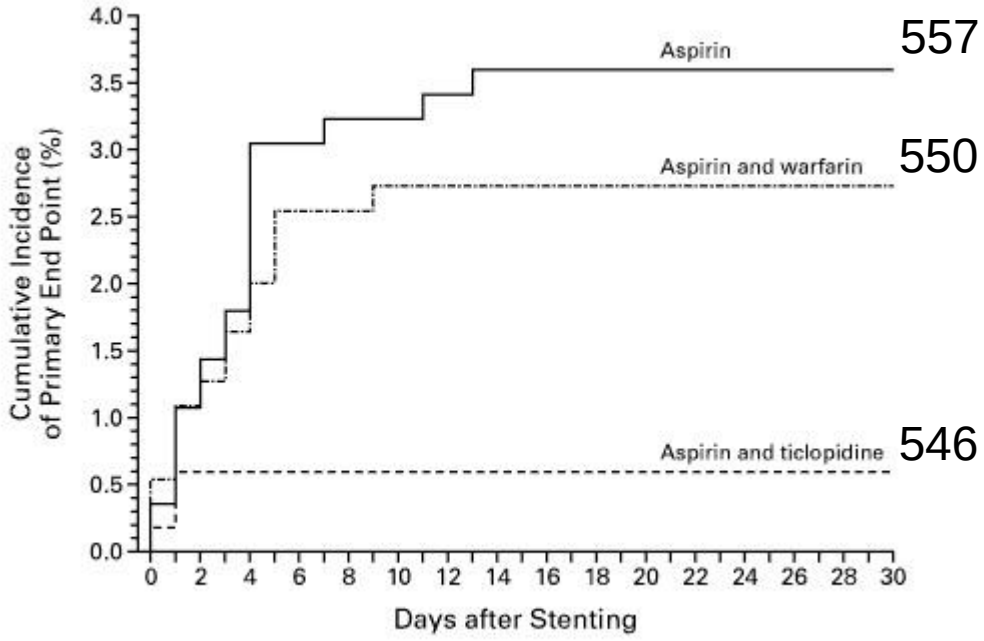
Sites of action: OAC and DAPT





Circ Cardiovasc Interv 2016;9:e004395

Dual Antiplatelet Therapy in PCI

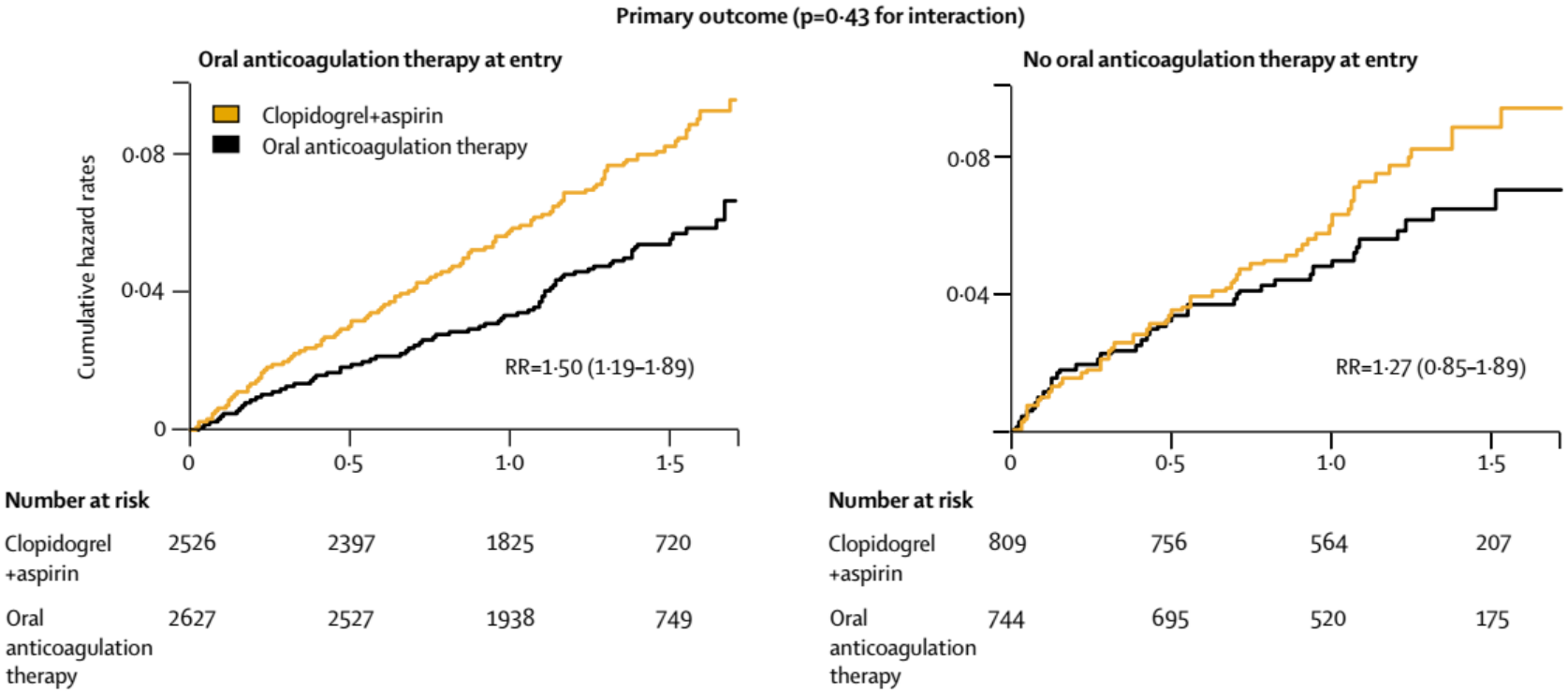


Primary end point: death, revascularization, stent thrombosis, MI

Leon et al. N Engl J Med 1988;339:1665

ACTIVE-W

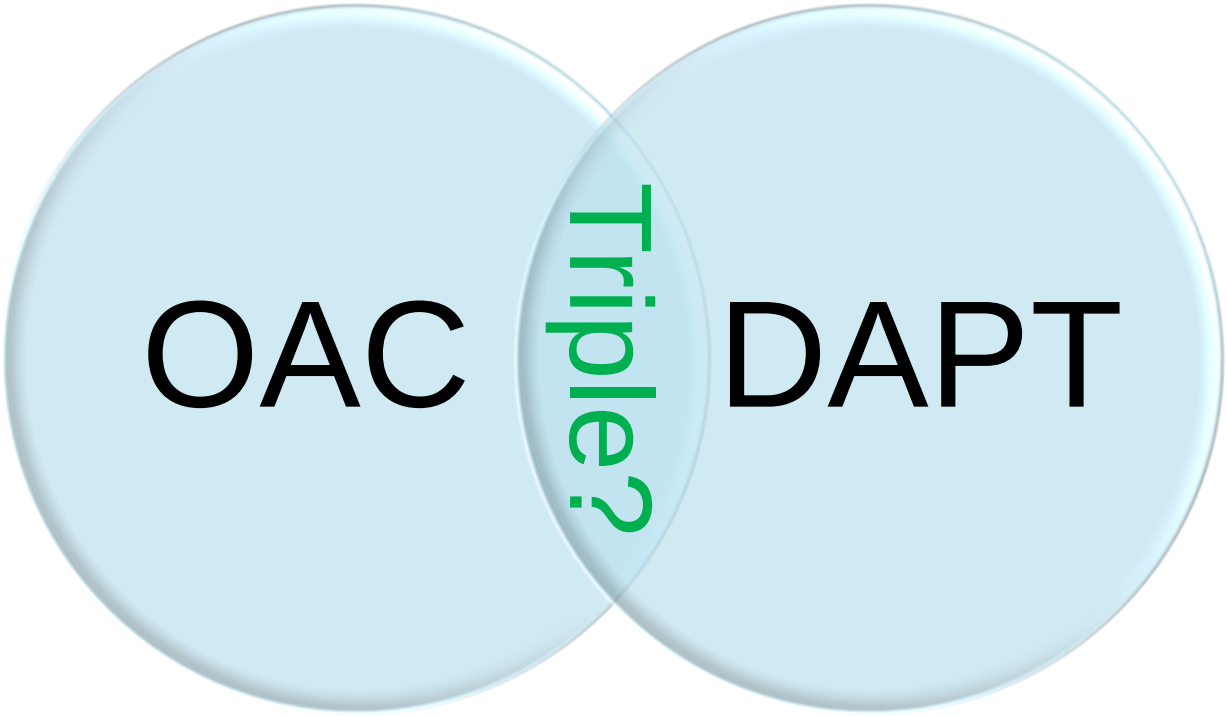
DAPT vs. OAC in AF



Primary end point: stroke, non-CNS systemic embolism, MI, vascular death

ACTIVE investigators. Lancet 2006;367;1903

Patients with AF undergoing PCI



Randomized trial with VKA

WOEST trial

ISAR-TRIPLE trial

WOEST trial: Primary end point

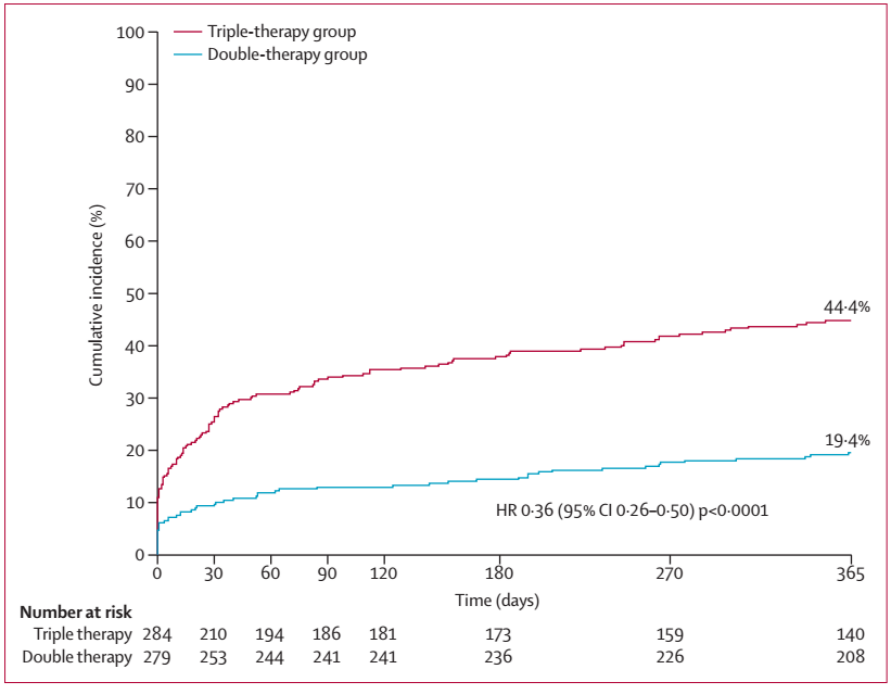


Figure 2: **Incidence of the primary endpoint (any bleeding)**
HR=hazard ratio.

	Double therapy (n-279)	Triple therapy (n=284)	Hazard ratio (95% CI)	p value
Any bleeding event	54 (19·4%)	126 (44·4%)	0·36 (0·26–0·50)	<0·0001
TIMI bleeding				
Major	9 (3·2%)	16 (5·6%)	0·56 (0·25–1·27)	0·159
Major and minor	39 (14·0%)	89 (31·3%)	0·40 (0·27–0·58)	<0·0001
GUSTO bleeding				
Severe	4 (1·4)	10 (3·5%)	0·40 (0·12–1·27)	0·119
Severe and moderate	15 (5·4%)	35 (12·3%)	0·42 (0·23–0·76)	0·003
BARC bleeding				
3	18 (6·5%)	36 (12·7%)	0·49 (0·28–0·86)	0·011
3c	3 (1·1%)	3 (1·1%)	1·00 (0·20–4·90)	0·996
3b	6 (2·2%)	14 (5·0%)	0·43 (0·17–1·10)	0·074
3a	9 (3·2%)	19 (6·7%)	0·47 (0·21–1·00)	0·054·
2	23 (8·2%)	59 (20·8%)	0·36 (0·23–0·59)	<0·0001
2+3	40 (14·3%)	90 (31·7%)	0·40 (0·28–0·58)	<0·0001
1	18 (6·5%)	45 (15·8%)	0·38 (0·22–0·66)	0·0004
Any blood transfusion	11 (3·9%)	27 (9·5%)	0·39* (0·17–0·84)	0·011

Percentages are calculated from the Kaplan-Meier curve. TIMI= Thrombolysis in Myocardial Infarction criteria. GUSTO=Global Utilization of Streptokinase and Tissue Plasminogen Activator for Occluded Coronary Arteries criteria. BARC=Bleeding Academic Research Consortium criteria. *Odds ratio.

Table 3: **Results for the primary endpoint at 1 year**

Triple: ASA+CLOPD+warfarin
Double: CLOPD+warfarin

WOEST trial: Secondary end point

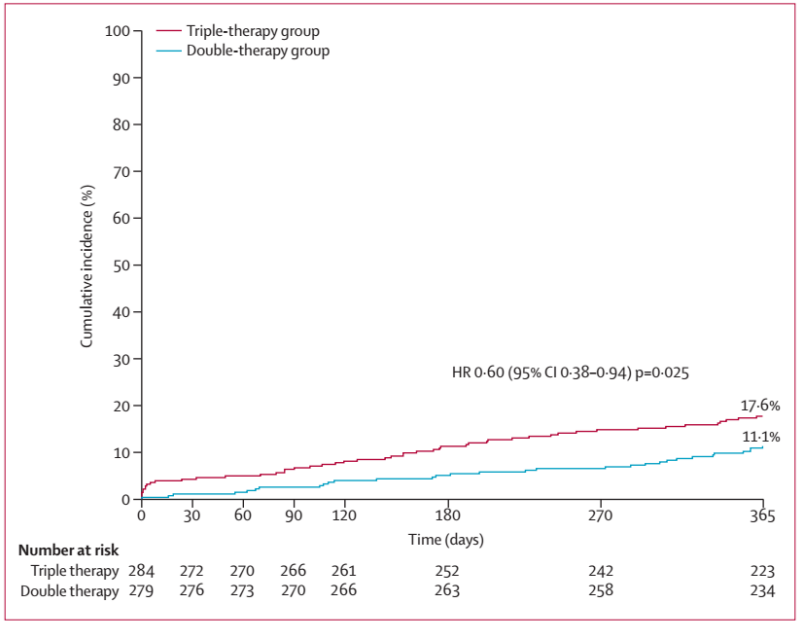


Figure 3: **Cumulative incidence of the secondary endpoint (death, myocardial infarction, stroke, target-vessel revascularisation, and stent thrombosis)**
HR=hazard ratio.

	Double therapy (n=297)	Triple therapy (n=284)	Hazard ratio (95% CI)	p value
Combined secondary endpoint	31 (11·1%)	50 (17·6%)	0·60 (0·38–0·94)	0·025
Death				
All-cause	7 (2·5%)	18 (6·3%)	0·39 (0·16–0·93)	0·027
Cardiac	3 (1·1%)	7 (2·5%)	0·43 (0·11–1·66)	0·207
Non-cardiac	4 (1·4%)	11 (3·9%)	0·36 (0·11–1·13)	0·069
Myocardial infarction				
Any	9 (3·2%)	13 (4·6%)	0·69 (0·29–1·60)	0·382
STEMI	1 (0·4%)	3 (1·1%)	0·34 (0·04–3·25)	0·325
Non-STEMI	8 (2·9%)	10 (3·5%)	0·79 (0·31–2·01)	0·625
Target-vessel revascularisation				
PCI or CABG	20 (7·2%)	19 (6·7%)	1·05 (0·56–1·97)	0·876
PCI	17 (6·1%)	16 (5·6%)	1·06 (0·54–2·10)	0·869
CABG	3 (1·1%)	3 (1·1%)	1·00 (0·20–4·90)	0·998
Stroke				
Any	3 (1·1%)	8 (2·8%)	0·37 (0·10–1·40)	0·128
Ischaemic	2 (0·7%)	8 (2·8%)	0·25 (0·05–1·17)	0·056
Haemorrhagic	1 (0·4%)	0	NA	0·321
Disabling	2 (0·7%)	2 (0·7%)	0·99 (0·14–6·99)	0·988
Non-disabling	1 (0·4%)	7 (2·5%)	0·14 (0·02–1·16)	0·034
Stent thrombosis				
Any	4 (1·4%)	9 (3·2%)	0·44 (0·14–1·44)	0·165
Definite	1 (0·4%)	3 (1·1%)	0·33 (0·03–3·22)	0·319
Probable	0	2 (0·7%)	NA	0·161
Possible	3 (1·1%)	4 (1·4%)	0·75 (0·17–3·30)	0·708

Percentages are calculated from the Kaplan-Meier curve. STEMI=ST-elevation myocardial infarction. PCI=percutaneous coronary intervention. CABG=coronary artery bypass graft. NA=not applicable.

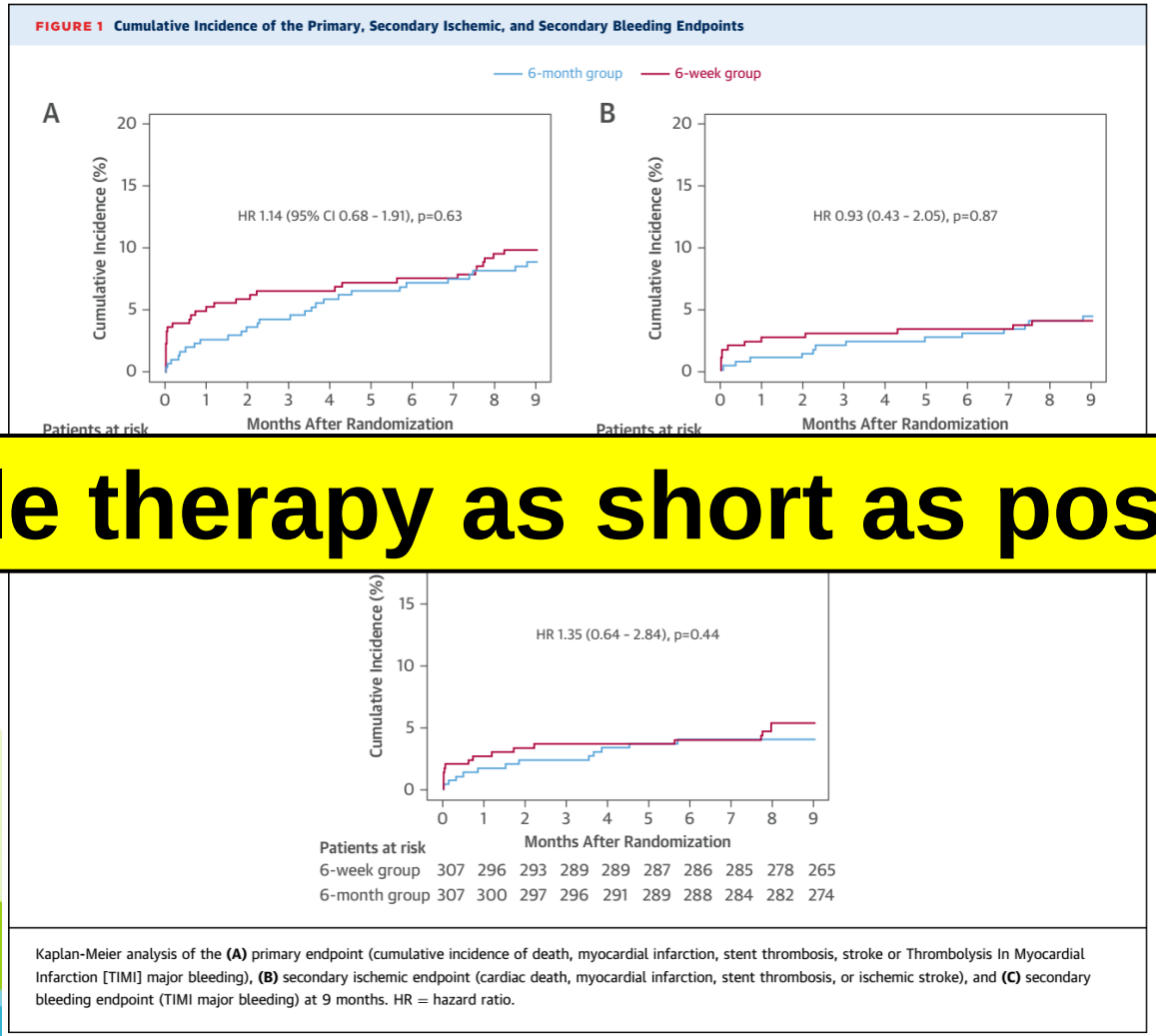
Table 5: **Secondary and safety endpoints at 1 year**

Limitations

- Small number of events
- Open-label design
- Low PPI use
- Majority of femoral access
- High (70%) prevalence of stable CAD
- Relatively simple lesions intervened
- Limited power to detect stent thrombosis

ISAR-TRIPLE trial

6 weeks vs. 6 month CLOPD therapy



Triple therapy as short as possible

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Optimal Antithrombotic Strategy in Patients With Atrial Fibrillation After Coronary Stent Implantation

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ABSTRACT

Background and Objectives: Little evidence is available on the optimal antithrombotic therapy following percutaneous coronary intervention (PCI) in patients with atrial fibrillation (AF). We investigated the outcomes of antithrombotic treatment strategies in AF patients who underwent PCI. **Subjects and Methods:** Three hundred sixty-two patients (68.0% men, mean age: 68.3±7.8 years) with AF and who had undergone PCI with stent implantation between 2005 and 2007 were enrolled. The clinical, demographic and procedural characteristics were reviewed and the stroke risk factors as well as antithrombotic regimens were analyzed. **Results:** The accompanying comorbidities were as follows: hypertension (59.4%), diabetes (37.3%) and congestive heart failure (16.6%). The average number of stroke risk factors was 1.6. At the time of discharge after PCI, warfarin was prescribed for 84 patients (23.2%). Cilostazol was used in addition to dual antiplatelet therapy in 35% of the patients who did not receive warfarin. The mean follow-up period was 615±385 days. The incidences of major adverse cardiac events (MACE), stroke and major bleeding were 11.3%, 3.6% and 4.1%, respectively. By Kaplan-Meier survival analysis, warfarin treatment was not associated with a lower risk of MACE (p=0.886), but it was associated with an increased risk of major bleeding (p=0.002). **Conclusion:** Oral anticoagulation therapy after PCI may increase hemorrhagic events in Korean AF patients. **(Korean Circ J 2011;41:578-582)**

KEY WORDS: Atrial fibrillation; Angioplasty; Stents; Anticoagulants; Platelet aggregation inhibitors.

Table 3. Clinical events during follow-up

Event, n (%)	Not anticoagulated (n=278)	Anticoagulated (n=84)	p
Death	23 (8.3)	3 (3.6)	0.144
AMI	4 (1.4)	3 (3.6)	0.206
TLR	12 (4.3)	1 (1.2)	0.132
Stent thrombosis	4 (1.4)	3 (3.6)	0.206
Major bleeding	6 (2.2)	9 (10.7)	0.002
Minor bleeding	3 (1.1)	2 (2.4)	0.329
Stroke	12 (4.3)	1 (1.2)	0.314
MACE	43 (15.5)	10 (11.9)	0.849
MAE	64 (23.0)	22 (26.2)	0.550

AMI: acute myocardial infarction, TLR: target vessel revascularization, MACE: major adverse cardiac event, MAE: major adverse event

기타 registry연구를 종합하면

- VKA+DAPT는 VKA+SAPT보다 bleeding risk가 높다.
- VKA+SAPT는 VKA 보다 bleeding risk가 높다.
- CLOPD+VKA는 ASA+VKA보다 bleeding risk가 높다.
- Efficacy에 대해서는 일관된 결과가 없다.

NOACs in Phase III Trials

- Dabigatran
  - Higher rate of MI vs. VKA (OR 1.33, CI 1.03-1.71) in a meta-analysis *Uchino et al. Arch Intern Med 2012;172:397*
  - No excess of MI in a Danish and an US Medicare registry *Larsen et al. J Am Coll Cardiol 2013;61:2264, US FDA DSC*
- Rivaroxaban
  - An excess of MI vs. VKA (no stat significance) *Patel et al N Engl J Med 2011;365:883*
- Edoxaban
  - An excess of MI vs. VKA (no stat significance) *Giugliano et al N Engl J Med 2013;369:2093*

NOACs in Patients with ACS

- Apixaban
  - DAPT+apixaban (standard dose) increased major and fatal bleeding without clear benefit of ischemic events.

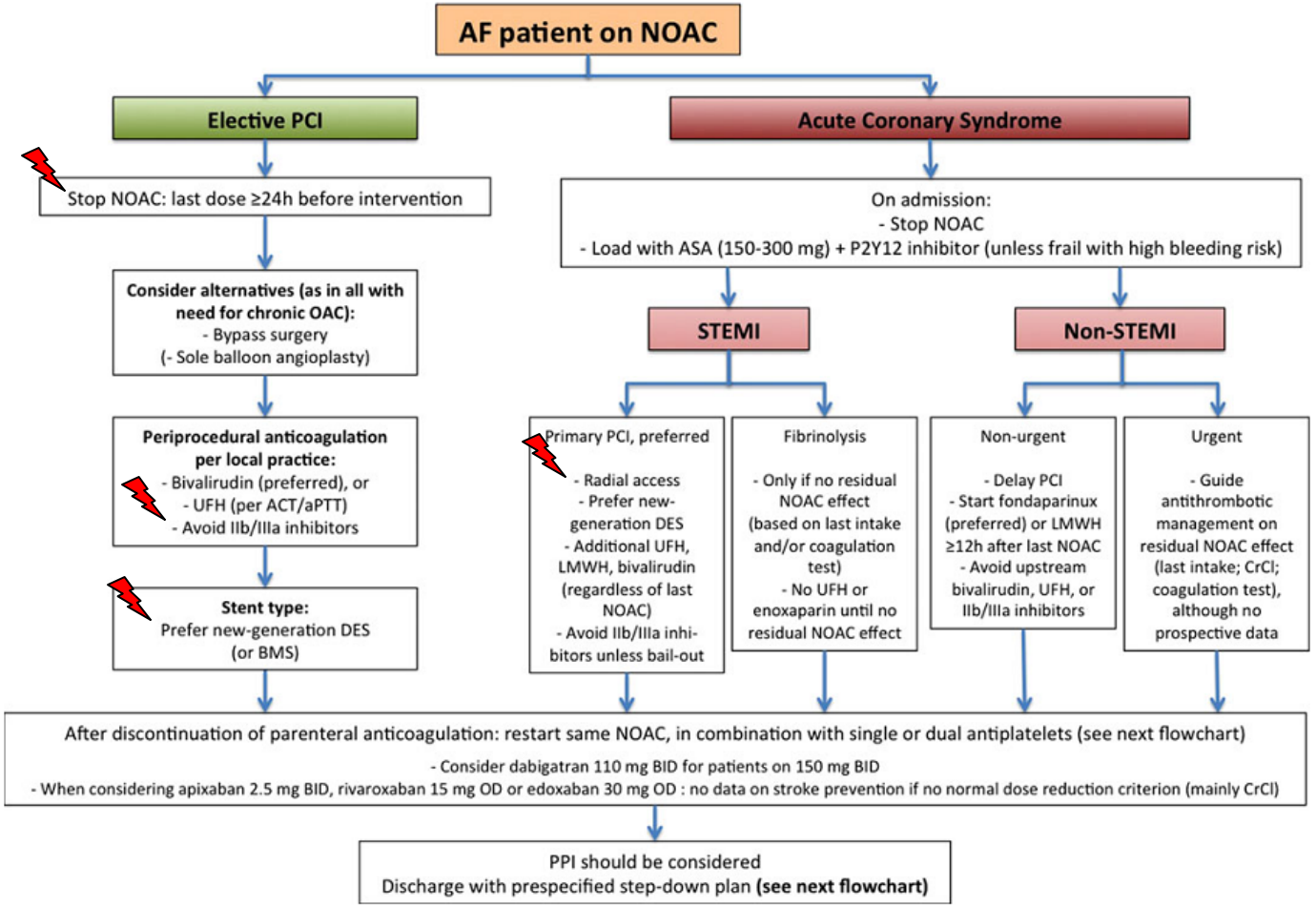
Alexander et al. N Engl J Med 2011;365:699

- Very low dose rivaroxaban (2.5mg bid)
  - DAPT에 추가하였을 때 ACS outcome은 좋았으나, bleeding은 역시 증가.
  - 저용량에서는 뇌졸중 예방효과는 없음.

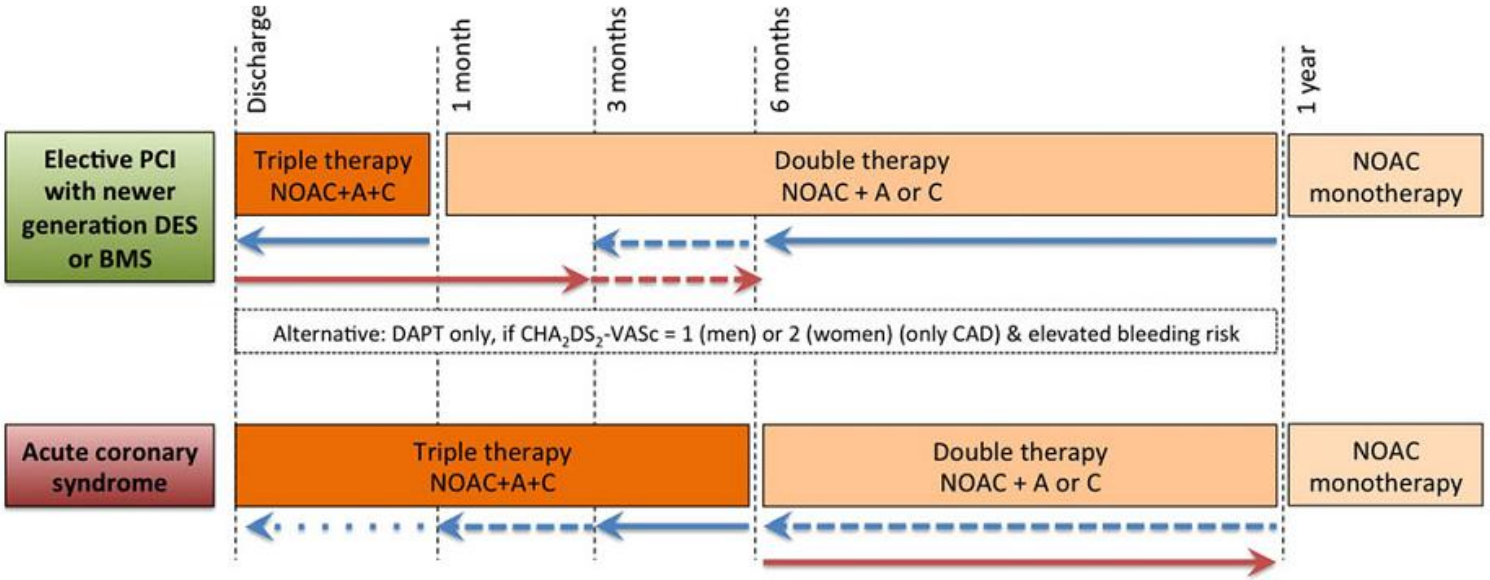
Mega et al. N Engl J Med 2012;366:9

Taken together, triple therapy should be kept as short as possible.

Current Guideline



2015 EHRA practical guide on NOAC



Factors to shorten combination therapy

- (Uncorrectable) high bleeding risk
- Low atherothrombotic risk (by REACH or SYNTAX score if elective?; GRACE <118 if ACS?)

Factors to lengthen combination therapy

- First-generation DES
- High atherothrombotic risk (scores as above ; stenting of the left main, proximal left anterior descending, proximal bifurcation; recurrent MIs; etc.) and low bleeding risk

2015 EHRA practical guide on NOAC

On-Going Trial

- RE-DUAL PCI (Dabigatran)
  - Finished
- PIONEER AF PCI (Rivaroxaban)
  - Finished and published
- AUGUSTUS (Apixaban)
- ENTRUST-AF PCI (Edoxaban)

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Prevention of Bleeding in Patients with Atrial Fibrillation Undergoing PCI

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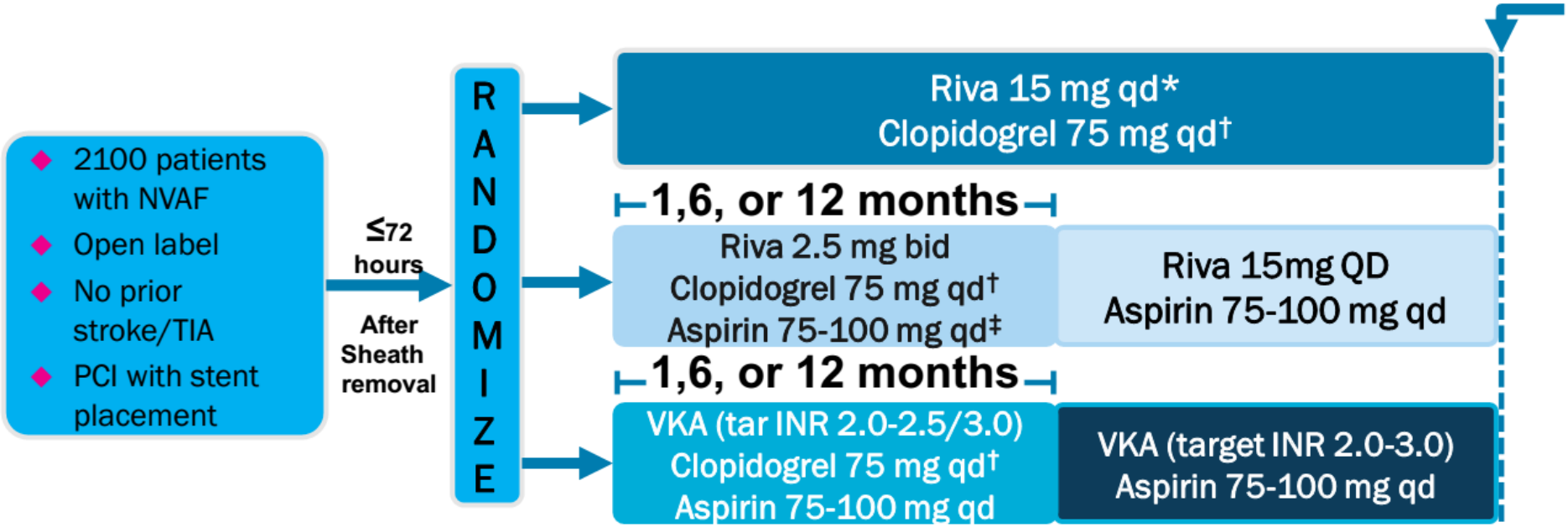
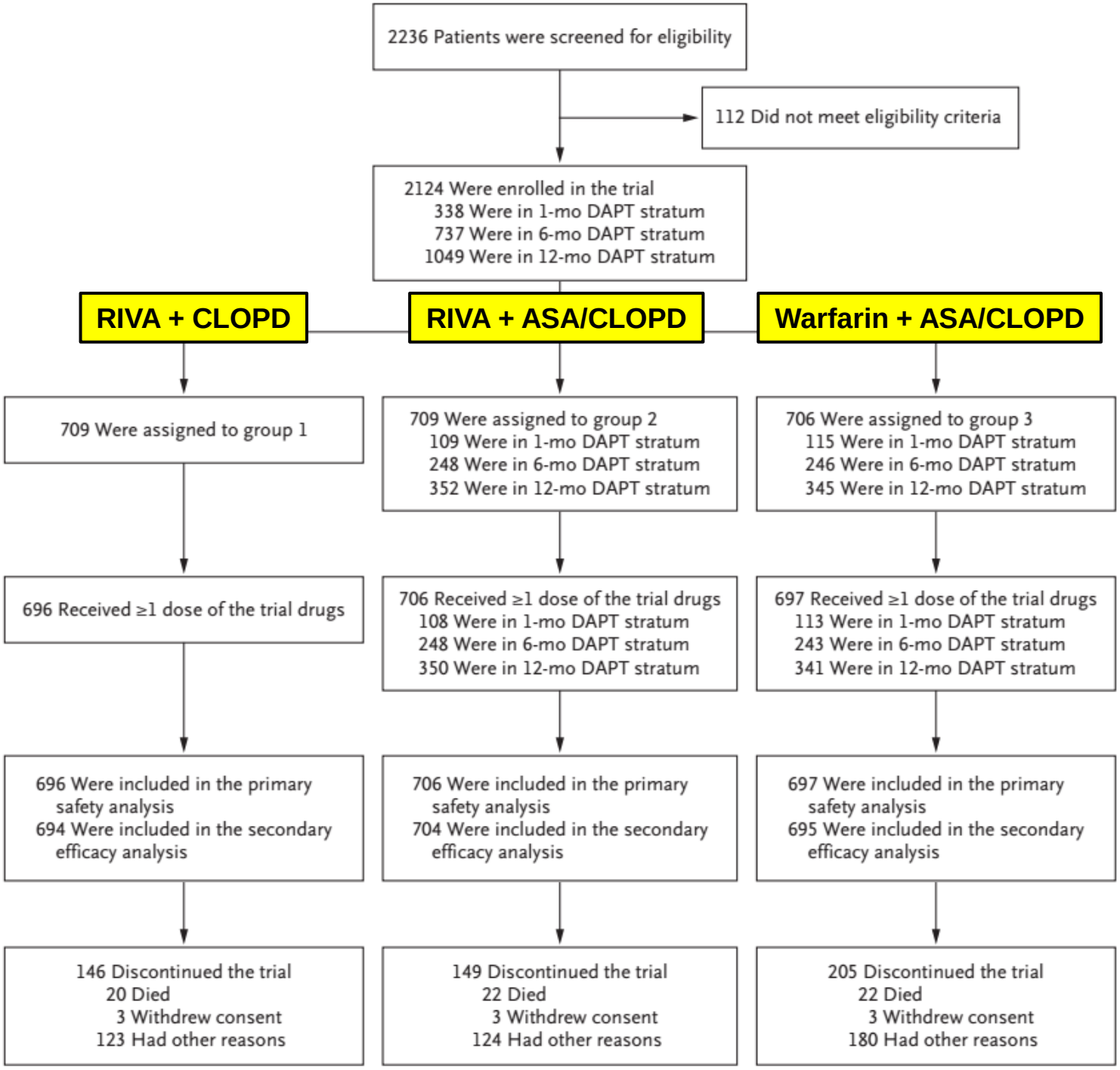
Gibson et al. N Engl J Med 2016;375:2423

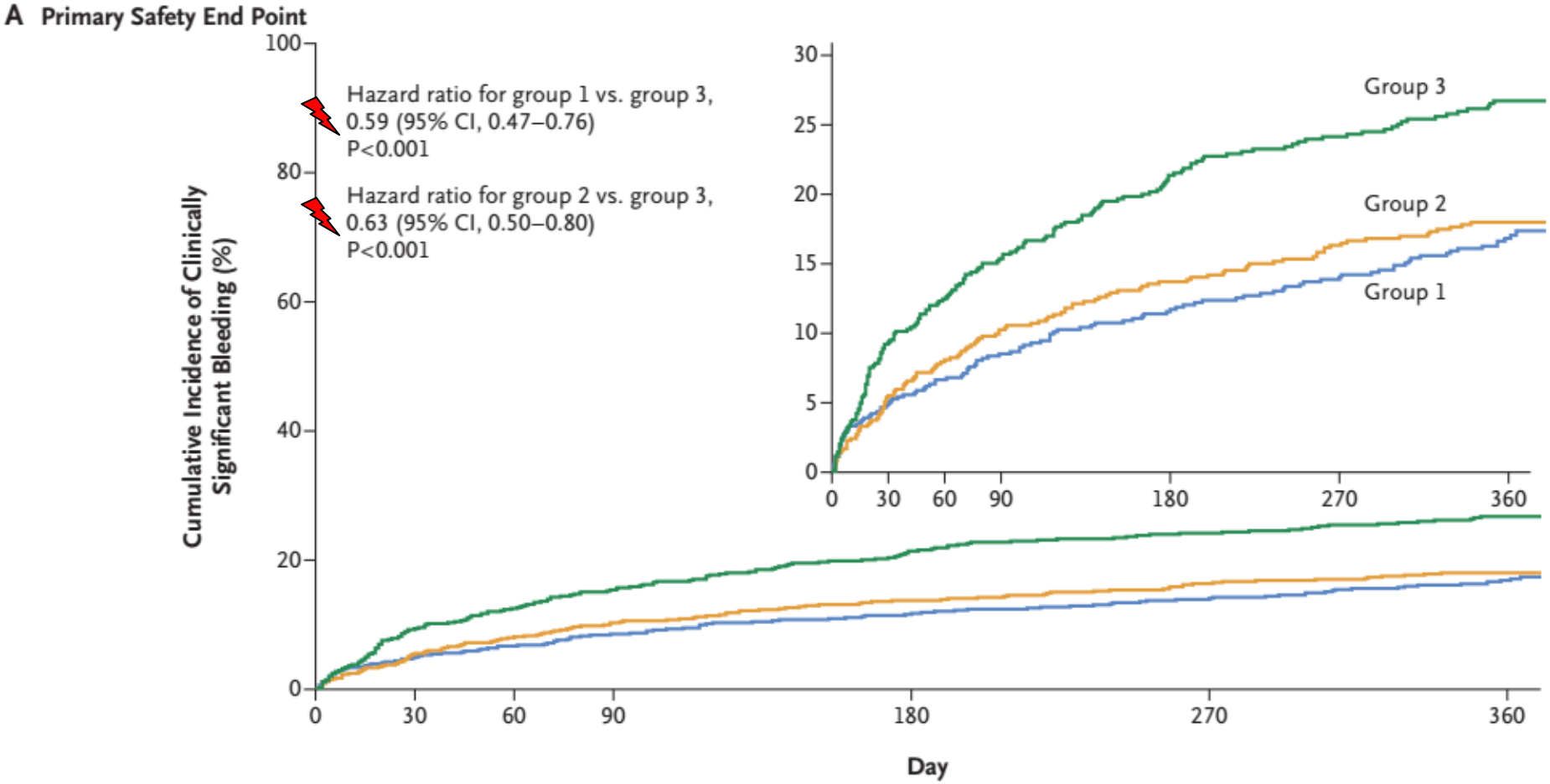
Rivaroxaban in Patients With AF Undergoing PCI: PIONEER AF-PCI



- Primary objective: clinically significant bleeding at 12 months
- Secondary objectives: CV death, MI, stroke, and stent thrombosis

http://clinicaltrials.gov/show/NCT01830543 Oct 2015

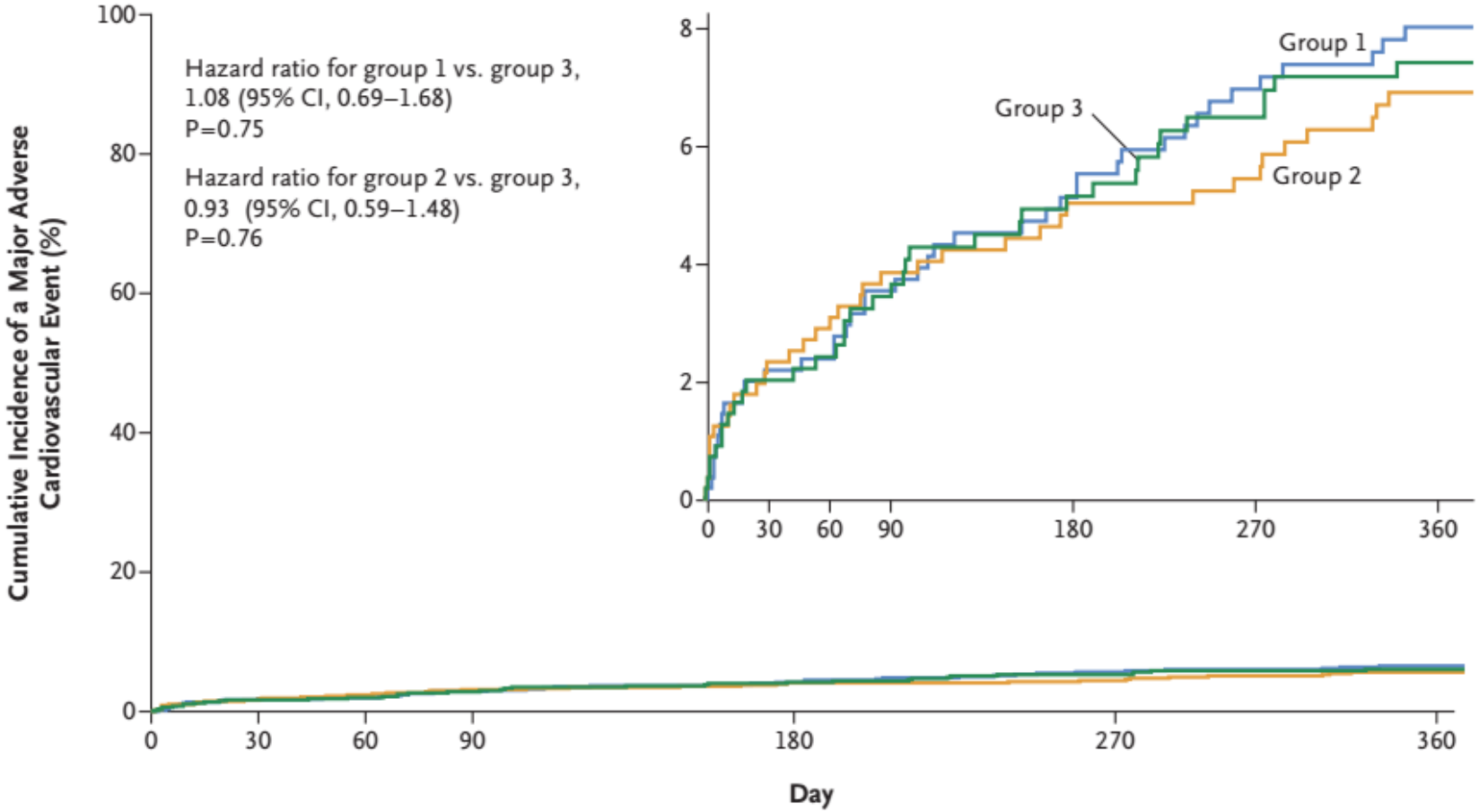

2236 Patients were screened for eligibility
112 Did not meet eligibility criteria
2124 Were enrolled in the trial
338 Were in 1-mo DAPT stratum
737 Were in 6-mo DAPT stratum
1049 Were in 12-mo DAPT stratum
RIVA + CLOPD
RIVA + ASA/CLOPD
Warfarin + ASA/CLOPD
709 Were assigned to group 1
709 Were assigned to group 2
109 Were in 1-mo DAPT stratum
248 Were in 6-mo DAPT stratum
352 Were in 12-mo DAPT stratum
706 Were assigned to group 3
115 Were in 1-mo DAPT stratum
246 Were in 6-mo DAPT stratum
345 Were in 12-mo DAPT stratum
696 Received ≥1 dose of the trial drugs
706 Received ≥1 dose of the trial drugs
108 Were in 1-mo DAPT stratum
248 Were in 6-mo DAPT stratum
350 Were in 12-mo DAPT stratum
697 Received ≥1 dose of the trial drugs
113 Were in 1-mo DAPT stratum
243 Were in 6-mo DAPT stratum
341 Were in 12-mo DAPT stratum
696 Were included in the primary safety analysis
694 Were included in the secondary efficacy analysis
706 Were included in the primary safety analysis
704 Were included in the secondary efficacy analysis
697 Were included in the primary safety analysis
695 Were included in the secondary efficacy analysis
146 Discontinued the trial
20 Died
3 Withdrew consent
123 Had other reasons
149 Discontinued the trial
22 Died
3 Withdrew consent
124 Had other reasons
205 Discontinued the trial
22 Died
3 Withdrew consent
180 Had other reasons



No. at Risk							
Group 1	696	628	606	585	543	510	383
Group 2	706	636	600	579	543	509	409
Group 3	697	593	555	521	461	426	329

Gibson et al. N Engl J Med 2016;375:2423

B **Secondary Efficacy End Point**



No. at Risk							
Group 1	694	648	633	621	590	562	430
Group 2	704	662	640	628	596	570	457
Group 3	695	635	607	579	543	514	408

Gibson et al. N Engl J Med 2016;375:2423

Primary Safety Endpoint

Table 2. Cumulative Incidence of the Primary Safety End Point and Its Components, with Stratification According to Intended Duration of DAPT.*

Cohort and End Point	Group 1	Group 2	Groups 1 and 2	Group 3	Group 1 vs. Group 3		Group 2 vs. Group 3		Groups 1 and 2 vs. Group 3	
	No. of Participants with Events (Kaplan–Meier Event Rate)				Hazard Ratio (95% CI)	P Value	Hazard Ratio (95% CI)	P Value	Hazard Ratio (95% CI)	P Value
All participants — no.	696	706	1402	697						
Clinically significant bleeding	109 (16.8)	117 (18.0)	226 (17.4)	167 (26.7)	0.59 (0.47–0.76)	<0.001	0.63 (0.50–0.80)	<0.001	0.61 (0.50–0.75)	<0.001
Major bleeding	14 (2.1)	12 (1.9)	26 (2.0)	20 (3.3)	0.66 (0.33–1.31)	0.23	0.57 (0.28–1.16)	0.11	0.61 (0.34–1.09)	0.09
Minor bleeding	7 (1.1)	7 (1.1)	14 (1.1)	13 (2.2)	0.51 (0.20–1.28)	0.14	0.50 (0.20–1.26)	0.13	0.51 (0.24–1.08)	0.07
Bleeding requiring medical attention	93 (14.6)	102 (15.8)	195 (15.2)	139 (22.6)	0.61 (0.47–0.80)	<0.001	0.67 (0.52–0.86)	0.002	0.64 (0.51–0.80)	<0.001
Participants assigned to DAPT for 1 mo — no.		108		113						

Gibson et al. N Engl J Med 2016;375:2423

Secondary Efficacy Endpoint

Table 3. Cumulative Incidence of Secondary Efficacy End Points, with Stratification According to Intended Duration of DAPT.*

Cohort and End Point	Group 1	Group 2	Group 3	Group 1 vs. Group 3		Group 2 vs. Group 3	
	No. of Participants with Events (Kaplan–Meier Event Rate)			Hazard Ratio (95% CI)	P Value	Hazard Ratio (95% CI)	P Value
All participants — no.	694	704	695				
Major adverse cardiovascular event	41 (6.5)	36 (5.6)	36 (6.0)	1.08 (0.69–1.68)	0.75	0.93 (0.59–1.48)	0.76
Death from cardiovascular causes	15 (2.4)	14 (2.2)	11 (1.9)	1.29 (0.59–2.80)	0.52	1.19 (0.54–2.62)	0.66
Myocardial infarction	19 (3.0)	17 (2.7)	21 (3.5)	0.86 (0.46–1.59)	0.62	0.75 (0.40–1.42)	0.37
Stroke	8 (1.3)	10 (1.5)	7 (1.2)	1.07 (0.39–2.96)	0.89	1.36 (0.52–3.58)	0.53
Stent thrombosis	5 (0.8)	6 (0.9)	4 (0.7)	1.20 (0.32–4.45)	0.79	1.44 (0.40–5.09)	0.57
Major adverse cardiovascular event or stent thrombosis	41 (6.5)	36 (5.6)	36 (6.0)	1.08 (0.69–1.68)	0.75	0.93 (0.59–1.48)	0.76

Gibson et al. N Engl J Med 2016;375:2423

	Event Rate			Group 1 vs. Group 3 Rivaroxaban *plus* $P2Y_{12}$ Inhibitor **vs.** VKA *plus* DAPT		Group 2 vs. Group 3 Rivaroxaban *plus* DAPT **vs.** VKA *plus* DAPT	
	Group 1	**Group 2**	**Group 3**	**HR (95% CI)**	**p-value***	**HR (95% CI)**	**p-value***
Overall	N= 694	N= 704	N= 695				
Overall Stroke	8 (1.3)	10 (1.5)	7 (1.2)	1.07 (0.39 - 2.96)	0.891	1.36 (0.52 - 3.58)	0.530
Ischemic Stroke	7 (1.2)	6 (0.9)	2 (0.3)	3.28 (0.68 – 15.78)	0.117	2.87 (0.58 – 14.23)	0.176
Ischemic Stoke with hemorrhagic transformation	0 (0.0)	1 (0.1)	1 (0.1)	-	0.318	0.97 (0.06 – 15.50)	0.983
Primary Hemorrhagic Stroke	1 (0.2)	2 (0.3)	3 (0.5)	0.31 (0.03 – 3.00)	0.286	0.63 (0.11 – 3.79)	0.614
Uncertain Stroke	0 (0.0)	1 (0.2)	1 (0.2)	-	0.296	0.93 (0.06 – 14.83)	0.957

Supplementary Appendix

Limitations

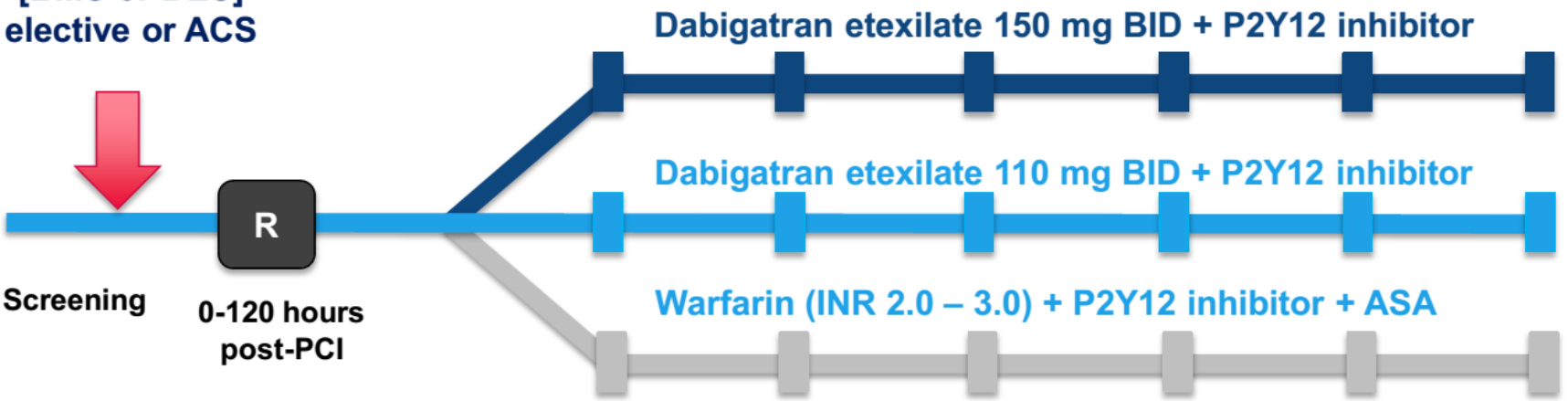
- Efficacy를 증명하기에는 대상환자가 적다. Superiority를 증명하기 위해서는 각 군당 13,598명이 필요
- 하물며 1, 6, 12개월 사용군 간의 subgroup analysis는 통계적 분석력이 더 떨어진다.
- Ticagrelor, prasugrel사용 군이 적다.

RE-DUAL PCI™
Study in NVAF patients undergoing PCI

Trial design

1º End Point
Time to first ISTH major bleeding or clinically relevant non-major bleeding event
n= 2,500 patients (approx. 834 patients per arm)

Paroxysmal, persistent or permanent NVAF, PCI with stenting [BMS or DES] elective or ACS



Patients >80 years living outside of the USA will be assigned to 110mg dabigatran etexilate (BID) or warfarin in a 1:1 ratio

DE arms: ASA discontinuation immediately after PCI

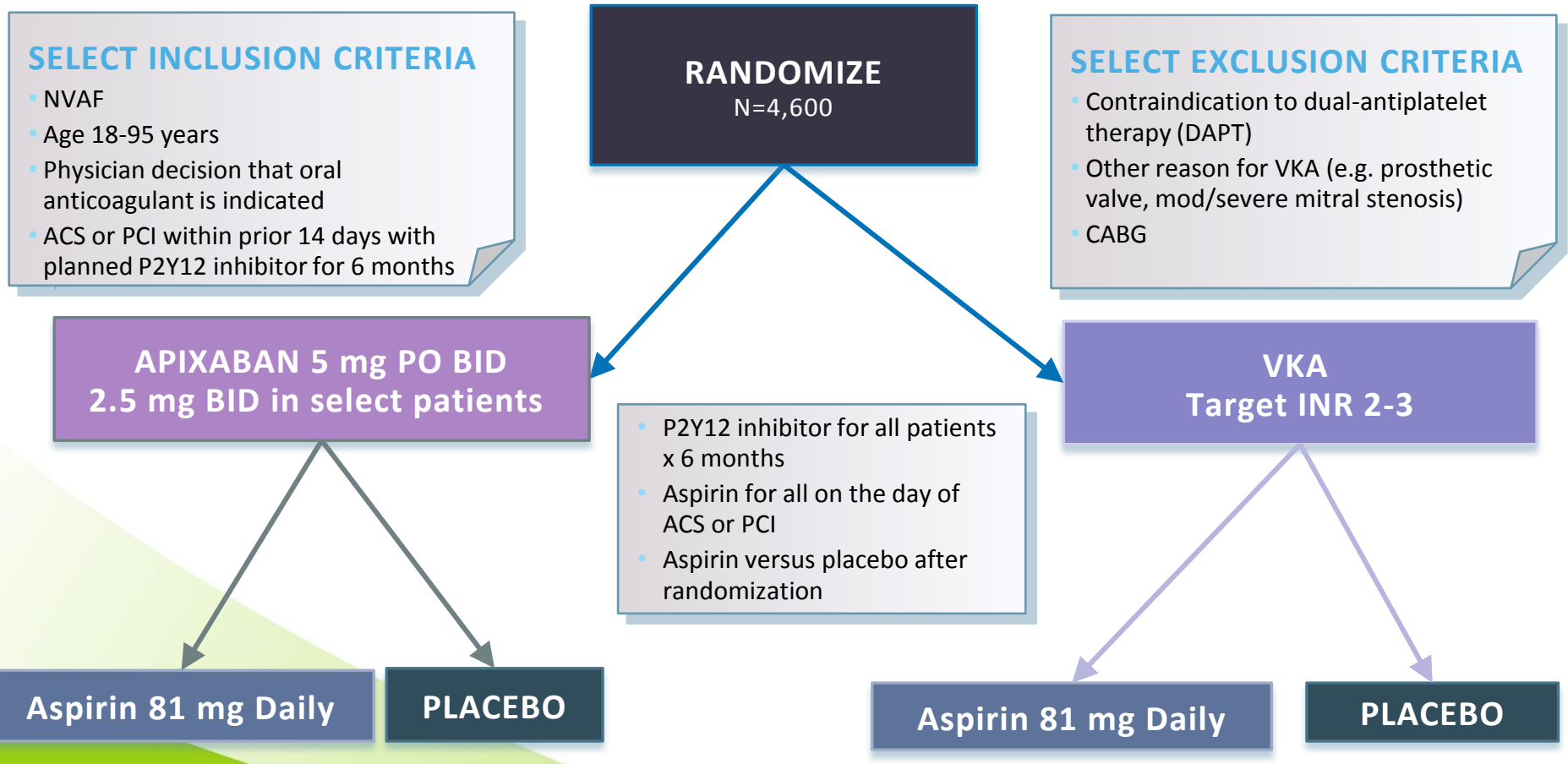
Warfarin arm: ASA (<100 mg) discontinuation after 1 month (BMS) or 3 months (DES)

P2Y12 inhibitor (clopidogrel 75 mg qd or ticagrelor 90 mg bid) can be discontinued or switched to ASA (≤ 100mg q.d.) after 12 months of follow up at the discretion of the investigator

ACS: Acute Coronary Syndrome; ASA: Acetylsalicylic acid; BMS: Bare Metal Stent
DES: Drug Eluting Stent; ISTH: International Society on Thrombosis and Haemostasis; INR: International Normalized Ratio; NVAF: Non Valvular Atrial Fibrillation; PCI: Percutaneous Coronary Intervention
ClinicalTrials.gov: NCT02164864

AUGUSTUS Trial: NVAF Patients Undergoing PCI

Phase IV, open-label, 2 x 2 factorial, randomized controlled clinical trial



*CABG, coronary artery bypass graft; ** Patients with ≥2 of the following: age ≥80 years, weight ≤60 kg, serum creatinine ≥1.5 mg/dL (133 mM)*

Source: Clinicaltrials.gov identifier: NCT02415400; EUDRACT: 2014-002004-24; www.clinicaltrialresults.org/Slides/ESC2015/Lopes_AUGUSTUS.PPT; Date accessed February 7, 2016.

ENTRUST-AF-PCI Study Design

ENTRUST-AF PCI

PROBE design: prospective, randomized, open label, blinded evaluation edoxaban based regimen vs VKA based regimen in N ≅ 1500 AF patients

12 months: end of treatment

Inclusion Criteria:

- ***OAC indication for AF for at least 12 months***
- ***Successful PCI with stent placement (goal of at least 25% ACS)***

4 hours – 5 days after sheath removal

RANDOMIZE

Edoxaban 60 mg/day*

***$P2Y_{12}$ antagonist** (without ASA)*

Vitamin K Antagonist*

$P2Y_{12}$ antagonist (ASA 1 - 12 months)**

**Edoxaban dose reduction to 30 mg OD*

- *if CrCL≤50 ml/min*
- *BW≤60 kg*
- *certain P-gp inhibitors*

***Clopidogrel 75mg once-daily or if documented need prasugrel 5 or 10mg once-daily or ticagrelor 90mg twice-daily . Predeclared at randomization*

**** VKA, target INR 2-3*

*****ASA 100mg OD for 1-12 months guided by clinical presentation (ACS or stable CAD), CHA_2DS-$VASc_2$ and HAS_BLED*

Primary outcome:
ISTH major and clinically relevant non-major bleeding

ClinicalTrials.gov Identifier: NCT02866175

기타 고려사항

- 시술 전 평가
  - PCI가 꼭 필요한가?
  - Ischemic/thrombotic and bleeding risk
- 시술 시 고려사항
  - Vascular access (radial)
  - Stent selection (new-generation DES)
- 시술 후 고려사항
  - Re-assessment of risk profile
  - Recommend PPI and avoid NSAIDs

Uninterrupted OAC for Ablation in Atrial Fibrillation

PERIPROCEDURAL MANAGEMENT

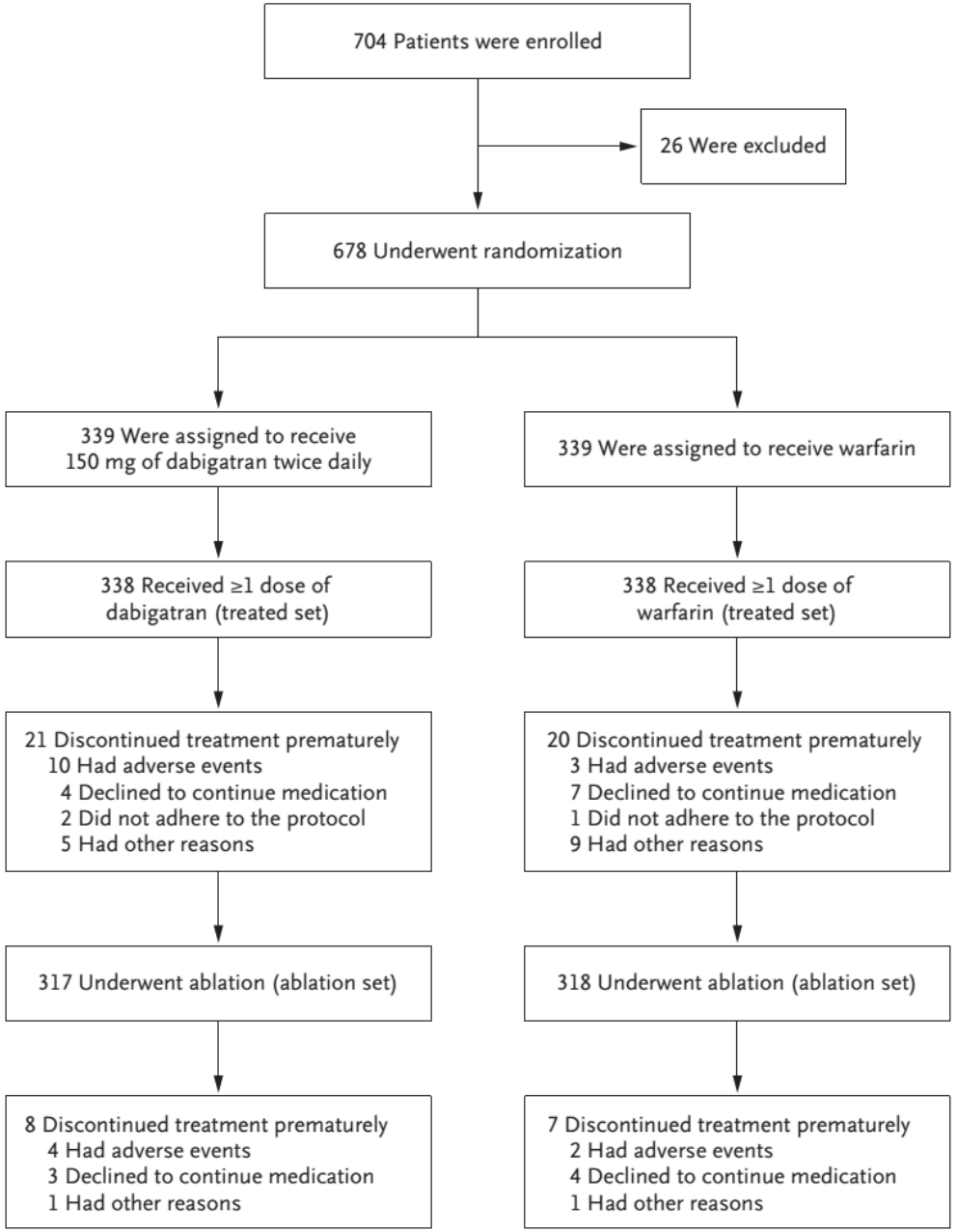
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Uninterrupted Dabigatran versus Warfarin for Ablation in Atrial Fibrillation

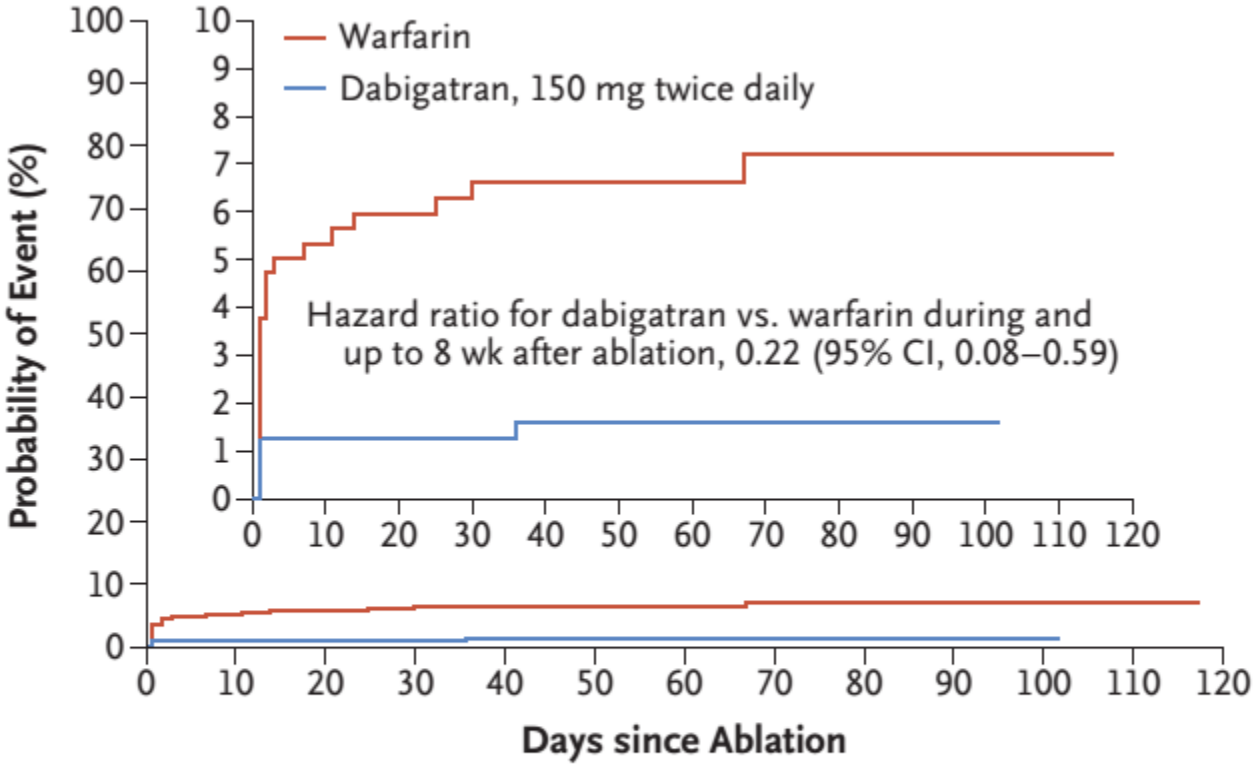
Hugh Calkins, M.D., Stephan Willems, M.D., Edward P. Gerstenfeld, M.D., Atul Verma, M.D., Richard Schilling, M.D., Stefan H. Hohnloser, M.D., Ken Okumura, M.D., Ph.D., Harvey Serota, M.D., Matias Nordaby, M.D., Kelly Guiver, M.Sc., Branislav Biss, M.D., Marc A. Brouwer, M.D., Ph.D., and Massimo Grimaldi, M.D., Ph.D., for the RE-CIRCUIT Investigators*

Calkins et al. N Engl J Med 2017 online



Calkins et al. N Engl J Med 2017 online

Time to First Adjudicated Major Bleeding Events



No. at Risk

Dabigatran	317	313	311	311	306	305	297	83	4	2	1	0	0
Warfarin	318	301	297	296	295	295	278	85	13	5	3	1	0

Calkins et al. N Engl J Med 2017 online

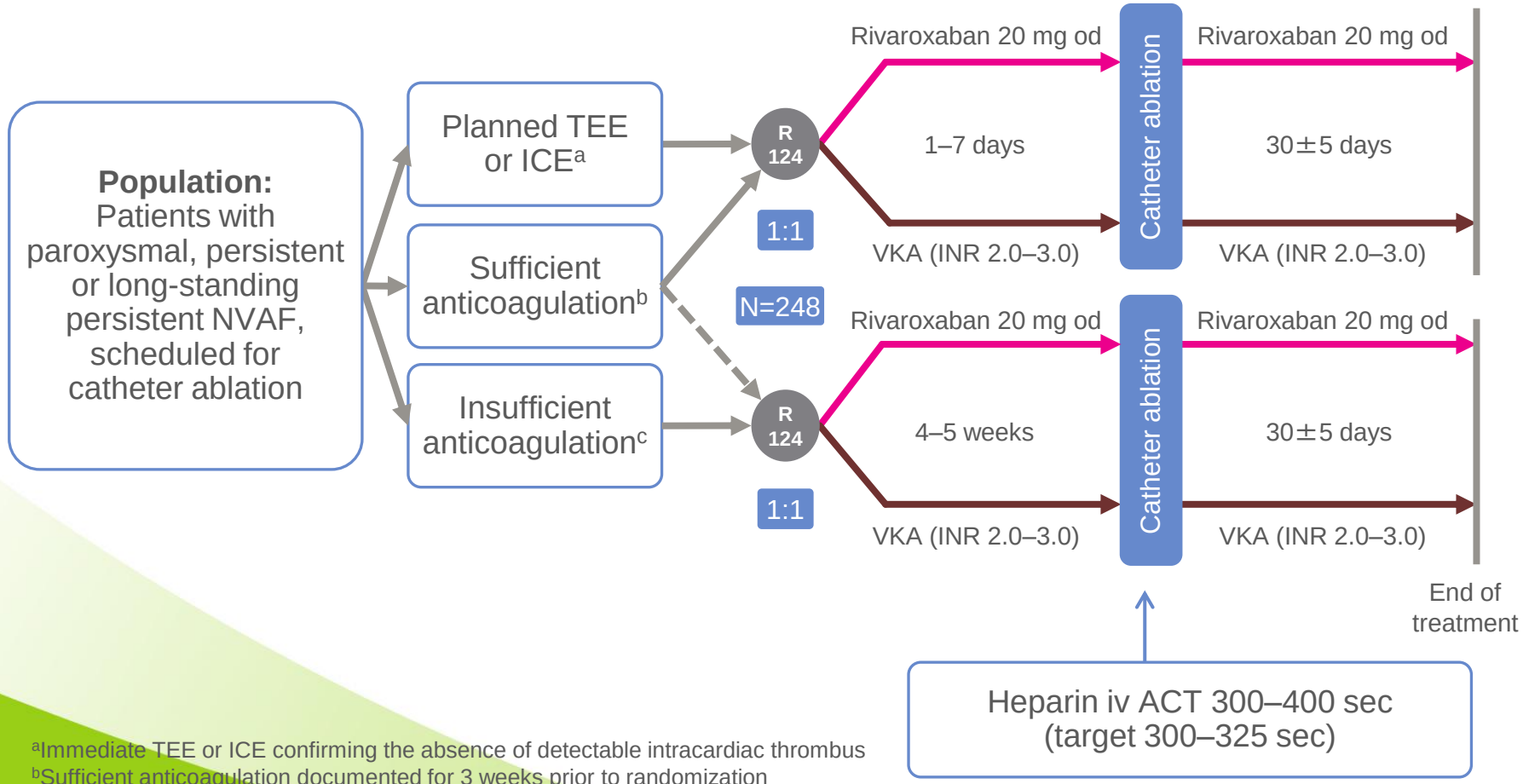
Adverse Events

Table 2. Adverse Events during the Treatment Period (Treated Set).*

Event	Dabigatran, 150 mg twice daily (N=338)	Warfarin (N=338)	Total (N=676)
		number (percent)	
Any adverse event	225 (66.6)	242 (71.6)	467 (69.1)
Severe adverse event†	11 (3.3)	21 (6.2)	32 (4.7)
Adverse event leading to treatment discontinuation	19 (5.6)	8 (2.4)	27 (4.0)
Serious adverse event	63 (18.6)	75 (22.2)	138 (20.4)
Fatal adverse event	0	0	0
Immediately life-threatening event	1 (0.3)	2 (0.6)	3 (0.4)
Event that resulted in clinically significant or persistent disability or incapacity	0	1 (0.3)	1 (0.1)
Event that required hospitalization	26 (7.7)	34 (10.1)	60 (8.9)
Event that prolonged hospitalization	13 (3.8)	22 (6.5)	35 (5.2)
Other‡	29 (8.6)	27 (8.0)	56 (8.3)

Calkins et al. N Engl J Med 2017 online

VENTURE AF Design: Randomized, Open-label, Active-controlled Multicentre Study



[a]Immediate TEE or ICE confirming the absence of detectable intracardiac thrombus
[b]Sufficient anticoagulation documented for 3 weeks prior to randomization
[c]These patients were randomized to receive study drug for 4-5 weeks prior to the procedure

Please refer to the slide notes for the full details of the footnotes

Naccarelli GV *et al, J Interv Card Electrophysiol* 2014;41:107–116

VENTURE AF: Complications During the Study Period

	Rivaroxaban	VKA	Total
Any adjudicated event	26	25	51
	n=123	n=121	N=244
Any bleeding event*	21	18	39
Major bleeding event	0	1	1
Vascular pseudoaneurysm	0	1	1
Non-major bleeding event	21	17	38
Most relevant:			
Arteriovenous fistula	0	1	1
Catheter/puncture site haemorrhage	1	1	2
Haematoma/vessel puncture site haematoma	8	10	18
Vascular pseudoaneurysm	3	1	4
	n=124	n=124	N=248
Any thromboembolic events (composite)#	0	2	2
Ischaemic stroke	0	1	1
Vascular death	0	1	1
	n=114	n=107	N=221
Any other procedure-attributable event†	5	5	10
Pericardial effusion without tamponade	0	1	1

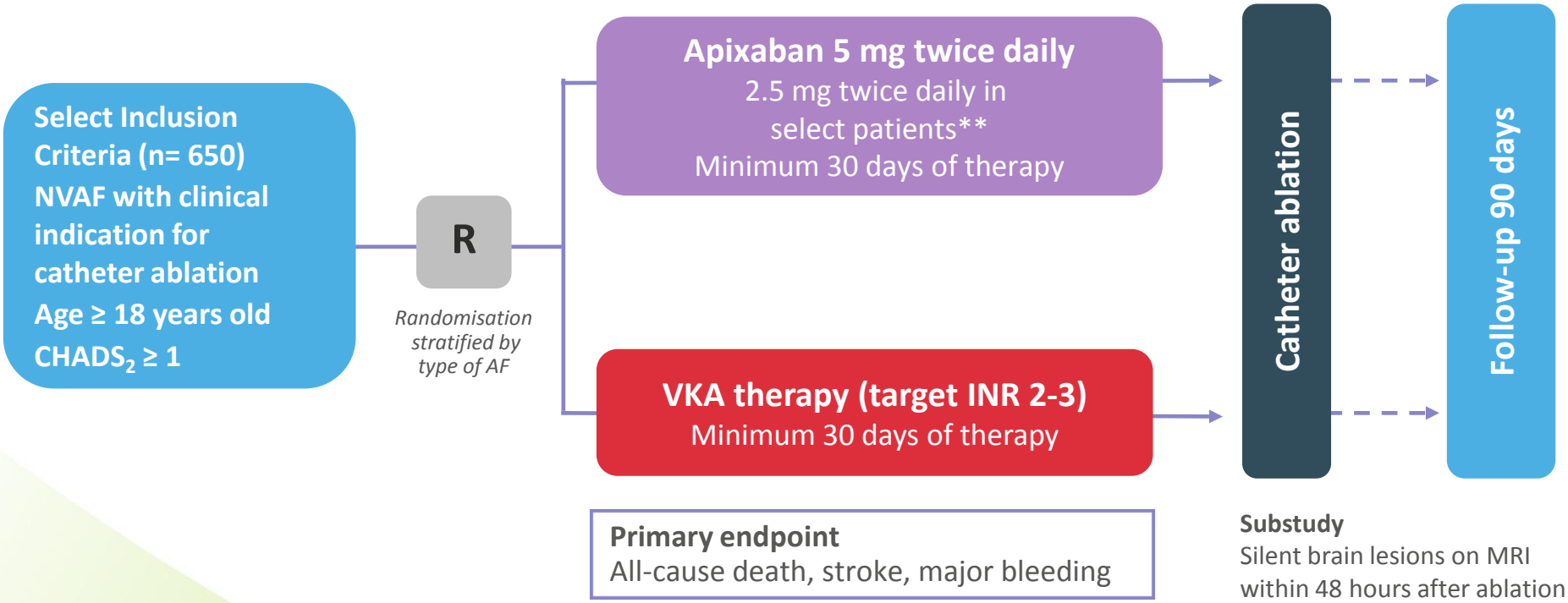
*safety population; #ITT population; †per-protocol population

For full list see publication or back-up-slide

Adapted from Cappato R *et al. Eur Heart J* 2015; doi:10.1093/eurheartj/ehv177 [E-Pub ahead of print]

AXAFA Trial: NVAF Patients Undergoing Catheter Ablation

Phase IV, Prospective Parallel –Group, Randomized, Open-label, Blind Assessment Non-inferiority Study (PROBE)*

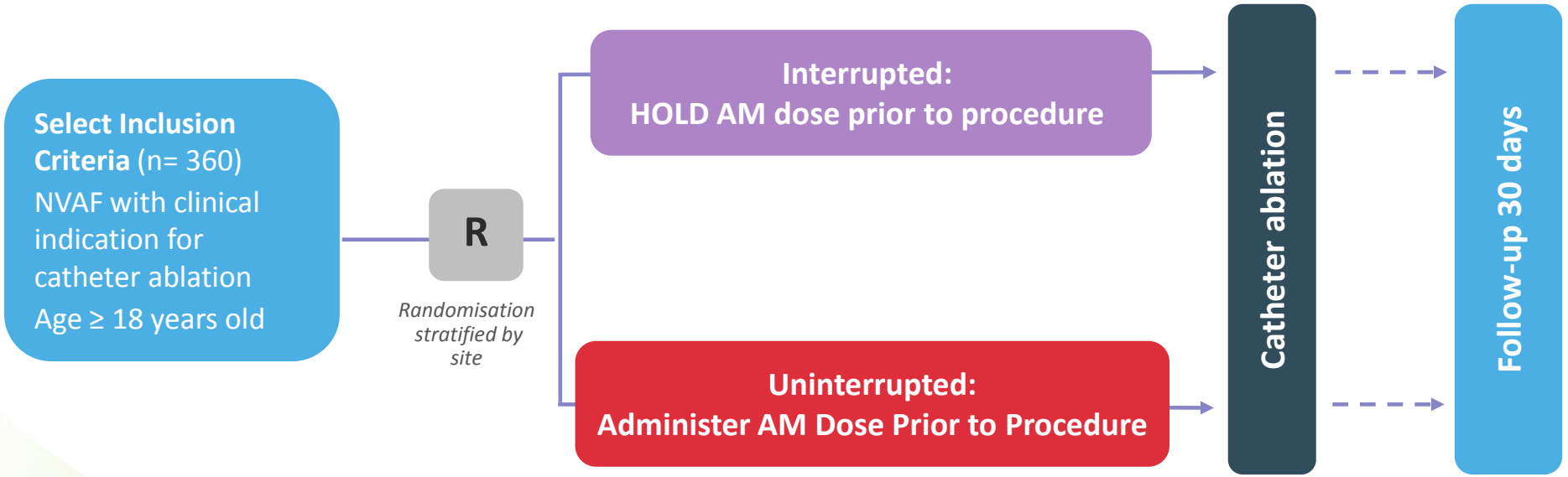


Countries: Belgium, Denmark, Germany, Italy, Netherlands, Spain, UK, US

*** Patients with ≥2 of the following: age ≥80 years, weight ≤60 kg, serum creatinine ≥1.5 mg/dL (133 mM)*
INR, international normalised ratio
Study number NCT02227550. Details available from www.ClinicialTrials.gov

AEIOU: NVAF Patients Undergoing Catheter Ablation

Phase IV, open label, randomized, parallel assignment trial with prospective and retrospective cohorts*



Apixaban 5 mg twice daily X 21 Days
2.5 mg twice daily in select patients**

Primary endpoint
Clinically significant bleeding (BARC ≥ 2)
Thrombotic events: composite non-hemorrhagic stroke and systemic thromboembolic events

Retrospective Warfarin Cohort
September 1, 2013 - present

*** Patients with ≥2 of the following: age ≥80 years, weight ≤60 kg, serum creatinine ≥1.5 mg/dL (133 mM)*
INR, international normalised ratio
Study number **NCT02608099**. *Details available from* www.ClinicialTrials.gov

Summary

- PCI in AF patients
  - NOAC (or VKA)는 stroke risk stratification에 따라 평생 사용한다.
  - DAPT의 기간을 조절한다.
  - VKA를 사용할 경우 INR 2.0-2.5
  - NOAC의 경우 lowest therapeutic dose
  - P2Y12 inhibitor로는 clopidogrel을 선호
  - ASA는 75-100mg/d
- Uninterrupted OAC in AF ablation
  - NOAC에서도 통용될 가능성이 높다
  - Antidote가 있을 경우 유리할 것