HIGHLIGHTS OF PRESCRIBING INFORMATION
These highlights do not include all the information needed to use PRADAXA safely and effectively. See full prescribing information for PRADAXA.

PRADAXA® (dabigatran etexilate mesylate) capsules for oral use
Initial U.S. Approval: 2010

RECENT MAJOR CHANGES
Dosage and Administration (2.2, 2.4, 2.6) 1/2012
Warnings and Precautions (5.1, 5.2, 5.3) 1/2012

INDICATIONS AND USAGE
PRADAXA is a direct thrombin inhibitor indicated to reduce the risk of stroke and systemic embolism in patients with non-valvular atrial fibrillation (1)

DOSE AND ADMINISTRATION
• For patients with CrCl >30 mL/min: 150 mg orally, twice daily (2.1)
• For patients with CrCl 15-30 mL/min: 75 mg orally, twice daily (2.1)
• Assess renal function during therapy as clinically indicated and adjust therapy accordingly (2.2)
• Instruct patients not to chew, break, or open capsules (2.3)
• Review recommendations for converting to or from other oral or parenteral anticoagulants (2.4, 2.5)
• Temporarily discontinue PRADAXA before invasive or surgical procedures when possible, then restart promptly (2.6)

DOSE FORMS AND STRENGTHS
Capsules: 75 mg and 150 mg (3)

CONTRAINDICATIONS
• Active pathological bleeding (4)
• History of serious hypersensitivity reaction to PRADAXA (4)

WARNINGS AND PRECAUTIONS
• Risk of bleeding: PRADAXA can cause serious and, sometimes, fatal bleeding. Promptly evaluate signs and symptoms of blood loss. (5.1)
• Temporary discontinuation: Avoid lapses in therapy to minimize risk of stroke (5.2)
• P-gp inducers and inhibitors: Effects on dabigatran exposure (5.3)

ADVERSE REACTIONS
Most common adverse reactions (>15%) are gastritis-like symptoms and bleeding (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact Boehringer Ingelheim Pharmaceuticals, Inc. at (800) 542-6257 or (800) 459-9906 TTY or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS
• P-gp inducers rifampin: Avoid coadministration with PRADAXA (5.3)
• P-gp inhibitors dronedarone and systemic ketoconazole in patients with moderate renal impairment (CrCl 30-50 mL/min): Consider reducing PRADAXA dose to 75 mg twice daily (7)
• P-gp inhibitors in patients with severe renal impairment (CrCl <30 mL/min): PRADAXA use not recommended (7)

USE IN SPECIFIC POPULATIONS
Geriatric use: Risk of bleeding increases with age (8.5)

See 17 for PATIENT COUNSELING INFORMATION and Medication Guide.

Revised: 04/2012

FULL PRESCRIBING INFORMATION: CONTENTS*

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*Sections or subsections omitted from the full prescribing information are not listed.
1 INDICATIONS AND USAGE
PRADAXA is indicated to reduce the risk of stroke and systemic embolism in patients with non-valvular atrial fibrillation.

2 DOSAGE AND ADMINISTRATION
2.1 Recommended Dose
For patients with creatinine clearance (CrCl) >30 mL/min, the recommended dose of PRADAXA is 150 mg taken orally, twice daily, with or without food. For patients with severe renal impairment (CrCl 15-30 mL/min), the recommended dose of PRADAXA is 75 mg twice daily [see Use in Specific Populations (8.6) and Clinical Pharmacology (12.3)]. Dosing recommendations for patients with a CrCl <15 mL/min or on dialysis cannot be provided.

2.2 Dosing Adjustments
Assess renal function prior to initiation of treatment with PRADAXA. Periodically assess renal function as clinically indicated (i.e., more frequently in clinical situations that may be associated with a decline in renal function) and adjust therapy accordingly. Discontinue PRADAXA in patients who develop acute renal failure while on PRADAXA and consider alternative anticoagulant therapy.

In patients with moderate renal impairment (CrCl 30-50 mL/min), concomitant use of the P-gp inhibitor dronedarone or systemic ketoconazole can be expected to produce dabigatran exposure similar to that observed in severe renal impairment. Consider reducing the dose of PRADAXA to 75 mg twice daily [see Drug Interactions (7) and Clinical Pharmacology (12.3)].

Generally, the extent of anticoagulation does not need to be assessed. When necessary, use aPTT or ECT, and not INR, to assess for anticoagulant activity in patients on PRADAXA [see Warnings and Precautions (5.1) and Clinical Pharmacology (12.2)].

2.3 Instructions to Patients
Instruct patients to swallow the capsules whole. Breaking, chewing, or emptying the contents of the capsule can result in increased exposure [see Clinical Pharmacology (12.3)].

If a dose of PRADAXA is not taken at the scheduled time, the dose should be taken as soon as possible on the same day; the missed dose should be skipped if it cannot be taken at least 6 hours before the next scheduled dose. The dose of PRADAXA should not be doubled to make up for a missed dose.

2.4 Converting from or to Warfarin
When converting patients from warfarin therapy to PRADAXA, discontinue warfarin and start PRADAXA when the INR is below 2.0.

When converting from PRADAXA to warfarin, adjust the starting time of warfarin based on creatinine clearance as follows:
- For CrCl ≥50 mL/min, start warfarin 3 days before discontinuing PRADAXA.
- For CrCl 30-50 mL/min, start warfarin 2 days before discontinuing PRADAXA.
- For CrCl 15-30 mL/min, start warfarin 1 day before discontinuing PRADAXA.
- For CrCl <15 mL/min, no recommendations can be made.

Because PRADAXA can increase INR, the INR will better reflect warfarin’s effect only after PRADAXA has been stopped for at least 2 days [see Clinical Pharmacology (12.2)].

2.5 Converting from or to Parenteral Anticoagulants
For patients currently receiving a parenteral anticoagulant, start PRADAXA 0 to 2 hours before the time that the next dose of the parenteral drug was to have been administered or at the time of discontinuation of a continuously administered parenteral drug (e.g., intravenous unfractionated heparin).

For patients currently taking PRADAXA, wait 12 hours (CrCl ≥30 mL/min) or 24 hours (CrCl <30 mL/min) after the last dose of PRADAXA before initiating treatment with a parenteral anticoagulant [see Clinical Pharmacology (12.3)].

2.6 Surgery and Interventions
If possible, discontinue PRADAXA 1 to 2 days (CrCl ≥50 mL/min) or 3 to 5 days (CrCl <50 mL/min) before invasive or surgical procedures because of the increased risk of bleeding. Consider longer times for patients undergoing major surgery, spinal puncture, or placement of a spinal or epidural catheter or port, in whom complete hemostasis may be required [see Use in Specific Populations (8.6) and Clinical Pharmacology (12.3)].

If surgery cannot be delayed, there is an increased risk of bleeding [see Warnings and Precautions (5.1)]. This risk of bleeding should be weighed against the urgency of intervention [see Warnings and Precautions (5.2)].

3 DOSAGE FORMS AND STRENGTHS
150 mg capsules with a light blue opaque cap imprinted in black with the Boehringer Ingelheim company symbol and a cream-colored opaque body imprinted in black with “R150”.

75 mg capsules with a cream-colored opaque cap imprinted in black with the Boehringer Ingelheim company symbol and a cream-colored opaque body imprinted in black with “R75”.

4 CONTRAINDICATIONS
PRADAXA is contraindicated in patients with:
- Active pathological bleeding [see Warnings and Precautions (5.1) and Adverse Reactions (6.1)].
- History of a serious hypersensitivity reaction to PRADAXA (e.g., anaphylactic reaction or anaphylactic shock) [see Adverse Reactions (6.1)].

5 WARNINGS AND PRECAUTIONS
5.1 Risk of Bleeding

Reference ID: 3123051
PRADAXA increases the risk of bleeding and can cause significant and, sometimes, fatal bleeding. Promptly evaluate any signs or symptoms of blood loss (e.g., a drop in hemoglobin and/or hematocrit or hypotension). Discontinue PRADAXA in patients with active pathological bleeding [see Dosage and Administration (2.2)].

Risk factors for bleeding include the use of other drugs that increase the risk of bleeding (e.g., anti-platelet agents, heparin, fibrinolytic therapy, and chronic use of NSAIDs). PRADAXA’s anticoagulant activity and half-life are increased in patients with renal impairment [see Clinical Pharmacology (12.2)].

A specific reversal agent for dabigatran is not available. Dabigatran can be diazylized (protein binding is low, with the removal of about 60% of drug over 2-3 hours); however the amount of data supporting this approach is limited. Activated prothrombin complex concentrates (aPCCs, e.g., FEIBA), or recombinant Factor VIIa, or concentrates of coagulation factors II, IX or X may be considered but their use has not been evaluated in clinical trials. Protamine sulfate and vitamin K are not expected to affect the anticoagulant activity of dabigatran. Consider administration of platelet concentrates in cases where thrombocytopenia is present or long-acting antiplatelet drugs have been used.

5.2 Temporary Discontinuation of PRADAXA
Discontinuing anticoagulants, including PRADAXA, for active bleeding, elective surgery, or invasive procedures, places patients at an increased risk of stroke. Minimize lapses in therapy.

5.3 Effect of P-gp Inducers and Inhibitors on Dabigatran Exposure
The concomitant use of PRADAXA with P-gp inducers (e.g. rifampin) reduces exposure to dabigatran and should generally be avoided [see Clinical Pharmacology (12.3)].

P-gp inhibition and impaired renal function are the major independent factors that result in increased exposure to dabigatran [see Clinical Pharmacology (12.3)]. Concomitant use of P-gp inhibitors in patients with renal impairment is expected to produce increased exposure of dabigatran compared to that seen with either factor alone.

Consider reducing the dose of PRADAXA to 75 mg twice daily when dronedarone or systemic ketoconazole is coadministered with PRADAXA in patients with moderate renal impairment (CrCl 30-50 mL/min). Avoid use of PRADAXA and P-gp inhibitors in patients with severe renal impairment (CrCl 15-30 mL/min) [see Drug Interactions (7) and Use in Specific Populations (8.6)].

6 ADVERSE REACTIONS
6.1 Clinical Trials Experience
Because clinical trials are conducted under widely varying conditions, adverse reactions rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The RE-LY (Randomized Evaluation of Long-term Anticoagulant Therapy) study provided safety information on the use of two doses of PRADAXA and warfarin [see Clinical Studies (14)]. The numbers of patients and their exposures are described in Table 1. Limited information is presented on the 110 mg dosing arm because this dose is not approved.

<table>
<thead>
<tr>
<th>Table 1 Summary of Treatment Exposure in RE-LY</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Total number treated</td>
</tr>
<tr>
<td>Exposure</td>
</tr>
<tr>
<td>&gt; 12 months</td>
</tr>
<tr>
<td>&gt; 24 months</td>
</tr>
<tr>
<td>Mean exposure (months)</td>
</tr>
<tr>
<td>Total patient-years</td>
</tr>
</tbody>
</table>

Drug Discontinuation in RE-LY
The rates of adverse reactions leading to treatment discontinuation were 21% for PRADAXA 150 mg and 16% for warfarin. The most frequent adverse reactions leading to discontinuation of PRADAXA were bleeding and gastrointestinal events (i.e., dyspepsia, nausea, upper abdominal pain, gastrointestinal hemorrhage, and diarrhea).

Bleeding [see Warnings and Precautions (5.1)]
Table 2 shows the number of patients experiencing serious bleeding during the treatment period in the RE-LY study, with the bleeding rate per 100 patient-years (%). Major bleeds fulfilled one or more of the following criteria: bleeding associated with a reduction in hemoglobin of at least 2 grams per deciliter or leading to a transfusion of at least 2 units of blood, or symptomatic bleeding in a critical area or organ (intraocular, intracranial, intraspinal or intramuscular with compartment syndrome, retroperitoneal bleeding, intra-articular bleeding, or pericardial bleeding). A life-threatening bleed met one or more of the following criteria: fatal, symptomatic intracranial bleed, reduction in hemoglobin of at least 5 grams per deciliter, transfusion of at least 4 units of blood, associated with hypotension requiring the use of intravenous inotropic agents, or necessitating surgical intervention. Intracranial hemorrhage included intracerebral (hemorrhagic stroke), subarachnoid, and subdural bleeds.

Reference ID: 3123051
Table 2  Bleeding Events* (per 100 Patient-Years)

<table>
<thead>
<tr>
<th></th>
<th>PRADAXA 150 mg twice daily</th>
<th>Warfarin</th>
<th>Hazard Ratio (95% CI**)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomized patients</td>
<td>6076</td>
<td>6022</td>
<td></td>
</tr>
<tr>
<td>Patient-years</td>
<td>12,033</td>
<td>11,794</td>
<td></td>
</tr>
<tr>
<td>Intracranial hemorrhage</td>
<td>38 (0.3)</td>
<td>90 (0.8)</td>
<td>0.41 (0.28, 0.60)</td>
</tr>
<tr>
<td>Life-threatening bleed</td>
<td>179 (1.5)</td>
<td>218 (1.9)</td>
<td>0.80 (0.66, 0.98)</td>
</tr>
<tr>
<td>Major bleed</td>
<td>399 (3.3)</td>
<td>421 (3.6)</td>
<td>0.93 (0.81, 1.07)</td>
</tr>
<tr>
<td>Any bleed</td>
<td>1993 (16.6)</td>
<td>2166 (18.4)</td>
<td>0.91 (0.85, 0.96)</td>
</tr>
</tbody>
</table>

*Patients contributed multiple events and events were counted in multiple categories.

The risk of major bleeds was similar with PRADAXA 150 mg and warfarin across major subgroups defined by baseline characteristics, with the exception of age, where there was a trend towards a higher incidence of major bleeding on PRADAXA (hazard ratio 1.2, 95% CI: 1.0 to 1.4) for patients ≥75 years of age.

There was a higher rate of major gastrointestinal bleeds in patients receiving PRADAXA 150 mg than in patients receiving warfarin (1.6% vs. 1.1%, respectively, with a hazard ratio vs. warfarin of 1.5, 95% CI 1.2 to 1.9), and a higher rate of any gastrointestinal bleeds (6.1% vs. 4.0%, respectively).

**Confidence interval

7 DRUG INTERACTIONS
The concomitant use of PRADAXA with P-gp inducers (e.g., rifampin) reduces exposure to dabigatran and should generally be avoided [see Clinical Pharmacology (12.3)].

P-gp inhibition and impaired renal function are the major independent factors that result in increased exposure to dabigatran [see Clinical Pharmacology (12.3)]. Concomitant use of P-gp inhibitors in patients with renal impairment is expected to produce increased exposure of dabigatran compared to that seen with either factor alone.

In patients with moderate renal impairment (CrCl 30-50 mL/min), consider reducing the dose of PRADAXA to 75 mg twice daily when administered concomitantly with the P-gp inhibitor dronedarone or systemic ketoconazole. The use of P-gp inhibitors (verapamil, amiodarone, quinidine, and clarithromycin) does not require a dose adjustment of PRADAXA. These results should not be extrapolated to other P-gp inhibitors [see Warnings and Precautions (5.3), Use in Specific Populations (8.6), and Clinical Pharmacology (12.3)].

The concomitant use of PRADAXA and P-gp inhibitors in patients with severe renal impairment (CrCl 15-30 mL/min) should be avoided [see Warnings and Precautions (5.3), Use in Specific Populations (8.6), and Clinical Pharmacology (12.3)].

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Category C
There are no adequate and well-controlled studies in pregnant women.

Dabigatran has been shown to decrease the number of implantations when male and female rats were treated at a dosage of 70 mg/kg (about 2.6 to 3.0 times the human exposure at maximum recommended human dose [MRHD] of 300 mg/day based on area under the curve [AUC] comparisons) prior to mating and up to implantation (gestation Day 6). Treatment of pregnant rats after implantation with dabigatran at the same dose increased the number of dead offspring and caused excess vaginal/uterine bleeding close to parturition. Although dabigatran increased the incidence of delayed or irregular ossification of fetal skull bones and vertebrae in the rat, it did not induce major malformations in rats or rabbits.

8.2 Labor and Delivery
Safety and effectiveness of PRADAXA during labor and delivery have not been studied in clinical trials. Consider the risks of bleeding and of stroke in using PRADAXA in this setting [see Warnings and Precautions (5.1)].

Death of offspring and mother rats during labor in association with uterine bleeding occurred during treatment of pregnant rats from implantation (gestation Day 7) to weaning (lactation Day 21) with dabigatran at a dose of 70 mg/kg (about 2.6 times the human exposure at MRHD of 300 mg/day based on AUC comparisons).

8.3 Nursing Mothers
It is not known whether dabigatran is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when PRADAXA is administered to a nursing woman.

8.4 Pediatric Use
Safety and effectiveness of PRADAXA in pediatric patients have not been established.
8.5 Geriatric Use
Of the total number of patients in the RE-LY study, 82% were 65 and over, while 40% were 75 and over. The risk of stroke and bleeding increases with age, but the risk-benefit profile is favorable in all age groups [see Warnings and Precautions (5), Adverse Reactions (6.1), and Clinical Studies (14)].

8.6 Renal Impairment
No dose adjustment of PRADAXA is recommended in patients with mild or moderate renal impairment [see Clinical Pharmacology (12.3)]. Reduce the dose of PRADAXA in patients with severe renal impairment (CrCl 15-30 mL/min) [see Dosage and Administration (2.1, 2.2) and Clinical Pharmacology (12.3)]. Dosing recommendations for patients with CrCl <15 mL/min or on dialysis cannot be provided.

Adjust dose appropriately in patients with renal impairment receiving concomitant P-gp inhibitors [see Warnings and Precautions (5.3), Drug Interactions (7), and Clinical Pharmacology (12.3)].

10 OVERDOSAGE
Accidental overdose may lead to hemorrhagic complications. There is no reversal agent for dabigatran. In the event of hemorrhagic complications, initiate appropriate clinical support, discontinue treatment with PRADAXA, and investigate the source of bleeding. Dabigatran is primarily excreted in the urine and shows low plasma protein binding. Therefore, dabigatran can be dialyzed with the removal of about 60% of drug over 2 to 3 hours; however, data supporting this approach are limited. Measurement of aPTT or ECT may help guide therapy [see Warnings and Precautions (5.1) and Clinical Pharmacology (12.2)].

11 DESCRIPTION
The chemical name for dabigatran etexilate mesylate, a direct thrombin inhibitor, is β-Alanine, N-[[2-[[4-[[[hexyloxy]carbonyl]amino]iminomethyl]phenyl]amino]methyl]-1-methyl-1H-benzimidazol-5-yl]carbonyl]-N-2-pyridinyl-ethyl ester, methanesulfonate. The empirical formula is C₃₄H₄₁N₇O₅·CH₄O₃S and the molecular weight is 723.86 (mesylate salt), 627.75 (free base). The structural formula is:

![Structural formula of dabigatran etexilate mesylate](image)

Dabigatran etexilate mesylate is a yellow-white to yellow powder. A saturated solution in pure water has a solubility of 1.8 mg/mL. It is freely soluble in methanol, slightly soluble in ethanol, and sparingly soluble in isopropanol.

The 150 mg capsule for oral administration contains 172.95 mg dabigatran etexilate mesylate, which is equivalent to 150 mg of dabigatran etexilate, and the following inactive ingredients: acacia, dimethicone, hypromellose, hydroxypropyl cellulose, talc, and tartaric acid. The capsule shell is composed of carrageenan, FD&C Blue No. 2 (150 mg only), FD&C Yellow No. 6, hypromellose, potassium chloride, titanium dioxide, and black edible ink. The 75 mg capsule contains 86.48 mg dabigatran etexilate mesylate, equivalent to 75 mg dabigatran etexilate, and is otherwise similar to the 150 mg capsule.

12 CLINICAL PHARMACOLOGY
12.1 Mechanism of Action
Dabigatran and its acyl glucuronides are competitive, direct thrombin inhibitors. Because thrombin (serine protease) enables the conversion of fibrinogen into fibrin during the coagulation cascade, its inhibition prevents the development of a thrombus. Both free and clot-bound thrombin, and thrombin-induced platelet aggregation are inhibited by the active moieties.

12.2 Pharmacodynamics
At recommended therapeutic doses, dabigatran etexilate prolongs the coagulation markers such as aPTT, ECT, and TT. INR is relatively insensitive to the exposure to dabigatran and cannot be interpreted the same way as used for warfarin monitoring.

The aPTT test provides an approximation of PRADAXA’s anticoagulant effect. The average time course for effects on aPTT, following approved dosing regimens in patients with various degrees of renal impairment is shown in Figure 1. The curves represent mean levels without confidence intervals; variations should be expected when measuring aPTT. While advice cannot be provided on the level of recovery of aPTT needed in any particular clinical setting, the curves can be used to estimate the time to get to a particular level of recovery, even when the time since the last dose of PRADAXA is not precisely known. In the RE-LY trial, the median (10th to 90th percentile) trough aPTT in patients receiving the 150 mg dose was 52 (40 to 76) seconds.
Figure 1  Average Time Course for Effects of Dabigatran on aPTT, Following Approved PRADAXA Dosing Regimens in Patients with Various Degrees of Renal Impairment*

*Simulations based on PK data from a study in subjects with renal impairment and PK/aPTT relationships derived from the RE-LY study; aPTT prolongation in RE-LY was measured centrally in citrate plasma using PTT Reagent Roche Diagnostics GmbH, Mannheim, Germany. There may be quantitative differences between various established methods for aPTT assessment.

The degree of anticoagulant activity can also be assessed by the ecarin clotting time (ECT). This test is a more specific measure of the effect of dabigatran than activated partial thromboplastin time (aPTT). In the RE-LY trial, the median (10th to 90th percentile) trough ECT in patients receiving the 150 mg dose was 63 (44 to 103) seconds.

Cardiac Electrophysiology
No prolongation of the QTc interval was observed with dabigatran etexilate at doses up to 600 mg.

12.3 Pharmacokinetics
Dabigatran etexilate mesylate is absorbed as the dabigatran etexilate ester. The ester is then hydrolyzed, forming dabigatran, the active moiety. Dabigatran is metabolized to four different acyl glucuronides and both the glucuronides and dabigatran have similar pharmacological activity. Pharmacokinetics described here refer to the sum of dabigatran and its glucuronides. Dabigatran displays dose-proportional pharmacokinetics in healthy subjects and patients in the range of doses from 10 to 400 mg.

Absorption
The absolute bioavailability of dabigatran following oral administration of dabigatran etexilate is approximately 3 to 7%. Dabigatran etexilate is a substrate of the efflux transporter P-gp. After oral administration of dabigatran etexilate in healthy volunteers, Cmax occurs at 1 hour post-administration in the fasted state. Coadministration of PRADAXA with a high-fat meal delays the time to Cmax by approximately 2 hours but has no effect on the bioavailability of dabigatran; PRADAXA may be administered with or without food.

The oral bioavailability of dabigatran etexilate increases by 75% when the pellets are taken without the capsule shell compared to the intact capsule formulation. PRADAXA capsules should therefore not be broken, chewed, or opened before administration.

Distribution
Dabigatran is approximately 35% bound to human plasma proteins. The red blood cell to plasma partitioning of dabigatran measured as total radioactivity is less than 0.3. The volume of distribution of dabigatran is 50 to 70 L. Dabigatran pharmacokinetics are dose proportional after single doses of 10 to 400 mg. Given twice daily, dabigatran’s accumulation factor is approximately two.

Elimination
Dabigatran is eliminated primarily in the urine. Renal clearance of dabigatran is 80% of total clearance after intravenous administration. After oral administration of radiolabeled dabigatran, 7% of radioactivity is recovered in urine and 86% in feces. The half-life of dabigatran in healthy subjects is 12 to 17 hours.

Metabolism
After oral administration, dabigatran etexilate is converted to dabigatran. The cleavage of the dabigatran etexilate by esterase-catalyzed hydrolysis to the active principal dabigatran is the predominant metabolic reaction. Dabigatran is not a substrate, inhibitor, or inducer of CYP450 enzymes. Dabigatran is subject to conjugation forming pharmacologically active acyl glucuronides. Four positional isomers, 1-O, 2-O, 3-O, and 4-O-acylglucuronide exist, and each accounts for less than 10% of total dabigatran in plasma.

Renal Impairment
An open, parallel-group single-center study compared dabigatran pharmacokinetics in healthy subjects and patients with mild to moderate renal impairment receiving a single dose of PRADAXA 150 mg. Exposure to dabigatran increases with severity of renal function impairment (Table 3). Similar findings were observed in the RE-LY trial.
In studies with the P-gp inhibitors ketoconazole, amiodarone, verapamil, and quinidine, the time to peak, terminal half-life, and mean residence time of dabigatran were not affected. Any observed changes in Cmax and AUC are described below.

Impact of Dabigatran on Other Drugs

Enoxaparin:
Enoxaparin 40 mg given subcutaneously for 3 days with the last dose given 24 hours before a single dose of PRADAXA had no impact on the exposure to dabigatran. Enoxaparin's effect (aPTT, ECT, and TT) remained unchanged, and inhibition of platelet aggregation (IPA), a measurement of clopidogrel's effect, remained unchanged.

Diclofenac, Ranitidine, and Digoxin:
Dabigatran's effect (aPTT, ECT, and TT) remained unchanged, and inhibition of platelet aggregation (IPA), a measurement of clopidogrel's effect, remained unchanged.

Dabigatran did not meaningfully alter the pharmacokinetics of amiodarone, atorvastatin, clarithromycin, diclofenac, clopidogrel, digoxin, pantoprazole, or ranitidine.

In RE-LY, dabigatran plasma samples were also collected. The concomitant use of proton pump inhibitors, H2 antagonists, and digoxin did not appreciably change the trough concentration of dabigatran.

In clinical studies exploring CYP3A4, CYP2C9, P-gp and other pathways, dabigatran did not meaningfully alter the pharmacokinetics of amiodarone, atorvastatin, clarithromycin, diclofenac, clopidogrel, digoxin, pantoprazole, or ranitidine.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Dabigatran was not carcinogenic when administered by oral gavage to mice and rats for up to 2 years. The highest doses tested (200 mg/kg/day) in mice and rats were approximately 3.6 and 5 times, respectively, the human exposure at MRHD of 300 mg/day based on AUC comparisons.

Dabigatran was not mutagenic in in vitro tests, including bacterial reversion tests, mouse lymphoma assay and chromosomal aberration assay in human lymphocytes, and the in vivo micronucleus assay in rats.

In the rat fertility study with oral gavage doses of 15, 70, and 200 mg/kg, males were treated for 29 days prior to mating, during mating up to scheduled termination, and females were treated 15 days prior to mating through gestation Day 6. No adverse effects on male or female fertility were observed at 200 mg/kg or 9 to 12 times the highest human exposure at MRHD.

Reference ID: 3123051
human exposure at MRHD of 300 mg/day based on AUC comparisons. However, the number of implantations decreased in females receiving 70 mg/kg, or 3 times the human exposure at MRHD based on AUC comparisons.

14 CLINICAL STUDIES
The clinical evidence for the efficacy of PRADAXA was derived from RE-LY (Randomized Evaluation of Long-term Anticoagulant Therapy), a multi-center, multinational, randomized parallel group trial comparing two blinded doses of PRADAXA (110 mg twice daily and 150 mg twice daily) with open-label warfarin (dosed to target INR of 2 to 3) in patients with non-valvular, persistent, paroxysmal, or permanent atrial fibrillation and one or more of the following additional risk factors:

- Previous stroke, transient ischemic attack (TIA), or systemic embolism
- Left ventricular ejection fraction <40%
- Symptomatic heart failure; ≥ New York Heart Association Class 2
- Age ≥75 years
- Age ≥65 years and one of the following: diabetes mellitus, coronary artery disease (CAD), or hypertension

The primary objective of this study was to determine if PRADAXA was non-inferior to warfarin in reducing the occurrence of the composite endpoint, stroke (ischemic and hemorrhagic) and systemic embolism. The study was designed to ensure that PRADAXA preserved more than 50% of warfarin’s effect as established by previous randomized, placebo-controlled trials of warfarin in atrial fibrillation. Statistical superiority was also analyzed.

A total of 18,113 patients were randomized and followed for a median of 2 years. The patient’s mean age was 71.5 years and the mean CHADS2 score was 2.1. The patient population was 64% male, 70% Caucasian, 16% Asian, and 1% black. Twenty percent of patients had a history of a stroke or TIA and 50% were Vitamin K antagonist (VKA) naïve, defined as less than 2 months total lifetime exposure to a VKA. Thirty-two percent of the population had never been exposed to a VKA. Concomitant diseases of patients in this trial included hypertension 79%, diabetes 23%, and CAD 28%. At baseline, 40% of patients were on aspirin and 6% were on clopidogrel. For patients randomized to warfarin, the mean percentage of time in therapeutic range (INR 2 to 3) was 64%; the mean percentages of time INR measurements were greater than 4 or less than 1.5 were 2% and 5%, respectively.

Relative to warfarin and to PRADAXA 110 mg twice daily, PRADAXA 150 mg twice daily significantly reduced the primary composite endpoint of stroke and systemic embolism (see Table 4 and Figure 2).

Table 4 First Occurrence of Stroke or Systemic Embolism in the RE-LY Study

<table>
<thead>
<tr>
<th>Patients randomized</th>
<th>PRADAXA 150 mg twice daily</th>
<th>PRADAXA 110 mg twice daily</th>
<th>Warfarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>6676</td>
<td>6015</td>
<td>6022</td>
<td></td>
</tr>
<tr>
<td>Patients (%) with events</td>
<td>134 (2.2%)</td>
<td>183 (3%)</td>
<td>202 (3.4%)</td>
</tr>
<tr>
<td>Hazard ratio vs. warfarin (95% CI)</td>
<td>0.65 (0.52, 0.81)</td>
<td>0.90 (0.74, 1.10)</td>
<td></td>
</tr>
<tr>
<td>P-value for superiority</td>
<td>0.0001</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Hazard ratio vs. PRADAXA 110 mg (95% CI)</td>
<td>0.72 (0.58, 0.90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-value for superiority</td>
<td>0.004</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2 Kaplan-Meier Curve Estimate of Time to First Stroke or Systemic Embolism

Reference ID: 3123051
The contributions of the components of the composite endpoint, including stroke by subtype, are shown in Table 5. The treatment effect was primarily a reduction in stroke. PRADAXA 150 mg twice daily significantly reduced both ischemic and hemorrhagic strokes relative to warfarin.

### Table 5  Strokes and Systemic Embolism in the RE-LY Study

<table>
<thead>
<tr>
<th></th>
<th>PRADAXA 150 mg twice daily</th>
<th>Warfarin</th>
<th>Hazard ratio vs. warfarin (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patients randomized</strong></td>
<td>6076</td>
<td>6022</td>
<td></td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>122</td>
<td>186</td>
<td>0.64 (0.51, 0.81)</td>
</tr>
<tr>
<td>Ischemic stroke</td>
<td>103</td>
<td>134</td>
<td>0.75 (0.58, 0.97)</td>
</tr>
<tr>
<td>Hemorrhagic stroke</td>
<td>12</td>
<td>45</td>
<td>0.26 (0.14, 0.49)</td>
</tr>
<tr>
<td>Systemic embolism</td>
<td>13</td>
<td>21</td>
<td>0.61 (0.30, 1.21)</td>
</tr>
</tbody>
</table>

The efficacy of PRADAXA 150 mg twice daily was generally consistent across major subgroups (see Figure 3).

### Figure 3  Stroke and Systemic Embolism Hazard Ratios by Baseline Characteristics

Centers were ranked post hoc by the percentage of time that warfarin-treated patients were in therapeutic range (INR 2 to 3). Findings for stroke/systemic embolism, all-cause mortality, and major bleeds are shown for centers above and below the median level of INR control in Table 6. The benefits of PRADAXA 150 mg relative to warfarin were most apparent in patients enrolled at centers with INR control below the median.

Reference ID: 3123051
Table 6 Center INR Control in the RE-LY Study

<table>
<thead>
<tr>
<th></th>
<th>Centers with INR control below the median of 67%</th>
<th>Centers with INR control above the median of 67%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke/systemic embolism</td>
<td>0.57 (0.42, 0.76)</td>
<td>0.76 (0.55, 1.05)</td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>0.78 (0.66, 0.93)</td>
<td>1.01 (0.84, 1.23)</td>
</tr>
<tr>
<td>Major bleed</td>
<td>0.82 (0.68, 0.99)</td>
<td>1.08 (0.89, 1.31)</td>
</tr>
</tbody>
</table>

In RE-LY, a higher rate of clinical myocardial infarction was reported in patients who received PRADAXA (0.7 per 100 patient-years for 150 mg dose) than in those who received warfarin (0.6).

16 HOW SUPPLIED/STORAGE AND HANDLING

PRADAXA 75 mg capsules have a cream-colored opaque cap imprinted with the Boehringer Ingelheim company symbol and a cream-colored opaque body imprinted with “R75”. The color of the imprinting is black. The capsules are supplied in the packages listed:
- NDC 0597-0149-54 Unit of use bottle of 60 capsules
- NDC 0597-0149-60 Blister package containing 60 capsules (10 x 6 capsule blister cards)

PRADAXA 150 mg capsules have a light blue opaque cap imprinted with the Boehringer Ingelheim company symbol and a cream-colored opaque body imprinted with “R150”. The color of the imprinting is black. The capsules are supplied in the packages listed:
- NDC 0597-0135-54 Unit of use bottle of 60 capsules
- NDC 0597-0135-60 Blister package containing 60 capsules (10 x 6 capsule blister cards)

**Bottles**
Store at 25°C (77°F); excursions permitted to 15°-30°C (59°-86°F). Once opened, the product must be used within 4 months. Keep the bottle tightly closed. Store in the original package to protect from moisture.

**Blisters**
Store at 25°C (77°F); excursions permitted to 15°-30°C (59°-86°F). Store in the original package to protect from moisture.

Keep out of the reach of children.

17 PATIENT COUNSELING INFORMATION

See FDA-approved patient labeling (Medication Guide)

17.1 Instructions for Patients
- Tell patients to take PRADAXA exactly as prescribed.
- Remind patients not to discontinue PRADAXA without talking to the health care provider who prescribed it.
- Keep PRADAXA in the original bottle to protect from moisture. Do not put PRADAXA in pill boxes or pill organizers.
- When more than one bottle is dispensed to the patient, instruct them to open only one bottle at a time.
- Instruct patient to remove only one capsule from the opened bottle at the time of use. The bottle should be immediately and tightly closed.
- Advise patients not to chew or break the capsules before swallowing them and not to open the capsules and take the pellets alone.

17.2 Bleeding
Inform patients that they may bleed more easily, may bleed longer, and should call their health care provider for any signs or symptoms of bleeding.

Instruct patients to seek emergency care right away if they have any of the following, which may be a sign or symptom of serious bleeding:
- Unusual bruising (bruises that appear without known cause or that get bigger)
- Pink or brown urine
- Red or black, tarry stools
- Coughing up blood
- Vomiting blood, or vomit that looks like coffee grounds

Instruct patients to call their health care provider or to get prompt medical attention if they experience any signs or symptoms of bleeding:
- Pain, swelling or discomfort in a joint
- Headaches, dizziness, or weakness
- Recurring nose bleeds
- Unusual bleeding from gums
- Bleeding from a cut that takes a long time to stop
- Menstrual bleeding or vaginal bleeding that is heavier than normal

17.3 Gastrointestinal Adverse Reactions
Instruct patients to call their health care provider if they experience any signs or symptoms of dyspepsia or gastritis:
- Dyspepsia (upset stomach), burning, or nausea
- Abdominal pain or discomfort
- Epigastric discomfort, GERD (gastric indigestion)

17.4 Invasive or Surgical Procedures
Instruct patients to inform their health care provider that they are taking PRADAXA before any invasive procedure (including dental procedures) is scheduled.

17.5 Concomitant Medications
Ask patients to list all prescription medications, over-the-counter medications, or dietary supplements they are taking or plan to take so their health care provider knows about other treatments that may affect bleeding risk (e.g., aspirin or NSAIDs) or dabigatran exposure (e.g., dronedarone or systemic ketoconazole).