ATRIAL FIBRILLATION:

Focus on Stroke Prevention

Considerations for the Prevention of Stroke in Patients with Atrial Fibrillation

A knowledge-based CPE activity presented during the NC TCCP Quarterly Meeting

Tuesday, November 9, 2010
The Institute of Pharmacy
Chapel Hill, North Carolina
6:30 pm – 7:30 pm

Planned and conducted by ASHP *Advantage*.
Supported by an independent educational grant from Boehringer Ingelheim Pharmaceuticals, Inc.

Considerations for the Prevention of Stroke in Patients with Atrial Fibrillation

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ACTIVITY FACULTY

James S. Kalus, Pharm.D., BCPS (AQ-Cardiology)
Senior Manager, Patient Care Services
Department of Pharmacy Services
Henry Ford Hospital
Detroit, Michigan

James S. Kalus, Pharm.D., BCPS (AQ-Cardiology), is Senior Manager of Patient Care Services in the Department of Pharmacy Services at Henry Ford Hospital in Detroit, Michigan. In this position, Dr. Kalus is responsible for planning, implementing, and managing all pharmacy services related to patient care. He also is responsible for formulary management, evaluation, and control. In addition, he oversees staff training and development, as well as pharmacy research. He is Program Director for the postgraduate year one (PGY1) residency at Henry Ford Hospital and precepts a general inpatient cardiology rotation for pharmacy students and residents.

Dr. Kalus earned both his Bachelor of Science in Pharmacy and Doctor of Pharmacy degrees at the University of Toledo in Toledo, Ohio. After completing a residency at the Medical University of South Carolina in Charleston, he did a two-year cardiovascular research fellowship through Hartford Hospital and the University of Connecticut in Hartford, Connecticut. Of note, Dr. Kalus was honored with the Outstanding Young Alumnus Award from the University of Toledo in 2009.

Before assuming his current position, Dr. Kalus served as Assistant Professor at the Eugene Applebaum College of Pharmacy and Health Sciences at Wayne State University in Detroit. He is board-certified as a pharmacotherapy specialist with added qualifications in cardiology

In his research, Dr. Kalus focuses on atrial fibrillation (AF), including the pathophysiology of AF occurring after cardiac surgery and novel strategies for the treatment and prevention of AF. He has authored several textbook chapters and many articles published in peer-reviewed journals, including the *American Journal of Health-System Pharmacy, Annals of Pharmacotherapy, Annals of Thoracic Surgery, Circulation, Journal of Electrocardiology, Pharmacoeconomics,* and *Pharmacotherapy*. He also serves on the editorial board of *The Annals of Pharmacotherapy*, Cardiology Panel.

Complementing the practice and research interests of Dr. Kalus is his involvement in professional associations. An active member of the American Society of Health-System Pharmacists (ASHP), he regularly speaks at educational sessions at the ASHP Midyear Clinical Meeting. As a member of the 2007 Research Affairs Committee of the American College of Clinical Pharmacy, he co-authored the report, “Recommended Education for Pharmacists as Competitive Clinical Scientists,” published in March 2009. The Southeastern Michigan Society of Health-System Pharmacists honored him with the 2008 Preceptor of the Year award and the 2006 Innovative Practice Award. He also has received the Drug Therapy Research Award from the ASHP Research and Education Foundation, and, in 2009, Dr. Kalus and his colleagues were finalists for the Foundation’s Excellence in Medication Use Safety Award.

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Kristi Hofer, Pharm.D.

Dr. Hofer declares that she has no relationships pertinent to this activity.

Considerations for the Prevention of Stroke in Patients with Atrial Fibrillation

ACTIVITY OVERVIEW

This continuing pharmacy education activity will provide an overview of current guidelines, quality measures, and clinical data on prevention of stroke in patients with atrial fibrillation (AF). Emerging issues regarding new drug therapies and clinical controversies in the care of these patients will be explored. The role of the pharmacist in identifying and overcoming barriers to appropriate and well-managed antithrombotic therapy will be discussed.

LEARNING OBJECTIVES

At the conclusion of this knowledge-based CPE activity, participants should be able to

- Explain how to incorporate clinical guidelines and performance measures on the prevention of stroke in the treatment of patients with AF.
- Identify barriers to improving the management of atrial fibrillation, specifically stroke prevention, and describe potential pharmacist-driven solutions.
- Describe emerging medications and combination therapy for stroke prevention in AF.

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The American Society of Health-System Pharmacists is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education. This activity provides 1 hour (0.1 CEU) of continuing pharmacy education credit (ACPE activity #204-000-10-465-L01P).

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Be sure to record the six-digit session code announced during this activity.

Considerations for the Prevention of Stroke in Patients with Atrial Fibrillation

Instructions for Processing Continuing Pharmacy Education (CPE)

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1. Select "Process Meeting CE" from bottom left. Log in to the ASHP Learning Center using your e-mail address and password.

   If you have not logged in to the new ASHP Learning Center (launched August 2008) and are not a member of ASHP, you will need to create a free account by clicking on "Become a user" and following the instructions.

2. Once logged in to the site, click on **"Process Meeting CE."**

3. If this activity title does not appear in your meeting list, enter the 5-digit activity code in the box above the list and click submit. The Activity Code for this meeting is **10640.** The **Session Code** was announced at the end of this activity. Click **register** again when prompted. When you receive the "thank you for registering" message, click **continue**. This step will bring you back to your meeting list. Click on the **start** link to the right of the activity title.

4. Enter the session code, which was announced during the activity, and select the number of hours equal to your participation in the activity. Pharmacists should only claim credit for the amount of time they participate in this activity.

5. Click **submit** to receive the attestation page.

6. Confirm your participation and click **submit**. Your transcript page will appear.

7. Select the applicable year from the drop-down menu and locate this activity.

8. Click on **Print Statement of Credit** in the **Status** column.

Activity code: **10640**

Session code:

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Objectives

- Explain how to incorporate clinical guidelines and performance measures on the prevention of stroke in the treatment of patients with AF.
- Identify barriers to improving the management of atrial fibrillation, specifically stroke prevention, and describe potential pharmacist-driven solutions.
- Describe emerging medications and combination therapy for stroke prevention in AF.

Epidemiology of AF

- Most common arrhythmia in U.S.
  - Projected to affect 2.66 million in 2010
- Men > women
  - Regardless of age
- Whites > blacks
- Incidence and prevalence increase with age
  - Median age = 75 yr
  - 70% of patients with AF between 65-85 yr

Lloyd-Jones D et al. *Circulation.* 2010; 121:e1-e170.
Go AS et al. *JAMA.* 2001; 285:2370-5.
Feinberg WM et al. *Arch Intern Med.* 1995; 155:469-73.

Stroke in AF

- 15-20% of all ischemic strokes occur in patients with AF
- AF independently increases risk of ischemic stroke by 4-5-fold
- Patients not treated with anticoagulants have 5% annual risk of stroke

Lloyd-Jones D et al. *Circulation.* 2010; 121:e1-e170.
Singer DE et al. *Chest.* 2008; 133(6 Suppl):546S-592S.

Stroke Risk Stratification

- $CHADS_2$ score
  - Congestive heart failure = 1 point
  - Hypertension = 1 point
  - Age ≥75 years = 1 point
  - Diabetes = 1 point
  - Stroke/TIA = 2 points

TIA = transient ischemic attack

Gage BF et al. *JAMA.* 2001; 285:2864-70.

Prediction of Stroke Risk – $CHADS_2$ Score

$CHADS_2$ Score	# Patients	Adjusted Stroke Rate‡ (95% CI)
0	120	1.9 (1.2-3.0)
1	463	2.8 (2.0-3.8)
2	523	4.0 (3.1-5.1)
3	337	5.9 (4.6-7.3)
4	220	8.5 (6.3-11.1)
5	65	12.5 (8.2-17.5)
6	5	18.2 (10.5-27.4)

‡ Per 100 person-years

Gage BF et al. *JAMA.* 2001; 285:2864-70.

Thromboembolic Consequences

- Patients at <u>high</u> risk for stroke in AF ($CHADS_2$ score ≥2)
  - Previous TIA, ischemic stroke, or systemic embolism
  - Having 2 or more of the following risk factors
    - Age > 75 years
    - Hypertension
    - Diabetes
    - Moderately or severely impaired left ventricular systolic function and/or heart failure

Singer DE et al. *Chest.* 2008; 133(6 Suppl):546S-92S.

Thromboembolic Consequences

- <u>Intermediate</u> risk ($CHADS_2$ score = 1)
  - Having only one of the following risk factors
    - Age > 75 years
    - Hypertension
    - Diabetes
    - Moderately or severely impaired left ventricular systolic function and/or heart failure
- <u>Low</u> risk ($CHADS_2$ score = 0)
  - Age ≤ 75 years with none of the risk factors in high- or intermediate-risk categories

Singer DE et al. *Chest.* 2008; 133(6 Suppl):546S-92S.

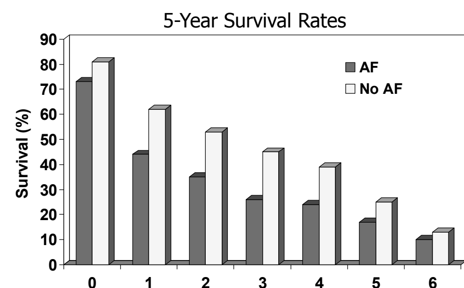
Short-Term Outcomes

- n = 4462 patients in Europe hospitalized for first-time stroke
  - AF present in 803 (18%) patients
- 3-month outcomes
  - Mortality ($p < 0.001$)
    - AF patients = 32.8%
    - Non-AF patients = 19.9%
  - Remaining disabled
    - OR 1.43 (95% CI 1.13-1.80)
  - Remaining handicapped
    - OR 1.51 (95% CI 1.13-2.02)

Lamassa M et al. *Stroke.* 2001;32:392-8.

Impact of Stroke on Survival

(*n* = 31,821 patients with and 73,253 patients without AF who had a stroke between 2001-2005)



Henriksson KM et al. *Int J Cardiol.* 2010:141:18-23.

Antithrombotic Therapy

Chest guidelines	Stroke/TIA or ≥ 2 other risk factors	1 risk factor	No risk factors
$CHADS_2$ score	≥2	1	0
Recommended antithrombotic therapy	Warfarin (1A)	Warfarin (1A) Aspirin (1B)	Aspirin (1B)

Warfarin: Target INR 2.5 (range 2-3)
Aspirin: 75-325 mg daily

Singer DE et al. *Chest.* 2008;133(6 Suppl):546S-92S.

Assessing a Patient's Stroke Risk

RT, a 68 yo AAF, presents to the cardiology clinic with palpitations and SOB. She states that she has been experiencing these symptoms for the past 3–4 days. She has a history of type 2 DM, HTN, and hypothyroidism. Her medications include hydrochlorothiazide 25 mg po daily, lisinopril 20 mg po daily, pravastatin 40 mg po daily, levothyroxine 125 mcg po daily, and glipizide XL 10 mg po daily. Her vital signs include BP 128/70 mm Hg, HR 125 bpm. An ECG reveals AF. Echocardiography reveals an LVEF of 50%, no evidence of thrombus, and no LVH. In which of the following stroke risk categories does this patient belong?

a. Low risk.

b. Intermediate risk.

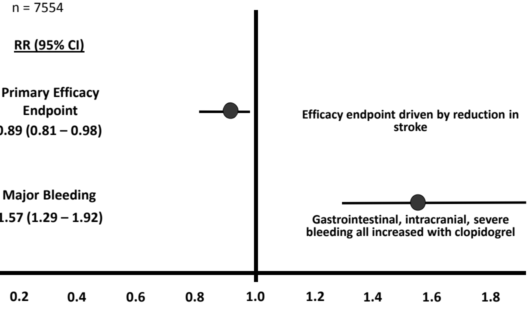
c. High risk.

Recommend the BEST option for long-term reduction in stroke risk for this patient.

RT, a 68 yo AAF, presents to the cardiology clinic with palpitations and SOB. She states that she has been experiencing these symptoms for the past 3–4 days. She has a history of type 2 DM, HTN, and hypothyroidism. Her medications include lisinopril 20 mg po daily, hydrochlorothiazide 25 mg po daily, pravastatin 40 mg po daily, levothyroxine 125 mcg po daily, and glipizide XL 10 mg po daily. Her vital signs include BP 128/70 mm Hg, HR 125 bpm. An ECG reveals AF. Echocardiography reveals an LVEF of 50%, no evidence of thrombus, and no LVH.

a. Aspirin 325 mg daily
b. Warfarin (INR target = 2 – 3)
c. Warfarin (INR target = 1.8 – 2.5)
d. Aspirin 325 mg + clopidogrel 75 mg daily

ACTIVE A: Efficacy/Safety Results



Note: ACTIVE-W found warfarin to be superior to clopidogrel + aspirin

ACTIVE Investigators. *N Engl J Med.* 2009; 360:2066-78.

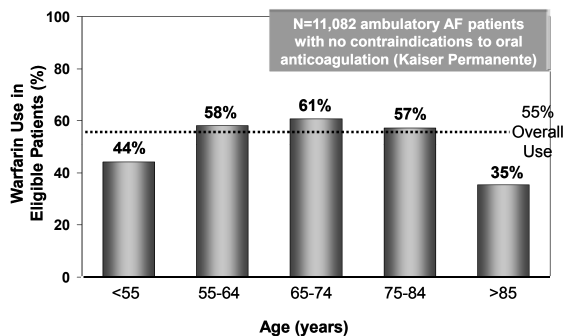
Role of the Pharmacist in Identifying and Overcoming Barriers to Appropriate and Well-Managed Antithrombotic Therapy

Question

In your healthcare system, what percentage of ambulatory patients with atrial fibrillation and a moderate to high risk of stroke receive warfarin therapy?

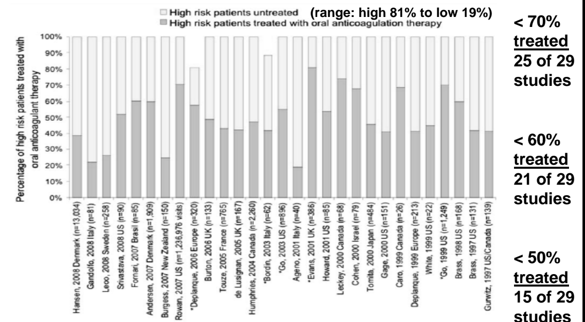
a. > 70 %
b. 50-70 %
c. 30-49 %
d. < 30 %

Underuse of Warfarin in AF Patients



Go AS et al. *Ann Intern Med.* 1999;131:927-34.

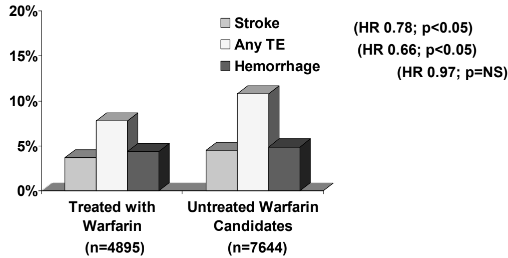
Underuse of Warfarin in AF Patients with a History of Stroke: International Meta-Analysis



Ogilvie IM et al. *Am J Med.* 2010; 123:638-45.

Preventable Thrombotic Events Due to Underuse of Warfarin in AF

N=12,539 managed care plan members with AF



Darkow T et al. *Curr Med Res Opin.* 2005; 21:1583-94.

Question

In your healthcare system, which of the following is the most prominent reason that AF patients at risk for stroke are not treated with warfarin?

A. Inconvenience of INR monitoring and follow-up

B. Bleeding risk higher than stroke prevention benefit

C. Patient reluctance/refusal to take warfarin

D. Patient noncompliance with follow-up

Barriers to Use of Warfarin in AF: Literature Review of Physician Surveys 1966-1998

Patient Barriers	**advanced age** **perceived low embolic risk** **perceived high hemorrhagic risk**
Physician Barriers	**individualized risk vs benefit analysis** **clinical uncertainty** **difficulty maintaining therapeutic INRs** **fear of litigation**
Health System Barriers	**inconvenience of monitoring** **lack of anticoagulation clinic support**

Bungard TJ et al. *Arch Intern Med.* 2000; 160:41-6.

2008 ACC/AHA/Physician Consortium Performance Measures for Atrial Fibrillation/Atrial Flutter

Performance Measure	Measure Description
Assessment of thromboembolic risk factors	Nonvalvular AF patients for whom assessment of thromboembolic risk factors is documented
Chronic anticoagulation therapy	Prescription of warfarin for all patients with any high-risk factor or more than 1 moderate risk factor
Monthly INR measurement	Frequency of monitoring of INR

Estes NA et al. *J Am Coll Cardiol. 2008*; 51:865-84.

Adherence to AF Performance Measures in Outpatient Medical Practices

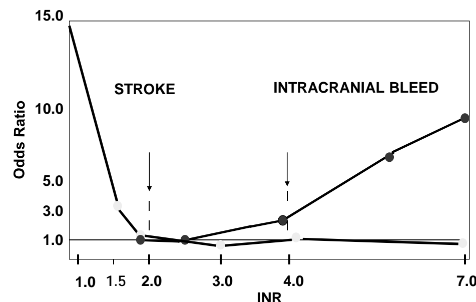
N= 2791 AF patients in 27 US practices enrolled in the ACC/NCDR PINNACLE Program

Performance Measure	Overall Compliance	Compliance in pts < 75	Compliance in pts ≥ 75	Age Group Analysis
Assessment of thromboembolic risk	73.6%	72.0%	75.1%	RR 1.00 p = 0.84
Warfarin prescribed for stroke prevention	79.2%	80.9%	78.4%	RR 0.96 p = 0.15

ACC: American College of Cardiology; NCDR: National Cardiovascular Data Registry; PINNACLE: Practice Innovation and Clinical Excellence

Chan PS et al. *J Am Coll Cardiol.* 2010; 56:8-14.

INR at Time of Adverse Event in Patients with AF Taking Warfarin



Hylek EM et al. *Ann Intern Med.* 1994; 120:897-902.
Hylek EM et al. *N Eng J Med.* 1996; 335:540-6.

Effect of Intensity of Oral Anticoagulation on Stroke Severity

N=596 pts with AF and ischemic stroke

	INR < 2	INR > 2
Fatal stroke	9%	1%
Severe (total dependence)	6%	4%
Major (not independent)	44%	38%
TOTAL	*59%*	*43%*
Minor (independent)	38%	55%
No neurologic sequelae	3%	2%
TOTAL	*41%*	*57%*

Hylek EM et al. *New Engl J Med.* 2003; 349:1019-26.

Causes of Over- and Undercoagulation

N = 12,897 INRs in 1020 ACC patients over 1 year

	INRs < 2 (n=2881; 22.3%)	INRs > 4 (n=603; 4.7%)
Dosing Issues[1]	55.2%	22.7%
Interactions[2]	15.1%	35%
No Explanation	29.7%	42.3%

1. initiation, withholding, noncompliance, dosing adjustments
2. Rx/OTC/herbal meds, diseases, diet, alcohol activity

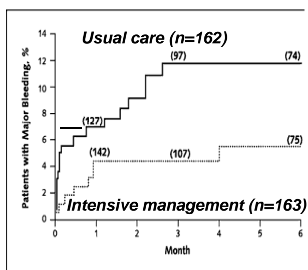
Wittkowsky AK, Devine EB. *Pharmacotherapy.* 2004; 24: 1311-6.

Effect of Anticoagulation Management on Risk of Bleeding in Elderly Patients

Mean age 75 years
Age range 65-94 years

Intensive management included:

- guideline-based consult to reduce bleeding risks
- protocol-based dosing
- routine assessment
- patient education
- self-monitoring (59%)



Beyth R et al. *Ann Intern Med.* 2000; 133:687-95.

Basic Patient Education

1. Why do I need to take a blood thinner, and for how long?
2. Why must I tell ALL of my doctors and other health care providers about ALL of the medicines, vitamins, and herbal supplements I am taking — including my blood thinning medicine?
3. How, if at all, should I change my diet now that I'm taking a blood thinner?
4. How often should I get my blood tested and what should my PT/INR number be?
5. What signs or symptoms should prompt me to seek further care?

www.mybloodthinner.org

Anticoagulation Management Services

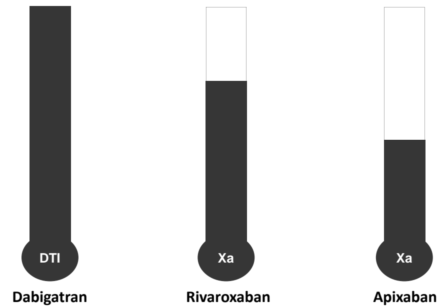
- Systematic, organized management of anticoagulation
- Improved dosage regulation
- *Continuous patient education*
- Early identification of potential risk factors for thromboembolic and hemorrhagic complications
- Timely, appropriate intervention to prevent or minimize complications

Emerging Antithrombotic Therapies

Warfarin Alternatives in the Pipeline

- Direct thrombin inhibitors
  - Dabigatran – FDA approval on October 19, 2010
- Factor Xa inhibitors
  - Rivaroxaban
  - Apixaban
  - Idraparinux
  - Betrixaban
  - Edoxaban
  - Idrabiotaparinux

On The Horizon



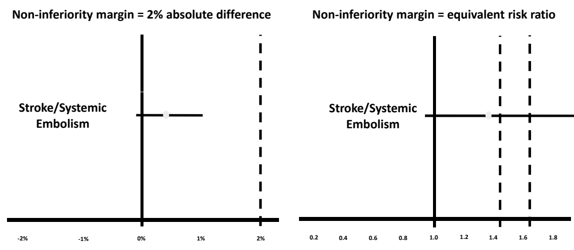
Oral Direct Thrombin Inhibitors

SPORTIF V: Learning From Past Mistakes?

ALT > 3 x ULN: 6% (ximelagatran) vs. 0.8% (warfarin) (p<0.0001)

Non-inferiority margin = 2% absolute difference

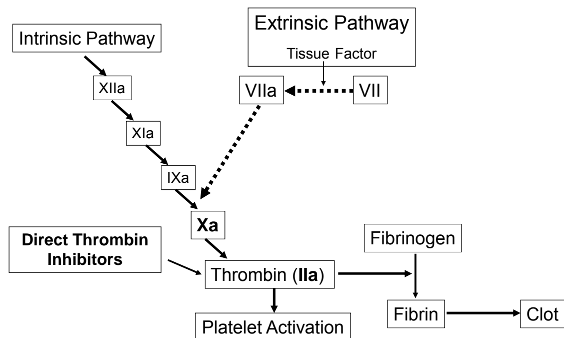
Non-inferiority margin = equivalent risk ratio



RISK >> BENEFIT

Kaul S et al. *J Am Coll Cardiol.* 2005;46:1986-95.

COAGULATION CASCADE



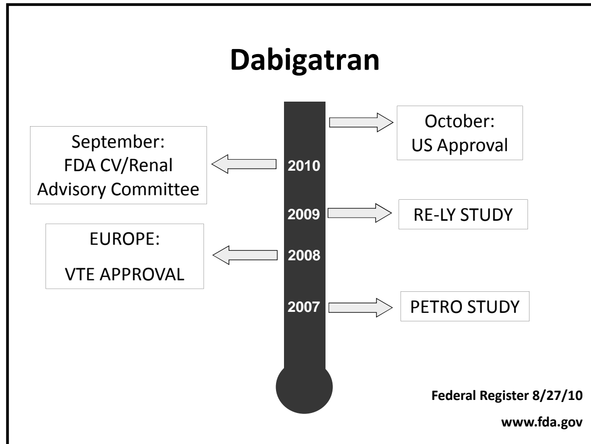
Pharmacologic Properties

	Dabigatran
Size	628 Daltons
T ½	12 – 14 hours
Elimination	80% renal excretion unchanged
Renal dose adjustment	30 – 50 mL/min, contraindicated <30 mL/min
Prolonged coagulation markers	Ecarin clotting time, thrombin time, INR, aPTT
Drug Interactions	Low potential for CYP450 PGP substrate

PGP = P-glycoprotein

Wittkowsky AK. *J Thromb Thrombolysis.* 2010;29:182-91.

Dabigatran



Federal Register 8/27/10

www.fda.gov

RE-LY: Non-Inferiority, Phase III

- Randomized, partial double-blind
  - Dabigatran 110 mg po BID
  - Dabigatran 150 mg po BID
  - Warfarin (INR: 2 – 3)
- Included
  - Non-valvular AF with $CHADS_2 \geq 1$ or CAD
- Excluded
  - Severe valve, renal or liver disease; recent stroke; high risk for bleeding

Connolly SJ et al. *N Engl J Med.* 2009;361:1139-51.

RE-LY: Outcomes

<u>Primary Outcome</u>

- Stroke or systemic embolism

<u>Primary Safety Outcome</u>

- Major hemorrhage
  - Hgb ↓ by 2g/dL
  - Transfusion of 2 units
  - Critical symptomatic bleeding

<u>Follow-up</u>

- Median = 2 years

Connolly SJ et al. *N Engl J Med.* 2009;361:1139-51.

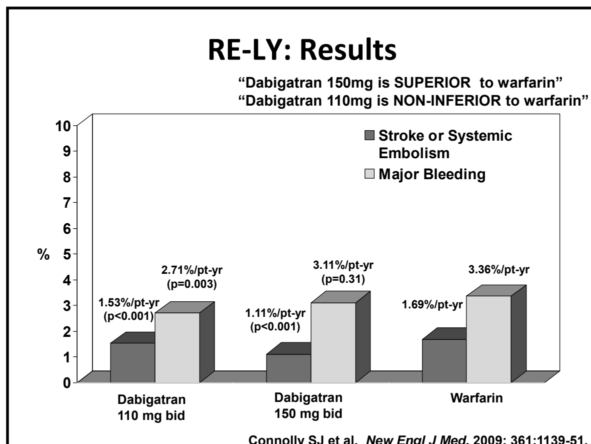
RE-LY: Key Patient Characteristics

	Dabigatran 110 mg (n = 6015)	Dabigatran 150 mg (n = 6076)	Warfarin* (n = 6022)
Age (years)	71.4 ± 8.6	71.5 ± 8.8	71.6 ± 8.6
$CHADS_2$ Score	**Mean $CHADS_2$ ~ 2.1**		
0 – 1	32.6%	32.2%	30.9%
2	34.7%	35.2%	37.0%
3 – 6	32.7%	32.6%	32.1%
ASA use at baseline	40.0%	38.7%	40.6%
ASA use throughout	21.1%	19.6%	20.8%
History of VKA use	50.1%	50.2%	48.6%

*Warfarin time-in-range = 64%

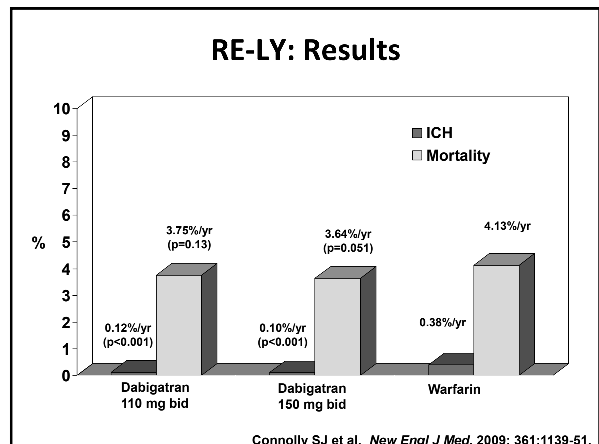
Connolly SJ et al. *N Engl J Med.* 2009;361:1139-51.

RE-LY: Results



Connolly SJ et al. *New Engl J Med.* 2009; 361:1139-51.

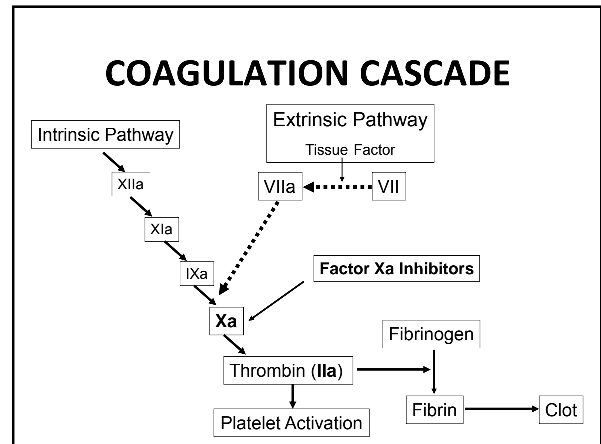
RE-LY: Results



Connolly SJ et al. *New Engl J Med.* 2009; 361:1139-51.

Factor Xa Inhibitors

COAGULATION CASCADE



Pharmacologic Properties

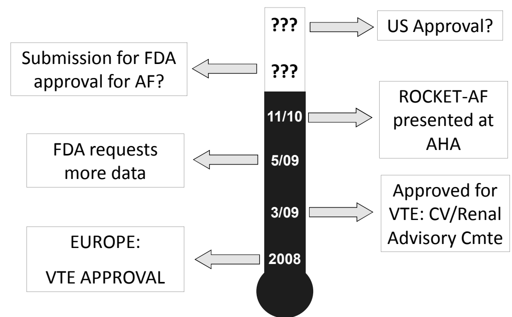
	Rivaroxaban	Apixaban
Size	436 Daltons	460 Daltons
T ½	5 – 9 hrs	8 – 15 hrs
Elimination	36% renal	25% renal
Renal dose adjustment	Caution < 30 mL/min NR < 15 mL/min	Not required
Prolonged coagulation markers	Prothrombin time, Factor Xa inhibition	Factor Xa inhibition
Drug Interactions	CYP3A4 substrate PGP substrate	CYP3A4 substrate

PGP = P-glycoprotein

NR = not recommended

Wittkowsky AK. *J Thromb Thrombolysis.* 2010;29:182-91.

Rivaroxaban



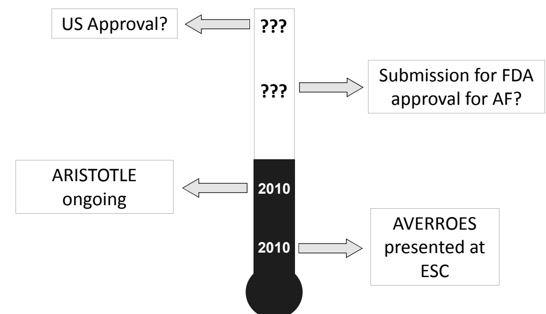
www.theheart.org 5/29/2009

ROCKET – AF

Design	Randomized, Double-blind, Double-dummy, Non-inferiority
Patients	Non-valvular AF, $CHADS_2$ score $\geq$ 2 (90% will have a score $\geq$ 3).
Treatments	Rivaroxaban 20 mg daily + warfarin placebo Warfarin (INR = 2 – 3) + rivaroxaban placebo
Endpoints	1° Efficacy = Stroke or systemic embolism 1° Safety = Major bleeding (clinically relevant non major included)

ROCKET AF Study Investigators. *Am Heart J.* 2010;159:340-7.

Apixaban



www.theheart.org 8/31/10

Apixaban: AVERROES

Design	Randomized, double-blind
Patients	Atrial fibrillation, $CHADS_2$ score $\geq$ 1 Not candidates for warfarin
Treatments	Apixaban 5 mg BID Aspirin 81 – 325 mg daily
Endpoints	1° Efficacy = Stroke or systemic embolism 1° Safety = Major bleeding (clinically relevant not included)

Eikelboom J et al. *Am Heart J.* 2010;159:348-53.

Apixaban: AVERROES

- Study stopped early (n = 8391)
  - Significant efficacy benefit with apixaban
- Stroke/Systemic Embolism
  - Apixaban: 1.6%
  - Aspirin: 3.6%

  $p < 0.001$
- Major Bleeding
  - Apixaban: 1.4%
  - Aspirin: 1.2%

  $p = 0.33$

www.theheart.org 8/31/10
Connolly S et al. European Society of Cardiology. August 29, 2010.

Other Factor Xa Antagonist Trials

All with active warfarin (INR 2 – 3) comparator

Apixaban
- ARISTOTLE: In progress (results expected April, 2011)

Betrixaban (Oral, daily)
- EXPLORE Xa: Complete, dose ranging

Edoxaban (Oral, daily)
- ENGAGE AF TIMI 48: Enrolling

Idraparinux (SC injection, weekly)
- AMADEUS: Stopped early, excessive bleeding risk

Idrabiotaparinux (SC injection, weekly)
- BOREALIS AF: In progress

www.ClinicalTrials.gov
Alexander W. *P & T.* 2010;35:291-4.
The AMADEUS Investigators. *Lancet.* 2008;371:315-21.

Conclusion

- Stroke is a potentially devastating complication of AF
- Performing stroke risk stratification is essential in all patients with AF
  - Used to determine appropriate antithrombotic therapy
- Evidence-based guidelines do not assure that patients receive appropriate treatment
- Patients on oral anticoagulant therapy require *continuous* education, monitoring, and management
- An alternative to warfarin (dabigatran) has recently been approved (and others may be on the way) that may offer
  - Better efficacy and/or safety
  - Improved convenience

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Considerations for the Prevention of Stroke in Patients with Atrial Fibrillation

SELF–ASSESSMENT QUESTIONS

1. Which of the following statements regarding the prevalence of atrial fibrillation is CORRECT?

   a. It is greater in men than in women regardless of age.
   b. It is greater in blacks than in whites.
   c. It decreases with age.
   d. It is likely to decrease by 3-fold by the year 2050.

2. Development of a stroke in patients with atrial fibrillation is associated with an increased risk of mortality.

   a. True
   b. False

3. In most outpatient settings, less than 60% of patients with atrial fibrillation receive appropriate stroke prevention therapy with warfarin

   a. True
   b. False

4. Stroke severity and stroke-related mortality are higher in patients on warfarin whose INR values at the time of presentation are greater than 2.0

   a. True
   b. False

5. Most of the emerging alternatives for warfarin will be from which class of agents?

   a. Factor VII antagonists
   b. Factor Xa inhibitors
   c. Indirect thrombin inhibitors
   d. Vitamin K antagonists

Answers

1. a
2. a
3. a
4. b
5. b

Considerations for the Prevention of Stroke in Patients with Atrial Fibrillation

Activity Evaluation Form

November 9, 2010 **James S. Kalus, Pharm.D., BCPS (AQ-Cardiology)** ***Chapel Hill, NC***

ASHP Advantage appreciates your participation in this educational activity and values your feedback. Please complete this brief evaluation form to assist us in improving the quality of future educational activities.

1 = strongly disagree 2 = disagree 3 = neither agree nor disagree 4 = agree 5 = strongly agree

Evaluation of Educational Objectives

After attending this knowledge-based CPE activity, I am able to	**Strongly Disagree**				**Strongly Agree**
1. Explain how to incorporate clinical guidelines and performance measures on the prevention of stroke in the treatment of patients with AF.	1	2	3	4	5
2. Identify barriers to improving the management of atrial fibrillation, specifically stroke prevention, and describe potential pharmacist-driven solutions.	1	2	3	4	5
3. Describe emerging medications and combination therapy for stroke prevention in AF.	1	2	3	4	5

Evaluation Content — **Strongly Disagree** … **Strongly Agree**

1. The content presented was relevant to the target audience……………………………..1 2 3 4 5
2. I will be able to apply the knowledge skills I learned ……………………………………..1 2 3 4 5
3. The activity fulfilled my education needs ……………………………………………………..1 2 3 4 5
4. The activity enhanced my ability to apply learning objectives to my practice …………1 2 3 4 5
5. Based on my previous knowledge and experience, the content level of the activity for attending audience was:
   ☐ Too basic ☐ Appropriate ☐ Too Complex

Faculty/Instructional Materials — **Strongly Disagree** … **Strongly Agree**

6. The teaching methods were effective…………………………………………………………1 2 3 4 5
7. The instructional materials were effective ……………………………………………………1 2 3 4 5

Continue on next page ⟶

Considerations for the Prevention of Stroke in Patients with Atrial Fibrillation

Faculty/Instructional Materials *(continued)*

8. Please indicate the extent to which you agree or disagree with the following statement: "Faculty statements and therapeutic recommendations in this activity were based on supported evidence or professional opinion and did **NOT** evidence commercial bias."

   ☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree

9. If you answered **strongly disagree or disagree** to question 8, what commercial bias did you perceive in this activity?
   ____

10. What did you find to be the most helpful aspect of this activity?
    ____
    ____

11. What was the least helpful aspect of this activity?
    ____
    ____

12. List ONE (and no more than three) changes that you intend to make in your practice as a result of this activity.
    ____
    ____

13. How confident are you that you will be able to apply these changes in your practice?
    a. Very confident
    b. Somewhat confident
    c. Not confident

14. Please indicate any barriers you perceive to implementing these changes.
    a. Cost
    b. Lack of experience
    c. Lack of resources
    d. Lack of administrative support
    e. Other, please specify:____
    ____

15. What question(s) do you still have about this topic?
    ____

16. Based on your educational needs, list any topics you would like to see addressed in future educational activities.
    ____

17. Other comments or suggested improvements:
    ____
    ____

18. Using the following scale, in the table below rate presentation skills, content knowledge, degree of balance, objectivity, and scientific rigor of faculty:

1 = very poor 2 = poor 3 = average 4 = above average 5 = excellent

	Presentation Skills	Knowledge of Content	Degree of Balance, Objectivity, & Scientific Rigor
James S. Kalus, Pharm.D., BCPS (AQ-Cardiology)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5